Nomination Dossier

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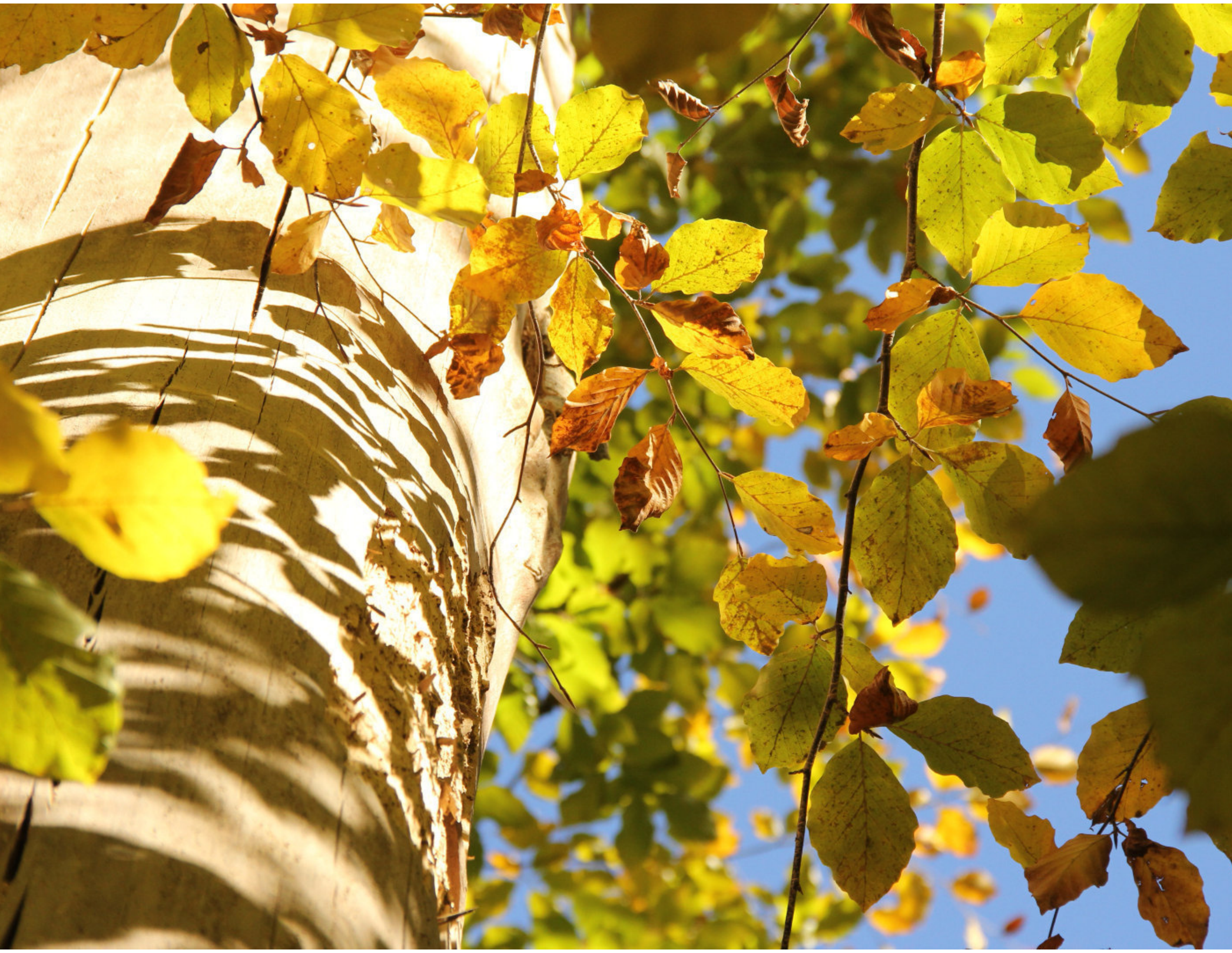
"Primeval Beech Forests of the Carpathians and Other Regions of Europe" as extension to the existing Natural World Heritage Site "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany" (1133bis)



Nomination Dossier to the UNESCO for the Inscription on the World Heritage List

NOMINATION DOSSIER

to the UNESCO
for the Inscription on the World Heritage List

"Primeval Beech Forests of the Carpathians and Other Regions of Europe"
as extension to the existing Natural World Heritage Site
"Primeval Beech Forests of the Carpathians and
the Ancient Beech Forests of Germany" (1133bis)

IMPRINT

Applicant body

Bearer of the nomination: Republic of Austria
11 State Parties participating (in alphabetical order): Republic of Albania, Republic of Austria, Kingdom of Belgium, Republic of Bulgaria, Republic of Croatia, Republic of Italy, Republic of Poland, Romania, Republic of Slovenia, Kingdom of Spain and, Ukraine

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Date

January 2016

PREAMBLE

The State Parties of Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Poland, Slovenia, Spain, Romania and Ukraine are glad to submit 67 component parts for inscription into the World Heritage List to extend the “Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany” (1133bis). The extended World Heritage property is proposed to carry the joint new name: “Primeval Beech Forests of the Carpathians and Other Regions of Europe”.

European beech forests are a unique natural heritage and a purely European phenomenon. Europe‘s natural beech forests have been pushed back and today are limited to a few regions. We take great pride in the nomination, for it reflects the decades-long efforts undertaken in whole of Europe to protect and preserve these outstanding old-growth beech stands. After the inscription of the World Heritage Site “Primeval Beech Forests of the Carpathians” in 2007 and its extension “Ancient Beech Forests of Germany” in 2011, the World Heritage Committee recommended starting a process in order to include further European Beech Forests in the existing property. With the present extension nomination, all Beech Forest Regions in Europe are displayed with at least one component part, therefore the whole spectrum of the European beech forests can be unified in one World Heritage Site.

As a whole, eleven State Parties propose 67 component parts as contribution to the Serial World Heritage property: Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Poland, Romania, Slovenia, Spain and Ukraine.

The nomination does fill us with joy also because the endeavor to nominate 67 component parts in eleven different State Parties with the support of our German, Slovakian and Ukrainian partners was crowned with success. The path to success was paved, on the one hand, by the political resolve that the governments involved have demonstrated and, on the other hand, by the acceptance of residents and all protagonists on location. Implementing an extension nomination of the kind required plenty of coordination with all involved parties at the local, regional, national and transnational level.

The present nomination is based on the nomination dossier of the German extension, which was kindly made available to us from the German Federal Agency for Nature Conservation (BfN). All participants in the present extension like to express their deep gratitude to Germany, Slovak Republic and Ukraine for their involvement in the preparation process and for the provision of information and experiences.

If the Natural Heritage property “Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany”, which has already been included in the World Heritage List, is extended by the nominated component parts, the efforts put up by all involved experts and the governments at the state and federal level to preserve these territories for present and future generations will be acknowledged and supported.

CONTENTS

GLOSSARY

Ancient (beech) forests/old-growth (beech) forest

In the context of this nomination dossier, the term "ancient (beech) forest" is synonymously used with "old-growth (beech) forest". Both terms describe forest stands which have been directly influenced by human activities in the past, but the last significant impact is dated back several decades (or even centuries) ago. Throughout the period of missing impact (mainly absence of logging) natural processes have taken place and structures similar to untouched virgin forests have developed. For beech forests, this includes trees that are significantly older than the usual period of logging rotation (100–120 years) and deadwood amounts of over 20 m^3 are already in place.

Component part

Each part of a serial World Heritage property which is delineated by its own borders forms a component part of the property. The component part is surrounded by a buffer zone, which is not part of the property, but is essential for the protection of the property.

Component cluster

If two or more component parts are located in one protected area and if they are not connected, they are defined as a component cluster. There will be one main description for each component cluster in the nomination dossier, except for the maps and the tables indicating the geographical position of the areas, where the single parts of the cluster are shown.

Natural (beech) forest

A forest composed by indigenous trees regardless of their age. Natural development and processes are ongoing and the intact ecosystem includes rare species and shows a high biodiversity. The term "natural (beech) forest includes ancient, old-growth as well as primeval or virgin forests.

Primeval/virgin (beech) forest

Within this World Heritage Nomination Dossier, the term "primeval forest" is used in a slightly broader way than in other contexts. In this document, the term "primeval" comprises "virgin" and "ancient" forests. Virgin forests are forests that have never been directly affected by humans.

Ancient forests are forests that have been exposed to human influence (e.g. logging) a long time ago, but the current structure and species combination is close to "virgin forests".

Primeval forests typically contain large living trees and a large amount of deadwood; they are characterized by their high biodiversity and their capacity of natural regeneration. Natural development and processes are ongoing without current human disturbance.

EXECUTIVE SUMMARY

State Parties

Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Poland, Romania, Slovenia, Spain, Ukraine

State, Province or Region

The State, Province or Region of each component part is given in the table below.

Name of Property

"Primeval Beech Forests of the Carpathians and Other Regions of Europe" (extension to the existing Natural World Heritage Site "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany", 1133bis).

Geographical coordinates to the nearest second

The position of the component parts of this extension nomination is defined based on the center of the respective territory.

Overview names, geographical position and area size of the nominated components (coordinates to nearest second)

ID	Component part/cluster	Region/District	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
001	Lumi i gashit	Kukes, Tropojë district	Albania	N:42°28'53" E:20°3'26"	1,261.52	8,977.48
002	Rrajca	Elbasan, Librazhd district	Albania	N:41°12'11" E:20°30'2"	2,129.45	2,569.75
003	Dürrenstein	Province of Lower Austria	Austria	N:47°46'12" E:15°2'51"	1,867.45	1,545.05
004	Kalkalpen - Hintergebirge	Province of Upper Austria	Austria	N:47°44'58" E:14°28'56"	2,946.20	14,197.24
005	Kalkalpen - Bodinggraben	Province of Upper Austria	Austria	N:47°47'14" E:14°21'12"	890.89	
006	Kalkalpen - Urlach	Province of Upper Austria	Austria	N:47°48'15" E:14°14'22"	264.82	
007	Kalkalpen - Wilder Graben	Province of Upper Austria	Austria	N:47°49'60" E:14°26'1"	1,149.75	
008	Sonian Forest - Forest Reserve "Joseph Zwaenepoel"	Flanders	Belgium	N:50°45'23" E:4°24'60"	187.34	4,650.86
009	Sonian Forest – Grippensdelle A	Brussels Capital Region	Belgium	N:50°46'54" E:4°25'36"	24.11	
010	Sonian Forest - Grippensdelle B	Brussels Capital Region	Belgium	N:50°47'1" E:4°25'57"	37.38	
011	Sonian Forest - Réserve forestière du Ticton A	Wallonia	Belgium	N:50°44'3" E:4°26'13"	13.98	
012	Sonian Forest - Réserve forestière du Ticton B	Wallonia	Belgium	N:50°43'37" E:4°25'51"	6.50	
013	Central Balkan - Boatin Reserve	Lovech	Bulgaria	N:42°48'10" E:24°16'9"	1,226.88	851.22
014	Central Balkan - Tsarichina Reserve	Lovech	Bulgaria	N:42°46'32" E:24°24'18"	1,485.81	1,945.99

ID	Component part/cluster	Region/District	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
015	Central Balkan - Kozya stena Reserve	Lovech	Bulgaria	N:42°47'47" E:24°31'29"	644.43	289.82
016	Central Balkan - Steneto Reserve	Lovech, Plovdiv	Bulgaria	N:42°44'43" E:24°42'26"	2,466.10	1,762.01
017	Central Balkan - Stara reka Reserve	Plovdiv	Bulgaria	N:42°42'11" E:24°49'8"	591.20	1,480.04
018	Central Balkan - Dzhendema Reserve	Plovdiv, Stara Zagora	Bulgaria	N:42°41'44" E:24°58'23"	1,774.12	2,576.63
019	Central Balkan - Severen Dzhendem Reserve	Lovech	Bulgaria	N:42°44'44" E:24°56'5"	926.37	1,066.47
020	Central Balkan - Peeshti skali Reserve	Lovech, Gabrovo	Bulgaria	N:42°45'54" E:25°4'29"	1,049.10	968.14
021	Central Balkan - Sokolna Reserve	Stara Zagora	Bulgaria	N:42°41'52" E:25°8'18"	824.90	780.55
022	Hajdučki i Rožanski kukovi	Ličko-Senjska County, Velebit Mountain	Croatia	N:44°45'59" E:15°0'39"	1,289.11	9,869.25
023	Paklenica National Park - Suva draga-Klimenta	Dinaric region, or Dinaric Alpes	Croatia	N:44°20'26" E:15°30'1"	1,241.04	414.76
024	Paklenica National Park - Oglavinovac-Javornik	Dinaric region, or Dinaric Alpes	Croatia	N:44°23'4" E:15°26'59"	790.74	395.35
025	Abruzzo, Lazio & Molise - Valle Cervara	Region Abruzzo – Province of L'Aquila	Italy	N:41°49'56" E:13°43'43"	119.70	751.61
026	Abruzzo, Lazio & Molise - Selva Moricento	Region Abruzzo – Province of L'Aquila	Italy	N:41°50'49" E:13°42'20"	192.70	
027	Abruzzo, Lazio & Molise - Coppo del Morto	Region Abruzzo – Province of L'Aquila	Italy	N:41°51'37" E:13°50'48"	104.71	415.51
028	Abruzzo, Lazio & Molise - Coppo del Principe	Region Abruzzo – Province of L'Aquila	Italy	N:41°47'15" E:13°44'39"	194.49	446.62
029	Abruzzo, Lazio & Molise - Val Fondillo	Region Abruzzo – Province of L'Aquila	Italy	N:41°45'15" E:13°53'9"	325.03	700.95
030	Cozzo Ferriero	Region Basilicata – Province of Potenza	Italy	N:39°54'21" E:16°6'4"	95.74	482.61
031	Foresta Umbra	Region Puglia – Province of Foggia	Italy	N:41°48'27" E:15°58'40"	182.23	1,752.54
032	Monte Cimino	Region Lazio – Province of Viterbo	Italy	N:42°24'31" E:12°12'11"	57.54	87.96
033	Monte Raschio	Region Lazio – Province of Viterbo	Italy	N:42°10'25" E:12°9'40"	73.73	54.75
034	Sasso Fratino	Region Emilia-Romagna – Province of Forlì-Cesena Region Toscana – Province of Arezzo	Italy	N:43°50'40" E:11°48'11"	781.43	6,936.64

ID	Component part/cluster	Region/District	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
035	Bieszczady - Border Ridge and Upper Solinka Valley	Podkarpackie Voivodeship	Poland	N:49°5'58" E:22°33'23"	1,482.18	24,564.46
036	Bieszczady - Polonia Wetlińska and Smerek	Podkarpackie Voivodeship	Poland	N:49°11'26" E:22°30'50"	1,049.53	
037	Bieszczady - Stream Terebowiec valley	Podkarpackie Voivodeship	Poland	N:49°5'37" E:22°43'29"	200.99	
038	Bieszczady - Stream Wolosatka valley	Podkarpackie Voivodeship	Poland	N:49°4'3" E:22°44'42"	574.33	
039	Cheile Nerei-Beușnița	Caraș Severin County	Romania	N:44°54'19" E:21°48'40"	4,292.27	5,959.87
040	Codrul secular Șinca	Brașov County	Romania	N:45°40'0" E:25°10'14"	338.24	445.76
041	Codrul Secular Slătioara	Suceava County	Romania	N:47°26'36" E:25°37'39"	609.12	429.43
042	Cozia - Masivul Cozia	Vâlcea County	Romania	N:45°19'54" E:24°19'32"	2,285.86	2,408.83
043	Cozia - Lotrisor	Vâlcea County	Romania	N:45°17'43" E:24°15'33"	1,103.30	
044	Domogled - Valea Cernei - Domogled-Coronini-Bedina	Caraș Severin County	Romania	N:44°56'31" E:22°28'7"	5,110.63	51,461.28
045	Domogled - Valea Cernei - Iauna Craiovei	Caraș Severin County and Mehedinți County	Romania	N:45°6'31" E:22°34'41"	3,517.36	
046	Domogled - Valea Cernei - Ciucevele Cernei	Caraș Severin County and Gorj County	Romania	N:45°14'40" E:22°49'23"	1,104.27	
047	Groșii Țibleșului - Izvorul Șurii	Maramureș County	Romania	N:47°32'59" E:24°11'9"	210.55	563.57
048	Groșii Țibleșului - Preluci	Maramureș County	Romania	N:47°32'5" E:24°13'13"	135.82	
049	Izvoarele Nerei	Caraș Severin County	Romania	N:45°7'21" E:22°3'59"	4,677.21	2,494.83
050	Strîmbu Băiuț	Maramureș County	Romania	N:47°37'33" E:24°4'23"	598.14	713.09
051	Krokar	Municipality Kočevje	Slovenia	N:45°32'31" E:14°46'8"	74.50	47.90
052	Snežnik-Ždrocle	Municipality Ilirska Bistrica and Municipality Loška dolina	Slovenia	N:45°35'5" E:14°27'19"	720.24	128.80
053	Hayedos de Ayllón - Tejera Negra	Autonomous Community of Castilla-La Mancha	Spain	N:41°14'43" W:3°23'19"	255.52	13,880.86
054	Hayedos de Ayllón - Montejo	Province of Guadalajara, region of Castilla la Mancha	Spain	N:41°6'44" W:3°29'58"	71.79	
055	Hayedos de Navarra - Lizardoia	Autonomous Community of Navarra	Spain	N:43°0'23" W:1°6'46"	63.97	24,494.52
056	Hayedos de Navarra - Aztaparreta	Autonomous Community of Navarra	Spain	N:42°54'39" W:0°48'58"	171.06	

ID	Component part/cluster	Region/District	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
057	Hayedos de Picos de Europa - Cuesta Fría	Autonomous Community of Castilla y León	Spain	N:43°10'21" W:4°59'16"	213.65	14,253.00
058	Hayedos de Picos de Europa - Canal de Asotín	Autonomous Community of Castilla y León	Spain	N:43°10'16" W:4°53'21"	109.58	
059	Gorgany	Ivano-Frankivsk region, Nadvirna district	Ukraine	N:48°28'19" E:24°17'58"	753.48	4,637.59
060	Roztochya	Lviv region	Ukraine	N:49°57'44" E:23°38'58"	384.81	598.21
061	Satanivska Dacha	Khmelnytska region, Horodok district	Ukraine	N:49°10'26" E:26°14'56"	212.01	559.37
062	Synevyr - Darvaika	Zakarpattia region, Mizhgirja district	Ukraine	N:48°29'14" E:23°44'56"	1,588.46	312.32
063	Synevyr - Kvasovets	Zakarpattia region, Mizhgirja district	Ukraine	N:48°23'6" E:23°42'46"	561.62	333.63
064	Synevyr - Strymba	Zakarpattia region, Mizhgirja district	Ukraine	N:48°27'11" E:23°47'48"	260.65	191.14
065	Synevyr - Vilshany	Zakarpattia region, Mizhgirja district	Ukraine	N:48°21'20" E:23°39'36"	454.31	253.85
066	Zacharovanyi Krai - Irshavka	Zakarpattia region, Irshava district	Ukraine	N:48°27'9" E:23°5'23"	93.97	1,275.44
067	Zacharovanyi Krai - Velykyi Dil	Zakarpattia region, Irshava district	Ukraine	N:48°25'21" E:23°9'42"	1,164.16	
TOTAL					**61,660.07**	**215,977.55**

Textual description of the boundaries of the nominated property

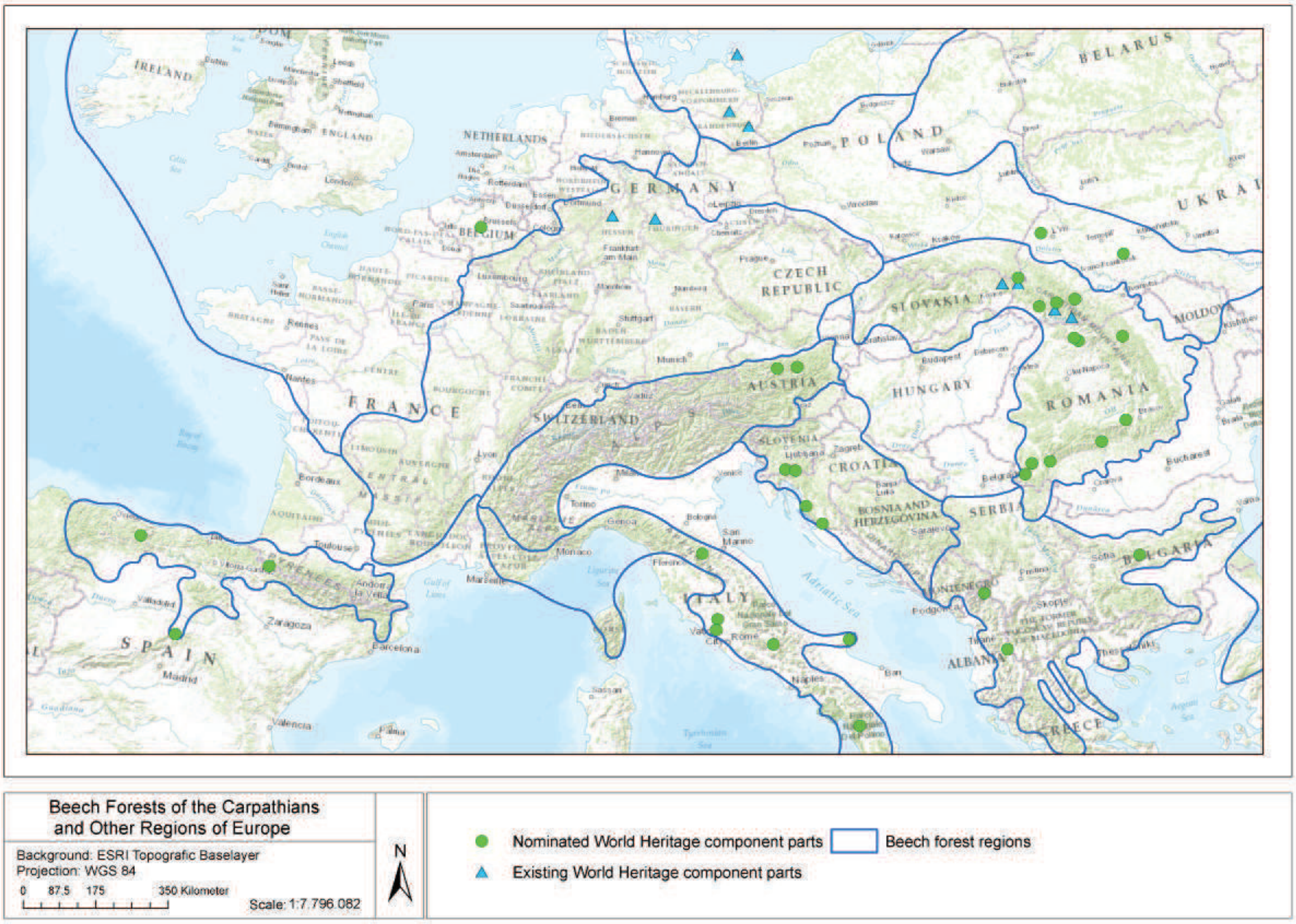
With the selected 67 component parts, the beech forests with the highest integrity in 33 protected areas, were included in the nomination as component parts of the serial property. The individual demarcations of the component parts have been chosen so as to guarantee outstanding universal value, maximum integrity, and coherent, sufficiently sized forests.

The selected boundaries reflect the ecological situation (location of primeval beech forest without human forest management), the spatial responsibility of the management organization in place (National Park, Strict Forest Reserve), local and regional stakeholders (landowners, neighbouring communities, responsible authorities and ministries) and legal constrains (status of strict protection has to be guaranteed).

Existing primeval forest relics of the protected areas have been included. Additional protection and ecological exchange is ensured by wooded buffer zones. All selected buffer zones are located within the borders of the protected areas and are therefore managed by the same institutions as the component parts. This ensures sufficient long term protection for the component parts, as well as for their buffer zones.

Map of the nominated property, showing boundaries and buffer zones

Please find detailed maps of all component parts and their buffer zones in chapter 2 and in annex 1.e.



Overview of the existing and new nominated World Heritage component parts

Criteria under which property is nominated

Inscription on the World Heritage List is proposed under criterion ix:

"Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals." The serial nomination "Primeval Beech Forests of the Carpathians and Other Regions of Europe" comprises outstanding examples of the evolutionary and developmental processes of beech forests since the last glacial period, giving rise to a terrestrial ecosystem that has shaped an entire continent in a globally unique manner. In addition to the "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany", the newly nominated beech forests in 67 component parts in 11 countries will enhance the existing World Heritage property to give an overall and comprehensive picture of the European postglacial development process of beech forest. With this extension, all glacial refuge areas and genotypes of beech are covered. The basic line of arguments in the nomination of the existing property remains mainly unchanged.

Draft Statement of Outstanding Universal Value

Brief synthesis

The "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are a serial property comprising 82 component parts in total. They represent an outstanding example of anthropogenically undisturbed, complex temperate forests and exhibit the most complete and comprehensive ecological patterns and processes of pure and mixed stands of European beech across a variety of environmental conditions. They contain an invaluable genetic reservoir of beech and many species associated and dependent on these forest habitats.

Justification for Criteria

The "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are indispensable to understand the history and evolution of the genus *Fagus*, which, given its wide distribution in the Northern Hemisphere and its ecological importance, is globally significant. These undisturbed, complex temperate forests exhibit the most complete and comprehensive ecological patterns and processes of pure and mixed stands of European beech across a variety of environmental conditions, such as climatic and geological conditions, throughout all relevant European Beech Forest Regions. They compromise all altitudinal zones from the coast up to the forest line in the mountains and, furthermore, include the best remaining examples of the outer boundaries of the European beech forest range. Beech is one of the most important elements of forests in the Temperate Broadleaf Forest Biome and represents an outstanding example of the recolonization and development of terrestrial ecosystems and communities since the last ice age. The continuing northern and westward expansion of beech from its original glacial refuge areas in the eastern and southern parts of Europe can be tracked along natural corridors and steppingstones spanning the continent. More recent changes in the distribution pattern of this species relate to direct influences of human disturbance and the more complex effects of anthropogenically induced climate change. Both historic and present serial patterns of distribution represent natural evolutionary strategies for adapting and surviving environmental change. The dominance of beech across extensive areas of Europe is a living testimony of the tree's genetic adaptability.

Statement of Integrity

The selected beech forest sites not only represent the full serial diversity found across Europe, they are also of sufficient size to maintain natural processes necessary for the long-term ecological viability of the wider ecosystem. Buffer zones including surrounding protected areas (nature parks, biosphere reserves) are managed sympathetically to ensure the long-term conservation of the particular character of the designated beech forests together with its inherent attributes. Next to criteria such as the extent of the forest area and the presence of an effective buffer zone, key characteristics which were also used in the site selection process included the average age of the forest stand and the period elapsed since it was last managed or actively disturbed. The evaluation criteria used in the selection process helped to describe the degree of naturalness of a forest, but also provide some indication of the inherent functional capacity of the ecosystem. Finally, where appropriate, special emphasis was given to connectivity between beech forests and the surrounding complementary habitats as a perceived prerequisite for ecosystem functioning and adaptation to environmental change.

Statement of authenticity for properties nominated under criteria (i) to (vi)

Not relevant as this property is nominated under criterion (ix).

Requirements for protection and management

Long-term protection and management is ensured through national legal protection such as national parks, core areas of biosphere reserves or other types of protected areas. Effective implementation of an integrated management plan and a multilateral integrated management system is required to guide the planning and management of this serial property. Key management issues include forest fire control and conservation of monumental old trees, conservation and management of mountain meadows, river corridors and freshwater ecosystems, tourism management, research and monitoring. Cooperative management agreements with local groups and tourism agencies can enhance the achievement of management goals and ensure local community engagement in the component parts.

Name and contact information of official local institution/agency

Name and contact information of the coordinators of the extension nomination “Beech Forests of the Carpathians and Other Regions in Europe”:

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Leaf canopy of ancient beech trees. H. Kirchmeir (E.C.O.)

1. IDENTIFICATION OF THE PROPERTY

1.a Country

Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Poland, Romania, Slovenia, Spain, Ukraine

1.b State, Province or Region

Table 1: State, Province or Region of the nominated component parts

ID	State Party	Component part	Region/District
001	Albania	Lumi i Gashit	Kukes, Tropojë district
002	Albania	Rrajca	Elbasan, Librazhd district
003	Austria	Dürrenstein	Province of Lower Austria
004	Austria	Kalkalpen – Hintergebirge	Province of Upper Austria
005	Austria	Kalkalpen – Bodinggraben	Province of Upper Austria
006	Austria	Kalkalpen – Urlach	Province of Upper Austria
007	Austria	Kalkalpen – Wilder Graben	Province of Upper Austria
008	Belgium	Sonian Forest – Forest Reserve "Joseph Zwaenepoel"	Flanders
009	Belgium	Sonian Forest – Grippensdelle A	Brussels Capital Region
010	Belgium	Sonian Forest – Grippensdelle B	Brussels Capital Region
011	Belgium	Sonian Forest – Reserve Forestière du Ticton A	Wallonia
012	Belgium	Sonian Forest – Réserve Forestière du Ticton B	Wallonia
013	Bulgaria	Central Balkan – Boatin Reserve	Lovech
014	Bulgaria	Central Balkan – Tsarichina Reserve	Lovech

ID	State Party	Component part	Region/District
015	Bulgaria	Central Balkan – Kozya Stena Reserve	Lovech
016	Bulgaria	Central Balkan – Steneto Reserve	Lovech, Plovdiv
017	Bulgaria	Central Balkan – Stara Reka Reserve	Plovdiv
018	Bulgaria	Central Balkan – Dzhendema Reserve	Plovdiv, Stara Zagora
019	Bulgaria	Central Balkan – Severen Dzhendem Reserve	Lovech
020	Bulgaria	Central Balkan – Peeshti Skali Reserve	Lovech, Gabrovo
021	Bulgaria	Central Balkan – Sokolna Reserve	Stara Zagora
022	Croatia	Hajdučki i Rožanski Kukovi	Ličko-Senjska County, Velebit Mountain
023	Croatia	Paklenica National Park – Suva draga-Klimenta	Dinaric region, or Dinaric Alps
024	Croatia	Paklenica National Park – Oglavinovac-Javornik	Dinaric region, or Dinaric Alps
025	Italy	Abruzzo, Lazio & Molise National Park – Valle Cervara	Region Abruzzo – Province of L'Aquila
026	Italy	Abruzzo, Lazio & Molise National Park – Selva Moricento	Region Abruzzo – Province of L'Aquila
027	Italy	Abruzzo, Lazio & Molise National Park – Coppo del Morto	Region Abruzzo – Province of L'Aquila
028	Italy	Abruzzo, Lazio & Molise National Park – Coppo del Principe	Region Abruzzo – Province of L'Aquila
029	Italy	Abruzzo, Lazio & Molise National Park – Val Fondillo	Region Abruzzo – Province of L'Aquila
030	Italy	Cozzo Ferriero	Region Basilicata – Province of Potenza
031	Italy	Foresta Umbra	Region Puglia – Province of Foggia
032	Italy	Monte Cimino	Region Lazio – Province of Viterbo
033	Italy	Monte Raschio	Region Lazio – Province of Viterbo
034	Italy	Sasso Fratino	Region Emilia-Romagna – Province of Forlì-Cesena, Region Toscana – Province of Arezzo
035	Poland	Border Ridge and Upper Solinka Valley	Podkarpackie Voivodeship
036	Poland	Polonia Wetlińska and Smerek	Podkarpackie Voivodeship
037	Poland	Stream Terebowiec Valley	Podkarpackie Voivodeship
038	Poland	Stream Wolosatka Valley	Podkarpackie Voivodeship
039	Romania	Cheile Nerei-Beușnița	Caraș Severin County
040	Romania	Codrul Secular Șinca	Brașov County
041	Romania	Codrul Secular Slătioara	Suceava County
042	Romania	Cozia – Masivul Cozia	Vâlcea County
043	Romania	Cozia – Lotrisor	Vâlcea County
044	Romania	Domogled-Valea Cernei – Domogled-Coronini-Bedina	Caraș Severin County
045	Romania	Domogled-Valea Cernei – Iauna Craiovei	Caraș Severin County and Mehedinți County
046	Romania	Domogled-Valea Cernei – Ciucevele Cernei	Caraș Severin County and Gorj County
047	Romania	Groșii Țibleșului – Izvorul Șurii	Maramureș County
048	Romania	Groșii Țibleșului – Preluci	Maramureș County
049	Romania	Izvoarele Nerei	Caraș Severin County
050	Romania	Strâmbu Băiuț	Maramureș County
051	Slovenia	Krokar	Municipality Kočevje
052	Slovenia	Snežnik-Ždrocle	Municipality Ilirska Bistrica and Municipality Loška dolina
053	Spain	Hayedos de Ayllón – Tejera Negra	Autonomous Community of Castilla-La Mancha
054	Spain	Hayedos de Ayllón – Montejo de la Sierra	Autonomous Community of Madrid
055	Spain	Hayedos de Navarra – Lizardoia	Autonomous Community of Navarra
056	Spain	Hayedos de Navarra – Aztaparreta	Autonomous Community of Navarra

ID	State Party	Component part	Region/District
057	Spain	Hayedos de Picos de Europa – Cuesta Fría	Autonomous Community of Castilla y León
058	Spain	Hayedos de Picos de Europa – Canal de Asotín	Autonomous Community of Castilla y León
059	Ukraine	Gorgany	Ivano-Frankivsk region, Nadvirna district
060	Ukraine	Roztochya	Lviv region
061	Ukraine	Satanivska Dacha	Khmelnytska region, Horodok district
062	Ukraine	Synevyr – Darvaika	Zakarpattia region, Mizhgirja district
063	Ukraine	Synevyr – Kvasovets	Zakarpattia region, Mizhgirja district
064	Ukraine	Synevyr – Strymba	Zakarpattia region, Mizhgirja district
065	Ukraine	Synevyr – Vilshany	Zakarpattia region, Mizhgirja district
066	Ukraine	Zacharovanyi Krai – Irshavka	Zakarpattia region, Irshava district
067	Ukraine	Zacharovanyi Krai – Velykyi Dil	Zakarpattia region, Irshava district

1.c Name of Property

“Primeval Beech Forests of the Carpathians and Other Regions of Europe” as extension to the existing Natural World Heritage Site “Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany” (1133bis).

Autumnal colours. H. Kirchmeir (E.C.O.)

1.d Geographical coordinates to the nearest second

The position of the component parts of this extension nomination is defined based on the center of the respective territory.

Table 2: Overview of names, geographical coordinates and area size of the nominated component parts

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
001	Lumi i Gashit	Albania	N 42° 28' 53" E 20° 3' 26"	1,261.52	8,977.48
002	Rrajca	Albania	N 41° 12' 11" E 20° 30' 2"	2,129.45	2,569.75
003	Dürrenstein	Austria	N 47° 46' 12" E 15° 2' 51"	1,867.45	1,545.05
004	Kalkalpen – Hintergebirge	Austria	N 47° 44' 58" E 14° 28' 56"	2,946.20	14,197.24
005	Kalkalpen – Bodinggraben	Austria	N 47° 47' 14" E 14° 21' 12"	890.89	
006	Kalkalpen – Urlach	Austria	N 47° 48' 15" E 14° 14' 22"	264.82	
007	Kalkalpen – Wilder Graben	Austria	N 47° 49' 60" E 14° 26' 1"	1,149.75	
008	Sonian Forest – Forest Reserve “Joseph Zwaenepoel”	Belgium	N 50° 45' 23" E 4° 24' 60"	187.34	4,650.86
009	Sonian Forest – Grippensdelle A	Belgium	N 50° 46' 54" E 4° 25' 36"	24.11	
010	Sonian Forest – Grippensdelle B	Belgium	N 50° 47' 1" E 4° 25' 57"	37.38	
011	Sonian Forest – Réserve Forestière du Ticton A	Belgium	N 50° 44' 3" E 4° 26' 13"	13.98	
012	Sonian Forest – Réserve Forestière du Ticton B	Belgium	N 50° 43' 37" E 4° 25' 51"	6.50	
013	Central Balkan – Boatin Reserve	Bulgaria	N 42° 48' 10" E 24° 16' 9"	1,226.88	851.22

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
014	Central Balkan – Tsarichina Reserve	Bulgaria	N 42° 46' 32" E 24° 24' 18"	1,485.81	1,945.99
015	Central Balkan – Kozya Stena Reserve	Bulgaria	N 42° 47' 47" E 24° 31' 29"	644.43	289.82
016	Central Balkan – Steneto Reserve	Bulgaria	N 42° 44' 43" E 24° 42' 26"	2,466.10	1,762.01
017	Central Balkan – Stara Reka Reserve	Bulgaria	N 42° 42' 11" E 24° 49' 8"	591.20	1,480.04
018	Central Balkan – Dzhendema Reserve	Bulgaria	N 42° 41' 44" E 24° 58' 23"	1,774.12	2,576.63
019	Central Balkan – Severen Dzhendem Reserve	Bulgaria	N 42° 44' 44" E 24° 56' 5"	926.37	1,066.47
020	Central Balkan – Peeshti Skali Reserve	Bulgaria	N 42° 45' 54" E 25° 4' 29"	1,049.10	968.14
021	Central Balkan – Sokolna Reserve	Bulgaria	N 42° 41' 52" E 25° 8' 18"	824.90	780.55
022	Hajdučki i Rožanski Kukovi	Croatia	N 44° 45' 59" E 15° 0' 39"	1,289.11	9,869.25
023	Paklenica National Park – Suva draga-Klimenta	Croatia	N 44° 20' 26" E 15° 30' 1"	1,241.04	414.76
024	Paklenica National Park – Oglavinovac-Javornik	Croatia	N 44° 23' 4" E 15° 26' 59"	790.74	395.35
025	Abruzzo, Lazio & Molise National Park – Valle Cervara	Italy	N 41° 49' 56" E 13° 43' 43"	119.70	751.61
026	Abruzzo, Lazio & Molise National Park – Selva Moricento	Italy	N 41° 50' 49" E 13° 42' 20"	192.70	
027	Abruzzo, Lazio & Molise National Park – Coppo del Morto	Italy	N 41° 51' 37" E 13° 50' 48"	104.71	415.51
028	Abruzzo, Lazio & Molise National Park – Coppo del Principe	Italy	N 41° 47' 15" E 13° 44' 39"	194.49	446.62
029	Abruzzo, Lazio & Molise National Park – Val Fondillo	Italy	N 41° 45' 15" E 13° 53' 9"	325.03	700.95
030	Cozzo Ferriero	Italy	N 39° 54' 21" E 16° 6' 4"	95.74	482.61
031	Foresta Umbra	Italy	N 41° 48' 27" E 15° 58' 40"	182.23	1,752.54
032	Monte Cimino	Italy	N 42° 24' 31" E 12° 12' 11"	57.54	87.96
033	Monte Raschio	Italy	N 42° 10' 25" E 12° 9' 40"	73.73	54.75
034	Sasso Fratino	Italy	N 43° 50' 40" E 11° 48' 11"	781.43	6,936.64
035	Bieszczady – Border Ridge and Upper Solinka Valley	Poland	N 49° 5' 58" E 22° 33' 23"	1,482.18	24,564.46
036	Bieszczady – Polonia Wetlińska and Smerek	Poland	N 49° 11' 26" E 22° 30' 50"	1,049.53	
037	Bieszczady – Stream Terebowiec Valley	Poland	N 49° 5' 37" E 22° 43' 29"	200.99	
038	Bieszczady – Stream Wolosatka Valley	Poland	N 49° 4' 3" E 22° 44' 42"	574.33	
039	Cheile Nerei-Beușnița	Romania	N 44° 54' 19" E 21° 48' 40"	4,292.27	5,959.87
040	Codrul Secular Șinca	Romania	N 45° 40' 0" E 25° 10' 14"	338.24	445.76
041	Codrul Secular Slătioara	Romania	N 47° 26' 36" E 25° 37' 39"	609.12	429.43
042	Cozia – Masivul Cozia	Romania	N 45° 19' 54" E 24° 19' 32"	2,285.86	2,408.83
043	Cozia – Lotrisor	Romania	N 45° 17' 43" E 24° 15' 33"	1,103.30	
044	Domogled-Valea Cernei – Domogled-Coronini-Bedina	Romania	N 44° 56' 31" E 22° 28' 7"	5,110.63	51,461.28
045	Domogled-Valea Cernei – Iauna Craiovei	Romania	N 45° 6' 31" E 22° 34' 41"	3,517.36	
046	Domogled-Valea Cernei – Ciucevele Cernei	Romania	N 45° 14' 40" E 22° 49' 23"	1,104.27	
047	Groșii Țibleșului – Izvorul Șurii	Romania	N 47° 32' 59" E 24° 11' 9"	210.55	563.57
048	Groșii Țibleșului – Preluci	Romania	N 47° 32' 5" E 24° 13' 13"	135.82	
049	Izvoarele Nerei	Romania	N 45° 7' 21" E 22° 3' 59"	4,677.21	2,494.83

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
050	Strâmbu Băiuț	Romania	N 47° 37' 33" E 24° 4' 23"	598.14	713.09
051	Krokar	Slovenia	N 45° 32' 31" E 14° 46' 8"	74.50	47.90
052	Snežnik-Ždrocle	Slovenia	N 45° 35' 5" E 14° 27' 19"	720.24	128.80
053	Hayedos de Ayllón – Tejera Negra	Spain	N 41° 14' 43" W 3° 23' 19"	255.52	13,880.86
054	Hayedos de Ayllón – Montejo de la Sierra	Spain	N 41° 6' 44" W 3° 29' 58"	71.79	
055	Hayedos de Navarra – Lizardoia	Spain	N 43° 0' 23" W 1° 6' 46"	63.97	24,494.52
056	Hayedos de Navarra – Aztaparreta	Spain	N 42° 54' 39" W 0° 48' 58"	171.06	
057	Hayedos de Picos de Europa – Cuesta Fría	Spain	N 43° 10' 21" W 4° 59' 16"	213.65	14,253.00
058	Hayedos de Picos de Europa – Canal de Asotín	Spain	N 43° 10' 16" W 4° 53' 21"	109.58	
059	Gorgany	Ukraine	N 48° 28' 19" E 24° 17' 58"	753.48	4,637.59
060	Roztochya	Ukraine	N 49° 57' 44" E 23° 38' 58"	384.81	598.21
061	Satanivska Dacha	Ukraine	N 49° 10' 26" E 26° 14' 56"	212.01	559.37
062	Synevyr – Darvaika	Ukraine	N 48° 29' 14" E 23° 44' 56"	1,588.46	312.32
063	Synevyr – Kvasovets	Ukraine	N 48° 23' 6" E 23° 42' 46"	561.62	333.63
064	Synevyr – Strymba	Ukraine	N 48° 27' 11" E 23° 47' 48"	260.65	191.14
065	Synevyr – Vilshany	Ukraine	N 48° 21' 20" E 23° 39' 36"	454.31	253.85
066	Zacharovanyi Krai – Irshavka	Ukraine	N 48° 27' 9" E 23° 5' 23"	93.97	1,275.44
067	Zacharovanyi Krai – Velykyi Dil	Ukraine	N 48° 25' 21" E 23° 9' 42"	1,164.16	
TOTAL				61,660.07	215,977.55

1.e Maps and plans, showing the boundaries of the nominated property and buffer zone

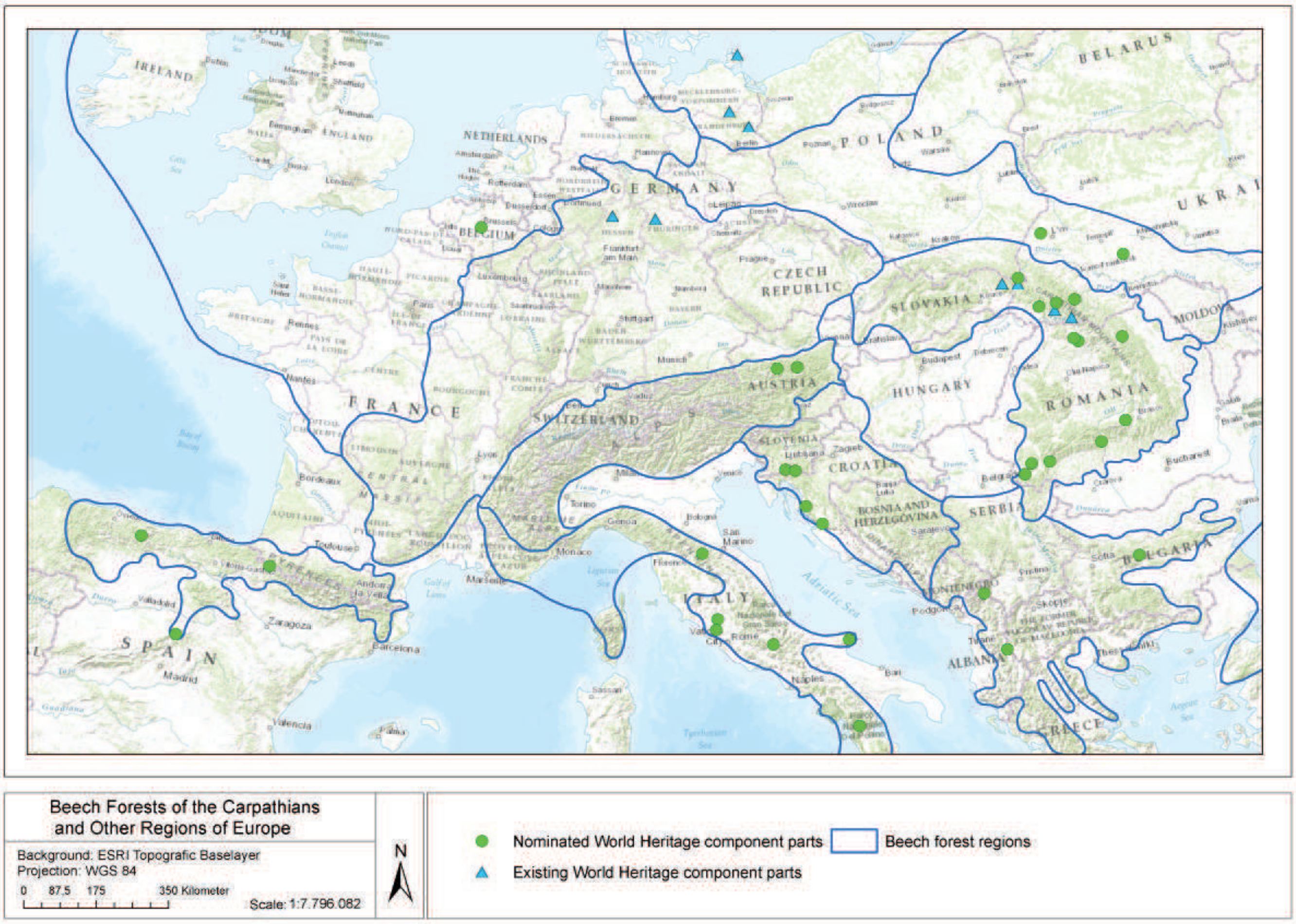
Please find detailed maps of all component parts and their buffer zones in the attached document.

The 67 component parts are distributed across Europe from Spain in the west to Ukraine in the east and from Italy in the south to Belgium in the north. Ten Beech Forest Regions are represented with at least one component.

The majority of the component parts is situated within large woodlands or densely wooded regions that reach far beyond the forest-dominated buffer zones. Hence, the nominated buffer zones of the nominated components almost entirely consist of woodland, providing the sites with additional protection.

Old-growth beech Forest. H. Kirchmeir (E.C.O.)

Figure 1 (below): Overview of the existing and new nominated World Heritage component parts

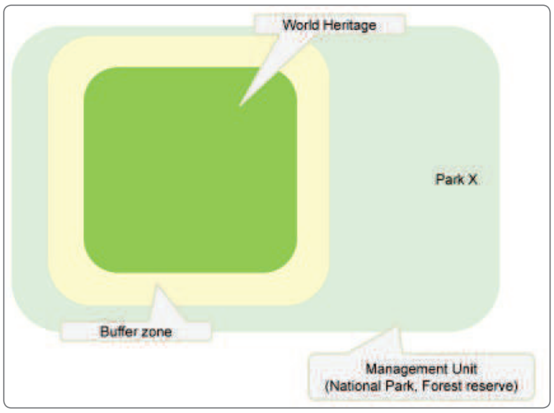


Cluster

The zonation process reflects the ecological situation (location of primeval and/or ancient beech forest without human forest management), the spatial responsibility of the management organization in place (e.g. national park, strict forest reserve), local and regional stakeholders (landowners, neighboring communities, responsible authorities and ministries, etc.) and legal constraints (status of strict protection is guaranteed by law or equivalent regulations).

Given the quite different situations in the eleven state parties and over 60 component parts, this nomination introduces the possibility of forming a so-called "component cluster".

There are several protected areas which have more than one component part within their boundaries and often have one joint buffer zone. Due to natural or manmade barriers, not all old-growth or primeval beech forests within a protected area can be combined into one component part. To avoid unnecessary repetition in the description of management, site conditions and legal background, component parts within the same protected area (and therefore under the same management) are grouped into so-called "component clusters". This is the case in 13 protected areas, hosting 2 to 9 component parts (Table 3). In these 13 cases, there is one description and one map for the whole component cluster, and the tables show the size and coordinates for each of the component parts within the cluster. In many cases, the component parts within a cluster are connected and therefore share the same buffer zone. Because of this, the area of the buffer zone is indicated for the whole component cluster and not for each of the component parts.



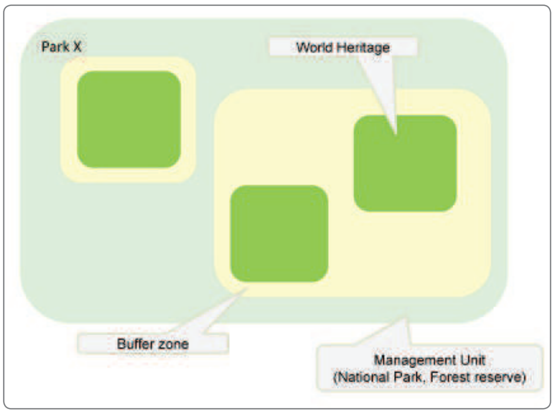


Figure 2 (left): Standard component part

Figure 3 (right): Component cluster

Table 3: Overview of the component parts and component cluster of the nominated extension

State Party	Name of the component cluster	Included component parts		Map (Annex 1.e)
		ID	Name	
Albania	**Lumi i Gashit**	001	Lumi i Gashit	AL_LUMI
Albania	**Rrajca**	002	Rrajca	AL_RRAJ
Austria	**Dürrenstein**	003	Dürrenstein	AT_DUER
Austria	**Kalkalpen**	004	Kalkalpen – Hintergebirge	AT_KALK_b
		005	Kalkalpen – Bodinggraben	AT_KALK_a
		006	Kalkalpen – Urlach	AT_KALK_a
		007	Kalkalpen – Wilder Graben	AT_KALK_b
Belgium	**Sonian Forest**	008	Sonian Forest – Forest Reserve "Joseph Zwaenepoel"	BE_SONI
		009	Sonian Forest – Grippensdelle A	BE_SONI
		010	Sonian Forest – Grippensdelle B	BE_SONI
		011	Sonian Forest – Réserve Forestière du Ticton A	BE_SONI
		012	Sonian Forest – Réserve Forestière du Ticton B	BE_SONI
Bulgaria	**Central Balkan**	013	Central Balkan – Boatin Reserve	BG_BALK_a
		014	Central Balkan – Tsarichina Reserve	BG_BALK_b

State Party	Name of the component cluster	Included component parts		Map (Annex 1.e)
		ID	Name	
		015	Central Balkan – Kozya Stena Reserve	BG_BALK_b
		016	Central Balkan – Steneto Reserve	BG_BALK_c
		017	Central Balkan – Stara Reka Reserve	BG_BALK_c
		018	Central Balkan – Dzhendema Reserve	BG_BALK_d
		019	Central Balkan – Severen Dzhendem Reserve	BG_BALK_d
		020	Central Balkan – Peeshti Skali Reserve	BG_BALK_d
		021	Central Balkan – Sokolna Reserve	BG_BALK_d
Croatia	**Hajdučki i Rožanski Kukovi**	022	Hajdučki i Rožanski Kukovi	HR_HAJD
Croatia	**Paklenica National Park**	023	Paklenica National Park – Suva draga-Klimenta	HR_PAKL
		024	Paklenica National Park – Oglavinovac-Javornik	HR_PAKL
Italy	**Abruzzo, Lazio & Molise National Park**	025	Abruzzo, Lazio & Molise National Park – Valle Cervara	IT_ABRU
		026	Abruzzo, Lazio & Molise National Park – Selva Moricento	IT_ABRU
		027	Abruzzo, Lazio & Molise National Park – Coppo del Morto	IT_ABRU
		028	Abruzzo, Lazio & Molise National Park – Coppo del Principe	IT_ABRU
		029	Abruzzo, Lazio & Molise National Park – Val Fondillo	IT_ABRU
Italy	**Cozzo Ferriero**	030	Cozzo Ferriero	IT_COZZ
Italy	**Foresta Umbra**	031	Foresta Umbra	IT_UMBR
Italy	**Monte Cimino**	032	Monte Cimino	IT_CIMI
Italy	**Monte Raschio**	033	Monte Raschio	IT_RASC
Italy	**Sasso Fratino**	034	Sasso Fratino	IT_SASS
Poland	**Bieszczady**	035	Bieszczady – Border Ridge and Upper Solinka Valley	PL_BIES_a
		036	Bieszczady – Polonia Wetlińska and Smerek	PL_BIES_a
		037	Bieszczady – Stream Terebowiec Valley	PL_BIES_b
		038	Bieszczady – Stream Wolosatka Valley	PL_BIES_b
Romania	**Cheile Nerei-Beușnița**	039	Cheile Nerei-Beușnița	RO_NERE
Romania	**Codrul Secular Șinca**	040	Codrul Secular Șinca	RO_SINC
Romania	**Codrul Secular Slătioara**	041	Codrul Secular Slătioara	RO_SLAT
Romania	**Cozia**	042	Cozia – Masivul Cozia	RO_COZI
		043	Cozia – Lotrisor	RO_COZI
Romania	**Domogled-Valea Cernei**	044	Domogled-Valea Cernei – Domogled-Coronini-Bedina	RO_DOMO_a
		045	Domogled-Valea Cernei – Iauna Craiovei	RO_DOMO_b
		046	Domogled-Valea Cernei – Ciucevele Cernei	RO_DOMO_c
Romania	**Groșii Țibleșului**	047	Groșii Țibleșului – Izvorul Șurii	RO_TIBL
		048	Groșii Țibleșului – Preluci	RO_TIBL
Romania	**Izvoarele Nerei**	049	Izvoarele Nerei	RO_IZVO
Romania	**Strâmbu Băiuț**	050	Strîmbu Băiuț	RO_STRA
Slovenia	**Krokar**	051	Krokar	SI_KROK
Slovenia	**Snežnik-Ždrocle**	052	Snežnik-Ždrocle	SI_SNEZ
Spain	**Hayedos de Ayllón**	053	Hayedos de Ayllón – Tejera Negra	ES_AYLL
		054	Hayedos de Ayllón – Montejo de la Sierra	ES_AYLL
Spain	**Hayedos de Navarra**	055	Hayedos de Navarra – Lizardoia	ES_NAVA_a
		056	Hayedos de Navarra – Aztaparreta	ES_NAVA_b
Spain	**Hayedos de Picos de Europa**	057	Hayedos de Picos de Europa – Cuesta Fría	ES_PICO
		058	Hayedos de Picos de Europa – Canal de Asotín	ES_PICO

State Party	Name of the component cluster	Included component parts		Map (Annex 1.e)
		ID	Name	
Ukraine	**Gorgany**	059	Gorgany	UA_GORG
Ukraine	**Roztochya**	060	Roztochya	UA_ROZT
Ukraine	**Satanivska Dacha**	061	Satanivska Dacha	UA_SATA
Ukraine	**Synevyr**	062	Synevyr – Darvaika	UA_SYNE
		063	Synevyr – Kvasovets	UA_SYNE
		064	Synevyr – Strymba	UA_SYNE
		065	Synevyr – Vilshany	UA_SYNE
Ukraine	**Zacharovanyi Krai**	066	Zacharovanyi Krai – Irshavka	UA_ZACH
		067	Zacharovanyi Krai – Velykyi Dil	UA_ZACH

1.f Area of nominated property and proposed buffer zone

Within the selected 67 component parts, the beech forests with the highest integrity, i.e. 33 protected areas, were included in the nomination as component parts of the serial property. The individual demarcations of the component parts have been chosen so as to guarantee outstanding universal value, maximum integrity, and coherent, sufficiently sized forests.

Existing primeval forest relics of the protected areas have been included. Additional protection and ecological exchange is ensured by wooded buffer zones.

Table 4: Are size of the component parts with buffer zones (ha)

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
001	Lumi i Gashit	Albania	N 42° 28' 53" E 20° 3' 26"	1,261.52	8,977.48
002	Rrajca	Albania	N 41° 12' 11" E 20° 30' 2"	2,129.45	2,569.75
003	Dürrenstein	Austria	N 47° 46' 12" E 15° 2' 51"	1,867.45	1,545.05
004	Kalkalpen – Hintergebirge	Austria	N 47° 44' 58" E 14° 28' 56"	2,946.20	14,197.24
005	Kalkalpen – Bodinggraben	Austria	N 47° 47' 14" E 14° 21' 12"	890.89	
006	Kalkalpen – Urlach	Austria	N 47° 48' 15" E 14° 14' 22"	264.82	
007	Kalkalpen – Wilder Graben	Austria	N 47° 49' 60" E 14° 26' 1"	1,149.75	
008	Sonian Forest – Forest Reserve "Joseph Zwaenepoel"	Belgium	N 50° 45' 23" E 4° 24' 60"	187.34	4,650.86
009	Sonian Forest – Grippensdelle A	Belgium	N 50° 46' 54" E 4° 25' 36"	24.11	
010	Sonian Forest – Grippensdelle B	Belgium	N 50° 47' 1" E 4° 25' 57"	37.38	
011	Sonian Forest – Réserve Forestière du Ticton A	Belgium	N 50° 44' 3" E 4° 26' 13"	13.98	
012	Sonian Forest – Réserve Forestière du Ticton B	Belgium	N 50° 43' 37" E 4° 25' 51"	6.50	
013	Central Balkan – Boatin Reserve	Bulgaria	N 42° 48' 10" E 24° 16' 9"	1,226.88	851.22
014	Central Balkan – Tsarichina Reserve	Bulgaria	N 42° 46' 32" E 24° 24' 18"	1,485.81	1,945.99
015	Central Balkan – Kozya Stena Reserve	Bulgaria	N 42° 47' 47" E 24° 31' 29"	644.43	289.82

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
016	Central Balkan – Steneto Reserve	Bulgaria	N 42° 44' 43" E 24° 42' 26"	2,466.10	1,762.01
017	Central Balkan – Stara Reka Reserve	Bulgaria	N 42° 42' 11" E 24° 49' 8"	591.20	1,480.04
018	Central Balkan – Dzhendema Reserve	Bulgaria	N 42° 41' 44" E 24° 58' 23"	1,774.12	2,576.63
019	Central Balkan – Severen Dzhendem Reserve	Bulgaria	N 42° 44' 44" E 24° 56' 5"	926.37	1,066.47
020	Central Balkan – Peeshti Skali Reserve	Bulgaria	N 42° 45' 54" E 25° 4' 29"	1,049.10	968.14
021	Central Balkan – Sokolna Reserve	Bulgaria	N 42° 41' 52" E 25° 8' 18"	824.90	780.55
022	Hajdučki i Rožanski Kukovi	Croatia	N 44° 45' 59" E 15° 0' 39"	1,289.11	9,869.25
023	Paklenica National Park – Suva draga-Klimenta	Croatia	N 44° 20' 26" E 15° 30' 1"	1,241.04	414.76
024	Paklenica National Park – Oglavinovac-Javornik	Croatia	N 44° 23' 4" E 15° 26' 59"	790.74	395.35
025	Abruzzo, Lazio & Molise National Park – Valle Cervara	Italy	N 41° 49' 56" E 13° 43' 43"	119.70	751.61
026	Abruzzo, Lazio & Molise National Park – Selva Moricento	Italy	N 41° 50' 49" E 13° 42' 20"	192.70	
027	Abruzzo, Lazio & Molise National Park – Coppo del Morto	Italy	N 41° 51' 37" E 13° 50' 48"	104.71	415.51
028	Abruzzo, Lazio & Molise National Park – Coppo del Principe	Italy	N 41° 47' 15" E 13° 44' 39"	194.49	446.62
029	Abruzzo, Lazio & Molise – Val Fondillo	Italy	N 41° 45' 15" E 13° 53' 9"	325.03	700.95
030	Cozzo Ferriero	Italy	N 39° 54' 21" E 16° 6' 4"	95.74	482.61
031	Foresta Umbra	Italy	N 41° 48' 27" E 15° 58' 40"	182.23	1,752.54
032	Monte Cimino	Italy	N 42° 24' 31" E 12° 12' 11"	57.54	87.96
033	Monte Raschio	Italy	N 42° 10' 25" E 12° 9' 40"	73.73	54.75
034	Sasso Fratino	Italy	N 43° 50' 40" E 11° 48' 11"	781.43	6,936.64
035	Bieszczady – Border Ridge and Upper Solinka Valley	Poland	N 49° 5' 58" E 22° 33' 23"	1,482.18	24,564.46
036	Bieszczady – Polonia Wetlińska and Smerek	Poland	N 49° 11' 26" E 22° 30' 50"	1,049.53	
037	Bieszczady – Stream Terebowiec valley	Poland	N 49° 5' 37" E 22° 43' 29"	200.99	
038	Bieszczady – Stream Wolosatka valley	Poland	N 49° 4' 3" E 22° 44' 42"	574.33	
039	Cheile Nerei-Beușnița	Romania	N 44° 54' 19" E 21° 48' 40"	4,292.27	5,959.87
040	Codrul Secular Șinca	Romania	N 45° 40' 0" E 25° 10' 14"	338.24	445.76
041	Codrul Secular Slătioara	Romania	N 47° 26' 36" E 25° 37' 39"	609.12	429.43

ID	Component part/cluster	State Party	Coordinates of the central point	Area of the component part (ha)	Area of the Buffer zone (ha)
042	Cozia – Masivul Cozia	Romania	N 45° 19' 54" E 24° 19' 32"	2,285.86	2,408.83
043	Cozia – Lotrisor	Romania	N 45° 17' 43" E 24° 15' 33"	1,103.30	
044	Domogled-Valea Cernei – Domogled-Coronini-Bedina	Romania	N 44° 56' 31" E 22° 28' 7"	5,110.63	51,461.28
045	Domogled-Valea Cernei – Iauna Craiovei	Romania	N 45° 6' 31" E 22° 34' 41"	3,517.36	
046	Domogled -Valea Cernei – Ciucevele Cernei	Romania	N 45° 14' 40" E 22° 49' 23"	1,104.27	
047	Groșii Țibleșului – Izvorul Şurii	Romania	N 47° 32' 59" E 24° 11' 9"	210.55	563.57
048	Groșii Țibleșului – Preluci	Romania	N 47° 32' 5" E 24° 13' 13"	135.82	
049	Izvoarele Nerei	Romania	N 45° 7' 21" E 22° 3' 59"	4,677.21	2,494.83
050	Strâmbu Băiuț	Romania	N 47° 37' 33" E 24° 4' 23"	598.14	713.09
051	Krokar	Slovenia	N 45° 32' 31" E 14° 46' 8"	74.50	47.90
052	Snežnik-Ždrocle	Slovenia	N 45° 35' 5" E 14° 27' 19"	720.24	128.80
053	Hayedos de Ayllón – Tejera Negra	Spain	N 41° 14' 43" W 3° 23' 19"	255.52	13,880.86
054	Hayedos de Ayllón – Montejo de la Sierra	Spain	N 41° 6' 44" W 3° 29' 58"	71.79	
055	Hayedos de Navarra – Lizardoia	Spain	N 43° 0' 23" W 1° 6' 46"	63.97	24,494.52
056	Hayedos de Navarra – Aztaparreta	Spain	N 42° 54' 39" W 0° 48' 58"	171.06	
057	Hayedos de Picos de Europa – Cuesta Fría	Spain	N 43° 10' 21" W 4° 59' 16"	213.65	14,253.00
058	Hayedos de Picos de Europa – Canal de Asotín	Spain	N 43° 10' 16" W 4° 53' 21"	109.58	
059	Gorgany	Ukraine	N 48° 28' 19" E 24° 17' 58"	753.48	4,637.59
060	Roztochya	Ukraine	N 49° 57' 44" E 23° 38' 58"	384.81	598.21
061	Satanivska Dacha	Ukraine	N 49° 10' 26" E 26° 14' 56"	212.01	559.37
062	Synevyr – Darvaika	Ukraine	N 48° 29' 14" E 23° 44' 56"	1,588.46	312.32
063	Synevyr – Kvasovets	Ukraine	N 48° 23' 6" E 23° 42' 46"	561.62	333.63
064	Synevyr – Strymba	Ukraine	N 48° 27' 11" E 23° 47' 48"	260.65	191.14
065	Synevyr – Vilshany	Ukraine	N 48° 21' 20" E 23° 39' 36"	454.31	253.85
066	Zacharovanyi Krai – Irshavka	Ukraine	N 48° 27' 9" E 23° 5' 23"	93.97	1,275.44
067	Zacharovanyi Krai – Velykyi Dil	Ukraine	N 48° 25' 21" E 23° 9' 42"	1,164.16	
TOTAL				61,660.07	215,977.55

Summer in Lumi i Gashit. Picture: L. Shuka

1.f.1 *Albania: Lumi i Gashit (001)*

The Wilderness Gashi River includes the largest primeval beech forest in the Albanian Alps. The total Wilderness Gashi area covers about 10,240 ha. The most natural parts with an area of 1,261.52 ha are proposed as a component part of the extended World Heritage Property.

The elevation ranges from 700 to 900 m.a.s.l. in low altitudes of Gashi to up to 1,900 m.a.s.l. in the higher parts of the surrounding valleys.

The primeval and old-growth beech forests are embedded in a natural landscape. These natural vegetation zones around the component part are included in the proposed buffer zone, which covers an area of 8,977.48 ha.

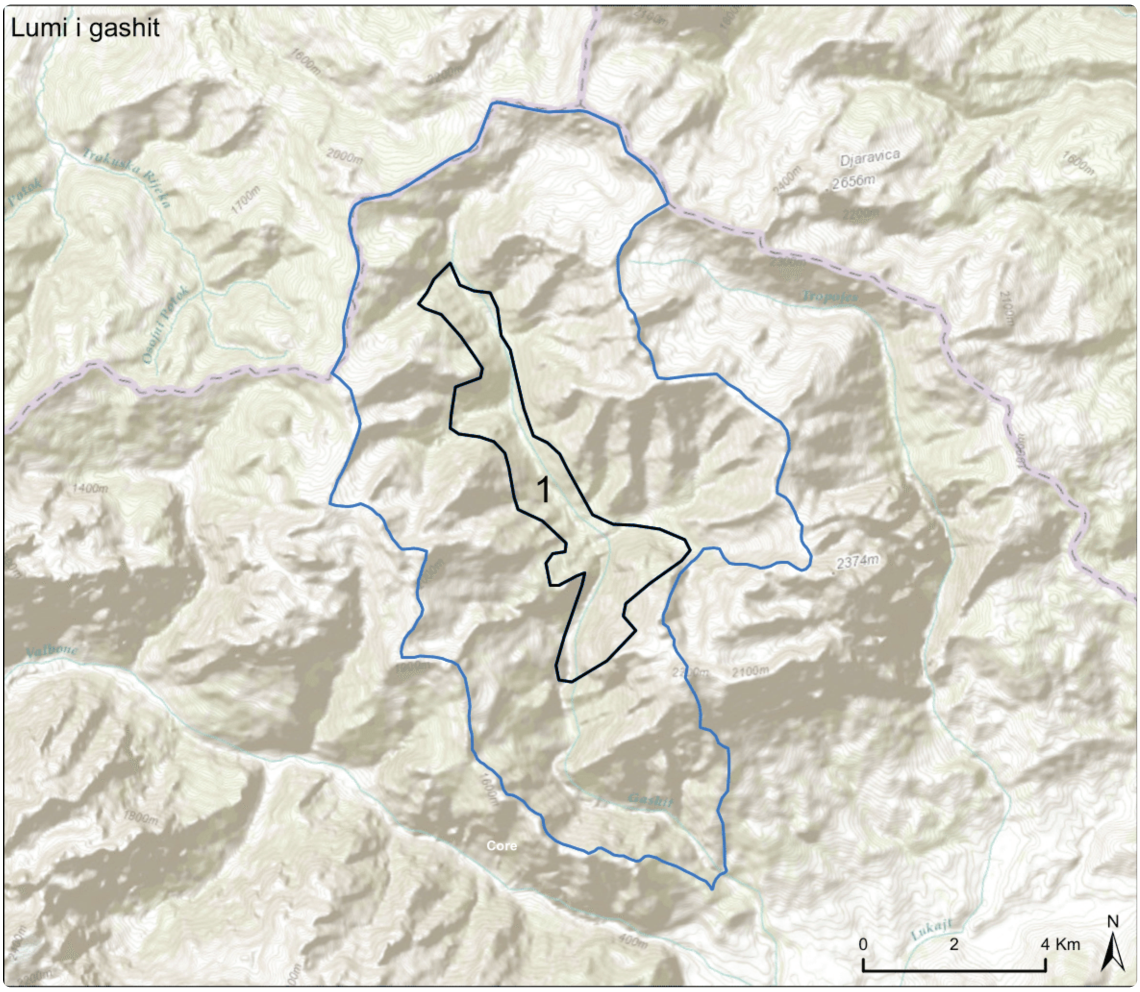


Figure 4: Zonation of Lumi i Gashit, Albania

World Heritage Site

Buffer Zone

Beech forests of Rrajca. Picture: H. Knapp

1.f.2 *Albania: Rrajca (002)*

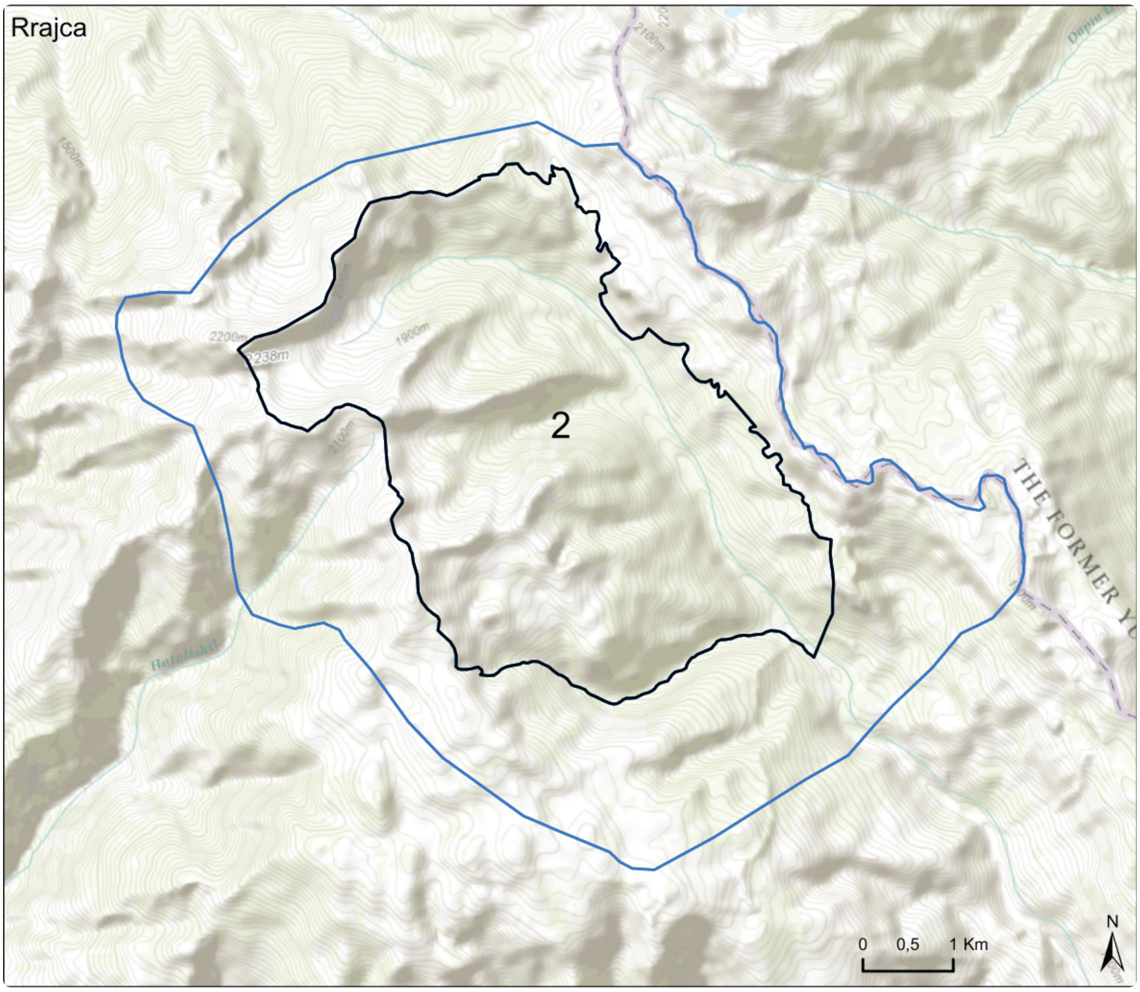
The nominated component part is included in the Shebenik-Jabllanicë National Park, which covers some of the most beautiful mountain areas in the east of the country, including some best preserved areas of beech forests of a primeval character. The proposed component part has a surface of 2,129.45 ha, or approximately 6.3% of the Park area.

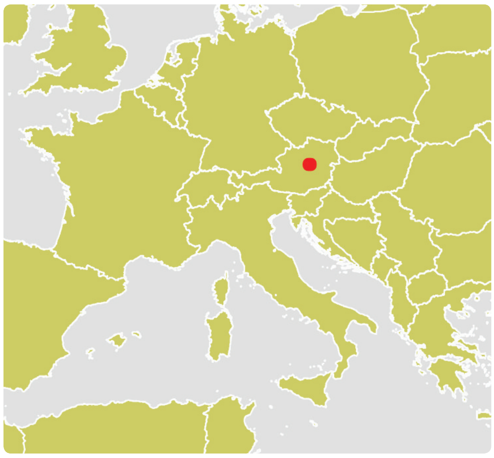
The component part is surrounded by a buffer zone with natural and mixed vegetation covering 2,569.75 ha, totally included in the Shebenik-Jabllanicë National Park. The area of Rrajca with its virgin forest complexes, located in the upper Bustrica Valley, has been conserved due to its isolation, remoteness and very limited access.

Figure 5: Zonation of Rrajca, Albania

World Heritage Site

Buffer Zone





Rothwald I in springtime. Picture: R. Pekny (Wilderness Area Dürrenstein)

1.f.3 *Austria: Dürrenstein (003)*

The Wilderness Area Dürrenstein includes the largest primeval Beech forest in the Alps. It has an overall size of about 3.500 ha. The most natural parts comprising an area of 1.965 ha, are proposed as a component part of the extended World Heritage Property. The primeval and old growth Beech forests are embedded in a natural landscape of alpine Krummholz-belt, rock and scree areas as well as alpine grasslands. These natural vegetation zones above the beech forest zone are included in the component part and will ensure that no negative human influence is to be expected from the higher zones and a natural development due to expected global warming change into higher elevation belts is possible.

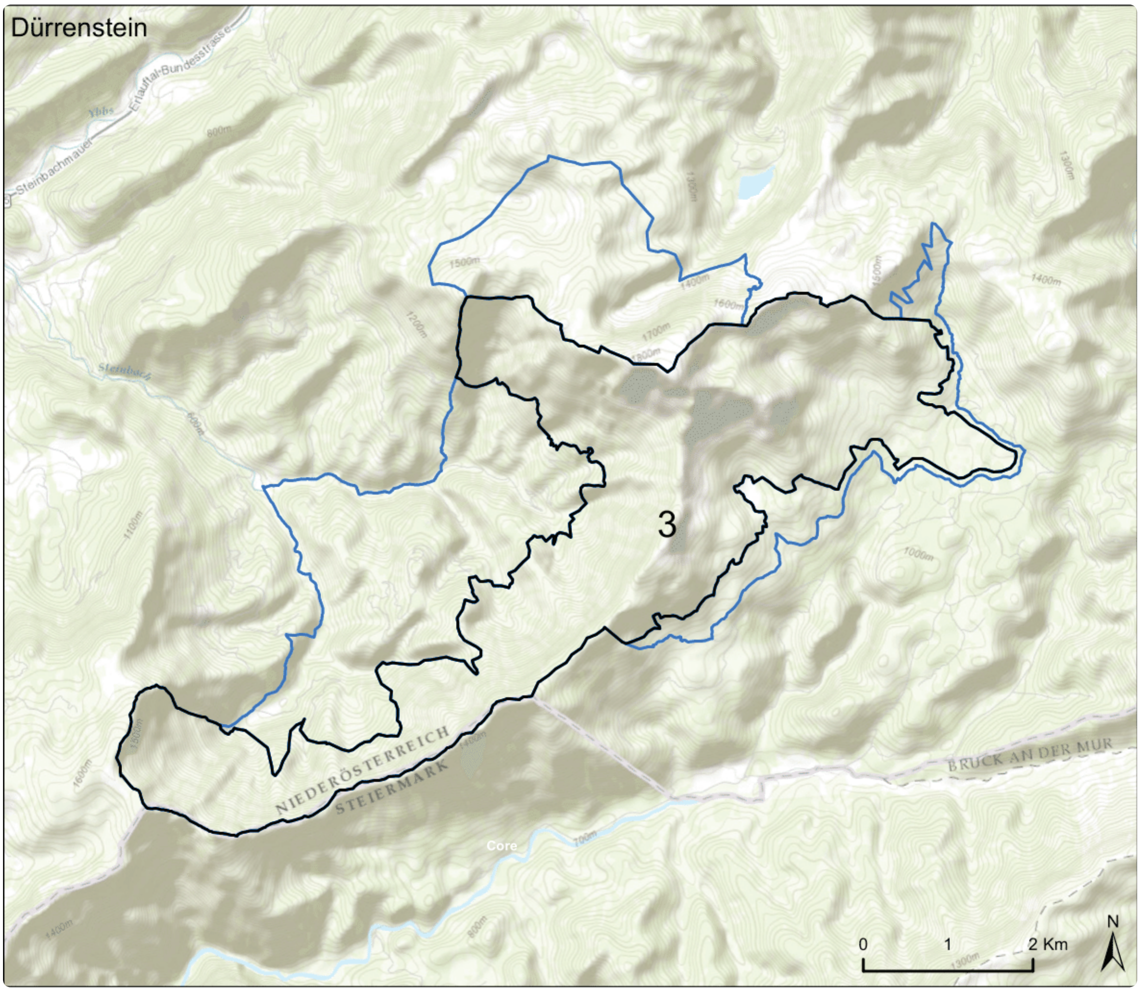


Figure 6: Zonation of Dürrenstein, Austria

World Heritage Site

Buffer Zone

Joint occurence of beech and larch. Picture: R. Mayr (Kalkalpen National Park)

1.f.4 *Austria: Kalkalpen (004, 005, 006, 007)*

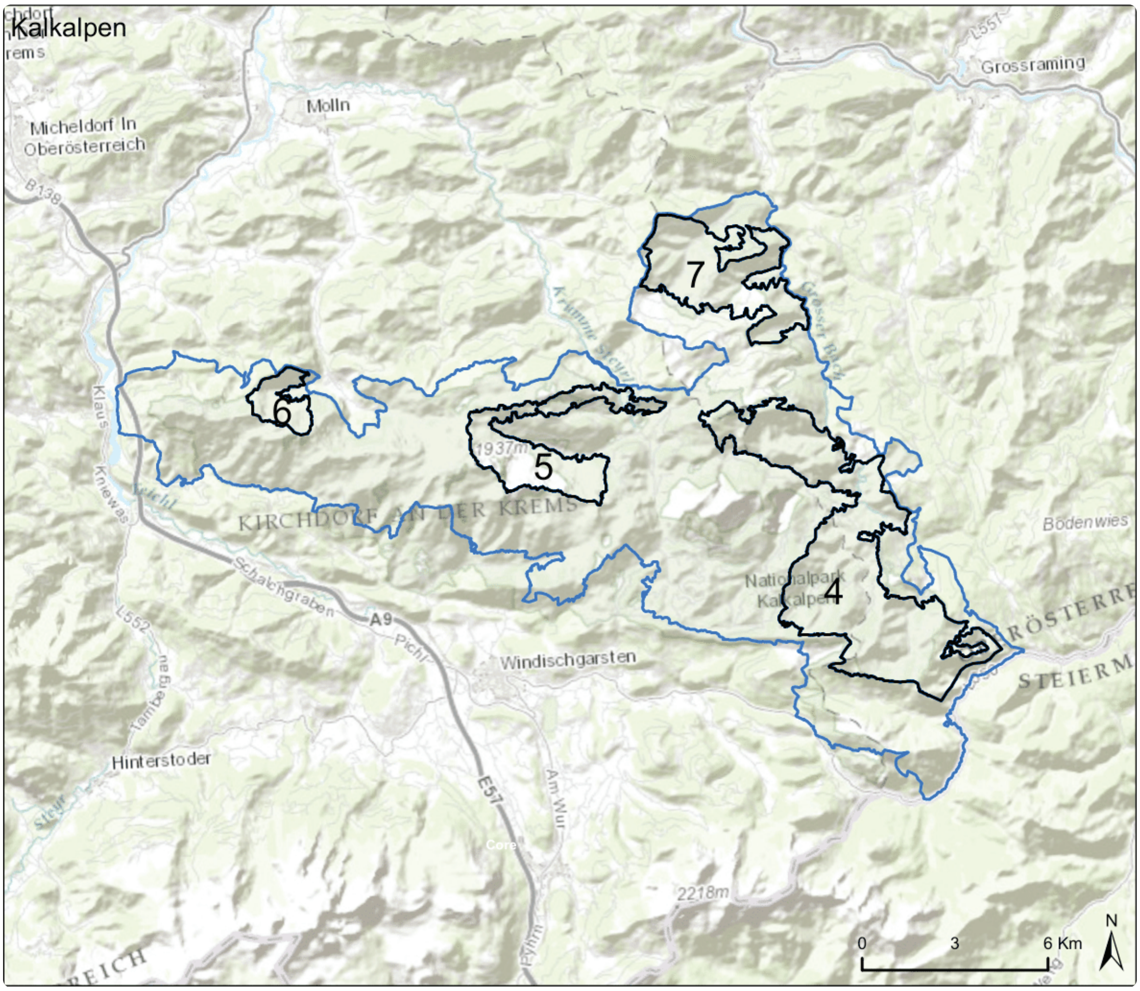
The component part Kalkalpen consists of four areas with high valuable beech forests that are embedded within the boundaries of the Kalkalpen National Park (IUCN II) and cover about one quarter of the total protected area. The remaining three quarters of the National Park area, which are free from forest utilization and intensive land use, are proposed to buffer the property.

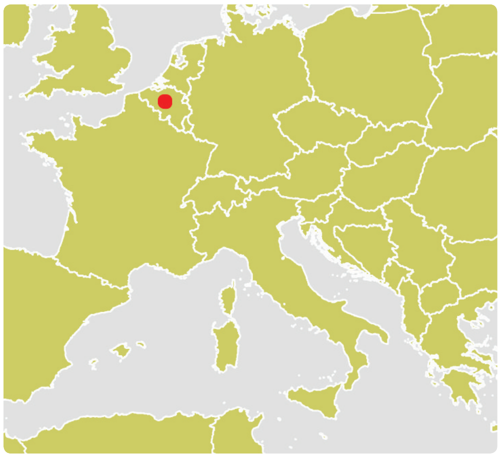
The borders of the component parts are mainly composed of biogeophysical barriers. Urlach and Bodinggraben are both bounded by the mountain ridges of the Sengsengebirge. Where the proposed component parts adjoin the borders of the National Park, a distance of at least 50 meters was considered as a buffer. The outer border of the buffer zone is in large parts equivalent to the national park border.

Figure 7: Zonation of Kalkalpen, Austria

World Heritage Site

Buffer Zone



Autumn in the Sonian Forest. Picture: P. Huvenne

1.f.5 *Belgium: Sonian Forest (008, 009, 010, 011, 012)*

The component parts are located inside the Sonian Forest boundaries. There is a strict zone of 50 m around each reserve where only security measures can be taken, while the entire forest acts as a less strict buffer zone where the sustainable and multifunctional forest management ensures its protection. “Joseph Zwaenepoel” and the Walloon forest reserve are completely embedded by buffer zones. “Grippensdelle” is bordered by a railroad and a traffic road and is connected with the buffer zones by a wildlife overpass bridging the railroad; another wildlife bridge is planned to connect this reserve with the extension on the other side of the road. A patchwork of set-aside areas and senescence islets with typical old beech trees and a high amount of deadwood will reinforce the ecological value.

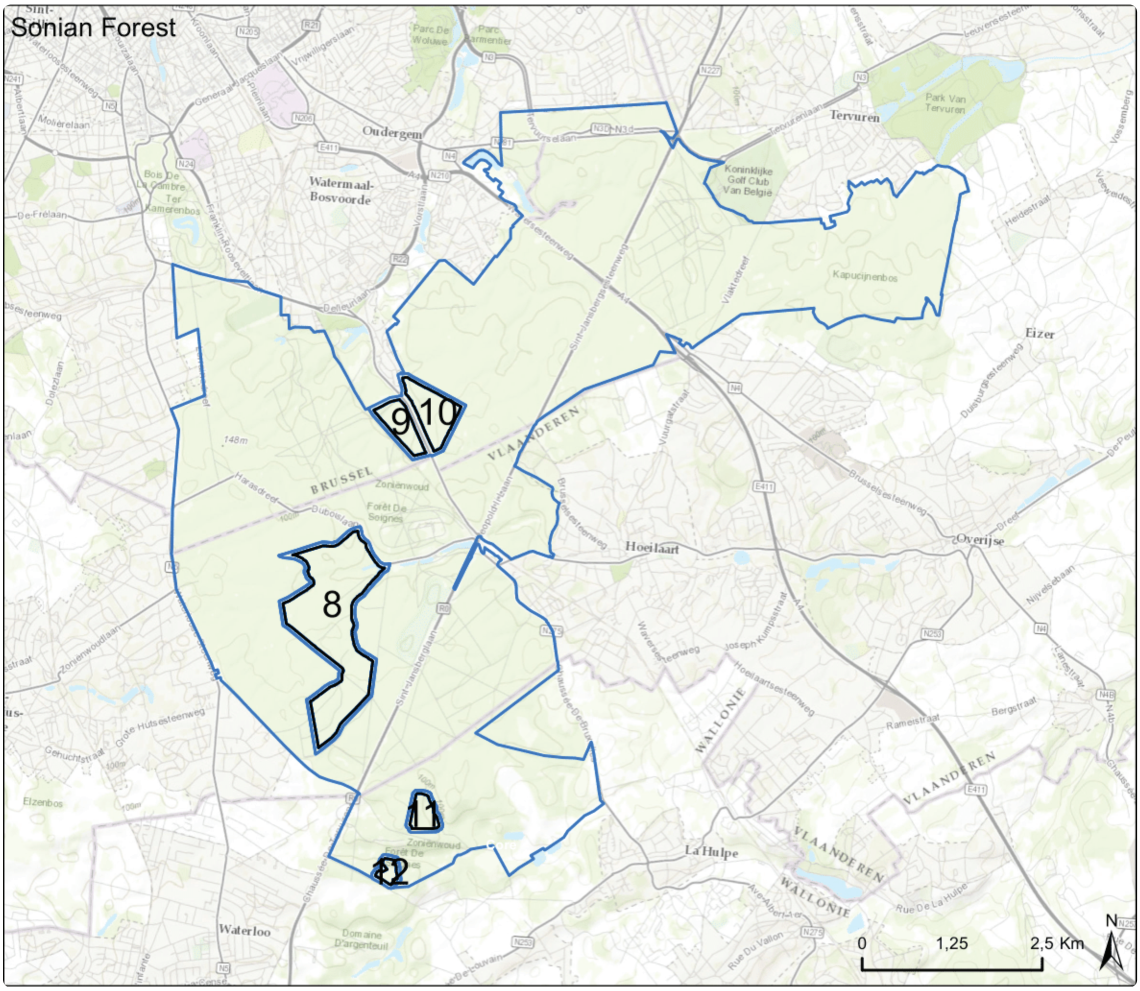


Figure 8: Zonation of Sonian Forest, Belgium

World Heritage Site

Buffer Zone

Sokolna Reserve. Picture: A. Ispirev (Central Balkan National Park)

1.f.6 *Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)*

The nominated component parts of Central Balkan are located entirely inside the borders of the existing 9 strict nature reserves (IUCN Ia), which fall within the boundaries of Central Balkan National Park (IUCN II). The total area of the proposed component parts is 10,988.91 ha, which is around 55% of the reserve's territory of the Park and around 15% of the whole Park's territory. Where the component parts' border areas are close to the Park border or to areas of the Park's multifunctional zone with livestock grazing, buffer zones were established. However, in several sections of the boundary there are natural barriers like mountain ridges, river valleys etc., therefore the buffer zone is not necessary in some parts.The whole territory of the Park is exclusive state property and there is no intensive use of mountain resources.

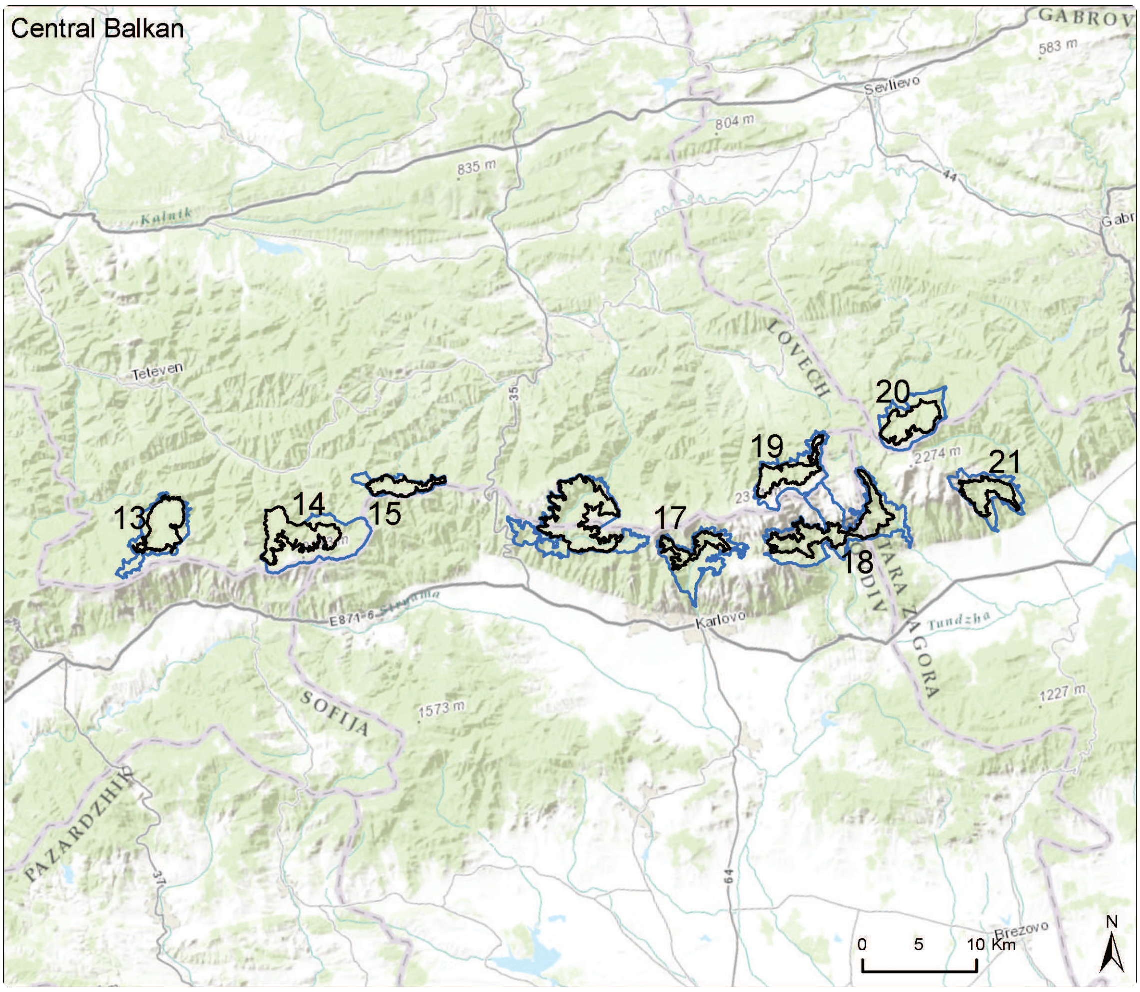
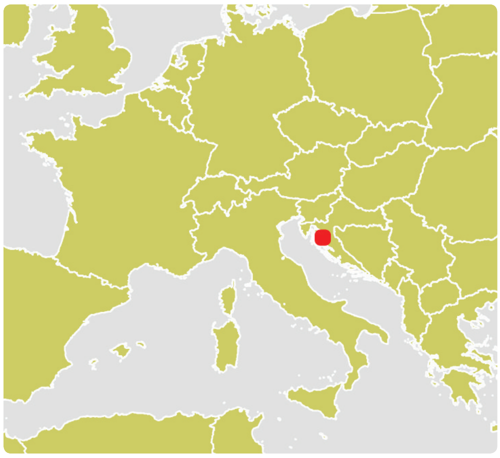


Figure 9: Zonation of Central Balkan, Bulgaria

World Heritage Site
Buffer Zone



Lichen in Northern Velebit. Picture: S. Renje (Northern Velebit National Park)

1.f.7 *Croatia: Hajdučki i Rožanski Kukovi (022)*

Hajdučki and Rožanski Kukovi is a Strict Reserve with the coordinates East 14.991955 and North 44.764827, and an altitude of 1,300 to 1,676 m.a.s.l. It is located within Northern Velebit National Park (the whole area of the National Park is the proposed buffer zone). The main types of beech forests inside of Reserve are Ranunculo platanifolii-Fagetum and Polysticho lonchitis-Fagetum. They are characterized by a specific shape of trees: their trunk is bend or they have krummholz shape due to harsh climate conditions and large amounts of snow.

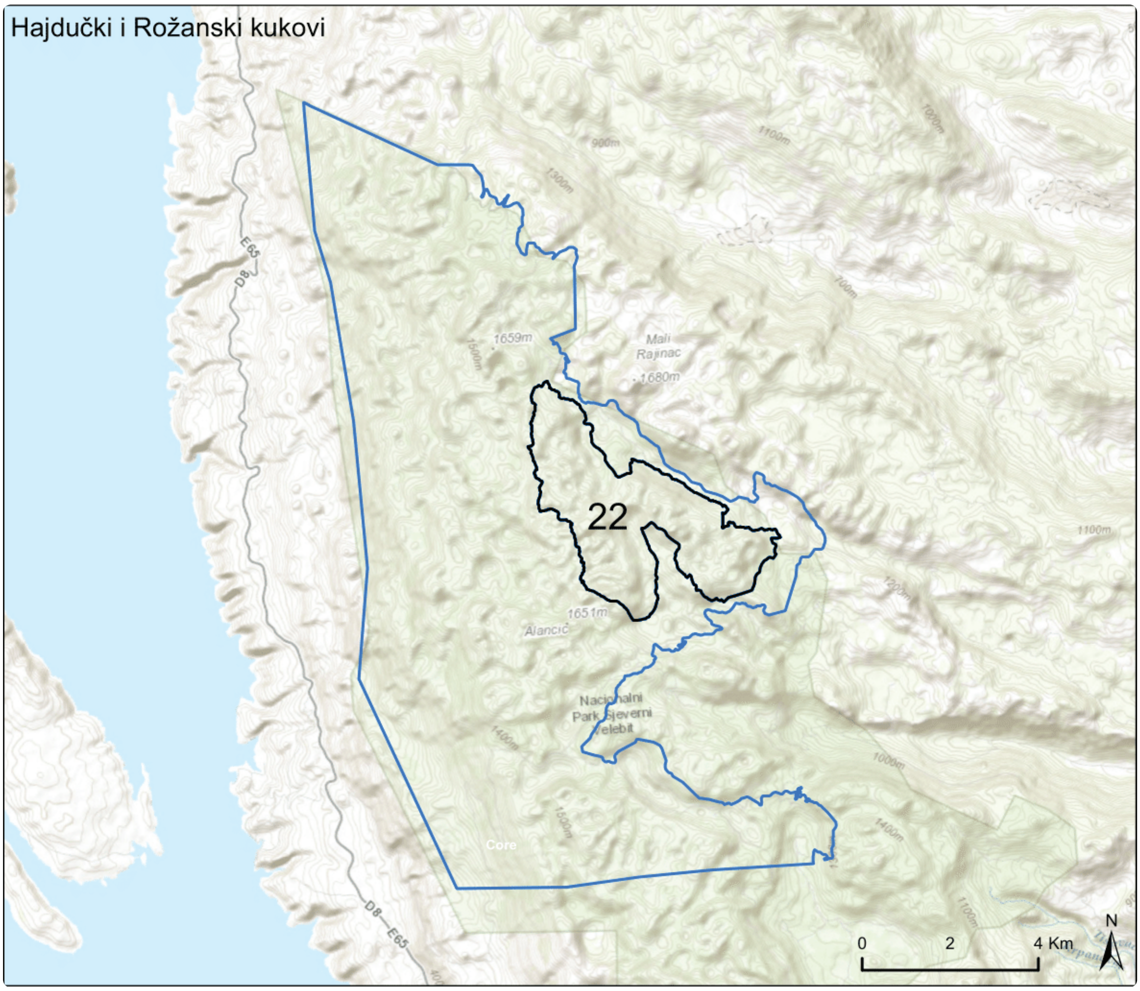


Figure 10: Zonation of Hajdučki i Rožanski kukovi, Croatia

World Heritage Site

Buffer Zone

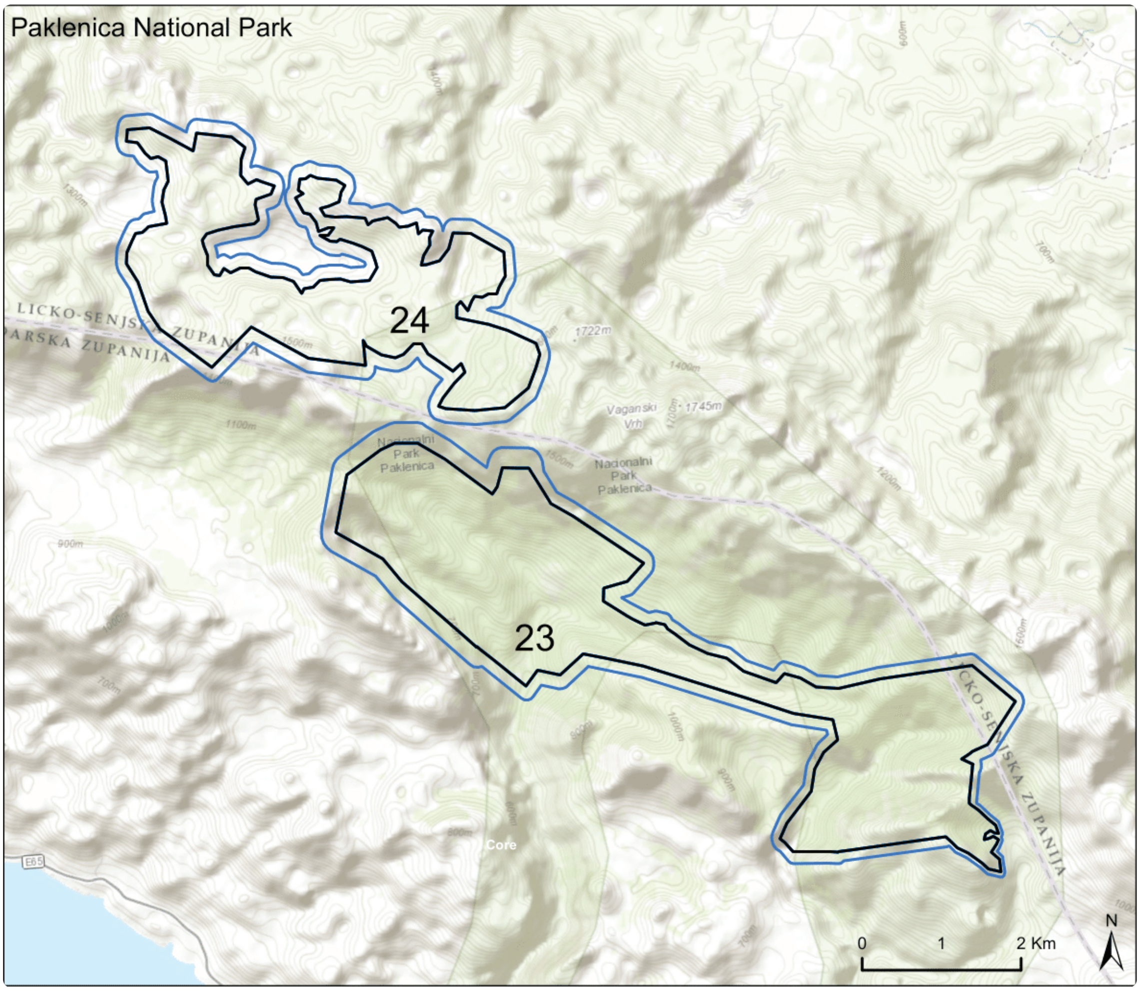
Beech forest of Paklenica National Park. Picture: G. Lukač (Paklenica National Park)

1.f.8 *Croatia: Paklenica National Park (023, 024)*

The component parts of nominated forest beech habitats represent one of the oldest old-growth beech forests without exploitation for more than 100 years. The two clusters are named Oglavinovac-Javornik and Suva draga-Klimenta. The primeval beech forest is located in the Paklenica National Park (IUCN II) and has a core zone of 2,842 ha and buffer zone of 1,421 ha. The total surface of the nominated forest type is 4,263 ha, which covers 44.9% of Paklenica National Park.

Figure 11: Zonation of Paklenica National Park, Croatia

☐ *World Heritage Site*
☐ *Buffer Zone*



Trunk and branches. Picture: B. D'Amicis

1.f.9 Italy*:* Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

The nominated area is a component cluster of 5 beech forests covering 937 ha entirely within the Abruzzo, Lazio and Molise National Park. All component parts but one are protected as strict reserves equivalent to IUCN I (the exception is a general reserve, corresponding to IUCN II), and their borders are generally buffered by IUCN I areas or mountain barriers. The IUCN II component part (Coppo del Morto) was affected in the past by low-intensity forestry in its surroundings, thus a buffer zone was established around it.

All component parts are on public land belonging to the Municipalities they fall in, and the National Park has a legally binding agreement with them to prevent intensive land-use or forestry within these strict reserves.

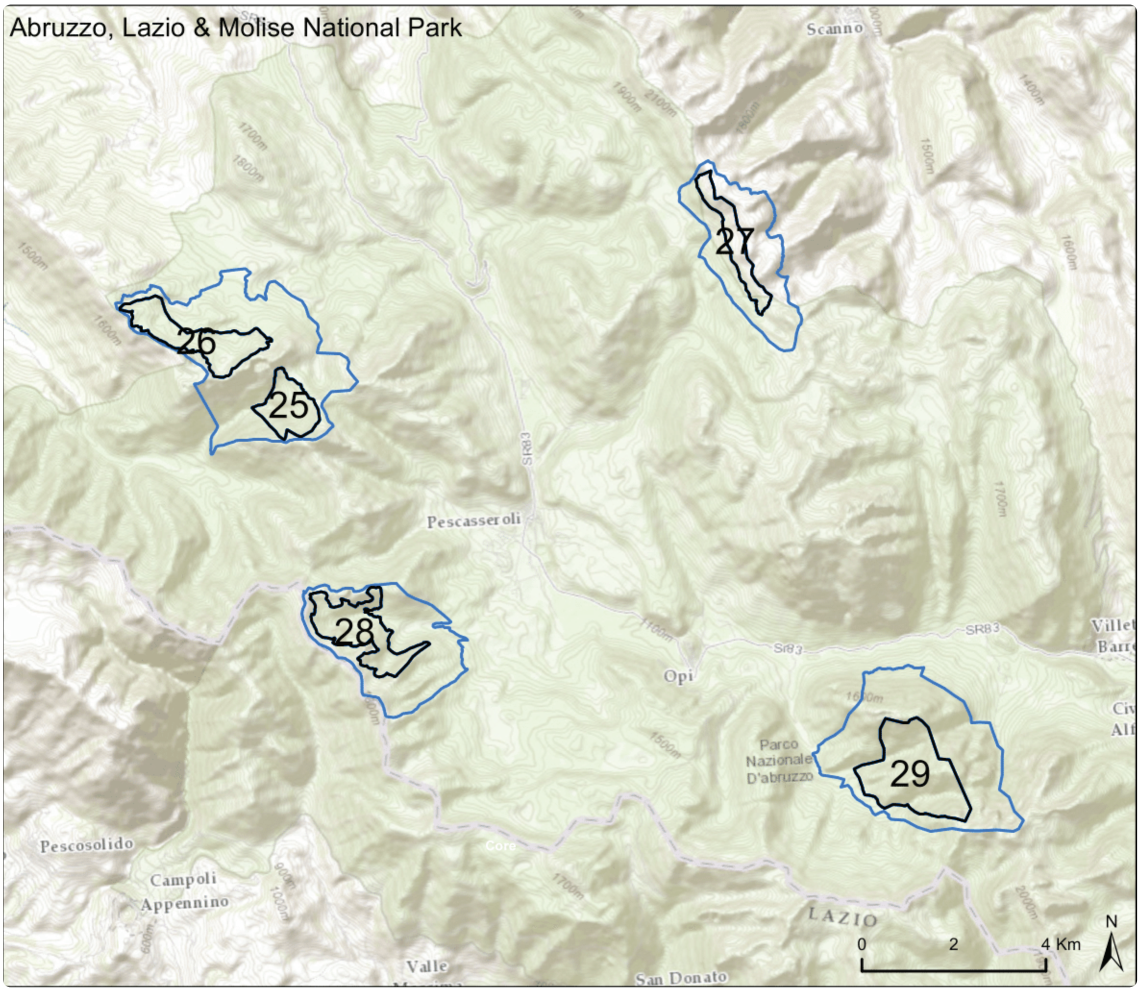
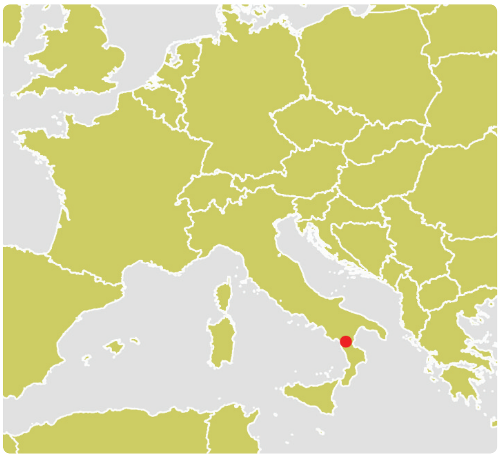


Figure 12: Zonation of Abruzzo, Lazio and Molise National Park, Italy

World Heritage Site

Buffer Zone



Mediterranean mountain landscape in Cozzo Ferriero. Picture: G. Piovesan

1.f.10 *Italy: Cozzo Ferriero (030)*

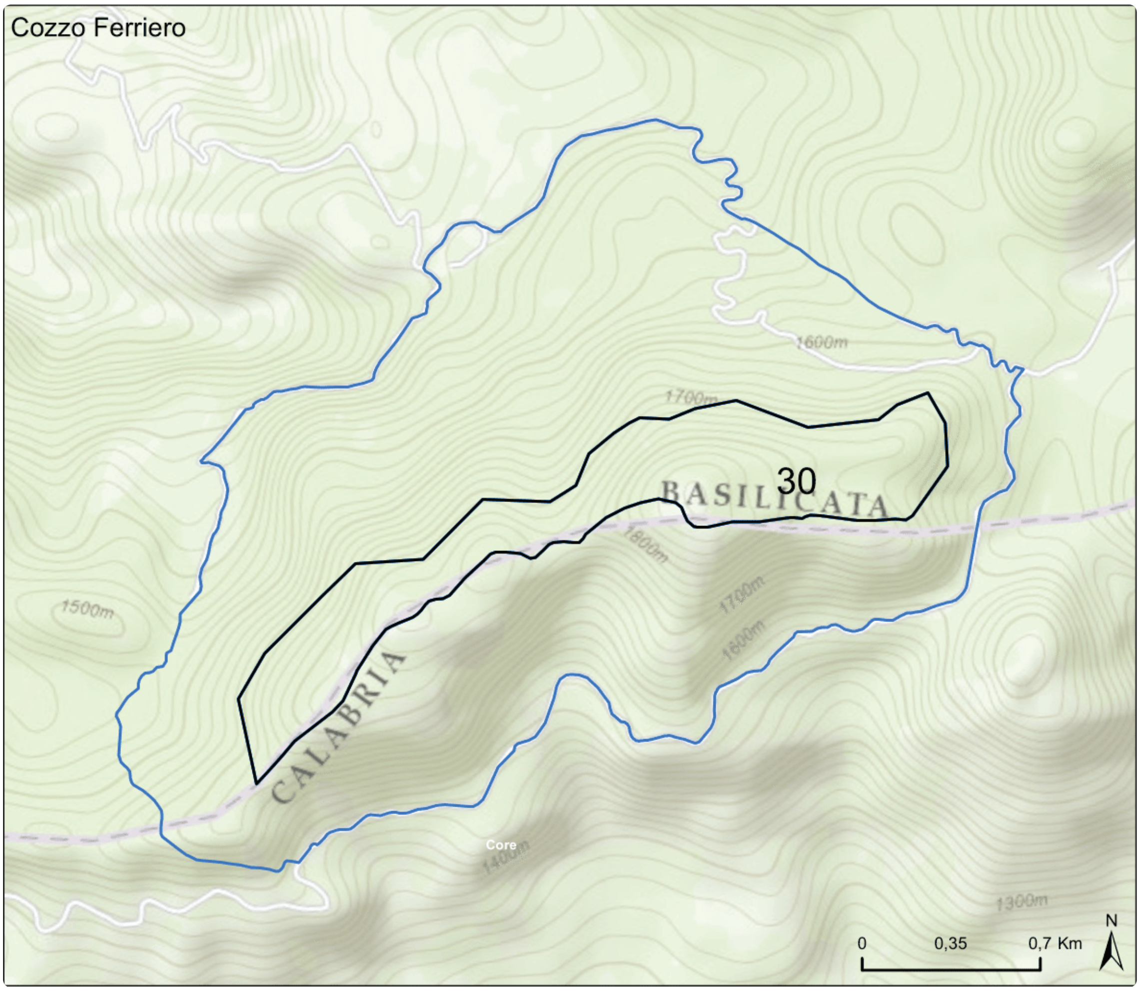
The component part is located in the Cozzo Ferriero Strict Reserve (IUCN Ia) within the Pollino National Park (192,000 ha), the largest protected area in Italy. It covers 0.05% of the National Park, 0.26% together with the buffer zone. The whole area is public property. It ranges from the top of the mountain Coppola di Paola and spreads along its steep slopes in a wild area free of human land use.

The component part is buffered by forest areas and rock cliffs that are either strictly protected (IUCN I), or otherwise equivalent to IUCN II, i.e. areas where only localized actions are allowed to restore the natural structural and compositional attributes of the stand altered by past commercial logging. The boundary with Calabria is characterized by rocks and mountain barriers representing a natural buffer zone.

Figure 13: Zonation of Cozzo Ferriero, Italy

World Heritage Site

Buffer Zone



Old-growth beech forests in Gargano National Park. Picture: G. Piovesan

1.f.11 *Italy: Foresta Umbra (031)*

The nominated component part Foresta Umbra is made of the two Forest Reserves (Foresta Umbra, Falascone) located within the Gargano National Park. The component part covers an overall area of 182 ha, protected as a Strict Reserve (equivalent to IUCN I) and property of the State. Their protection is in charge of the staff of a permanent office of the National Forest Service.

The component part is surrounded by a buffer zone covering 1,752.54 ha, totally included in the Gargano National Park (118,144 ha). The buffer zone is made up of high-forests managed with a priority given to nature conservation under the surveillance of the Park (equivalent to IUCN II). The ownership of the buffer zone belongs to the Region Puglia.

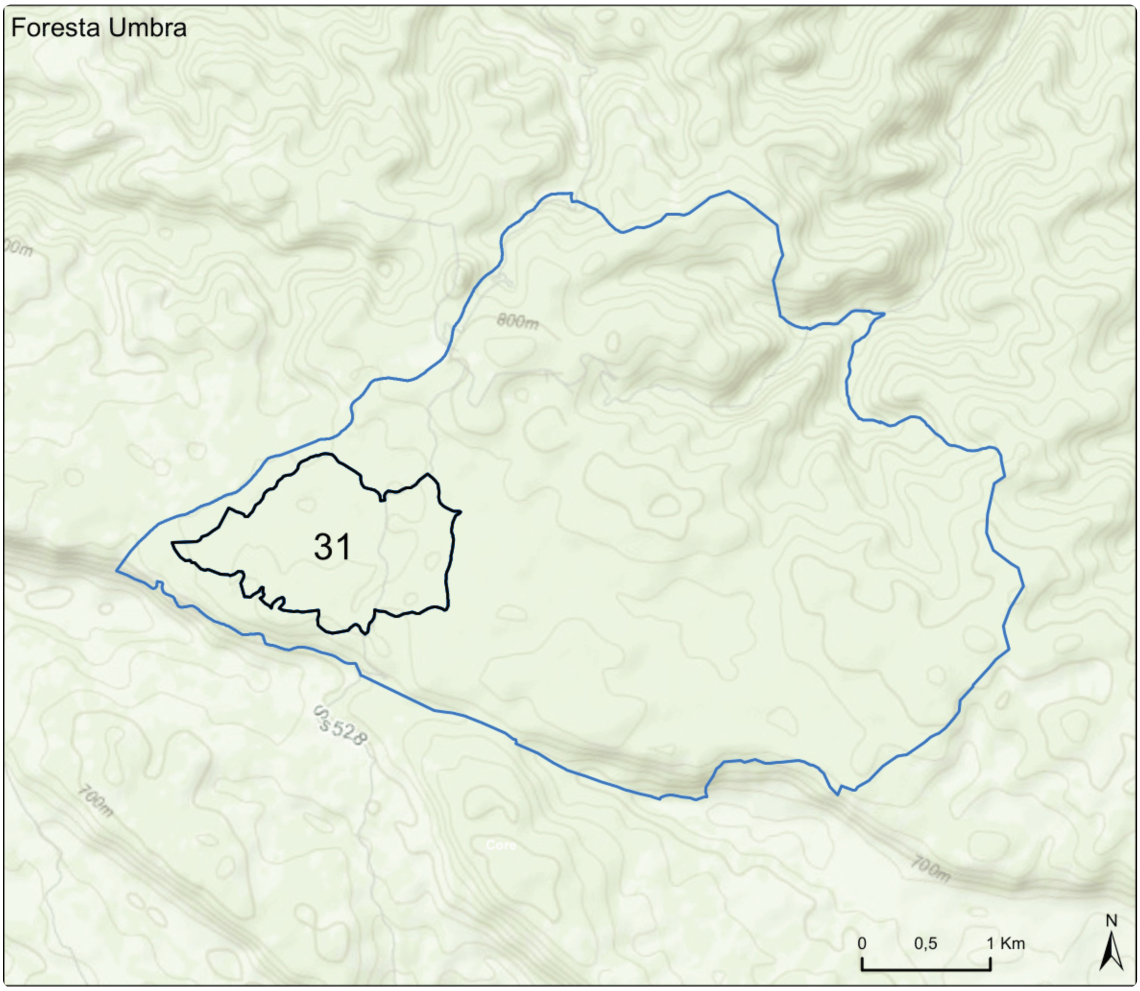
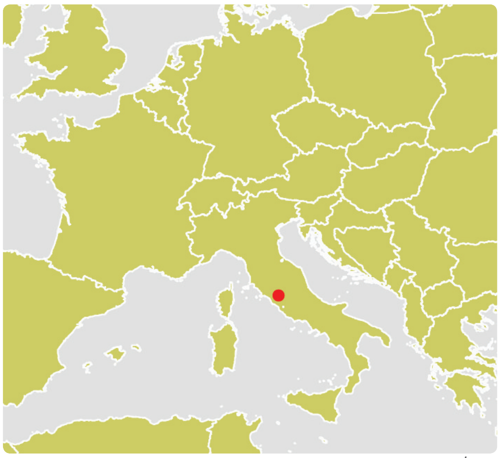


Figure 14: Zonation of Foresta Umbra, Italy

World Heritage Site
Buffer Zone



Large beech trees in the volcanic rocky landscape of Monte Cimino. Picture: G. Piovesan

1.f.12 *Italy: Monte Cimino (032)*

The Monte Cimino beech forest is located in the Municipality of Soriano nel Cimino, Viterbo Province, Lazio Region.

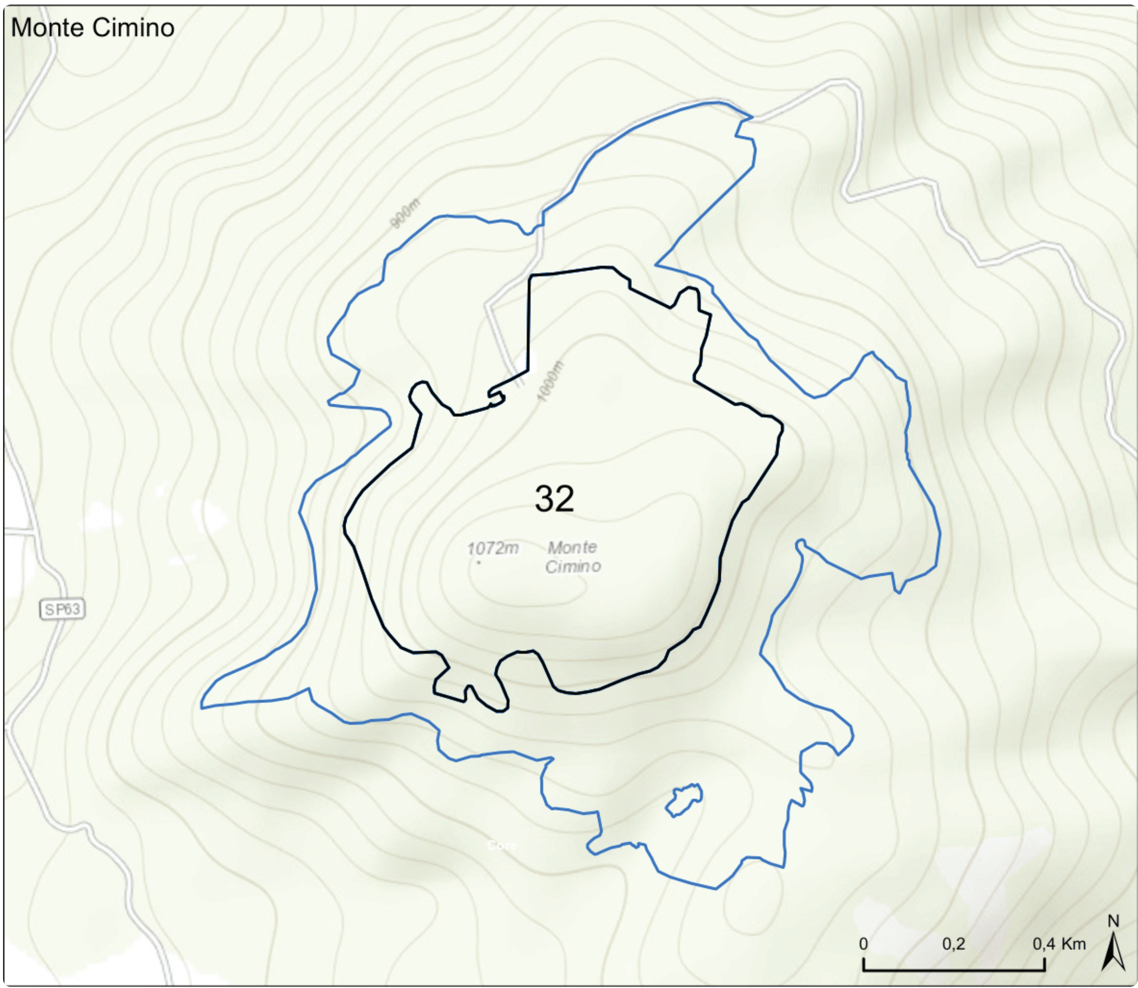
It is property of the Municipality that protects it as a Strict Reserve (equivalent to IUCN I) via its Forest Management Plan. The site has been nominated to be recognized as a Natural Monument by the Regional Administration.

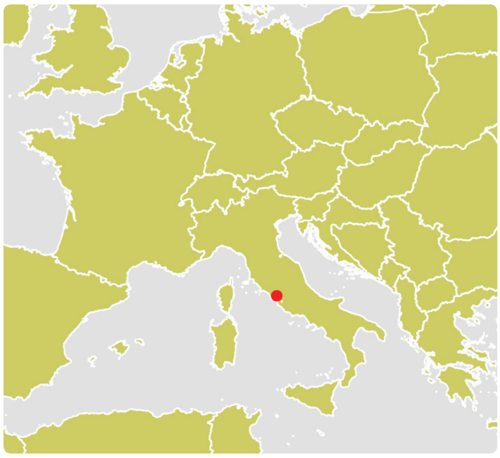
The component part is buffered by public chestnut forests, owned by the Municipality. These forests were managed as coppice in the past but, due to their unfavorable site conditions, have long been excluded from logging, and now beech (and other tree species) regeneration is expanding. The only silvicultural activities planned in the buffer area are localized and aimed at the protection of the component part.

Figure 15: Zonation of Monte Cimino, Italy

☐ *World Heritage Site*

☐ *Buffer Zone*





Optimal stage of the structural cycle in Monte Raschio. Picture: G. Piovesan

1.f.13 *Italy: Monte Raschio (033)*

The component part is located within the Bracciano-Martignano Natural Park, part of the Lazio Administrative Region. It occupies about 74 ha (0.4% of the Park) in an area possessed by the Region and prescribed as a Strict Reserve (corresponding to IUCN I) by the Park's Management Plan.

The proposed buffer zone occupies 54.75 ha pertaining to public property (Region). It is mostly occupied by forests, where only localized actions are allowed to restore the natural attributes altered by past commercial logging or artificial tree plantations. In the part of the northeastern slope of the mountain, beech trees are directly in contact with agricultural areas: in this case, an external 70 m strip of the beech forest has been subtracted from the component part and destined to buffering functions.

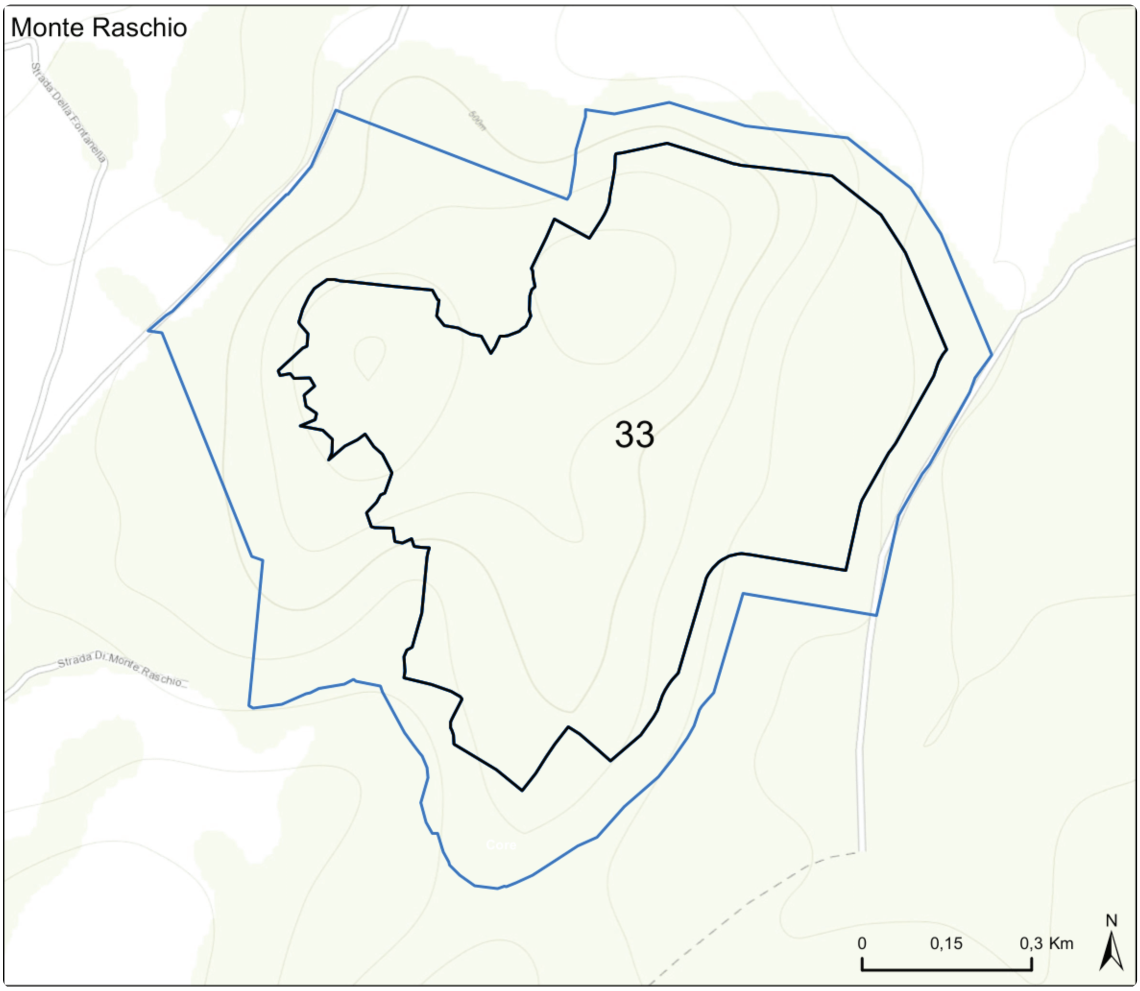


Figure 16: Zonation of Monte Raschio, Italy

World Heritage Site

Buffer Zone

View of Sasso Fratino Integral Reserve. Picture: N. Agostini (Comunità del Parco)

1.f.14 *Italy: Sasso Fratino (034)*

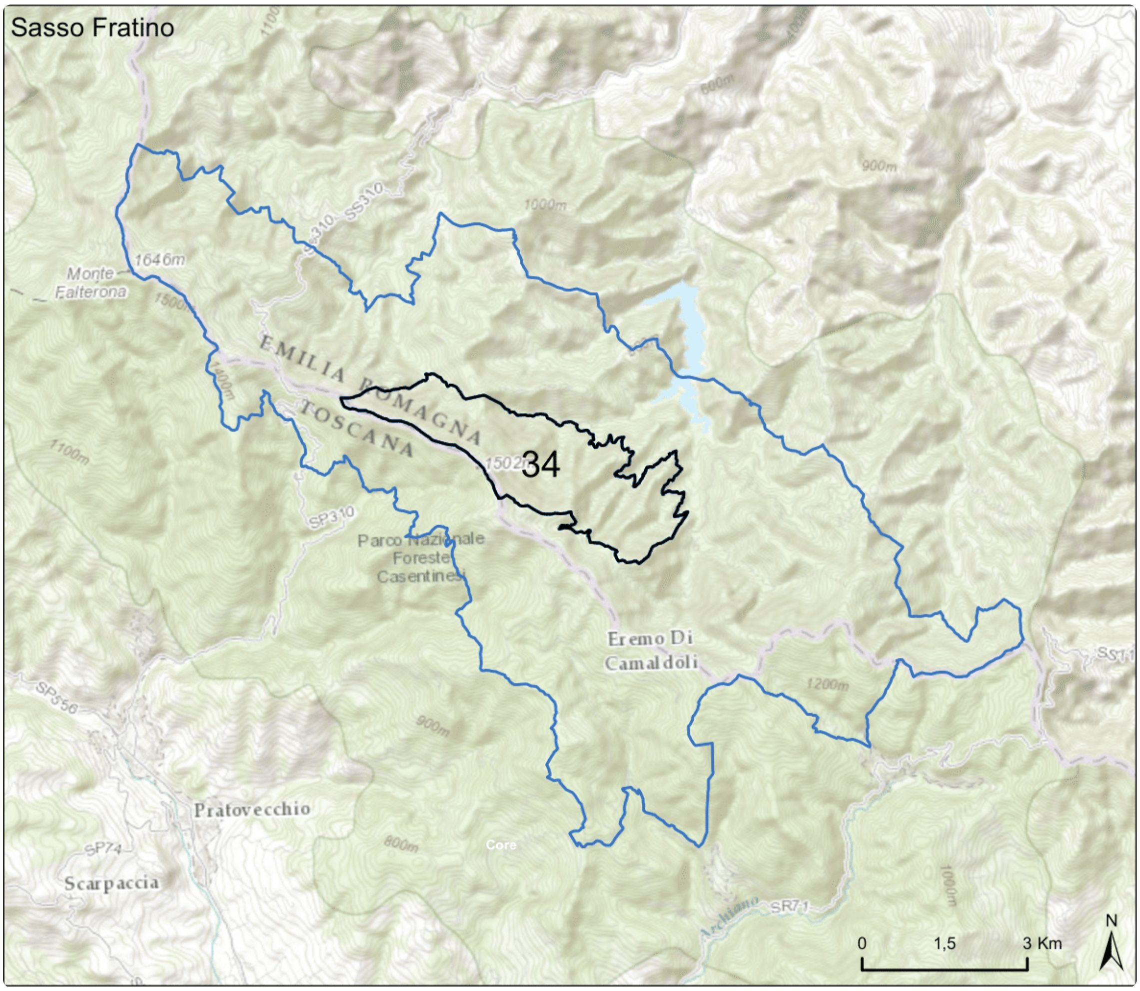
The component part is located within the Sasso Fratino Strict Reserve (equivalent to IUCN Ia), part of the Foreste Casentinesi National Park. Sasso Fratino itself covers 2.1% of the National Park, 20.9% with the buffer zone.

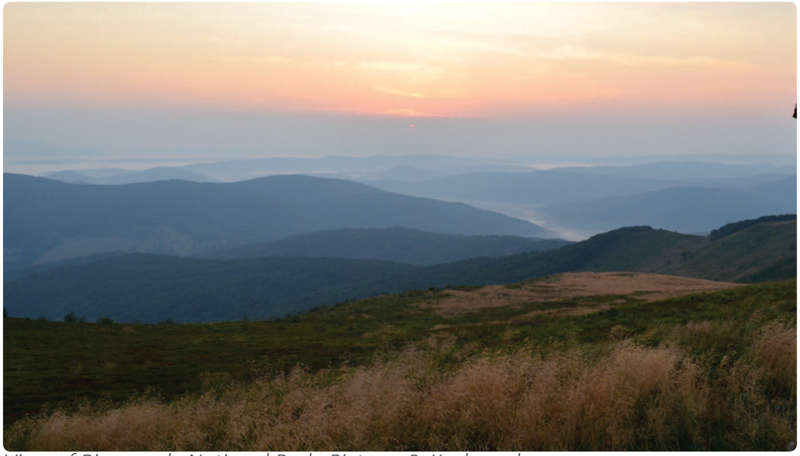
Most of the buffer area pertains to public property, except for 1.3% which is private property. The component part is buffered by forest areas that are either strictly protected, or otherwise areas where only localized actions are allowed to restore the natural structural and compositional attributes altered by past commercial logging (equivalent to IUCN II). Some buffer areas pertain to parts of the Sasso Fratino Reserve outside of the component part and to the Strict Reserve La Pietra, the others pertain to a part of the so-called Riserve Biogenetiche Casentinesi.

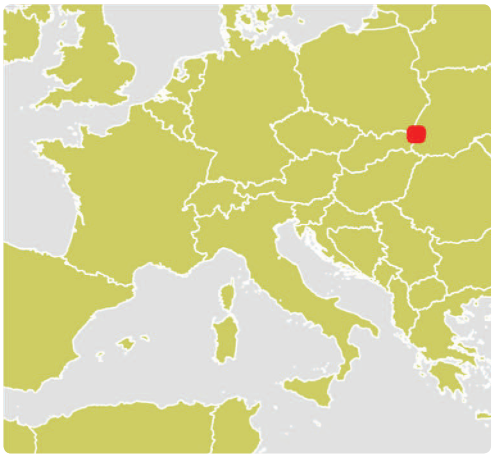
Figure 17: Zonation of Sasso Fratino, Italy

World Heritage Site

Buffer Zone







View of Bieszczady National Park. Picture: S. Kucharzyk

1.f.15 *Poland: Bieszczady (035, 036, 037, 038)*

The proposed component cluster is part of the Bieszczady National Park (approx. 11% of the National Park area), including the best-preserved areas of beech forests of a primeval character with four large component parts: Polonina Wetlinska and Smerek (the Tworylczyk Stream Valley and the Hylaty Stream Valley) in the northwest, the Border Ridge and the Upper Solinka Valley in the southwestern part of the National Park, the Wołosatka Stream Valley and the Terebowiec Stream Valley in the southeast. The buffer zone is composed of the remaining part of the Bieszczady National Park with a total surface area of 24,564.46 hectares.

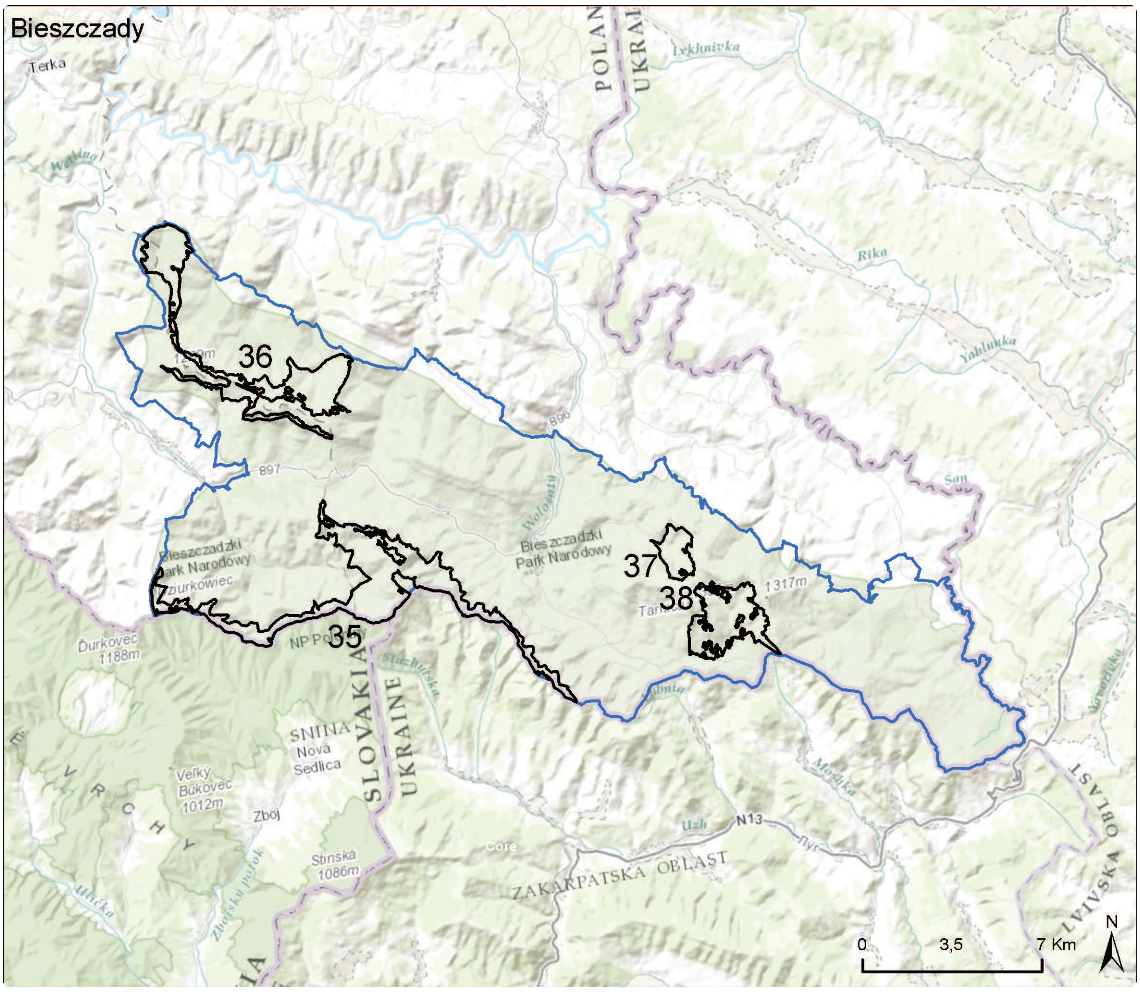
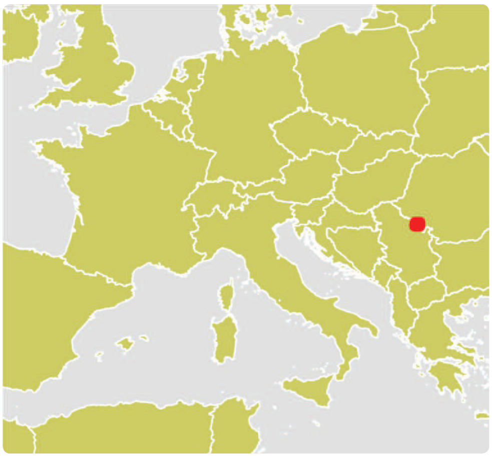


Figure 18: Zonation of Bieszczady, Poland

World Heritage Site

Buffer Zone



View of Cheile Nerei. Picture: D.-O. Turcu

1.f.16 *Romania: Cheile Nerei-Beușnița (039)*

The Cheile Nerei-Beusnita nominated component part is a large complex of beech forests: 4,292.27 ha enveloped in a buffer zone of 5,959.87 ha. The forest stands are characterized by a high degree of naturalness, situated in a landscape covered up to 80% by forests predominantly formed by beech. The limits of the nominated component part are natural, on ridges, being themselves a shelter.

This forest suffered only minor human influences during the history; being relatively isolated and inaccessible, it was preserved, despite the fact that logging was present in the area not far from the nominated component part. The nominated component part is a Nature Reserve (with no intervention), part of a National Park. The buffer zone also has natural limits: mountain and hills ridges.

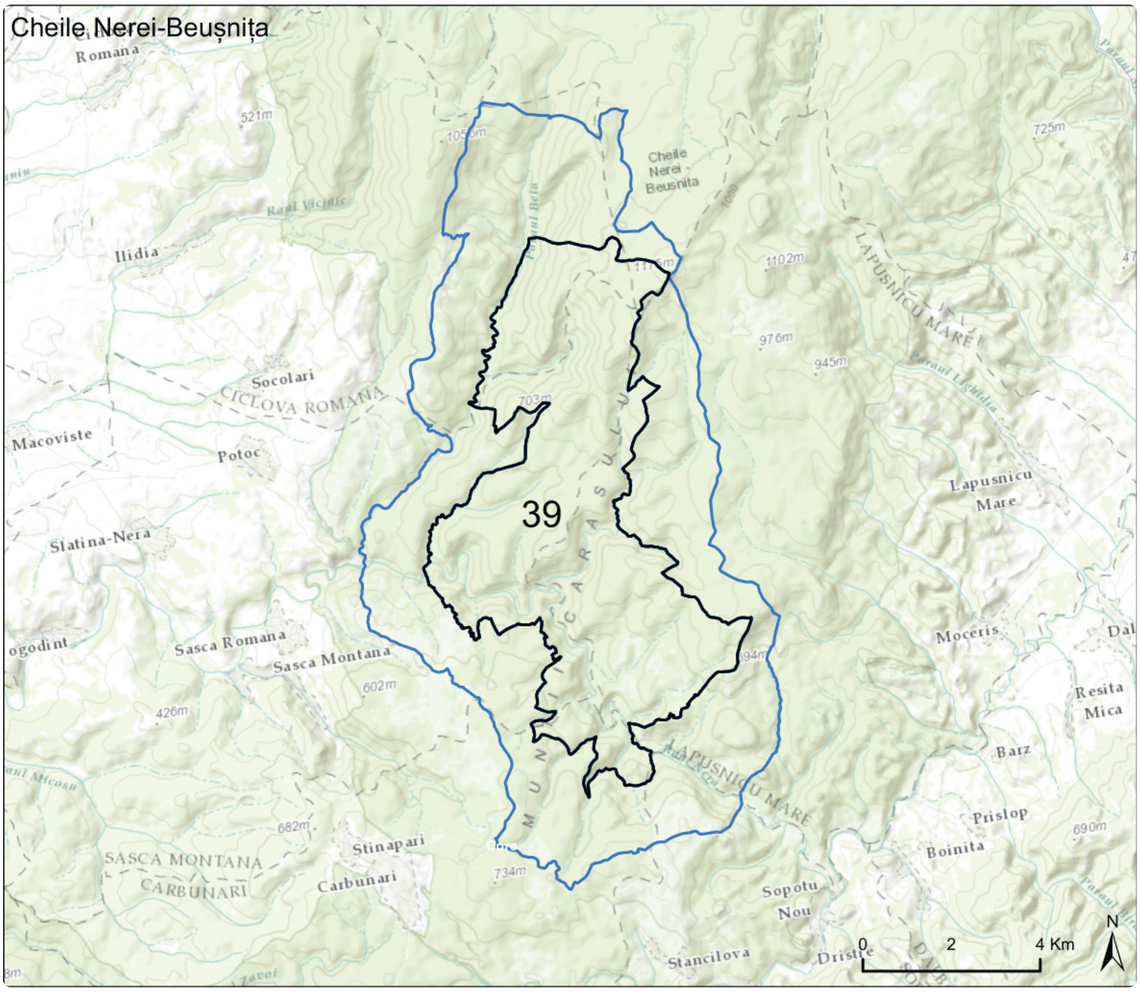
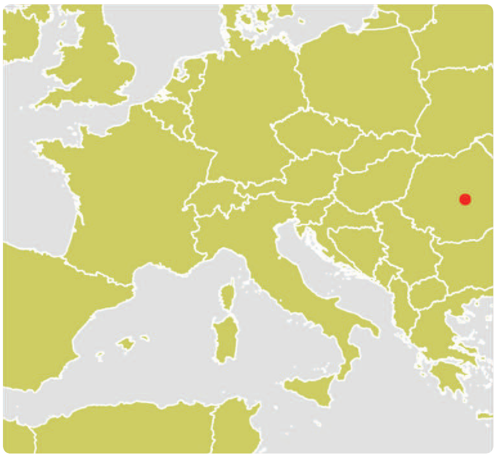


Figure 19: Zonation of Cheile Nerei-Beușnița, Romania
World Heritage Site
Buffer Zone



Inside Sinca forest. Picture: RPL OS Padurile Sincii RA

1.f.17 *Romania: Codrul Secular Șinca (040)*

The nominated component part is located in the central part of the country, in the Southern Carpathians, in the eastern part of Fagaras Massif, on the northern slopes of Ţaga Mountains. The component part covers exclusively forested areas and is located in a compact and extended forest massif. The buffer zone consists of mixed forest parcels that completely surround the property. Both the property and the buffer area have natural relief boundaries consisting mostly of crests and coinciding with forestry parcels' boundaries clearly identifiable in the field and stable across time.

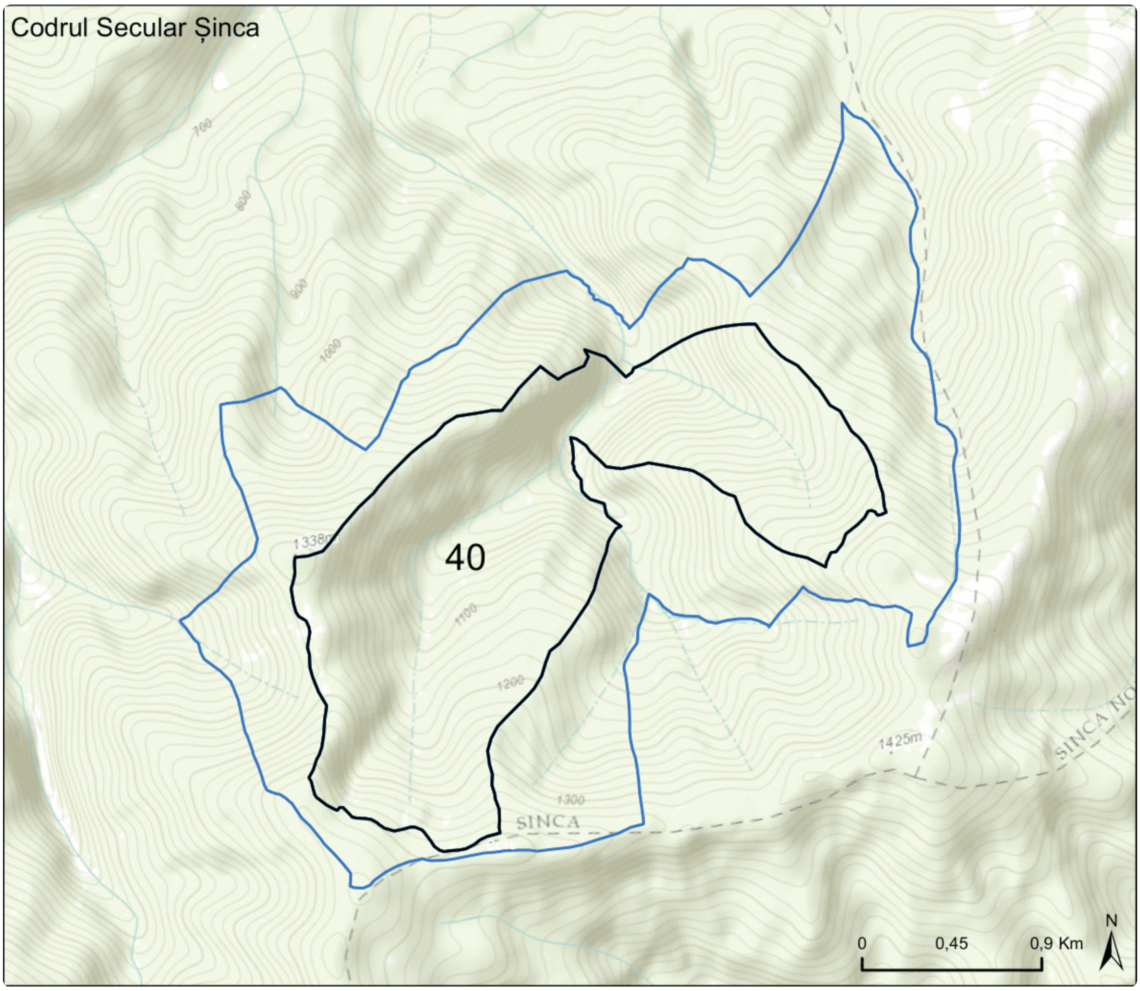
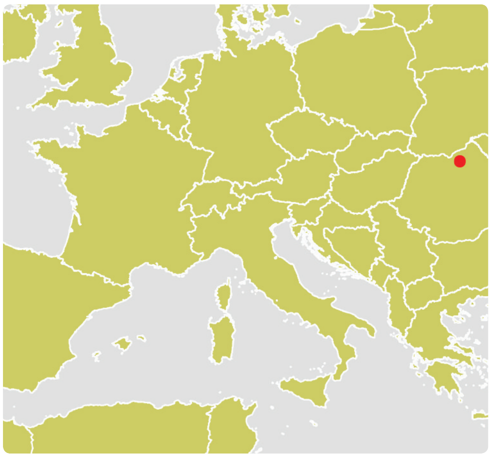


Figure 20: Zonation of Codrul Secular Șinca, Romania

World Heritage Site

Buffer Zone



General view of Slătioara Forest. Picture: I. Ichim

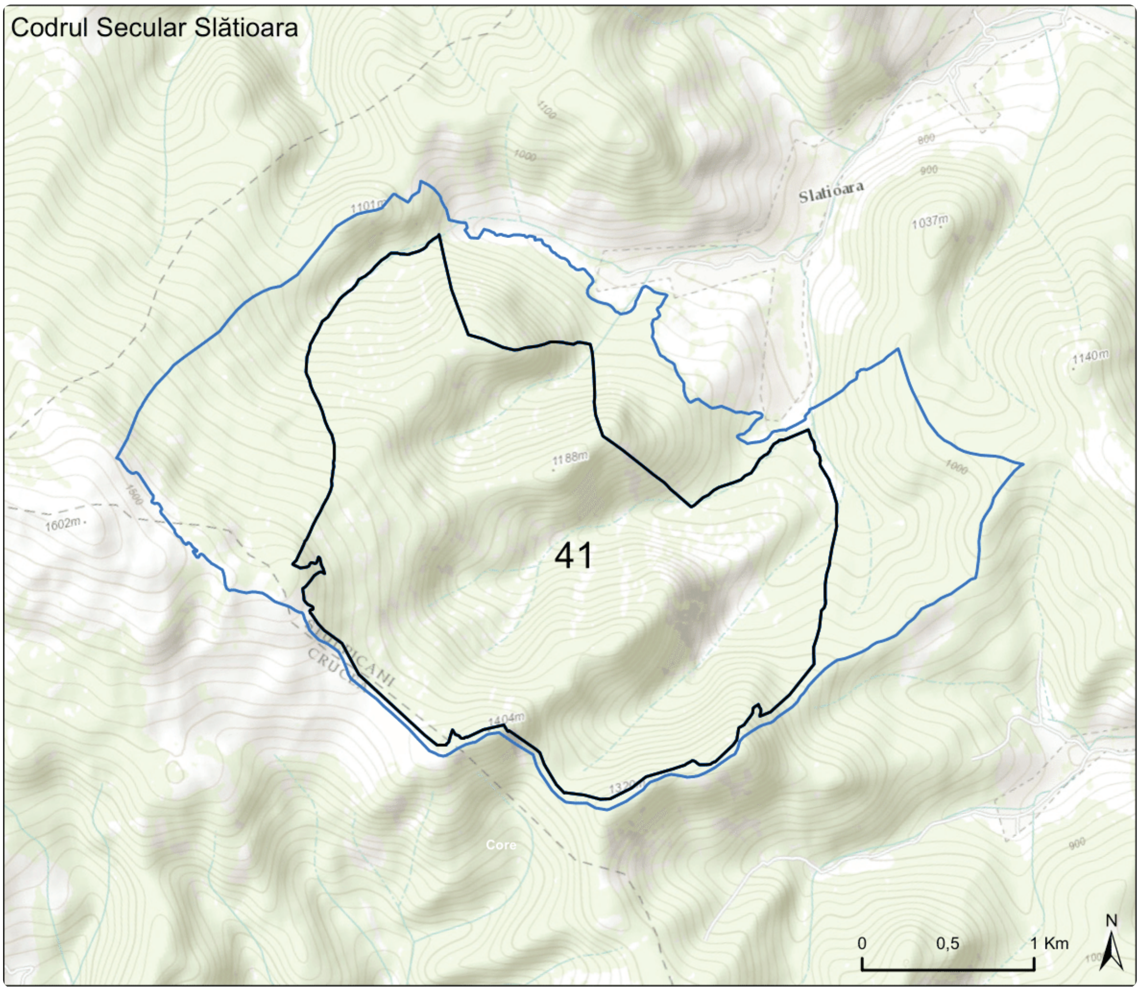
1.f.18 *Romania: Codrul Secular Slătioara (041)*

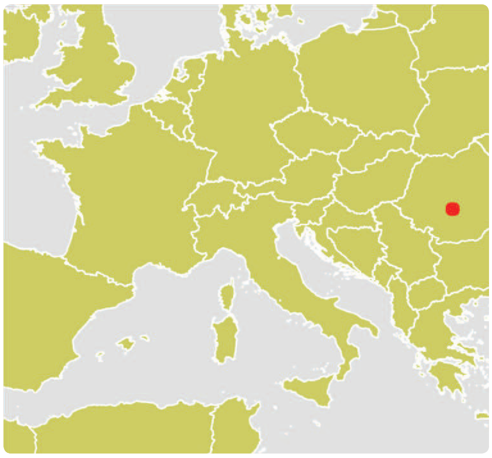
The nominated property Slătioara is composed of one component of 609 ha, surrounded by a buffer zone of 429.4 ha. The component is situated entirely within the strictly protected zone (core area) of Codrul Secular Slătioara forest reserve. In the western and southern part of the component part, a small buffer area was delineated, which follows natural limits (valley and ridges, respectively). The component part is part of the Natura 2000 site Rarău-Giumalău (ROSCI0212), covering about 24% (42% including the component buffer zone) of its area. The upper part consists of a Floristic Reserve (The Secular Meadows Todirescu).

Figure 21: Zonation of Codrul Secular Slătioara, Romania

World Heritage Site

Buffer Zone





View of Cozia National Park. Picture: C. Buduleci (Cozia National Park)

1.f.19 *Romania: Cozia (042, 043)*

The nominated component cluster Cozia is located in the central part of the Southern Carpathians, on their southern cline. It is entirely included in Cozia National Park (CNP) (IUCN II), covering 28% of its surface. The component cluster Cozia consists of two component parts, Masivul Cozia and Lotrisor, that are separated by Olt Defile. Both component parts are situated entirely in the strictly protected zone of CNP. The component part Cozia is limited by steep mountain ridges and steep rocky slopes of Olt Defile, ensuring a natural protection of the nominated area. The component parts are surrounded by a buffer zone, entirely covered with forests located largely in the strictly protected zone and the rest of it in the sustainable management zone of CNP.

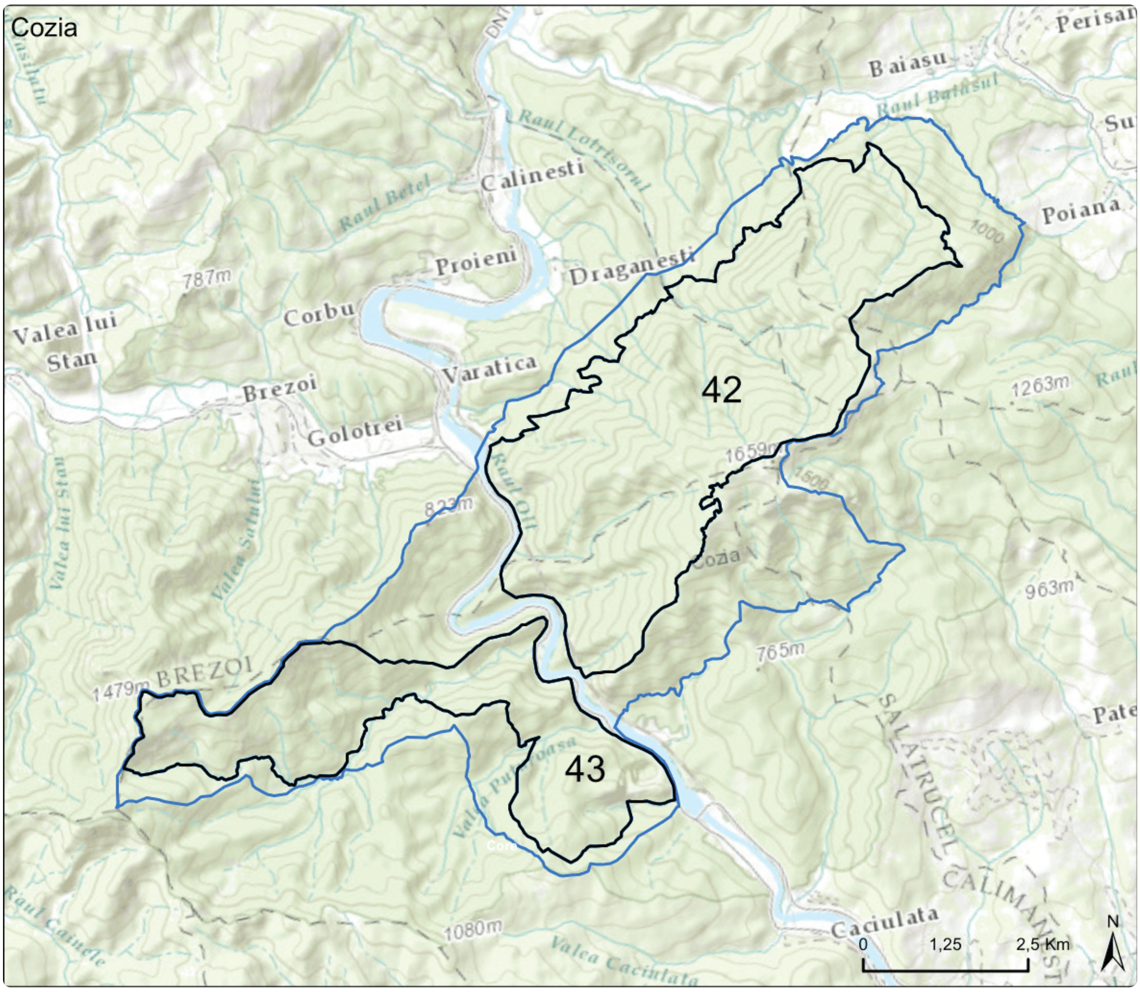
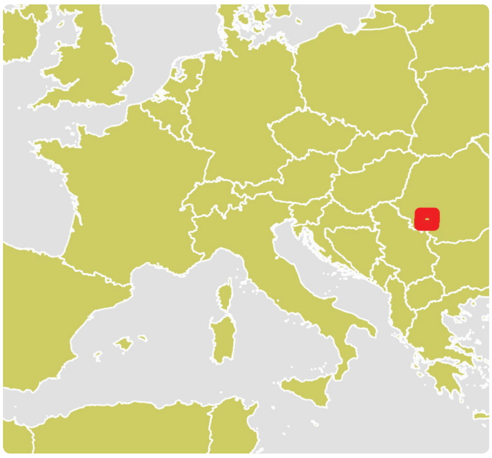


Figure 22: Zonation of Cozia, Romania

World Heritage Site

Buffer Zone



General view of Ciucevele Cernei. Picture: S. Milanovici

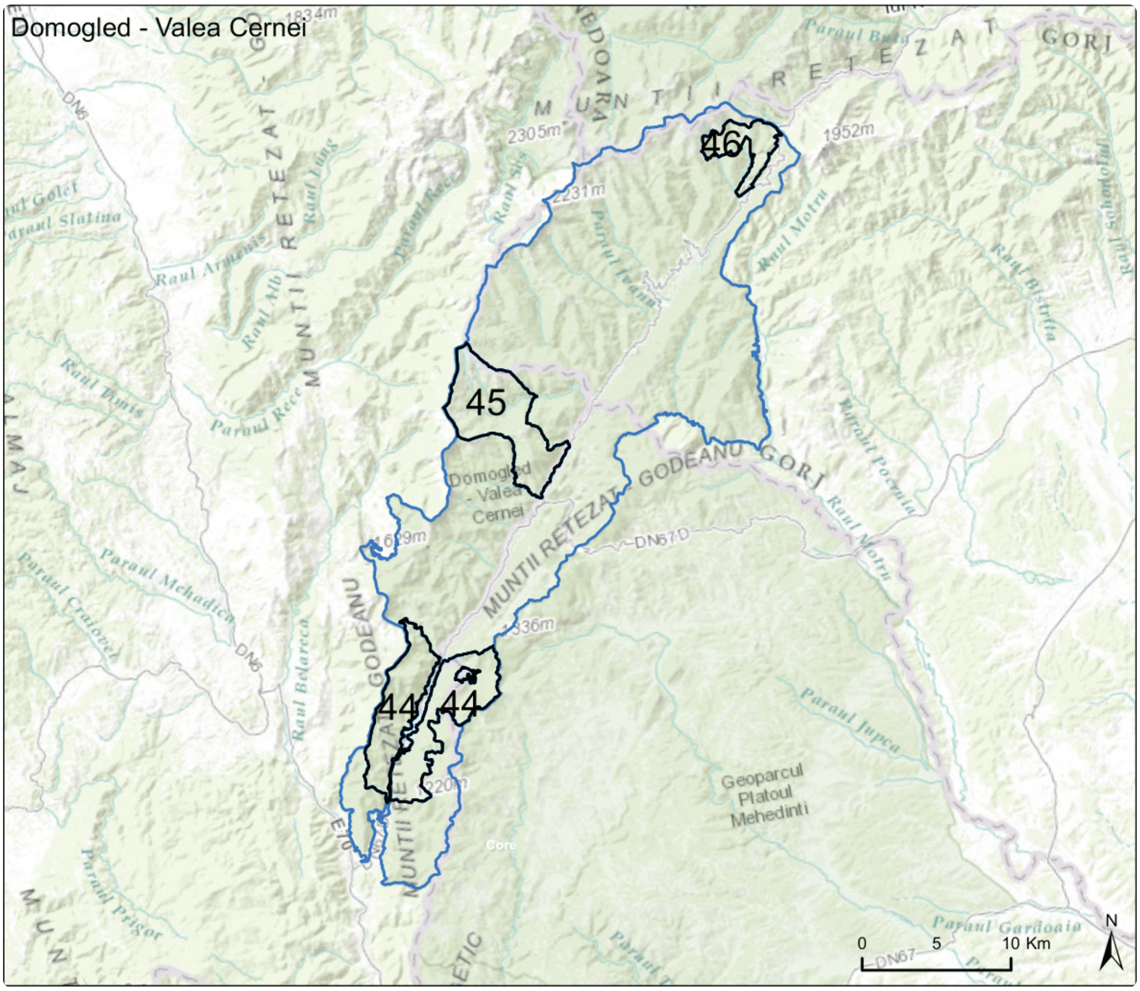
1.f.20 *Romania: Domogled-Valea Cernei (044, 045, 046)*

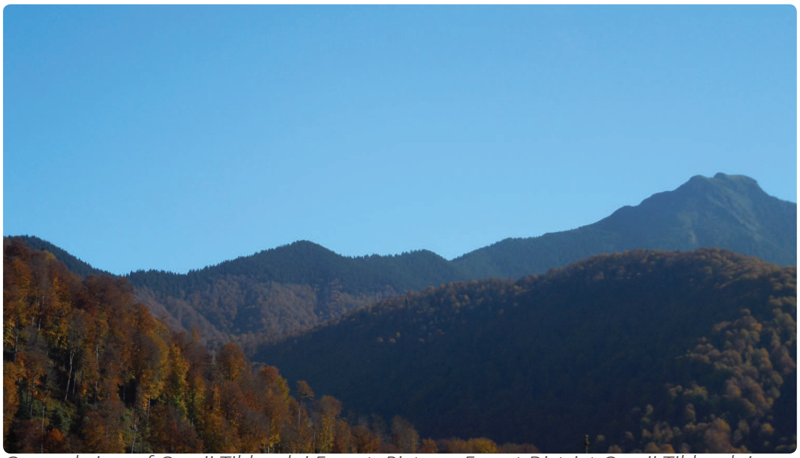
The Domogled-Valea Cernei component cluster is a large complex of beech forests consisting of three component parts that are connected by a continuous forest cover and enveloped in a common buffer zone. The nominated component cluster Domogled-Valea Cernei (9,732.26 ha) is located in the Southern Carpathians of Romania. The buffer zone is delineated by natural limits and overlaps almost completely with the Domogled-Valea Cernei National Park limits. Boundaries of the nominated component parts coincide with limits of forest management units and have natural features: ridges and streams clearly identifiable and stable over time in the field. In areas where the buffer is narrow (50–100 m), the ridge itself is a buffer protection area.

Figure 23: Zonation of Domogled-Valea Cernei, Romania

World Heritage Site

Buffer Zone






General view of Groșii Țibleșului Forest. Picture: Forest District Groșii Țibleșului

1.f.21 *Romania: Groșii Țibleșului (047, 048)*

The nominated Groșii Țibleșului is a component cluster of 346.4 ha, surrounded by a buffer zone of 563.6 ha. The component cluster consists of Izvorul Șurii (IȘ) and Preluci (P) forest areas, which are connected by a continuous forest cover and are enveloped in a common buffer zone. In some zones (north of IȘ and south of P), the small buffer was delineated to follow natural limits (valleys, ridges).

The first component part (IȘ) covers the main part of the cluster (210.5 ha, which is 60%), while the size of the second (P) is 135.8 ha (40%).

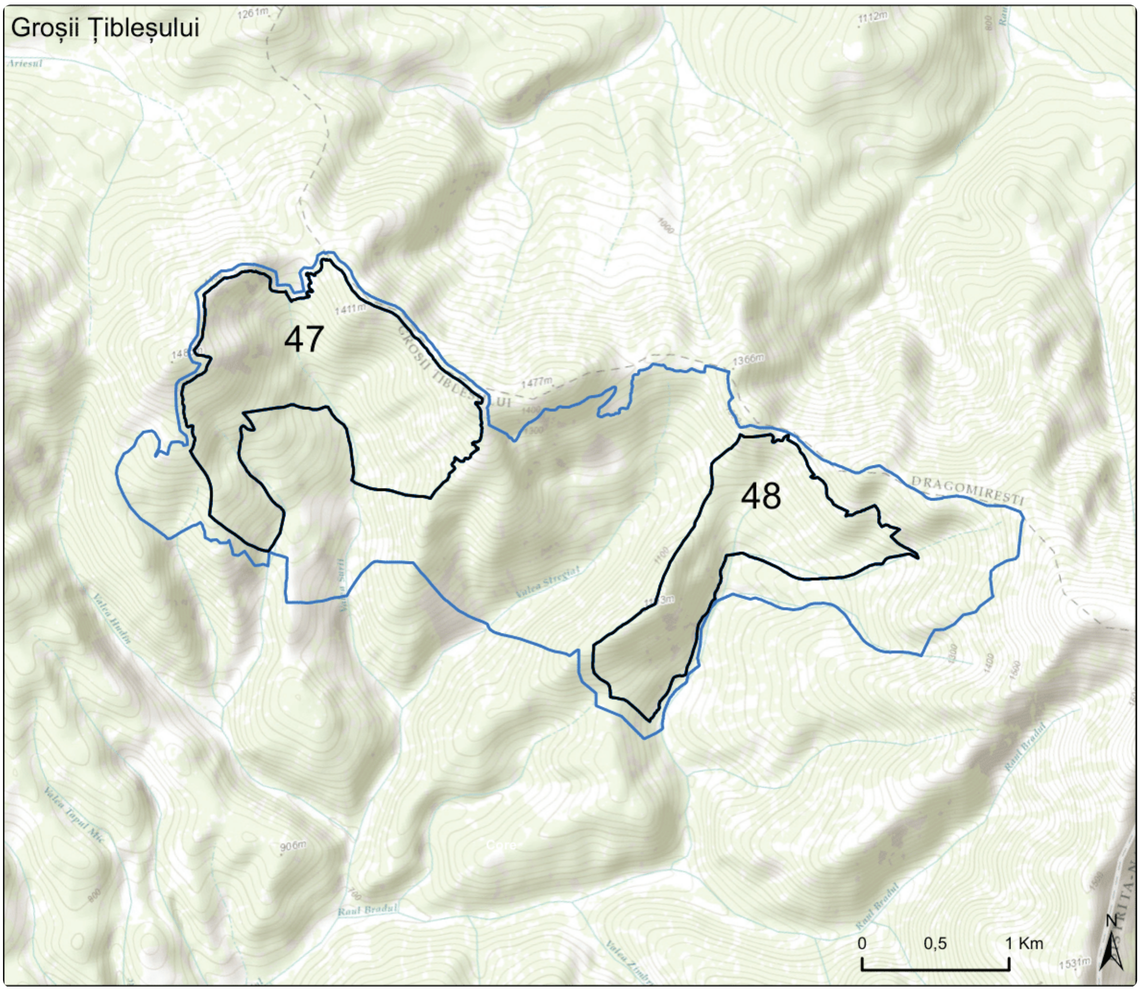


Figure 24: Zonation of Groșii Țibleșului, Romania

World Heritage Site

Buffer Zone

View of Izvoarele Nerei. Picture: M. Schickhofer

1.f.22 *Romania: Izvoarele Nerei (049)*

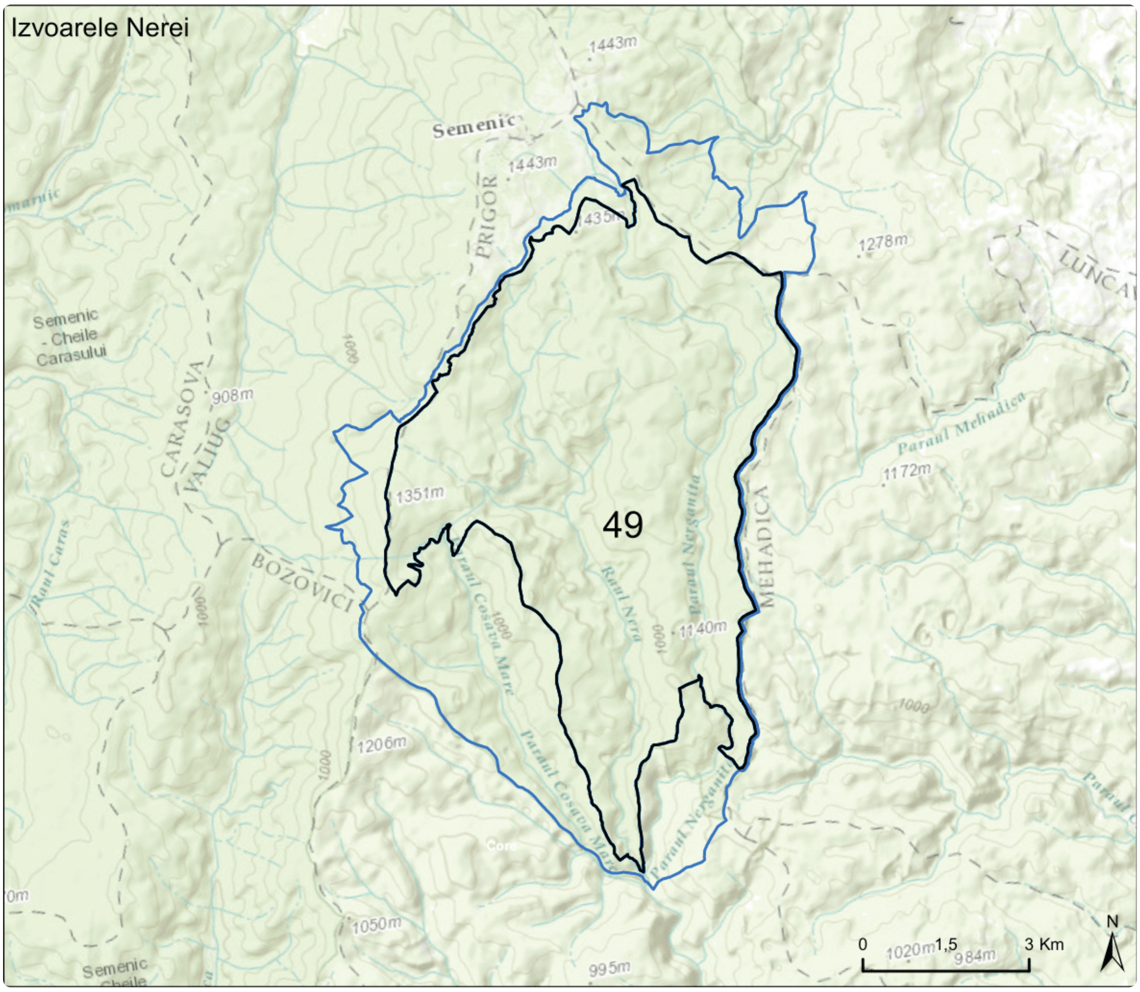
The Izvoarele Nerei nominated component part is a large complex of beech forests: 4,677.21 ha with a buffer zone of 2,494.83 ha. This forest massif is one of the largest remnant virgin forests of the temperate Europe. It is a pure beech forest with only a few exemplars of other tree species.

This forest suffered only minor human influences during the history; being isolated and inaccessible, it has been preserved. Nowadays, the nominated component part is a Nature Reserve (no intervention), part of a National Park. The limits of the nominated component part are natural, constituted by two main ridges which separate the Nergana and Nerganita rivers' basins from the surroundings. The natural boundaries guarantee the integrity of the Reserve and constitute themselves protection features.

Figure 25: Zonation of Izvoarele Nerei, Romania

World Heritage Site

Buffer Zone



General view of Strâmbu Băiuț Forest. Picture: V. Radu

1.f.23 *Romania: Strâmbu Băiuț (050)*

The nominated Strâmbu Băiuț is composed of one component part (size of 598.1 ha, surrounded by a buffer zone of 713.1 ha), located in the northern part of the Romanian Eastern Carpathians. The forest reserve is included in the Natura 2000 site Codrii Seculari de la Strâmbu-Băiuț (ROSCI0285), covering about 27% (53% including the buffer zone) from site area. In some zones (northwestern and northeastern part), the small buffer was delineated to follow natural limits (valleys, ridges).

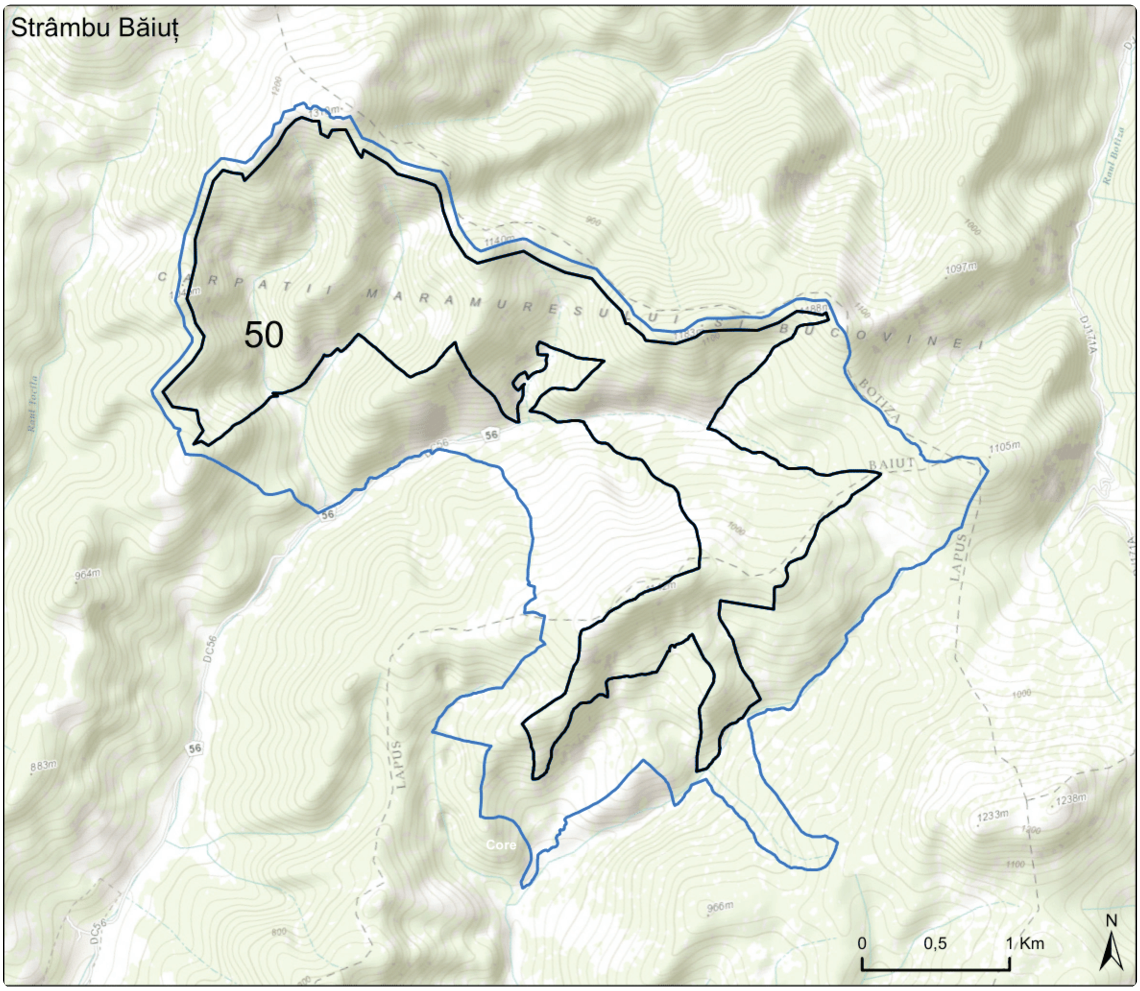


Figure 26: Zonation of Strâmbu Băiuț, Romania

World Heritage Site

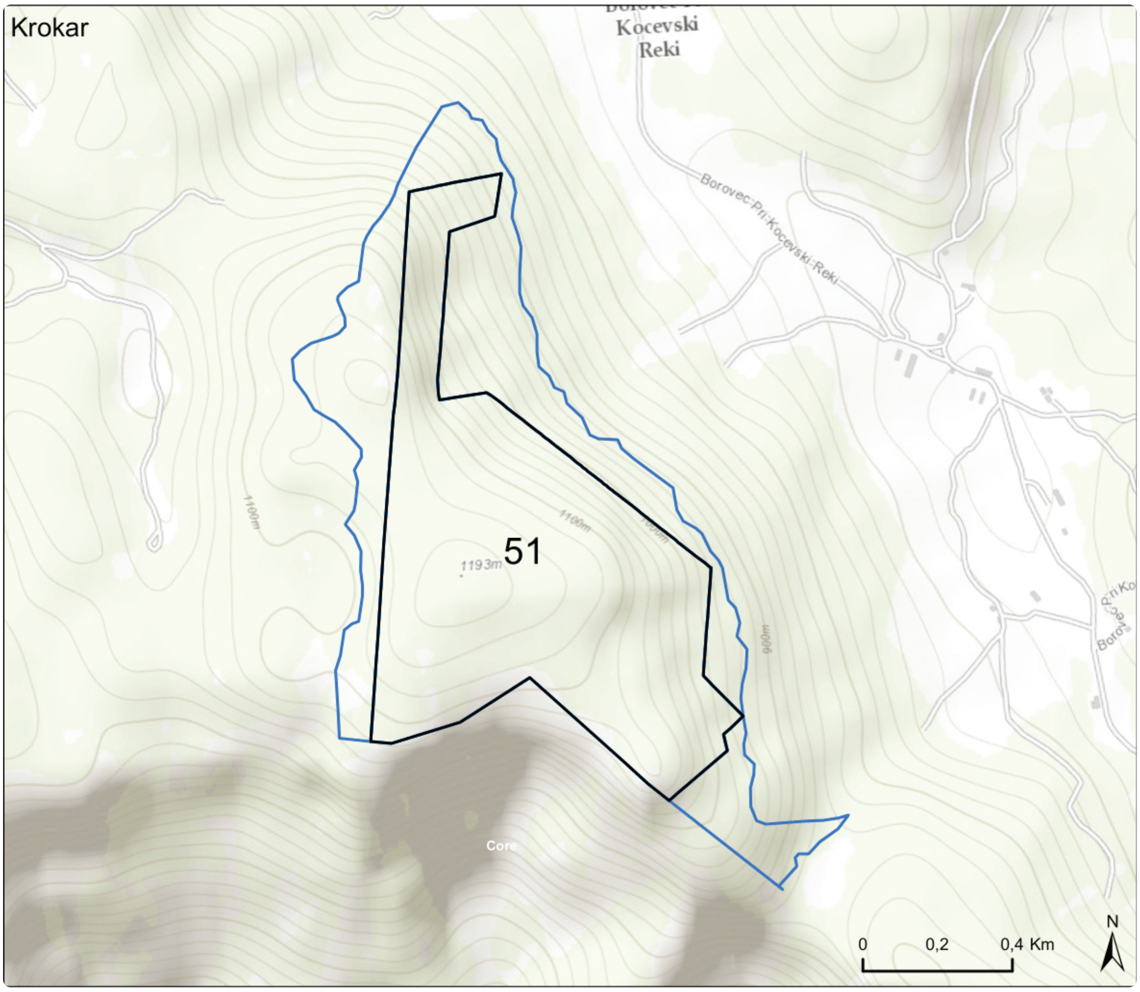
Buffer Zone

Allium ursinum in Krokar. Picture: M. Masterl (Slovenia Forest Service)

1.f.24 *Slovenia: Krokar (051)*

The Forest reserve Virgin Forest Krokar (short name Krokar) with its buffer zone forest reserve Borovec is part of the forested area of Kočevska, which covers more than 90,000 ha. In this area the forest management is sustainable and close to nature. Species like brown bear, wolf, lynx, and white-backed woodpecker inhabit the area. Kočevska is part of the Natura 2000 network. Krokar and Borovec are fully protected from all human interventions, with exception of non-destructive research activities and visiting using the forest educational trail in the buffer zone. In the southern part of Krokar the protective forests on steep slopes of Kolpa river canyon are found that are legally protected and excluded from management, so no negative human influence is expected there

Figure 27: Zonation of Krokar, Slovenia
World Heritage Site
Buffer Zone



Mountain Snežnik. Picture: Š. Habič

1.f.25 *Slovenia: Snežnik-Ždrocle (052)*

The proposed component part Snežnik-Ždrocle and its buffer zone lie on the mountainous karst plateau in the Dinaric Mountains, also including Mt. Snežnik (1,796 m), the highest peak of the area. The karst plateau is covered by forests which are managed sustainably and co-naturally. These forests belong to the Natura 2000 network. The border of the buffer zone in the northern part coincides with the border of the legally protected Forest Reserve Snežnik-Ždrocle, in which no logging and other negative human influences are allowed. The border of the buffer zone in the southern part is part of the legally protected protective forests, where no negative human influence is allowed.

Figure 28: Zonation of Snežnik-Ždrocle, Slovenia

World Heritage Site

Buffer Zone

View of Tejera Negra. Picture: G. Cerezo

1.f.26 *Spain: Hayedos de Ayllón (053, 054)*

The component cluster has two different parts. The size of the component part of Tejera Negra is 255.5 ha. It is situated in a Natural Park in the Autonomous Community of Castilla-La Mancha. The size of the component part of Montejo de la Sierra is 71.8 ha. It is situated in the core zone of a Biosphere Reserve in the Autonomous Community of Madrid. Both component parts include within the most valuable area of natural beech forest in the region. They aren´t in the same management unit, but together join an important bio-geographical unit with a buffer zone, wich also spans over the Autonomous Community of Castilla y León, where other remarkable relict beech forest occurs. All together, the size of the component cluster is 327.3 ha and the size of the whole buffer zone is 13,880 ha.

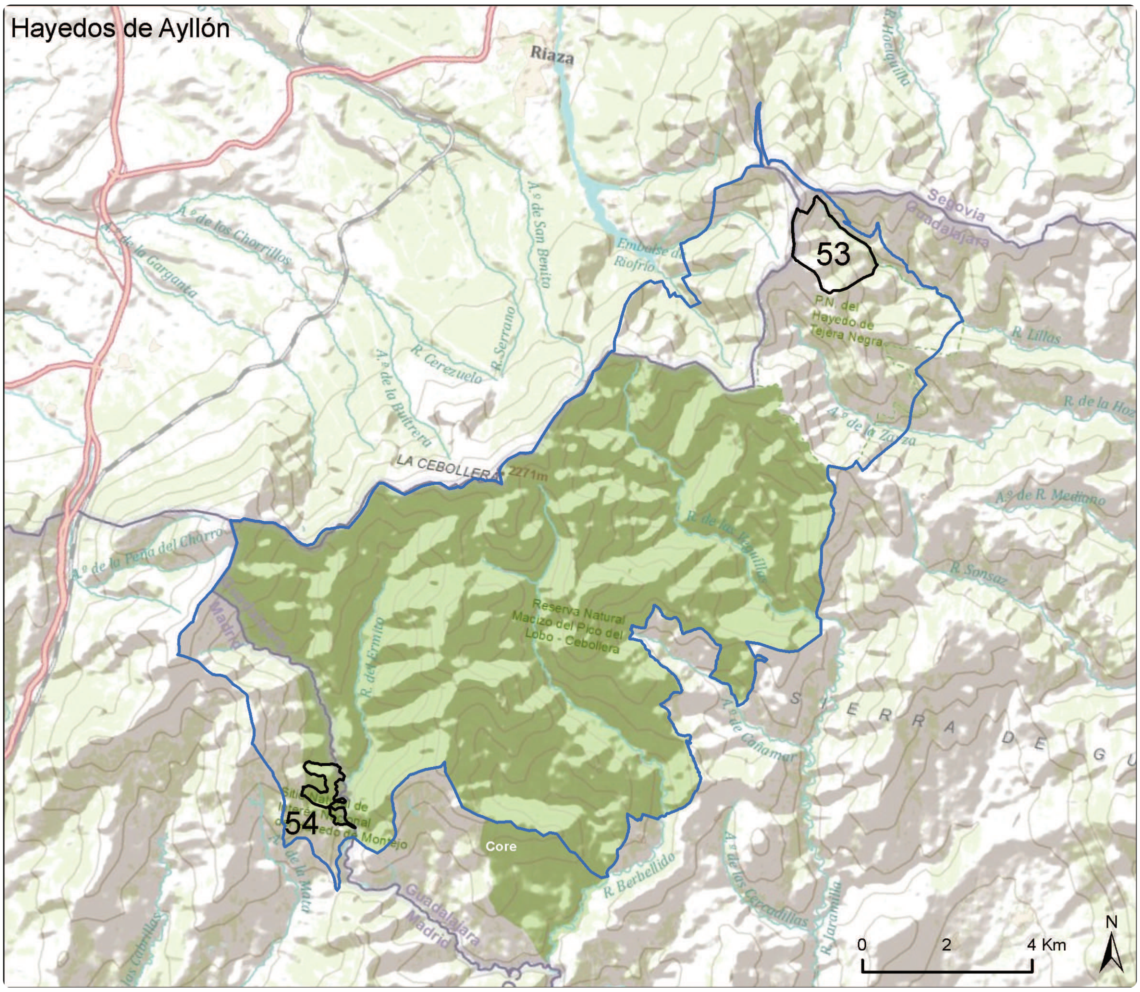
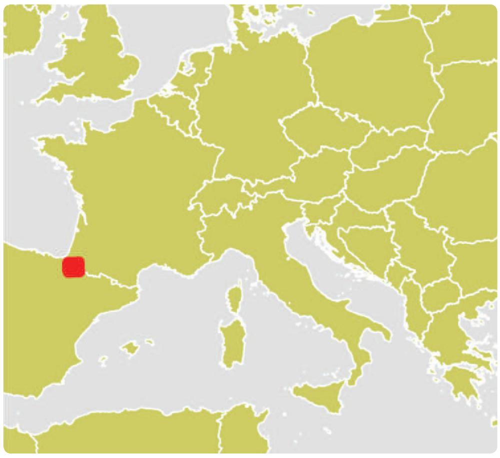


Figure 29: Zonation of Hayedos de Ayllón, Spain

World Heritage Site

Buffer Zone



Forest of Lizardoia. Picture: A. Senosiain

1.f.27 *Spain: Hayedos de Navarra (055, 056)*

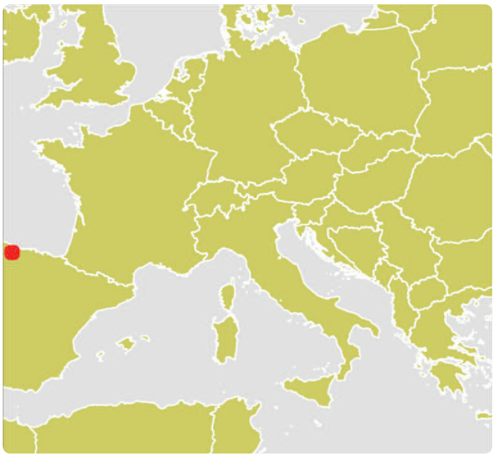
Both component parts cover an area of 239 ha (Aztaparreta: 171 ha, Lizardoia: 64 ha).

The borders of the component part coincide mainly with the borders of two protected Strict Reserves (IUCN I) but where the component part of Aztaparreta adjoin the borders of the Autonomous Community of Navarra, a distance of at least 50 metres was concidered as a buffer zone. The outer borders of the buffer zone coincide with the borders of the three Natura 2000 Special Areas of Conservation which comprises the component parts.

Figure 30: Zonation of Hayedos de Navarra, Spain

World Heritage Site

Buffer Zone



View of Cuesta Fría. Picture: O. Schwendtner

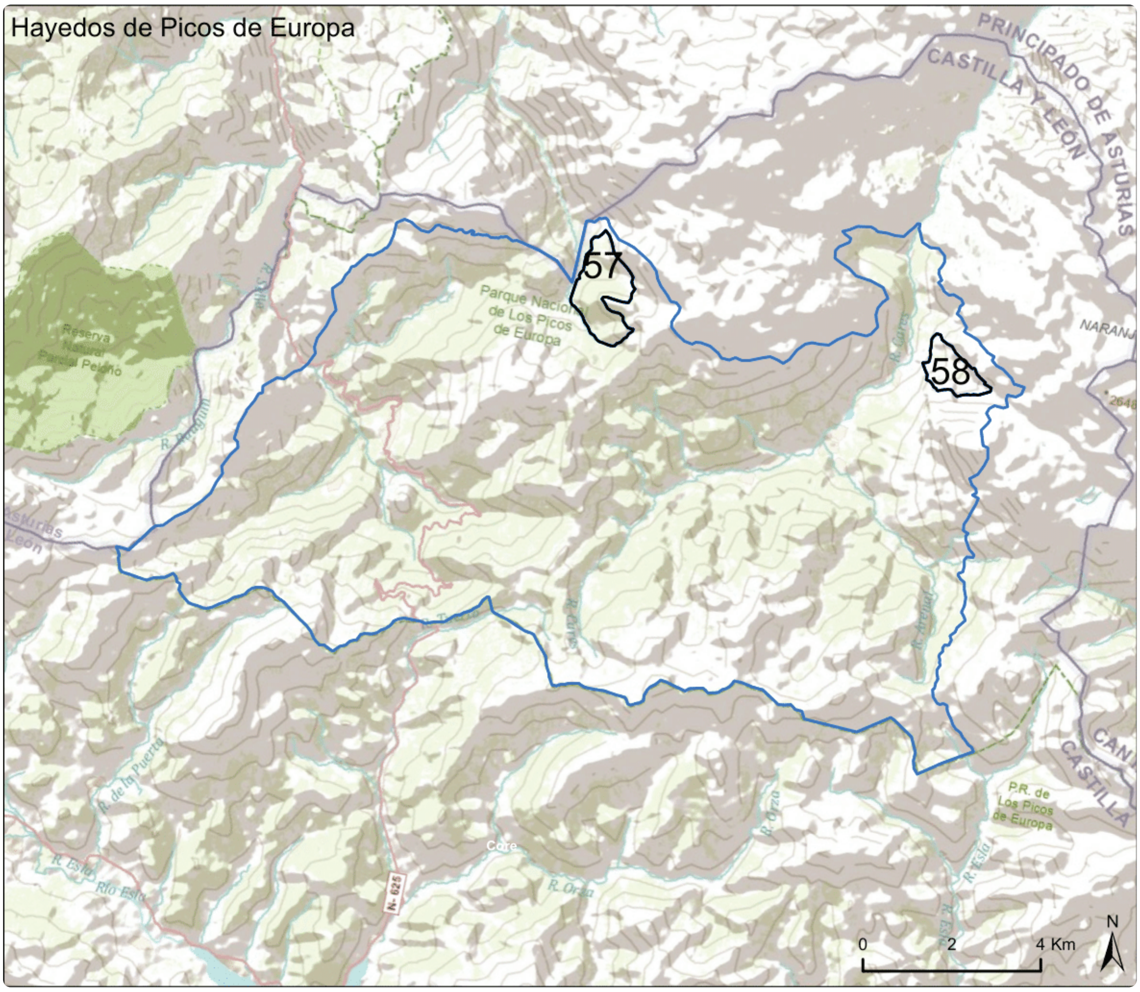
1.f.28 *Spain: Hayedos de Picos de Europa (057, 058)*

One component cluster consisting of two component parts was selected, one called Canal de Asotín (109 ha) and the other Cuesta Fría (213 ha).

The borders of the component parts are composed mainly by biogeographical barriers, which surround the most valuable area of old-growth beech forest.

The buffer zone surrounding the two component parts extends over 14,253 ha through the natural beech forests in the National Park of Picos de Europa. The borders of the buffer zone coincide with the borders of the National Park in the Autonomous Community of Castilla y León.

Figure 31: Zonation of Hayedos de Picos de Europa, Spain
World Heritage Site
Buffer Zone



Forest of Gorgany. Picture: O.M. Slobodian

1.f.29 Ukraine: Gorgany (059)

The nominated property Gorgany is located inside the borders of the current Gorgany Nature Reserve (IUCN I) and it covers 26% of the total area. The rest of the area of Gorgany Nature Reserve serves as a buffer zone and ensures the integrity and security of the nominated property.

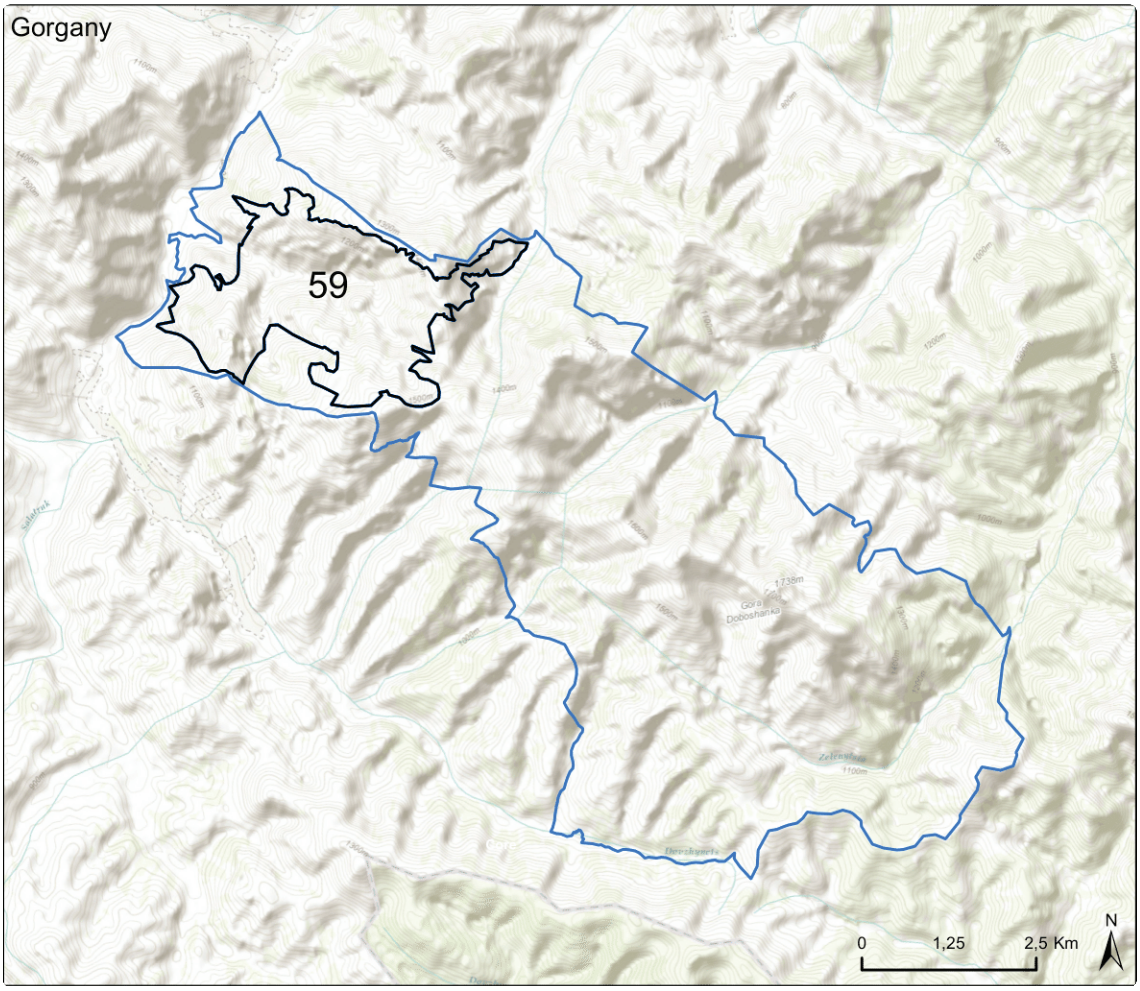


Figure 32: Zonation of Gorgany, Ukraine

World Heritage Site

Buffer Zone

Forest of Roztochya. Picture: V. Pokynchereda

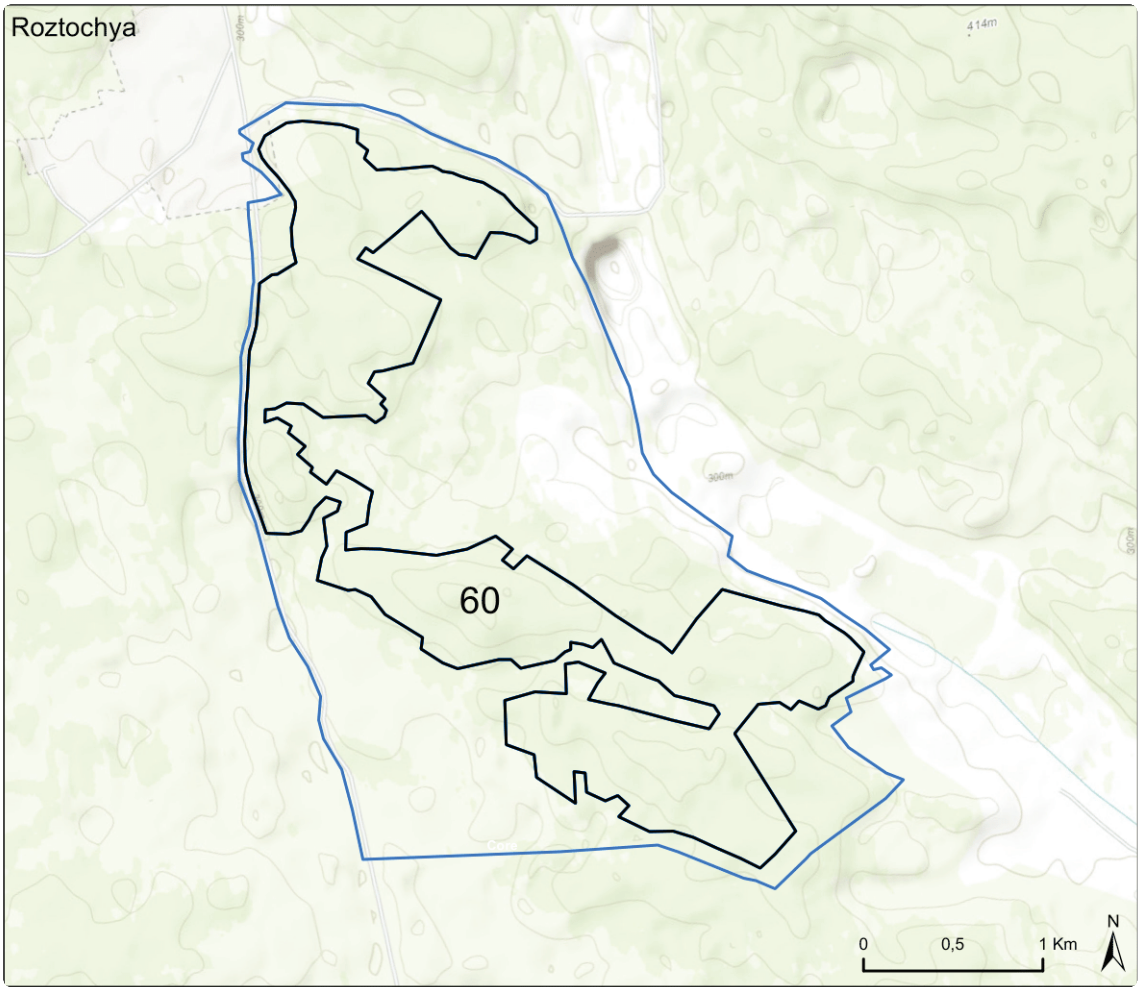
1.f.30 *Ukraine: Roztochya (060)*

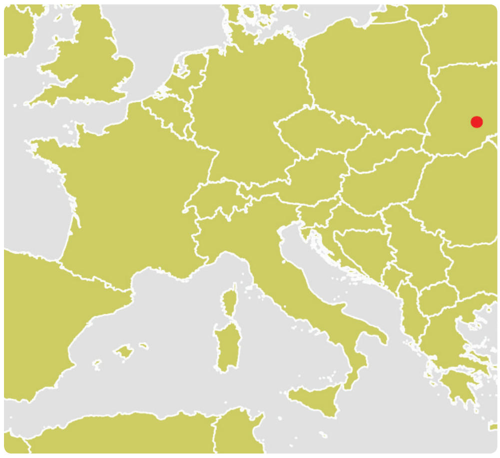
The nominated component part Roztochya is part of the Natural Reserve Roztochya (category IUCN I), which also is the core of the Biosphere Reserve Roztochya. It covers almost 20% of the reserve territory. Along the perimeter of the nominated object is the buffer zone which reduces the negative impacts of adjacent areas, where forestry and agriculture are practised. The whole buffer zone is also a part of the Natural Reserve Roztochya. The nominated component part is comprised by the best-preserved old-growth beech forests.

Figure 33: Zonation of Roztochya, Ukraine

World Heritage Site

Buffer Zone





Forest of Satanivska Dacha. Picture: M. Riabyi, Podilski Tovtry NNP

1.f.31 *Ukraine: Satanivska Dacha (061)*

The nominated property Satanivska Dacha is situated within the Podilski Tovtry National Nature Park (IUCN category II) and holds 0.07% of its total territory.

In segments where the property is bordering on territories where farming and forestry activities are carried out more intensively, a buffer zone is established.

In the adjacent forests surrounding the property, management is based on the Project of organization and development of the Yarmolynetske State Forestry Enterprise and the Project of territory organization, protection, reproduction and use of the recreational complexes and objects of the Podilski Tovtry National Nature Park (the Management Plan).

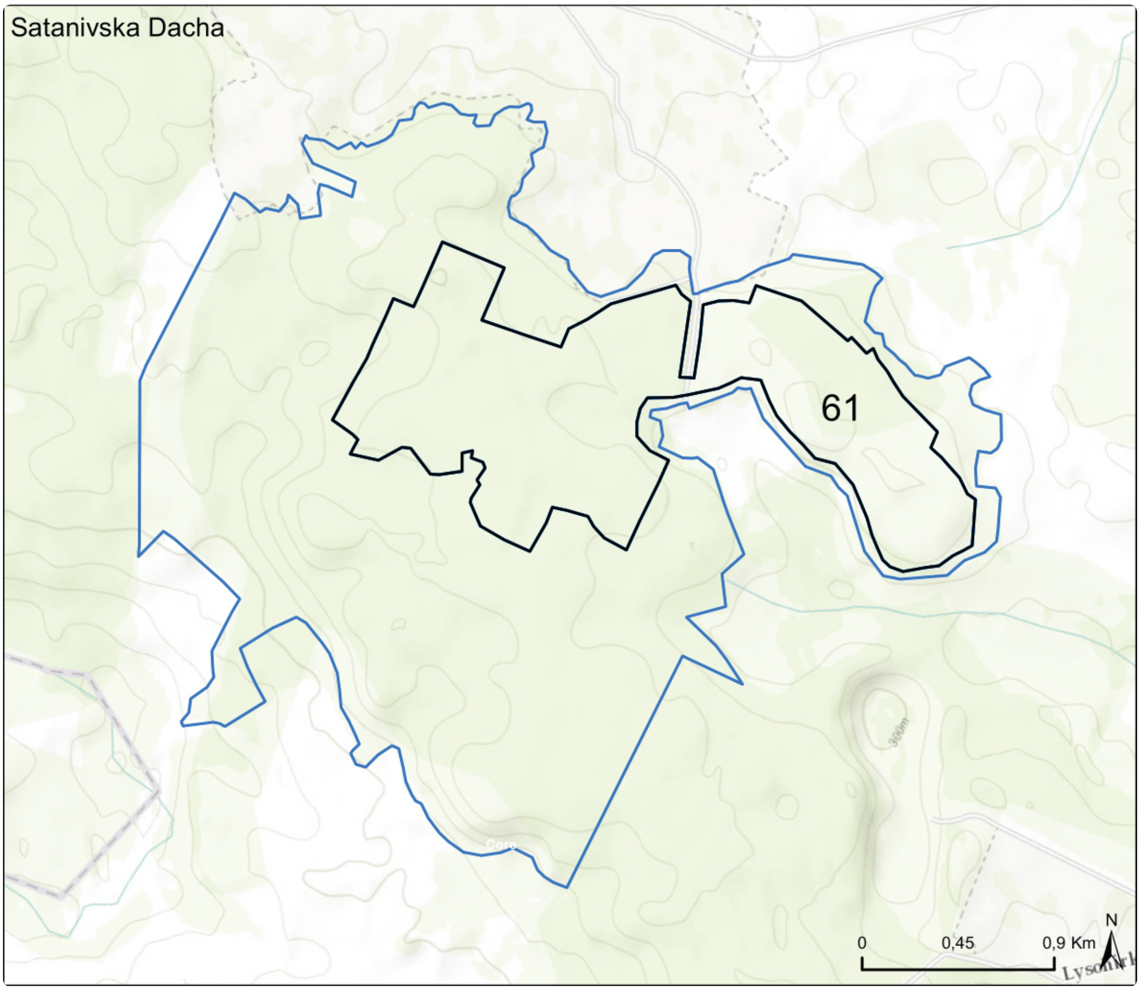
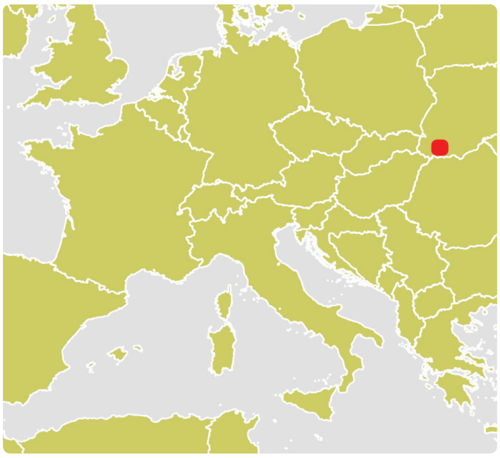


Figure 34: Zonation of Satanivska Dacha, Ukraine

World Heritage Site

Buffer Zone



View of Synevyr National Park. Picture: V. Pokynchereda

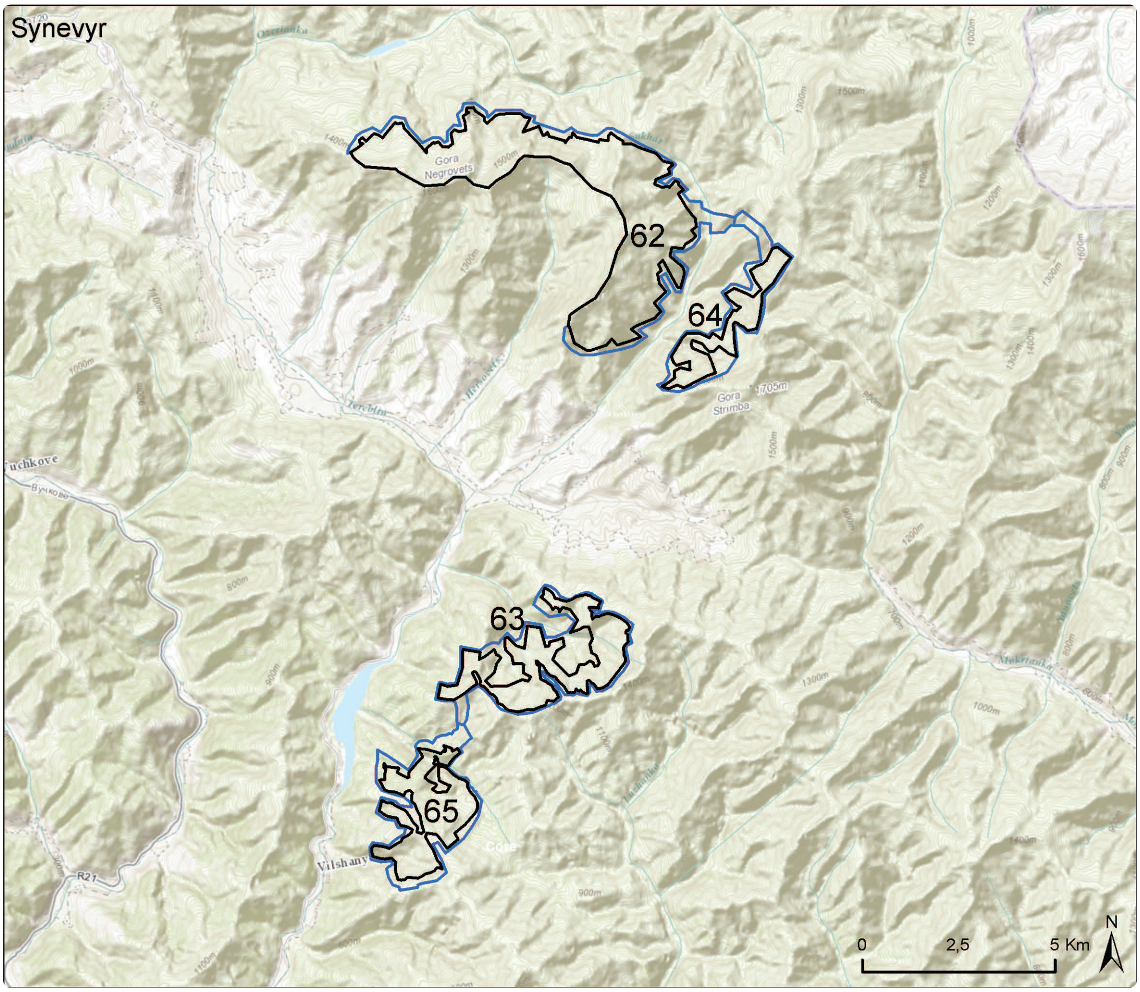
1.f.32 *Ukraine: Synevyr (062, 063, 064, 065)*

The nominated component cluster is located in the territory of the core zone of the Synevir National Park (category IUCN I) and covers about 10% of its total territory. In areas where the property borders on areas with forestry activity and grazing, the buffer zone is established. However, some boundaries of Darvaika component pass through the mountain range with a significant slope gradient (40°), excluding any nature management in these territories. Thanks to this, a buffer zone in these areas is not necessary. An insignificant size of the buffer zone of both component clusters is explained by the requirements of the National Nature Park dministration.

Figure 35: Zonation of Synevyr, Ukraine

World Heritage Site

Buffer Zone



Forest of Zacharovanyi Krai. Picture: V. Pokynchereda

1.f.33 *Ukraine: Zacharovanyi Krai (066, 067)*

Zacharovanyi Krai represents a component cluster that includes two single component parts (Velykyi Dil, 1,164.2 ha, and Irshavka, 94 ha), situated partly in the Zacharovanyi Krai National Nature Park (79% of the territory) and in the territory adjacent to the National Park which is planned for inclusion in the park (21%). Along the perimeter of the nominated component parts, a buffer zone is created with total area of 1,275.4 ha, which is partially located on adjacent NPP territory and is also planned for inclusion in the National Park (21%). The primeval beech forests of the component parts extend to the border of the National Park, that is why the buffer zone is so narrow.

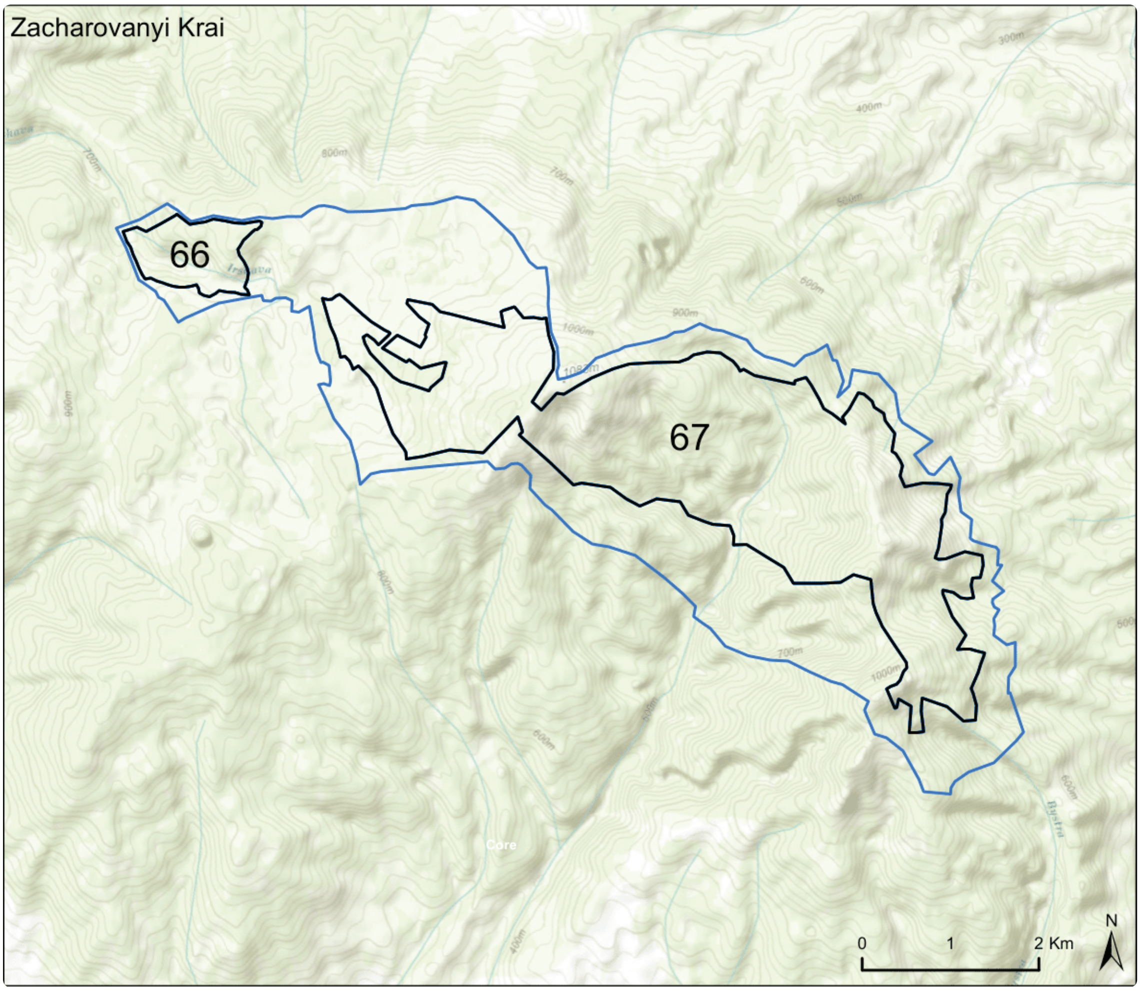


Figure 36: Zonation of Zacharovanyi Krai, Ukraine

World Heritage Site

Buffer Zone

Autumnal Beech Forest. Picture: H. Kirchmeir (E.C.O.)

2. DESCRIPTION

Europe is the only continent hosting pure and mixed Fagus sylvatica forests. The postglacial spread of European beech is an ongoing process lasting for more than 10,000 years. The variety in glacial refuge areas (Pyrenees, the Apennine, the Illyric region and Southern Carpathians) lead to genetic variety of the species Fagus sylvatica and co-evolutionary adaptations of regional fauna and flora to the specific ecosystem of beech forest. Given the different flora and fauna, climatic situations and soil conditions, the postglacial expansion process led to the development of more than 80 different beech forest types spread over most of the biogeographic regions of Europe. The European countries are bearing extraordinary responsibility for the conservation of these beech ecosystems. This is underlined by the fact that almost two thirds of the beech forest types listed in the Palearctic Habitat Classification are listed in the Annex I of the EU Habitat Directive.

The 67 component parts (located in 33 component clusters) of the nominated serial property "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are to extend the World Natural Heritage site "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany"(1133bis).

This is to ensure that the unique and ongoing postglacial development process of the European beech forests is comprehensively illustrated.

European Beech Forests

Europe's beech forests are deciduous forests, which are dominated by the European Beech (*Fagus sylvatica*). The European beech is endemic to Europe, and therefore beech forests formed by *Fagus sylvatica* are limited to Europe. Such forests therefore share the fate of all deciduous forests of the northern hemisphere's nemoral zone: they have been exposed to an enormous development pressure (settlement, utilization) for centuries so that natural forests have become scarce.

Forest communities built up and dominated by the beech are widespread across major parts of Central

Europe. Potentially forming the predominant zonal vegetation in Western and Central Europe in terms of area, they are found at the montane level of the South European mountain ranges. They show the widest amplitude of soil trophic levels and altitude distribution of all deciduous forests in Europe, potentially occupying the largest area (BOHN & NEUHÄUSL 2003). The beech's main range of distribution lies in the moderately humid temperate climate of Central Europe.

A significant feature of the beech forests is that floristic diversity, which is a result of the history of flora and vegetation, decreases from the former glacial refuges in Southern and Southeastern Europe up the northern and northwestern subterritories.

The European beech forests stand out due to an exceptional variety of types. According to BOHN & NEUHÄUSL (2003), a total of 86 different biocoenotic units of the beech and mixed beech forests are found in the beech forest area, subdivided according to trophic and altitude levels as well as geo-graphical and local forms.

Primeval Beech Forests of the Carpahtians and the Ancient Beech Forests of Germany

"These undisturbed, complex temperate forests exhibit the most complete and comprehensive ecological patterns and processes of pure stands of European beech across a variety of environmental conditions. Beech is one of the most important elements of forests in the Temperate Broad-leaf Forest Biome and represents an outstanding example of the re-colonisation and development of terrestrial ecosystems and communities after the last ice age, a process which is still ongoing." (UNESCO World Heritage Committee)

The nominated 67 component parts of the "Primeval Beech Forests of the Carpathians and other regions of Europe" are absolutely necessary to exhaustively and consisely illustrate the still ongoing postglacial development processes and preserve this specific European natural phenomenon in an exhaustive and complete way by constituting the main range of distribution of the beech forests.

The proposed extension covers the most important remnants of European ancient or primeval forests including the largest existing remnants of near natural beech forests of the alpine region, of the Northern Apennines or the Atlantic region, encompassing most valuable glacial refuges such as the Pyrenees or Dinarides and large remnants in East-Central Europe, which still allow for natural gap dynamics.

2.a Description of Property

Biogeography

The sum of the component parts reflects the full adaptive potential of beech in a large variety of climatic preconditions.

The nominated component parts are characteristic of the beech forests in Europe and cover all relevant areas where beech forests occurred naturally. Components being located at latitudes between 39° N (Cozzo Ferriero, Italy) and 50° N (Sonian Forest, Belgium) and longitudes between 5° W (Hayedos de Picos de Europa – Canal de Asotín, Spain) and 26° E (Satanivska Dacha, Ukraine), thus extend over large parts of the continent. Depending on their geographic position within Europe, the nominated components are situated at altitudes of around 65 m.a.s.l. (Sonian Forest, Belgium) up to subalpine krummholz belts at altitudes of more than 1,900 m.a.s.l. (Lumi i Gashit, Albania; Abruzzo, Lazio & Molise National Park and Cozzo Ferriero, Italy) with most components being located between 400 and 1,200 m.a.s.l.

The component parts are spread over all European macroclimatic regions reflecting beech forests located in mild, but more arid areas of the Mediterranean climate (Italy), in humid areas characterized by Atlantic climate, and beech forests which are subject to harsher climate conditions with hot summers and cold winters (Ukraine). The locations of the individual component parts are just as diverse as the edaphic conditions, climatic conditions as well as geological features covering most of European geological zones and soil types occurring.

The component parts show an average annual rainfall between 550 mm (Ukraine) and 3,143 mm (Slovenia) and average annual mean temperatures between 1 °C and 12 °C. Given these extremely wide spans, this clearly underpins the unique ability of beech to adapt to different natural conditions and allows for a comprehensive illustration of the postglacial development process.

Significant ecological characteristics

The European primeval and ancient beech forests stand out due to a highly peculiar natural dynamism, which is determined by the cycle of growth and decay of one single tree species, namely the beech. Old beech stands will regenerate with the crowns of individual trees gradually dying back to allow more light to the ground. Either there already is young beech wood that will now emerge, or the next generation of saplings will close the void within a period of a few years. The beech once again forms the upper crown canopy later on, thus resetting the cycle, which has been described as the small development cycle (ZUKRIGL et al. 1963). In the wake of major disruptions, however, the cycle may also involve the formation of an early successional forest made up of pioneer species such as pines, birches, willows or rowans, which are later on infiltrated by medium-shade and shade tree species. This big successional cycle may take several decades longer than the small one. Variations incorporating elements of both big and small cycle are possible.

This endogenous cycle of development meets with the diversity of sites resulting from the glacial and postglacial periods, producing the considerable structural variety as a basis for the species rich, complex system. Rooted in the beech's enormous ecological plasticity, the high ecological stability results in a biodiversity-promoting continuity of the forest's character, which makes the dynamics of the beech forest persistently "predictable" for the forest dwellers. Old beech forests are, for example, home to a multitude of flightless ground beetles that would drop the ability to fly due to the habitat being continuously available or changing only at a small scale (WINTER 2005).

The nominated component parts show a broad range of possible forest development stages from rejuvenation to decay. Several components add significant large areas which allow to preserve and support these large scale succession processes in a unique range of climatic, altitudinal and geographical situations.

Vegetation

All significant beech forest communities of Europe are represented in the additional component parts. They are a decisive complement to the existing property compromising beech forests of the Carpathians and in Germany.

All significant beech forest communities from the planar to high-montane zones are represented in the nominated component parts. The various trophic levels and altitudinal zones are reflected in the large number of different beech forest communities.

The additionally nominated component parts comprise a full range of different beech forest types with regard to tree species composition (e.g. types of mixed beech forests with *Acer sp., Sorbus sp., Carpinus betulus, Ostrya carpinifolia, Abies sp., Picea abies*, various species of oak), regarding different edaphic conditions (from nutrient-rich to poor, from basic to slightly acidic, from moist to extremely dry) and regarding their altitudinal and biogeographic location (reaching from elfin (krummholz) beech wood, lowland mixed beech forests rich in geophytes until thermo-xeric Mediterranean beech forests). Furthermore, the nominated component parts comprise specific and endemic beech forest types such as Helleboro nigri-Fagetum restricted to the Limestone Alps, Ranunculo brutii-Fagetum restricted to the Southern Apennines or Dacian Beech forests in the Carpathians, but also representative intact and large areas of common and widely distributed beech forest types such as Asperulo-Fagetum or Aremonio-Fagetum.

The beech forest communities of the extension nomination are therefore an outstanding and significant addition to the communities present in the existing property, which covers only 3 of the 12 Beech Forest Regions in Europe.

Autumn season. Picture: H. Kirchmeir (E.C.O.)

Flora

The nominated component parts house relict species, endemic species and a large share of forest species with global distribution concentrated in Europe giving them a superior importance for preserving the European floral heritage.

The European beech forests show a decline in vascular plant species numbers from the glacial refuges in Southern Europe to the north and northwest, in which directions they were advancing. Their centers of diversity lie in the South-Eastern Carpathians, Dinaric Alps, and Pyreneans (DIERSCHKE & BOHN 2004). The particular evolutionary connection clearly reflects the entire European flora. For example, 265 forest species of the lowland and highland (SCHMIDT et al. 2003) have a marked focus of distribution in Europe (chorology of MEUSEL et al. 1965, 1978, 1992). Of these species, 264 are found in the highland forest, and 194 in the lowland forests.

The nominated components cover this full range of phytobiodiversity by integrating species-rich glacial refuges in Southern Europe as well as additional specific, endemic beech forest types with their characteristic plant communities. Many of these have particularly high numbers of geophytes and orchids (e.g. *Cypripedium calceolus, Epipogium aphyllum*). Due to the large geographical distribution and related varying site conditions, the proposed extension is a manifestation of the unique natural inventory of large parts of Europe.

The phytobiodiversity of the proposed beech forests varies according to location and type, but is generally characterized by a huge number of (macro)fungi and a comparatively high number of relict and endemic species, giving the sites above average importance for the conservation of the characteristic flora of Europe.

Seasonality

As opposed to the climatic pattern of tropical rainforests, the climate of the temperate zone is distinguished by its seasonal changes together with the phaenological floral cycle involved. From a physiognomic perspective, the most striking feature of deciduous trees is the fall of leaves, which will further accentuate the seasonal differences and conditions of the biotopes respectively. However, the foliage changing with the seasons does not take place abruptly. In pure beech forests, this process is accompanied by unique changes in color, from bright neon green in May to the golden leaves of autumn.

The most dramatic consequence of leaf fall is the light climate's periodicity. This sets deciduous forests apart from all non-deciduous forest types, permitting the intermittent occurrence of a herb layer that shows different specific adaptations. Spring geophytes exploiting the brief warm spring period prior to leafing for development are particularly well adapted and transform the soils of richer beech forests into a carpet of flowers.

Many of the nominated component parts have distinct geophyte forests, which are multifaceted both in seasonal course and structural arrangement. They are very beautiful and, at the same time, an image of their evolutionary formation in parallel to the beech's continuous expansion. The association that has given rise to geophyte-rich beech forests is a result of co-evolution as well as the inner functional and structural differentiation of the development cycle of deciduous forests. This is particularly true for the component parts located in Central Europe in lowland and montane areas, making them unparalleled in the world.

Fungi

A multitude of fungi are involved in dead wood decomposition, with a number of species being specialized in the metabolization of specific wood types. Species typical of the beech include Horse's Hoof Fungus (*Fomes fomentarius*), Neobulgaria pura, Porcelain Fungus (*Oudemansiella mucida*), which is indicative of extensive matured wood pools, and Coral Tooth (*Hericium coralloides*), which, although widespread throughout the northern hemisphere and also growing on other trees, is only found in very old, mature beech forests and is a good indicator of integrity of the beech forest. A particularly important symbiosis has evolved between fungi and plants in the rhizosphere, which is called mycorrhiza. Unlike tropical regions, forests of the temperate zone are home to fungi that will enter into specific symbioses with one or few tree species.

The nominated component parts of the extension are home to an extremely high diversity of fungi with reaching numbers of up to 1,000 different species of fungi and up to 320 species of fungi related to deadwood of beech in individual components. Thus, the richness of fungi is an inherent and outstanding characteristic of ancient or primeval beech forests.

Bracket fungus. Picture: H. Kirchmeir (E.C.O.)

Fauna

While the beech itself is endemic to Europe, there is only a limited number of species that are exclusively bound to the beech (or the beech forest), which is rather young from an evolutionary perspective. Even so, the beech forest, as the dominant biotope by land area, is of particular relevance to the European fauna. The European beech forest is a reliable constant to its inhabitants with their potential range of distribution from the planar to the subalpine altitudinal zone. Its habitats and structures are available everywhere in sufficient diversity, or at least were before having been impacted by human activity. The nominated component parts prove their outstanding significance also here: the proposed forests show a degree of structural and habitat continuity and the specific biodiversity coming with it that is scarcely found in the managed forests of modern day Europe.

The different beech forest types are home to 20% of the terrestrial fauna in Central Europe: 7,000 to 10,000 animal species (OTTO 1994) that have mostly adapted their rhythm of life to the seasonal cycle. Alongside with the plants, fungi, and microorganisms, they are the determining factor in the beech forest ecosystem.

The inventory of species in the nominated component parts can be regarded as being indicative of the exceptionally well-preserved ecological-functional interrelationships in beech forests.

Salamandra salamandra. Picture: V. Radu

The specific abundance of species in the beech forests is no coincidence. Consumer numbers will increase at the stages of late maturity and collapse of the forest. Wood-dwelling insects, for instance, are found in numbers. When increasing, the number of birds per unit area will rise accordingly (REMMERT 1997). In over 180-year-old beech forests, the population density of breeding birds is twice as high as in a 140-year-old forest (SCHERZINGER 1996), with hole-nesting birds accounting for more than 50%. Consequently, natural beech forests are regarded as particularly rich in fungi as well as plant and animal species that take advantage of dead wood.

Despite the beech's absolute dominance, the beech forests, which have evolved in Europe, show outstanding diversification and are unique in function and structure. Notwithstanding the geologically short time of a few thousand years, a highly characteristic faunistic biocoenosis has evolved postglacially which is just as globally unique as is the plant community. The fauna can exist in all its diversity, and the postglacial evolutionary processes can take place only if each forest development stage of the natural regeneration cycle is available, which is the case in the beech forests of the nominated component parts.

Birds

The beech forests represent a faunistic community, which is both typical of Europe and universally unique. In the nominated component parts, their diversity shows almost to its entirety, particularly regarding the richness in (rare and spectacular) bird species.

As for the number of both species and individuals, birds are the leading vertebrate group in many European beech forest ecosystems. Their ability to fly permits them to exploit the entire spatial structure of the beech forest and quickly respond to changes (WINTER 1999). They occupy a variety of niches. For example, the “wood dwellers” will feed on sources found on/in the wood and nest in tree holes. Moreover, the occurrence of numerous bird species is largely coextensive with the beech forest.

The proposed beech forests are particularly rich in species of woodpeckers, grouses and owls and other birds requiring (near-)natural structures and habitats. Examples include the Pied Flycatcher (*Ficedula hypoleuca*), the Middle Spotted Woodpecker (*Dendrocopos medius*) (LÜBCKE et al. 2004) or the Short-toed Treecreeper (*Certhia brachydactyla*) as indicator species. Furthermore, majestic Ural Owls (*Strix uralensis*) and Eurasian Eagle-owls (*Bubo bubo*), several species of thrushes (*Turdus sp.*) and grouse (e.g. *Tetrao urogallus*) as well as significant numbers of birds of prey such as Golden Eagle (*Aquila chrysaetos*) or Red Kite (*Milvus milvus*) are found in several of the nominated component parts. They additionally illustrate the ornithological and ecological importance of the proposed components and underpin their ecological integrity.

Found in many of the 67 component parts, various species of woodpeckers, particularly the Black Woodpecker, are key species of old beech forests

(MÜLLER 2005), preferring beech-dominated stands and building its nests in old live beeches. The nesting holes are the starting point of an exceedingly complex ecological development chain. The White-backed Woodpecker (Dendrocopos leucotos), which also frequently occurs in the nominated beech forests, is regarded as indicator species of beech and mixed deciduous forests with extensive pools of deadwood. It is dependent on a minimum deadwood volume of 58 m^3/ha (FRANK 2002).

Mammals

With civilization advancing, predators such as wolf, bear, lynx, and even wildcat have become very rare and regionally extinct, particularly in Central Europe. However, bear, wolf and lynx seem to return into suitable areas in central Europe and keep spreading. The wildcat, but also wolf and bear are once again gaining ground as a result of the extensive networking projects and reduced hunting pressure in some forest landscapes. Requiring ample habitats, these predators form viable populations only in East and South Europe also occurring in many of the proposed components of the extension.

Alongside with large domestic hoofed game such as Red Deer (*Cervus elaphus*), Roe Deer (*Capreolus capreolus*), Wild Boar (*Sus scrofa*) and the critically endangered European Mink (*Mustela lutreola*), bear and wolf are reported from more than half of the nominated components, lynx and even wildcat frequently occur in these beech forests. This emphasizes the fact that the proposed components are of high importance for the conservation of large European mammals and makes them important refuges not only for preserving primeval beech forests, but also for preserving the related, typical megafauna of Europe.

In the early days of the postglacial era, large herbivorous mammals were present in Central, North, and East Europe in the form of roe deer, red deers, elk, wild boar, aurochs and wisent. While elks prefer to search swamps and fen woodland for food, the other animal species were widespread in the primordial forest landscape. The cattle species are irrelevant for today’s forests. The aurochs has been extinct. Wisent populations have been rescued through re-breeding, and reintroductions are underway in certain areas (e.g. Bieszczady National Park, Poland).

There are more than 40 bat species in Europe. From a global perspective, the distribution range of at least seven species has a focus in Europe. The bat species such as *Myotis bechsteinii, Myotis myotis* and *Pipistrellus nathusii* are mainly threatened by the extensive loss of forests containing natural structures. The above-mentioned species rely on the availability of tree hollows in the forest, which are abundant in the component parts and are found in major tree dimensions. Hence, the ancient or primeval beech forests are highly significant for the preservation of the European forest bat populations. Barbastella barbastellus, for instance, preferentially uses clefts in trees in forests, which occur frequently in forests that have not been managed for years. Based on the accumulated pool of deadwood, the formation of holes in living trees, and the occurrence of trees with protruding bark and crotches, the component parts provide highly favorable living environments for the bat species occurring in Europe.

Ursis arctos in Șinca Forest, Romania. Picture: M. Struteanu (WWF-DC)

Intervebrates („Primeval forest relic species“)

The occurrence of rare "primeval forest relic species" reflects the fact that the old beech forests in the individual component parts are highly ecologically valuable. Excellent data is available for the component cluster Kalkalpen.

Hundreds of wood-dwelling insect species pick from the diverse wood inventory of the primeval and ancient beech forest. The respective experts come into action consecutively, depending on whether the tree is sickly, partly dead or contributing to the diversity of biotopes in the form of deadwood. Some of them exclusively dwell inside the bark, others in the dry wood or moist duff. There are some highly demanding species among the wood-dwelling insects. For instance, some beetles require the excrements of other particular species for proper development. Some require a specific level of humidity, such as is only found in the root collar of old deciduous trees. Some conditions will develop only over the course of decades or even centuries. The specialized insects must be capable of finding the respective place. For the survival of such species it is of highest importance that the “ecological niche” is available in high continuity, which requires a habitat and dead wood tradition. If this is not the case, the species is bound to vanish. This is exactly what makes the beech so relevant. Within its range of distribution, it will form and dominate stands at a large scale. Moreover, it ascends from the lowland up to high montane zones.

Hallmarks of “primeval forest relic species” are their being highly demanding in terms of habitat quality and continuity as well as very limited mobility. A list of 115 primeval forest relic species among xylobiontic beetles has been drawn up for Germany (MÜLLER et al. 2005a), with some 30 species probably being typical of beech forests. The fact that these species are not found in most of the managed forests of Western and Central Europe but in relic populations can be explained by the management history of the forests. Because of permanent extraction of timber, the managed forest are largely lacking in the development stages of late maturity and decomposition with a diverse supply of dead wood. However, a number of primeval forest relic species have been observed in the component parts, some of them such as the Great Capricorn Beetle (*Cerambyx cerdo*) or Peltis grossa in several of the component parts. This reflects their above-average ecological value within Europe, also characterizing them as ancient or primeval beech forests.

Lucanus cervus. Picture: C. Manci

Rosalia alpina, Strîmbu Băiuț. Picture: Ch. Timur

View of Gashi Reserve. Picture: B. Lushaj

2.a.1 Albania: Lumi i Gashit (001)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
001	Albania	Lumi i Gashit	1,261.52	8,977.48	Moesian-Balcanic

Table 5: Area size of the component part Lumi i gashit (Albania)

Short profile and biogeography

The component part covers an area of 1,261.52 ha. Gashi River valley starts from the glacial groove of Dobërdoli in an altitude of 1,600 m.a.s.l. and ends at the Tropoja catchment at an altitude of 244 m.a.s.l. The lithological diversity is reflected in the morphological variety of the valley, especially in its widenings and narrowings, separated between them by thresholds of mainly tectonic-lithologic origin. On the left of this groove, the glacial Lake of Dashi is situated, which ranks third by size, after Sylbica Lake, and the first in the whole of the Alps by altitude (2,175 m). Its total length reaches up to 275 m, whereas its width is 255 m.a.s.l. The beech zone is located between 700 and 1,900 meters of altitude. The beech forests occupy the major part in this zone, as seen in the areas of Vermoshi, Cukali, Thethi, Fushzezë, etc. In this zone, apart from Beech trees (*Fagus sylvatica*), ,some other tree species are present like Maple tree (*Acer obtusatum*), Fir (*Abies alba*), Bosnian Pine tree (*Pinus leucodermis*) and Norway Spruce (*Picea abies*) in altitudes over 1,400 m.

The Strict Nature Reserve of Gashi River is covered mostly by forests, heath land and herbaceous vegetation associations. Forests occupy a surface of 2,693 ha. Apart from the beech forest, the other characteristics of the strict reserve are the abundance of forests along the Valley of Gashi River and shrubby, grassy habitats around forests.

Abiotic factors

Geographical position, natural region, altitudinal zone

The Gashi River valley is situated in northeast of the Albanian Alps: N 42° 29' 2", E 20° 03' 31"

The Strict Nature Reserve contains the different elevation zones from around 800 m at river level up to the watershed along the eastern border of the mountain at 2,100 m.

Geology and geomorphology

From geological point of view the Albanian Alps area, including the component part, begins at the southern ridge of Lake Shkodra following Vidhgar, through Taraboshi Mountains and Shkodra castle and continuing to the north to Mes-Gjuraj village. Afterwards it takes an eastern direction up to Curraj i Eperm village (Bajram Curri town), to the north to Valbona-Plave-Vermosh ending near the south of Lake Shkodra (Hani i Hotit place). Gashi River Strict Nature Reserve lies over the flysch of Vermoshi unit and subzone of Valbona. The area is composed by schists of the Silurian-Devonian, volcano-sedimentary formation of upper Paleozoic, conglomerate-sandy formations of "Luma" of Permian-lower Triassic and the lower and medium Triassic carbonate formation (Anisiane), which is followed by vulcanite of the rift of the upper Anisiane and tuffs, siliceous pelagic limestones with cherts of Ladiniane and limestone with siliceous of upper Triassic.

Climate

The climate of the component part, according to Albanian national climatic classification, is part of the Mediterranean Climate North Mountain subzone. This sub area is one of the coldest parts of the territory. Low temperatures are due to the high altitude above sea level.

In the altitudes between 1,000 and 1,300 m above sea level, the annual average air temperatures are 8 to 11 °C. Minimal average temperatures are observed during the month of January varying from 0 to -3 °C and from -4 to -6 °C in the upper part of the catchment range. The maximum temperatures are observed during July and vary from 18 to 21 °C. Absolute minimum temperatures observed vary from -10 to -18 °C, while the absolute maximum temperatures range from 35 to 37 °C. Annual rainfall ranges from 1,500 mm in lower parts to up to about 2,000 mm in its higher zone. The average maximum of snow height is of 75 to 175 cm.

Bracket fungus. Picture: H. Kirchmeir (E.C.O.)

Soils

The soil structure and composition of Gashi River, as well as of all cover of the Albanian Alps is quite heterogeneous and it is comprised of several types of soil. The pedologic soil composition of this part of Albanian Alps can be classified in several types of soil. The most important ones are the following: (i) Typical ranker in neutral rocks; (ii) Typical ranker in acidic rocks (pH 4–5); (iii) Lithosol and regosol soils in carbonate; (iv) Acidic hydrogen soil; (v) Red brown soil on hard limestone strata and (vi) Rendzina soil on dolomite rocks or limestone.

Water balance

The wilderness area is traversed by a dense network of hydrological systems, based on its pronounced mountainous character. Almost all streams have two directions, West-East and East-West. Gashi's river runs in north-south direction and it is the only river which has water during the whole year, fuelled partly by the Deberdolit lake and from the other streams. It flows into Valbona river, which then flows into the river Drini. The biggest streams which have water throughout the year are: Radogoshi Stream, Poligjca Stream and Torkuzi Stream. By analyzing the data it is evident that the Gashi River has a mixed nivo-pluvial regime. The maximum observed occurs during the spring period (April/May) with the water coming from the melting of the snow. Another maximum period is observed in the winter (November, December and January), which is related to the rainy precipitation that produces high water levels in the river.

Biotic factors

Biotopes and vegetation

Due to its location, the wilderness area Gashi River is characterized by different vegetation complexes ranging from lower mountain forests up to alpine rocks. Beech forests occur on steep slopes in the montane zone; they are partly mixed with *Abies alba*, *Picea abies*, *Pinus peuce* (endemic for the Balkans) and *Pinus heldreichii*. The timberline is at approximately 2,100 m.a.s.l. but due to grazing it is lowered down to 1,700 m.

Beech forests are covering approximately one third of the Strict Nature Reserve (around 1,000 ha).

The habitats in the area are influenced by the variable climate conditions in the area. Considering the vertical distribution of the vegetation types in the Alps area, three zones can be distinguished from each other. The component part Gashi River covers mostly two of them: the beech zone is located between 700 and 1,900 meters of altitude. The beech forests occupy the major part in this zone, as seen in the areas of Vermoshi, Cukali, Thethi, Fushzezë, etc. In this zone, apart from Beech (*Fagus sylvatica*), some other tree species are present in altitudes over 1,400 m, like Maple tree (*Acer obtusatum*), Fir (*Abies alba*), Bosnian Pine tree (*Pinus leucodermis*) and Norway Spruce (*Picea abies*). Above the beech zone, the alpine pastures zone is situated.

Flora

About 80% of Gashi River component part is covered by beech forests and the other part is covered with mixed beech and pine forests, like *Pinus heldreichii*, *Abies alba (fir)*, Silver Pine Arnenit, *Pinus sylvestris*, and *Pinus peuce*.

Vertical extension of up to 1,700 m.a.s.l. and water flow presence has created favorable conditions for the development of flora, especially light and shade loving species.

The species most prevalent in this area are *Ranunculus platanifolius, Cardamine enneaphyllos, Actaea spicata, Mercurialis annua, Cardamine bulbifera, Geum coccineum, Anemone nemorosa, Cephalanthera rubra, Digitalis grandiflora, Viola aethiolica, Viola tricolor*. In addition, from a point of view, the importance of the area is emphasized by the fact that there are species which are red listed as *Atropa belladonna, Lilium albanicum, Convallaria majalis, and Lunaria telekiana*, the latter are endemic plants. L. telekiana is a very rare and endangered species, which increases the biodiversity value of the Gashi River component part.

Fauna

The wilderness areas Lumi i Gashit harbors almost the complete range of species existing in the Albanian Alps. The component part hosts more than a hundred birds species, the most important of them are: Bearded Vulture (*Gypaetus barbatus*), Griffon Vulture (*Gyps fulvus*), Hazel Grouse (*Bonasa bonasia*), Capercaillie (*Tetrao urogallus*), etc.

Mammals are composed by a variety of groups from small mammals to large carnivores like the threatened Lynx (*Lynx lynx*), the Brown Bear (*Ursus arctos*) and the Wolf (*Canis lupus*).

From an ornithological point of view, the importance of the area is emphasized by the fact that a number of Balkan endemic species of global conservation concern are hosted in the component part, such as *Lynx lynx balcanicus, Rupicapra rupicapra balcanica, Microtus felteni, Rana graeca, Podarcis erhardii, Triturus macedonicus, Salmo faroides*, etc.

Salmo trutta is also found in the fresh waters of Gashi River.

Endemic species are important indicators: around 35 species of amphibians and reptiles are known to the component part.

Table 6: Representative species for the component part Lumi i Gashit (Albania)

Class	Species
Amphibian	Salamandra atra aurorae
Amphibian	Salamandra salamandra
Amphibian	Triturus alpestris
Amphibian	Triturus carnifex
Bird	Alectoris graeca
Bird	Aquila chrysaetos
Bird	Aquila heliaca
Bird	Bonasa bonasia
Bird	Gypaetus barbatus
Bird	Gyps fulvus
Bird	Neophron percnopterus
Bird	Tetrao urogallus
Mammal	Canis lupus
Mammal	Capreolus capreolus
Mammal	Lynx lynx
Mammal	Rupicapra rupicapra balcanica
Mammal	Ursus arctos

Multi stemmed beech tree. Picture: H. Kirchmeir (E.C.O.)

View on Rajca. Picture: F. Brazhda

2.a.2 Albania: Rrajca (002)

Total Area

Table 7: Area size of the component part Rrajca (Albania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
002	Albania	Rrajca	2,129.45	2,569.75	Moesian-Balcanic

Short profile and biogeography

The component part Rrajca is located in the upper Bustrica valley within the borders of Shebenik-Jabllanica National Park and it covers 2,130 ha. The component is located in the northeastern part of Librazhd District in Elbasan County in central Albania. Traditional land use on vegetation and landscape can be observed in lower elevations. In the hilly landscape around Rrajca and Sutani, only on extreme steep slopes, very few and also grazed remnants of thermophile mixed oak forests of the sub-montane belt can be found. The bushes of *Buxus sempervirens* are dominant and only some *Juniperus oxycedrus* and *Pteridium aquilinum* are growing. Few trees of *Quercus petraea, Acer opulifolium, Fraxinus ornus, Carpinus orientalis* have survived. Cattle do not eat *Buxus sempervirens* and apparently this is the reason for its massive occurrence.

Abiotic factors

Geographical position, natural region, altitudinal zone

The geographic location of the component is in the center of Albania.

The altitudinal range of Rrajca is 700 to 2,000 m.a.s.l. (the National Park where Rrajca is part of, ranges in altitude from 300 m to more than 2,200 m). The relief is rugged and mountainous.

Geology and geomorphology

The diversity of geological substrata, with very ancient rock formation from Paleozoic time, the location at the interface between different biogeographic regions (Balkan mountains, Mediterranean region and the southern limit of continental Europe), the large altitudinal gradient, and the persistence of rare Tertiary relicts in Balkan refugia during the glacial eras determined also a rich and interesting flora at the component.

Climate

The region on Shebenik-Jabllanica National Park (where the component part is part of) is characterized by a Mediterranean climate. The average annual temperature is between 7 °C and 10 °C. The average annual precipitation is 1,300 to 1,800 mm, while the influence of Continental climate category is present.

Soils

Depending on the various pedogenetic factors in the region, there are several types of soil. The dominant soils in the area are alluvial soils (fluvisols) located in the lowest parts of the region. These soils are formed over the sediments by the rivers. On the other hand, on the southwestern part of the region, as well as within the band closest to the lakeshore, hydric soil formation is ongoing, which leads to the formation of gleysols in different stages of evolution. Around the fluvisols, colluvial soils are well developed. These soils are formed above thicker sediments and are being created by the rivers and torrents in the area. On a significant part in the valley and hills on the western side, chromic luvisols have been formed and these soils are partly used for agriculture. In the mountain region, various types of cambisols have been formed.

Water balance

The area of the component part is located in the Bustrica valley. Bustrica is a mountain river with its source below the peak of Shebenik (2,250 m). Besides the two rivers Qarrishte and Bustrica, there are multiple smaller streams and at least 14 small glacial lakes. Lower and deeper valleys of creeks characterize the wooded steep slopes. Along rock walls and boulder fields, the natural timberline within the beech forest belt is formed. Avalanche tracks, sliding blocks and screes are expressing the tremendous geomorphological dynamic and its impact on the forest structure.

Biotic factors

Biotopes and vegetation

The vegetation of the component consists of mixed beech forest (*Fagus sylvatica, Abies borisii-regis, Pinus peuce, Sorbus cf. aria*).

The areas above an elevation of approximately 1,230 m on both sides of the Bustrica Valley and the tributaries of Bustrica River are covered by a close, old-growth beech forest of primeval character. Beech trees expand to the gravel islands in the narrow riverbed and grow in mixture with *Abies alba*, *Pinus peuce*, and *Sorbus cf. aria*.

In lower areas, the natural vegetation comprises: *Quercus trojana, Quercus petraea, Qu. cerris, Carpinus orientalis, Ostrya carpinifolia, Acer opulifolium, Acer campestre, Cornus mas, Fraxinus ornus, Corylus avellana* and some *Fagus sylvatica*.

Flora

The diversity of geological substrata, with very ancient rock formation from Paleozoic time, the location at the interface between different biogeographic regions (Balkan mountains, Mediterranean region and the southern limit of continental Europe), the large altitudinal gradient, and the persistence of rare Tertiary relicts in Balkan refugia during the glacial eras determined also a rich and interesting flora in the wide area of the park. 26 target plant species are identified as being of particular conservation interest. Of these, 23 are included in the Red Data List for Albania, including one that is critically endangered, five that are endangered and seven that are considered vulnerable. Two species are listed on the Red Data List for Europe and five on the World Red Data List. Eight of the listed species are endemic or sub-endemic to Albania and a further seven species are Balkan endemic.

Fauna

The wider areas provide crucial habitat for numerous important animal species. Among the numerous mammal species, six are listed in Annex II of the Bern Convention requiring strict protection; fourteen other species are listed in the Red Book of Albanian fauna. Species of special conservation interest are: Brown Bear (*Ursus arctos*), Wolf (*Canis lupus*), Lynx (*Lynx lynx*), Otter (*Lutra lutra*), Wild Cat (*Felis silvestris*), Chamois (*Rupicapra rupicapra*), Wood Mouse (*Apodemus sylvaticus*) and Lesser White-toothed Shrew (*Crocidura suaveolens*).

The area supports a diverse bird community due to its wide altitudinal range and impressive variety of habitat types. The most notable species recorded are Golden Eagle (*Aquila chrysaetos*), Hobby, Rock Partridge, Nightjar, Rock Thrush, White-backed Woodpecker and Black Woodpecker, Wryneck, Hoopoe, Sombre Tit, Cirl Bunting, Black-headed Bunting and Corn Bunting.

The previous data records show a presence of 15 species of reptiles in the Shebenik-Jablanica National Park.

Table 8: Representative species for the component part Rrajca (Albania)

Class	Species
Bird	Accipiter gentilis
Bird	Accipiter nisus
Bird	Alectoris graeca
Bird	Aquila chrysaetos
Bird	Bonasa bonasia
Bird	Buteo buteo
Bird	Charadrius alexandrinus
Bird	Charadrius dubius
Bird	Corvus cornix
Bird	Falco peregrinus
Bird	Falco tinnunculus
Bird	Tetrao urogallus
Bird	Turdus merula
Mammal	Felis silvestris
Mammal	Lutra lutra
Mammal	Lynx lynx
Mammal	Rupicapra rupicapra balcanica

View of Rothwald. Picture: R. Pekny (Wilderness Area Dürrenstein)

2.a.1 Austria: Dürrenstein (003)

Area size

Table 9: Area size of the component part Dürrenstein (Austria)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
003	Austria	Dürrenstein	1,867.45	1,545.05	Alpic

Short profile and biogeography

The wilderness area Dürrenstein includes the largest primeval beech forest in the Alps. It has an overall size of about 3,500 ha. The most natural parts, compromising an area of 1,867.45 ha, are nominated as a component part of the extended World Heritage Property. The elevation of the area ranges from 800 to 1,800 m.a.s.l. The bedrock is dominated by limestone (Dachstein Limestone and Dolomite). There is proof that the forest in the core area of 277 ha has never been actively managed or used by humans. Another 1,000 ha still show structures and elements of natural undisturbed forests, although it is possible that about 100 to 250 years ago, one harvesting intervention took place. Nevertheless, it is very likely that within the steep slopes there are further stands that never have been touched by human forest management activities.

For about 100 years, scientific research has been conducted in this important site for natural forest development. The main forest types are montane to altimontane alpine spruce-fir-beech forests compromising the following phytosociological associations: Galio-odorati-Fagetum and Adenostyles-glabrae-Fagetum.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part Dürrenstein including the Rothwald, comprising 277 ha of primeval forest, is located in the southwestern part of the Austrian province Lower Austria close to the border to Styria.

The area is located south of the municipality of Lunz am See at the southeastern foot of the steep slopes of Mount Dürrenstein (1,878 m.a.s.l.).

Geology and geomorphology

The Northern Limestone Alps consist of the Bajuvaricum, the Tirolicum and the Juvavicum. The wilderness area is located in the Lassinger Alps. They are part of the Ötscher stratum, which is part of a northern lower stratum of the Tirolicum.

The Lassinger Alps and the Hochschwab have always been very snowy. During the last glaciation period, the largest glacier of the Northeastern Limestone Alps was located in this area. The impacts of the glacier such as extensive cirques are still visible in the present landscape.

Steep slopes dominated by Dolomite rock characterize large parts of the area. Towards the Dürrenstein Plateau, steep rock facies of Dachstein Limestone become more prominent and overlay the dolomite layer.

Climate

The oceanic climate of the nominated component part is influenced by its location at the boundaries of the Alps and is characterized by high annual precipitation (up to 2,300 mm per year) and rather mild, but snowy winters. In this area, higher elevations are more strongly influenced by the oceanic climate than lower elevations in the valleys.

Consequently, the European beech grows up to the timberline, sometimes it even occurs in the krummholz belt. In some areas, where invernal temperature inversion frequently occurs, a further forest zone dominated by beech may form at higher elevations, whereas at lower elevations spruce forests occur in so-called frost pockets.

The average annual temperature is 3.9 °C (mean temperature in January: -4.7 °C, mean temperature in July: 13.4 °C).

Soils

Rendzina soils are typical for the area, particularly in middle or upper sections of the slopes. Mostly, the soil is an alkaline to neutral calcareous soil with humus. Humus is directly accumulated above protruding bedrock or above scree without any visible "mixing" soil horizon. In general, Rendzina soils provide less favorable conditions for forests. Soils are mostly moderately dry to moderately fresh. Apart from Rendzina soils, Terra fusca, a relic soil, occurs in the area. This soil type probably was formed by Aeolian deposition. Due to its characteristics, it is highly susceptible to erosion and may trigger landslides. Consequently, this soil type is limited to flat parts, depressions, basins and the bottom or lower parts of steep slopes.

Additionally, considerable parts of the nominated component part are covered by a clay and humus rich mixed soil, which can be classified between Rendzina and Terra fusca. Next to Rendzina soils, this soil type is the second most frequent soil.

Water balance

The water-runoff of almost the complete area is directed towards north with all streams flowing into the rivers Erlauf or Ybbs, which both lead to the Danube. The oldest part of primeval forest in the eastern part of the component part is an exception. This part is located at the southern side of a water divide. Its water-runoff flows down towards the river Lassnig further south, continuing into the river Salza and finally flowing into the river Enns and then into the Danube as well. In the past, this anomaly caused a severe dispute about ownership of the area, which positively, but unintentionally, contributed to the conservation of this part of the forest.

Due to its geological preconditions (Dachstein Limestone), there is no perennial water-bearing water body at the surface. Water run-off mainly takes place in subterranean aquifers. Whenever snowmelt or extreme precipitation occur, water run-off also takes place at the surface, temporarily filling natural drainage channels in the area.

Rothwald IUCN Ia. Picture: H. Glader (Wilderness Area Dürrenstein)

Biotic factors

Biotopes and vegetation

The northwestern part of the area is dominated by alpine grassland and Nardus grassland. The western and southern parts of the nominated component part are characterized by forest. About 50% of the total wilderness area are covered by beech-fir-spruce forests. This forest type represents about 70% of the total forested area of the property. The occurring forest communities widely comply with the typical vegetation to be expected in the Northern Limestone Alps. Beech forest communities are the most abundant forest type.

The highly diverse and varying natural site conditions led to a diversity of forests. This includes forests on fresh soils characterized by dense, closed tree layers and forests which are rich in herbs. Furthermore, there are open forests with grassland in the herbal layer on slopes on dry soils. Steep humid slopes often favor the establishment of alluvial and slope forests, whose tree layer is dominated by deciduous hardwood species such as the Sycamore Maple (*Acer pseudoplatanus*), the European Ash (*Fraxinus excelsior*) and the Scots Elm (*Ulmus glabra*).

Natural spruce forests only occur in very small-sized areas (e.g. growing on rocky landslide material and screes or along a narrow belt at the most upper border of the timber line if soil conditions are rather rocky). The snowy winters and the humid climate conditions favor the growth of beech forests in the nominated component part. Beech forests may even reach up to the timberline. Asperulo-Fagetum beech forests (on cambisols) are the most abundant type of beech forest. To a lesser extent, subalpine Adenostylo-Fagetum beech forests as well as Cephalanthero-Fagion beech forests on calcareous, dry soils occur within the nominated component part.

Flora

The understory of the beech forests compromises a number of tall herbs such as the Adenostyles (*Adenostyles glabra*), the Aconite (*Aconitum*) and Senecio (*Senecio subalpinus*). Above the timberline, the alpine krummholz belt is dominated by Swiss Mountain Pines (*Pinus mugo*). At even higher altitudes around the peak of the Dürrenstein the vegetation cover is dominated by alpine grassland and rocky areas sparsely covered by vegetation. Characteristic species of this area are the Mountain Avens (*Dryas octopetala*) and the Auricula (*Primula auricula*).

Deadwood is a key criterion for a large number of fungi. In the nominated component part, the diversity of fungi is extraordinarily high including several species of fungi, which are endemic to the area and were first described in the area. In total, more than 600 species of macrofungi, thereof 20 species enlisted in the Red List of Endangered Fungi in Austria, are present in the nominated component part.

Fauna

The component part harbors almost the complete range of species occurring in the Northern Alps. With regard to mammals, the occasional presence of the European Lynx (*Lynx lynx*) is noteworthy. The Alpine Newt (*Ichtyosaura alpestris*), the Alpine Salamander (*Salamandra atra*) and the White-backed Woodpecker (*Dendrocopos leucotos*), which is generally rare in Austria, are other characteristic species. The presence of the Rosalia Longicorn (*Rosalia alpina*), a Priority Species of Annex IV of the EU Habitats Directive, is representative for the enormous diversity of xylobiontic species depending on sufficient deadwood or old-growth stands.

From an ornithological point of view, the importance of the area is emphasized by the fact that all four grouse species present in Austria are documented: the Black Grouse, the Western Capercaillie, the Hazel Grouse and the Alpine Ptarmigan (*Tetrao urogallus, Lyrurus tetrix, Tetrastes bonasia, Lagopus mutus helveticus*). Golden Eagles (*Aquila chrysaetos*) are frequently seen in the area. In 2008, the Ural Owl (*Strix uralensis*), which was extinct in Austria, was successfully reintroduced.

Table 10: Representative species for the component part Dürrenstein (Austria)

Class	Species
Amphibian	Salamandra atra aurorae
Bird	Dendrocopos leucotos
Bird	Dryocopus martius
Bird	Ficedula parva
Bird	Glaucidium passerinum
Bird	Strix uralensis
Invertebrate	Callimorpha quadripunctaria
Invertebrate	Cucujus cinnaberinus
Mammal	Barbastella barbastellus
Mammal	Lynx lynx
Mammal	Myotis emarginatus
Mammal	Myotis myotis

Deadwood and lichen. Picture: R. Pekny (Wilderness Area Dürrenstein)

View of the Sengsengebirge. Picture: E. Mayrhofer

2.a.4 Austria: Kalkalpen (004, 005, 006, 007)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
004	Austria	Kalkalpen – Hintergebirge	2,946.20	14,197.24	Alpic
005	Austria	Kalkalpen – Bodinggraben	890.89		
006	Austria	Kalkalpen – Urlach	264.82		
007	Austria	Kalkalpen – Wilder Graben	1,149.75		
TOTAL			**5,251.66**	**14,197.24**	

Table 11: Area size of the component cluster Kalkalpen (Austria)

Short profile and biogeography

The landscape of the Kalkalpen National Park is mainly characterized by forests (81%), whereof beech forests are dominating. The most precious of the park's beech forests, about 5,250 ha, are proposed to expand the existing World Heritage site. Despite the economic use in the past, the integrity of these forests was largely preserved: about 75% are older than 140 years and are classified as natural or near-natural.

The beech forests in the Kalkalpen represent a great altitudinal gradient (396 to 1,450 m.a.s.l.) and include submontane/low montane pure beech forests and high montane mixed beech forests.

The spectrum of occurring phytosociological associations ranges from the thermophilous (Helleboro nigri-Fagetum ZUKRIGL 1973 and Cyclamini-Fagetum SOÓ (1962) 1971) to mesophilous beech forests. The Helleboro nigri-Fagetum can be constituted as endemic for the northeastern Limestone Alps (WILLNER 2002). The mesophilous group includes the Adenostylo glabrae-Fagetum MOOR 1971 the Cardamine trifoliae-Fagetum OBERDORFER 1987 and the Saxifrago rotundifoliae-Fagetum (ZUKRIGL 1989) s.l., all of which are typical for carbonate rock, but also the Galio odorati-Fagetum (SOUGNEZ & THILL 1959).

The diversity of different site conditions enables the occurrence of various biotopes. Therefore, the dense beech forest belt is frequently broken up by natural forest-free habitats. Snow pressure and avalanches strongly affect forest ecosystems. Dwarf and saber growth of beech is a common picture in steep slopes and avalanche paths.

Abiotic factors

Geographical position, natural region, altitudinal zone

The component parts of the cluster Kalkalpen are located in the southeast of the Austrian province Upper Austria close to the border to Styria. In physiogeographical terms, the area is part of the Northern Limestone Alps and covers the Sengsengebirge and the Hintergebirge. Sea level altitude ranges from 396 to 1,963 m.a.s.l.

Geology and geomorphology

The geological situation in the Kalkalpen National Park is complex and dominated by zones of Main Dolomite and Wetterstein limestone facies. Along the faultlines of the mountain formation, numerous caves were formed. More than 70 have already been detected. The largest among them has a total length of about 30 km.

The terrain is mainly steep, rough and often impassable. The Sengsengebirge with its karst plateau in the summit region slopes down abruptly and steeply to the north. The Reichraminger Hintergebirge is characterized by its numerous ditches and canyons that form the longest unaffected branched river system in Austria. The soils are quite shallow. Erosion is omnipresent and a natural phenomenon.

During the last cold periods, the area remained widely free of ice. Many plant and animal species persisted in this non-glaciated area, but did not re-spread. This resulted in a high number of endemic species in the area.

Saber growth in Kalkalpen National Park. Picture: F. Sieghartsleitner (Kalkalpen National Park)

Climate

The climatic conditions in the component parts of Kalkalpen are characterized by the restraining effects from the mountain ranges. The frequently occurring northwesterly humid weather causes intensive rainfalls. The climate can be categorized as temperate and humid with an oceanic influence.

The average precipitation per year is about 1,600 mm, but it reaches up to more than 2,000 mm per year in exposed locations. Peaks of precipitation occur in March and July. The duration of snow cover also varies within certain areas: from 60 days in the northern valleys (400 m.a.s.l.), to 100 days in inner-alpine valleys (600 m.a.s.l.) and up to 190 days in 1,500 m.a.s.l.

The average annual temperature varies between 8 °C in the valleys and 1 °C in the summit regions of the Sengsengebirge.

Soils

A mosaic of different kinds of soil types is characteristic for the soils in the component parts of Kalkalpen. Shallow and deep soils, calcareous and acidified soils alternate rapidly within small areas. Depending on the relief, different soil types occur. In the mountain ridges and slopes, rendzinas are most common, whereas braunlehms occur in basins, ditches and plateaus. The deeper the soil the more often water-impermeable layers are existent that lead to pseudogleys.

The main part of the soils in the area Kalkalpen is mixed soil, which can be classified somewhere between rendzina and braunlehm. Soils with little influence of braunlehm are rather shallow and therefore the water holding capacity can be classified as relatively low. Due to high precipitation, which compensates the dry soil aspect, moderately fresh and fresh habitats dominate. Vigorous stands for beech, fir and spruce represent the so-called braunlehm-rendzina, a clay and humus-rich mixed soil.

Water balance

The component parts of Kalkalpen are situated within the water catchment area of the rivers Enns and Steyr. The main drainage system is build up by the river Großer Bach that flows into the Enns in Reichraming and the river Krumme Steyrling that flows into the Steyr in Molln. The western part of the area, the Sengsengebirge and Größtenberg, is dominated by karst. Due to the rock solubility, a subsurface dewatering system occurs that resurfaces in various small and some great wells. Surface water is rare in this area.

However, the situation is completely different in the Reichraminger Hintergebirge, which is dominated by dolomite. A long and widely branched river system full of small ditches, gorges and creeks has developed here. It is the longest unaffected river system in Austria.

Under the summits of the Hohe Nock, two standing water bodies, the lakes Feichtau Seen are located. Other wetland habitats are bogs, mires, fens and various spring habitats.

Biotic factors

Biotopes and vegetation

The scenery of the component cluster Kalkalpen is dominated by forests that cover about 80% of the area. The dominating beech forests make up about 3,400 ha and show different variety of types: from nutrient-rich to poor, from basic to slightly acidic, from moist to extremely dry.

The endemic Helleboro nigri-Fagetum and the Cardamine trifoliae-Fagetum are the most abundant types of beech forests. The high montane beech forests, which are rich in ferns and tall herbs, are built up in shady areas with deep soils, whereas the Adenostylo glabrae-Fagetum occupies shallow and steep carbonate slopes. Soils poor in lime are dominated by the Galio odorati-Fagetum. The Cyclamini-Fagetum is quite rare, as it is restricted to thermophilous low montane stands which make up only a small area.

The areas above beech distribution are settled by natural spruce forests (Adenostylo glabrae-Piceetum, Adenostylo alliariae-Picetum), that are replaced by dwarf pine scrubs and alpine mats with increasing height. Beech is characterized by a wide amplitude of growth conditions. Nevertheless, there are also sites where the competitive beech is displaced by other trees. Various ravines and gorges in the area offer humid habitats that are stocked by slope forests with Sycamore Maple (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*) and Scots Elm (*Ulmus glabra*). Small-patched or linear riparian forests accompany the alpine rivers and creeks. In extremely dry, mostly southerly exposed slopes, thermophilous beech forests are replaced by pine forests (Erico-Pinetum sylvestris). The diversity of different forest types in combination with natural forest-free biotopes offers a small-scale variety of different habitats that is unique for the area.

Flora

The beech forests in the nominated component parts show a great floral diversity due to the high number of different stands and site conditions. Natural forest-free stands like avalanche paths and rock habitats are often part of the beech forests and, therefore, enable the occurrence of light-loving non-forest species that prefer open and semi-open habitats.

The characteristic species like the Christmas Rose (*Helleborus niger*), Dog's Mercury (*Mercurialis perennis*) and the Sweet Woodruff (*Galium odoratum*) can be found in the beech and mixed beech forests. Also worth mentioning are the species of the genus Helleborine (*Cephalanthera*) that prefer the thermophilous beech forest. These forests are also habitat for the beautiful and rare Lady's Slipper Orchid (*Cypripedium calceolus*).

As mentioned before, the region of the Northern Limestone Alps is a hotspot for endemic species. Some of them also occur within beech forests, such as Austrian Spurce (*Euphorbia austriaca*), *Callianthemum anemonoides* and Kerners' Lungwort (*Pulmonaria kerneri*).

Fauna

The high diversity and integrity of habitats in the Kalkalpen area bear an extraordinary species-rich fauna. More than 1,500 species of butterflies, thereof 7 species listed in the EU Habitats Directive have been confirmed. 6 species of woodpeckers and 5 of owls out of the 10 known in Austria live here. Another 4 out of 5 grouse species and all 4 flycatcher species live in the protected area; within the 28 bat species known in Austria 17 have already been documented for the Kalkalpen. The detection of 21 rare primeval relic beetle species confirms the preservation of a highly original faunal community. The population densities of the Rosalia Longicorn Beetle and the White-backed Woodpecker, that are both specialized on beech deadwood, are rather high in the Kalkalpen National Park. The White-backed Woodpecker, a primeval forest indicator species, has its Austria-wide highest population density here: for each 100 ha, 2.2 breeding pairs have been confirmed.

The area is one of the endemism hot spots in Austria: 46 of the 97 endemic and 77 subendemic faunal species in Austria are occurring in the area of Kalkalpen.

Class	Species
Bird	Aquila chrysaetos
Bird	Falco peregrinus
Bird	Ficedula parva
Bird	Tetrao urogallus
Invertebrate	Aglia tau
Invertebrate	Austropotamobius torrentium
Invertebrate	Cucujus cinnaberinus
Invertebrate	Euphydryas maturna
Invertebrate	Rosalia alpina
Invertebrate	Stephanopachys substriatus
Mammal	Barbastella barbastellus
Mammal	Lutra lutra
Plant	Cypripedium calceolus
Plant	Dicranum viride
Reptile	Coronella austriaca

Table 12: Representative species for the component cluster Kalkalpen (Austria)

Autumn in the Sonian Forest. Picture: P. Huvenne

2.a.5 Belgium: Sonian Forest (008, 009, 010, 011, 012)

Area size

Table 13: Area size of the component cluster Sonian Forest (Belgium)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
008	Belgium	Sonian Forest – Forest Reserve “Joseph Zwaenepoel”	187.34	4,650.86	Atlantic
009	Belgium	Sonian Forest – Grippensdelle A	24.11		
010	Belgium	Sonian Forest – Grippensdelle B	37.38		
011	Belgium	Sonian Forest – Réserve Forestière du Ticton A	13.98		
012	Belgium	Sonian Forest – Réserve Forestière du Ticton B	6.50		
TOTAL			**269.31**	**4,650.86**	

Short profile and biogeography

The Sonian Forest is unique in Western Europe because of its large number of impressive old beech trees and stands. About 74% of the surface area consists of beech-dominated stands. About 1/3 of these are over 180 years old. The rest consists of oak (13.5%), mixed broadleaves (2%), mixed broadleaf-conifer (7.5%) and pine stands (3%). Today, the majestic beech stands are considered a historical monument and landscape. Also, the undisturbed soils and intact postglacial relief are valuable treasures. Soils consist of acidocline quaternary silt deposits.

The most natural parts of the forest are now proposed as component parts. They mainly consist of very old beech stands (150–250 years old). They originate from close-to-nature managed forests, but all have now the statute of strict forest reserve (no harvest), or will receive this statute within the next months.

The forest is located in the temperate Atlantic climate zone with a growing season of 7 months (April to October), a mean temperature of 10.5 °C and an annual precipitation of 835 mm

Phytosociologically, the stands mainly consist of Atlantic Acidophilous Beech forest (Milio-Fagetum) intermixed with more neutrocline Atlantic Bluebell Beech forests (Endymio-Fagetum). The forest complex has a high biodiversity with over 400 species of vascular plants, 1,000 fungi, 195 bryophytes (40 liverworts and 155 mosses), 100 hoverflies and close to 600 beetles, many of which are rare and endangered, and related to deadwood.

Abiotic factors

Geographical position, natural region, altitudinal zone

The Sonian Forest is located in the center of Belgium, nearby the capital of Europe: less than 10 km from the center of Brussels. Today, it is almost completely surrounded by residential areas. Formally, the forest is spread over three administrative regions: Brussels Capital region, Flanders and Wallonia. The altitude ranges from 65 to 130 m.a.s.l.

Geology and geomorphology

The Sonian forest is situated on the plateau between the rivers Zenne and Dijle, to the southeast of Brussels. This plateau is locally interrupted by rolling flat hills and steep, long and shallow valleys as well as by smaller, dry depressions (so-called 'dellen'). The lowest point is 65 m.a.s.l., the highest point is 130 m.a.s.l.

On 95% of the forest surface, the soil consists of tertiary calcium-rich sandstone and flint stone, covered with quaternary niveo-aeolic loess deposits (FAO classification: Luvisols and Podzoluvisols) of the Würm glacial (20,000 BP).

Soil analysis showed that the soils of the Sonian Forest have remained undisturbed in the last 10,000 to 15,000 years. This suggests that the current appearance of the soil of the Sonian Forest dates back to the last ice age. Since forest cover has been constant since the last ice age, the micro relief has been almost untouched and unchanged. This is rare in Western Europe, especially on loamy soils.

Climate

The Atlantic climate in Brussels is characterized by a mean annual temperature of 10.5 °C and an annual precipitation of 852 mm. Winters are very mild with an average temperature in January of 3.3 °C. The average temperature in July is 18.4 °C, with a growing season of 7 months (April–October). This is a very typical Atlantic climate, which is reflected in the typical Atlantic beech forest types that are present at the site. This Atlantic climate may involve more frequent storm events than in the continental climate zone, which may influence the natural dynamics of these forests.

Soils

The prevailing soil types are Luvisols (Albeluvisols) and Podzoluvisols with typical fragipans. A fragipan is an altered subsurface soil layer that restricts water flow and root penetration. They occur from 60 to 100 cm and are the result of periglacial effects.

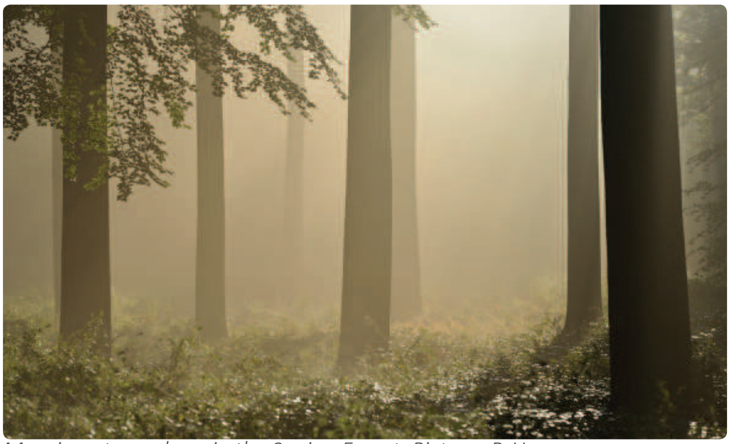
Some 20,000 years ago, sand with sandstone and flint stone formed the upper layer in the area of the Sonian Forest. During the last ice age, this layer was covered with loess. Today, the largest part (95%) is composed of a 3 to 4 m thick lessivated silt layer (pHH2O around 4.0 in the upper 10 cm), which corresponds to the loess deposition. The Sonian forest has the vastest surface of unperturbed soil profiles in Belgium: there has never been tillage and soil life has always been very poor. From an archaeological and soil-heritage point of view, this makes this soil highly valuable.

Water balance

Rainwater is mostly drained to a deep-laying phreatic table.

At a depth of 32 to 52m below ground, a permanent water reserve is present, situated on a clay substrate and held up in a deep, chalk rich sandy profile. Because of the deep groundwater level, the Sonian Forest is dry except for a few springs, one of which is located in the Forest Reserve Zwaenepoel (source of the IJse).

The water-runoff of the Sonian forest is directed towards the north through rivers of the basin of Dijle and Zenne. The sources and headwaters of the Ijse (with important ponds) and the Voer drain into the Dijle. The Woluwe, Vuilbeek and the brook near Rood Klooster drain into the Zenne.



Morning atmosphere in the Sonian Forest. Picture: P. Huvenne

Biotopes and vegetation

The majority of the Sonian forest consists of Atlantic acidophilous beech forest (Milio-Fagetum sensu Noirfalise, 1984; European habitat type 9120, EUNIS-code G1.62). This is the Atlantic counterpart of the widespread Luzulo-Fagetum in the continental region. Ground vegetation is scarce and dominated by *Pteridium aquilinum*, *Milium effusum*, *Oxalis acetosella*, *Convallaria majalis*, etc.

On the less acidic soils, the more neutrocline Atlantic Bluebell Beech forests (Endymio-Fagetum sensu Noirfalise & Sougnez, 1963; Corine-code 41.132) occurs. It is characterized by carpets of Bluebells (*Hyacinthoides non-scripta*), together with *Anemone nemorosa*, *Lamiastrum galeobdolon*, etc. Rare, typical Atlantic species like *Gagea spathacea* and *Tamus communis* are also present. It is considered the Atlantic counterpart (or subtype) of the Asperulo-Fagetum or Melico-Fagetum (Eur. Habitat 9130).

Both vegetation types are well developed on this ancient woodland site, containing all indicative species.

The tree layer in both forest types is strongly dominated by beech. Shrub and understory are poorly developed, which is typical for these forest types. The tree layer may be even-aged, due to historic management, but often contains a high density of very old, monumental trees. Beech trees may reach very large sizes at this site, with diameters up to 170 cm and tree heights over 45 meters. More than 10,000 trees in the forest have a DBH over 100 cm, of which an important share (approx. 1/4) are located in the proposed component parts.

Other rare vegetation types occurring in the forest include linear vegetation of the Alno-Padion along the streams, and acidocline Oak-hornbeam forests (Stellario-Carpinetum) on richer oak-dominated sites.

Flora

In the dense, acidocline forests, vegetation is scarce, including *Oxalis acetosella*, *Milium effusum* and *Polygonatum multiflorum*. In canopy openings, herbs as *Rubus sp.*, *Pteridium aquilinum* with *Dryopteris dilatata* and *Athyrium filix-femina* become temporarily dominant. On richer soils, *Anemone nemorosa*, *Lamium galeobdolon*, and *Hyacinthoides non-scripta* are dominant.

418 vascular plant species were recorded in the forest, 70 of which are considered ancient woodland indicators (HERMY et al. 1999). Rare species include *Paris quadrifolia*, *Neottia nidus-avus*, *Gagea spathacea* and *Phyteuma spicatum*.

The species list of fungi exceeds 1,000. Among them are at least 323 species related to deadwood of beech, including rare indicator species of natural beech forests like *Hericium erinaceus, Ganoderma pfeifferi, Lentinellus ursinus, Aurantioporus fissilis, Coprinus spelaiophilus,* and *Henningsomyces candidus*.

Concerning bryophytes, the area is one of the richest in the Benelux with 195 species of which 40 are liverworts and 155 mosses. Rare species are *Drepanocladus uncinatus*, *Rhytidiadelphus loreus*.

Fauna

70 bird species occur, including Goshawk, Honey Buzzard and five species of woodpeckers including the Middle Spotted and Black Woodpecker.

Regarding mammals, the Sonian forest is important for numerous bat species: Bechstein's Bat (*Myotis bechsteinii*), Great-eared Bat (*Myotis myotis*) and Leisler's Bat (*Nyctalis leisleri*) have been recorded.

The forest contains over 190 species of hoverflies and about 600 species of beetles; many of them are typical for old beech forests with high amounts of deadwood. They include rarities like *Caliprobola speciosa, Ceriana conopsoides, Mallota fuciformis, Sphiximorpha subsessilis, Xylota meigeniana, Gnorimus nobilis, Sinodendron cylindricum, Corymbia scutellata* and the endemic *Carabus auronitens var. putzeysii. Lucanus cervus* (Annex II of the EU Habitats Directive) occurs just outside the forest perimeter.

Table 14: Representative species for the component cluster Sonian Forest (Belgium)

Class	Species
Amphibian	Triturus cristatus
Bird	Alcedo atthis
Bird	Dendrocopos medius
Bird	Pernis apivorus
Fish	Rhodeus sericeus amarus
Invertebrate	Lucanus cervus
Mammal	Myotis bechsteinii
Mammal	Myotis dasycneme
Mammal	Myotis emarginatus
Mammal	Myotis mystacinus
Mammal	Myotis nattereri
Mammal	Nyctalus leisleri
Mammal	Pipistrellus pipistrellus
Mammal	Plecotus auritus

Dead wood in the Sonian Forest. Picture: P. Huvenne

View of Dzhendema reserve. Picture: A. Ispirev (Central Balkan National Park)

2.a.6 Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

Area size

Table 15: Area size of the component cluster Central Balkan (Bulgaria)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
013	Bulgaria	Central Balkan – Boatin Reserve	1,226.88	851.22	Moesian-Balcanic
014	Bulgaria	Central Balkan – Tsarichina Reserve	1,485.81	1,945.99	
015	Bulgaria	Central Balkan – Kozya Stena Reserve	644.43	289.82	
016	Bulgaria	Central Balkan – Steneto Reserve	2,466.10	1,1762.01	
017	Bulgaria	Central Balkan – Stara Reka Reserve	591.20	1,480.04	
018	Bulgaria	Central Balkan – Dzhendema Reserve	1,774.12	2,576.63	
019	Bulgaria	Central Balkan – Severen Dzhendem Reserve	926.37	1,066.47	
020	Bulgaria	Central Balkan – Peeshti Skali Reserve	1,049.10	968.14	
021	Bulgaria	Central Balkan – Sokolna Reserve	824.90	780.55	
TOTAL			**10,998.91**	**11,720.85**	

Short profile and biogeography

The nominated cluster of Central Balkan National Park (CBNP) consists of the above mentioned 9 component parts.

CBNP is located in the central and higher part of Stara Planina Mountain (named Balkan Range) which is the main range of the Balkan Peninsula and Bulgaria and an extension of the Alpine-Carpathian folds. The National Park is home torare and endangered wildlife species and communities, as well as self-regulating ecosystems with great biological diversity, as well as historical sites of global cultural and scientific significance. The park area (72,021.07 ha) ranges from 500 to 2,376 m.a.s.l. and forest covers more than 61% of its area.

CBNP is the biggest, well-protected old beech forest massif in Bulgaria. Beech occupies 29,960.4 ha, which is 71% of the forests in the National Park and 5.2% of Bulgaria's total beech forest area. Approximately 97% of the forests in the National Park are of natural origin. Most of them have not been affected by human activity in the last century. The average age of the beech communities in CBNP is 135 years. Some of the most significant natural treasures of Central Balkan are the pure and mixed stands of beech forests. In the CBNP, widely distributed species of beech forests include the the Asperulo-Fagetum, Luzulo-Fagetum and Medio-European limestone beech forests of the Cephalanthero-Fagion habitat types. Less represented and fragmented are the forests of Moesian Beech. A majority of the forests in the Park are composed of broadleaf species, i.e. beech, hornbeam, durmast, sycamore and others. The coniferous are mainly spruce and Rumelian pine and the mixed forests consist mainly of beech and fir.

Abiotic factors

Geographical position, natural region, altitudinal zone

CBNP and its reserves are located in the central part of Bulgaria and include the central and higher areas of the Balkan Mountain Range. The altitude of the National Park ranges from 500 to 2,376 m.a.s.l. Botev peak is the highest peak in the National Park and in the Balkan Range.

The National Park is situated in five administrative regions and falls within nine municipalities.

Geology and geomorphology

The Balkanides are the largest formation from Neogene and Quaternary periods; they were formed alongside the Alps and the Himalayan mountain chains. This system is represented in Bulgaria by three longitudinal parts: Pre-Balkan, Balkan Range and Srednogorie areas.

The National Park's soils consist of magma plutonic bodies, sediment, and metamorphous rocks of Paleozoic, Mesozoic and Paleogenic age.

CBNP has a complex geological history and structure. 4 denudation levels with abundant and diverse geomorphological elements are observed. These include flattened ridges, steep slopes, granite over-thrusts, and well expressed surface and underground limestone forms. There are deep canyons, individual rocks and rock walls, deep precipices and water caves in the Park.

One quarter of the forested area of the Park is on granite rock. Next in distribution are the crystalline schists, the sandstone, the clay, the granodiorite and the dolomite. Others include granite gneiss, marl, lime, and quartz porphyry.

Climate

CBNP lies in 3 main climatic areas: mountain, moderate continental and transitory climate.

The mountain climate prevails in areas higher than 1000 m.a.s.l. The National Park's northern foothills experience a moderate continental climate and its southern parts are characterized by transitory conditions. The climate elements vary significantly in the Park according to the height of the elevation, slope, exposure of slopes, and the intendation of the terrain. The average annual temperature is 7 °C (mean in January: -6 °C; mean in July: 11.8 °C). The precipitation increases with height and usually reaches 1,200 mm per year and is more abundant on the northern slopes. The snow cover remains for approximately six months. The mountain climate is characterized by frequent and strong winds. The northern foothills of the CBNP experience uncharacteristically warm spring winds (foehn), while turbulent boreal winds can occur on the southern slopes.

Soils

In CBNP, the following soil types prevail: brown forest soil, cinnamonic forest soil, mountain forest dark soil, mountain meadow soils and rendzinas prevail.

The brown forest soils (Dystric-Eutric Cambisols) cover the middle forest vegetation belt and occur in 96.9% of the forest area. They are formed mainly over non-carbonate rocks (granite, gneiss, crystalline schist, sand). Their characteristic feature is the full soil profile.

The cinnamonic forest soils (Chromic Luvisols) occur in the lowest mountain sections and occupy 2.1% of the forest area. They cover predominantly dry and broken landforms and overlay non-carbonic rocks.

The mountain forest dark soils (Umbric Cambisols) are insignificant in the forest fund (1.0%). They cover parts of the Middle and High-Mountain belts.

The mountain meadow soils (Modic Cambisols) occupy the highest parts of the Park. They are formed on non-carbonaceous rocks and are completely covered by grass.

Rendzinas occur on a limited area in the karst regions in the Park.

Water balance

CBNP is rich in water resources. The Park's deep karst performs significant regulatory functions in supplying underground water to rivers, and the large forested areas contribute significantly to water retention in the watershed.

The main line dividing the rivers of the Black Sea and Aegean watersheds follows along the ridge of the Balkan Range. This line divides the Park in two parts, a northern part with the waters draining into the Danube and then into the Black Sea, and a southern part with waters draining into the Maritsa River and into the Aegean Sea.

The main rivers originating in the National Park are Vit, Osam, Rositsa and Tundzha. Due to the higher degree of forestation, the northern part is more favorable for surface runoff formation.

On the southern slopes, the basins of the rivers are small and steep with a large water outflow. The average annual volume of water formed in CBNP is 460 million m^3. The water in the National Park represents a significant part of Bulgaria's drinking water reserves.

Biotic factors

Biotopes and vegetation

The nominated component parts include the most representative habitats and related biodiversity of CBNP. With regard to phytogeography, the National Park area is included in the Central Balkan District of the Ilyrian Province, of the European Deciduous Forest Area.

Six vegetation belts exist entirely or are represented partially in CBNP. These include xerothermic oak forests, xeromesophyllic and mesophyllic oak and hornbeam forests, a beech belt (best represented; 71% of the forests), a coniferous belt (15.7% of the forests), a sub-alpine and an alpine belt.

The territory of the Park contains a wide variety of natural habitats, mainly related to medium and high-altitude areas of the country. Most of them (77%) have a European and/or national environmental significance. There are 86 habitat units classified according to the European Nature Information System EUNIS (62 of them are included in the Bulgarian Red Data Book). 4 of them represent different freshwater habitats, 3 are bogs and fens, 23 are pastures and meadows, 13 are shrub communities and communities of low shrubs, 29 are forests, 10 are cliffs and caves, and 4 are anthropogenic habitats. 56 of the types and subtypes classified according to EUNIS are represented in the 35 habitats included in appendices of Bulgarian Biodiversity Act and of the EU Habitats Directive.

The forests in the Park cover 61% of the territory, whereof 84.3% are broadleaf and mixed forest. The main environment-forming species is Common Beech (*Fagus sylvatica*), whose monodominant communities are most prevalent in the Park. The coniferous tree species occupy 15.7% of the area. The average age of the beech forests is 135 years, and 115 years for the coniferous forests.

The widest distribution of beech is presented by Asperulo-Fagetum, Luzulo-Fagetum and Medio-European limestone beech forests of the Cephalanthero-Fagion habitat types.

Flora

CBNP is characterized by high plant diversity. In the Park and its reserves, almost 1,700 species of higher plants (41% of the Bulgarian higher flora) can be found.

186 species of the Park's floristic wealth are of conservation value; 78 of them are under strict protection (Biological Diversity Act), 58 are protected by the Red Data Book of Bulgaria, 120 species are listed in the Red List of vascular plants in Bulgaria, and 17 species are recorded in the Red List of IUCN. In CBNP, 98 species of plants are endemic, of these, 75 species are Balkan endemic and 23 Bulgarian endemic. The list of relict higher plants includes 101 species; of these, 48 are Tertiary relicts and the remaining 53 species are glacial relicts. This ranks the Park among the most important refuges of arctic-alpine elements in the high mountains in southern Europe.

The beech forest or its undergrowth can be the appropriate place for some of the species with high conservation significance as *Prunus laurocerasus*, *Taxus baccata*, *Acer heldreichii*, *Angelica pancicii*, *Galanthus elwesii*, *Haberlea rhodopensis* and others.

Fauna

The diversity of invertebrates in CBNP was evaluated through 8 model groups. According to them, 2,366 species have been found, about 45% of the expected ones. Among them are 261 stenotopic species, 168 endemic and 108 relict species; 19 species are globally threatened.

211 vertebrate species have been recorded in the Park, 5 fish, 9 amphibians, 15 reptiles, more than 220 bird species (123 are nesting) and 60 mammal species. Among these, there are 21 globally endangered vertebrates and 44 European endangered ones. Wildcat, red deer and brown bear are endangered in Europe. The populations of 8 species of mammals, among which the Snow Vole, the Souslik, the Lesser Mole-rat, the Edible Dormouse, and the Balkan Chamois are of global conservation significance. Approximately 90 bird species breed in the reserves Boatin, Tsarichina, Steneto and Stara Reka.

The beech forests in the Park are of global conservation significance as a habitat of vertebrate fauna. These forests are the breeding grounds for 18 species which are globally endangered or globally significant (13 mammal, 4 bird and 1 amphibian species).

Table 16: Representative species for the component cluster Central Balkan (Bulgaria)

Class	Species
Bird	Aegolius funereus
Bird	Alectoris graeca
Bird	Aquila chrysaetos
Bird	Bubo bubo
Invertebrate	Rosalia alpina
Mammal	Myotis myotis
Mammal	Rhinolophus ferrumequinum
Mammal	Rhinolophus hipposideros
Mammal	Rupicapra rupicapra balcanica
Mammal	Spermophilus citellus
Mammal	Ursus arctos
Mammal	Canis lupus
Mammal	Lutra lutra
Mammal	Myotis bechsteinii
Reptile	Vipera berus
Reptile	Testudo graeca
Reptile	Lacerta viviparia

View toward Hajdučki and Rožanski kukovi. Picture: I. Friščić Prpić (Northern Velebit National Park)

2.a.7 Croatia: Hajdučki i Rožanski Kukovi (022)

Area size

Table 17: Area size of the component part Hajdučki i Rožanski Kukovi (Croatia)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
022	Croatia	Hajdučki i Rožanski Kukovi	1,289.11	9,869.25	Illyric

Short profile and biogeography

Hajdučki and Rožanski Kukovi Strict Reserve is located within the Northern Velebit National Park (IUCN category II). The Strict Reserve is under protection since 1969. It encompasses two craggy massifs connected with a mountain pass. The surface of the area of Hajdučki and Rožanski Kukovi Strict Reserve is 1,220 ha. The primary natural characteristics of the Reserve are geomorphological and speleological uniqueness as well as almost untouched wilderness. On the rugged and diverse landscape of peaks, ledges and sinkholes, the forests that are growing there are subalpine beech, subalpine spruce and dwarf pine forests that have virtually been undisturbed due to the inaccessibility of the terrain as well as the low economic value of the wood itself. The beech forests growing in the Reserve are of the Illyrian type, with a lot of Illyrian species in their composition, making them very species-rich and interesting from the floristic point of view. Velebit Mountain in general is one of Croatia's centers of endemism. There is a combination of generative and vegetative regeneration of the stands, which is a rarity on the European level. As the Reserve encompasses the top area of the mountain, the subalpine beech forests here are high-altitude types growing on 1,200 to 1,500 m.a.s.l. The main types of beech forest in the nominated component part are Ranunculo platanifolii-Fagetum and Polysticho lonchitis-Fagetum; they are both characterized by an interesting tree shaoe, the first one having pipe-shaped trees, and the second one krummholz shape.

Abiotic factors

Geographical position, natural region, altitudinal zone

Hajdučki and Rožanski Kukovi Strict Reserve is located inside of the Northern Velebit National Park, East 14.991955 and North 44.764827. The whole Reserve has a surface of 1,220 ha.

Geology and geomorphology

The Velebit karst rocks have formed in sea shallows on a journey of over 6,000 kilometers long, moving from an area south of the equator to the 45th parallel of north altitude. In this sea, through deposition of carbonate silt, crushed shells and skeletons of dead organisms for hundreds and thousands of meters, thick carbonate sediments were created. The deposited sediments hardened or cemented and were gradually bent, cleft, lowered or uplifted above the sea level. This area is composed of sedimentary, predominantly carbonate sediments, limestone, dolomite and clastic rocks composed of particles created through decomposition of other rocks. Crucial for the creation of this majestic karst topography were thick carbonate sediments, the tectonic activity, which formed the relief, and carbon dioxide-rich precipitation, which dissolved the carbonate sediments. As a result of dissolution, countless karst forms, small and large, were created both on the surface and in the underground.

Climate

Velebit is the natural border between the continental and Mediterranean part of Croatia. Two different climates meet on its crest, the Mediterranean and the Continental one. This causes unpredictable weather conditions. The area of Strict Reserve is one of the coldest and most humid parts of Croatia. The average snowy winter lasts longer than seven months, but it is not unusual for it to snow here in the summer months as well. In valleys and sinkholes, snow remains longer, and in ice caves it is present the whole year round. One of the main characteristics of this area is bora, the strong wind which blows from the mainland to the sea, often reaching hurricane force. In Northern Velebit National Park is the highest meteorological station in Croatia, Zavižan, at the altitude of 1,594 m. The average annual temperature is 3,3 °C, and the annual precipitation 1,919 mm.

Soils

The main feature of the soil cover in Northern Velebit, and karst areas in general, is the highly pronounced spatial variability, with a variety of different types of soil found within a small area. The reasons for this include: geomorphologic structure of the terrain, climate, parent bedrock, karstification process, glacial and nivation processes, and millennia-long anthropogenic influences. The main types of soil within the Park are: black soil on limestone, rendzina on dolomite and dolomitized limestone, brown soil on limestone, lessive soil on limestone, brown podzolic soil and acidic brown soil.

Water balance

The mountain biotope is vulnerable to various negative influences, especially in a karst area like this. The vast underground system collects copious amounts of water from rain and snowfall, delivering it to the surrounding lowland and sea, after passing through the cave system. The forest cover and its ecosystem therefore plays a huge role in maintaining the quality of water in the wider area, as well as protecting the fragile and unique underground ecosystems with its life forms. Although often whipped by rain and snow, animals and plants here frequently lack water because the majority is drained into the cavernous underground world. In National Park Northern Velebit, there is no surface water except for a little stream in the south part of the Park called Štirovača.

Biotic factors

Biotopes and vegetation

The Strict Reserve Hajdučki and Rožanski Kukovi reveals a fascinating mosaic of dark coniferous and mixed forests, steep rocky peaks and cliffs interwoven with small grasslands. The Reserve is predominantly covered by forest habitat. One of the main characteristics of every mountain is vertical zoning, in this case from the maritime/continental ones into alpine ones. The mountaintops are inhabited by typical alpine animals and plants, while in lower altitudes, continental species are encountered more and more frequently with some elements of Mediterranean flora especially on the side of the mountain turned towards the sea.

Lichen in Northern Velebit. Picture: S. Renje (Northern Velebit National Park)

The highest peaks are covered in mountain pine, spruce, beech and sycamore. The slopes are covered in beech, mixed beech and fir forests. The wider area is part of the glacial refuge for beech trees, and these forests are genetically very interesting and invaluable for phylogenetic studies. Although grasslands are a common feature of a mountain landscape, the climate in Velebit, much like that of other Croatian mountains, is not suitable for the development of natural pastures. The majority of Velebit grasslands were created through the efforts of many people who needed space for grazing livestock and for growing food.

Flora

The Velebit Mountain hosts plants characteristic of coastal, inland and mountain habitats and this can also be seen in the Strict Reserve. The flora of this area is preserved in almost pristine form. Communities with a large number of alpine plants have maintained especially members of the Illyrian or Dinar vegetation areas. In exposed locations, forests of Submountain Beech (Fagetum croaticum subalpinum) take the krummholz form. The central part of the component part and deep sinkholes are covered with Spruce (*Vaccino-Piceion*). The highest parts are covered with Mountain Pine (Pinetum mughi Illyricum). In small grassland surface areas, Mat Weed-grass (*Nardus stricta*) is found. Many of the species are regionally distributed, and about 40 are locally distributed strict endemics. Some of the species making up the forest communities are exclusive to Croatia and Bosnia. At European level, 5% of plant species in Strict Reserve are protected under the Bern Convention and the EU Habitats Directive.

Fauna

The Strict Reserve abounds in endemic species that are native only to this area. There is an especially interesting subterranean animal life. Velebit Leech (*Croatobranchus mestrovi*), a species endemic to Northern Velebit, was discovered in Lukina pit in 1992 (Hajdučki and Rožanski Kukovi). The most common mammals are Roe Deer, Red Deer, Chamois, Wild Boar, European Hare, Marten and Fox. It is important to note that large complexes of preserved forests are suitable habitats for all three species of large carnivores: bear, wolf and lynx. The Reserve has many bird species. In The Reserve and its close surroundings, 103 species were counted. Some rare species can be seen in the Reserve, like Golden Eagle and Peregrine Falcon. The Reserve is very important for some invertebrates like beetles (especially saproxylic beetles) and butterflies (more than 100 species have been discovered in Reserve up to now).

Table 18: Representative species for the component part Hajdučki i Rožanski Kukovi (Croatia)

Class	Species
Amphibian	Salamandra salamandra
Bird	Aquila chrysaetos
Bird	Bubo bubo
Bird	Dendrocopos leucotos
Bird	Falco peregrinus
Bird	Pernis apivorus
Bird	Strix uralensis
Bird	Tetrao urogallus
Invertebrate	Lucanus cervus
Invertebrate	Morimus funereus
Invertebrate	Parnassius mnemosyne
Invertebrate	Rosalia alpina
Mammal	Canis lupus
Mammal	Capreolus capreolus
Mammal	Felis silvestris

Springtime in Northern Velebit. Picture: S. Obradović (Northern Velebit National Park)

Subalpine Beech Forest in Paklenica. Picture: G. Lukač (Paklenica National Park)

2.a.8 Croatia: Paklenica National Park (023, 024)

Area size

Table 19: Area size of the component cluster Paklenica National Park (Croatia)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
023	Croatia	Paklenica National Park – Suva draga-Klimenta	1,241.04	414.76	Illyric
024	Croatia	Paklenica National Park – Oglavinovac-Javornik	790.74	395.35	
TOTAL			**2,031.78**	**810.11**	

Short profile and biogeography

The proposed component parts are managed as National Park and is situated on the southern part of Velebit Mountain. Velebit Mountain is a part of the Dinaric Alps, and is famous for its diversity and abundance of species. In 1978, it was proclaimed a Biosphere reserve, and in 1981, a Nature Park with a surface of 2,200 km². From biogeographical and biodiversity point of view, this area is especially valuable and it harbors endemic hot spots with Mediterranean, alpine and continental influences. The whole mountain spreads for 145 km along the east Adriatic coast. The main forest habitat types are four various beech forests communities. The nominated beech forests represent one of the oldest old-growth forests without exploitation for more than 80 years. The National Park (IUCN II) is one of eight National Parks in Croatia The oldest and most undisturbed parts of the National Park are proposed to be nominated as component parts with a surface of 2,031 ha, and 810 ha buffer zone composed of several forest polygons connected with forests, pastures or stony areas. The proposed area is managed as national park without any economic use of natural resources, in accordance with the Nature Protection Act, the Physical Plan and the Paklenica NP Management Plan. A wider area around Paklenica National Park is proclaimed as Velebit Nature Park, which ensures integrity of the proposed site. The biggest part of the area is in state property. The altitudinal gradient is between 400 and 1,400 m.a.s.l. Ecological research on some of this old-growth beech stands showed mean tree ages ranging from 200 to 250 years.

Abiotic factors

Geographical position, natural region, altitudinal zone

The Paklenica National Park is located East 49.05000 and North 41.1000, the altitude ranges from 30 to 1757 m.a.s.l. in the whole National Park. The altitude of the beech forest is between 400 and 1,400 m.a.s.l. The NP is situated in the southern part of the Velebit Mountain and the second National Park is surrounded by Velebit Nature Park.

Geology and geomorphology

On a relatively small surface, geological activity has shaped a great diversity of habitats developed mostly on carbonate bedrock with narrow outcrops of clastits and sandstone. Predominately consisting of carbonate rocks (limestone, dolomites, carbonate breccias), Paklenica is, along with the rest of the Velebit Mountain, the longest mountain and part of the Dinaric Alps. The mountain massif has a unique geological structure due to Paleozoic breaks of Perm sediments in dolomite-limestone structure. The layers occur on the surface as a part of the Paleozoic anticline core that was elevated during the motion along the fault and came to the surface by erosion processes. Continuous series of Triassic, Jurassic and Cretaceous Paleogene layers occur on this core, except on certain areas where some of the elements were "lost" due to fault slipping. The youngest geological layers occur in the area of Tertiary breccias and limestone.

Wildlife in Paklenica. Picture: Paklenica National Park

Climate

The climate of Paklenica National Park is influenced by Mediterranean, continental and alpine climate. Therefore, Velebit is one of the main climate borders that stretch along the peak zone of the mountain. The results of a 13 year long measurement period (1992–2004), in which air temperature, mean precipitation and other meteorological characteristics were gathered at Starigrad-Paklenica meteorological station, situated 250 m from the coast, showed: The mean annual temperature is 16.34 °C for the Starigrad-Paklenica area. The mean number of hot days with a mean daily temperature higher than 30 °C is 0.5 days in July and 0.3 days in August, the mean annual precipitation is 1261 mm/m^2 or 34.5 mm/day. There were 219 sunny days (61%) and 54 rainy days (14.8%). Wind is most frequent in winter (January and March), and there are 4 days with storm.

Soils

Soils in Paklenica NP are classified as shallow lithosol on limestone or calcareous rocks. The soils in beech forest are generally well-developed brown soils with mull humus. However, soil depth and fertility can vary largely according to terrain, considering that slope is generally moderate to steep, and this greatly influences local soil features in terms of depth, rockiness and runoff. Often rocky areas are present within the forest, generating rendzic leptosols. Red soils, terra rossa, are common on south slopes of the National Park with vegetation of Querco-Carpinetum orientalis croaticum.

Water balance

Rocky grounds of Paklenica National Park are not rich in permanent surface water. Besides two streams which which flow permanently in one part of their course, there are several torrent flows, several permanent springs and one lake (Babino j.). The springs of Velika and Mala Paklenica are the only permanent streams on the southern, karstic slopes of Velebit. Velika Paklenica has its source in several springs below Ivine Vodice. The water flows into the stream and down to the sea; however, the stream only contains water during heavy rains and in snow melting period in spring. The stream Velika Paklenica has a flow rate ranging from 0.01 to 4.26 m^3 per second, depending on time of the year. In summer it dries out, especially in the area from the reception to the branch trail to Manita peć cave, in warmer and drier years even all the way to Pile (above forester's hut "Lugarnica"). The Mala Paklenica usually has water in its bed upstream from the branch trail to Njive Lekine. It rises from Vlaški grad, also from several springs.

Biotic factors

Biotopes and vegetation

The habitat types of National Park Paklenica have been defined at a scale of 1:25,000. In compliance with the National Habitat Classification, 12 habitat types were ascertained at classification level III, of which 7 are threatened or rare habitats. Among the threatened and rare habitat types of the National Park, the most common are thermophilous beech forests with Autumn Moor Grass, Subalpine Beech, littoral thermophilous and Dalmatian White Oak underbrush and southeastern Alpine Beech forests. The definition of the habitats is on a 1:25,000 scale. The detailed habitat description is given in the Management Plan (2007). For the middle part of the National Park, the relief complex Borovnik and Crni vrh is typical, where the valleys Mala and Velika Močila can be found. Velika Močila is a very interesting bowl-shaped valley at the altitude of 850 m, surrounded by Crni vrh (1,110 m), Škiljića kosa (1,015 m) and Zeleno brdo, while Borovnik, named after a local pine forest, stretches on the southern border. The eastern part of the Park is extremely diversified, inaccessible and wild.

Further east this wilderness zone acquires more gentle forms, in the area of Malo and Veliko Libinje that create karst plains with numerous sinkholes whose bottoms were once cultivated. There is a very interesting and diverse geomorphological site in the Bojinac area (1,100 m) on the coastal slope, where a labyrinth of solitary rocks constitutes a particularly valuable landscape. The narrow ridge of Velebit, 1 to 1.5 km wide, forms the peak zone of Paklenica National Park. This is the site of Velebit's highest peak, Vaganski Vrh (1,757 m) and the area is almost completely covered by a mosaic of dwarf pine shrubs and the vegetation of mountain meadows, screes and cliffs.

Flora

National Park Paklenica is characterized by an exceptional wealth of plants. Due to specific relief and microclimate, Mediterranean, continental and mountain plant species are found in the area, many of them endemic to Velebit. In the scope of the field investigations, systematic vegetation inventories were carried out over the whole area of the National Park Paklenica (except of the eastern peak zone, a potentially mined area). Currently the field research and the analysis of the geo-referenced data are still to be completed. A part of the area is not completely researched, therefore the inventory will be continued. So far, 985 taxa have been recorded, based on the literature data, herbarium material and field research. The analysis of the floristic data will indicate areas which are of great importance for species of the Red List and the 79 endemic species, as well as for the presence of particularly vulnerable and rare plant communities. As already mentioned, vegetational features had a great influence on the establishment of the National Park Paklenica.

Fauna

All parts of southern Velebit have a diverse and characteristic fauna. At the moment, 343 species of vertebrates and 1,000 species of invertebrates are listed. The research carried out in the scope of the inventory project confirmed 5 species of amphibians, 19 species of reptiles, 25 species of small mammals and 24 bat species. Small mammals have not been completely researched, and some questionable findings require further examination. The lowest coastal part of the National park, together with the cliff Anića kuk as well as limestone rocks and screes found on similar altitudes, are characterized by typical species of the Velebit's coastal slope. Among them, the most important of conservation purposes are the Dinaric vole (*Dinaromys bogdanovi*) and the snakes *Elaphe longissima* and *E. situla*. Insufficient knowledge of their abundance and potential key microhabitats makes them vulnerable to potential interventions in space but currently it is not possible to determine the needed level of protection and adequate spatial management. In the last 5 years, more investigation was carried out on Ursinis Viper (*Vipera ursinii*), and *V. ammodytes*.

Table 20: Representative species for the component part Paklenica National Parki (Croatia)

Class	Species
Amphibian	Triturus alpestris
Amphibian	Salamandra salamandra
Bird	Alectoris graeca
Bird	Anthus campestris
Bird	Aquila chrysaetos
Invertebrate	Lucanus cervus
Invertebrate	Morimus funereus
Invertebrate	Parnassius mnemosyne
Mammal	Rupicapra rupicapra balcanica
Mammal	Myotis myotis
Mammal	Pipistrellus pipistrellus
Plant	Orchis ustulata
Plant	Eryngium alpinum
Plant	Ilex aquifolium
Reptile	Vipera ursinii
Reptile	Testudo hermanni
Reptile	Lacerta horvathi

Young Strix in Paklenica.
Picture: D. Bušljeta (Paklenica National Park)

Autumn colours in Val Cervara. Picture: B. D'Amicis

2.a.9 Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

Area size

Table 21: Area size of the component cluster Abruzzo, Lazio & Molise National Park (Italy)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
025	Italy	Abruzzo, Lazio & Molise National Park – Valle Cervara	119.70	751.61	Central Mediterranean
026	Italy	Abruzzo, Lazio & Molise National Park – Selva Moricento	192.70		
027	Italy	Abruzzo, Lazio & Molise National Park – Coppo del Morto	104.71	415.51	
028	Italy	Abruzzo, Lazio & Molise National Park – Coppo del Principe	194.49	446.62	
029	Italy	Abruzzo, Lazio & Molise National Park – Val Fondillo	325.03	700.95	
TOTAL			**936.63**	**2,314.69**	

Short profile and biogeography

The nominated component parts form a component cluster of 5 beech forests (Valle Cervara, Selva Moricento, Coppo del Principe, Coppo del Morto, Val Fondillo), covering 937 ha in the Abruzzo, Lazio & Molise National Park. They include highly natural beech forests hosting a considerable bulk of trees older than 400 years. Valle Cervara and Coppo del Morto host the oldest beech trees in the Northern Hemisphere (560 years). Valle Cervara is the only known example of primary old-growth forest in Italy. All component parts are beech-dominated forests of the montane and upper-montane belt, growing on limestone/dolomite at elevations between 1,400 m and the tree line (1,850–1,950 m.a.s.l.). They belong to the associations Anemono apenninae-Fagetum and Cardamino kitaibelii-Fagetum. The Central Apennines have a special biogeographic position, being the southernmost tip of a "finger" of the Central European floristic region surrounded by the Mediterranean region.

All component parts are old-growth forests that escaped intensive logging either due to their remoteness, rugged topography, protective function against avalanches and landslides or water resources protection. Coppo del Morto remained undisturbed because of ownership disputes between neighboring municipalities.

All component parts occupy entirely the middle-upper part of remote valleys bordered by ridges, rocks and screes, subalpine grasslands or shrublands. These forests have been shaped by natural disturbance and, since the property covers a multiplicity of habitats, are free to adapt to environmental changes.

Abiotic factors

Geographical position, natural region, altitudinal zone

The 5 component parts range between 1,400 and 1,850 m in the Abruzzo, Lazio & Molise National Park. All are situated in the administrative region of Abruzzo, L'Aquila Province, but pertain to different municipalities: Villavallelonga (Valle Cervara), Pescasseroli (Coppo del Principe, Coppo del Morto), Lecce nei Marsi (Selva Moricento) and Opi (Val Fondillo).

Geology and geomorphology

This component cluster is situated in an area with complex stratigraphic and structural setting, typified by northwest-southeast and north-south trending ridges divided by narrow valleys. Limestones prevail, most from pre-orogenic Meso-Cenozoic marine successions, related to carbonate platforms locally covered by Quaternary continental deposits and shaped by Pleistocenic glacial landforms. Val Fondillo is the only site with lower Lias dolomite.

Karstic landforms (sinkholes, uvalas, karrens, caves) characterize geomorphology, thus water runoff on mountain slopes is greatly reduced, giving rise to rare seasonal creeks (often in steep gullies). A remarkable exception is the dolomitic part of the cluster, where surface water originates a network of permanent streams. High-altitude areas are shaped by Pleistocenic glacial landforms, snow cover is abundant and can last until June. Large snowpacks cumulating above the forest line produce small avalanches, generally moving downslope in avalanche tracks through the forests.

Climate

The climate within the nominated area can be defined as transitional between Mediterranean-montane and temperate nemoral, with high values of annual precipitation (c. 1200–1800 mm, increasing with altitude), a rainfall peak in autumn, and limited summer drought (mostly compensated by orographic rain and cloud/fog moisture within the elevation belt where the nominated property is located). Snowfall is highly variable, but can be very abundant in some years.

Annual temperature is below 10 °C. Above 1,500 m.a.s.l., i.e. over most of the property, the mean annual temperature is c. 6.5 °C and precipitation c. 1,600 mm, with markedly cold winters, frequent late frost (May), and warm summers with possible dry periods.

Soils

Soils within the nominated area are classified as fine loamy calcaric cambisols, typical of the Apennine Mountains on Mesozoic calcareous rocks. These soils are generally well-developed forest brown soils with mull humus. However, soil depth and fertility can vary largely according to terrain, considering that slope is generally moderate to steep, and this greatly influences local soil features in terms of depth, rockiness and runoff. Rocky areas are often present within the forest, generating rendzic leptosols. Scree areas can also occur above the forest line.

Water balance

Valle Cervara is the only forest in the cluster whose surface water drains to the Tyrrhenian Sea via the Rosa and Giovenco streams, which are tributary of the Liri River. The other 4 component parts belong to the river Sangro basin, draining to the Adriatic Sea. Due to the limestone substrate, subterranean karstic drainage heavily reduces surface water and generates many springs at lower elevation (Sorgente Valle Cervara) or immediately close to the forests (Sorgente Puzza in Valle Cervara). The dolomitic site of Val Fondillo is an exception, hosting abundant surface water flow, even in summer.

Biotic factors

Biotopes and vegetation

Beech forests cover most of the area within the component parts, from its lower boundaries to the tree line (c. 1,900 m.a.s.l.). They are classified into the associations Anemono apenninae-Fagetum (below c. 1,400 m) and Cardamino kitaibelii-Fagetum (above c. 1,400 m). This latter association grows often on steep slopes, with prolonged snow cover, low winter temperatures and frequent late frost: here beech is strongly dominant and there are only scattered individuals of *Acer pseudoplatanus* and *Sorbus aucuparia*. In Val Fondillo, also the endemic *Pinus nigra var. italica* (a drought-tolerant relict ecotype, perhaps of Tertiary origin) is found on rocky outcrops within the beech belt. In the north-facing upper part of this site, even *Vaccinium myrtillus* and *Pinus mugo* (two species that reach here their southernmost range limit in Italy) are associated with beech. Cardamino-Fagetum forests are crossed by small avalanche tracks, where snow can run downslope or simply creep slowly, creating a natural coppice with bent trees. Anemono-Fagetum is found on less steep slopes, frequently crossed by deep ravines that remain dry for most of the year. Although dominated by beech, this association can include several thermophilous tree species, e.g. *Ostrya carpinifolia, Acer obtusatum, Quercus cerris*. In Val Fondillo, mid to large-sized *Taxus baccata* and *Ilex aquifolium* trees are associated with beech up to 1,500 to 1,600 m.a.s.l.

Above the forest line, scattered beech trees can survive within subalpine shrublands dominated by *Rhamnus alpina* or *Juniperus nana*. In other cases, the tree line is sharp and immediately followed by natural grasslands dominated by *Festuca sp.pl.* or *Sesleria apennina*. Rock walls and screes occur frequently above the forest line, and can be found even within the forests.

Flora

In general, the understory is characterized by cold-tolerant, drought-sensitive species such as *Cardamine kitaibelii* and *C. enneaphyllos, Adenostyles australis, Actaea spicata, Polystichum lonchytis*, etc. The Val Fondillo forest is characterized by a high number of orchid species, including *Epipogium aphyllum, Epipactis atrorubens, Corallorhiza trifida* and the endangered *Cypripedium calceolus*: this latter species reaches here its southernmost boundary in Italy. On wet cliffs grows the very narrow endemic *Pinguicula vallis-regiae*. The southernmost Italian population of *Pinus mugo* (a glacial relict) grows in a belt between beech forests and high-mountain grasslands. The semi-natural grasslands include endemic species such as *Iris marsica* and several orchids. The subalpine grasslands include relicts of arctic-alpine species like *Dryas octopetala*.

Abundant deadwood and the widespread multi-century beech trees are the habitat of very rare fungi, mosses and lichens: these latter, beside the abundant *Lobaria pulmonaria*, include the extremely rare *L. amplissima*.

Fauna

Thanks to its biogeographic position, the Park hosts a high animal biodiversity within a confined territory (4,332 species, 336 vertebrates; 97 species are listed in the Italian Red List), with several endemic or relic species. Many of the flagship species of the Park are found in the forest habitats within the nominated area: the Marsican Brown Bear (*Ursus arctos marsicanus*), the Abruzzo chamois (*Rupicapra pyrenaica ornata*), the Apennines Wolf (*Canis lupus*), the Wildcat (*Felis silvestris*), the Barbastelle (*Barbastella barbastellus*), the Bechstein's bat (*Myotis bechsteinii*). Forests host a complex bird community with rare indicator species like woodpeckers (7 species), among which are the rare White-backed Woodpecker and Middle-spotted Woodpecker (*Dendrocopos leucotos* and *D. medius*) and other important species linked to old-growth forests (e.g. *Accipiter gentilis, Ficedula albicollis, Certhia familiaris*).

The widespread abundance of deadwood in old-growth beech forests allows the presence of Habitat Directive species, i.e. *Rosalia alpina*, as well as other saproxylic species (e.g. *Osmoderma eremita*), and some endemic taxa.

Table 22: Representative species for the component cluster Abruzzo, Lazio & Molise National Park (Italy)

Class	Species
Amphibian	Salamandrina terdigitata
Amphibian	Bombina pachipus
Bird	Aquila chrysaetos
Bird	Bubo bubo
Bird	Dendrocopos leucotos
Bird	Ficedula albicollis
Invertebrate	Lucanus cervus
Invertebrate	Rosalia alpina
Invertebrate	Cerambyx cerdo
Mammal	Myotis bechsteinii
Mammal	Rupicapra pyrenaica ornata
Mammal	Ursus arctos
Mammal	Barbastella barbastellus
Mammal	Canis lupus
Reptile	Vipera ursinii

Bracket fungi. Picture: B. D'Amicis

View of Cozzo Ferriero. Picture: G. Piovesan

2.a.10 Italy: Cozzo Ferriero (030)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
030	Italy	Cozzo Ferriero	95.74	482.61	Central Mediterranean

Table 23: Area size of the component part Cozzo Ferriero (Italy)

Short profile and biogeography

Cozzo Ferriero is a strict reserve (corresponding to IUCN I) that covers 95 ha in the Pollino National Park (about 192,565 ha). The forest is situated between 1,750 and 1,900 m.a.s.l. on the northwestern slope of the mountain ridge dividing two Administrative Regions (Basilicata and Calabria). It grows on a complex terrain (from almost flat to highly steep), where limestone bedrock predominates.

The component part is the southernmost of the serial site, and situated in an area that represents an important refuge area for forest biodiversity.

The component part is mostly covered by an early old-growth forest, unexploited in the last 80 years due to its remoteness. It has an uneven-aged structure, with beech trees up to 400 years old.

The forest of the component part is a very characteristic example of the association Ranunculo brutii-Fagetum, a high-altitude community found only in the Southern Apennines. The herb layer is unusually dense (up to 80%) and species-rich, probably as a consequence of the site's naturalness.

The component part is almost entirely surrounded by beech high-forests on the northern slope, the conservation of which is granted by the National Park Plan. The southern slope is extremely steep and rocky, partly occupied by high-elevation grasslands or beech forests, providing a natural protection to the beech forest.

Abiotic factors

Geographical position, natural region, altitudinal zone

Cozzo Ferriero is situated in the Pollino National Park (Municipality of Rotonda, Province of Potenza, Basilicata Region) which stretches from Coppola di Paola to Cozzo Ferriero along the mountain ridge that separates Basilicata and Calabria. The property covers an area of 95 ha, surrounded by a 482 ha buffer zone, on a northwest facing slope with an elevation range of 1,750 to 1,900 m.

Geology and geomorphology

The whole Pollino Massif is made up of a series of mountain peaks aligned west-east: Monte Cerviero (1,443 m), Coppola di Paola (1,920 m), Serra del Prete (2,180 m), Monte Pollino (2,260 m) and Serra Dolcedorme (2,267 m).

The bedrock of the component part is bioclastic Jurassic limestone with extremely fine to medium texture (mudstone, wakestone, packstone), well packed and stratified, sometimes alternating with rudstone and chert layers. Below these units, highly altered dolomite or dolomitic limestone is intermingled to upper Trias marls and argillites. The entire succession constitutes a large monoclinal oriented southwest-northeast, dislocated between

Coppola di Paola and Cozzo Ferriero by a direct fault, subvertical, oriented north-south.

Climate

Climate at Cozzo Ferriero is intermediate between montane Mediterranean and temperate nemoral, with a short summer drought, precipitation peak in autumn, snowy winter and a secondary precipitation peak in spring. The mean annual temperature is 7.3 °C and the mean annual rainfall is 1,350 mm. The limiting factors for plant life such as the relatively dry summer and the large annual excursion (winter absolute minimum temperature

Snags and logs. Picture: G. De Vivo

can drop to -20 °C), are counterbalanced by a large annual rainfall (in some years up to 2,000 mm), as the area is exposed to humid western winds leading to high-intensity precipitation events (and frequently bearing foggy weather, essential for the beech forest). During the winter season, close to the mountain ridge, high winds can produce intense glaze storm and hard rime ice phenomena, locally known as “calabrosa”. In spite of the high elevation, summer drought is recurrent at this site.

Soils

The component part, northwest faced and placed on a bedrock made of dolomitic limestone, is characterized by moderately deep greensands and clay soils, with texture from silty loam to clay loam, neutral to subalkaline reaction, that can be referred to the Typical Hapludolls. This site may locally be covered by volcanic ashes. The pedogenetic processes, occurring under a Mediterranean sub-oceanic climate, allow the formation and persistence of andic soils.

Water balance

The component part falls within the river Lao (also known as Mercure) basin, one of the largest of the National Park (600 km^2), that originates at Serra del Prete and reaches the Tyrrhenian Sea. The area is characterized by karstic landforms and a complex drainage pattern, with the mountain slope dissected by several small valleys. The geological/geomorphological variety of the area generates a complex surface and underground hydrological network. Given the limestone nature of bedrock, there are no perennial surface water bodies. Springs are found at lower elevation mainly in small, narrow valleys, where they are generated by discontinuities within the rocks. Whenever snowmelt or extreme precipitation occur, surface runoff can also take place, temporarily filling natural drainage channels in the area.

Biotic factors

Biotopes and vegetation

Due to the complex interactions between climate, landscape and soil, the Pollino National Park exhibits an extraordinarily broad range of habitats. Patches of sub-Mediterranean grasslands and chasmophytic vegetation are scattered within the beech forest matrix. Cozzo Ferriero is an almost pure *Fagus sylvatica* old-growth forest: other tree species include *Acer pseudoplatanus* at colder and moister sites. Canopy openings and forest fringes surrounding rocky outcrops are occupied by a shrub community composed by *Sorbus aucuparia, Rhamnus alpinus* and *Frangula alnus*. Few patches of park-forest with sparse, large beech trees and grassland remnants testify that the area was used in the past for grazing.

The forest of the component part is a very characteristic example of the association Ranunculo brutii-Fagetum (=Asynemauti-Fagetum), a high-altitude community found only in the Southern Apennines. The herb layer is unusually dense (up to 80%) and species-rich, probably as a consequence of the site’s naturalness; dominant species include *Asyneuma trichocalycinum, Ranunculus brutius, Adenostyles australis, Calamintha grandiflora, Senecio stabianus, Milium effusum, Hordelymus europaeus,* and *Galium odoratum*. Shrubs are instead scarce, but, interestingly, mainly represented by two well-known indicators of cool conditions, *Daphne mezereum* and *Lonicera alpigena*.

The component part contains some small patches of semi-natural dry grasslands (Brometalia erecti) and some steep calcareous cliffs (mainly in the buffer area), hosting an important casmophytic community, rich in endemic species and constituting a priority habitat.

Flora

The herbaceous layer of this beech forest is unusually dense and particularly species-rich. The biogeographic position of the area, placed between the Calabrian and Lucanian Apennines, makes this site a very representative one for the peculiar forest flora of the Southern Apennines, including subendemic taxa (e.g. *Arisarum proboscideum*, a Tethyan relict with a disjunct distribution between Italy and Southern Spain, very common in the Southern Apennines), endemic Southern Italian species (e.g. *Asyneuma trichocalycinum*) and a characteristic contingent of taxa with an amphi-Adriatic disjunct range, not found in the Central and Northern Apennines (e.g. *Ranunculus brutius, Lamium flexuosum*).

The forest hosts also numerous epiphytic lichen species, some of which are flag species indicator of ancient forest (*Lobaria pulmonaria*).

Clearings within and above the forests are occupied by sub-Mediterranean dry grasslands, hosting many species of conservation interest, including a high number of *Orchidaceae*; rocky outcrops host chasmophytic communities.

Fauna

Important populations of Wolf and, among ungulates, Roe Deer are present, as well as the rare and elusive Wildcat.

Aquila chrysaetos settles on cliffs; *Milvus migrans* and *M. milvus* are present with the most important populations of the Italian Peninsula. The Black Woodpecker (*Dryocopus martius*) lives in the most secluded forests. *Bubo bubo, Dendrocopos medius, Ficedula albicollis* are also present.

Important amphibians and reptiles are: *Bombina variegata, Salamandrina terdigitata, Triturus carnifex,* and *Emys orbicularis*.

Many arthropod species live in the old-growth beech forest, like the carabids *Trechus schatzmayri* and *T. angelae*, the rare *Poecilus angustatus* and, in warmer areas, the endemic *Cychrus italicus*. At the forest border lives *Calathus sirentensis*, typical of the Central-Southern Apennines (at its southern distribution limit). *Amara praetermissa, Licinus cassideus, Dromius agilis, D. quadrimaculatus, Ophonus cordatus, Ocydromus rudis* find here their southern boundary. For Coleoptera can be cited *Rosalia alpina, Lucanus tetraodon* and *Cucujus cinnaberinus*.

Table 24: Representative species for the component part Cozzo Ferriero (Italy)

Class	Species
Amphibian	Triturus carnifex
Amphibian	Salamandrina terdigitata
Bird	Aquila chrysaetos
Bird	Bubo bubo
Bird	Dendrocopos medius
Bird	Dryocopus martius
Bird	Ficedula albicollis
Bird	Milvus migrans
Bird	Milvus milvus
Invertebrate	Cucujus cinnaberinus
Invertebrate	Rosalia alpina
Mammal	Canis lupus
Plant	Asyneuma trichocalycinum
Plant	Arisarum proboscideum
Reptile	Coronella austriaca


Old beech trees covered by Lobaria. Picture: G. Piovesan

View of Falascone Reserve. Picture: G. Piovesan

2.a.11 Italy: Foresta Umbra (031)

Area size

Table 25: Area size of the component part Foresta Umbra (Italy)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
031	Italy	Foresta Umbra	182.23	1,751.54	Central Mediterranean

Short profile and biogeography

The nominated component part Foresta Umbra includes most of the area of two adjacent forest reserves (Foresta Umbra, Falascone), covering 182 ha within the Gargano National Park. These high-biodiverse old-growth forests, particularly rich in Tertiary elements like *Taxus baccata* and *Ilex aquifolium*, represent one of the most important forest refugia, in a very peculiar biogeographic area (a peninsula between Italy and the Balkans, belonging to the Mediterranean floristic region), isolated from the other beech populations.

Elevation ranges between 666 and 804 m.a.s.l. The area lies on limestone bedrock, originating a complex geomorphology with karstic landforms, wet areas, and rocky ridges. The vegetation, a unique habitat in Europe ("41.181 Gargano beech forest" in the EU Palaearctic Habitats), is dominated by thermophilous beech forests (Aremonio-Fagetum), with many sub-associations because of the great environmental heterogeneity confined in such a small area.

The two reserves forming the component parts are both Stat Reserves, protected since 1971 (Falascone) and 1977 (Foresta Umbra). They show high levels of integrity, especially in their core area, testified by the many monumental trees of different species. Beech trees reach 350 years, a remarkable lifespan for beech at such a low elevation in Southern Europe. The highest naturalness is present in Falascone (some parts of Foresta Umbra have been impacted by logging after second World War), where the favourable bioclimatic conditions have allowed an extremely fast recovery of old-growth attributes.

Abiotic factors

Geographical position, natural region, altitudinal zone

The component parts are located on the Promontory of Gargano, in the Administrative Region of Puglia, Province of Foggia, Municipality of Monte Sant'Angelo. They cover an elevation range of 666 to 804 m.a.s.l.

The component parts, which comprise the State Forest Reserves Foresta Umbra and Falascone, are part of the Gargano National Park (121,118 ha), where it covers 182.10 ha.

Geology and geomorphology

The Gargano Promontory, stretching eastward into the Adriatic Sea for 60 km, is separated from the Apennines by the Tavoliere Plain and the River Fortore valley. Gargano is on the Apulia Platform, part of the stable and relatively undeformed foreland of the Apennines thrust belt. The backbone of the Gargano Promontory consists of a thick pile (3,000–3,500 m) of Jurassic and Cretaceous shallow-water carbonates.

This bedrock type, together with the high precipitation values near the top of the Promontory, generates karstic landforms (dolines, sinkholes, caves, karrens, polje) and deposits of Terra rossa.

Within the component part, the terrain is mainly flat but irregular, with alternating rocky ridges and depressions, generally occupied by vegetation. Dolines sometimes host small ponds (cutini), traditionally managed in the past by shepherds to accumulate water for their livestock.

Climate

The macroclimate is Mediterranean (with a rainfall maximum in autumn, summer drought and limited winter frost), but mesoclimate is highly heterogeneous depending on elevation, distance from the Sea, and aspect, that generate striking differences in few kilometers and make the mesophytic vegetation of the Promontory top plateau completely different from the plant communities at hilly and coastal sites.

Cold northern winds funneled by the Adriatic Sea cause a temperature drop in winter. Although summers are very hot and dry, abundant precipitation in spring and atmospheric moisture in summer allow the presence, on the Promontory top, of a widespread beech forest in close contact with evergreen maquis. Snowfall in some years can be abundant and last long on the ground. Mean annual temperature and precipitation at Foresta Umbra are 11 °C and 1,064 mm, respectively.

Soils

The soils in the component parts develop on limestone bedrock and, thanks to the tall vegetation and the warm climate, the pedogenesis can be very fast. However, according to the complex small-scale geomorphology and the widespread presence of emerging rocks, soils can vary greatly in depth and degree of development. Within the forest, the soils (Leptic Phaeozems) have generally a fine-loamy texture, characterized by an abundant organic topsoil and the presence of the bedrock within 1 m. Where the local morphology allows the accumulation of clay, it is possible to find Luvic Phaeozems, with a loamy texture and an argillic B horizon.

In several areas the rockiness can be very pronounced and soils are rather shallow, characterized by a dark humose topsoil over calcareous rock (Rendzic Leptosols).

Water balance

Karstic processes dominate within the component parts. The only water spring present is the Sorgente Sfilzi, outside the component parts, the highest in Gargano (429 m.a.s.l.). Most of the water moves underground and toward the coast, emerging in proximity of the coastline. Important exceptions occur in the territories of Vico nel Gargano, Ischitella and Rodi, where numerous springs essential for irrigation are sustained by water captured hundreds of meters above in the Foresta Umbra beech forest. Surface runoff is rare

Epiphytes garden on a downed dead yew tree. Picture: A. Di Filippo

and limited to extremely intense rain events. In this case, water accumulates in terrain depressions with an argillic stratum of low permeability, giving origin to typical small ponds, locally known as cutini. The capacity of some cutini has been historically increased through embankments to maintain water availability all year round, as in the so-called Cutino d'Umbra. Other traditional infrastructures for water storage are reservoirs, locally known as "piscine".

Biotic factors

Biotopes and vegetation

The beech forests of the Gargano Promontory are among those growing at the lowest altitudes in Italy: they are exceptional in that they are in direct contact with the Mediterranean thermo-xeric vegetation, and are quite close to the sea. They are also unique in Mediterranean Europe (thus recognized by EU Palaearctic classification as a special habitat type "41.181 Gargano beech forest"), as they host magnificent yew (*Taxus baccata*) and holly (*Ilex aquifolium*) trees. In the nominated component parts, the forest is dominated by beech, with abundant *Carpinus* *betulus, Acer obtusatum, A. campestre, Taxus baccata, Ilex aquifolium; Tilia platyphyllos* and *Ulmus glabra*. Prevailing understory species include *Festuca exaltata, Melica uniflora, Cardamine bulbifera, Galium odoratum,* and *Daphne laureola*.

The biogeographic position of the Promontory, its peculiar bioclimate and the karstic landforms, generate a variety of habitats within the beech forest. The phytosociological association recognized in the component part is Aremonio agrimonoidis-Fagetum, with many sub-associations according to the high landform complexity. Aremonio-Fagetum subass. typicum includes the mesophytic forest on the middle part of the slopes. A more meso-hygrophytic community (with *Polygonatum multiflorum, Allium ursinum*, etc.) is the *Pulmonaria apennina* variant of this subassociation. The mesoxerophytic assemblages on limestone outcrops, with *Fraxinus ornus, Sorbus torminalis, Ostrya carpinifolia* and even *Quercus ilex* mixed with beech, are included in the sub-association fraxinetosum orni. The rim of the dolines and sinkholes are dominated by *Taxus baccata* and rich in ferns like *Polystichum setiferum* and *Phyllitis scolopendrium* (*subass. taxetosum baccatae*).

Flora

The flora is rich and phytogeographically distinctive, as a result of the historical role of the Gargano as a bridge between the Italian Peninsula and the Balkans during Tertiary and as a forest refugial area during ice ages. The herbaceous layer includes vernal geophytes commonly found in Central European beech forests (*Galanthus nivalis, Allium ursinum*), Mediterranean thermophilous species (*Cyclamen hederifolium*), taxa of Eastern affinities (*Anemone apennina, Vicia barbazitae*), and endemic South Italian plants (*Digitalis micrantha, Festuca exaltata, Lathyrus jordanii*) as well as several orchids (e.g. *Cephalanthera longifolia, C. damasonium, C. rubra, Epipactis muelleri, Neottia nidus-avis*). Ferns are particularly common on sinkhole rims or on giant tree logs, e.g. *Dryopteris filix-mas, Phyllitis scolopendrium, Polystichum setiferum, Polypodium cambricum*. Mosses and lichens are abundant on tree stems (e.g. *Lobaria pulmonaria*).

Fauna

The component part hosts a variety of animal species. Of particular interest is the presence here of an isolated population of *Capreolus capreolus italicus*, considered autochthonous and genetically well-differentiated from other populations. Other important mammals are *Felis silvestris, Eliomys quercinus* and numerous bat species.

Among birds, 6 species of Picidae have been recorded. The occurrence of the rare *Picoides leucotos lilfordi* and *P. medius*, the last one in Italy common only here, are particularly relevant. Moreover, *Bubo bubo* and *Strix aluco* are present. Abundant large standing and downed dead trees host many rare species related to the detritus chain and several species of saproxylic arthropod species, as the rare *Osmoderma eremita*. Temporary ponds are habitat for amphibians such as *Triturus italicus, T. carnifex, Rana dalmatina,* and *Hyla intermedia*. Important reptiles are: *Anguis fragilis, Elaphe longissima* and *E. quatuorlineata*. The Gargano area is zoogeographically important, especially as for invertebrate species, often featuring trans-Adriatic or trans-Ionian distribution.

Table 26: Representative species for the component part Foresta Umbra (Italy)

Class	Species
Amphibian	Triturus carnifex
Bird	Bubo bubo
Bird	Dendrocopos leucotos
Bird	Dendrocopos medius
Bird	Strix aluco
Invertebrate	Osmoderma eremita
Mammal	Canis lupus
Mammal	Capreolus capreolus italicus
Mammal	Felis silvestris
Plant	Digitalis micrantha
Plant	Festuca exaltata
Plant	Ilex aquifolium
Plant	Lathyrus jordanii
Plant	Taxus baccata
Reptile	Elaphe quatuorlineata

Beech forest of Monte Cimino. Picture: G. Piovesan

2.a.12 Italy: Monte Cimino (032)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
032	Italy	Monte Cimino	57.54	87.96	Central Mediterranean

Table 27: Area size of the component part Monte Cimino (Italy)

Short profile and biogeography

Monte Cimino is a relict high-forest “island” with magnificent beech trees (height up to 50 m, diameter > 1 m) , that survived within a deeply human-modified Mediterranean landscape.

The beech forest survived at the top of a volcanic mountain, where it grows on fertile deep soils. It covers 57.5 ha on all aspects, between 900 and 1,050 m.a.s.l. It is located in the Municipality of Soriano nel Cimino, Viterbo Province, Lazio Region.

This forest survived on the Mediterranean environment thanks to the delicate balance between volcanic soils and the wet mesoclimate generated by the nearby volcanic lakes and Tyrrhenian Sea. Its biogeographic importance is also due to its position, at the transition between the low-elevation and the mountain belts. The vegetation is classified into the association Allio pendulini-Fagetum sylvaticae.

It is an old-growth beech forests (canopy trees are 150–250 years old), not exploited in the last 70 years. Site fertility allows extremely fast recovery rates, and the forest has acquired a high ecological and aesthetic value after reaching old-growth status.

The highest part of Silva Cimina is also a historical forest and probably it has been a sacred wood since the Bronze Age.

Abiotic factors

Geographical position, natural region, altitudinal zone

The old-growth beech forest is located in Central Italy, Municipality of Soriano nel Cimino (Viterbo province, Lazio Region). It covers an area of 57.5 ha on all aspects on the top of Monte Cimino, between 950 and 1,053 m.a.s.l.

Geology and geomorphology

The Mount Cimino is an trachytic-rhyodacitic dome complex including lava domes and ignimbrites and is part of the “Provincia Magmatica Toscana”, which includes a series of middle Pliocene to Pleistocene calc-alkaline volcanic centres along the west coast of central Italy. It was active between 1.35 and 0.94 million years BP. The evolution of the Cimini complex includes three main close-in time phases: intrusion of a shallow laccolith, stagnating at the contact between the Mesozoic-Cenozoic and the Pliocene-Pleistocene sedimentary units; emplacement of lava domes and ignimbrite eruptions along radial and tangential fractures; final effusion of olivine-latitic lavas. In the top of the dome the prevailing bedrocks are trachytic-latitic and olivine-latitic lavas. The morphology is very complex, alternating steep slopes with sub-horizontal areas (in depressions), ridges, lava outcrops and large boulders.

Climate

The Monte Cimino raises like an "island" from the lowlands of northern Lazio. While in the surrounding lowlands the climate is typically Mediterranean with a prolonged dry summer, on the mountain top, where the component part is located, summer drought is partly mitigated by the lower temperature and by orographic thunderstorms and western wet winds coming from the sea (giving rise to mist and clouds). The climate in the component part is thus sub-Mediterranean. Mean annual temperature is 10.8 °C (mean temperature in

Corydalis cava carpet. Picture: G. Piovesan

January is 2.5 °C, mean temperature in July 20 °C), mean annual precipitation is c. 1,300 mm, with a marked autumn peak and less than 200 mm falling in summer. A small amount of snowfall occurs regularly in winter but does not last long on the ground.

Soils

The trachytic-latitic bedrock originated moderately acid soils (pH between 5.5 and 6.2 depending on the considered horizon). A soil sample from near the top was classified as Vitrandic Hapludalf, characterized by a marked genesis and translocation of clay (originated by the weathering of the large amount of feldspars and biotite) and very low values of Al and Si, and featuring weak andic properties. Even though the volcanic activity of Mt. Cimino ended 0.94 million years ago and that of the adjacent Vico volcanic complex ended 0.095-0.06 million years ago, the soils show easily weatherable minerals, suggesting that the local soils developed only recently, perhaps less than 20,000 years BP, i.e. after the last glacial maximum.

Water balance

The component part corresponds to the mountaintop, so no permanent water bodies exist within its boundaries. Small but steep gullies can temporary convey water during intense precipitation events. Some springs exist on the mountain slopes, just below the component part's boundaries in the buffer zone.

Biotic factors

Biotopes and vegetation

The component part is fully covered with beech forest. The vegetation is classified into the association Allio pendulini-Fagetum sylvaticae. Beech is completely dominant, and reaches an exceptional height (c. 50 m). The only other tree species found in the canopy (but with very scattered individuals) are *Acer obtusatum* and *A. pseudoplatanus*. There is no significant shrub layer (only scattered individuals of *Crataegus laevigata* and *Corylus avellana*), except under canopy gaps, where *Sambucus nigra* typically develops. The herb layer is not very rich but is very showy in early spring because of the many geophytes: the most abundant are *Corydalis cava, Scilla bifolia* and *Cyclamen hederifolium* (this latter, however, flowers in late summer-early autumn). The rugged morphology gives rise to at least two different beech forest communities. Flatter and deeper soils host more mesophytic species such as *Galanthus nivalis* and *Ranunculus ficaria*. Ridges and rocky sites have a herb layer characterized by Mediterranean species like *Cyclamen repandum* and *Anemone apennina*.

Flora

Interesting species include some orchids (*Epipactis helleborine, Neottia nidus-avis*) and a rare small geophyte, *Gagea lutea*. Two species of cyclamen occur in the forest: *Cyclamen repandum*, flowering in spring, and *C. hederifolium* flowering in late summer. *Corydalis cava* makes spectacular carpets over wide extensions in early spring. Other species of aesthetic value include *Lilium bulbiferum ssp. croceum, Anemone ranunculoides,* and *Allium pendulinum*.

The lichen *Lobaria pulmonaria* is often present with large thalli on larger trees.

Fauna

The area hosts the following bird species listed in Annex 1 of Directive 79/409/EEC: *Pernis apivorus, Lanius collurio, Lullula arborea* and *Caprimulgus europaeus*. Other interesting species (as "interior forest species", thus environmental quality indicators) include *Picus viridis, Picoides major, Certhia brachydactyla* and *Sitta europaea*. Many owl species (*Tyto alba, Otus scops, Strix aluco*) nest in the forest or in the buffer area. Mammals observed in the Cimino beech forest include *Hystrix cristata, Myoxus glis, Martes martes, M. foina* and *Meles meles*. The wolf (*Canis lupus*) is probably an occasional visitor. Among amphibians *Salamandrina perspicillata*, endemic to Apennine, and *Salamandra salamandra*, locally rare, are present in the area. Among invertebrates, some very rare Pauropoda species were found here (*Allopauropus insulanus* and *A. pectinatus*). The site hosts the southernmost population of *Percus andreinii* (Coleoptera Carabidae), endemic to the Northern Apennines. A population of *Austropotamobius pallipes s.l.* (Crustacea Decapoda) has been quoted for the northern side of Monte Cimino.

Class	Species
Bird	Caprimulgus europaeus
Bird	Certhia brachydactyla
Bird	Dendrocopos major
Bird	Lanius collurio
Bird	Lullula arborea
Bird	Otus scops
Bird	Pernis apivorus
Bird	Picus viridis
Bird	Sitta europaea
Bird	Strix aluco
Bird	Tyto alba
Invertebrate	Percus andreinii
Mammal	Canis lupus
Mammal	Hystrix cristata
Plant	Gagea lutea

Table 28: Representative species for the component part Monte Cimino (Italy)


Beech forest in volcanic landscape. Picture: G. Piovesan

At the border of the old-growth beech stand. Picture: G. Piovesan

2.a.13 Italy: Monte Raschio (033)

Area size

Table 29: Area size of the component part Monte Raschio (Italy)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Bech Forest Region
033	Italy	Monte Raschio	73.73	54.75	Central Mediterranean

Short profile and biogeography

The component part is located in the Municipality of Oriolo Romano, within the Bracciano-Martignano Natural Park. It occupies about 74 ha (0.4% of the Park), in an area owned by the Regional government and designated as a strict reserve (equivalent to IUCN I) by the Park's Management Plan.

The beech forest has survived at the top of a small volcanic mountain (400–554 m.a.s.l.), where it grows on deep, fertile soils. It has ben able to survive at such a low elevation in this Mediterranean area thanks to the delicate balance between volcanic soils and the wet microclimate generated by the nearby volcanic lake and the Tyrrhenian Sea. The vegetation is classified into the association Fraxino orni-Fagetum.

It is an old-growth beech forest, not exploited in the last 50 years. Site fertility allows extremely fast recovery rates (canopy trees with diameter around 1 m have no more than 100 years), that have allowed the forest to acquire a high ecological and aesthetical value after entering old-growth status.

Abiotic factors

Geographical position, natural region, altitudinal zone

The component part is located in Central Italy, Municipality of Oriolo Romano, Viterbo Province, Lazio Region. It occupies an area of 74 ha between about 400 and 554 m.a.s.l., around the top of Monte Raschio (mainly on its northeastern slope), part of the Sabatini Mountains.

Geology and geomorphology

The volcanic scoria cone of Monte Raschio, associated with lava flows and pyroclastic deposits, is located on a ridge of the volcanic caldera hosting the Bracciano Lake, and is part of the the Sabatini volcanic district (SVD) of wider Quaternary "Potassic Roman Province". The SVD volcanism include a wide spectrum of magma compositions (from trachybasalts to trachytes/ phonolites), large calderas, several monogenetic centres, hydromagmatic activity and a variety of eruption styles and sourced area: pyroclastic successions from the Morlupo (800-510 ka); plinian fall deposits and piroclastic flow deposits from the Southern Sabatini (ca. 510-420 ka); large-scale pyroclastic flow eruptions from Bracciano (ca. 310 ka) and Sacrofano (ca. 285 ka) and recent activity (as young as ca. 90 ka) sourced around the Bracciano and Sacrofano calderas. The landscape of the component part is characterized by gentle hills, corresponding to scoria and cinder cones, and by sub-horizontal pyroclastic plateaux.

Climate

Climate is Mediterranean, with a marked dry summer, precipitation maximum in autumn and very weak winter frost. Mean annual temperature is 14.1 °C (mean temperature in January is 5.5 °C, mean temperature in July 23.8 °C), mean annual precipitation is c. 1,100 mm. However, because of the position of the property, located on a ridge exposed to both air moisture coming from the nearby Bracciano Lake and to the moisture-carrying western winds from the Tyrrhenian Sea, summer drought is partly mitigated by atmospheric moisture and clouds.

Soils

Soils within the forest are moderately acid (pH between 5.1 and 6.6, determined by spatial heterogeneity and on the considered horizon). They are quite heterogeneous depending on the various types of pyroclastic layers that can be found as parent material, and the geomorphological position. On ash/cinder cones, soils are typical Andosols. On the pyroclastic plateau, there are both andic soils (classified as Oxyc Distrandepts) and other soil types (Umbric Dystrochrept). Taking into account the Mediterranean climate of the site, the Andosols here have an extrazonal and/or relictual character, as the beech forest that grows on them.

Water balance

The component part includes some small gullies and temporary creeks draining into the Bracciano Lake. A thin belt from Oriolo towards the south, beyond Manziana, is the most elevated zone of the western volcanic plateau and acts as the local watershed.

Biotic factors

Biotopes and vegetation

The nominated component part is fully covered with beech forest, classified into the association Fraxino orni-Fagetum. Beech is dominant in the canopy that includes also *A. obtusatum, A. pseudoplatanus, Castanea sativa, Prunus avium and Quercus cerris*. A lower tree-layer is made up of *Carpinus betulus*, with *Acer campestre*, *Malus sylvestris* and (rarely) *Ulmus glabra* and *Fraxinus ornus*. The shrub layer is characterized by *Ilex aquifolium*; other shrubs include *Corylus avellana, Cornus mas, Crataegus laevigata, Evonymus europaeus, Mespilus germanica, Sambucus nigra* and *Ulmus minor*. In the herb layer, *Ruscus aculeatus* is dominant; frequent species include *Sanicula europaea, Melica uniflora, Mercurialis perennis, Anemone apennina, Allium pendulinum* and *Lathyrus venetus*.

Flora

The floristic assemblage contains a number of Mediterranean species which is quite unusual for beech woods (e.g. *Cyclamen repandum, Carex olbiensis, Carex distachya, Asplenium onopteris*), mixed with a relictual group of typical Fagetalia herbs such as *Galium odoratum, Sanicula europaea, Mercurialis perennis*. Orchids include *Epipactis helleborine, Neottia nidus-avis, Dactylorhiza maculata*. *Cyclamen hederifolium* has an aesthetic value because it flowers in late summer/autumn, while in early spring there is an abundant flowering of *Allium pendulinum* and *Anemone apennina*. An endemic Italian species is *Digitalis micrantha*.

Fauna

Felis silvestris and *Lepus corsicanus* are the most important mammals reported for the site (the latter is classified as highly endangered). Other threatened species recorded within the site include: *Glis glis italicus, Eliomys quercinus, Muscardinus avellanarius, Martes martes, Mustela putorius, Sciurus vulgaris* and *Meles meles*.

The bat *Barbastella barbastellus* feeds in old-growth forests. Birds associated to old-growth forests and recorded within the property include: *Sitta europaea*, *Certhia brachydactyla*, *Picoides major* and *P. minor, Picus viridis*. *Strix aluco* is the most common night raptor. Other Red List or increasingly threatened species are *Accipiter nisus, Upupa epops* and *Oriolus oriolus*.

Among amphibians, *Salamandrina perspicillata* is found in wet habitats within the forest. *Testudo hermanni* and *Elaphe quatuorlineata* are the most significant reptiles.

Among Coleoptera, the following species bound to old-growth forest habitats are recorded within the property: *Cerambyx cerdo, Rosalia alpina* and *Lucanus cervus*.

Class	Species
Reptile	Testudo hermanni
Reptile	Elaphe quatuorlineata
Mammal	Hystrix cristata
Mammal	Barbastella barbastellus
Mammal	Canis lupus
Invertebrate	Rosalia alpina

Table 30: Representative species for the component part Monte Raschio (Italy)

View of Sasso Frattino Integral Reserve. Picture: N. Agostini (Comunità del Parco)

2.a.14 Italy: Sasso Fratino (034)

Area size

Table 31: Area size of the component part Sasso Fratino (Italy)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
034	Italy	Sasso Fratino	781.43	6,936.64	Central Mediterranean

Short profile and biogeography

The component part Sasso Fratino Nature Reserve was founded in 1959 as the first strict reserve in Italy; it covers about 782 ha in the Foreste Casentinesi, Monte Falterona and Campigna National Park (about 36,000 ha). The forest grows on flysch bedrock, crossed by many small creeks. It covers a large elevation range (600–1,600 m.a.s.l.) on a northeastern mountain slope characterized by high steepness and uneven morphology. As the property is located on the Northern Apennines, close to the Alps, its biogeographic position lies at the boundary between the temperate and Mediterranean climate regimes and in a transitional area between the Central European and Mediterranean floristic regions.

Although some marginal areas were harvested in the past (76 years ago), the oldest part of the Reserve has remained untouched. It is mostly covered by an old-growth forest composed by all-aged beech trees (up to 510 years).

In the upper part (above 1,300 m.a.s.l.), the property is characterized by an almost pure beech forest (association Galeopsi-Fagetum). At lower altitude, beech is generally associated with silver fir (association Cardamino chelidoniae-Fagetum), and the forest is characterized by a greater participation of other broadleaved tree species. The property includes also some rock/scree areas colonized by grassland communities.

The old-growth forest is almost entirely surrounded by a natural forested landscape whose conservation is granted by the National Park Plan and the National Forest Service. The upper part of the forest is bordered by the mountain ridge, ensuring its protection.

Abiotic factors

Geographical position, natural region, altitudinal zone

Sasso Fratino is located on the Northern Apennines (Appennino Tosco-Romagnolo, Municipalities of Bagno di Romagna and Santa Sofia (Forlì-Cesena Province)), close to the mountain ridge dividing two Administrative Regions, Toscana and Emilia-Romagna.

From the ridge downward, the component part covers 781.43 ha on the northeastern slope, between 1,520 to 650 m.a.s.l.

Geology and geomorphology

The geological substrate is relatively homogeneous and is a flysch unit of the Marl Sandstone Formation originated in the Langhian. The Marl-Sandstone Formation was deposited in an elongate, NW-stretched foredeep basin formed in front of the growing N-Apennines orogenic wedge. From the mountain ridge to 800 m.a.s.l. the prevailing bedrock are sandstones, in thick to very thick beds, but locally are interbedded with thinner strata of sandstones, mudstones and marls.

From 800 m.a.s.l. to the mountain ridge, thick sandstones banks can emerge. At lower elevations the sandstones are generally thinner, leaving more space to marls.

The morphology is extremely rough, with the presence of secondary ridges bordering deep ditches, deriving mainly from marl erosion and the subsequent breakdown of sandstone banks. The local morphology is characterized by extremely steep slopes alternating with relatively flat areas. The average slope is 65%, and the prevailing aspect is northeast.

Climate

The climate of Sasso Fratino can be classified as humid temperate, with possible short summer drought at lower elevations. The Northern Apennines lie at the boundary between the domains of the temperate and Mediterranean climate regimes, and important differences can be found in connection to the large elevation range covered. Precipitation is generally high (annual average is 1,790 mm), distributed with a typical Apennines regime (peak in autumn and winter, minimum in summer). Snowfall occurs mainly in December and January, it can be highly variable from year to year, and last even 4 to 5 months. Fog is frequent, especially at higher altitudes. A recurrent phenomenon is rime ice (known as "galaverna"), i.e. fog freezing on trees, a spectacular event covering the forest with a white mantle.

The mean annual temperature is 7.8 °C (mean temperature in January is 0 °C, mean temperature in July is 17 °C).

Soils

Soils are generally deep and well developed, thanks to the presence of easily erodible rocks and organic matter produced by the tall forest. In spite of the slope steepness, large erosive processes are generally concentrated in gullies and around streams. Soils, classified as Cambic Umbrisols, are generally deep and fertile. The abundant organic matter produced by deciduous trees is well mixed with the mineral component and generates a typical humus of mull type, with a C/N between 10 and 20, and a sub-acidic or acidic pH.

However, the large elevation gradient covered by the forest generates differences in the main soil features, which at lower elevation are influenced by both a warmer climate and a lower steepness; this favors deeper soils, more developed horizons, more nitrogen and phosphorous, a higher richness in base cations, and a higher pH.

Water balance

Thanks to its geological features, the forest area is crossed by many small minor streams stretching from southwest to northeast, with frequent jumps and waterfalls, generated by the occurrence of different geological strata. The Sasso Fratino forest falls entirely within the hydrographic basin of the river Savio, in particular it pertains to the sub-basin of the Bidente stream.

At the bottom of the forest there is the artificial Lake of Ridracoli, generated by a dam (construction ended in 1983).

Casentinesi Natural Reserve. Picture: N. Agostini (Comunità del Parco)

Biotic factors

Biotopes and vegetation

The upper part of Sasso Fratino is characterized by a pure beech forest belonging to the Galeopsi-Fagetum association, with the occasional presence of *Acer pseudoplatanus, Fraxinus excelsior* and *Sorbus aucuparia*. In the coldest areas of the property, it is possible to find beech stands with *Gymnocarpium dryopteris* and *Huperzia selago* that could be referred to the association Gymnocarpio-Fagetum.

The intermediate elevations are characterized by beech-silver fir mixed forests, typical of the Sasso Fratino Reserve, belonging to Cardamino chelidoniae-Fagetum association. At lower elevations a mixed beech-fir forest with an increasing participation of *Quercus cerris, Q. petraea, Q. pubescens, Acer opalus, A. campestris, Sorbus torminalis, Ostrya carpinifolia, Carpinus betulus, Fraxinus ornus* and *Corylus avellana*, can be observed. In the wetter, fertile conditions it is even possible to find Tilio-Acerion communities, with abundant *Acer pseudoplatanus, A. platanoides, Ulmus glabra, Tilia platyphyllos* and *T. cordata*, *Fraxinus excelsior* and *Taxus baccata*. In these forest patches, occurring between 650 and 800 m.a.s.l., beech is not dominant, and the vegetation can be referred to the association Ornithogalo sphaerocarpi-Aceretum pseudoplatani subass. geranietosum nodosi.

Most of the area within the component part is forest, with the exception of a small percentage occupied by two landslides that occurred on the same slope, one recently (1993) and one dating back to 1983.

Flora

The reserve hosts 20 species endemic to the Apennines or to an even narrower area, e.g. the extremely rare *Epipactis flaminia* (included in the national Red List) and *Arenaria bertolonii, Brachypodium genuense, Sesleria pichiana, S. italica*. Taxa of biogeographical interest include *Filipendula ulmaria subsp. denudata, Carex macrolepis* and *Leucopoa dimorpha*. The Reserve hosts the southernmost sites in Italy of *Matteuccia struthiopteris* and *Phegopteris connectilis*.

81 bryophyte species have been found so far (66 mosses and 15 liverworts).

A long-term abundance of deadwood sustains a great fungal diversity (544 species only among macrofungi). Many species are not found in the rest of Italy: *Ceriporia herinkii, Ceriporiopsis guidella, Crustomyces expallens* and *C. subabruptus, Dentipellis fragilis, Fomitopsis labyrinthica, Hyphodontia latitans* and *H. nudiseta, Parvobasidium cretatum, Steccherinum robustius*. Recently, 3 new fungi species have been discovered in Sasso Fratino: *Fomitopsis labyrinthica, Ceriporiopsis guidella* and *Botryobasidium sassofratineoense*, dedicated to the Reserve.

Fauna

Sasso Fratino hosts one of the most important populations of Apennines *Canis lupus* and all main ungulate species (*Cervus elaphus, Capreolus capreolus, Dama dama, Sus scrofa*). Recently, *Felis silvestris* has been observed. More than 18 species of Chiroptera are present, including *Nyctalus noctula, N. leisleri, Plecotus auritus, P. austriacus* and *Barbastella barbastellus*.

The area is the only breeding site in the northern Apennines of a viable population of *Dryocopus martius* (estimated in 8–10 breeding pairs). Other important species linked to old-growth forests are *Certhia familiaris, Phylloscopus sibilatrix, Accipiter gentilis*. Also *Ficedula albicollis* and *Lophophanes cristatus* have been recently found. Among amphibians, Sasso Fratino hosts *Salamandra salamandra*, *Salamandrina perspicillata*, *Speleomantes italicus*, the latest two endemic to the Northern Apennines. Among insects, numerous Coleoptera linked to old forests were reported for the area (e.g. *Rosalia alpina, Osmoderma eremita*). Some have a restricted geographical range and are recognized as species of Community interest by EU.

Table 32: Representative species for the component part Sasso Fratino (Italy)

Class	Species
Amphibian	Salamandrina terdigitata
Bird	Accipiter gentilis
Bird	Certhia familiaris
Bird	Dryocopus martius
Bird	Ficedula albicollis
Bird	Phylloscopus sibilatrix
Invertebrate	Osmoderma eremita
Invertebrate	Rosalia alpina
Mammal	Nyctalus leisleri
Mammal	Plecotus auritus
Mammal	Plecotus austriacus
Mammal	Barbastella barbastellus
Mammal	Canis lupus
Plant	Taxus baccata
Plant	Epipactis flaminia

Beech forest at the upper limit of the forest. Picture: S. Kucharzyk

2.a.15 Pol and: Bieszczady (035, 036, 037, 038)

Area size

Table 33: Are size of the component cluster Bieszczady (Poland)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
035	Poland	Bieszczady – Border Ridge and Upper Solinka Valley	1,482.18	24,564.46	Carpathian
036	Poland	Bieszczady – Polonia Wetlińska and Smerek	1,049.53		
037	Poland	Bieszczady – Stream Terebowiec Valley	200.99		
038	Poland	Bieszczady – Stream Wolosatka Valley	574.33		
TOTAL			**3,307.02**	**24,564.46**	

Short profile and biogeography

The forests of the Bieszczady National Park (BNP) are included among the best-retained forests in Poland. Generally, it is accepted that considerable areas of the forest are preserved in close to natural or even primeval condition. It is the best-preserved remnant of the vast fir and beech forests (so called Carpathian Forest) occupying the southeastern part of Poland. These forests have retained their original character due to their unavailability, i.e. the remote location from markets and roads and massive displacement of human populations conducted after the Second World War. According to the evaluation carried out by BNP, areas proposed for nomination were never influenced by forest management; however, parts of stands located at high altitude near the upper tree line were under pressure of grazing activity in the mid-twentieth century. Forests in the buffer zone are also valuable with natural species composition; however, the age structure has been slightly changed by the management practices. A part of the forest has been protected as nature reserves in the 1950s, another part of it is protected from acquisition by a National Park in 1973 or from the following enlargements of the Park. Studies on the dynamics of these forests are conducted for 40 years. The dominant type of ecosystem is the Carpathian beech forest Dentario glandulosae-Fagetum, acidophilous mountain beech forest Luzulo luzuloidis-Fagetum, and on smaller surfaces also Aceri-Fagetum. These communities vary in altitude gradient as they occupy the locations from 700 m.a.s.l. to 1,260 m.a.s.l.

Abiotic factors

Geographical position, natural region, altitudinal zone

The proposed component part- is part of the BNP and is situated in the Western Bieszczady Mountains, the most western range of the Eastern Carpathians, in southeast Poland. In the southern part of the Park, these areas represent a natural continuation of the sites already covered by the entry in the World Heritage "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany".

Geology and geomorphology

The area is comprised mainly of sedimentary rocks known under the general name of the Carpathian flysch. This is a common name for rocks that evolved as a result of the marine sedimentation of silt and sand suspended matter. The alternated rock layers, formed during 130 million years spanning the Upper Cretaceous Period and the turn of the Oligocene and the Miocene, vary greatly in thickness.

Forest of primeval character. Picture: S. Kucharzyk

The dominant geological layers include primarily the hard and relatively weather-resistant sandstone and the soft silt/marl shale. Other noteworthy rock formations include conglomerate, mudstone, ferric dolomite, marl, chert and very little limestone (with fossils).

Climate

The climate of the Bieszczady Mountains is primarily influenced by incoming air masses. For 62 to 64% of the year, the Bieszczady are dominated by Polar Ocean air, for 20 to 25% by continental Polar air, for 6 to 10% by Arctic air and for 3% by tropical air. Southern winds dominate with 30% of the days. The longitudinal mountain range system is conducive for valley wind, as well as for foehn winds, known in Poland as the "halny".

The average annual temperature depends not only on the elevation above sea level, but also on slope orientation and land relief. There are two main climatic tiers in the Park: the moderate cold (annual average temperature of 4 °C to 6 °C) and cold (2 °C to 4 °C), with the latter mainly covering the glades. The average annual precipitation of the lower areas of the Bieszczady Wysokie ranges from 900 mm to 1,100 mm.

Soils

The mountain soils within the Bieszczadzki National Park are strictly linked to their geological underbed, land relief and the intensity of relief forming processes in the slopes, as well as with the climate, hydrology and vegetation. Brown soils dominate the overall soil structure with nearly 90% of the total National Park area. Of those soils the acid (dystrophic) brown soils occupy a slightly larger area than the brown proper and leeched soils (eutrophic and mezotrophic). This slight domination is caused by the local petrography and by properties of the Quaternary slope covers. Regosols and lithosols, as well as ranker soils combined cover some 5% of the National Park area. Typically of the rock-rubble type, they occur in the summit zones of the main ridges, on steep slopes and on hard "horseback-shaped" rocks. Gleysols (mineral wetland soils) are normally found in water-head zones and at slope break lines where ground water seeps out of the covers.

Water balance

The Bieszczady National Park is drained principally by the river San and its tributaries. The southern watershed of the San follows the border ridge and forms a portion of the European watershed dividing the Baltic and Black Sea drainage basins.

The highest water discharge in the National Park is recorded in April after snow thawing. During summertime, the highest water discharge occurs in July and is related to the typically heavy rainfall. The lowest water levels are recorded in the fall (September–October) and in wintertime (January–February).

Biotic factors

Biotopes and vegetation

Forests cover the predominate proportion of the Bieszczady National Park (BNP) (22,520 ha, 77.50% of the total area). Primary beech forest (11% of whole area) consists mainly of Beech (95% of the total number of trees), followed by Sycamore Maple and Silver Fir. The predominating forest association is Carpathian beech wood (Dentario glandulosae-Fagetum), differentiated into several sub-associations. The most common is the sub-association of typical Carpathian beech wood (with *Dentaria glandulosa* and *Symphytum cordatum*). The sedge-grass sub-association (with *Festuca drymeja* and *Carex pilosa*) of beech wood occurs mainly on warmer, southern slopes and on skeletal, highly permeable soils. In moist habitats, in local depressions and in narrow gorges cut by streams, moist beech wood with Perennial Honesty *Lunaria rediviva* or Ramsons *Allium ursinum* occurs. Near the tree line, a characteristic elfin (krummholz) beech wood with a tall-herb layer occurs (with *Athyrium distentifolium*). The poorest sites in the lower montane zone are occupied by acidophilous mountain beech wood (Luzulo luzuloides-Fagetum) usually occurring on a shallow skeleton soil.

Table 34: Representative species for the component cluster Bieszczady (Poland)

Class	Species
Amphibian	Triturus montandoni
Amphibian	Triturus cristatus
Bird	Aegolius funereus
Bird	Aquila chrysaetos
Fish	Barbus meridionalis
Fish	Lampetra planeri
Invertebrate	Isophya stysi
Invertebrate	Rhysodes sulcatus
Invertebrate	Rosalia alpina
Invertebrate	Unio crassus
Mammal	Myotis bechsteinii
Mammal	Myotis emarginatus
Mammal	Myotis myotis
Mammal	Rhinolophus hipposideros
Plant	Drepanocladus vernicosus
Plant	Dicranum viride
Plant	Agrimonia pilosa

Flora

The most valuable components of the vascular flora of the Bieszczady forests are species typical for Eastern and Southern Carpathians including: *Aconitum moldavicum subsp. hosteanum* and *Rumex arifolius subsp. carpaticus*. Bryophytes are represented by 413 species (e.g. *Anomodon rugeli, Dicranum viride, Buxbaumia viridis*), lichens by 529 species (e.g. *Lobaria pulmonaria, Usnea faginea, Bryoria crispa*) and mushrooms by approx. 1300 species (e.g. *Antrodia Mellita, Hericium coralloides*).

Fauna

In the nominated area of forests there are 4 large carnivores: brown bear, wolf, lynx and wildcat. The *Myotis alcathoe*, a species considered to be an indicator for forests of natural character is present in this area. A relatively large number of the birds of prey are present (Lesser Spotted Eagle, Buzzard), owls (Ural Owl, Pygmy Owl, Boreal Owl) and woodpeckers (White-backed, Black Woodpecker). Among invertebrates associated with old growth forest are: *Rosalia alpina, Cerambyx scopoli, Cucujus cinnaberinus, Ceruchus chrysomelinus* and among them species like *Bolitobius inclinans* and *Stichoglossa semirufa.*

Beech forest with Carex pilosa. Picture: S. Kucharzyk

General view of Cheile Nerei. Picture: D.-O. Turcu

2.a.16 Romania: Cheile Nerei-Beușnița (039)

Area size

Table 35: Area size of the component part Cheile Nerei-Beușnița (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
039	Romania	Cheile Nerei-Beușnița	4,292.27	5,959.87	Carpathian

Short profile and biogeography

The Cheile Nerei-Beușnița nominated component part is a large complex of beech forests: 4,292.27 ha enveloped in a buffer zone of 5,959.87 ha. This forest massif is one of the largest remnant virgin forests of the temperate Europe. The forest stands of the nominated component part are characterized by a high degree of naturalness, occurring in a landscape covered up to 80 % by forests predominantly formed by beech.

This forest suffered only minor human influences during the history; being relatively isolated and inaccessible, it was preserved despite the fact that logging was present in the area not far from the reserve. In the most recent past (a few years), the forest was occasionally very lightly influenced by uncontrolled tourism. Nowadays, the nominated component part is a Nature Reserve (with no intervention), part of a National Park.

The elevation of this area ranges from 150 to 1,150 m.

The forests habitat types from the area are the following: Asperulo-Fagetum beech forests (9130), Medio-European limestone beech forest of the Cephalanterion-Fagion (9150) type, Galio-Carpinetum oak-hornbeam forests (9170) and Tilio-Acerion forests of slopes, screes and ravines (9180*).

There are large exemplars of beech and oak which may have over 300 years in age. Other species are also present with monumental trees (*Corylus colurna, Taxus baccata*, etc.), probably of very old age too.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part is located in the southwestern Carpathians of Romania, on the southwestern slopes of the Semenic-Almaj Mountains, covering parts of the Anina Mountains and the Oraviţa Hills in the middle basin of Nera river. The area encompasses the Nera Gorge as well as the Beuşniţa basin and the Rea valley. Altitude: 150-1,150 m.

Geology and geomorphology

Geologically, the lithological substrate is made of limestone (lithographic and dolomitic limestone), with silica and marl lentils, crystalline schists, silicone marbles, sands and gravel.

As being a karst area, the geomorphology shows steep valley and gorges, with streams and rivers that do not carry water in dry periods, karstic springs, caves, rocks and dolines. The nominated component part encompasses the Nera Gorge as well as the Beuşniţa basin and the Rea valley. The component part covers mainly forested areas, but also scrubs, semi-natural grasslands and rocky habitats.

The altitude of the nominated component part ranges between 150 and 1,150m. It is mostly located on slopes, most of them showing great relief energy. About 75% of the slopes have a gradient from 16 to 40 degrees. The general orientation of the component part is towards the south, with variations of the slopes. Due to the large diversity of the geomorphology, there are a lot of screes, ravines and rocky slopes.

Climate

The nominated component part is situated in the area of temperate continental climate, with sub-Mediterranean influences characterized by a moderate regime of temperature oscillations, moderate winters, early and short springs, warm and less humid summers and long, sometimes droughty, autumns. The annual average temperature is between 8 and 10° C. The annual precipitation average is 700 to 1,100 mm, the most frequent precipitations being in June and the less frequent ones in September.

Soils

The lithological substrate of the nominated component part is made of limestone (lithographic and dolomitic limestone), with silica and marl lentils, crystalline schists, silicone marbles, sands and gravel. On this kind of lithological substrates a great variety of soils developed, from mostly leptosols and eutric cambisols to luvisols in some parts.

The nominated component part includes a great number of rocky slopes, screes and ravines; in and around these areas, the soil is superficial and this is a limitative factor for the forest vegetation.

Water balance

The hydrological network within the nominated component part is well developed. The bigger valleys (Nera, Beusnita Valley and Rea Valley) have a perennial water regime, although the hydrological regime is not constant throughout the year. It rises in the seasons with most rainfall (end of autumn and in the spring) and in dry seasons streams can dry out completely and springs can disappear.

Important areas with rocky soils are included in the nominated component part, where water regime is a limitative factor for the forest vegetation.

Biotic factors

Biotopes and vegetation

The nominated component part comprises hilly pure beech forests and mixed forests with Sessile Oak (*Quercus petraea*), Common Oak (*Quercus robur*), Turkey Oak (*Q. cerris*), Hornbeam (*Carpinus betulus*), Linden tree (*Tilia cordata, T. tomentosa* and *T. plathyphyllos*), Sycamore (*Acer pseudoplatanus*), Maple (*Acer platanoides*), Ash (*Fraxinus excelsior*), Manna (*Fraxinus ornus*), Turkish Hazel (*Corylus colurna*), Oriental Hornbeam (*Carpinus orientalis*),

Forest of Cheile Nerei. Picture: D.-O. Turcu

growing on superficial soils or soils having a high quantity of skeleton. Beech covers over 80% of the forest stand, although specimens of big diameter e.g. of Turkish Hazel (*Corylus colurna*) and Yew (*Taxus baccata*) can be found.

The vegetation covered by numerous thermophilous species show strong influences from the Balkan (Moesic and Illyrian) region. The forests cover the habitat types Asperulo-Fagetum beech forests (9130), Medio-European limestone beech forest of the Cephalanterion-Fagion (9150), Galio-Carpinetum oak-hornbeam forests (9170) and Tilio-Acerion forests of slopes, screes and ravines (9180*) according to the EU Habitats Directive. Beiului Valley is almost completely covered by impressive formations of tufa (7220*) and along the calcareous ridges and cliffs there are rocky slopes with chasmophytic vegetation (8210), screes (8160*), caves (8310) and low deciduous scrubs with continental and sub-Mediterranean affinities (40A0*) that host a large number of endemic species of flora and fauna.

Within the nominated component part there are important surfaces with screes, ravines and rocky slopes, with specific habitats. Secondary meadows are also present on small surfaces.

Flora

The main tree species (80%) is European Beech (*Fagus sylvatica*); other trees also found are: *Quercus petraea, Q. robur, Q. cerris, Carpinus betulus, Tilia cordata, T. tomentosa T. plathyphyllos, Acer pseudoplatanus, A. platanoides, Fraxinus excelsior, Fraxinus ornus, Corylus colurna, Carpinus orientalis* and *Taxus baccata.*

Other plants occurring in the are are: *Anemone nemorosa, Lamium galeobdolon, Galium odoratum, G. schultesii, Melica uniflora, Dentaria spp., Carex alba, C. flacca, C. montana, C. digitata, Sesleria albicans, Brachypodium pinnatum, Cephalanthera spp., Neottia nidus-avis, Epipactis leptochila, E. microphylla, Convallaria majalis, C. umbrosa, Festuca heterophylla, Actaea spicata, Lunaria rediviva, Polystichum aculeatum, Euphorbia carniolica, Hacquetia epipactis, Helleborus odorus, Knautia drymeia, Omphalodes verna, Primula vulgaris, Ruscus hypoglossum, Scopolia carniolica* and *Scrophularia scopolii.*

Fauna

Invertebrates:

The following invertebrates are found in the area: *Austropotamobius torrentium, Lucanus cervus, Callimorpha quadripunctaria, Pholidoptera transsylvanica, Nymphalis vaualbum, Morimus funereus, Rosalia alpina, Cordulegaster heros, Unio crassus, Euphydryas maturna, Osmoderma eremita*

Fish:

As for fish, *Barbus meridionalis, Gobio kessleri, Sabanejewia aurata, Cottus gobio, Rhodeus sericeus amarus, Gobio uranoscopus* and *Aspius aspius* occur in the area.

Herpetofauna:

The area is home to *Bombina variegata, Vipera ammodytes, Bufo bufo, Rana dalmatina, R. temporaria, Salamandra salamandra, Lacerta agilis* and *L. viridis*

Birds:

The National Park hosts the following birds: *Alcedo atthis, Aquila chrysaetos, Aquila pomarina, Bubo bubo, Circaetus gallicus, Dendrocopos major, Dendrocopos medius, Dendrocopos syriacus, Dryocopus martius, Falco peregrinus* and *Strix uralensis*

Mammals :

The following mammals live in the area: *Ursus arctos, Canis lupus, Lynx lynx, Lutra lutra, Felis silvestris, Martes martes, M. foina, Muscardinus avellanarius, Glis glis* and *Dryomys nitedula*

Bats:

Bats are also found in the National Park. The following species have been listed: *Barbastella barbastellus, Myotis bechsteinii, Myotis blythii, Myotis capaccinii, Myotis myotis, Myotis emarginatus, Myotis nattereri, Rhinolophus ferrumequinum, Rhinolophus hipposideros* and *Rhinolophus mehelyi*

Table 36: Representative species for the component part Cheile Nerei-Beușnița (Romania)

Class	Species
Amphibian	Bombina bombina
Amphibian	Salamandra salamandra
Amphibian	Bombina
Bird	Alcedo atthis
Bird	Aquila chrysaetos
Bird	Aquila pomarina
Bird	Ficedula albicollis
Bird	Strix uralensis
Fish	Barbus meridionalis
Fish	Aspius aspius
Invertebrate	Lucanus cervus
Invertebrate	Morimus funereus
Mammal	Myotis bechsteinii
Mammal	Myotis blythii
Plant	Taxus baccata
Plant	Dactylorhiza
Reptile	Coronella austriaca

Beech forest of Codrul Secular Șinca. Picture: RPL OS Padurile Sincii RA

2.a.17 Romania: Codrul Secular Șinca (040)

Area size

Table 37: Area size of the component part Codrul secular Șinca (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
040	Romania	Codrul Secular Șinca	338.24	445.76	Carpathian

Short profile and biogeography

The nominated component part is the most representative undisturbed primeval beech forest in the northern cline of the Southern Carpathians. The bedrock consists in geological formations from the Miocene epoch characterized by blanket sedimentary deposits of crystalline mesomorphic schists from Făgăraş series that led to the formation of fertile, deep, well-structured soils. The altitude ranges between 790 and 1,400 m.a.s.l. The forest of the component part consists of mixed beech-silver fir stands (*Fagus sylvatica*, *Abies alba*) and belongs fully to the EU HD habitat type (91V0) Dacian beech forest (Symphyto-Fagion). The forest is, in advanced stage, of dynamic balance with complex uneven structures comprising all the development stages in a mosaic pattern with century-old elements. The high frequency of trees of ages above 350 to 400 (500) years for beech and 400 to 500 for silver fir trees is remarkable, until the limits of physiological longevity when they are drying on foot. The forest is famous for the remarkable size of the trees: the tallest silver fir tree in Romania, at 62.5 m, and the tallest beech tree from Europe, at 55.1 m, were measured in this forest (ROIBU et al. 2013).

A large quantity of deadwood is present both on the ground and still standing, in all decomposing stages.

The nominated component part hosts a large number of species of flora and fauna of endemic, rare or vulnerable species: *Canis lupus, Ursus arctos, Lynx lynx, Rupicapra rupicapra, Tetrao urogallus, Aquila pomarina, Hyla arborea, Vipera berus* and *Platanthera bifolia,* to mention some of them.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part Codrul Secular Șinca is located in the central part of the country, in the Southern Carpathians; there, it is situated in the in the eastern part of the Fagaras Massif, and on the northern slopes of Ţaga Mountains. The component part covers only forested areas in a compact and extended forest massif. The altitude ranges between 790 and 1,400 m.a.s.l.

Geology and geomorphology

In the lower parts of the Şinca Nouă region, Holocene (sand, gravel, loess deposits) and Pleistocene sediments can be found, and only a little higher, schist and sandstone from the Paleogene. Further up, marls and conglomerates from the Upper Cretaceous appear on the surface, together with some small islands of limestone, Aptian conglomerates and Triassic dolomite. In the area of the component part, the bedrock consists of geological formations from the Miocene epoch characterized by blanket sedimentary deposits of crystalline mesomorphic schists from Făgăraş series. The terrain is undulated, therefore the area is mostly located on slopes with great relief energy (> 80% of the territory has an inclination over 31 degrees). The general aspect of the slopes is north, being situated on the northern side of Țaga Mountains, and the local one is determined by the floating direction of valleys. Due to the rich hydrographic net, the detail aspects are varied but the shady aspects are dominant.

Dacian beech forest (Symphyto-Fagion). Picture: RPL OS Padurile Sincii RA

Climate

In terms of climate, the territory is influenced by various climates, but locally this generates a series of particluar characteristics. The geographical position (in the highest mountains of the Southern Carpathians, in the center of the country), microdepressions, and the varied physiognomy of relief have a strong influence on climatic conditions. Altitude is one of the factors that significantly influence the variation of climatic elements, reflecting the vertical disposure expressed in temperature evolution and precipitation which in turn are reflected in soil and vegetation. The thermic regime is characterized by an annual average of about 4,5 C°. The coldest month is January (-8.8 C°), whereas the warmest is July (14.5 C°), with an annual amplitude of 23.3 C°. The annual precipitation is around 1,100 mm/year, with a maximum in June (around 150 mm) and a minimum in September/February.

Soils

The identified types of soil are a result of pedogenetic factors, i.e. geologic substratum, geomorphology, microrelief, local climatic factors and biocoenosis. The types of soil are: eutric cambisol (85%), dystric cambisol (10%) and podzol (5%). The nature of the mentioned rocks (crystalline schists), the water regime (percolate) and the main presence of beech forests and beech mixed with silver fir, illustrate the soil distribution present in the range, deep, well-structured soils, permeable with normal ventilation.

Water balance

In terms of hydrology, the component part is situated in the middle Olt river basin, in the so-called Fagaras Country, and consequently the entire hydrographic net is tributary to it. At the site scale, the component part is crossed by two valleys, Strâmbșoara Mare and Pârâul Negru, which are tributary to Valea Strâmba and further to Șercaia river, and finally to Olt river at its turn. The highest average monthly run-off takes place in April and May due to snow melting from the upper part of the mountains. The valleys have a constant run-off all year round with slight decreases in dry periods. The riverbeds are on crystalline schists and the mountain slopes are well protected by forestry vegetation, so the streams do not carry high sediment load from erosion.

Biotic factors

Biotopes and vegetation

The forest of Codrul Secular Șinca component part are mixed beech-silver fir stands (*Fagus sylvatica*, *Abies alba*) and belong fully to the EU Habitats Directive´s habitat type 91V0: Dacian beech forest (Symphyto-Fagion) (BIRIŞ et al. 2012). The beech and silver fir are dominant species in the area showing a high degree of competitiveness and a state of climax. In the tree layer, beside beech and silver fir also grow individuals of Spruce (*Picea abies)*, Sycamore (*Acer pseudoplatanus)*, Elm (*Ulmus glabra)* and Hornbeam (*Carpinus betulus)*. The scrubs layer is represented amongst others by *Rubus sp*., Elder (*Sambucus nigra*), Bilberry (*Vaccinium myrtillus*), and Dog-rose (*Rosa canina*). Stands have an uneven-aged structure with a high degree of naturalness. It is important to note the high number of trees of ages above 350 to 400 (500) years for beech and 400 to 500 for silver fir trees, until the limits of physiological longevity when they are drying on foot. The tallest silver fir in Romania, at 62.5 m, and the tallest beech from Europe, at 55.1 m, were measured in this forest (ROIBU et al. 2013). Boldea et.al 2011 carried out biometric measurements in stands of the Codrul Secular Şinca property and concluded that this forest shelters the highest beech and silver fir trees in Romania. The growth dynamic confirms the natural (primeval) character of the forest as a direct result of the large structural variation processes for long time. Dendrochronological series indicate that this forest was not affected by human (anthropic) intervention, having a low impact for structure and spatial-temporal stability of the forest (ROIBU et al., 2013).

Flora

The richness of the flora and the diversity of the habitats in the area of Şinca Nouă are closely related to the complex geological substrate and the particularities of the relief. A biodiversity study on Şinca Nouă area (POP et al. 2007) found a broad variety of habitats and an astonishing natural beauty and richness. Despite the small area investigated, the study found 545 flora species, at least 22 orchid species and subspecies, 19 of them listed on the Romanian Red List, 42 mosses and 26 lichen species and 23 different habitat types (detailed list in the annex).

Fauna

The component part hosts a very large fauna biodiversity. The area serves as a critical refugee for *Ursus arctos dens*, *Rupicapra rupicapra* and *Tetrao urogallus*. A WWF scientific inventory of the property found an impressive number of protected species: 11 mammals (e.g. *Canis lupus*, *Ursus arctos*, *Lynx lynx, Rupicapra rupicapra*), 13 birds (e.g. *Tetrao urogallus, Aquila pomarina, Picoides tridactylus*), 3 reptiles (*Vipera berus, Anguis fragilis, Elaphe longissima*), 5 amphibians (e.g. *Salamandra salamandra, Hyla arborea, Bombina variegata*) and 3 invertebrates (*Rosalia alpina, Neptis sappho, Rhysodes sulcatus*). A study of the Şinca Nouă area (the Valea Strambei basin) (POP et al. 2007) found 23 fish species (among them *Cottus gobio*), 532 species of Macrolepidoptera, 101 beetle species, 40 spiders, 11 amphibians (one salamander, three newts and seven anurans) and six reptilian species (two lizards, four snakes), 99 bird species, nine species of bats and the same amount of small mammals.

Table 38: Representative species for the component part Codrul secular Șinca (Romania)

Class	Species
Amphibian	Hyla arborea
Amphibian	Salamandra salamandra
Bird	Tetrao urogallus
Bird	Nucifraga caryocatactes
Bird	Pernis apivorus
Bird	Picoides tridactylus
Bird	Picus canus
Bird	Streptopelia turtur
Bird	Strix uralensis
Fish	Cottus gobio
Invertebrate	Rosalia alpina
Invertebrate	Rhysodes sulcatus
Invertebrate	Carabus variolosus
Mammal	Rupicapra rupicapra balcanica
Mammal	Ursus arctos
Mammal	Felis silvestris
Reptile	Vipera berus

Standing and lying deadwood. Picture: I.A. Biris (INCDS-Marin Dracea)

General view of Slătioara Forest. Picture: I. Ichim

2.a.18 Romania: Codrul Secular Slătioara (041)

Area size

Table 39: Area size of the component part Codrul Secular Slătioara (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
041	Romania	Codrul Secular Slătioara	609.12	429.43	Carpathian

Short profile and biogeography

The nominated component part Codrul Secular Slătioara (609 ha) is part of the largest forest reserve from the north of Romanian Eastern Carpathians, which preserves one of most important mixed (Beech, Norway Spruce, Silver Fir) primeval forests from Romania, a sample of the original mixed forests that covered the area in the past. It is located in a mountainous area, between 720 to 1,510 m, at the bottom of a valley with steep sides. Forests cover 93% of the property, with the beech forests in 60% of area, the rest being covered by a floristic reserve, the Todirescu Meadows. The nominated property is one of the first forests declared as reserve from the country. The proposed component part belongs also to Natura 2000 site Rarău-Giumalău. Inside the forest component, no signs of forest use are present, while in the buffer area, slightl traces of extractions operated in the past due to windstorms or insect attacks can be found.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated property is located in the north of the Romanian Eastern Carpathians, on the eastern slope of Rarău Massif from Rarău-Giumalău Mountains. Its geographical coordinates are East: 25.6264696834; North: 47.4427250275, and its altitude is between 720-1,510 m.a.s.l.

Geology and geomorphology

The geological structure of Slătioara's geological structure is related to Rarău Mountains, a huge basin of crystalline schists. In this trough, thick stacks of sedimentary rocks, mainly sandstones, conglomerates and limestone accumulated along the geological time (OANCEA & SWIZEWSKI 1983). Slătioara area belongs to the Mesozoic marginal cuvette, with the largest dimensions in the lower part of the basin. There is a predominance of Aptian limestones and dolomites of the so-called Klippe, which appear as uninterrupted dams downstream and upstream of the gorge. Lithological substrate also includes sericite-chlorite crystalline schists, amphibolites, mica-schists and sandstones. The area spans three large, parallel edges: Bâtca Neagră, Bâtca cu Plai, Bâtca Lesei, separated by deep, sometimes steep, valleys, with slopes frequently (frequently between 35°, until 42°). The main slope aspect is north (N, NE, NW: 63%), followed by south (26%) and east (10%).

Climate

The region has a temperate transitional continental climate, in Rarău-Giumalău Mountains with excessive shades. The winters are long and full of snow, while the summers are short, cool and wet. The region experiences influences of cold air masses of Baltic origin, but also of western Atlantic air masses, which are particularly felt during the summer. In winter there are also influences from continental (eastern) and polar (northern) air masses. Most days with clear sky are in fall, whereas spring is characterized by the highest degree of weather instability (changeable in a short time) (OANCEA & SWIZEWSKI 1983; SEGHEDIN 1983). The mean annual temperature varies between 5.8 °C and 3.9 °C, and the precipitation between 700 mm and 810 mm.

Soils

MITITELU et al. (1981) indicated the existence of numerous trials of pedogenetic character: the advanced stage of meteoric rock alteration, argillic alteration, bioaccumulation of organic matter, and moderately mull type. The main soil types (FAO) are: cambisols (10% of the area) and lithosols (90%) (Forest District Stulpicani, Forest Management Plan 2002). The litomorph soils were formed on the substrate limestone and dolomite, as a result of the excess of Ca++ and Mg++. The typical and cambic rendzina introduce a particular note in the biocoenotic relations. The cambic soils are mostly represented by brown acid soils, formed on the crystalline rocks and sedimentary Mesozoic rocks.

Water balance

Văiuga, Ion Valley, Bear Valley and Ciurgău Valley are the main rivulets in Slătioara. These then unite in pairs, creating Slătioara river, further flowing into Gemenea, a tributary of Suha, which confluences with Moldova in Frasin city.

Biotic factors

Biotopes and vegetation

The beech forests cover the main area (60%), while in the upper zone spruce forests are present. Three main habitat types (N2000) are found inside the component part: 91V0 Dacian beech forests (Symphyto-Fagion), which cover 48% of the area, 9110 Luzulo-Fagetum beech forests (12%) and 9410 *Picea abies* acidophilous forests in mountainous regions (Vaccinio-Piceetea) (40%). The site has a higher naturalness, characterized by the presence of large amounts of deadwoods, old trees of large sizes (e.g. individuals of Silver Fir over 50 m high), and a higher structural heterogeneity and diversity. This seems to be the best preserved beech and mixed forest in the north of the Carpathian Mountains.

Flora

The component part hosts nature monuments and rare, protected species: *Cypripedium calceolus* that grows on limestone cliffs of the reserve, *Daphne cneorum, Hieracium racemosum ssp. pojorîtense, Hildenbrandia rivularis* (freshwater red algae on wet rocks in valleys), and *Taxus baccata*.

Fauna

The fauna of the component part includes endangered species of mammals (*Meles meles, Cervus elaphus, Ursus arctos*), birds (*Tetrao urogallus, Corvus corax, Bubo bubo*) and amphibians (*Salamandra salamandra*). Detailed studies on springtails (Collembola) and the carabid species (Coleoptera: Carabidae) are available as supplementary material (annex).

Also, several previously unknown species were found: *Prozercon tragardhisimilis* (SOLOMON 1982), *Zercon aniellae* (SOLOMON 1982), *Zercon blaszaki* (SOLOMON 1984) and *Zercon sylvii* (SOLOMON 1984) or at least new to Romanian fauna like Seghedin (1983) mentioned : *Cydia duplicana* Zetterstedt 1839 *syn. C. interruptana* Herrich-Schäffer 1851, *Thera britannica* Turner 1925 *syn. T. albonigrata* Gornik 1942, *Colostygia laetaria* de La Harpe 1853, *Endothenia ustulana* Haworth 1811 *syn. E. carbonana* Doubleday 1849 and *Pammene ochsenheimeriana* Lienig & Zeller 1846.

Table 40: Representative species for the component part Codrul Secular Slătioara (Romania)

Class	Species
Amphibian	Salamandra salamandra
Bird	Tetrao urogallus
Bird	Aquila pomarina
Bird	Bubo bubo
Bird	Corvus corax
Bird	Dryocopus martius
Bird	Strix uralensis
Invertebrate	Rhysodes sulcatus
Mammal	Ursus arctos
Mammal	Felis silvestris
Mammal	Lynx lynx
Plant	Cypripedium calceolus
Plant	Asplenium adulterinum

Forest landscape in Cozia National Park. Picture: P. Prundurel (Cozia National Park)

2.a.19 Romania: Cozia (042, 043)

Area size

Table 41: Area size of the component cluster Cozia (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
042	Romania	Cozia – Masivul Cozia	2,285.86	2,408.83	Carpathian
043	Romania	Cozia – Lotrisor	1,103.30		
TOTAL			**3,389.16**	**2,408.83**	

Short profile and biogeography

The component cluster of Cozia (3,389.2 ha) consists of two component parts: Masivul Cozia (2,285.9 ha) and Lotrișor (1,103.3 ha), separated by the Olt Defile, and connected by a joint buffer zone. Cozia and Narățu Massifs are located in the central-southern part of Southern Carpathians and belong to the category of low and middle high mountains with maximum heights of 1,300 to 1,668 m. They are bordered by a low depression and corridors; they look like an isolated bastion whose steep marginal sides and peaks catch the eye from far away. Forests cover over 99% from the Massifs Cozia and Narățu, and even if they consist of beech in over 3/4, they have a high diversity of forest types. A characteristic of the Cozia Massif is the presence of pure sessile oak and mixed beech-sessile oak forests at high altitude (1,000–1,350 m) directly joining mixed beech-coniferous and pure spruce forests, and the presence of pure beech and mixed beech-silver fir forests at low altitudes of 300 to 400 m on shady valleys. Different beech forest communities, pure and mixed, with high degree of naturalness, cover over 95% of the area, starting from the submontane layer until the high montane layer. The component parts preserve primeval forests as part of a larger intact forest landscape of more than 8,000 ha. The size of the area allows the complete array of natural processes and dynamics to happen, until now mostly undisturbed. The component cluster of Cozia harbors endemic, endangered, vulnerable or rare species of vascular flora and fauna and of rare habitat types.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated property Cozia is located in the central part of the Southern Carpathians, in the lower part of Olt Defile, and in the northern part of Valcea County. It comprises 3,389 ha of primeval beech forests. The altitude of the Masivul Cozia component part ranges between 310 and 1,640 m.a.s.l. and between 300 and 1,500 m.a.s.l for Lotrișor.

Geology and geomorphology

The component part Cozia mainly consists of crystalline formations (known as "gneiss of Cozia") in the upper part, and Lotrisor component part and the lower part of Cozia Massif consists of sedimentary early Jurassic formations (known as "Brezoi formation" made of breccias and sandstones). Cozia's crystalline formation is separated from the sedimentary Brezoi formation by the Cozia fault with a general orientation east-west on both sides of Olt River. Characteristic of Cozia gneisses and Brezoi breccias are the very steep slopes, and for this reason, the soil is hardly formed. Cozia Massif is an isolated horst with peaks in the shape of narrow sides, sharp tops accompanied by steep and inaccessible mountainsides with slopes of 45 to 60° and rare and very rare plain surfaces. The relief consists of a superposed, almost concentric step-like from 300 to 1,600 m altitude.

Climate

The climate of the area is influenced by its specific location, protected from massive rainfall and cold currents by the high Făgăraş Mountains in the north, and exposed to warm sub-Mediterranean currents from the south passing through the Olt Valley. Thus a specific microclimate characterizes the region by moderate temperatures and rainfall; an annual average temperature of 3.3 °C recorded in the high areas of the massif and 10 °C in the Olt Valley; these are higher temperatures than in the rest of the Southern Carpathians. In the highest areas of the Cozia massif, the average annual precipitation is about 1,015 mm, and in lower altitudes, e.g. in the Olt Defile, around 700 mm. During the year the precipitation regime is balanced. Drought periods as well as torrential rains are rather unusual.

Soils

Bedrocks and steep slopes are the basic determinants for the soil characteristics. In both component parts of the property, dystric cambisol and eutric cambisol, typical or leptic, are predominant. The highest parts of the Cozia Massif are covered by podzols. On the steep slopes from the western facade of Cozia massif and on the eastern and southern parts of Lotrisor, dystri-lithic leptosols are predominant in association with dystric cambisols on the surfaces of less steep slopes. Due to the highly dynamic relief, the soils are predisposed to erosion and even to landslides in the lower part of the mountain sides in Olt Valley. These are soils with small or middle edaphic volume, skeletal, with limited water and nutritional reserves, and middle or low fertility for beech. On the slopes with reduced inclination and shady exposure, profound soils are formed with a higher content of humus (over 2%), with humidity and favorable aeration, and with a high content of bases and fertility for beech.

Water balance

The nominated area has a dense hydrographic network, deeply encrusted in the bedrock, which drains directly into the Olt River. The brooks present high water volumes in spring and at the beginning of summer, with the possibility of high floods occurring in summer after heavy rains and at the end of winter due to the snow melting. As a result of its geological and geomorphological conditions there are no natural lakes, bogs or marshes in the area of the nominated property. The accumulation lake Turnu was built on the Olt River that separates the two component parts. All of the small hydrographic basins from the component part Cozia Massif (Usturoiul, Alunul, Dumbrăvița, Armăsarul, Văratec, Tocileasa, Tisa) are completely

Mixed beech-Scots pine forest in Cozia. Picture: C. Manci

inaccessible and lack forest roads, permitting the conservation of the ecosystems in their integrity. In the afferent hydrographic basins of the component part Lotrișor, only Lotrișorul brook is accessible by means of a forest road, the others are completely inaccessible.

Biotic factors

Biotopes and vegetation

Forests represent over 99% of the component cluster, whereas the small surfaces are covered by rocky habitats (c. 20 ha), and semi-natural dry grasslands and scrubland on shallow and xerocline soils (c. 15 ha). The diversity of the site conditions led to a great range of forest types on relatively reduced spaces, from hilly sessile oak forests to subalpine sparse growth spruce forests, which naturally occur at far altitudinal and spatial distances. The types of forests established by the presence of beech in composition cover over 95% of the site surface, besides very small areas of acidophilous spruce forests (2%) that may occur on the northern mountain sides in the upper part of Cozia Massif, and mesophilous and thermophilous sessile oak forests (3%) on the southern slopes in the lower part of both component parts. Forests characterized by the presence of beech stretch on an altitudinal gradient of over 1,300 m, from Olt River (300 m) up to the timberline (over 1,600 m). Examples of forest types with beech are: neutrophile hilly beech forests, neutrophile mixed beech-sessile oak-hornbeam forests, neutrophile mixed beech-sessile oak-silver lime forests (f.), acidophilous beech-sessile oak f., neutrophile mountain beech f., acidophilous mountain beech f., mixed beech-sessile oak-silver fir f., acidophilous beech-Scots pine f., acidophilous beech-silver fir f., acidophilous beech-spruce f., and acidophilous mixed beech-silver fir-spruce f. A characteristic of the Cozia Massif is the presence of pure sessile oak and mixed beech-sessile oak forests at high altitude (1,000–1,350 m) directly joining mixed beech-coniferous and pure spruce forests, and the presence of pure beech and mixed beech-silver fir forests at low altitudes of 300 to 400 m on shady valleys.

Flora

Until present, 402 species of parasite and saprophyte fungi with 4 new taxa for Romania have been inventoried, as well as 76 taxa of lichens, 9 of them new for Romania, 199 species of bryophytes, and 932 taxa of cormophytes. Concerning endemic and rare species, 6 plant species are endemic to Cozia Massif (*Achillea coziana, Centaurea coziensis, Galium baillonii, Rosa x argesana, Rosa coziae, Stipa crassiculmis ssp. heterotricha*), 12 species are endemic to the Carpathians, and 70 species are endangered, vulnerable or rare. A characteristic of the Cozia Massif is the presence of some xerophilous-thermophilous tree species such as *Fraxinus ornus, Juglans regia, Sorbus graeca, Cotynus coggygria, Quercus delechampii,* and *Quercus polycarpa* that grows even on 1,200 to 1,300 m, altitudinal record for the Carpathians. In the area, there is an interference of Eurasian, Meridional and Atlantic species to which Carpathian endemic species are added.

Fauna

The high diversity of site conditions and vegetation of the area is also reflected in the diversity of fauna. The wild landscape formed by steep mountain slopes, covered by old-growth forests and rocky slopes, represent the habitat of major populations of large carnivores (*Ursus arctos, Canis lupus, Lynx lynx*), small carnivores (*Felis silvestris, Martes martes, Martes foina*), day raptor birds (*Aquila chrysaetos, Aquila pomarina, Falco peregrinus*) and night raptor birds (*Strix uralensis, Strix aluco, Glaucidium passerinum*), and reptiles (*Vipera berus berus* and *Vipera ammodytes*). Among the numerous species of invertebrates, the Pseudoscorpion (*Neobisium carpathicum*) is worth mentioning, a protected species frequently met in both Cozia and Narăţu Massifs. The area hosts an impressive number of species of community interest covered by EU Habitats Directive: 11 species of invertebrates, 5 species of fish, 7 species of amphibians, 7 species of reptiles, 17 species of mammals, and 30 species of birds covered by the Birds Directive.

Table 42: Representative species for the component cluster Cozia (Romania)

Class	Species
Bird	Tetrao urogallus
Bird	Aquila chrysaetos
Bird	Aquila pomarina
Bird	Dendrocopos leucotos
Bird	Falco peregrinus
Bird	Glaucidium passerinum
Fish	Sabanejewia aurata balcanica
Fish	Sabanejewia aurata
Fish	Cottus gobio
Invertebrate	Neobisium carpathicum
Mammal	Ursus arctos
Mammal	Canis lupus
Mammal	Felis lynx
Mammal	Lutra lutra
Mammal	Lynx lynx
Reptile	Vipera ammodytes

View of the Stan Peak. Picture: O. Merce

2.a.20 Romania: Domogled-Valea Cernei (044, 045, 046)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
044	Romania	Domogled-Valea Cernei – Domogled-Coronini-Bedina	5,110.63	51,464.28	Carpathian
045	Romania	Domogled-Valea Cernei – Iauna Craiovei	3,517.36		
046	Romania	Domogled-Valea Cernei – Ciucevele Cernei	1,104.27		
TOTAL			**9,732.26**	**51,464.28**	

Table 43: Area size of the component cluster Domogled - Valea Cernei (Romania)

Short profile and biogeography

The Domogled-Valea Cernei cluster is a large complex of beech forests consisting of three components: Ciucevele Cernei (1,104 ha), Iauna Craiovei (3,517 ha) and Domogled-Coronini-Bedina (5,110 ha), that are connected by a continuous forest cover and enveloped in a common buffer zone (51,464 ha). The forest stands of all three proposed components are characterized by a high degree of naturalness occurring in a landscape covered with about 72% of forests predominantly formed of beech.

The elevation of these areas ranges from 160 to 1,620 m.a.s.l.

All three components are found in a single basin valley (Valea Cernei). It is worth noting that in this cluster, beech forests extend into the sub-alpine area constituting the upper limit altitude of forest. In two of the three components, bands of subalpine grasslands are included, as well as scrubs representing a buffer that could allow an eventual expansion in altitude for beech in the context of global warming.

The main forest types are represented by beech forests (pure or mixed) of the habitats 91K0, 9150, 91V0 and 9130, spruce forests (pure or mixed with beech and fir), and pine forests with endemic Pinus nigra ssp. banatica.

Abiotic factors

Geographical position, natural region, altitudinal zone

The cluster is located in the Domogled-Valea Cernei National Park that stretches over three counties: Caraş Severin, Mehedinţi and Gorj. The altitude of Domogled-Coronini-Bedina is between 160 and 1,300 m.a.s.l., the altitude of Iauna Craiovei ranges from 400 to 1,560 m.a.s.l., and for Ciuvele Cernei, it ranges from 775 to 1,620 m.a.s.l.

Geology and geomorphology

Domogled-Coronini-Bedina consists of two distinct parts from geomorphological point of view: crystalline schists on the right side of the valley and limestones on the left one.

Iauna Craiovei is part of the crystalline schists area of the Cerna Mountains. The lithological substrate is largely built of metamorphic rocks (mica-schists, paragneisses, marls), but also depositions of rocks (conglomerates, marls, argillaceous schists) can be found.

Ciucevele Cernei area shows a great geological diversity. On the ramifications of Cerna Mountains, the forests developed mostly on metamorphic formations from the upper Precambrian and, on a smaller scale, on pre-alpine magmatic formations associated with crystalline slates. The lithological formations encountered on the ramifications of Mehedinţi Mountains contain mostly amphibolites

Morimus funereus. Picture: C. Manci

and amphibolitic schists. On the Cerna river valley, the lithological substrate is formed from sedimentary formations from the upper and inferior Cretaceous.

Climate

Domogled-Coronini-Bedina has a temperate climate with strong sub-Mediterranean influences. The annual average temperature varies between 8.0 and 9.5 °C. Rainfalls reach approximately 760 to 850 mm per year.

The component parts Iauna Craiovei has a temperate climate with sub-Mediterranean influences. The annual average temperature is 6.6 °C, with a maximum monthly average temperature of 20.5 °C and a minimum monthly average temperature of -4 °C. The average annual precipitation is approximately 1,050 mm.

The climate of the Ciucevele Cernei component part is characterized by moderate summers and harsh winters receiving significant precipitation in all seasons. The thermal regime is characterized by an average yearly temperature of 6.3 °C, with a maximum monthly average temperature of 20.2 °C and a minimum monthly average temperature of -4 °C. The yearly average quantity of precipitation is 938 mm.

Soils

Typical soils occurring in the component area are cambisols and podzols.

Cambisols occupy the largest part of the cluster. Edaphic characteristics of cambisols are related to the low useful edaphic volume due to shallow positioning of solid rock at around 20 to 50 cm. Rainfall actively promotes an alteration of mineral substrate, which influences the grain size composition of these soils. With few exceptions, cambisols in the cluster have a medium texture, clay with a varying skeleton percentage. Soils of this type were formed under a humid climate. This ensures an intense alteration of rocks to form secondary minerals.

Podzols occupy the top half of the right side of Valea Cernei. They are soils that have evolved both in climatic conditions specific to the forest, alpine grasslands, and under the conditions of a wet temperate climate. Podzols are soils with an intense degree of alteration and strongly differentiated. They develop mainly on sloping surfaces of protected area at over 1,200.

Water balance

All three component parts are located in a single basin valley (Valea Cernei). The hydrographic basin is elongated, narrow and asymmetrical to Cerna River's tributaries. It is varied and influenced by the lithological diversity of the basin. A special feature of the river Cerna is its rectilinear flow over a long distance and confluence angles of about 90 degrees. Cerna River has a mixed supply of 54% from groundwater and 46% of surface water.

The hydrological network of Iauna Craiovei is extended. The main small depressions belong to the Iauna Mare and Craiova affluents having a continuous flow but seasonal fluctuations.

The Domogled-Valea Cernei cluster also contains many groundwater and karst springs. Lithological variety facilitated the formation of different aquifer structures that depend mainly on the permeability of rocks.

Biotic factors

Biotopes and vegetation

The cluster is characterized by a high diversity of habitats, where forest habitats and habitats of grasslands, scrubs and rocky habitats can be found.

In the 3 component parts, the following types of habitats are present: 91K0 – Illyrian Fagus sylvatica forests (Aremonio-Fagion), 9150 – Medio-

European limestone beech forest, 91V0 – Dacian beech forest, 9130 – Asperulo-Fagetum beech forests, 9410 – Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea), 91Q0 – Western Carpathian calcicolous Pinus sylvestris forests, 9530* – Sub-Mediterranean pine forest with endemic black pines, 9180* – Tilio-Acerion forests of slopes, screes and ravines, 91M0 – Pannonian-Balkanic turkey oak-sessile oak forest, 8210 – Calcareous rocky slopes with chasmophytic vegetation, 8160* – Medio-European calcareous screes of hill and montane levels, 8120 – Calcareous and calchist screes of the montane to alpine levels (Thlaspietea rotundifolii), 6520 – Mountain hay meadows, 6230* – Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submontane areas, in Continental Europe), 6150 – Siliceous alpine and boreal grasslands, 6170 – Alpine and subalpine calcareous grasslands, 6110* – Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi, 6430 – Hydrophilous tall herb fringe communities of plain and of the montane to alpine levels, 6190 – Rupicolous pannonic grasslands (Stipo-Festucetalia pallentis), 4070* – Bushes with Pinus mugo and Rhododendron myrtifolium, 4060 – Alpine and Boreal heaths, and 40A0* – Subcontinental peri-Pannonic scrub.

Forest habitats occupy about 72% of the cluster (with beech habitats occupying about 64% of the cluster).

Flora

Of the approximately 1,110 species of superior plants in Domogled-Valea Cernei National Park, 66 species are endangered, rare and endemic.

Among the plant species characteristic of beech forests are the following: *Geranium macrorrhizum, Carex pilosa, Euphorbia amygdaloides, Galium odoratum, Ruscus aculeatus, Geranium robertianum, Mercurialis perennis, Oxalis acetosella, Polypodium vulgare, Polystichum aculeatum, Pulmonaria rubra, Poa nemoralis, Symphytum cordatum*, and some species of orchids.

At higher altitudes, the vegetation is typical for grasslands and rocky areas.

The National Park harbors a number of rare species: *Cephalanthera longifolia, Dianthus gigantheus banaticus, Athamanta turbith, Thymus comosus, Alyssum petraeum, Primula auricula, Veronica spicata, Saxifraga rocheliana, Silene saxifraga, Aethionema saxatile, Corylus colurna, Campanula crassipes, Linum uninerve, Cerastium banaticum,* and *Dianthus petraeus*.

Fauna

The cluster hosts a very rich and interesting fauna. The area is characterized by a high biodiversity in terms of Lepidoptera, with 1,463 species of butterflies (45% of the country's fauna of Lepidoptera).

Fauna is represented by a large number of species, ranging from invertebrates to mammals. Among insect species are: *Euscorpius carpathicus, Kirinia roxelana, Morimus funereus, Rosalia alpine, Cerambyx cerdo, Lucanus cervus, Cordulegaster heros, Callimorpha quadripunctaria, Austropotamobius torrentium, Parnassius mnemosyne, Rhysodes sulcatus, Euphydryas maturna, Maculinea arion,* and *Paracaloptenus caloptenoides*.

Concerning birds, the most important species include: *Lamius collurio, Picus canus, Dendrocopos major, Pernis apivorus, Dendrocopos medius, Dryocopus martius, Strix aluca, Asio otus,* and *Turdus merula*.

Regarding bats, the most important species in the area are: *Myotis myotis, Myotis blythii, Rhinalophus ferrumequinum, Myotis capaccinii, Myotis emarginatus, Rhinolophus blasii, Rhinolophus euryale, Rhinolophus hipposideras, Miniopterus schreibersii.*

Table 44: Representative species for the component cluster Domogled - Valea Cernei (Romania)

Class	Species
Amphibian	Bombina bombina
Bird	Turdus merula
Bird	Asio otus
Bird	Bonasa bonasia
Bird	Dendrocopos major
Bird	Dendrocopos medius
Bird	Dryocopus martius
Invertebrate	Euphydryas maturna
Invertebrate	Lucanus cervus
Invertebrate	Morimus funereus
Invertebrate	Paracaloptenus caloptenoides
Mammal	Myotis blythii
Mammal	Myotis capaccinii
Mammal	Myotis emarginatus
Mammal	Myotis myotis

General view of mixed stands in Groșii Țibleșului Forest. Picture: Forest District Groșii Țibleșului

2.a.21 Romania: Groșii Țibleșului (047, 048)

Area size

Table 45: Area size of the component cluster Groșii Țibleșului (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
047	Romania	Groșii Țibleșului – Izvorul Șurii	210.55	563.57	Carpathian
048	Romania	Groșii Țibleșului – Preluci	135.82		
TOTAL			**346.37**	**563.57**	

Short profile and biogeography

The nominated component cluster Groșii Țibleșului (346 ha) preserves unique primeval forests from the northern part of the Romanian Eastern Carpathians, the last remnants of Maramureș area, a favorable area for beech. The component consists of two parts: Izvorul Șurii (210 ha) and Preluci (136 ha). The site is located in the northern part of (Romanian) Eastern Carpathians, in the area of volcanic Țibleș Mountains, within an altitudinal range of 980 to 1,450 m. The beech forests cover 100% of the component parts and represent the main forest type.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component cluster is located in the north of the Romanian Eastern Carpathians, in the area of the volcanic mountain range Oaș-Gutâi-Țibleș (BIRIŞ et al. 2012), situated in the upper basin of the Lăpuş River. The elevation of Izvorul Șurii (IS) ranges from 1,050 to 1,450 m.a.s.l., that of Preluci (P) from 980 to 1,100 m.a.s.l.

Geology and geomorphology

The bedrock at the site is of Neogene volcanic origin, causing the development of generally acidic soils. The surface takes the form of domes or columns separated by patches or strips of sedimentary deposits. Lava flows and pyroclastic products occur less frequently, as they are removed through erosion by water (BIRIŞ et al. 2012). The secondary peaks of the main ridge that were shaped by the hydrographic network are generally oriented north-south and separated from each other by valleys with undulating slopes/by valleys, which forms undulating slopes. A major part of the site shows an inclination of the terrain between 31 and 40°. The slopes have a direct influence on soil depth, which increases from the peak to the valley due to washing and transport of material from the upper slopes and its sedimentation at the bottom (BIRIŞ et al. 2012). The site is generally oriented towards the south, with some smaller areas with exposures towards west, and very few towards east and north (BIRIŞ et al. 2012).

Climate

The climate of the region is typical for mountainous areas, favorable for the development of forest vegetation characterized by harsh winters, cool summers and adequate rainfall throughout the year. It shows an annual average in temperature of 6.5 °C (the annual average temperatures range from 5.5 to 7.5 °C) and an annual precipitation average of 1,100 to 1,400 mm (BIRIŞ et al. 2012).

Soils

The climate of the region is typical for mountainous areas, favorable for the development of forest vegetation characterized by harsh winters, cool summers and adequate rainfall throughout the year. It shows an annual average in temperature of 6.5 °C (the annual average temperatures range from 5.5 to 7.5 °C) and an annual precipitation average of 1,100 to 1,400 mm (BIRIŞ et al. 2012).

Water balance

The hydrographic network caused increased fragmentation of the landscape and the appearance of a mosaic of physical conditions over time. The main water collector of the component is Ţibleş brook, favoring the formation of convection fog in spring and summer especially in the lower parts (BIRIŞ et al. 2012). The springs and brooks of the site are characterized by a permanent drainage system. The hydrological regime is characterized by percolation, while groundwater only rarely affects the forest vegetation (BIRIŞ et al. 2012).

Biotic factors

Biotopes and vegetation

The component parts encompass a great majority of primary forest ecosystem structures that are extremely complex and in a state of dynamic equilibrium with minimal anthropogenic influences The present ecosystems are samples of the natural habitats available in the region and of special conservation value: they are unique in the north of the Carpathian Mountains, as they host complex, multi-year and multi-secular elements that reach the evolved physiological age limit (BIRIŞ et al. 2012). The site harbors Asperulo-Fagetum beech forests (9130) and, to a major part, Dacian beech forests (Symphyto-Fagion) (91V0) of the European Habitats Directive (Biriş et al. 2012). About 70% of the forest stands are composed by beech trees of more than 140 years of age, reaching ages of up to 180 years (BIRIŞ et al. 2012).

Flora

The flora of the component parts includes species characteristic to the beech forests of dominant types: *Actaea spicata, Allium ursinum, Anemone ranunculoides, Asarum europaeum, Campanula persicifolia, Cardamine impatiens, Carex sylvatica, Circaea lutetiana, Dactylis polygama, Dentaria bulbifera, Geranium robertianum, Impatiens noli-tangere, Lathyrus niger, L. vernus, Melittis melissophyllum, Polygonatum multiflorum, Primula vulgaris, Sanicula europaea, Senecio nemorensis, Stachys sylvatica, Symphytum cordatum* and *Viola reichenbachiana*. An extensive inventory of the flora is not available.

Inside Groșii Țibleșului. Picture: L. Teodosiu

Fauna

The component parts host a large spectrum of species, from large and small carnivores (*Ursus arctos, Lynx lynx, Felis silvestris, Martes martes*) to bird species (*Falco peregrinus, Strix uralensis, Strix aluco*) or reptiles (*Vipera berus berus, Vipera ammodytes*). To date, no extensive inventory of the fauna has been conducted.

Table 46: Representative species for the component cluster Groșii Țibleșului (Romania)

Class	Species
Bird	Accipiter nisus
Bird	Bonasa bonasia
Bird	Dryocopus martius
Bird	Falco tinnunculus
Bird	Pernis apivorus
Bird	Picus canus
Bird	Strix uralensis
Mammal	Ursus arctos
Mammal	Felis silvestris
Mammal	Canis lupus
Mammal	Lynx lynx
Reptile	Vipera berus

View of Izvoarele Nerei. Picture: M. Schickhofer

2.a.22 Romania: Izvoarele Nerei (049)

Area size

Table 47: Area size of the component part Izvoarele Nerei (Romania)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
049	Romania	Izvoarele Nerei	4,677.21	2,494.83	Carpathian

Short profile and biogeography

The Izvoarele Nerei nominated component part is a large complex of beech forests of 4677.2 ha with 2,494.8 ha buffer zone. This forest is one of the largest remnant virgin forests of the temperate Europe. The main species is beech, with only a few exemplars of other species.

This forest suffered only minor human influences during the history; being isolated and inaccessible, it has been preserved. In the past, the forest was only influenced by trespassing of the shepherds and, during the Turkish invasions, people from the middle Nera valley sheltered against the invaders in two meadows of this forest. In the last few decades, it was very lightly influenced by shepherds trespassing, uncontrolled tourism and mushroom harvesting, all happening occasionally. Nowadays, it is a Nature Reserve (no intervention), part of a National Park.

In the middle of the reserve, at an altitude of 1,000 m.a.s.l. an age estimation was made - 16 trees of over 350 years and 8 trees of over 400 years, with a maximum age of 477, were found per hectare.

The elevation ranges from 620 to 1,400 m.

The limits of the nominated component part are natural, constituted by two main ridges which separate the Nergana and Nerganita basins from the surroundings.

The main forest types are beech forests classified as two types of habitats: 9130, Asperulo-Fagetum beech forests, and 9110, Luzulo-Fagetum beech forests.

In the South-Western Romanian Carpathians, beech forests cover very large areas, from 100 m altitude to the tree line (in some cases), being the most representative ecosystems of the region.

Abiotic factors

Geographical position, natural region, altitudinal zone

Izvoarele Nerei is located in the South-Western Carpathians of Romania, in the historical region of Banat, in Prigor Commune, Caras-Severin County. It is situated on the southern slope of the Semenic mountain, encompassing the small depressions of the rivers Nergana and Nerganita. The altitude varies between 620 and 1,400 m.a.s.l.

Geology and geomorphology

The geological conditions are relatively uniform throughout the reserve, as only a single type of rock (micaschists) has been identified on the entire area of the reserve, with a small exception, an area covered with granites and granodiorites. On most parts of the reserve area, the soil type dystric cambisol is found which is also moist in summer. On this type of soil, pure beech forests of high productivity can be found. In two extreme areas of the reserve, the upper part, neighboring the Semenic alpine barren, and the base of the reserve, where the slopes are very steep (close to the confluence of the rivers Nergana and Nerganita), the soil is characterized by a higher quantity of skeleton, lowering the productivity of the beech forests in dependency of the water supply of the specific locality. As forest vegetation has a high degree of coverage, there has been no slope wash and no loose accumulation of rocks. Soil debris is formed at the base of the slope.

Climate

The component part Izvoarele Nerei is located in a temperate continental climate with Mediterranean influences.

The average annual temperature is between 9 and 10 °C at the lower parts of the proposed component and decreases with the increase of the relief's elevation: in the Nergana and the Nerganita Valleys, the average annual temperature is 7.5 °C, and on the Semenic Mountain it is 4 °C. Late frosts occur quite frequently.

Precipitations are also distributed according to the atmospheric circulation and to the layered relief. In the region of the hills, they range from 750 to 900 mm; in the middle mountain layer from 900 to 1,050 mm, and on the Semenic Peak the average rainfall is 1,200 mm.

The territory of the Izvoarele Nerei Reserve is dominated by the circulation of air masses from the west and northwest.

Soils

In most parts of the area of the component part Izvoarele Nerei nominated, the soil type is dystric cambisol which is also moist in summer. On this type of soil, pure beech forests of high productivity can be found. On the steep slopes, close to the Nergana and Nerganita rivers, the skeletic subtype of this soil is found. These soils are very favorable for beech, therefore high wood volumes per hectare are representative for the area.

Water balance

The hydrographical network is dense and rich in water all year long. The entire area of the proposed component is very rich in springs; the name "Izvoarele Nerei" means "the springs of the Nera river". The main rivers are Nergana and Nerganita, the reserve covering the basins of these two rivers; at the base of the reserve, where they unite, the Nera river is formed.

Water of exceptional quality is supplied to many localities of the territory. The underground water is very high, and in the areas that have slight depressions, springs appear forming small wet surfaces (0.1–0.5 ha) where swamps are formed and the herbaceous vegetation forms peat, which is why these areas are naturally not occupied by forest.

Bracket fungus. Picture: D.-O. Turcu

Biotic factors

Biotopes and vegetation

The nominated component part is quite uniform and significantly dominated by two types of habitats: 9130, Asperulo-Fagetum beech forests, and 9110, Luzulo-Fagetum beech forests. The main vegetation associations in the area are represented by Hieracio rotundati-Fagetum Vida 1963 Täuber 1987 (syn.: Deschampsio flexuosae-Fagetum Soó 1962); Festuco drymejae-Fagetum (Morariu et al. 1968); Galio schultesii-Fagetum (BURDUJA et al. 1973) Chifu et Ştefan 1994; Lathyro veneti-Fagetum (DOBRESCU et Kovács 1973) Chifu 1995; Carpino-Fagetum (Paucă 1941). In the proposed component part, the vast majority of the surface is covered by pure beech forests, with very small areas of grasslands (below 2%). Some small wet areas are also represented, consisting of small bogs from where springs originate, which add to the diversity of the beech ecosystems.

Flora

The dominant tree species is *Fagus sylvatica*, with a few small groups of *Abies alba*. A few exemplars of *Ulmus glabra, Acer pseudoplatanus* and *Betula pendula* can be also found. The shrubs are represented by *Corylus avellana, Euonymus sp., Sambucus nigra*, etc. The mosses found in the area are: *Polytrichum formosum, Hylocomium splendens, Eurhynchium striatum* and *Dicranum scoparium*. The main plants to be found in the area, including ferns, are the following: *Luzula luzuloides, Oxalis acetosella, Deschampsia flexuosa, Calamagrostis villosa, Vaccinium myrtillus, Pteridium aquilinum, Athyrium filix-femina, Digitalis grandiflora, Dryopteris filix-mas, Festuca drymeia, Galium odoratum, G. schultesii, Poa nemoralis, Veronica officinalis, Lunaria rediviva, Circaea lutetiana, Cystopteris fragilis, Dentaria glandulosa, Dryopteris filix-mas, Geranium robertianum, Helleborus purpurascens, Impatiens noli-tangere, Lamium galeobdolon, Mercurialis perennis, Sanicula europaea, Senecio sp., Salvia glutinosa, Stellaria nemorum, Stachys sylvatica, Carex spp., Cephalanthera spp.*, and *Neottia nidus-avis*.

Fauna

In the component part, the following insects occur: *Rosalia alpina, Lucanus cervus, Morimus funereus, Cerambyx cerdo, Maculinea nausithous, Callimorpha quadripunctaria*, and *Zubovskya banatica*. Regarding herpetofauna, the area hosts the following species: *Salamandra salamandra, Triturus alpestris, T. cristatus, Bombina variegata, Bufo bufo, B. viridis, Hyla arborea, Rana sp., Anguis fragilis*, and *Natrix tessellata*. As for birds *Aquila chrysaetos, A. pomarina, Bubo bubo, Strix uralensis, Dendrocopos major, D. medius, D. minor, D. leucotos, Corvus corax* and *Corvus monedula* are part of the reserve. The area harbors the following mammals: *Ursus arctos, Canis lupus, Martes martes, M. foina, Meles meles, Mustela putorius, Lynx lynx, Felis silvestris, Cervus elaphus, Capreolus capreolus, Lepus europaeus, Scuirus vulgaris*, and *Sorex araneus*. The following bat species are also found in the component part: *Rhinolophus ferrumequinum, R. hipposideros, R. mehelyi, R. euryale, R. blasii, Myotis myotis, M. oxygnatus, M. bechsteinii, M. capaccinii, M. emarginatus, M. mystacinus, Miniopterus schreibersii, Plecotus austriacus, Barbastella barbastellus, Eptesicus nilssonii*, and *Pipistrellus pipistrellus*.

Table 48: Representative species for the component part Izvoarele Nerei (Romania)

Class	Species
Amphibian	Triturus cristatus
Amphibian	Triturus alpestris
Amphibian	Hyla arborea
Bird	Aquila chrysaetos
Bird	Aquila pomarina
Bird	Bubo bubo
Bird	Corvus corax
Invertebrate	Lucanus cervus
Invertebrate	Maculinea nausithous
Invertebrate	Morimus funereus
Invertebrate	Rosalia alpina
Mammal	Myotis bechsteinii
Mammal	Myotis capaccinii
Mammal	Myotis emarginatus
Mammal	Myotis myotis
Mammal	Myotis mystacinus
Plant	Dactylorhiza

Deadwood. Picture: D.-O. Turcu

View of Strâmbu Băiuț. Picture: V. Radu

2.a.23 Romania: Strâmbu Băiuț (050)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
050	Romania	Strâmbu Băiuț	598.14	713.09	Carpathian

Table 49: Area size of the component part Strâmbu Băiuț (Romania)

Short profile and biogeography

The nominated component part Strâmbu Băiuț (598 ha) preserves unique primeval forests from the northern part of the Romanian Eastern Carpathians, the last remnants of the Maramureș area, a favorable zone for beech. The nominated property is located in a mountainous area, between 560 and 1,300 m.a.s.l. Beech forests cover 100% of the property, preserving one of most important mixed primeval forests from its area (north of Romania). The proposed component also belongs to the Natura 2000 site Codrii Seculari de la Strâmbu Băiuț.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated property is located in the north of the Romanian Eastern Carpathians, part of the volcanic mountain range Oaș-Gutâi-Țibleș (BIRIŞ et al. 2012), in the upper basin of the Lăpuş River, within an altitudinal range of 560 and 1,300 m.a.s.l.

Geology and geomorphology

Most surfaces are formed on Paleogene flysch, with eruptive breakdowns and Neogene deposits (Oligocene and Miocene). The main bedrocks are eruptive (andesites) and sedimentary (marno-clay schists, sand stones and silica conglomerates). A smaller part of the site is constituted of Paleogenic sediments (with eruptive rocks), formed of gritstones, marls and clays (BIRIŞ et al. 2012). The main slope aspect is south (S, SE, SW: 61%), followed by northern aspect (30%). More than 65% of the site has an inclination between 31 and 40°.

Climate

The climate is characterized by annual average temperatures between 5.5-7.5 °C, with an annual average of 6.5°C and an annual precipitation average of 1,100 to 1,400 mm (BIRIŞ et al. 2012).

Soils

More than 85% of the soils at the site are dystric cambisols, followed by 10% of prepodzol and very small areas covered by Eutric cambisols and Gleysols (BIRIŞ et al. 2012).

Water balance

The territory is situated in the upper basin of Lăpuș river. The hydrologic regime is constant and water flows are pretty regular.

Biotic factors

Biotopes and vegetation

The majority of the forest stands at the site show primary forest structures with minimal anthropogenic influences. The present ecosystems represent especially valuable samples of natural habitats existing in the region and being unique in the Carpathian Mountain area, through the complex, age-heterogeneous structures, with multi-century elements that reach the physiological age limit (BIRIŞ et al. 2012). The forest ecosystems of the site are very valuable also because of their great typological and compositional diversity, showing a natural mix of species with predominantly Beech (*Fagus sylvatica*), Fir (*Abies alba*), Spruce (*Picea abies*) and Sycamore (*Acer pseudoplatanus*) together with Ash (*Fraxinus excelsior*), Elm (*Ulmus glabra*), Maple (*Acer platanoides*) and the pioneer species Silver Birch (*Betula pendula*), Goat Willow (*Salix caprea*), and Trembling Poplar (*Populus tremula*). The forests habitat types of the area are Dacian beech forests (Symphyto-Fagion) (91V0) with 78%, Asperulo-Fagetum beech forests (9130) with 10% and Tilio-Acerion forests of slopes, screes and ravines (9180*) according to the EU Habitats Directive.

Ciconia nigra in Strâmbu Băiuț. Picture: Ș. Angelescu

Flora

The flora of the component part includes species characteristic to the beech forests of dominant types: *Actaea spicata, Allium ursinum, Anemone ranunculoides, Asarum europaeum, Campanula persicifolia, Cardamine impatiens, Carex pendula, Carex sylvatica, Circaea lutetiana, Dactylis polygama, Dentaria bulbifera, D. glandulosa, Galium odoratum, Geranium robertianum, Impatiens noli-tangere, Lamium galeobdolon, Lathyrus niger, L. vernus, Melittis melissophyllum, Mercurialis perennis, Milium effusum, Polygonatum multiflorum, Primula vulgaris, Pulmonaria officinalis, P. rubra, Salvia glutinosa, Sanicula europaea, Senecio nemorensis, Stachys sylvatica, Symphytum cordatum*, and *Viola reichenbachiana*. An extensive inventory of the flora is not available.

Fauna

The large area of the component part offers a habitat to populations of large and small carnivores (*Ursus arctos, Lynx lynx, Felis silvestris, Martes martes*), bird species (*Falco peregrinus, Strix uralensis, Strix aluco*), and reptiles (*Vipera berus berus, Vipera ammodytes*). Among invertebrates we mention: *Rosalia alpina* and *Carabus hampei*. To date, no extensive inventory of the fauna has been conducted.

Table 50: Representative species for the component part Strîmbu Băiuț (Romania)

Class	Species
Bird	Ciconia nigra
Bird	Dryocopus martius
Bird	Pernis apivorus
Bird	Strix uralensis
Invertebrate	Rosalia alpina
Mammal	Ursus arctos
Mammal	Felis silvestris
Mammal	Canis lupus
Mammal	Lynx lynx
Reptile	Vipera berus

Winter view of Strâmbu Băiuț. Picture: V. Radu

Deadwood in Krokar. Picture: S. Pelc (Slovenia Forest Service)

2.a.24 Slovenia: Krokar (051)

Area size

Table 51: Area size of the component part Krokar (Slovenia)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
051	Slovenia	Krokar	74.50	47.90	Illyric

Short profile and biogeography

The proposed component part Virgin Forest Krokar is located in the northern part of the Dinaric mountain range, in the southeastern part of the mountain Borovška gora near the town Kočevje in southern Slovenia. The Virgin Forest Krokar is part of the broader Kočevska region, where the percentage of forest cover is higher than 75%. Fir-beech and beech forests are typical of this forested area, making up more than 65% of the forests. It is assumed that this area was an important glacial refuge, from where the beech spread across Europe again. The reserve covers an area of 74 ha and is situated between 840 and 1,170 m.a.s.l. The reserve includes the peaks Krokar (1,122 m) and Cerk (1,192 m), as well as the karst plateau in between these peaks which comprises several deep sinkholes. Steep slopes are found in the eastern and southern parts of the reserve. The Virgin Forest Krokar lies at the intersection of Dinaric, Predinaric, Subpannonian and sub-Mediterranean phytogeographical regions. The forests of the Virgin Forest Krokar can be described as transitional between Predinaric mountain beech forest and Dinaric fir-beech forest and are dominated by Beech (*Fagus sylvatica L.*) and Fir (*Abies alba Mill.*). The phytocoenosis of the forest reserve can be classified into five associations: Omphalodo-Fagetum, Arunco-Fagetum, Lamio orvalae-Fagetum, Stellario montanae-Fagetum and Allio victorialis-Fagetum. The integrity of the forests in the component part is well preserved due to the inaccessibility and the early protection with the forest management plan more than 120 years ago.

Abiotic factors

Geographical position, natural region, altitudinal zone

Krokar is located in the northern part of the Dinaric mountain range, in the southeastern part of the mountain Borovška gora near the town Kočevje in southern Slovenia. The reserve is situated between 840 and 1,170 m.a.s.l. on a karst plateau with many sinkholes and also comprises the peaks Krokar (1,122 m) and Cerk (1,192 m). Steep slopes are found in the eastern and southern parts.

Geology and geomorphology

The area belongs to the Dinaric mountain range, for which, in comparison to the Alps, lower altitudes, less inclination and a less rocky surface are characteristic. It lies on carbonate rocks (limestone and dolomite). The area is characterized by an undulated surface and karst phenomena (e.g. sinkholes) without streams on the surface, as the surface water seeps fast into plenty of numerous underground caves.The southern part of the karst plateau ends with the picturesque steep slopes of the Kolpa River canyon. The area was not covered during the glacial periods.

Climate

The Virgin Forest Krokar lies at the intersection of Dinaric, Predinaric, Subpannonian and sub-Mediterranean phytogeographical regions. The climate is montane Dinaric with an annual precipitation of over 1,500 mm and an average annual temperature of 7 °C.

Soils

The bedrock material is Jurassic limestone and Jurassic dolomite and the soil types are eutric cambisols and rendzic leptosols.

Beech forest of Krokar. Picture: M. Masterl (Slovenia Forest Service)

Water balance

The karst area of the Virgin Forest Krokar does not have water streams on the surface. The water is gathered in the underground and in the Kolpa River canyon 800 m below. Rare small water bodies (puddles not bigger than 10 m^2) occur only sporadically after heavy rainfalls in spring and autumn.

Biotic factors

Biotopes and vegetation

The forests of the Virgin Forest Krokar can be described as transitional between Pre-Dinaric mountain Beech forest and Dinaric fir-beech forest and are dominated by Beech (*Fagus sylvatica L.*) and Fir (*Abies alba Mill.*). The phytocoenosis of the forest reserve can be classified into five associations: Omphalodo-Fagetum, Arunco-Fagetum, Lamio orvalae-Fagetum, Stellario montanae-Fagetum and Allio victorialis-Fagetum. The prevailing tree species are Beech (87%), Fir (9%), and Maple (*Acer pseudoplatanus* L., 4%). The growing stock in 2014 was 641 m^3/ha. In the entire area of the forest reserve, the average number of all (beech and fir) dead trees per hectare was 54 and dead biomass amounted to 83 m^3/ha.

Flora

In the Virgin Forest Krokar the typical flora of fir-beech and beech forests occur. The most interesting parts are the drier edges of the mountain with influence of Mediterranean and continental climate, where very diverse plant species occur: from alpine and Nordic to more common thermophilic and sclerophyll plants. Especially important are Illyrian plant species (mesophilic endemic species) which survived glacial periods (Trinajstić 1992).

Fauna

The Virgin Forest Krokar and the broader Kočevsko forest are part of Natura 2000 network (Kočevsko SCI – SI3000263 and Kočevsko SPA – SI 5000013). Species like Brown Bear, Wolf, Lynx, Golden Eagle, Peregrine Falcon, Boreal Owl, Ural Owl, Black Woodpecker, White-backed Woodpecker, Western Capercaillie, and Rosalia Longicorn inhabit this forested area.

Table 52: Representative species for the component part Krokar (Slovenia)

Class	Species
Bird	Tetrao urogallus
Bird	Aegolius funereus
Bird	Aquila chrysaetos
Bird	Dendrocopos leucotos
Bird	Dryocopus martius
Bird	Falco peregrinus
Bird	Picoides tridactylus
Bird	Strix uralensis
Invertebrate	Rhysodes sulcatus
Mammal	Rhinolophus hipposideros
Mammal	Ursus arctos
Mammal	Barbastella barbastellus
Mammal	Canis lupus
Mammal	Lynx lynx
Mammal	Myotis bechsteinii

Vegetation Inversion. Picture: Š. Habič

2.a.25 Slovenia: Snežnik-Ždrocle (052)

Area size

Table 53: Area size of the component part Ždrocle (Slovenia)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
052	Slovenia	Snežnik-Ždrocle	720.24	128.80	Illyric

Short profile and biogeography

The component part Snežnik-Ždrocle surrounds the Snežnik Mountain (1,796 m), the highest peak of the karst plateau in the northwestern part of the Dinaric mountain range in the south of Slovenia. The component part covers an area of 720 ha, with the altitude ranging from 1,200 m to 1,796 m.a.s.l. The reserve comprises the slopes of all expositions and several distinct closed karst ravines and deep glacial depressions. The reserve is located on Jurassic and Cretaceous limestone as well as dolomitized limestone and their breccia. Moreover, traces of glaciers are found. Snežnik-Ždrocle is the largest forest reserve in Slovenia, and beech is the main tree species. Mountain Beech forests (Ranunculo platanifolii-Fagetum) prevail and on the exposed positions on the highest parts they turn into subalpine Beech forests (Polysticho lonchitis-Fagetum), which form the tree line due the mild, humid climate. Above the tree line, in the belt of Dwarf Pine (Hyperico grisebachii-Pinetum mugo), only single trees occur. The top of the mountain Snežnik is covered by Dinaric subalpine grassland with very diverse flora, composed of Illyric and also of alpine plant species. The special features of the area are deep depressions, in which the air remains cold, and the typical spruce forests are found (Lonicero caeruleae Piceetum). The integrity of forests in the component part is well preserved due to the inaccessibility in the past and the process of legal protection that started 50 years ago.

Abiotic factors

Geographical position, natural region, altitudinal zone

Snežnik-Ždrocle comprises the highest and partly primeval forests of the Snežnik-Javornik karst plateau in the northwestern part of the Dinaric mountain range in the southwestern part of Slovenia, which are difficult to access. The altitude ranges from 1,200 to 1,796 m. The area belongs to the municipalities Ilirska Bistrica and Loška Dolina.

Geology and geomorphology

The central massif of Snežnik is a large tectonically raised part, built from Jurassic and Cretaceous limestones, dolomites and limestone-dolomite breccia. It is the dominant orographic area in northwestern Dinaric carbonate massif, which is part of the Adriatic tectonic plate. Intensive tectonic events are reflected in the prevailing Dinaric mountain range direction northwest-southeast. Prolonged exposure of rocks to water and tectonic changes are reflected in the rugged karst terrain with rounded tops, blind valleys, dolines, caves and shafts. Directly below the top of Snežnik there are some freezing ravines with characteristic vegetation. In the southern part of the forest reserve in Ždrocle, there are ravines with steep slopes as a result of long-term operation of ice in the tectonic fissures. This area is difficult to access even on foot. Glacial moraines and other traces of glacial erosion from the Pleistocene glaciation, when Snežnik was covered with ice, are found.

Climate

The area is influenced by Mediterranean, Atlantic and continental climates. Due to the fact that the broader area of Snežnik forms a large orographic barrier between the Adriatic Sea and the interior of Slovenia, the southern slopes of the area have a high amount of precipitation (3,143 mm, weather station Gomance, 937 m). Snežnik area belongs to the rainiest parts of Slovenia, and has relatively high average temperatures (6.7 °C). However, for the upper part of the area (above 1,400 m.a.s.l.), extreme weather conditions are characteristic with the prevailing strong northeastern wind (bora) and abundant snow precipitation, leading to a short vegetation period. Short and cool summers and long but not too cold winters characterize the area. The vegetation period lasts from May to September.

Soils

The dominant soil type, especially at lower altitudes, is brown calcaric cambisols with acid or weak acid reaction, which is due to the humid climate. The depth of the soil above the parent rock is uneven; the soil is developed in the pockets of carbonate rocks. Brown calcaric cambisols create a mosaic like pattern with rendzina eroded soil and rocks on the surface. Sometimes the rocky area covers more than 50% of the surface. Shallow, skeletal rendzinas soils are common on the slopes and on the rugged surface. In cold and wet areas, where limestone, dolomite as well as moraines occur together with raw humus with acid reaction, where the Blueberry thrives (*Vaccinium myrtillus*).

Water balance

The component part Snežnik-Ždrocle is without surface water due to the karstic character of the area: the water is gathered in the underground. The whole Snežnik-Javornik area is a big karst aquifer. The main karst springs are on the outskirts of the mountain, in contact with impermeable rock at an altitude of around 600 m. Snežnik-Ždrocle lies on the watershed between the Adriatic and the Black Sea basin. From Snežnik area, the water flows underground to the southwest side (catchment area of the Adriatic), but also to the west and the east (catchment areas of the Black Sea). Shorter streams appear only occasionally on the surface, in the wettest part of the year. They originate in contact with the less permeable limestone (dolomite) rock, and after a few meters, end in the karstic underground. Sometimes smaller springs appear at the bottom of a ravine, where they deposit thick layers of clay brought from the slopes. An example of such a source is Andrew spring in the southern part of the area.

Biotic factors

Biotopes and vegetation

In Snežnik-Ždrocle beech is the main tree species. Mountain Beech forests (Ranunculo platanifolii-Fagetum var. geogr. Calamintha grandiflora) prevail between 1,200 and 1,400 m.a.s.l. On the exposed positions on the highest parts, from 1,300 to 1,500 (1,600) m, they turn into subalpine Beech forests (Polysticho lonchitis-Fagetum var. geogr. Allium victorialis). These forests form the tree line. Due to the extreme climate (strong northwestern wind, low winter temperatures and abundance of snow), the beech tress in this part have curved and twisted trunks and branches. Trees, reaching only 10 to 15 m in height and 10 to 30 cm in diameter, grow in clusters. Above the subalpine forests there is a belt of Dwarf Pine (Hyperico grisebachii-Pinetum mugo), where only single trees occur such as Spruce, Fir, and Mountain Ash. The Dwarf Pine is slowly conquering former pasture that was used by the shepherds from Istria and Kvarner for summer grazing of sheep and goats by the end of the 19th century. The special features of the area are deep, freezing ravines, where temperature and therefore vegetation inversion occur with spruce forests (Lonicero caeruleae Piceetum) and in the deepest parts with Dwarf Pine and sometimes even with subalpine meadows. The top of the mountain Snežnik is covered by Dinaric subalpine grassland with a very diverse flora, composed of Illyric and also of alpine plant species. At lower altitudes, mountain Beech forests turn into mountain fir-beech forests (Omphalodo-Fagetum var. geogr. Calamintha grandiflora). The area is also part of the Natura 2000 network according to the EU Bird and Habitats Directive. SPA Snežnik-Pivka and SAC Javorniki-Snežnik (covers 54,927 ha, 13 habitat types (among them 4 forest habitat types), 17 species (among them 2 plant species) and 35 bird species are protected.

Flora

The top of Snežnik (196 ha) was declared a Botanical Reserve in 1964. In the area a mixture of alpine and Illyrian species is found. In addition to the plant community Edraiantho-Caricetum firmae, the Illyrian species of the area include *Scabiosa silenifolia*, *Trinia carniolica*, and *Arabis scopoliana*. Snežnik is the only location in Slovenia where *Cerastium dinaricum* occurs. *Campanula justiniana* also found here belongs to the endemic species of the area Snežnik-Gorski Kotar. Typical representatives of alpine flora are *Ranunculus traunfellneri*, *Saxifraga paniculata*, *Galium noricum*, *Nigritella miniat*a and others. Species that are also found in the area are *Leontopodium alpinum*, *Achillea clavenae* and *Soldanella alpina*. In the subalpine beech forests, beside the dominant beech, individual trees of *Sorbus aria*, *Sorbus aucuparia*, *Picea abies* and *Abies alba* occur. Among the shrub species, *Rhododendron hirsutum* and *Lonicera alpigena* are common. In the herbal layer, *Polystichum lonchitis*, *Clematis alpina* and *Valeriana tripteris* occur. In the mountain beech forests, *Acer pseudoplatanus* occurs occasionally.

Fauna

The nominated component part Snežnik-Ždrocle is located in the central area of the distribution area of all three large carnivores: *Ursus arctos, Canis lupus* and *Lynx lynx*. *Felis silvestris* is also present. The most common game species in the area are *Cervus elaphus, Rupicapra rupicapra, Martes sp., Meles meles* and *Vulpes vulpes*. The population of *Sus scrofa* is growing. *Aquila chrysaetos* nests in the rocks on the edge of the plateau. *Tichodroma muraria, Prunella collaris,* and *Monticola saxatilis* can be observed around the top of the mountain. In the dwarf pine stands, *Sylvia curruca, Turdus torquatus, Pyrrhula pyrrhula,* and *Loxia curvirostra* can be observed. *Tetrao urogallus* is endangered, while *Strix uralensis* has a high nesting density. *Picoides tridactylus* and *Dendrocopos leucotos* are present. The *Morimus funereus* and *Rosalia alpina* should be mentioned. *Leptodirus hochenwartii* and other underground species were found in caves in the area. In the wider area, amphibians also occur such as *Bombina variegata, Salamandra salamandra, Salamandra atra, Mesotriton alpestris* and *Triturus carnifex*.

Table 54: Representative species for the component part Snežnik-Ždrocle (Slovenia)

Class	Species
Bird	Aegolius funereus
Bird	Dendrocopos leucotos
Bird	Dryocopus martius
Bird	Glaucidium passerinum
Bird	Pernis apivorus
Bird	Picoides tridactylus
Bird	Picus canus
Bird	Strix uralensis
Bird	Tetrao urogallus
Invertebrate	Leptodirus hochenwartii
Invertebrate	Morimus funereus
Invertebrate	Rosalia alpina
Mammal	Barbastella barbastellus
Mammal	Lynx lynx
Mammal	Ursus arctos

Karst sinkhole. Picture: Š. Habič

View on Hayedos de Ayllón. Picture: G. Cerezo

2.a.26 Spain: Hayedos de Ayllón (053, 054)

Area size

Table 55: Area size of the component cluster Hayedos de Ayllón (Spain)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
053	Spain	Hayedos de Ayllón – Tejera Negra	255.52	13,880.86	Pyrenaic – Iberian
054	Spain	Hayedos de Ayllón – Montejo de la Sierra	71.79		
TOTAL			**327.32**	**13,880.86**	

Short profile and biogeography

Located well within the Mediterranean biogeographical region, the nominated component parts are enclaves in the southwesternmost limit of beech forest and form small but important remnants in the global range of the species. The areas of Montejo de la Sierra and Tejera Negra are the best representation of beech forest remnants in the center of the Iberian Peninsula. Another beech forest known as Hayedo de Riofrío de Riaza (province of Segovia), which is also of special ecological and biogeographical importance, is included/situated in the buffer zone.

The component part Montejo de la Sierra is located in the province of Madrid, it is very popular as the nearest beech forest to the capital city of Spain. Moreover, Montejo de la Sierra has been protected for a long time. The second component part covers the upper part of Hayedo de Tejera Negra, located in the province of Guadalajara.

Main forest types are high altitude beech forest in Tejera Negra and mixed oak (*Quercus pyrenaica* and *Q. petraea*) – beech forest in Montejo de la Sierra. There is also a unique remnant of beech forest colonizing high-altitude bedrock belonging to Riofrío de Riaza in the buffer zone. The phytosociological association in these three beech forests is Galio rotundifolii-Fagetum.

Abiotic factors

Geographical position, natural region, altitudinal zone

The component cluster is located in the Sierra de Ayllón , part of the (Spanish) Central System, Spain's central system of mountain ranges. Hayedo de Montejo de la Sierra is situated in the north of the province of Madrid and Hayedo de Tejera Negra in the province of Guadalajara. Altitudes range from 1,450 to 2,011 m.a.s.l. in Tejera Negra and from 1,300 to 1,550 m.a.s.l. in Montejo de la Sierra.

Geology and geomorphology

The Sierra de Ayllón range is located at the eastern end of the Spanish Central System, with high diversity of geological materials, resulting in very contrasting landscapes dominated by metamorphic rocks of Precambrian and Paleozoic age, especially shales, schists, gneisses and quartzites. The bedrock of the core area Tejera Negra is comprised of homogeneous black slates, that of Montejo de la Sierra (is composed) of mica schist.

Geomorphology is conditioned by lithology, with rocky crest outcrops in the areas occupied by the toughest rocks, generally quartzites; and slopes, softer and retouched by fluvial phenomena, develop on shale, which is significantly more eroded than the quartzites.

The presence of peaks of over two thousand meters, as Lobo Peak (2,273 m) and Buitrera (2,043 m), determines that glaciers formed the surface: the ice sheets during the Pleistocene developed an erosive glacier morphology. Also there are some screes, i.e. periglacial deposits generated by the combined action of freezing, thawing and gravity.

Climate

The climate is conditioned by the general Mediterranean character of the region, continentality and orography.

The most striking feature of the climate is the vast difference in temperature and rainfall that occurs throughout seasons and due to interannual variation. Annual rainfall is above 1,000 mm, but summers are dry. Winters are quite cold, with minimum temperatures often dropping below -9 °C. Summers are cool, the average temperature being only 17 °C

The adverse weather conditions that most affect the beech forest are summer droughts, since there are years when rainfall only amounts to 15 mm in July and August. To compensate for the lack of summer rain, the influence of humid air masses from the northwest (Atlantic) is critical, they cause fog to remain around the summit areas and in high valleys which are oriented such that the persistence of fog is favored.

Another adverse weather condition is late frost that can occur until mid-May.

Soils

Two factors have played a major role in the formation of soils in this component: lithology and vegetation. The alteration of shale produces clay materials, which are poor in nutrients, very porous and impermeable; a circumstance that results in a high water retention.

Typical soils under forest cover in the area of beech are cambisols. However, ranker occurs in the areas of heath and other scrubs surrounding the beech forests and even in marginal beech forest spots.

The high slope limits the edaphic development. In the beech forest, nevertheless, the high input of organic matter from the litterfall together with the permanent shade and high humidity causes fresh soils to form, with a remarkably well developed organic horizon, both characteristics not very common in the area.

In the USDA soil taxonomy, the soils of the area correspond to the inceptisol order and umbrept suborder: underdeveloped soils, acidic, reddish or brown and rich in organic matter.

Water balance

The hydrological network in this component cluster gives water to the Tagus River, through the rivers Jarama and Sorbe. Valleys are typically V-shaped, characteristic of upper courses with steep slopes and storm water courses.

The component part of Montejo de la Sierra is limited by the river Jarama, which is one of the main tributaries of the Tagus River on its right bank. The source of the Jarama River is at 1,800 m.a.s.l. at the foot of the Sierra Cebollera, within the municipality of Montejo de la Sierra in the Community of Madrid.

The Lillas River rises in the foothills of the Buitrera (2,043) and Cerro de Mesa Peñota and its upper section limits the component part of Tejera Negra. Water does not run in summer due to filtrations in the quaternary deposits which the river is crossing. In its upper parts, the slope of the Lillas River is 30% and higher.

The Zarzas river collects water from another important area of beech forest, located in the buffer area, and following different ravines. It is not dry in summer.

Biotic factors

Biotopes and vegetation

The vegetation in the area forms a complex mosaic due to the high diversity of ecological conditions and the ancient influence of man (exploitation that caused the regression of deciduous forest and its replacement by heather and rockrose shrub vegetation).

Lithology and topographic heterogeneity make significant differences in vegetation formations, which is why Mediterranean and Atlantic type formations can be found together.

Both component parts are defined as acidophilous beech forests (Galio rotundifolii-Fagetum sylvaticae, 9120). In some places of the buffer area, beech forest is the potential vegetation even if it is now covered by afforestation of *Pinus sylvestris*, but in recent years a “strong recruiting” of beech could be observed, which is why it is expected that in some years, beech will replace the pine trees.

Also there are some relict fragments of acidic mesophilous forests, as Oak (*Quercus petraea*) forests (Asperulo odoratae-Quercetum petraeae), also Yew stands (9580) and Holly stands (9380) (Ilici-Fagion sylvaticae).

Remnants of Birch (*Betula alba*) forest with Rowan (*Sorbus aucuparia*) in high places, in some cases as (sparse) altitudinal belt in the tree line over the altitude beech forest, in other cases as riparian forest (Betulion fontqueri-celtibericae).

Sub-Mediterranean oak forests (Festuco braun-blanquetii-Quercetum pyrenaicae and Luzulo forsteri-Quercetum pyrenaicae 9230), are in direct contact with the beech forests.

Apart from beech forests, in the buffer area there are other Mediterranean forests as gall-oak forests (Cephalanthero-Quercetum fagineae, 9240), holm-oak forests (Erico scopariae-Quercetum rotundifoliae 9340), and juniper woods (Juniperetum hemisphaerico-thuriferae 9560*). Also alluvial forests with *Alnus glutinosa* (Galio broteriani-Alnetum glutinosae 91E0*) occur.

Flora

The flora in these beech forests is determined by acidic soils, the Mediterranean macroclimate, the microclimate caused by topography and even the own coverage of forests which causes humidity, thermal inertia, shadow, and a better developed organic soil horizon. This leads to a very specialized flora with numerous geophytes.

At best preserved stands there are: *Galium odoratum, Sanicula europaea, Scrophularia alpestris, Conopodium bourgaei, Lilium martagon, Paris quadrifolia, Viola reichenbachiana, Melica uniflora, Deschampsia flexuosa, Neottia nidus-avis, Narcissus pseudonarcissus, Aconitum lamarckii,* and *Corydalis bulbosa.*

In the ecotone between beech forest and other formations such as grasslands, rocky areas or Mediterranean Oak (*Quercus pyrenaica*), several species of trees and shrubs can be found: *Quercus petraea, Betula alba, Taxus baccata, Sorbus aria, Sorbus aucuparia, Fraxinus excelsior, Populus tremula, Corylus avellana, Frangula alnus,* and *Prunus padus*, and herbs such as: *Hepatica nobile, Arenaria montana, Helleborus foetidus, Digitalis purpurea, Vaccinium myrtillus, Ilex aquifolium,* and *Lathyrus niger.*

Fauna

A typical beech forest's faunal community is present in the component cluster, although the isolation of the spot, surrounded by Mediterranean habitat areas, makes it possible that some species are not present. For instance, *Galemys pyrenaicus*, previously present in the rivers, has not been located in recent years. Also, the priority species *Rosalia alpina* has not been detected in the last 10 or 15 years, although its presence in both core areas is considered possible. In regard to bats, *Barbastella barbastellus* appears linked to forest environments in Montejo de la Sierra.

The establishment of *Canis lupus signatus* in the surrounding areas of the component cluster as evidence of natural rewilding has been recorded since 2011, with occasional presence in Montejo de la Sierra and Tejera Negra.

The presence of *Lucanus cervus* as a representative of species associated to the decomposition of deadwood can be highlighted. Furthermore in Montejo's mixed beech forest more than 200 species of saproxylic beetles have been detected which illustrates the importance of wood decomposition processes in the component cluster.

Table 56: Representative species for the component cluster Hayedos de Ayllón (Spain)

Class	Species
Bird	Aquila chrysaetos
Bird	Circaetus gallicus
Bird	Gyps fulvus
Bird	Hieraaetus fasciatus
Bird	Luscinia svecica
Bird	Milvus migrans
Bird	Milvus milvus
Bird	Pernis apivorus
Bird	Scolopax rusticola
Invertebrate	Lucanus cervus
Invertebrate	Euphydryas aurinia
Mammal	Barbastella barbastellus
Mammal	Canis lupus
Mammal	Lutra lutra
Reptile	Lacerta schreiberi
Reptile	Lacerta monticola
Reptile	Coronella austriaca

Beech Forest of Lizardoia. Picture: A. Senosiain

2.a.27 Spain: Hayedos de Navarra (055, 056)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
055	Spain	Hayedos de Navarra – Lizardoia	63.97	24,494.52	Pyrenaic – Iberian
056	Spain	Hayedos de Navarra – Aztaparreta	171.06		
TOTAL			**235.03**	**24,494.52**	

Table 57: Area size of the component cluster Hayedos de Navarra (Spain)

Short profile and biogeography

This component cluster is located in the westernmost part of the Pyrenees range. It is located in the Alpine biogeographical region characterized by a continental climate along with some Atlantic influence. The core areas of Lizardoia and Aztaparreta are the last remnants of primeval forests in the Pyrenees. They are mixed fir-beech forests, undisturbed due to a combination of inaccessibility and historical reasons. Both are protected as integral (strict) reserves. Both component parts are one management unit and therefore nominated together. Together they cover an area of 239 ha at an altitude between 850 and 1,730 meters above sea level.

In the component part, forest presents an uneven distribution with young to high dimension trees (up to 80 cm), high basal area values (44 m^2/ha), frequent little gaps, good tree regeneration, high stem volumes (460 m^3/ha) and high volumes of deadwood (162 m^3/ha, 95% of it with diameter > 30 cm). Also a good representation of microhabitats on trees (around 20% of trees) is present.

The buffer area is managed in 3 contiguous Natura 2000 Special Areas of Conservation (SAC): Larra-Aztaparreta, Larrondo-Lakartxela and Roncesvalles-Selva de Irati. This buffer zone consists mainly of semi-natural beech forests but also *Pinus uncinata* forests, shrub formations, natural subalpine grassland and rocky slopes in a superb mountainous landscape near the border with France. The big extension of beech forest in this area (Irati forest) is renowned as the largest and best-preserved beech forest in Western Europe.

Abiotic factors

Geographical position, natural region, altitudinal zone

The cluster occupies a long strip along the upper bounds of the western Pyrenees range, in the northeastern part of Navarra province, close to the border of France. The component part of Aztaparreta is located east of Isaba municipality, between 1,200 and 1,730 m.a.s.l. and that of Lizardoia is located north of Otsagabia municipality, between 850 and 1,125 m.a.s.l.

Geology and geomorphology

The cluster is located on the western Pyrenees. Geologically it is composed by tertiary rocks, and, to a lesser extent, Cretaceous, Devonian and Ordovician rocks.

The western part of the area is composed of quartzite and schists, with small areas of slates.

Large areas of the central part of the cluster are dominated by different kinds of limestone, such as marly limestone, dolomitic limestone and massive limestone. We also find mixtures of marl and siltstone. Large areas of the central part of the cluster are also composed by detrital flysch.

Relating to the eastern part of the component, it is dominated mainly by calcarenite and limestone, with parts of marl and siltstone.

Inside Hayedos de Navarra. Picture: O. Schwendtner

Regarding the Lizardoia component cluster, 85% of the area is composed by detrital flysch, except for the southern part which is composed by marly limestone.

The Aztaparreta property is composed entirely by marl and siltstone.

Climate

The component cluster is included in the Alpine biogeographical region with a mountain climate, continental but with some oceanic influence due to the proximity of the Cantabrian sea. Lizardoia has stronger oceanic influence, whereas the climate in Aztaparreta is less influenced in that sense.

Lizardoia has cold winters, cold and rainy springs and autumns, and moderated temperate summers. Precipitations are well distributed and are around 1,900 mm per year. The annual average temperature is 9.2 °C (mean temperature in January is 2.4 °C, mean temperature in July is 16.7 °C).

Aztaparreta is characterized by cold and long winters with frequent snowfalls, and short and cool summers. Precipitations are abundant and well distributed (up to 1,940 mm per year). The annual average temperature is 6.9 °C (mean temperature in January is -0.3 °C, mean temperature in July is 15.3 °C).

Soils

Dystric cambisols are typical for the area. Soils are commonly acid or moderately acid, due to the decarbonizing of the calcareous bedrocks, caused by the frequent rainfalls. Cambisol soils present a incipient process of pedogenesis, with a weak horizon differentiation, conditioned by their young age. In general, cambisol provides favorable conditions for forests, depending on the depth of the soil. In the middle and the upper sections of the steep slopes soils are shallower, so the soil conditions for forests that require cambisols became worse in areas, which are highly susceptible to erosion.

Characteristics of the soil profile: A1 B2 R horizons, with a clay-silt-loam and silty-clay texture. B horizon has polyhedral structure with yellowish brown color, and very dark color and granular structure in A horizon. It is a well-drained soil, with a large variability of thickness and color, according to the nature of the bedrock and the slope.

Water balance

Due to the frequent rainfalls, there are many perennial streams in the cluster. Almost all of the water runoff goes to the Mediterranean watershed, except for a small watershed in the west side of the cluster which drains to the Cantabric watershed.

The main rivers of the Mediterranean watershed are Eska, Irati and Urrobi, which flow to the Aragon river. Tributaries of Irati in the cluster are Txangoa, Erlan, Egurgoa, Urtxuria, Ibarrondoa, Kako and Arrantzarien. There are also two reservoirs at Irati River, Koixta (1.28 ha) and Irabia (100.07 ha, 14 hm^3). Tributaries of Salazar are Eterreka, Artoleta and Anduña streams. Tributaries of Eska are Mintxate and Belagua. The only tributary of Urrobi in this area is Arrobi.

The stream Arbanta is tributary of La Nive River, the only watercourse which drains to the Cantabric side of the watershed.

On the component parts, there are only non-perennial watercourses; however, Urtxuria Stream close to Lizardoia and Belagua Stream near Aztaparreta are perennial rivers.

Biotic factors

Biotopes and vegetation

The component parts stand out by their diversity, including different habitats of interest. About 63% of the area is covered by forests, 14% by shrubs, 20% by grasslands and 3% by rocks.

Considering the forests, the most representative habitat is the Asperulo-Fagetum beech forest (9130), with 6,800 ha and 32% of the total area. Also Atlantic acidophilous beech forests with Ilex (9120) are present, covering an area of 3,800 ha, 18% of the area. About 760 ha of basophil beech forests are present, which cpver 3.6% of the area. Pyrenean fir forests are also present (4% of the area and 820 ha). Two priority habitats are present: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (91E0), with a surface of 7 ha and subalpine and montane Pinus uncinata forests (9430) over limestone, covering about 660 ha, which is 3.1% of the total area. There are also about 400 ha of secondary *Pinus sylvestris* pine woods, and other habitats with a smaller extension, like Atlantic acidophilous oak forests, Quercus humilis oak forests and Rosa arvensis-Quercetum humilis facies of *Pinus sylvestris*.

Regarding the shrub vegetation, the most common habitat is European dry heaths (4030), covering 2,000 ha and 9.5% of the surface. Secondly we have the Endemic oro-Mediterranean heaths with gorse (4090), covering 2.7% of the area (560 ha). Other habitats with lower surfaces are present, like Arborescent matorral with Juniperus spp. (5210), Alpine and Boreal heaths (4060), Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (5110), Rubus and Crataegus scrublands, Buxus scrublands, and Buxus and Crataegus Pyrenean basophil scrublands. The total area of those scrublands is less than 2% of the total area.

Also grasslands and rocky habitats are present in the component.

Flora

The variety of habitats provides the components with a wide range of flora species. On the montane level dominate the beech forests, which are commonly monospecific at the tree layer, but it is possible to find individuals of *Abies alba, Pinus sylvestris, Quercus humilis, Quercus robur, Taxus baccata, Prunus avium,* and *Sorbus aucuparia*. In the lower layer, species like *Vaccinium myrtillus, Ilex aquifolium, Crataegus monogyna, Saxifraga hirsuta, Anemone nemorosa, Isopyrum thalictroides, Helleborus occidentalis, Euphorbia dulcis, Blechnum spicant, Deschampsia flexuosa, Ranunculus nemorosus, Circaea alpina, Ruscus aculeatus*, etc.

The beech and fir forests comprise a number of tall herbs such as *Scilla lilio-hyacinthus, Cardamine heptaphylla, Viola reichenbachiana, Poa nemoralis, Carex sylvatica, Oxalis acetosella, Euphorbia amygdaloides, Athyrium filix-femina, Luzula sylvatica, Mycelis muralis*. It is worth mentioning *Buxbaumia viridis*, a moss specialized on deadwood of fir. In old-growth forests, another rare moss can be found: *Dicranum viride*.

Fauna

The local population of *Dendrocopos leucotos lilfordi* is of special interest for its connector role between the French Pyrenaic populations, the small Aragonese one and the rest of the western Navarra population, constituting the global distribution limit for the species. Ursus arctos is sporadically present in Atzaparreta.

Other interesting species are present in the buffer area: *Lagopus mutus pyrenaicus* population has the western limit of its global distribution in high places of Larra-Aztaparreta Special Area of Conservation (S.A.C.). Also *Tetrao urogallus aquitanicus* (the Pyrenaic subspecies) reaches its western limit of distribution here. This pyrenaic population is in steep decline, therefore the breeding sites are currently tracked by the rangers.

Aegolius funereus breeds only in some points of Larra-Aztaparreta, linked to the pine forest habitats of *Pinus uncinata* considered of priority interest. *Perdix perdix hispaniensis* has been in sharp decline in recent decades, especially in the peripheral areas of distribution. *Rana pyrenaica* is an endemic species in in the west Central Pyrenees.

Table 58: Representative species for the component cluster Hayedos de Navarra (Spain)

Class	Species
Bird	Aquila chrysaetos
Bird	Dendrocopos leucotos
Fish	Achondrostoma arcasii
Invertebrate	Rosalia alpina
Mammal	Myotis mystacinus
Mammal	Nyctalus leisleri
Mammal	Pipistrellus pipistrellus
Mammal	Plecotus auritus
Mammal	Rhinolophus ferrumequinum
Mammal	Rhinolophus hipposideros
Mammal	Tadarida teniotis
Mammal	Barbastella barbastellus
Mammal	Galemys pyrenaicus
Mammal	Lutra lutra
Mammal	Mustela lutreola
Plant	Dicranum viride
Plant	Buxbaumia viridis

View of Cuesta Fría. Picture: O. Schwendtner

2.a.28 Spain: Hayedos de Picos de Europa (057, 058)

Area size

Table 59: Area size of the component cluster Hayedos de Picos de Europa (Spain)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
057	Spain	Hayedos de Picos de Europa – Cuesta Fría	213.65	14,253.00	Pyrenaic – Iberian
058	Spain	Hayedos de Picos de Europa – Canal de Asotín	109.58		
TOTAL			**323.23**	**14,253,00**	

Short profile and biogeography

The cluster Hayedos de Picos de Europa is located in the Atlantic biogeographical region and is a pure beech montane forest in an Atlantic climate with high humidity. Two component parts were selected, one called Canal de Asotín over karstic limestone, and the other Cuesta Fría on acidic rock. They are characterized by good interaction between the beech forests and other types of vegetation: in Canal de Asotín with shrub formations of Orocantabric Oak (*Quercus orocantabrica*), Hazel (*Corylus avellana*) thickets and Holly (*Ilex aquifolium*) woods; in Cuesta Fría with Birch (*Betula celtiberica*) forests and Sessile Oak (*Quercus petraea*) forests.

The phytosociological association in Canal de Asotín is Epipactido helleborines-Fagetum while in Cuesta Fría two different associations are found: Blechno spicanti-Fagetum and Carici sylvaticae-Fagetum. The buffer zone surrounding the two component parts consists mainly of beech forests and related habitats. The entire cluster is included in the Picos de Europa National Park in the Province of León.

Abiotic factors

Geographical position, natural region, altitudinal zone

This component cluster is located in the north of Spain, near the Atlantic coast (Cantabrian sea) in a large calcareous massif called Picos de Europa at the northern watershed of the Cantabrian mountain range. The elevation of the component cluster ranges from 1,250 to 1,550 m.a.s.l. and that of Canal de Asotín from 900 to 1,300 m.a.s.l.

Geology and geomorphology

The rocks constituting the Picos de Europa National Park are the result of sedimentary accumulation along millions of years in sedimentary basins. Most of them were formed during Paleozoic period, 500 to 250 million years ago.

In the Picos de Europa National Park, three geologic regions can be recognized: Picos de Europa region, formed by limestone massifs; Liébana and Valdeón valleys, which are part of the Pisuerga-Carrión region, formed by acidic rocks; and finally a sector of Sajambre valley with a mixture of acidic and basic rocks.

The rugged structure of the main range that dominates the landscape responds largely to the karstic phenomena on limestone rocks.

The selected component part Cuesta Fría is located in the area where the Picos de Europa and the Sajambre regions join, on a succession of basic and acidic rocks and the component part Asotín is situated in the area where the Picos de Europa region unites with the Pisuerga-Carrión region, at scree on limestone.

Climate

The geographic location of the cluster in the north of Spain, its situation between the Cantabrian sea and the continental Mediterranean territories of the Castilian plateau and its acute relief provides it with a strong climatic diversity.

Both component parts, located at northern slopes of the Cantabrian range, have a general Atlantic climate with some continental influences. They are characterized by cold and long winters and cool summers. Precipitations are well distributed (up to 1,500 mm per year). The average annual temperature is 9.5 °C (mean temperature in January is 3 °C, and the mean temperature in July is 15 °C).

This Mountain climate is conditioned by large fluctuations of temperature. The weather varies within each season according to the prevailing winds. Winds blowing from the south can bring warm weather in winter, while north winds can bring thick frog and cold weather in summer.

Soils

The soils of both component parts are characterized by their steep slopes that avoid the formation of a diagnostic horizon. They are undeveloped soils with A-C horizons, called regosol (RG). A desaturation due to the abundant precipitation gives rise to eutric regosol (RGeu).

In some areas, cambisol (CM) can be found, a more developed soil with a sequence of horizons A-B-C. This is well-drained soil, with a yellowish brown A horizon, and good structure in the A and B horizons. According to the desaturation of the horizons, eutric cambisol (CMeu) or dystric cambisol (CMdy) are present.

In some parts of Cuesta Fría, a mollic surface horizon can be found. The presence of an organic upper horizon is common, it is rich in nutrients and not as acid as the mineral horizons.

Soil chemistry plays an important role in the floristic composition of beech forests in this component.

Water balance

The Picos de Europa National Park is a karstic massif, so the hydrological regime is governed by the characteristics of that kind of formations. These karstic massifs are characterized by many canyons, gorges and coombs, where watercourses frequently become subterranean. The subterranean streams (endokarst) are very important in Picos de Europa, with many chasms which are interconnected, providing large quantities of water that are part of aquifers, fed by the abundant precipitations in the zone. Often the water comes to the surface close to the banks of the main rivers of the region:

General view of Cuesta Fría. Picture: O. Schwendtner

Dobra, Duje, Deva and Cares. Once the process of hydric feeding saturates the aquifer, many natural springs appear, which are very frequent in Picos the Europa, but most of them seasonal and short-lived.

Due to its karstic nature and their steep slopes, there are no perennial streams at both component parts, but the water supply is guaranteed by the abundant precipitations.

Biotic factors

Biotopes and vegetation

Both component parts stand out by its diversity, due to the variety of climatic and geomorphologic conditions. Many Habitats of the EU Habitat Directive are present, giving them a high ecological value.

Regarding the forests of Cuesta Fría, the most representative habitat is the Medio-European limestone beech forests of Cephalanthero-Fagion (9150) with *Carex sylvatica*, which are xerothermophile Fagus sylvatica forests developed on calcareous soils. Also Atlantic acidophilous beech forests with Ilex (9120) and with *Blechnum spicant* are present. *Quercus petraea* with *Luzula henriquesii* forests and *Fagus sylvatica* forests are also present, orocantabric mesic *Betula alba* forests, and *Betula alba* young forests. Concerning other habitats, there are also blanket bogs (7130) in birch forests' fringe, *Ilex aquifolium* forests with Fraxinus, endemic oro-Mediterranean heaths (4090) with *Erica vagans*, orocantabric mesophyll grasslands and species-rich Nardus grasslands, on siliceous substrates in mountain areas (6230).

At Asotín we also can find Medio-European limestone beech forests of Cephalanthero-Fagion (9150) with *Carex caudata*, which is the most representative habitat; *Quercus faginea* forests, continental hazelnut bushes with *Laserpitium eliasii*, endemic oro-Mediterranean heaths (4090) with *Erica vagans*, endemic oro-Mediterranean heaths (4090) with *Genista legionensis*, western Mediterranean and thermophilous scree (8130) with *Rumex scutatus*, and western Mediterranean and thermophilous scree (8130) with *Crepis pygmaea* and *Linaria filicaulis*.

Flora

In the Picos de Europa National Park, 1,753 taxa have been identified. It is worth noting the floristic richness of the zone: according to estimates, about 8,000 taxa exist in the Iberian Peninsula, so in Picos de Europa National Park, 22% of the taxa of the Iberian Peninsula are represented. However, the Park supposes only 0.1% of the total area of the Iberian Peninsula: 22% of the taxa in 0.1% of the area makes this area a hot spot of floristic biodiversity.

Concerning the chorological spectrum of the National Park, 28% are Eurosiberian elements, 22% are multiregional, 15.4% endemic, 13% Mediterranean, 6% are orophytes, 6% are Alpine and boreal elements, 5 % are Atlantic elements, and 5% are introduced or cultivated species.

In both component parts, species of special interest are present: *Carex caudata, Epipactis microphylla, Equisetum sylvaticum, Ilex aquifolium, Narcissus asturiensis, Narcissus pseudonarcissus, Quercus faginea, Sideritis hyssopifolia,* and *Taxus baccata*.

Fauna

In the selected component parts, most of the characteristic species for the Atlantic forests are present. The conservation status of the territory is optimal: coexistence between humans and nature since the Paleolithic and the harsh environment in Picos de Europa have led to an exceptional diversity of species with an exceptional diversity of species.

The rich community of mammals include: *Ursus arctos, Canis lupus signatus, Rupicapra pyrenaica, Felis silvestris, Lutra lutra, Martes martes, Mustela erminea, Mustela nivalis, Mustela putorius, Genetta genetta, Galemys pyrenaicus, Lepus castroviejoi,* and *Glis glis*.

Also a wide range of birds are present in the area: *Accipiter gentiles, Aquila chrysaetos, Circaetus gallicus, Gyps fulvus), Hieraaetus fasciatus, Neophron percnopterus, Falco peregrinus, Perdix perdix, Tetrao urogallus subsp cantabricus,* and *Dryocopus martius*.

As for fish, amphibians and reptiles, the following species occur in the area: *Salmo trutta, Salamandra salamandra, Mesotriton alpestris, Lissotriton helveticus, Anguis fragilis, Iberolacerta monticola, Zootoca vivipara, Lacerta viridis,* and *Vipera seoanei.*

Table 60: Representative species for the component cluster Hayedos de Picos de Europa (Spain)

Class	Species
Bird	Tetrao urogallus
Bird	Aquila chrysaetos
Bird	Circaetus gallicus
Bird	Dryocopus martius
Bird	Gyps fulvus
Bird	Hieraaetus fasciatus
Bird	Neophron percnopterus
Bird	Perdix perdix hispaniensis
Invertebrate	Rosalia alpina
Mammal	Ursus arctos
Mammal	Canis lupus
Mammal	Galemys pyrenaicus
Plant	Narcissus asturiensis
Reptile	Lacerta vivipara
Reptile	Lacerta monticola
Reptile	Coronella austriaca
Amphibian	Triturus alpestris

Inside of Gorgany Nature Reserve. Picture: A.M. Klymenko

2.a.29 Ukraine: Gorgany (059)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
059	Ukraine	Gorgany	753.48	4,637.59	Carpathian

Table 61: Area size of the component part Gorgany (Ukraine)

Short profile and biogeography

The nominated component part Gorgany covers the primeval and old-growth mixed beech forests within this area including natural adjacent habitats to present this complex ecosystem mosaic completely.

Ecological integrity, completeness of the species composition and natural correlation of species, as well as the primeval forest with all adjacent buffer zones ensure capability for well-organized self-regulation.

The nominated property is formed from well-preserved natural forests without human impact.

The mixed coniferous-beech forests of the nominated property are indigenous phytocoenoses preserved on the edge of spreading beech forests. In the proposed area, mixed beech primeval forests occur in the holistic phylogenetic complex of beech, beech-fir, beech-fir-spruce, Swiss pine-spruce and spruce-Swiss pine communities of mountain primeval forests.

Naturally, they are vertically changing within the elevation from 710 to 1,535 m.a.s.l. and are completed by a complex of evolutionary replaced stony debris areas that feature stages of lichens, mosses, herbaceous plants up to Green Alder and Mountain Pine dwarfish communities and relict coenosis of pine-birch, pine and Swiss pine-spruce.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part Gorgany is located in the basin of the river Bystrycia Nadvirnianska in the physical-geographical area of Dovbushanski Gorgany. Its altitude ranges from 710 to 1,535 meters above sea level.

Geology and geomorphology

The nominated component part is located in the central part of the Ukrainian Carpathians and belongs to the Skybova zone of the Carpathians. The Quartenery, Neogene, Paleogene and Upper Cretaceous deposits make up the geological structure here; alluvial-deluvial clay loams, clays, and sand clays make up the lithological structure of Gorgany. The mountainous part of the object is made up of Carpathian flysch by conglomerates, sandstones, and clay and marl schist of the Cretaceous and Quaternary periods. Apart from these characteristics, steep slopes, meteorological conditions and natural hazards result in complex ongoing and high dynamic processes, which considerably affect the Beech forest ecosystems. The relief here is both genetically and historically diverse, and reflects the movements of an ancient glacier.

Climate

The climate in the nominated component part is classified as a continental European one characterized by a domination of Atlantic and transformed continental air masses.

Deadwood in Gorgany Nature Reserve. Picture: O. M. Slobodian

The Dovbushanski Gorgany Mountains are characterized by three climatic zones: cool (750–950 m.a.s.l., sum of active temperatures is 1,400–1,800 °C, total vegetation period: 136 days, active vegetation: 85 days); temperate-cool (950–1,200 m.a.s.l., sum of active temperatures is 1,000–1,400 °C, total vegetation period: 120–130 days, active vegetation: 50–60 days); and cold, with a less cold sub-zone (1,250–1,400 m.a.s.l., sum of temperatures is 600–1,000 °C, total vegetation period: 90–120 days, active vegetation: up to 50 days) and a colder sub-zone (1,400–1,500 m.a.s.l., sum of active temperatures is less then 600 °C, total vegetation period lasts for 90 days, and the active vegetation is absolutely absent).

Soils

The topsoil was formed in a complex of lithological differentiation of soil formation and relief, and atmospheric precipitation that has caused considerable diversity.

Main soil formations are alluvial-deluvial clay loams, weathering products of flysch.

The mountainous part of the object is made up of brown soil type, among them the most developed clay loam varieties. Clay loam varieties are found at all altitudes within the tall sandstone subsuites, which spread in the upper parts of the slopes. Forest podzol soils are formed in the intensive flushing condition and widespread in the Skybova zone of the Carpathians. Within the Bystritskaya troughs the most common are sod-podzol-clay loam soils.

Water balance

High humidity in the Gorgany caused formation of a dense network of rivers and streams of different size within the object. Streams are short but the network of hydrographical density (0.2 km^2–1.2 km^2) is the largest in Ukraine. Riverbeds are stony, paved with gravel and boulders. Watercourse speed is 1 to 2 m/sec, and higher in flooding period. Waters are fresh, poorly mineralized, mostly carbon calcium ones. The sustentation of watercourses is mixed with a predominance of rain. Annual variation of water level is characterized by a series of floods: in winter time from thaws, in spring time from snowmelt and in summer time from rains. Spring floods usually begin in mid of April, sometimes in the second half of March or late April.

In spring, the water rises quickly (up to 0.5–0.6 m/day) and, after one to two days, comes to a maximum height of 0.5 to 0.6 meters above the before flood water level in normal years and up to 1.0 to 1.5 m in high-water years.

Biotic factors

Biotopes and vegetation

A peculiarity of the nominated component part is the occurrence of the mixed beech primeval forests in the holistic phylogenetic complex of beech, beech-fir, and beech-fir-spruce communities of mountain forests that are distributed in the ranges from 710 to 1,535 meters above sea level. The nominated component part is a reference model of the occurrence of all types of primeval beech forests of the Carpathians, successively replaced vertically.

These forests present an outstanding example of undisturbed, well-preserved ecological models where all development stages and evolution cycles can be observed. Crustose lichens on the stone screes demonstrate the evolution of vegetation. And it alternates with the second stage of overgrown stone screes that can be seen nearby. Landslides of moving sandstones and upper tree line are covered by crooked forests of *Pinus mugo* and in the leakage flows covered by *Duschekia viridis*. Peculiar age, vertical, horizontal and spatial structure of primeval forests are typical.

The proposed area of mixed beech forests of Gorgany are represented by the communities Piceeto-Abieto-Fageta, Piceeto-Fageta, Fageto (sylvaticae)-Piceeto (abieto)-Abietum (albae), Fageto (sylvaticae)-Abieto (albae)-Piceetum (abietis), and Fageto (sylvaticae)-Piceeto (abieto)-Abietum (albae), which do not only complement the spectrum of beech forests presented to Natural Heritage, but also adds the remnants of natural beech forests to the Carpathian Beech Forest Region.

Mixed coniferous-beech primeval forests of the nominated property are indigenous phytocoenoses preserved on the edge of spreading beech forests.

Flora

The flora of the nominated component part is characterized by naturalness. 161 species of vascular plants occur here, among them 30 are relict, endemic, rare and border-areal. In the mixed beech forests, 12 rare species of plants occur, including relics, and endemic species of the Red Book of Ukraine. 210 species of lichens occur here, among them *Lobaria pulmonaria*, and *Usnea florida*. 112 species of bryoflora occur in the nominated property. *Scapania verrucosa*, and *Brachythecium geheebii* are listed in the Red Data Book of European Bryophytes 1995. In the grass cover of adjacent tree stands, a number of indicators of beech forests occur, such as *Dentaria glandulosa, Symphytum cordatum, Asperula cynanchica,* and *Sanicula europaea*, which proves potential possibilities for wider high-rise growth of beech under the climate change. Deadwood is a key criterion for a large number of fungi. In total, more than 554 species of fungi, thereof 5 species enlisted in the Red Book of Ukraine, are present in the nominated property.

Fauna

The core fauna of the proposed component part includes a specific complex of boreal-taiga and mountain species. There are 833 species of animals occurring in the nominated property, among them: 1 species of Mollusca, 29 species of Arachnida, 629 species of Insecta, 9 species of Amphibia, 6 species of Reptilia, 114 species of Aves and 45 species of Mammalia. It is particularly important that in the nominated property, habitat of the most vulnerable large mammals such as *Ursus arctos, Canis lupus, Felis lynx, Cervus elaphus,* and *Capreolus capreolus,* these species remain untouched. In the mixed beech primeval forests, 9 species of woodpeckers occur. Furthermore, 3 rare species of amphibians were observed. The presence of the Rosalia Longicorn (*Rosalia alpina*), a priority and rare species of the Red Book of Ukraine, is representative for the enormous diversity of xylobiontic species depending on sufficient deadwood. Furthermore, *Aquila chrysaetos, Bubo bubo, Strix ralensis, Glaucidium passerinum, Strix uralensis, Tetrao urogallus, Tetrastes bonasia* are present in the area.

Table 62: Representative species for the component part Gorgany (Ukraine)

Class	Species
Amphibian	Mesotriton alpestris
Amphibian	Triturus montandoni
Bird	Dendrocopos medius
Bird	Dryocopus martius
Bird	Grus grus
Bird	Glaucidium passerinum
Fungi	Leucoagaricus nympharum
Fungi	Gomphus clavatus
Invertebrate	Nymphalis antiopa
Lichens	Usnea florida
Mammal	Vespertilio murinus
Mammal	Pipistrellus pipistrellus
Mammal	Ursus arctos
Mammal	Felis silvestris
Plant	Neottia nidus-avis
Reptile	Lacerta vivipara
Reptile	Coronella austriaca

Springtime in Gorgany Nature Reserve.
Picture: Iu. V. Klimuk

Roztochya Nature Reserve. Picture: V. Pokynchereda

2.a.30 Ukraine: Roztochya (060)

Area size

Table 63: Area size of the component part Roztochya (Ukraine)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
060	Ukraine	Roztochya	384.81	598.21	Carpathian

Short profile and biogeography

Roztochya Nature Reserve is part of the same physical and geographic area called Roztochya. Beech forests belong to one of the main forest forming species. Natural old-growth forests are growing on the eastern boundaries of continuous habitat. Beech turf soils occupy areas with surface deposits of limestone weathering products (rendzina) and have characteristics of Carpathian beech forests, because in turfgrass, montane species are present. These forests are the habitat of many rare plant species. The feature of the proposed sites is the presence of rare groups of pine-beech forests (Pineto (sylvestris)-Fageta (sylvaticae)). Here, beech is located on the eastern limits of the natural area and pine is located on the southern edge of the area, between the north and the Carpathian eastern parts of a continuous range. This is a rare type of association. Communities are derivatives of mid Holocene mixed forests. There are more than 10 forest associations involving beech in the reserve.

The ancient beech forests of the nominated component part are kept in very good condition since the nineteenth century. Partly, those forests were protected from the nineteenth century on. There are individual trees older than 200 years.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part Roztochya is located in the western part of the Lviv Region, close to the Polish boarder. It is part of the Main European Watershed and forms a green corridor between Ukraine and Poland. Roztochya is a hilly ridge with a height difference of 203 to 403 meters above sea level.

Geology and geomorphology

It is located at the junction between the transitional Precambrian Eastern-European plattform with the Mediterranean geosynclinals belt. This transition zone isolated as young epi-Paleozoic West-European platform. Upland territory is considered to be the latest horst show. In the geological structure of the region, Cretaceous, Neogene and Quaternary sediments are involved. The characteristic feature of the relief is skewness of ridges and hills: their western and northwestern slopes are steeper, while eastern and southeastern ones are gently sloping, the features of ridges and hills are rounded. The relief of Roztochya is predominantly erosive, sculptural. On steep hills, quite a dense network of ravines has been formed, particularly on the southeastern edge of Roztochya, where erosion is developed on forest-like loam soil and involves Tortonian rocks. On the southern slopes of Roztochya, areas of carbonate karst occur, which are connected to the thickness of Neogenic limestones.

Climate

The Roztochya region is located in the transition zone from warm temperate West European climate to Eastern Europe temperate-continental climate. The average annual wind speed is 4 m/sec. The average annual precipitation ranges from 700 to 750 mm. The average annual temperature is 7.4 °C. The maximum is 38 °C and the minimum -35 °C. The sum of temperatures above 10 °C is 2,500 °C, and the duration of the frost-free period ranges from 160 to 220 days.

The region is characterized by frequent winter thaws, considerable cloudiness, rains and the resulting flooding in summer and autumn. In winter, there is a more or less steady snow cover which protects the soil from frost. Climatic conditions are favorable for the development of deciduous and pine forests.

Soils

Beech forests of the nominated component part are growing on a complex of quartz-glauconite sands with limestone and calcareous sandstones prefer turf-carbonate (humus-carbonate) and sod-podzolic soils.

Sod-calcareous soils (rendzina) are biolithic intrazonal soils that formed on eluvial weathering of crust thick carbonate rocks under simultaneous action of wood and grass vegetation type in terms of wash water regime. The combination of different elementary soil processes under conditions of sufficient moisture led to the formation of an undifferentiated profile.

Part of the area is sod- podzolic soil. These soils are divided into: low, medium and deep sod. Soil forming rocks of sod-podzolic soils are glacial deposits of Quaternary and light grain size, sometimes they have carbonate solid ground, eluvium sandstone and moraine.

Water balance

The nominated component part belongs to geographic area of Ukrainian Roztochya, which is part of the main European watershed, as well as of the Black Sea catchment.

Groundwater aquifers are of different ages, capacities and hydrological importance. Quaternary aquifers are confined to the modern and ancient alluvial deposits, their capacity reaches 0.3 to 20.0 m, the water level is mostly at a depth of 1.0 to 3.0 m. Mineralization reaches 1 g/l, the chemical composition of water with calcium bicarbonate occurs, as well as with sodium bicarbonate, hydrochloride, calcium-sodium and others.

Biotic factors

Biotopes and vegetation

The beech forests of the nominated component part are represented by the following associations: Fagetum (sylvaticae) hederosum (helitis); Carpineto (betuli)-Fagetum (sylvaticae) hederosum (helitis); Pineto (sylvestris)-Fageta (sylvaticae); Carpineto (betuli)-Pineto (sylvestris)-Fageta (sylvaticae); Pineto (sylvestris)-Fagetum (sylvaticae) galeobdolosum (lutei); Fageto (sylvaticae)-Qercetum (roboris) caricosum (pilosae); Fageto (sylvaticae)-Pineta (sylvestris); Fageto (sylvaticae)-Querceto (roboris)-Pineta (sylvestris); and Carpineto (betuli)-Fageto (sylvaticae)-Pinetum (sylvestris) asarosum (europaei).

Beech leaves in the sun. Picture: H. Kirchmeir (E.C.O.)

An important feature of the natural forests is the high amount of deadwood, which is the habitat for many fungi species.

Flora

The flora of the nominated component part includes 128 species of vascular plants, including 11 species that are listed in the Red Book of Ukraine. The *Cypripedium calceolus, Lilium martagon, Huperzia selago, Galanthus nivalis,* and *Platanthera chlorantha* are rare species and growing in the proposed area. *Hedera helix* is widely spread here. 96 species of bryophytes occur in the nominated area, including *Dicranum viride*. Among lichens, approximately 45 species are present. The fungi are represented in large groups, more than 91 species that belong to Basidiomycota. The rare *Polyporus umbellatus, Clathrus archeri* and *Hericium coralloides* can be found here.

Fauna

The beech forest is rich in variety of vertebrates, including many birds: *Buteo buteo, Strix uralensis, Picus canus, Dryocopus martius, Sylvia atricapilla, Ficedula hypoleuca, Erithacus rubecula, Turdus merula, Turdus philomelos, Parus caeruleus, Parus major, Sitta europaea, Certhia brachydactyla, Fringilla coelebs,* and *Coccothraustes coccothraustes*. Among amphibians prevail: *Triturus vulgaris, Bufo bufo, Hyla arborea,* and *Rana arvalis*. It is important that this tract is among the most numerous in spawning of many amphibians. The diversity of reptiles is small, but on the fringes occur lizards such as *Anguis fragilis, Lacerta agilis,* and *Lacerta vivipara*. Typical mammal species are *Capreolus capreolus, Sus scrofa, Vulpes vulpes, Martes martes, Putorius putorius, Lepus europaeus*. Quite common are *Erinaceus europaeus, Sciurus vulgaris, Sylvaemus sylvaticus, Sylvaemus tauricus, Myoxus glis.,* and *Muscardinus avellanarius*. Among the animals listed in the Red Book of Ukraine there are *Coronella austriaca, Ciconia nigra, Pandion haliaetus, Strix uralensis, Mustela erminea,* and *Meles meles*.

Table 64: Representative species for the component part Roztochya (Ukraine)

Class	Species
Amphibian	Triturus cristatus
Bird	Sylvia atricapilla
Bird	Sylvia borin
Bird	Sylvia communis
Bird	Sylvia nisoria
Bird	Serinus serinus
Bird	Sitta europaea
Bird	Strix aluco
Bird	Strix uralensis
Mammal	Sicista subtilis
Mammal	Canis lupus
Mammal	Felis lynx
Mammal	Mustela eversmannii
Plant	Dicranum viride
Plant	Cypripedium calceolus
Reptile	Lacerta horvathi
Reptile	Coronella austriaca

Inside Roztochya Nature Reserve. Picture: V. Pokynchereda

Beech forest of Podilski Tovtry National Nature Park. Picture: M. Riabyi, Podilski Tovtry NNP

2.a.31 Ukraine: Satanivska Dacha (061)

Area size

Table 65: Area size of the component part Satanivska Dacha (Ukraine)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
061	Ukraine	Satanivska Dacha	212.01	559.37	Carpathian

Short profile and biogeography

The nominated component part presents the brink of the Central European floristic region, and also the geobotanical zoning limit of the European broad-leaved forests' region. The size of the nominated component part amounts to 212 hectares. Elevation ranges from 300 to 395 meters above sea level. The main type of forest is fresh hornbeam-beech forest with the following phytosociological associations: Carici pilosae-Fagetum and Galio odorati-Fagetum. Exactly here the eastern border of the beech forest range is identified, beyond which *Fagus sylvatica* is met only as single trees. The beech forests of the given region belong to the east-Podolian ecotype, where the adjustment to extreme climatic conditions is usual.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component part is located in the southwestern part of the Khmelnytskyi region on the border with the Ternopil region. The site is located in the northwestern part of the Podilski Tovtry National Nature Park. Satanivska Dacha is a part of the Tovtry forested ridge. The limestone hills, named Tovtry are 339 to 396 m.a.s.l. high within the property.

Geology and geomorphology

Sataniv beech forest is located in the Podolic Highland within the middle part of the Tovtry ridge. Tovtry are the remains of the barrier reef of the Sarmatian Sea (15 million years.) which existed in the Miocene. The Tovtry ridge is oriented from northwest to southeast. It is characterized by the presence of sharp tops with steep slopes and valleys located between hills. On the surface, there are calcareous rocks that form the tops of the Tovtry and large boulders.

Climate

The climate is temperate continental. The Podolic Upland refers to the southwestern subregion of the Atlantic-continental climate area. The radiation balance of Podolic Upland is 40 to 45 kcal/cm^2. Precipitation amounts to 540 to 640 mm; the average temperature in winter is -2.9 °C, and in summer 18.4 °C, with a maximum of 35 °C, and a minimum of -35 °C. The depth of soil freezing is 25 cm, in some years up to 60 cm. The duration of the vegetation period is on average 180 days.

Soils

The underlying rock is limestone. The soil type is light gray podzol. The thin humus layer reaches 4 to 7 cm, on the stone outcrops it is absent.

Under it there is light loam (up to 45 cm), then reddish-brownish-yellow loam (30–150 cm), then limestone (fragments or solid plates). These soils are characterized as rendzina. In some areas there are weak surface-stone hard loamy black soils.

Water balance

The Tovtry ridge is located on the left bank of the river Zbruch. The forest massifs grow on the Tovtry slopes, some of which are directed to the river. Precipitation supplies the forest with water. On those areas that are not steep, ground water comes to the surface in some places, which form minor depressions with swamps (up to 1.5 square meters).

Biotic factors

Biotopes and vegetation

The nominated component part represents habitats according to the classification EUNIS – G1.631, Beech forests Asperulo-Fagetum (NATURA 2000 code 9130). Sataniv beech forests are formed by the association Asperulo-Fagetum and the crown density is 80-95%. The beech undergrowth made of uneven aged plants can be formed either of single specimens or be composed of 5 to 20 specimens per square meter. The understory is not present in some areas, but in some places there are shrubs. The herbal layer is like a mosaic, and its coverage fluctuates from 3 to 25%. In beech forests grow diagnostic species like: *Fagus sylvatica, Dentaria bulbifera, Galium odoratum, Mycelis muralis,* and *Viola reichenbachiana*. Regarding constant species, the following are common: *Fagus sylvatica, Athyrium filix-femina, Dentaria bulbifera, Dryopteris filix mas, Galium odoratum, Mycelis muralis, Poa nemoralis, Senecio nemorensis agg.,* and *Viola reichenbachiana*; and the dominant species are: *Fagus sylvatica, Galium odoratum,* and *Melica uniflora*. Since the site is located in more arid climates, *Oxalis acetosella* species were not found.

Flora

Fagus sylvatica makes up 70 to 100% of the forest stand. In the beech forest, the tree layer is also formed by *Carpinus betulus, Quercus robur, Acer platanoides, Fraxinus excelsior, Acer pseudoplatanoides,* and *Cerasus avium*. In the undergrowth, there grow *Euonymus europaea, E. verrucosa, Corylus avellana*. Herbal flora is characterized by a large number of ephemeroids including *Anemone nemorosa, A. ranunculoides, Corydalis solida, C. cava,* and *Dentaria glandulosa*. The species *Allium ursinum, Epipactis helleborine, E. atrorubens,* and *Galanthus nivalis* are included in the Red Book of Ukraine (2009). Other species that grow in the area are *Galium odoratum, Galeobdolon luteum, Mercurialis perennis, Carex pilosa, Primula veris, Aegopodium podagraria,* and *Paris quadrifolia*. Sataniv beech forest hosts relict species typical for beech forest like *Asarum europaeum, Hedera helix,* etc.

Fauna

Satanivska Dacha is a typical habitat for rare species of fauna, in particular for valuable species listed in Annex 3 of the Bern Convention. Among are the following mammals: *Meles meles, Martes martes, Capreolus capreolus, Dryomys nitedula,* and *Muscardinus avellanarius;* the repatile *Anguis fragilis*, and the amphibians *Rana temporaria,* and *Rana arvalis*. Avifauna is represented by *Accipiter gentilis, Accipiter nisus, Buteo buteo, Aquila pomarina, Bubo bubo, Strix aluco,* and *Picus viridis*.

Table 66: Representative species for the component part Satanivska Dacha (Ukraine)

Class	Species
Amphibian	Hyla arborea
Bird	Accipiter gentilis
Bird	Accipiter nisus
Bird	Dendrocopos leucotos
Bird	Picus canus
Bird	Picus viridis
Bird	Strix aluco
Invertebrate	Lucanus cervus
Mammal	Myotis emarginatus
Mammal	Myotis myotis
Mammal	Pipistrellus pipistrellus
Mammal	Plecotus auritus
Mammal	Rhinolophus hipposideros
Mammal	Mustela eversmannii
Mammal	Myotis bechsteinii
Reptile	Coronella austriaca

View of Synevyr. Picture: V. Pokynchereda

2.a.32 Ukraine: Synevyr (062, 063, 064, 065)

Area size

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
062	Ukraine	Synevyr – Darvaika	1,588.46	312.32	Carpathian
063	Ukraine	Synevyr – Kvasovets	561.62	333.63	
064	Ukraine	Synevyr – Strymba	260.65	191.14	
065	Ukraine	Synevyr – Vilshany	454.31	253.85	
TOTAL			**2,865.04**	**1,090.95**	

Table 67: Area size of the component cluster Synevyr (Ukraine)

Short profile and biogeography

Synevyr National Park includes some of the largest beech forests that have survived in the Eastern Carpathians. The total area of all four nominated component parts is 2,865 hectares, around of which there is allocated a buffer zone area of 1,091 hectares. The local beech forests have never been exposed to any form of forest management and accordingly are examples of naturalness and integrity. The main types of forest here are pure beech and mixed beech-fir-spruce forests. Over 70% of the beech forests are occupied by the association Fagetum dentariosum i F. asperulosum. Beech primeval forests border on (and sometimes even get into) the natural crooked landscape at the upper forest line. Natural vegetation located above beech forests is included in the nominated component parts and is aimed to ensure no negative impact of human activity on the natural development of vegetation in the upper forest line, especially in the light of global climate change. The proposed component cluster is located in the Tereblya basin on the southern macroslope of the Internal Gorgany, on the southeastern parts of the ridges Pyshkonya and Strymba (component parts Darvaika and Strymba) and on the western slopes of the Polonyna Krasna (component parts Kvasovets and Vilshany). Both mountain ridges are parts of the east-Carpathian sub-province of the Polonyna-Chornohora Region.

Abiotic factors

Geographical position, natural region, altitudinal zone

The nominated component parts include more than 2,500 ha of beech forests, which lie in the northern part of the Zakarpattia Region. They are located in the southern part of Mizhgirrya District near the village Kolochava on the southwestern slopes of Darvaika (1,506 m.a.s.l.), Strymba (1,719 m.a.s.l.) and Krasna mountains. They are located at an altitude of 800 to 1,675 m.a.s.l.

Geology and geomorphology

The component parts belong to the Skybova zone of the Ukrainian Carpathians and its mountainous part is formed by the Carpathian flysch with conglomerates, sandstones, clay and shale marl of the Cretaceous and Quaternary periods. The red and greenish mergels and mergel-like argillites are the most ancient here. The Paleogene deposits are mighty thicknesses of the Oligocene rocks in limits of 800 to 1,450 meters above sea level; meanwhile, the youngest Quaternary deposits are mainly cones of removal on the valleys and river terraces. Geomorphological features of the landscape are the distinct asymmetry of the slopes of the mountain ranges and the wide spread of rocky scree. All over, the ridges are winding, there are spurs of different sizes that form ridges of the second and third order. For the relief of middle and

Forest of Synevyr. Picture: V. Pokynchereda

high mountains, partly sharp vertical dissections are characteristic, as well as the presence of deep valleys and sharp ridges. The maximum slope gradient reaches 47°, the medium being 25°.

Climate

The climate is mostly moderate and only on the upper parts of the slopes cold. The average annual temperature is 5.7 °C, in July 31 °C and in January -34 °C. The average annual precipitation comprises 1,400 mm. The winds are mainly western or southwestern but in winter the northern and northeastern winds predominate and they are dry and cold.

Soils

The light brown soils of middle thickness dominate under most beech forests, but the dark brown argillaceous soils and partly the podzol brown soils on the mighty eluvial-deluvial sediment or even rocks are distributed there too. Besides, the stony surface soils sometimes are also noted here. For all these soils, the pH balance is around 5.6 and the content of humus 7 to 8%.

Water balance

The nominated component parts are located in the upper part of the basin Tereblia River, and its hydrological regime is characterized by the large number of small rivers and streams having mainly stony beds. There is a strictly marked flooding river regime including the strong fluctuations of the water flows and heavy showers.

Biotic factors

Biotopes and vegetation

The beech primeval forests of the nominated component parts belong to five formations: Fageta sylvaticae, Fageto-Piceeto-Abieta, Fageto-Abieto-Piceeta, Piceeto-Fageta and Abieto-Piceeto-Fageta. The communities belonging to the formation Fageta sylvaticae dominate, and they include more than 15 associations. Within them, the communities belonging to two associations, Fagetum (sylvaticae) rubosum (caesii) and Fagetum (sylvaticae) sparsiherbosum, are mostly distributed. Some territories of nominated areas belong to the unique subformation of the coniferous-beech forests, which have to be considered like the models of the native phytocoenoses. The territory of the component parts is surrounded by a buffer zone which includes mainly the natural or partly derivative beech communities of *Fagus sylvatica*, also the mixed communities with participation of other species (e.g. *Fraxinus excelsior*), and part of them are also rare or at least unusual ones. Sometimes these beech forests In some parts, these beech forests are present at the upper parts of the mountain slopes, close to the high mountain meadows or even instead of them. For instance, the communities belonging to the association Fagetum (sylvaticae) vacciniosum (myrtilli) occur very close to the patches of the crooked trees of *Fagus sylvatica* and close the communities Duschekietum (viride) and Vaccinietum (myrtilli). Nominated clusters include the following types of forest habitats: 9110 Luzulo-Fagetum beech forests, 9130 Asperulo-Fagetum beech forests, 9140 Medio-European subalpine beech woods, 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae), 91V0 Dacian Beech forests (Symphyto-Fagion), 9410 Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea).

Flora

The flora of the vascular plants in the communities with *Fagus sylvatica* includes more than 200 species. The most commonly distributed are *Actaea spicata, Anemone ranunculoides, Blechnum spicant, Carex pilosa, Dentaria bulbifera, D. glandulosa, Galium odoratum, Gentiana asclepiadea, Helleborus purpurascens, Lunaria rediviva, Luzula sylvatica, Mercurialis perennis, Oxalis acetosella, Polystichum braunii, P. aculeatum, Stellaria holostea, Symphytum cordatum, Vaccinium myrtillus,* etc. The endemic species in the beech forests are the following 9: *Campanula abietina, Centaurea carpatica, C. marmarosiensis, Lathyrus laevigatus, Leucanthemum rotundifolium, Matteucia struthiopters, Ranunculus carpaticus, Scabiosa opaca,* and *Silene dubia. Meanwhile*, and partly within above mentioned rare plants, there are 9 Tertiary relict species: *Atropa belladonna, Cephalanthera damasonium, Cystopteris sudetica, Diphasiastrum alpinum, Festuca drymeja, Huperzia selago, Lathyrus laevigatus, Lycopodiella inundata,* and *Selaginella selaginoides*. The flora of mosses includes 25 species, that of lichens 150 and there are more than 160 species of fungi.

Fauna

The fauna of the nominated property includes around 40 species of Mammalia (*Mustela putorius, Lutra lutra, Ursus arctos, Felis silvestris, Lynx lynx,* etc.), around 90 species of birds (*Ciconia nigra, Aquila pomarina, A. chrysaetos, Bubo bubo, Strix uralensis, Picus viridis*, etc.), 20 species of fish, 12 species of amphibians (e.g. *Salamandra salamandra, Lissotriton vulgaris, L. montandoni, Bombina variegata*, etc.) and 7 species of Reptilia (e.g. *Vipera berus, Coronella austriaca, Elaphe longissima, Lacerta agilis*).

Table 68: Representative species for the component cluster Synevyr (Ukraine)

Class	Species
Invertebrate	Lucanus cervus
Invertebrate	Rosalia alpina
Invertebrate	Callimorpha quadripunctaria
Invertebrate	Apatura iris
Lichens	Lobaria pulmonaria
Mammal	Myotis emarginatus
Mammal	Myotis myotis
Mammal	Myotis mystacinus
Mammal	Rhinolophus ferrumequinum
Mammal	Rhinolophus hipposideros
Mammal	Ursus arctos
Mammal	Canis lupus
Mammal	Lutra lutra
Mammal	Lynx lynx
Mammal	Mustela lutreola
Mammal	Myotis bechsteinii
Reptile	Coronella austriaca

Deadwood in Synevyr. Picture: A. Mykhailyk

Inside Zacharovanyi Krai. Picture: V. Pokynchereda

2.a.33 Ukraine: Zacharovanyi Krai (066, 067)

Area size

Table 69: Area size of the component cluster Zacharovanyi Krai (Ukraine)

ID	State Party	Component part/cluster	Size area (ha)	Size buffer zone (ha)	Beech Forest Region
066	Ukraine	Zacharovanyi Krai – Irshavka	93.97	1,275.44	Carpathian
067	Ukraine	Zacharovanyi Krai – Velykyi Dil	1,164.16		
TOTAL			**1,258.23**	**1,275.44**	

Short profile and biogeography

Unlike the primeval forests of Slovakia and the Carpathian Biosphere Reserve, the nominated component parts of the Zacharovanyi Krai are distributed on volcanic bedrocks, which are represented by typical (Fagetum sylvaticae) and unique communities of beech (Fagetum sylvaticae humile, Fagetum sylvaticae myrtillosum, Sorbeto-Fagetum humile), which exist in the specific cool climate. The total area of the site proposed to the World Heritage list is 1258.9 ha. Dendrological research of some of these primeval forest sites showed a mean age of trees from 250 to 280 years. Primeval Beech Forests are embedded in the natural landscape with the participation of oligotrophic bogs, rocky outcrops and places of rockslides. These natural habitats are included as part of the proposed buffer zone to guarantee the absence of negative human impact on the surrounding areas, and to ensure the natural development of beech ecosystems under the global climate change.

Abiotic factors

Geographical position, natural region, altitudinal zone

The area of the nominated parts is confined to the central part of Hutyn Vihorlat volcanic ridge of the foothills of the Eastern Carpathians, namely the ridge Velykyi Dil. This massif is separated from other parts of the volcanic ridge by river valleys Latorytsia from the northwest and Borzhava from the southeast. The altitude elevation here is 400 to 1,085 m.a.s.l.

Geology and geomorphology

The nominated component parts are located in the area of the Transcarpathian internal deflection that is composed of Solotvyno and Mukachevo basins with Vihorlat-Hutyn ridge overlapping with them. The volcanic complex of the Vygorlat-Hutyn ridge is composed mainly of andesites, andesite-basalts, rarely liparites and their tuffs. Various sediments accumulated on the slope of the mountain belong to the anthropogenic age.

By the nature of the relief, the area is confined to the foothills, which are formed by trachytic tuffs. Vihorlat-Hutyn volcanic ridge in terms of geomorphology is the youngest in the Carpathian arc morphological structure imposed on the Carpathian basin, formed in the Panonic era in Tertiary Pliocene. Over the Transcarpathian lowlands adjoined from the southwest, the Vihorlat-Hutyn ridge rises to 600 to 700 m. The main feature of the ridge is asymmetry. Its southern slopes, more gentle, have a greater length than the northern ones. Medium slope gradient is different; it ranges from 15 to 25°.

Climate

The nominated component parts belong to the continental-Atlantic climate region; their climate is influenced by the mountain topography. In general, there dominates western transfer of air masses. For this area, the typical conditions are temperate continental climate with abundant moisture, moderate summers, mild winters and warm autumns. Maximum (summer) temperatures reach 30 °C and minimum (winter) temperatures -33 °C. Here there are relatively high annual temperatures (7–8 °C). The growing season lasts 195 days. Average annual rainfall is 872 mm. During the growing season 70% of the precipitation falls.

Soils

Velykyi Dil ridge soils are formed on weathering products of volcanic rocks. The differences in the morphological structure of the soil is caused by the difference between the soil-forming underlying rocks on individual sections. Despite this, all the soils of the researched region belong to the type of brown forest soils with all their characteristic features. The soils in beech forests at an altitude of 700 meters above sea level belong to light-brown mountain-forest soils, and those located above 700 meters to dark brown mountain forest. Furthermore, among the brown mountain-forest soils which are formed on weathering products of igneous rocks, we distinguish the following groups: brown unsaturated non-podzol (degree of saturation 20–25%); brown saturated non-podzol (degree of saturation 60–80%); brown unsaturated weak-podzol. Less common are brownsoil-podzolic soils on weak-drained and preferably non-scree eluvial-deluvial flysch.

Water balance

The hydrography of the region is primarily determined by rainfall, much of which is impregnated into water layers and volcanic rocks and over time, comes to the surface again in the form of springs. Multiple streams, creeks and brooks of the catchment area of the southeastern ridge of Velykyi Dil flow into the river Irshava, which in turn is a right tributary of the Borzhava, which is part of the basin of the Tisza. In total, the hydrological network is made up of about 36 small rivers and streams of mountain origin. For this area, uneven distribution of annual runoff is typical in March–April accounting for 10 to 22%, May–September for 41 to 53 %, October–November for 11 to 15%, and December–February for 16 to 18%; the warm season accounts for 85% of the annual runoff.

Forest of Zacharovanyi Krai. Picture: V. Pokynchereda

Biotic factors

Biotopes and vegetation

The most common are primeval forests of the climax communities of pure beech forests (Fageta sylvaticae), which are distributed within a wide altitudinal diapason, from 400 to 1,085 meters above sea level. Within these elevations there are also sites of Sycamore (Acereto pseudoplatani-Fagetum), sycamore-beech forests (Acereto pseudoplatani-Fagetum humile), in fragments there are distributed sites with Dwarf Beech (Fagetum sylvaticae humile), sorb-beech (Sorbeto-Fagetum humile) and beech-sycamore blackberry coenosis (Fagetum sylvaticae myrtillosum). Forest communities form the following habitats: 9110 Luzulo-Fagetum beech forests, 9130 Asperulo-Fagetum beech forests, 9140 Medio-European subalpine beech woods, 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae).

Flora

Phytocoenotic core of the formation is a group of the pure beech forest type (Fagetum sylvaticae). The floristic composition of the herbaceous layer in pure beech forests is not rich, there are 20 to 30 species, with the domination of *Anemone nemorosa*, *Dentaria glandulosa*, *D. bulbifera* and other ephemeroids. In fresh humid eutrophic beech forests, the following associations are present:

Fagetum asperulosum, Fagetum caricosum pilosae, Fagetum dentariosum, Fagetum rubosum hirtae, Fagetum mercurialidosum, and Fagetum athyriosum. The higher the altitude, the worse are the conditions for beech growth. In pre-polonyna (under the alpine meadow) belt at the upper tree line, the following beech forests are distributed: Fagetum oxalidosum, Fagetum myrtillosum, Fagetum adenostylosum, which are characterized by lesser productivity. The characteristic feature here is the absence of many Quercetal species due to the chilly microclimate.

There are 162 vascular plant species, 4 moss species, and 62 fungi species.

Fauna

The nominated component parts are home to several species typical for Ukrainian Carpathians. About 1,500 animal species are registered in this area. About 50 species are rare, endemic and relict for the Ukrainian Carpathians. Vertebrate fauna of the component cluster is typical for the lower part of the forest and foothill belt of the volcanic range. In total, there are 5 species of fish, 8 species of amphibians, 8 species of reptiles, 86 species of birds and 34 species of mammals. The Red Book of Ukraine covers 21 of these species, including rare species such as: *Lynx lynx, Felis silvestris, Lutra lutra, Rhinolophus hipposideros, Rh. ferrumequinum, Myotis bechsteinii, Barbastella barbastellus, Picus viridis, Dendrocopos leucotos, Picoides tridactylus, Salamandra salamandra, Lissotriton montandoni, Mesotriton alpestris, Bombina variegate, Rana dalmatina* and others.

Table 70: Representative species for the component cluster Zacharovanyi Krai (Ukraine)

Class	Taxon
Bird	Accipiter gentilis
Bird	Accipiter nisus
Bird	Aquila chrysaetos
Bird	Aquila pomarina
Bird	Bubo bubo
Bird	Dendrocopos leucotos
Fish	Thymallus thymallus
Invertebrate	Rosalia alpina
Invertebrate	Callimorpha quadripunctaria
Invertebrate	Apatura iris
Lichens	Lobaria pulmonaria
Mammal	Rhinolophus ferrumequinum
Mammal	Rhinolophus hipposideros
Mammal	Capreolus capreolus
Mammal	Mustela eversmannii
Mammal	Myotis bechsteinii
Reptile	Coronella austriaca

Beech trees in Zacharovanyi Krai. Picture: V. Pokynchereda

2.b History and Development

A single tree species, the beech, having come to dominate the forest and ecosystem development of major portions of an entire continent over the course of an ongoing ecological process is unparalleled globally. This dominance has developed within a few thousand years after the last ice age, which is an extremely short period from a geological or evolutionary perspective. The present extension eflects the complete spectrum of this process, including not only current beech expansion areas, but also all relevant glacial refuges of beech now allowing to preserve the full scope of this unique process.

Processes of Europe's evolutionary development

Although the Gondwana supercontinent had started to fragment at the turning point from Triassic to Jurassic, the fragments were initially close to each other so that plants could spread. A number of recent plant taxa therefore have a distinct "Gondwana distribution range". Relic areas on the southern tip of South America, Australia, and New Zealand are possibly occupied by the southern beech (Nothofagus) genus (WALTER & STRAKA 1970). Nothofagus might have evolved within the region of what is Antarctica today, but was subsequently unable to reach the portions of Gondwanaland that had detached already at an earlier point (Africa, Madagascar, India). However, it would come to South America, New Zealand, and Australia, where it has persevered ever since (CRANWELL 1963, 1964 in WALTER & STRAKA 1970). Disjunctive distribution might best be explained by the existence of a former Antarctic land bridge (DU RIETZ 1940, quoted in WALTER & STRAKA 1970).

It is assumed that Fagus spread from a "warmer subterritory of Laurasia". The bipolar areas of the nearest related genuses Nothofagus and Fagus are most probably due to migrations across the tropical high mountains. Until the Eocene, the Central European flora was of a tropical-subtropical character (Arctotertiary flora, WALTER & STRAKA 1970). By the end of the Oligocene, it was losing species under the influence of a temperate climate. Deciduous forests had developed as early as during the period when broadleaf indeciduous species migrated from tropical to more temperate zones. This adaptation would allow them to survive in the northern hemisphere in the cool to chilly climate of the Miocene, while the austral woodland vegetation in the southern hemisphere has been dominated by broadleaf indeciduous forest to the present day. The Central European Miocene flora saw the blending of numerous geographical elements (East Asian, North American, Mediterranean, Subtropical, Tropical, Holarctic, and Eurasian). During this epoch, a beech species appeared being an intermediate type between the North American Fagus grandiflora and the European Fagus sylvatica (WALTER & STRAKA 1970).

The subsequent loss of species in Europe resulted from climatic changes. By the end of the Pliocene epoch, the Quaternary was already about to set in with its relatively rapid and strong variations in temperature. The Glacial epoch (Pleistocene) with at least four glacials had commenced, causing the tropical-subtropical and East Asian-North American elements to disappear. Yet it was not before the onset of the Middle Pleistocene that the temperate flora would turn into what we see today.

The glacial epoch resulted in Arctotertiary floristic elements becoming extinct at a globally unprecedented scale.

During the glacials, the snow line in Scandinavia dropped to the zone of maximum precipitation, giving rise to a vast continental ice sheet of up to 3,000 meters in thickness. With the water bound, sea levels fell by up to 120 meters. The Baltic Sea region was covered by huge glaciers but the southern North Sea, and the greatest part of the Adriatic turned into dry land (SCHROEDER 1998). The Alps were also glaciated, leaving only a single ice-free strip in Central Europe between the Nordic continental ice *sheet and the Alpine glaciers that were reaching far into the foreland. Consequently, the climate was extreme here, and tundra was spreading. With the inland ice approaching from the north and due to the chill, plant species of the temperate zones became extinct. In Europe, the "retreating" flora would, beside the Alps, encounter the Mediterranean, so that it sought out regions of the Mediterranean coast with a favorable climate as refuges. Trees could still grow in some mountain ranges – places which also allowed the beech to survive. Like Europe, North America and parts of northeastern Asia were also ice-covered. The tundra had expanded* here also. However, while only relatively small refuge areas with limited climates were available in southern Europe for the species to survive, the entire spectrum of species would persevere in North America due to the availability of large-area refuges. In East Asia, the glacial epochs had only a mild impact resulting from the much less extensive continental ice sheet. The original Arctotertiary flora was not forced out of the region and has consequently survived to the present day almost unchanged (WALTER & STRAKA 1970, SCHROEDER 1998). The different consequences of the Quaternary climate oscillations on the flora, which had still been distributed all over the northern hemisphere during the Tertiary, resulted in large-scale disjunction for many species. During the interglacials, the climate would keep fluctuating from arctic through sub-arctic to temperate or warm Atlantic and back. In this manner, the climate oscillations forced the plant species to migrate back and forth, with many genuses of the Arctotertiary becoming extinct in the process (floristic impoverishment). The less pronounced their capacity to expand and mutate, the more threatened were the species. FRENZEL (1967), for instance, describes a forest composed of beeches, hornbeams, tsuga, and elm trees for the Tegelen interglacial (early Quaternary) of northwestern Central Europe. In contrast, beech was rarely found during the interglacials of the Middle Quaternary. Fagus was almost completely absent during the last interglacial. However, migrations during the climate oscillations also resulted in new species evolving. Only in this way could what little of the Tertiary genuses was left survive the Ice Age. While most of our forest trees therefore belong to Tertiary genuses, the species did not evolve before the glacial climate change.

Postglacial development of Europe

With the end of the last ice age, the large-area reforestation of Central and Western Europe set in: the Central European basic succession. With the climate gradually warming and soil development taking place, the territories were at first colonized by birches and pines. Their qualities as anemochoric, rapidly migrating pioneers proved beneficial (POTT 1992), while the zoochoric oaks and beeches with their heavy fruits were not gaining much ground. It was only in the further course of the forest development that hazel, oak, elm, ash, maple, and lime would advance. The mixed oak forest period of the Atlantic was associated with an increase in temperatures and humidity. Dense mixed deciduous forests would develop (POTT 1993). The climate was already suitable for the beech's expansion 8,000 years ago (GIESECKE et al. 2006). However, some more millennia were to pass before it reached the Baltic Sea, and even more before it took hold as the dominant tree species (WALTER & STRAKA 1970). In the end, it was a temperature depression to a humid-cool climate at the beginning of the Subboreal period some 5,000 years ago that promoted the beech's mass expansion (WALTER & STRAKA 1970). A number of recent American studies have furnished evidence of the climate's key role in triggering the sudden, extremely rapid geographical expansion of a population (MAGRI et al. 2006).

The beech has survived the last ice age in southern refuges in the Mediterranean area. In the period that followed the ice age, it spread from the Dinaric Alps to colonize Central Europe. For it to reach the Baltic Sea took several millennia.

The beech has only been taking hold in Central Europe for a few millennia, which is a very short period from the geological perspective, representing a still ongoing process of the evolutionary development of complex and different beech forest ecosystems. The beech's highly successful expansion can be explained by its immense climatic plasticity, wide ecological amplitude, and genetic adaptability, which is why it is also called "prevalence strategy". The beech owes its enormous competitiveness most notably to its shade tolerance, which is characterized by the growth rate being flexibly adapted to the light conditions based on leaf morphology, sprout length, and branching type (PETERS 1997). Beeches are, for example, able to survive in the shade of the understory for more than 200 years, waiting for a gap in the crown canopy to open, which would allow it to grow upwards and reach the light. VISNJIC & DOHRENBUSCH (2004) and CZAJKOWSKI & BOLTE (2006) have demonstrated that occurrences of Fagus sylvatica from different climatic regions show different tolerances toward extreme temperatures and aridity. Recent genetic assessments have shown the beech's postglacial colonization of Central Europe to have started from only a few populations. The main thrust of expansion took its origin from the Dinaric Alps and, to a lesser extent, from the Western Alps and Western Carpathians. The populations of the Pyrenean and Italian refuges seem to have not contributed to the colonization of Central Europe (MAGRI et al. 2006). However, expansion cores for the Northwest Iberian beech forests are considered to be the glacial refuge areas of the Pyrenees (LOPEZ-MERINO et al. 2008), and the South Italian refuges for the Apennine Mountains (LEONARDI & MENOZZI 1995). Components compromising the refuges in the Dinarides, Italy and the Pyrenees are thus an important addition to the existing property. Central Europe was colonized from about 7,000 years before present (POTT 1992). Subsequently, it has probably spread to adjacent siliceous sites and the montane zone. About 3,800 years ago, it reached the coastal region of the North Sea and the Baltic young moraine along the Baltic Sea (LANGE et al. 1986). During the Late Glacial period (until 10,000 years ago), the beech covered 6% of its current range in few isolated refuge areas.

In the mid Holocene (5,000 years ago), the beech had colonized about 50% and the second half up to the present time. However, the beech's expansive capacity is unbroken: expansive tendencies are observed on the British Isles, in Scandinavia, and in Poland (CZAJKOWSKI et al. 2006). According to POTT (1992), the beech has never been able to take over its potential distribution area in the Central European lowlands. While the ongoing beech expansion in northern Germany (HANSTEIN 2000), Northeast Central Europe, and South Scandinavia should rather be considered to be a retaking of terrain that became lost in the course of its usage, the development in Great Britain and Norway appears to be the "consummation" to an incomplete postglacial immigration process (CZAJKOWSKI et al. 2006).

This means that the beech has not yet arrived at its climatic limit (LANG 1994), which is also expanding in the course of the present climate change (SYKES et al. 1996, BOX & MANTHEY 2006) and absence of historic land use practices eliminating beech. Changes of the beech distribution area within the context of climate change, however, are anticipated not to take place but along the edge of the present potential distribution. The present beech distribution area in its large core area will remain unaffected by climate change (KÖLLING et al. 2005).

The nominated beech forests represent the development of an ongoing process that has been taking place in Europe since the Ice Age including refuge and expansion areas all across Europe. The nominated component parts are expressive of this process, its starting points as well as its development trend.

As is illustrated by the forest history, the beech has shaped the natural appearance of Europe in a relatively short period. Beech became the dominant tree species in the temperate low to medium mountain ranges and lowlands. The beech's expansion in Central Europe is related with the encroachment of Neolithic cultures. Man with his settlements and agriculture did interfere with dynamic processes which have not come to their conclusion yet. The succession of settlements and wasted sites probably aided and accelerated the simultaneous immigration of the beeches. The beech obviously continued to take hold in parallel with the cultural development in Europe, which has left behind characteristic traces. The naturally occurring beech forests were repeatedly pushed back over the course of settlement history. The portion of primeval or ancient beech forests has decreased significantly and constantly all across Europe apart from some remote areas in the Carpathians. In the rest of Europe, primeval beech forests' remnants are mostly very small, rare and relics only.

The beech's expansive capacity is unbroken. It has not yet reached its climatic limits.

From Fagus sylvatica's rate of spread (150–350 m/a), the onset of fructification with 40 to 50 years in the case of free standing trees and 60 to 80 years in closed stands, leaps of expansion of 6 to 22 km can be derived according to LANG (1994). This is made possible by the relatively voluminous and highly oleiferous fruits being disseminated by animals, most notably birds. Beeches produce full masts at 6 to 7 year intervals, i.e. it took them 10 to 30 seed generations to cross Central Europe from south to northwest (POTT 1992).

As for forest continuity and regenerative potential, the nominated component parts contain the largest contiguous and most natural beech forests all across Europe and complement the existing World Natural Heritage "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany". Complementing additional types of primeval beech forests reflecting the wide spectrum of different biogeographical, edaphic, climatic and topographic conditions and the high variability of this forest type as well as including all significant glacial refuges boosts the representativeness and completeness of the existing property.

Beech forest in autumn. Picture: H. Kirchmeir (E.C.O.)

2.b.1 Albania: Lumi i Gashit (001)

Historic development of the forest

The high integrity of the proposed beech forest is given by the high level of naturalness. The forest area was undisturbed for a long period of time and not impacted by human and forest management. The average stand age of the component part is around two centuries. On steep slopes in remote areas, primary forest remnants survived. The primeval Beech Forests of Albania represent clear examples of ongoing postglacial biological and ecological evolution of terrestrial ecosystems and spread of the beech.

Gashi Reserve. Picture: L. Shuka

Human influence

The component part has not been affected by human influences for a long period of time. Because of the long distance and the difficulty of reaching the site and its beech forest, the area has remained unchanged for many years. The protection status given to the area in 1996, by virtue of Council of Ministers' Decision as a Strict Nature Reserve, adds to the absence of any negatively affecting activity. Far from the wilderness area, wood is mainly used as energy source, for construction purposes, but the wilderness area is undisturbed. In some parts outside the component part, the natural forests are replaced by flowery mountain pastures due to overgrazing.

The agriculture and rocky habitats are very few and concentrated in limited surfaces in the Alps area, far from the component part. In the surrounding area there is limited human presence during summer time, when no type of activity is carried out.

Summer in Lumi i gashit. Picture: L. Shuka

Nature disasters

The wilderness area Gashi River is characterized by heavy snowfalls during winter measured 2 to 2.5 m high. Temperatures go down to -30 °C and there are frequent snow storms. Such storms and sporadic strong winds affect the breaking of branches, the falling of trees and death of the animal species/ wild fauna.

There are two periods when natural disaster factors hugely affected the wilderness area Gashi River, namely the icing of December 1984–January 1985 and January–February 2005. In winter the area is totally isolated. The isolation period usually lasts from mid-November until the end of May.

2.b.2 Albania: Rrajca (002)

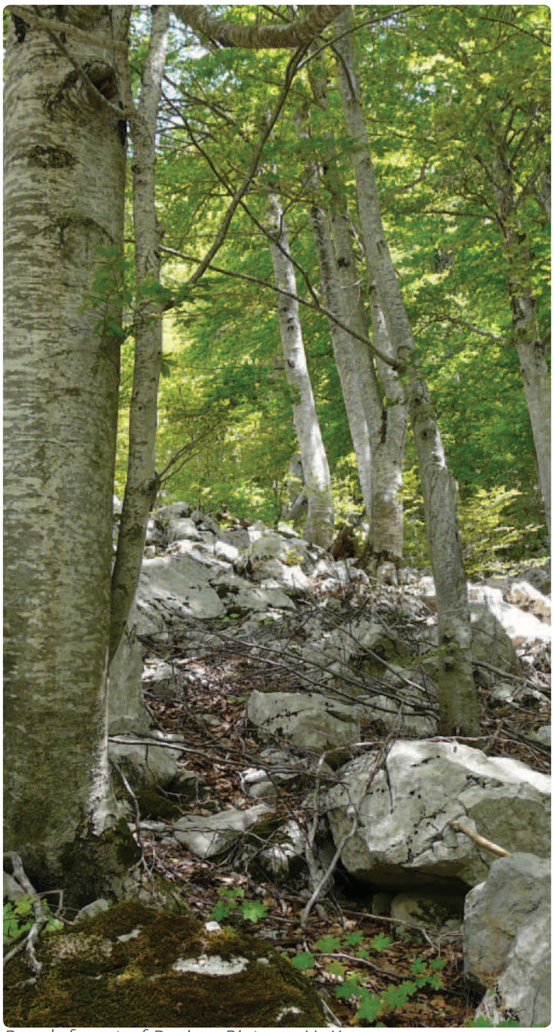
Historic development of the forest

It is a well-known fact that the forest at the wilderness area exclusively developed naturally without any human intervention. The component part was safe and unaffected by human influences, due to the inaccessibility of the area. The average stand age of the component part is 180 years. On steep slopes in remote areas, primary forest remnants survived. The primeval Beech Forests of Albania represent clear examples of ongoing postglacial biological and ecological evolution of terrestrial ecosystems and spread of the beech (*Fagus sylvatica*).

Inside Rrajca. Picture: H. Knapp

Human influence

According to the historical data, the component part was never affected by extensive human influences. The area of Rrajca with its primary forest complexes has been conserved, inter alia, also due to its isolation as former border zone and due to its remoteness with very difficult and limited access. For a period of half a century it was almost prohibited to get close to the border area. The area of the buffer zone surrounding the beech forests ensures effective protection from active human intervention as well.



Beech forest of Rrajca. Picture: H. Knapp

Nature disasters

In the area inside and around the National Park, there were no significant nature disasters in recent history (in the last half century). Even aged patches of forest indicate influence of the windstorms within the area. By their very nature, avalanches represent the only impact in these mountainous areas of the Shebenik-Jabllanica National Park, where geographic and meteorological conditions give rise to accumulations of snow and ice prone to hurtling down in the valleys. There are few signs of avalanches present, particularly at the northern part of the Rrajca beech forest area.

In addition, avalanches have sporadically happened during the last decades, thus playing a major role in shaping ecosystem dynamics across a range of scales, contributing to diversity at the species and landscape level, and affecting soil transport and the spread of other types of disturbances. It also affected the integrity of beech forest.

2.b.3 Austria: Dürrenstein (003)

Historic development of the forest

A pollen analysis carried out at the Lecker Mire (Leckermoor) provides a comprehensive overview of the historic distribution and range of plant species in and around the nominated component part.

The results describe the succession process from the development of a ground vegetation on immature soil and the establishment of a park-like tundra dominated by birch and pine towards a stepwise establishment of larch, spruce and Swiss Mountain Pine and the increasing dominance of mixed oak forests during a longer warm phase. Furthermore, the results give proof for the intrusion of fir and beech, which are highly competitive in dense forests and are able to successfully rejuvenate under these conditions.

Finally, the results document the first human impacts in the area, the historic partial conversion of the forests into meadows for mountain farming and livestock keeping.

The first pollen of forest tree species (spruce and willows) date back to approximately 10,000 BC Around the year 6,000 BC mixed oak forests became more prominent. The first traces of fir and beech date back to the period around 5,000 BC Between 3,000 and 1,000 BC a first "beech peak" with regards to dominance and distribution was recognized around Lake Obersee.

Human influence

The first traces of human settlements in the surrounding area date back to the end of the Würm Ice Age approximately 10,000 BC Prior to this time, neither type of forest could develop. Even though the wider region was temporarily populated during the Stone Age, the nominated property remained largely untouched until the year 1000 AC. In the year 1330, the ownership of the area was transferred to the Carthusian order. At that time, the property comprised 30,000 ha, thereof around 2,700 ha primeval forest. The Carthusians had been managing their property for almost 450 years and continuously intensified the use of the forest. Despite this period of intensification of use, the area of the primeval forest was "only" reduced by around 530 ha. The 2,170 ha of the remaining primeval forest can be attributed to its topographic location in a mountain basin and to a dispute about ownership. Traditionally, the boundaries of land ownership were defined by water divides. Although the Carthusian Order owned the land north of the water divide, parts of the primeval forest are located at the southern side of the water divide. The southern part was owned by the Admont Monastery, which led to a fundamental century lasting legal dispute about the ownership of the area, which unintentionally also prevented the primeval forest from being logged. The dispute itself was not settled until the year 1689. When more intense iron extraction started in the area, the primeval forest and surrounding areas were intensively used as energy source. However, large parts of the area still remained untouched. In 1875, Baron Albert Rothschild bought the area, which still contained approximately 420 ha of untouched primeval forest. He recognized the unique value of untouched wilderness and thenceforward enforced the protection of the area.In 1942, the area was first declared a nature conservation area. In 1988, the nature conservation area "Rothwald II" was established. Nine years later, in 1997, a project funded by the nature conservation program of the European Union was carried out in order to pave the way for the first wilderness area in Austria. In 2011, the wilderness area was decreed by national law, and two years later (in 2013), the IUCN officially recognized the area as Category I Wilderness Area.

Nature disasters

The so-called Devil's Forest in the Rothwald III section, which is an about 250 year old secondary forest, is frequently affected by massive foehn storms. Major wind-through events are reported for the years 1777, 1796, 1990 and 1996. The „Primeval Forest Avalanche" is a periodically occurring avalanche affecting the area. Major events took place in 1909 and 1986 showing the impact of avalanches on the area. The most recent larger avalanche hit the area in 2009 and deeply penetrated the primeval forest. The mighty, several hundred year old trees, which were hit and severely damaged during this event, give proof that much time had passed since such a powerful avalanche hit the area. The damages caused were not cleared as they are part of the natural dynamics of the area. Currently, the area has become a focus point of scientific research to study natural succession and natural regeneration of the forest. The influence of avalanches is limited to small portions of the beech forest.

2.b.4 Austria: Kalkalpen (004, 005, 006, 007)

Historic development of the forest

With the end of the last ice age, forest development started in the region of the Eastern Alps with pine and birch. The higher elevations were mainly covered by spruce. In the Atlanticum, fir and beech spread forward, whereas the distribution of beech peaks in the Subatlanticum (MAYER 1974).

The postglacial reforestation in the Kalkalpen National Park is documented by pollen analysis of mires (KRISAI & WIMMER 2000). The mire “Seeau” has a peat layer of 4.2 meters and an age of 7,660 years. At this time, the area was largely covered by oak forests that were dominated by spruce at this altitude. Soon after that, beech and fir started their extension. The proportion of fir was quite high. Beech became the main tree species in the time period of the Subatlanticum. The 800 years younger mire “Ebenforstalm” started its growth at the same time (about 5,000 BC) as beech and fir started their extension. Traces of human influence (cereal pollen findings) date back to around 1,000 BC.

Human influence

By 2,000 BC, the first settlers had arrived in the valleys of Windischgarsten and Ennstal. People did not move far into the primeval forest.

From the 15th century on, there was large-scale deforestation in the region. Iron production needed huge amounts of charcoal. The required wood was driven on the water. 42 logging dams, 16 racks, daring drifting tracks and about 100 charcoal sites in the National Park bear witness to this time of forest utilization. Finally, spruce monocultures were created by modern forestry from the late 19th century on.

Bears, wolves and lynx were soon exterminated and instead the stocks of game animals were increased, which disturbed the biological balance of the forests.

However, the area of today’s Kalkalpen National Park was difficult to reach because of inaccessible gorges and steep rock faces. Some parts of the National Park appear to have seen rather intensive use, while others were used only once. Therefore, natural, wild forests and remnants of primeval forests with outstanding biodiversity were able to survive. These rarely influenced forests have been selected for World Heritage.

Nature disasters

One characteristic of the mountain forests in the Kalkalpen National Park is the presence and allowing of natural dynamic processes. Avalanches, snow debris, windbreaks, floods, landslides, rock falls and forest fire show enormous potential for restructuring natural landscape that results in a small-patched mosaic of different habitats and is therefore fundamental for a unique and high biodiversity.

Due to steepness and high precipitation, mountain forests in the Kalkalpen National Park are exposed to avalanches and snow pressure. Beech and other tree species in the area often show the typical saber growth that is characteristic for the area. The edges of avalanche paths are often stocked by bush-shaped beeches. Both formations of beech can be interpreted as adaption to the recurrent mechanical stress triggered by avalanches and snow pressure.

Severe storms are rare but destroying events. The storms in 2007 and 2008 resulted in 60,000 solid cubic meters of wind thrown wood. Spruce-dominated forests outside the component cluster were mainly affected, but also mixed forests did not remain untouched. Storm damages are followed by bark beetle infestations with time lag. Large scaled bark beetle infestations mainly occur in former intensively silviculturally used forests but also in natural spruce and mixed forests. The Austrian Forest Act requires the removal or debarking of fallen timber because of an increased risk of insect infestation, hence the National Park must perform bark beetle control. Because of an exception, this needs to be done only on 25% of the National Park’s area. This exception is unique for Austria’s national parks and enables natural forest development. The proposed area is part of the wilderness zone and, therefore, free from such intervention.

The bark beetle is seen as a natural dynamical factor of forest ecosystems. Especially in altered forest stands, the bark beetle accelerates the development in a more natural direction due to opening the closed canopy and facilitating regeneration of native tree species.

All these dynamical factors are part of the ecosystem and are permitted by the non-intervention management of the National Park authority.

2.b.5 Belgium: Sonian Forest (008, 009, 010, 011, 012)

Historic development of the forest

Since the last ice age, the area evolved from a cold steppe vegetation to a closed temperate forest with climate-influenced change of tree species. Big parts of the forest have been influenced by human activity since 2,700 BP. A written source 'Donatio Angelae', dated about 1,050 BP, reports of *Quercus* and *Fagus sylvatica* as being the two most important tree species. Later, *Carpinus betulus* is mentioned as a common hardwood and that *Betula*, *Populus tremula* and *Salix caprea* were important pioneer trees. At least since the 9th century, the forest was used for hunting, wood production and common rights. By the 16th century, the forest was mainly managed for wood production. Common practice was the Tire-et-aire system involving large clear-cuts with standard trees (oak and beech). As a consequence of excessive cuts of oaks and the absence of selective thinning, beech dominated productive stands since the early 17th century. Large-scale replantings were performed mainly with beech. Deforestations in the first half of the 19th century reduced the forest area to half of its original 10,000 ha.

Natural regeneration seemed problematic until very recently. Since about 7 years, natural regeneration is abundant and everywhere, which proves that the evolution of the beech population is still ongoing.

Human influence

A field survey in the 1980s revealed the presence of approx. 10,000 remains of charcoal kilns within the Sonian Forest. They confirm the long history of the forest as a managed woodland. According to radiocarbon data, the production of charcoal can be traced back to at least the early medieval period.

The oldest written record of the Sonian Forest dates back to the 11th century. For the first time, people referred to the forest as an independent existing entity, "Sonia". Beech was at that time one of the most common indigenous species, besides oak.

The property remained continuously in the hands of the dukes of Brabant for centuries. By the 14th century, the duchy of Brabant was incorporated into centralized principalities, and the forest became included in the Royal Domain. Accounts reveal that the wooded area covered 10,400 ha in 1638.

The privatization of the forest at the beginning of the 19th century caused a dramatic change. Because of the financial needs of the new owner, the bank holding of the Société Générale, the forest was partially sold in the 1820–1830s. The Belgian state purchased the remaining forest in 1842. What was left was an area of 4,600 ha, though important because this nucleus remained untouched. The original geomorphology is extremely well preserved in this core zone.

Due to the afforestation policy of the last decades of the 18th and the beginning 19th century, almost exclusively in favor of beech, large parts of the forest evolved into homogenous resources (1890). By the end of the 19th century, forest management changed under pressure of the public opinion. Aesthetic concepts were introduced into the management, such as "screens of trees" along roads, diversification taking species and tree-age into account, the construction of trails through picturesque sites, etc.

In the second half of the 20th century, the Sonian Forest was protected by different legal instruments.

Nature disasters

Historic nature disasters have not systematically been recorded, although the wood was occasionally affected by fire or windthrow events. Windthrows by storms have regularly impacted the beech stands. Records date back to 1705, and the most recent large impact storm occured in 1990.

In the non-intervention sites (this proposal), natural dynamics and structures are allowed to re-develop, a process that is ongoing studied in detail. The oldest part of the strict reserve has already remained unmanaged for over 30 years. Storm events appear to be important drivers in the dynamics of these forests (more than in continental beech forests). Since the 1990 storms, the deadwood amount at this site remained constantly above 100 m³/ha, and the number of overmature trees even exceeds the densities of natural beech forests. Also, in the 1993 extension of the reserve, deadwood amounts have gradually increased to over 40 m³/ha.

2.b.6 Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

Historic development of the forest

It has been suggested that the intensive spreading of beech in the Balkan Range began five to six thousand years ago. Indeed, it is possible that the presence of the species in the Range is due, to some extent, to human intervention in the distant past (the destruction of the coniferous belt and the purposeful use of fir wood). The average age of the species is 135 years, covering more than 70% of the forestry area, which also accounts for approximately 80% of the total stock reserve. The average stock of the beech forests is approximately 265 m^3/ha. All this determines the enormous significance of the species and its communities as an important factor for the microclimate and the maintenance of the aquatic regime of the rivers in the Balkan Range. Other forest formative species of high importance are the spruce (6% of the area), fir (6%), oaks (mainly Durmast Oak, 5%), and European Hornbeam (4%).

Beech tree with fungi. Picture: H. Kirchmeir (E.C.O.)

Human influence

Forest-timber resource use in the area presently occupied by the National Park has two main periods: historical use and more recent use. Historical use includes the period from ancient times until the Liberation of Bulgaria in 1878. Although detailed information does not exist, the main features of this period are intensive reduction in size of high mountain coniferous forests, mainly due to intensive use and fire. In low-mountain forests, in the beech belt, coppice and limb removal was the typical manner of management. The first known substantial use of resources dates back to the 6th–3rd centuries BC. During this time period, large quantities of coniferous wood, mainly Austrian and Scots Pine in the area of Beklemeto, Kurthisar, Stanchov Plugar, etc., had been used. The timber was used to construct and repair high-mountain (more than 1,500 m.a.s.l.) road-side stations and watch towers, buildings, road construction and other facilities. Burning and cutting of the coniferous forests in ancient times has lead to the present fragmented locations of certain forests such as the Austrian Pine, Scots Pine, and Macedonian Pine forests. Burning of high mountain forests is also related to the development of active pasture livestock grazing, started more than 7 centuries ago. These processes led to the contemporary location of the upper forest line at 1,300 to 1,700 m.a.s.l., the changed composition of species and age structure on large forest massifs, and the fragmented spreading and distribution of individual forest communities.

The period of recent use includes the time from the beginning of the century until the present. During the first part of the century, mainly large-size coniferous timber was used. In the reserves, there is no forest management since their establishment in the 1940's and 1970's. From the very designation of those areas, their regimes did not allow any interventions, especially related to deforestations. There was no forest management also in the virgin old beech forests (24,578.3 ha, part of them in the reserves), well-preserved in hardly accessible, gorgeous places.

Following the establishment of the National Park, all activities in the forests are planned and organized by the Park Directorate and include only maintenance and restoration.

Nature disasters

A number of natural threats in the National Park affect species, communities, and ecosystems. Avalanches are of frequent occurrence, most often in the range from 1,500 to 2,200 m.a.s.l., mainly in the treeless zone. The rapid sliding of significant masses of snow destroys vegetation in various locations, but is rare in the forests. There are some cases in which early autumn snow caused insignificant damage to trees. Rare sporadic strong winds on the northern (foehn) and southern slopes (boreal) can cause damage to the forest. Because of their local nature, the caused damages are insignificant. Natural fires are rare and do not pose a serious threat to the National Park and its resources. The likelihood of natural fires is higher in the high-mountain treeless zone where they affect mainly grass communities, and in the massifs of coniferous trees. The decreasing precipitation related to global warming during recent decades has had a negative effect on the forest vegetation and other plant communities in the National Park.

2.b.7 Croatia: Hajdučki i Rožanski Kukovi (022)

Historic development of the forest

The whole landscape of Northern Velebit National park is characterized by karst relief. This relief, together with the rough climate, shapes the ecosystems in this area. This can be seen especially in forest ecosystems. Trees are short and of irregular shape because of the strong bora influence and big amounts of snow. Thanks to the careful management of forests in the past, and also to the inaccessibility of this area, the forest systems in the National Park are very well preserved. The whole area of the Reserve has been almost completely undisturbed by man, as can be seen by the huge biodiversity of fungi and moss species, including the presence of old-growth indicator species such as *Tatraea dumbirensis*, *Chlorencoelia versiformis* and many others. There are beech trees in the stands that are over 500 years old, and the percentage of dead trees in the forest biomass is around 20%, which indicate the true primeval character of the stands. Although old, the beech trees are not massive, as the extreme weather and the rough terrain have formed some kind of "natural bonsai" of the trees, which grow very slowly and can be dwarfed and twisted. Combined with the craggy rocks of the massive they grow on, these forms, together with views of the seaside, create a unique and very peculiar landscape of great aesthetic value.

Mushrooms. Picture: Northern Velebit National Park

Human influence

Due to rich and dense spruce, fir and beech forests, forestry has always been one of the most important sources of income on Velebit. The first forestry office in Croatia was established in the very area of Northern Velebit, in the village of Krasno in 1765. Thanks to its inaccessible area, Hajdučki and Rožanski Kukovi has been almost completely undisturbed by man. The area of the Reserve itself is not very large, but it is very well buffered, being nested within the National Park, which is itself exempt from any human exploitation and largely a wilderness area, having only basic infrastructure and no permanent settlements.

Nature disasters

In area inside and around the National Park, there were no significant natural disasters in the recent history (in the last 50 years). There were only a few small fires, all of them started by lightning, the biggest was on 1st August 2013 at Borov vrh on a surface of 2,000 m. The National Park has an organized fire patrol every day especially in summer.

2.b.8 Croatia: Paklenica National Park (023, 024)

Historic development of the forest

The climate-zonal vegetation in most of the area of the National Park is primarily beech and black pine forest, except for some rocky, cliff and extrazonal stone areas except for some rocky, cliff and extrazonal stone areas whose vegetation is/was comprised primarily by scrubs and bushes, and which are important hot spots for endemic plant species. Black Pine forest prevailed. Dwarf Pine covered higher areas together with scarce alpine vegetation, grazed upon by sheep and goats. There were a lot of pine trees that inhabitants used for obtaining resin called "paklina" by cutting into the tree trunks. It is assumed that the term Paklenica originates from this word. After the year 1945, the forests of Paklenica were logged to reconstruct the houses devastated by war. There are no records on how many trees were cut, but the forest was not destroyed, and by the act of law in 1949, the entire area was proclaimed as a National Park and was placed under the management of Zadar Forestry Office. This act formally abolished the usage rights which the residents of Starigrad and Seline exercised based on a regulation dating from the 19th century. The forest management program in the Park was adopted in 1980. From 1949 on, goats and all kind of forest exploitation were forbidden in area of the National Park.

Human influence

The Southern Velebit area and the Paklenica NP have been inhabited since 8,000 years from Paleolithic period on. The most influences on the forest were in the period between the 17th century and 1945. After the proclamation of the National Park in 1949, the forest was protected. In some inaccessible areas of the National Park, which are of special protection and comprise the best examples for the proposed component parts, very old forests with diverse plant species are present. Nowadays, only minimal influences occur due to tourism and a mountain path that runs along an edge area of beech and black pine forests. Some investigations on permanent plots suggest that the soil and rain were of good quality and without influences of acid rain from surroundings areas. The beech forests of this area are situated in the strictest conservation zone (1a). This core area according to the Management Plan (2007) covers 50.3% of the Paklenica NP area. Most stands of this beech forest are located in this zone and some in a very strict conservation zone (1b) and cover 13.4% of the Paklenica NP area. These two zones are the most restricted ones regarding managing of the area; in zone 1b, only interventions to preserve and protect biological and landscape diversity are possible, for example, human intervention in meadows, pastures and other biotopes.

Parnassius apollo. Picture: Paklenica National Park

Nature disasters

The fire has the most dangerous impact on forests in the area of the National Park. Due to the climate change, fires had the biggest impact in the National Park in the last 10 years. They were all started by lightning in summer, between June and August. The biggest fire occurred in the year 2003 and many black pine forests were damaged in that summer. The damaged area comprised a surface of 200 ha. The last fire occurred in the NP area in the year 2007 and destroyed the vegetation on a surface area of 170 ha, among them 100 ha of beech forest. Some small, local disturbance agents in the Paklenica NP are wind, snow and snow-slip. Windfall occurs frequently, as cold, northern wind can reach speeds up to 200 km/h. This north wind, Bora, is locally known as "bura".

2.b.9 Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

Historic development of the forest

According to pollen records, mountain slopes (1,400–2,000 m) in the late glacial and early Holocene were covered by *Pinus*, while at lower altitude the vegetation was dominated by *Pinus* and deciduous *Quercus* mixed forests. Most of the other mesophilous tree species were sporadically present. *Fagus* became dominant after the early Holocene, indicating wetter conditions favorable for closed-canopy forests. For most of the Holocene, *Fagus* has been dominating the landscape up to an elevation of at least 2,000 m. *Carpinus* had instead peaks at lower altitudes (below 1,500 m) in the early Holocene and, then, became a minor component of mixed lowland forests. Around 2,800 BP, a first reduction in arboreal pollen (AP) occurred, concomitant to widespread domestic grazing at up to 2,000 m.a.s.l. The AP reduction and *Pinus* increase may be associated to higher pressure coinciding with Samnite settlements on these mountains. As in other Apennines sites, since the Bronze Age and early Iron Age, the development of a rural economy based on grazing (sheep, goats) enhanced the clearance of forested slopes at 1,400 to 2,000 m. The Romans continued the transhumant grazing system. They developed settlements in the Camosciara Valley floor with a centuriation of annexed land up to an altitude of at least 1,200 m.

Human influence

The vegetation of the upper Sangro Valley was significantly impacted by man in the late Holocene. Major reductions of forest cover took place since the early medieval period (Longobards), with impacts persisting for centuries. Hilltop settlements with agriculture on the valley floor and lower slopes and summer grazing on mountaintops (transhumance system) are a testament to this process. The transhumance landscape persisted through all of the Middle Ages and Modern times until the 20th century, when field systems were abandoned after rural depopulation and the National Park was established. Differently to other Apennines districts (e.g. Majella), the low-density population did not impact forests excessively through grazing. The institution of collective lands ("Difese") helped in conserving biodiversity: that allowed the preservation of a consistent plant and animal capital within the cradle of the Italian civilization. In the Modern period (1700–1800), forests were increasingly interested by intensive clear-cutting with reserves ("tagli borbonici"). In many old-growth forests, the structure was highly simplified, leaving multi-century trees (400–500 years) that today are mixed with the young cohorts (e.g. 100–150 years). However, some remote forests remained untouched, so that most of them were reached by harvesting only in the period of economic crisis after the Second World War (1950–1960). The institution of hunting reserves (1872–1878 and 1900–1912), and then of the National Park (1923) contributed to the preservation of hundreds of hectares of old-growth forests, some of them primary (without signs of logging). Since the 1920s, many coppices were converted to high-forest, buffering these old-growth forests. Meanwhile, the reduction in high-altitude grazing permitted the expression of secondary forest succession and forest restoration to old-growth condition. Within the component cluster, a consistent part of Valle Cervara remained untouched even after the Second World War (primary forest). Coppo del Morto, Coppo del Principe and Selva Moricento may have been interested by occasional, limited logging. Val Fondillo is the only forest logged in the 1950s–1960s due to the close installation of a sawmill: however, it still conserves tree groups with 400+ years, especially nearby the river or steep cliffs, and has an impressive biodiversity.

Nature disasters

A low-to-moderate severity disturbance regime prevails in these forests, with frequent small gaps and rare, intense events. The main disturbance agents are avalanches and wind. Drought may cause death, especially on warmer, rocky slopes. Dendroecological reconstructions of the disturbance history showed synchronicity in peak mortality events among all high-elevation beech forests in central Italy. Some peaks coincide with Spanish beech forests, connected to Atlantic windstorms. At the end of 1700, frequent disturbance may be related to windstorms in the Maldá Anomaly, a period of considerable variations in Mediterranean atmospheric circulation. Additional climate-driven disturbances on northern aspects are associated to the East Atlantic/West Russia pattern, i.e. glaze storms generated by northerly winds. Avalanches periodically cross the forests in small tracks, bending beech trees and locally generating a natural coppice structure (Coppo del Morto and, especially, Valle Cervara).

2.b.10 Italy: Cozzo Ferriero (030)

Historic development of the forest

In Southern Italy, the beginning of the late glacial interstadial is marked by a rise in the relative abundance of *Betula*, then replaced by deciduous *Quercus* woodlands (also including other broad-leaved taxa such as *Fagus*, *Tilia*, *Ulmus* and *Populus*). In this refuge area, the transition to the Holocene is marked by the decrease in relative abundance of *Betula*, *Gramineae* and other steppic taxa (e.g. *Artemisia*) and by an increase in a wide range of tree taxa (e.g. *Corylus*, *Ulmus*, *Phillyrea*, *Fraxinus ornus*). On a millennial timescale, there is evidence of an increasing moisture from approx. 11,000 to 6,200 BP (maximum), prior to a general trend towards drier climate conditions that have prevailed up to the present. However, most of the Holocene was a rather stable interval, dominated by forest ecosystems. In the mountain belt here, like in most of Central and Southern Italy, the vegetation cover's history of the Holocene reports the persistence of important and relatively stable *Fagus* forests, a rare example of a beech woodland able to withstand climate changes for more than 11,000 years. Moving to middle and late Holocene, the picture is further complicated by the interaction between human activity and natural environmental changes (aridity crises). Regarding the history of human impact, the Trifoglietti pollen record shows only poor imprints of agricultural activities and anthropogenic indicators, apart from those indicating pastoralism beneath forest cover. As in most of the Apennines, selective exploitations of *Abies*, present since the Early Holocene, 9,500 BP, appear to have been the strongest human impact on the Trifoglietti surroundings, as well in the Vulture areas, causing a reduction/local extinction of the population between 3,000–2,000 BP. This extinction may be linked to the prevention of regeneration through selective cutting and perhaps subsequent burning during the classic period (Etruscan/Greek or Roman). However, at Monticchio and Trifoglietti the total forest cover was not strongly impacted by man until about 1,500 BP, when an appreciable decrease of arboreal pollen is recorded following the impacts of medieval society. It must be remarked that forest biodiversity, including *Abies* and *Taxus*, is all preserved today in the Pollino National Park.

Human influence

Like in most of the Central Apennines, the first severe loggings occurred from 1700 to the unification of Italy (1861), when the widening of road networks made the exploitation of remote areas economically feasible. Before then, the main human disturbance in the area was summer grazing by domestic animals. Around 1900, intense forest exploitations started for the production of railway ties. The rise of plywood industries and new harvesting systems gave a new impulse to logging since the 1930s. An extraordinary period of exploitation on the Pollino and Orsomarso Massives began in 1910, when the Italian-German society Rueping opened many logging sites over a wide territory, using forest cable lines and Decauville railways (about 100,000 beech trees cut in 20 years).

Intense exploitations continued in the area until the 1960s, when forestry started to use less intense approaches. In many areas, like the component part, logging was completely stopped. After the establishment of the National Park, this approach became more common, with the rise of the touristic demand for forests.

The absence of significant human impacts in Cozzo Ferriero, at least in the last 80 years, allowed the expression of natural dynamics and the formation of structurally complex and rich coenosis.

Nature disasters

No catastrophic natural events are recorded for the last 3 centuries in the archive sources. The abundance of trees with 3 to 4 centuries of age suggests a long period of stability that, coupled to the widespread cessation of loggings after the Second World War, promoted the acquisition of the old-growth status and favored the natural regeneration. Dendroecological reconstructions of the disturbance history evidenced the presence of small gap dynamics interspersed by intense disturbance agents with longer return interval, mainly hard rime (calabrosa) and strong winds. The opening of gaps and patches in the forest canopy is often linked to strong perturbations, often connected to high-mountain beech forests of the Central Apennines.

2.b.11 Italy: Foresta Umbra (031)

Historic development of the forest

Foresta Umbra was a refuge area for temperate tree species during Pleistocene glaciations. In this area, after 11,000 BP, a mixed deciduous forest (mainly *Quercus spp*., also *Corylus*, *Carpinus*, *Fagus*, *Alnus*, and *Betula*) expands. The mixed forest peaks around 7,000 BP (the "Holocene climate optimum"). In the mid-Holocene, a highly diverse Mediterranean forest (with *Quercus ilex*, *Olea*, *Phillyrea*, and *Pistacia*), and a mixed evergreen-deciduous forest are widespread. Tree pollen concentration then falls sharply and the fire frequency increases around 4,400 to 4,000 BP, suggesting a shift towards drier conditions; in this period, herbs and grasses dominate, and *Juniperus*/*Pinus* increase, suggesting a degradation of woodlands to scrub. The rich broad-leaved forests on the highlands of Gargano underwent a severe contraction. Archaeological data record a strong human presence in the area in the Neolithic and Bronze Age, which overlapped with a dry phase around 4,400 BP.

Open landscapes, testified by *Asteraceae* abundance, even increased since 2,700 BP, causing a higher sedimentation rate. Recent centuries are characterized by the highest deforestation rate. Since the Gargano forests persisted through the Holocene, they represent a sanctuary for conserving Mediterranean vegetation.

Human influence

The Gargano has been known since ancient epochs for its vast, sacred woods: the so-called Nemus Garganicus, celebrated by Latin authors. In 1858, De Leonardis still described it as a large, ancient forest, whose remnants are represented today by the Foresta Umbra. The first information on these forests is from the second half of 1500, when the nobleman Girolamo Grimaldi bought the vast territory of Monte Sant'Angelo from another feudatory. His family owned the area for two and a half centuries. The first impact on the forests are thought to have occurred during the Great Famine of 1763–64. In these years, King Ferdinando IV allowed widespread land clearings, and most primeval forests of the hills and plains were converted to agricultural lands. The demographic increase in the 19th century inevitably provoked a higher impact on forests by grazing, fire, and logging. In the 20 years before the unification of Italy (1861), the forest area was halved (111,000 vs. 57,000 ha), and the attack continued for another century. The National Forest Law of 1929 imposed a slowdown of this degradation. During the Napoleonic occupation, Gioacchino Murat dispossessed the goods of Princess Maria Grimaldi for her debts with the State, giving the Foresta Umbra property back to the municipality. The area remained State property even after the Bourbons return and the Unification of Italy in 1861, when it passed from the Regno delle Due Sicilie to the new Regno d'Italia. In 1866, its management was assigned to the Forest Administration (National Law 3713). Intense logging and grazing contributed to forest degradation and loss of forest area during the 19th and especially the 20th century. The installation of Decauville railways promoted forest exploitation at the beginning of 1900 and again in the period 1950 to 1971, following a new demographic expansion. However, the lack of proper road system to access to the upper part of Foresta Umbra facilitated the failure of repeated exploitation projects for the area. Since the 1970s, many people abandoned the surrounding territory and, thanks to new emphasis given to nature protection and the establishment of afforestation programs in the area, forests started to increase again. In 1971 and 1977, the two State Nature Reserves of Falascone and Foresta Umbra, respectively, were established and included in the Gargano National Park in 1995.

Nature disasters

Foresta Umbra has a disturbance regime dominated by small canopy gaps (e.g. 100–500 m^2) alternated to occasional severe events. The complex terrain facilitates the exposure of dominant trees to climate agents. Drought can have effect at this low elevation, especially on large trees growing on rocky areas. Snowfall can be abundant in some years, and its accumulation on branches can occasionally cause crown damage. As both the geomorphology and the aspect of the property protect it from strong winds, they are not a predominant factor in causing localized treefalls or blowdowns of larger patches.

2.b.12 Italy: Monte Cimino (032)

Historic development of the forest

The component part is located close to the Vico volcanic lake; sediment cores were investigated and gave one of the most complete pictures of the last glacial and postglacial vegetation dynamics of the surrounding area of Tuscia.

During the Pleniglacial, a number of fluctuations of angiosperm mesophilous trees suggest the presence of sparse tree refugia in the area. Looking to the last glaciation, the lowest pollen concentration values are recorded at c. 22,000 BP, in agreement to other paleoecological investigations in the other lakes of Lazio. The Lateglacial is characterized by an expansion in the arboreal pollen curves, less pronounced than in other Italian pollen profiles, suggesting a fairly open landscape. The first clear increase of arboreal pollen after the Pleniglacial is found around 11,300 BP. This is preceded by low representation of deciduous *Quercus* accompanied by only sporadic records of other deciduous tree taxa (*Betula*, *Carpinus betulus*, *Ulmus*, *Fagus* and *Corylus*). The Holocene part of the profile is consistently dominated by deciduous oak pollen. No major changes in arboreal pollen composition are recorded, but several marked and sudden declines (e.g. 7,000 BP) suggest that the forest cover underwent dramatic changes. Between approx. 10,300 and 8,200 BP, the deciduous oaks are accompanied mainly by *Corylus*, which attains overall maximum representation, *Tilia* and *Ulmus*. Between approx. 8,200 and 6,800 BP, deciduous oaks always constitute the most important curve. *Fagus* and *Quercus ilex*-type, which attain up to 15% and 12%, respectively, increase appreciably. From approx. 6,800 to 3,900 BP, the composition of the forest appears fairly stable, with clear dominance of deciduous oaks, accompanied by *Fagus*, *Quercus ilex*-type, *Alnus* and many other tree taxa at low percentage values. However, the pollen concentrations show oscillations, with a pronounced drop around 4,300 BP.

Clear evidence for human impact is recorded only when cultivated crops became important (the period of Etruscans, c. 2,600 BP) when the decline in pollen concentration corresponds with records for cultivated plants such as *Castanea*, *Olea* and cereals.

Human influence

The old-growth beech forest of Monte Cimino represents the highest part of the ancient and wild Silva Cimina (Titus Livius, Ab Urbe Condita, Liber IX, 36-39) that for many years acted as a border between the Romans and the Etruscans. It was probably a sacred wood since the Bronze Age. The forest has been managed for a long time as a low-density grazing forest (park-forest for pig feeding and fuelwood production), but during the 19th century its aesthetic and recreational potential increased, because the local community strongly opposed any type of silvicultural intervention. In the last 150 years, the beech forest has been exploited by local people almost exclusively for recreational purposes, and through time has acquired a new ecological and aesthetical value. Loggings occurred only occasionally until 1949, when the northern sector was partially harvested. Since then, no other logging practices have been performed in the forest, so that in the past 60 years the only human impact on the forest has been recreational use and the partial removal of fallen trees.

Nature disasters

The mixed disturbance regime is dominated by frequent single tree-gaps (e.g. 100–200 m^2) alternated to occasional severe events. Wind and glaze storms can cause localized treefall or blowdowns of large patches, both facilitated by the huge dimension of trees in the forest. Among the most severe events recorded, in the spring 1997 a glaze storm, associated to an extremely strong northern wind, simultaneously killed many trees on the northern slope, opening many patches (one about 0.5 ha, still open). Other large patches opened especially on the western slope in 1999, with the hurricane Lothar.

2.b.13 Italy: Monte Raschio (033)

Historic development of the forest

The vegetation dynamics of the component part and the surrounding territory can be inferred from the pollen diagram of Lago di Martignano, providing an 11,000-year record of vegetation and environment change. The earliest pollen spectra are dominated by a late glacial steppe vegetation (*Artemisia* and *Gramineae*), typical of the Mediterranean region. The initial steppe-like vegetation indicates an environment subject to extreme seasonal temperature range, but there are also evidences of the apparent survival of some tree taxa at intermediate altitudes. Broad-leaved forests were established by approx. 11,000 BP and although *Quercus* initially dominated their canopy, a wide range of other mesophilous trees (*Fagus*, *Ostrya*-type, *Carpinus betulus*, *Ulmus*, *Tilia*) were also present with generally lower pollen values. The rapid replacement of steppe-like communities by mesophilous forests indicates that a period of protracted summer drought no longer occurred. The occurrence of sclerophyllous taxa continued to be restricted, probably limited by the competition with more mesophilous ones, rather than by their intolerance of low winter temperatures; they likely occupied more drought-prone microhabitats. After 7,000 BP, however, sclerophyllous taxa begin to increase and rise to a peak of >40% of total land pollen (c. 6,700 BP), with *Olea europaea* being the most abundant taxon. Human influence on vegetation becomes significant somewhat after this peak, with progressive clearance of woodland and expansion of grassland communities. After the Neolithic, pollen values of *Ostrya*-type and *Alnus* increased, whereas those of *Fagus* and *Carpinus betulus* showed little changes; pollen values of *Quercus* (deciduous) show the greatest decrease. Pollen from *Castanea sativa* and *Juglans regia* is consistently recorded concurrently to the rise of pollen production by characteristic taxa of Mediterranean scrub communities. The same occurred for arable crops, whose pollen values increased progressively after approx. 5,500 BP.

Human influence

One of the oldest Neolithic bank villages of Western Europe has been found in this area. A significant population growth occurred in the Etruscan times thanks to improved agricultural techniques, drainage pipes, and the impulse given to trading by the constructions of the first road infrastructures. However, the persisting dense forest cover prevented for centuries the Romans to occupy the area. Only with the conquest of Caere (273 BC), the Agro Sabatino gets into full possession of the Romans that changed the agricultural system from the “landscape of the settlers” to the “landscape of the villas”, based on extensive farming. Large estates and small rural centers distributed on a wild and rural landscape have persisted more or less unchanged until modern times. Important economic changes took place around 1950–60 with urbanization and tourism activities. In this framework, the northern sector of the Sabatini Mountains (where the Monte Raschio beech forest grows) is characterized by the persistence of large woods, latest remnants of the ancient Silva Cimina. Here an economy based on timber extraction and wild breeding pigs persisted for millennia. After the institution of the Regional Park, site management became more focused on tourism and nature conservation.

Nature disasters

The forest is characterized by a widespread dominant cohort which started to die in the last decades. Natural treefall gaps are increasingly forming after localized disturbances (e.g. strong winds). Wind and drought, facilitated by the large dimension of trees, can both cause tree death. The disturbance regime is thus mixed, with frequent single tree-gaps (e.g. 100–200 m^2) alternating to occasional severe events (>500 m^2). The management plan should consider the risk of forest fires, and prevention of human fires should be implemented in the area.

2.b.14 Italy: Sasso Fratino (034)

Historic development of the forest

Paleoecological studies across the Northern Apennines showed that during the period 8,000–6,100 BP, a mixed *Abies-Fagus* forest succeeded *Abies* dominated woodlands. The rising spread of *Fagus* was not homogeneous among sites, probably due to both local environmental factors and different levels of interference by human activities. Archaeological records for the Late Neolithic and throughout the Copper and Bronze Ages (up to 2,900 cal BP) support the paleoecological evidences of a widespread interference of pastoralism in natural forest dynamics. The creation of upland pastures and farmlands, as well as the utilization of woodland fodder for domestic animals as part of a transhumance-based husbandry, became increasingly significant after 3,500 cal BP. During the Roman time, *Abies alba* was selectively exploited in some valleys. Although there were temporary periods of forest restoration in humid and cool climate phases, the main trend was one of increasing forest alteration and landscape changes connected to human land-use. The exploitation reached a peak during the Middle Ages when, in coincidence with a warmer climate, it resulted in the progressive decline of *Abies*, *Ulmus*, *Fraxinus* and *Tilia* across most of the landscape. Such species are preserved today in the Sasso Fratino forest.

Human influence

At the beginning of the year 1000, the Foreste Casentinesi, including Sasso Fratino, formed a hunting reserve of the Guidi Counts. Between 1380 and 1440, their ownership passed to the Republic of Florence, that assigned the property to the Opera di S. Maria del Fiore, an organization in charge of building the Dome of Florence. In this period, logging was allowed only after a written permit, but rarely occurred in Sasso Fratino (where few trees were harvested). The forest was largely preserved until 1700, when the growing populations in Romagna started to exploit its lower part in spite of prohibitions. The problem exacerbated with the Grand Duke Pietro Leopoldo who, with an act in 1780, allowed for the first time to exploit forests up to the Apennines ridge. In 1818, Foreste Casentinesi was assigned as emphyteusis to the Monks of Camaldoli, who did not stop the widespread forest degradation. To stop the forest over-exploitation, the Grand Duke Leopoldo II asked the Bohemian foresters Anton Seeland and Karl Siemon to prepare a report on the status of Foreste Casentinesi, and suggest the actions needed for their restoration. They highlighted the existence of remote areas, such as Sasso Fratino, difficult to reach but with abundant mature and old-growth beech trees. The Grand Duke then assigned the forests to the Royal Property and appointed Karl Siemon as manager, who greatly improved the overall quality of the forests. In 1900, a large part of the Foreste Casentinesi was sold to Ugo Ubaldo Tonietti, who heavily exploited the area with intensive cuttings, but without reaching Sasso Fratino. In 1914, the forests became a state property, managed by the Azienda del Demanio forestale di Stato. Its Director, Dr. Sansone, noted the old-growth forest remnants within the property, thanks to its inaccessibility. The 1934 Forest Management Plan reported that Sasso Fratino was never really exploited due to the lack of forestry roads. Thanks to its naturalistic value, in the 1950s Dr. Fabio Clauser suggested that Sasso Fratino was to be excluded from any logging and rather destined to a strict preservation. In 1959, together with Prof. Pavan and Prof. Gösswald, he achieved that a first portion (45 ha, plus a 65 ha buffer) of Sasso Fratino became the first strict reserve in Italy. Between 1972 and 1983, thanks to Prof. Padula, the Reserve was expanded to more than 700 ha.

Nature disasters

The main disturbance agents in the Sasso Fratino forests are wind, snow and landslides. Windfall occurs frequently, as cold, northern wind can reach speeds up to 200 km/h. Disturbance can generally open moderate size gaps (<1,000 m^2). Dendroecological studies documented that periods of widespread mortality are rare: the last important one occurred at the end of the 18th century during the so-called Maldà Anomaly. Glaze storms are also a concurrent cause of tree death, and both factors become increasingly important with elevation. Beech responds well to these disturbance events, forming almost pure stands at higher elevations. At lower elevations, these factors are less pronounced and forests are taller and mixed. Larger severity disturbances (>1,000 m^2) are extremely rare. In 1983, the Property was affected by a 1.7 ha landslide (between 1,000–1,280 m.a.s.l.), that swept away a part of the forest. It is currently under colonization by grasses and shrubs, together with *Ostrya carpinifolia*.

2.b.15 Poland: Bieszczady (035, 036, 037, 038)

Historic development of the forest

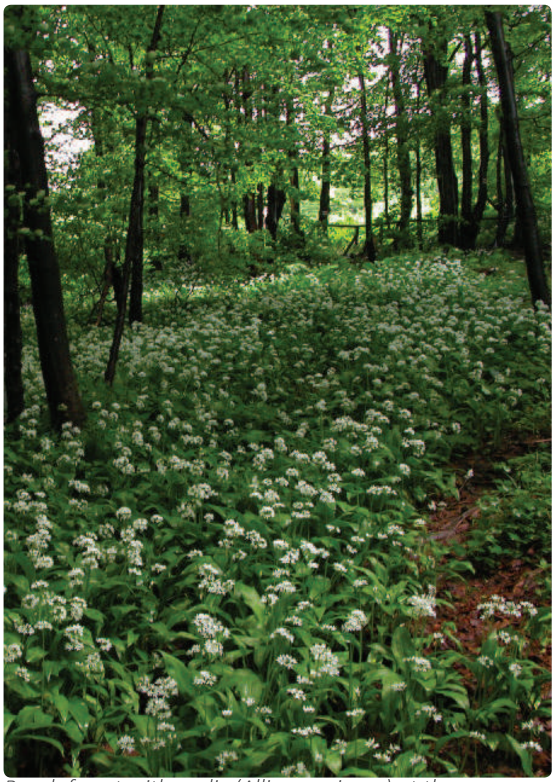
A pollen analysis was carried out at the Wołosate and Tarnawa peat bogs. After the last glacial period, forest succession started 10,000 BC at lower elevations. During the Alleröd period, sparse subalpine larch-Arolla pine forests with Scots pine and addition of spruce probably reached the altitude of 800 to 1,000 m. 8,250 BC, the forest cover decreased and the upper forest limit descended to 700 m.a.s.l. At the beginning of the Preboreal period (8,250 BC), Arolla pine-larch forest with Scots pine developed to be later pushed up to higher elevations by expanding Scots pine forest with spruce, and later with witch elm. During the Boreal period (7,100–5,700 BC), forests with mountain elm predominating began to appear on mountain slopes, on fertile and moist soils; shallow, poor soils were occupied by Scots pine forests.

In the Subboreal period (3,100–300 BC), a gradual increase in humidity occurred. Elm-hazel forest communities turned into woods with the predominance of hornbeam and beech. In the younger part of the period, silver fir started to expand. Spruce generally occupied the moist and cold bottoms of valleys and occurred as an admixture in other forest communities.

During Subatlantic period (2,300 BC–1950 AD) silver fir penetrated the beech woods at lower mountain elevations, and the spruce forests in some colder valleys.

Human influence

The archaeological and therefore paleoecological investigations ascertain the traces of human in Western Bieszczady in the Neolithic period. Colonization of the Bieszczady Mountains was begun in the 15th century. During the next bicentenary, the settlement was intensively developed. In the 17th century, as a result of the wars, the incursions of the Tatars social conflicts and also plagues, the profound regress of the colonization followed. In the course of the 18th century, the political and economical situation influenced the redevelopment of the villages, and the forest areas were further decreased. In this period, the first wood processing plants were founded, but their influence on the forest area's exploitation was probably negligible. In the 19th century, the extended demand of wood and larger availability of the range caused that considerable areas of the beech forests were felled and spruce was often seeded on the logged areas. At the beginning of the 20th century, the forest narrow-gauge railways were built, which made considerable areas of the mountains available to exploitation. After the Second World War to the present, this range was depopulated.



Beech forest with garlic (Allium ursinum) at the upper limit of the forest. Picture: S. Kucharzyk

Nature disasters

A significant part of the forests in Bieszczady National Park (BNP) provides an example of a regenerative process (at the moment 80 years) of beech forests after a large disturbance, an extremely cold winter in 1928/29. This winter had caused a large-scale decline of beech and fir stands in this region. Frost cracks, cambium decline, and disease changes inside the stem, connected with the occurrence of frost hardwood in beech trees and the so-called mist hardwood in fir trees, were the immediate effect of low temperatures. Insect pests and fungi occurred in mass in weakened stands. The disease process developed during several years, proceeding from lower locations toward higher grounds. The large-scale stand decline initiated by the frost contributed to the fir decline and it impacted on the increase of the share of pioneering (rowan) and post-pioneering (maple) species in stands. The share of beech did not change because beech regeneration developed on the place of quickly declining stands.

2.b.16 Romania: Cheile Nerei-Beușnița (039)

Historic development of the forest

The southwestern part of Romania constitutes one of the major ways of migration for beech after the Ice Age, from the south and southwest (the area of Croatia today, which was one of the refuges), approx. 5,000 years ago. *Fagus* became dominant (according to pollen records) from Middle Subboreal up to the present, reaching the maximum of 60% of pollen during Late Subatlantic period and being dominant since then.

The small mountain region of southwest Romania was not disturbed by human activity until the end of the middle ages. After the Austro-Hungarian conquest of the area, during the 18th and the 19th century, the forestry management system was applied to many forests in the region, affecting their natural structure and stability: many virgin forests became even-aged stands and some of them were used to establish coniferous plantations.

After the nationalization of all forests in 1948 (made by the communist state), a major technological change appeared: the mechanization of forestry operations and road building. These new technologies allowed the opening of isolated forest basins for logging; many virgin forests were transformed into managed forest during that period.

After 1950, some parts of the middle Nera basin were logged; the forests lost their naturalness, they became more and more even-aged and their composition was altered (sessile oak was partially replaced by lime and hornbeam, and in the mountain area, beech expanded very much).

The nominated component part, being located in an isolated, inaccessible mountain area, was not disturbed by major anthropogenic activities.

Human influence

The first human influences in the area occured during the Bronze Age. The very large area of beech forests from the Banat Mountains (Southwest Romania) was then undisturbed during millennia. During the Middle Ages, the first minor human impacts on the forests were placed in the area by the population of the villages from the middle Nera basin (Almajului Valley).

Most forests were managed by the Austrian forestry system, during the time of the Austro-Hungarian Empire. Large forest surfaces were transformed into even-aged forests in the Banat region, however, large areas still remained in a natural state as they were inaccessible. During the communist period, the technology changes allowed mechanized road building and forest harvesting, which resulted in many forests becoming even-aged forests.

Despite logging in the surrounding basins of the nominated component part, this forest was never affected. Before the establishment of the current protection regime, some of the forests from the nominated component part were managed (from the forestry point of view), but nowadays the proposed area is a Nature Reserve (no intervention) included in a National Park. Inside the nominated component part there are small surfaces of secondary meadows, some are traditionally managed and some are abandoned.

Nature disasters

The beech forest is very stable in time and space, there are no natural disasters recorded. However, in the past, forest fires were recorded in the vicinity of the protected area, most probably caused by humans.

2.b.17 Romania: Codrul Secular Șinca (040)

Historic development of the forest

According to the historical data recorded in the forest management plans (e.g. the last 60 years), the component part was unaffected by human influences, as a consequence of the inaccessibility of the area. Before that the forests were managed based on some brief silvicultural plans which served the interest of the local forest owners, mostly fire wood being harvested from the nearby more accessible stands. Long period forest records are missing but recent dendrochronological series analysis conducted in the site found trees more than 500 years old, indicating that this forest was not affected by human intervention for the last centuries.

Toad (Bufo bufo) in Sinca forest. Picture: RPL OS Padurile Sincii RA

Human influence

The component part is the most significant and representative undisturbed primeval beech forest in the Southern Carpathians. Concerning the recent history, before 1948 the forest was the property of Şinca village. Since the forest was inaccessible, no silvicultural interventions were undertaken. Alter 1948, once the communist regime had gained power, the forests were nationalized. The first Forest Management Plan was elaborated in 1953. During the communist period, the technology changes allowed mechanized road building and forest harvesting. During the 70s of the last century, a forest road was constructed that passes the nominated component part. Despite logging in the surrounding basins of the proposed component part, the forest of Codrul Secular Șinca was not affected, it was preserved. After the Romanian revolution in 1989, the forest was returned into the property of Sinca village and currently is under the administration of the private forest district RPL OS Padurile Sincii RA.

Massive beech tree.
Picture: I.A. Biris (INCDS-Marin Dracea)

Nature disasters

The forest is in an advanced stage of dynamic balance reached over centuries of natural evolution, with complex uneven structures comprising all the development stages in a mosaic pattern with century-old elements, thus very stable to biotic disturbing factors like windfalls, windbreaks or insects/pathogen attacks manifesting a minor impact. The driving forces that shape the forest are occurring naturally; the old trees begin to dry and fall once they reach the physiological limit. The surrounding managed forests are generally affected with low impact by drying, windfalls and windbreaks. However, in 2015, a large forested area (dozens of hectares) was damaged in nearby beech stands by frozen rain and snow, but the nominated area was not affected. Recent studies in the area showed that the structural patterns of beech and silver fir suggest the stability and resilience of the Codrul Secular Șinca forest (PETRIŢAN et al. 2015).

2.b.18 Romania: Codrul Secular Slătioara (041)

Historic development of the forest

Before the beginning of the 19th century, no human influence is known in the area ("virgin" forest), certified in the published paper of Adolf Knight of Guttenberg ("Bericht über die Excursion des Österreichischen Reichsforstvereines in die Bukovina und der 42-ten Wanderversammlung desselben in Czernowitz (13-21 Juni 1897). Redigiert von Adolf Ritter von Guttenberg, Wien 1897"), who visited this zone together with a delegation of the Foresters Association of Austria from the 13th to the 21st June 1897.

Both Slătioara (274.27 ha) and the Todirescu meadows (44.43 ha) were declared as nature monuments in 1941. In 1955, the forest reserve was redesigned into a 333 ha core area, surrounded by a 530 ha buffer zone, including also the 44 ha of the floristic reserve Todirescu. Since 2000, the extended area (core and buffer) of the forest of Slătioara comprises 1,064.20 ha.

Deadwood in runway. Picture: C. Tomescu

Human influence

No direct influences are known to have affected the nominated component part. In 1930, at the lower limit of the Slătioara reserve (now in buffer zone and outside of the nominated area), 7,200 m^3 of wood were harvested. Inside the forest, two trails are marked for tourism purposes.

Nature disasters

No particular signs of natural disasters can be identified within the area.

2.b.19 Romania: Cozia (042, 043)

Historic development of the forest

The paleoenvironmental researches in the Southern Carpathians indicate significant differences regarding postglacial vegetation dynamics comparing with chronologies for other regions of Europe. The first difference is the early and rapid expansion of *Pinus* and *Betula* in Lateglacial period and later of *Picea* and *Ulmus* in detriment of open ground vegetation. Secondly, *Tilia*, *Fraxinus*, *Acer* and *Quercus*, and later *Corylus*, expanded in the region establishing dense mixed *Corylus* and *Picea* dominated forest, with some *Pinus*, *Ulmus*, *Quercus*, *Tilia*, *Fraxinus* and *Acer*. In the Southern Carpathians, these species played a more important role and for a longer duration (c. 11,250–5,750 BP) than in other regions of Central and Eastern Europe. Thirdly, the period between 5,750 and 4,800 BP is characterized by the establishment and expansion of *Carpinus*, which rapidly became dominant in the region for a short period of time, as a response to higher temperatures and humidity. At 5,200 BP, *Fagus* became locally established and expanded as a result of moist climatic conditions. From 4,000 cal. BP to the present, *Fagus* dominated the woodlands, and all other deciduous trees (except for *Carpinus* and *Quercus*) became greatly reduced. Evidence of human influence on the local vegetation is low for this time period.

Human influence

Archaeological vestiges show that the depressions surrounding the Cozia Massif have been inhabited since polished Stone Age. The rocky steep slopes of the mountains and the narrow Olt Defile with thresholds represent the natural protective shield of Cozia. However, in the year 105 AD, on the way to the capital of Dacia, the Romans under the rule of Trajan emperor avoided the cataracts and the rocky steep slopes of Olt strait circumventing through the eastern part. This road built by romans was used until the 18th–19th century known as “Loviștei road”. Although after the year 123 AD, from the order of Hadrian, roman emperor a new road was dug into the rocks with numerous wood bridges cast in stone on the left shore of the river Olt. This road was no longer used after the Roman retreat from Dacia. Starting with the Roman until the medieval period, in relation with the relief conditions, the human settlements developed in the depressions located at the south (Jiblea-Berislăvești Depression) and to the north (Loviștei Depression, called Terra Losytha by the Romans), with no influence on the natural environment and ecosystems of Cozia. The only settlements from Cozia massif were few small hermitages and the houses of some solitary monks. So the forests were preserved in their primary status. During the medieval period, Cozia massif was offered as a gift to neighboring monasteries and hermitages from by the rulers of Wallachia, and the more accessible areas as collective forests to the inhabitants of the local villages. After the secularization of monastery properties in 1864, the most extended part of Cozia forests were attributed to the Romanian state which possesses them also at present. Although after the year 1900, some isolated and extensive exploitation of forests has occurred in the area, the forests of Cozia have remained untouched until present due to the lack of access roads, dynamic relief and erosion or landslides. In the year 1966, Cozia Massif was declared Natural Reserve. The protective status was enforced by declaring the Cozia National Park in 1990.

Nature disasters

The main disturbing factor that influences the forest dynamics are the landslides. These events have an isolated character and occur on small surfaces (0.1–1 ha), more frequently on the steep mountain slopes that margine the Olt Defile and Lotrișor Valley. In winters with abundant snowfalls, stands are affected by endemic windthrows and windsnaps on small surfaces. As a result of natural successive processes, the gaps that appeared in the stands are covered by pioneer species and light demanding species at first stage and later by climax species. These natural processes contribute to the increase of the compositional and structural heterogeneity of forests alongside with processes of elimination of dead trees and regeneration representing the main driving forces of forest dynamics in the component cluster.

2.b.20 Romania: Domogled-Valea Cernei (044, 045, 046)

Historic development of the forest

The nominated component parts are characterized by a high amplitude of altitudes (160–1,620 m.a.s.l.), therefore the area of beech forests is quite extensive, limiting in contact with subalpine. These forests are also interesting in terms of climatic changes resulting in the movement of beech forests to higher altitudes. The component parts represent on-going ecological processes (Glacial refuge area, postglacial beech forest expansion in Europe).

For this cluster, no pollen analysis has been performed. Pollen analyses were performed for Izvoarele Nerei component (which is located in the southwestern Carpathians of Romania and relatively close to Domogled-Valea Cernei).

The pollen analysis showed that the southwestern part of Romania constitutes one of the major ways of migration of beech after the Ice Age from the south and southwest (the area of Croatia today, which was one of the refuges), approximately 5,000 years ago. *Fagus* became dominant (according to pollen records) from Middle Subboreal up to present, reaching the maximum of 60% of pollen during Late Subatlantic period and being dominant since then (RÖSCH & FISCHER 2005).

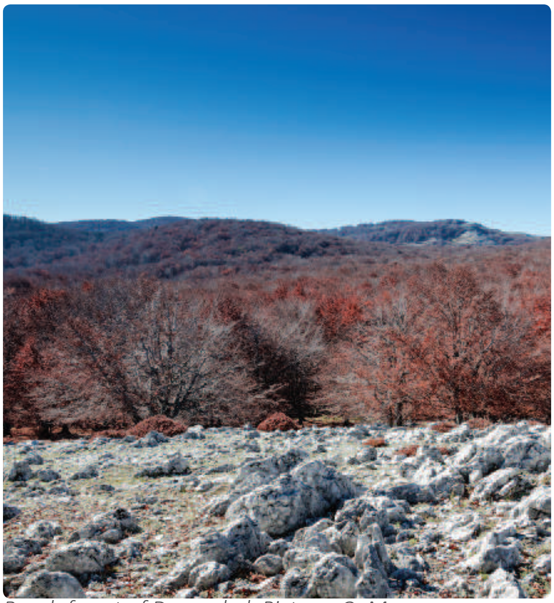
Human influence

Human presence is attested on the Valea Cernei since the Paleolithic era. Objects found in the cluster in archaeological excavations attest the dawn of Geto-Dacian civilization in the Iron Age. Supposedly, Baile Herculane was founded by Trajan Emperor, between 102 and 117 AD, due to the thermal springs in the area.

Until 1880, forests were fully owned by the Austro-Hungarian rulers. Forest management until 1948 was done according to existing management plans excepting peasant properties, which were managed inefficiently without silvicultural concerns. After 1918, the Austro-Hungarian Empire forests turned over to the Romanian state, which administers the Autonomous State Forests House.

However, due to the steep slope of Cerna Valley, the area remained sparsely populated. Most of the forests have remained inaccessible due to lack of roads and rocky slopes.

In 1932, Mount Domogled Reserve was established among the first reservations set up in Romania. After nationalization in 1948, the forests have become fully owned by the state. Since 1952, the forests were uniformly managed using forest management plans, which operated with forest management units (each unit being a small river's basin, geographically separated by others).



Beech forest of Domogled. Picture: O. Merce

Nature disasters

There are no evidences of major disturbances. Only litter fires have affected the forests as natural disasters. They do not pose a serious threat for the woody vegetation (trees), but they affect the herbaceous flora and part of the fauna, which leads to reduced overall biological diversity.

The decreasing precipitation related to global warming during recent years has had a negative effect on the forest vegetation in the National Park (especially on *Pinus nigra ssp. banatica*).

2.b.21 Romania: Groșii Țibleșului (047, 048)

Historic development of the forest

FEURDEAN (2005) argued a forest appearance during Lateglacial/Holocene transition. At about 11,250 BP forest consisted of *Ulmus* and some *Picea*, *Betula* and *Pinus*. *Quercus*, *Tilia* and *Fraxinus* expanded (approx. 10,750 BP), followed by *Corylus* (at approx. 10,200 BP), which became dominating until 5,750 BP. *Fagus* became locally established (at 5,200 BP), and expanded later (approx. 4,800 BP), possibly as a result of moist climatic conditions. *Fagus* dominates the woodlands from 4,000 BP to the present. According to the historical data recorded by the forest management plans (e.g. the last 50 years), the component part was not affected by extensive human influences. Signs of some past extractions due to windthrow or insect attacks could be observed in small patches in the buffer zone.

General view of mixed stands in Groșii Țibleșului Forest. Picture: Forest District Groșii Țibleșului

Human influence

The component part consists of large areas of forest undisturbed by humans. Few disparate wood extractions, in small patches, were most likely affected by windfalls in the areas. Some isolated maple and silver fir trees present incisions on the trunk, a test method for domestic traditional wood, especially used to derive roofing shingles. At present, inside the forest, two trails are marked for tourism purposes.

Beech forest on steep terrain. Picture: H. Kirchmeir (E.C.O.)

Nature disasters

Even aged patches of forest suggest influence of the windstorms within the area.

2.b.22 Romania: Izvoarele Nerei (049)

Historic development of the forest

The southwestern part of Romania constitutes one of the major ways of migration of beech after the Ice Age, from the south and the southwest (the area of Croatia today, which was one of the refuges), approx. 5,000 years ago. *Fagus* became dominant (according to pollen records) from Middle Subboreal up to present, reaching the maximum of 60% of pollen during the Late Subatlantic period and being dominant since then (ROSCH & FISCHER 2000).

The small mountain region of Southwest Romania was not disturbed by human activity until the end of the Middle Ages. After the Austro-Hungarian colonization of the area, during the 18th and the 19th century, the forestry management system was applied to many forests in the region, affecting their natural structure and stability: many virgin forests became even-aged stands and some of them were used to establish coniferous plantations (ROSCH & FISCHER 2000 and BANDIU et al. 1995).

After the nationalization of the forests made by the communist state in 1948, a major technological change appeared: the mechanization of forestry operations and road building. These new technologies allowed the opening of isolated forest basins for logging; many virgin forests were transformed into managed forests during that period.

The nominated component part, being located in an isolated, inaccessible mountain area, was not disturbed by anthropogenic activities, except for occasional hiding of the villagers during the Turkish invasions in the past and occasional trespassing of the shepherds and their animals.

Human influence

The first human influences in the area occured during the Bronze Age. The very large area of beech forests from the Banat Mountains (Southwest Romania) was undisturbed during millennia. The first major human impact was the colonization of the Austro-Hungarian Empire in the 18th century (Germans, Slovaks, Czechs, etc. were settled there), when new villages were created (Valiug, Garana-Wolfsberg, Lindenfeld, etc.), and large areas of forests were cleared for agriculture and pasture lands. The Empire gave the forests to the local communities to manage them as a resource, in exchange for defending the Eastern borders of the Empire when necessary. Wood harvesting occured still at low intensity and mainly near the localities. During the 19th century, the Company of Factories and Domains Resita was created, in order to mine in the area; they created forest management on large areas and many forests were converted from natural to managed forests; however, large areas still remained inaccessible. During the communist period, the technology changes allowed mechanized road building and forest harvesting, so many forests became even-aged forests. The area of the nominated component was not disturbed along history. Nowadays it constitutes a 'no intervention' Reserve included in a National Park.

Nature disasters

The beech forest is very stable in time and space, there are no natural disasters recorded. However, a relatively small forest fire was recorded at the beginning of the 2000s, most probably caused by humans (shepherds). In the area close to the tree line, at high altitudes, the snow layer persists for long periods (even 5 months/year); also early frosts and snows (in autumn) and late frosts (in spring) occur every few years.

2.b.23 Romania: Strâmbu Băiut (050)

Historic development of the forest

FEURDEAN (2005) argued a forest appearance during Lateglacial/Holocene transition. At about 11,250 BP, forest consisted of *Ulmus* and some *Picea*, *Betula* and *Pinus*. *Quercus*, *Tilia* and *Fraxinus* expanded (approx. 10,750 BP), followed by *Corylus* (at approx. 10,200 BP), which became dominating until 5,750 BP. *Fagus* became locally established (at 5,200 BP), and expanded later (approx. 4800 BP), possibly as a result of moist climatic conditions. *Fagus* dominates the woodlands (from 4,000 BP to the present). According to the historical data recorded by the forest management plans (e.g. the last 50 years), the component was safe from extensive human influences. Signs of some past extractions due to windthrow or insect attacks could be observed in small patches from the buffer area.

Terminal development stage of beech forests. Picture: V. Radu

Human influence

The oldest archive documents indicate that before 1769, the forests of the component were Gherla domain. Thereafter, they became the property of some Hungarian barons, from which they were subsequently confiscated by the Hungarian state for tax debts. The documents mention that a number of settlers in the region benefited of ancestry rights, they were allowed to lead their cattle to grazing in the forest and could use brushwood fire. In 1924, with the agrarian reform, the ownership of forests was divided between the local community and the Romanian state. From 1948 until now, the forests are state managed by the Forest District Strâmbu Băiut. The component, state property according to history, consists of large areas of forest undisturbed by humans, due to the inaccessibility and the lack of roads. Few disparate wood extractions, in small patches, were, most likely in the areas affected by windfalls. Some isolated maple and silver fir trees present incisions on the trunk, a test method for domestic traditional wood. At present, inside the forest, two trails are marked for touristic purposes.

Winter view of Strâmbu Băiuț. Picture: V. Radu

Nature disasters

The windstorms do not occur regularly in the aea, but the rare events can cause large windthrows. The last event, in 2005, did not affect large patches in the forests of the component part, but created small even-aged patches.

2.b.24 Slovenia: Krokar (051)

Historic development of the forest

Palynological research shows the general development of forest vegetation. The development of Fir-Beech forests reaches back to 9,000 to 11,000 years ago. It is assumed that the area of the Virgin Forest Krokar was an important glacial refuge. In the lower areas, the conditions were too dry, in the higher areas too cold. The area of the Dinaric Mountains is not suitable for agriculture, so the permanent land use cover was forest. Due to inaccessibility and distance to the wood market, the logging in the area took place relatively late, after the 1850s. The territory of Kočevsko was settled by German farmers under the Counts of Ortenburg in the 14th century. It was difficult to colonize enough productive land for settlements and fields. Despite numerous Ottoman attacks that took place in the region, new villages were built. In 1471, the town of Kočevje was elevated to a city. The right to sell goods outside the territory was granted to the people of Kočevje in 1492. There were also artisans and some forest workers who produced charcoal and potash for glass production. At home, mostly women and children were farming for their own needs and benefits for landlords. The Kočevsko estate was passed from hand to hand of different owners; 1641 bought the country family Auersperg, who built the castle in the city. A ban on trading and the end of the feudal system in the 19th century stopped the development of Kočevska. The difficult life conditions forced many people to leave the area. The continuous population decline ended with the eviction of 12,000 people of German nationality by war promises in the years 1941/42. Villages abandoned during the Second World War never revived again and the forest covered the land again after 600 years of human presence.

Human influence

There are only scarce traces of human influence in the Kočevsko forests: some stone weapons were found from the hunters of the Ice Age in the Željnje cave, some traces from Bronze Age and market pathways from the Roman Empire. In the area of Virgin Forest Krokar, stronger human influence never took place. Due to inaccessibility and informal protection of the most parts of Borovška Gora at the beginning of forest management in the late 19th century, the Virgin Forest Krokar area remained largely untouched. There are no visible traces of the logging; the only exception is a narrow band representing the border between two cadastral entities.

Peak Krokar (Raven). Picture: Slovenia Forest Service

Nature disasters

In the Virgin Forest Krokar, no bigger natural disasters occurred in the past.

2.b.25 Slovenia: Snežnik-Ždrocle (052)

Historic development of the forest

The territory of the southeastern edges of the Alps, which includes the Snežnik mountain range, played a very important role in the history of Central European vegetation. Periodic glaciation has influenced movements of Northern and Central European flora from north to south, hitting the impenetrable barrier of the Alps. Although the Snežnik mountain chain was also covered by ice during the glaciation, the high species diversity of the area was maintained. Around 10,000 years ago, the vegetation has started to rapidly spread northward and to higher areas. Among the tree species, the area was initially covered by pine mixed with birch, afterwards by mixed oak forest, which was followed by a predominantly beech forest. In this region, the beech has achieved a dominant share in the tree composition of the forest already around 8,000 years ago, which was not the case in the Alps in that period. Silver fir has slowly achieved the higher percentage in the beech forests over the next 2,000 years. The Beech has maintained a leading position in most of the territory of present-day Slovenia, except in the lowlands dominated by oak and with a large proportion of spruce at higher altitudes. In the last 2,500 years, the tree structure of forests in the lowlands has changed significantly due to human impact. In the least accessible areas, such as the proposed area, this impact reached only recently; some areas remained untouched.

Human influence

Pivška kotlina, which lies on the western foothills of Snežnik Mountains, is known as the oldest inhabited area of today's Slovenia, as traces of prehistoric man were discovered in the caves. More traces of the population from the broader lowland area were found from the Iron Age and the times of Japodes and Celts. The Romans crossed the mountains Javorniki and Sneznik in an altitude of around 1,000 m while they were marching eastward. The Slavs settled in this region between the 6th and 8th century. By the end of the 15th century, they had initially settled the lowlands and later mountainous areas up to 1,000 m.a.s.l. The forests were removed mainly by burning with the aim to acquire the arable land and pastures. In the area of Snežnik, sheep were herded only during the summer until the end of the 19th century, when the grazing was prohibited. The charcoal production was most intense between the First and Second World War. There are data about forest logging on accessible parts of the component part in the period 1900 to 1980. In the component part, some wildlife management activities are carried out. Despite the presence of humans in this area, some parts of the component part have remained intact and represent the primeval character of the forests from the past.

Subalpine beech forest. Picture: Š. Habič

Nature disasters

In the area of the forest reserve Snežnik-Ždrocle there are no traces of natural disasters. Nonetheless, form, structure and species composition of vegetation bear witness to the extreme climatic conditions (strong wind, abundant precipitation, especially snow, low temperatures).

2.b.26 Spain: Hayedos de Ayllón (053, 054)

Historic development of the forest

In the Spanish Central Range, the beech forest meets its Iberian southern limit. From a paleobotanical point of view, little is known about the Sierra de Ayllón. This massif has few pollen sequences, and furthermore, they are all shallow. In Pelagallinas bog (Condemios, Guadalajara), a pollen analysis was carried out (FRANCO et al. 2001). This place is located on the northern side of the Alto Rey range, at an altitude of 1,340 m, relatively close to the beech forests of Tejera Negra.

The analysis revealed that *Fagus* has been present at the site of Pelagallinas for at least 3,700 years. Also, there are data from *Fagus* presence in other relatively close sites, such as the Pico del Lobo (1,170 BP), but they are not as old as in Pelagallinas. The constant presence of *Fagus* from the base of the record in the Pelagallinas pollen diagram may be related to the current woods of this species in Tejera Negra, just 25 km from the site of sampling.

These new data allow to change, at least in part, the hypothesis postulated by COSTA (1990) about a recent expansion of beech in the last 1,000 years to the current beech manifestations in Ayllón massif, in the Central Range. In contrast, data from Pelagallinas seem to reflect the existence of a glacial refuge area for this taxon in the area.

Human influence

Major changes in vegetation that have taken place in the Sierra de Ayllón in the past 4,000 years appear to be associated with the existence of forest fires, probably of anthropic origin. Human influence has intensified since 2,500 BP through the destruction of forests as a result of a lengthy and intense period of grassland exploitation. Livestock transhumance had a heavy influence on the landscape in this area until a few decades ago. That is the cause of the vast scrubland extension in the landscape. In the period between 1950 and 1965, a big afforestation program was conducted in the area, mainly with *Pinus sylvestris*. Recently, observations suggest that in some places, the beech regeneration is progressing under the protection of these pine afforestations.

Regarding the beech forests, the two selected component parts are very different and even contrasting concerning their ecological conditions and the human influence through the time. Tejera Negra has a past conditioned by its history being a private property. On tender slopes, intense charcoal logging was carried out, on a coppice system, with special intensity in the 1850 to 1950 period. But high altitude krummholz formations and strait riverine positions were excluded from the general forest exploitation and remain natural.

In contrast, Montejo de la Sierra beech forest, at lower elevations, was a medieval open forest (dehesa) with big pollarded trees. It remained a grazed forest until the 20th century. By 1960, cattle was removed, and a rapid, still ongoing, process began, with young beech recruitment around the old trees (oaks, beeches and Mediterranean oaks). The last episodes of commercial logging of trees in Montejo de la Sierra were in 1951 (100 trees) and 1959 (350 trees). Soon after, this component part was designated as reserve.

Currently, one of the main reference points for “green” tourist use in the area is Montejo de la Sierra beech forest, but also in Tejera Negra a growing recreational use can be seen.

Nature disasters

Since grazing was excluded from Montejo de la Sierra beech forest, quick changes began to happen: a new generation of beeches filled the gaps and a major fraction of old trees were dying, standing or thrown by the wind. This process leads to a more natural forest with significant amounts of deadwood and a more heterogeneous structure. In Tejera Negra, major beech forest changes happened in a similar way: the lack of exploitation leads to a renaturalization of old coppiced forest structures. In any case, on the selected component part in Tejera Negra, human influence was much lower and dynamics are driven by lesser natural disturbances than in Montejo de la Sierra beech forest, maintaining woodland renewal through single-tree mortality. Climate change is one of the most important risk factors: in the last years, water stress has led to an increased death rate of beeches, especially striking on old trees, in areas with little soil (rocky slopes) and on outer edges of riverine beech formations.

2.b.27 Spain: Hayedos de Navarra (055, 056)

Historic development of the forest

After the Ice Age, forest expansion began through birch and Scots pine. During the Atlantic period (8,000–5,000 BP), when weather conditions improved, oak forest became dominant in the region.

After the Tardiglacial, beech began to expand: In contrast to older hypotheses about spreading of *Fagus* from east to west, arriving and crossing the Western Pyrenees around 4,000 to 5,000 BP, latest research suggest the existence of lowland refugia in this area. Some protected areas with warmer microclimatic conditions would have allowed the permanence of some beech bastions.

CAROZZA (2005) has discovered *Fagus* pollen from 5,500 BP in Quinto Real (the forest massif to the west of the nominated component part). MAGRI (2008) has found three genetically different populations in the northern Iberian mountain ranges, separated by isozyme analysis, and that should correspond to three separate refuge areas. One of them would be near to this component part, in the Western Pyrenees.

These data show two different genetic origins of beeches in the area: firstly one similar to that in the rest of East and Central Europe. And secondly, one with unique characteristics, related to the glacial refugia. Pyrenaic genetic information would have joined the genetic mainstream from the Balkans in their westward expansion.

Human influence

The expansion and development of beech in this region occurs on the oak forests, which until then had constituted the dominant vegetation. In this context, the pollen series (CAROZZA 2005) show a clear increase in the pastoral activity between 4,100 and 3,700 BP.

The use of fire by early man is supposed to have freed up large areas of land for future colonization by the beech, a species that behaves as colonizing on suitable sites.

Little is known about about this mountain area until 17th century. In that time, high territories of Irati massif belonged to France. La Cuestion forest, where Lizardoia property is located, was the subject of disputes, including armed skirmishes, between Spain and France during a long period. Finally, in 1856, the International Boundary Treaty assigned it to Spain. But after that, a long judicial process began between the Spanish state and the Salazar Valley to determine to whom the property corresponded.

This means that while other parts of the big Irati massif began to be exploited, mainly removing timber by floating through the rivers, the exploitation of La Cuestion forest was delayed.

Finally in the 1960s, a forest manager decided that a small part of this impressive beech-fir forest should be retained as a Reserve; he called it a "cathedral of nature". In 1986, this little piece of untouched beech forest was protected legally as Strict Reserve.

The Aztaparreta component part is in such a remote and inaccessible area that it was never possible to exploit the area. It is also protected as a Strict Reserve since 1986.

Beech forest in summer. Picture: H. Kirchmeir (E.C.O.)

Nature disasters

The dominant tree species in the component part (*Fagus sylvatica* and *Abies alba*, both self-perpetuating, shade tolerant species) are subject to single-tree mortality dynamics. Through a dendrochronological study, multiple periods of suppression and release in some old trees can be observed (OLANO & SCHWENDTNER 2014).

The presence of pioneer species such as *Sorbus aucuparia* or *Ulmus glabra* can be related with the periodical opening of the canopy by the fall of little groups of dominant trees, caused by the wind. In the Aztaparreta col, a young stand of one hectare with high volume of deadwood on the floor might be attributable to a major windstorm from the south that happened in the 1980s. But in general, gaps in the canopy have a smaller size (between 200 and 600 square meters). Both component parts remain unmanaged, therefore all sylvogenetical phases are present in a mosaic of little size pieces.

2.b.28 Spain: Hayedos de Picos de Europa (057, 058)

Historic development of the forest

A pollen analysis carried out (MORENO et al. 2011) near the component cluster at the Lake Enol (within the Picos de Europa National Park) provides a comprehensive overview about the historic distribution and range of plant species in and around the component.

During the Younger Dryas (13,500–11,600 BP), the zone was dominated mainly by grasslands, with Poaceae and steppe taxa including *Artemisia*, *Juniperus*, *Fabaceae* and *Compositae*. The tree component was dominated by *Pinus* and *Betula*, but deciduous *Quercus* was also present, as were *Corylus*, *Fagus* and other mesophytes, pointing to the presence of refuge areas in the region.

Later, drugin the the Early Holocene (11,600–9,700 BP), mesophytes increased and *Juniperus* decreased, while *Corylus*, *Betula*, *Pinus* and *Quercus* started to dominate, establishing a deciduous forest in the area. During the Middle Holocene (9,700–4,650 BP), the deciduous forest were well established and the dominant taxa were the same as in the Early Holocene, but with a more outstanding role of *Fagus*, *Fraxinus* and *Salix*; and *Alnus* began to occur.

During the recent Holocene (4,650–2,200 BP), an increase of *Alnus*, *Castanea* and *Fagus* happened, as well as the appearance of *Juglans*, a decrease in *Quercus*, *Corylus* and *Fraxinus*, and the almost complete disappearance of *Pinus*.

Human influence

According to the pollen analysis carried out at Lake Enol, after 4,650 BP a small decrease in the arboreal percentages of the area included in the current National Park can be observed. Particularly significant is the decrease of *Pinus sp*., *Corylus* and deciduous *Quercus*, which is accentuated after 2,700 BP. The observed disappearance of *Pinus* in the Late Holocene was probably mediated by anthropogenic factors. In contrast, the percentages increased for other taxa including *Alnus*, *Castanea* and *Fagus*, and there were also increases in shrub formations (mainly *Ericaceae*, which were previously very rare), *Plantago sp*. and *Rumex acetosella* type. These changes may have been related to the beginning of human activity in the zone, with clearing for grazing resulting in establishment of a more open landscape, as has been suggested to have occurred in the Late Bronze Age and the beginning of the Iron Age. The increase in the relative percentage of *Castanea* and the appearance of *Juglans* seem to be also indicative of human impact. In addition, the development of *Fagus* forests was likely to have been favored by human disturbances in the area. Although the effect of climate cannot be ruled out, the evidence points to major human impact that changed the forest structure after 4,650 cal. BP.

Many human settlements existed in the area since Bronze Age, and all of them used the woods as energy source or burned them to convert them into grasslands. Only the less accessible forests were respected and remained undisturbed: that seems to be the case for the two component parts.

In 1918, the Covadonga National Park was declared, in whose area the Canal de Asotín component part was included. Until the 1980s, logging was allowed in the whole area of the National Park. Since then the only allowed timber exploitation is the extraction of limited firewood for the neighbors. This firewood extraction is made by soft thinnings which barely have any impact. In 1995, the Covadonga National Park was extended and renamed to Picos de Europa National Park, covering a larger area, including Cuesta Fría. Regarding human influence in the component parts, due to their inaccessibility they have never been logged. Seldom had some goats grazed at the Asotin component part.

Nature disasters

There is no evidence of major disturbances. The beech forest is subject to a single-tree mortality and small-scale gap dynamics. In general, gaps in the canopy have a small size, around 200 to 500 square meters.

Through ring analysis, it is possible to appreciate a process of self-perpetuating in beeches as a shade tolerant species, withstanding multiple periods of suppression and release. The presence of pioneer species as *Betula celtiberica* in Cuesta Fría is related to different soil conditions (acidic substrate) more than to a major disturbance.

In the beech forests in both component parts, there is a high structural variability on the scale of one to a few trees and attaining relative homogeneity at larger scales.

2.b.29 Ukraine: Gorgany (059)

Historic development of the forest

The high integrity of the nominated mixed beech forest is given by the high level of naturalness. It was documented that the forest area was undisturbed in a long historical period without human and forest management impact. Hemeroby analysis shows that 57.5% of the nature reserve forests were classified as primeval (CHERNYAVSKYY, SHPILCHAK & SLOBODIAN 2013). Dendroecological research on some of this primeval stands showed mean tree ages ranging from 250 to 280 years.

Beech forest in Gorgany. Picture: O.M. Slobodian

Human influence

The extensive area of the buffer zone that matches the rest of the area of the reserve (4,737 ha) with surrounding mixed beech forests is not separated by zones and ensures effective protection from active human intervention.

Protection status of the candidate area and their buffer zone according IUCN is Ia (Strict Nature Reserve) which ensures their integrity and preservation. The access to the primeval forest by scientists and visitors is strictly regulated to minimize human impact. This area is valuable and has never been disturbed and touched by active human forest management. It was documented that the forest area was undisturbed in a long historical period without human and forest management impact.

Inside Gorgany Nature Reserve. Picture: O.M. Slobodian

Nature disasters

There is no documented data on natural disasters, which affected the nominated component part.

2.b.30 Ukraine: Roztochya (060)

Historic development of the forest

The modern beech forests of Roztochya are the result of centuries of development of biotypes in the region under the influence of different environmental factors. The process of their formation proceeded simultaneously with the development of geological history. Some 12,000 years ago, Scandinavian glaciers retreated on the Gulf. In this period, the most notable changes in the flora and vegetation of Roztochya took place, leading to the formation of the modern type of vegetation, including beech forests. Holocene was characterized by alternating different climatic periods, which contributed to the migration of different floral elements on the hills of Roztochya. ZEROV (1952) identifies three phases in the Holocene: Early Holocene (pine and pine-birch forests), Middle Holocene (mixed forests with elements of oak forest), Late Holocene (mixed forests of moisture-loving species). The last phase of the Holocene, according to most paleobotanists, was the time when the beech complex of Roztochya was formed. The climate then was quite wet, which enabled the spreading of European beech and fir forests; floristic complexes migrated with them, as evidenced by the findings of a rare mountain species of moss, *Pedinophyllum interruptum*. The arrays of wetlands in floodplains in Roztochya are of glacier origin. Therefore, spore-pollen analyses of these arrays contain accurate information about the nature of the flora and vegetation during the Holocene. The first palynological data obtained in Roztochya showed that the range of the arrays has two bands palynologically: the bottom band, with a maximum of pine, oak, linden, hazel, and the upper band, involving beech and fir. The climate was moist in the upper band, which contributed to the spread of mountain and Atlantic elements, especially beech and species that accompany it. The association of beech forests that are in a state of relative stability and have formed the core of Middle European mountain species can be seen as a relic of the Late Holocene complex of mountain species on the plain of Roztochya.

Human influence

The proposed area is a strictly protected reserve, so any human influence is forbidden. The buffer zone of 598 ha is a Nature Reserve (IUCN category Ia) as well. The human influence on the nominated component part is minimal. In the 19th century, a hunting area was there, so it was influenced by hunters. There is no evidence but we can assume that local population collected some firewood and mushrooms in the forests around.

Roztochya Nature Reserve. Picture: V. Pokynchereda

Nature disasters

In the area, the only natural disasters are windstorms and icing. The last major wind-through was in 2008.

2.b.31 Ukraine: Satanivska Dacha (061)

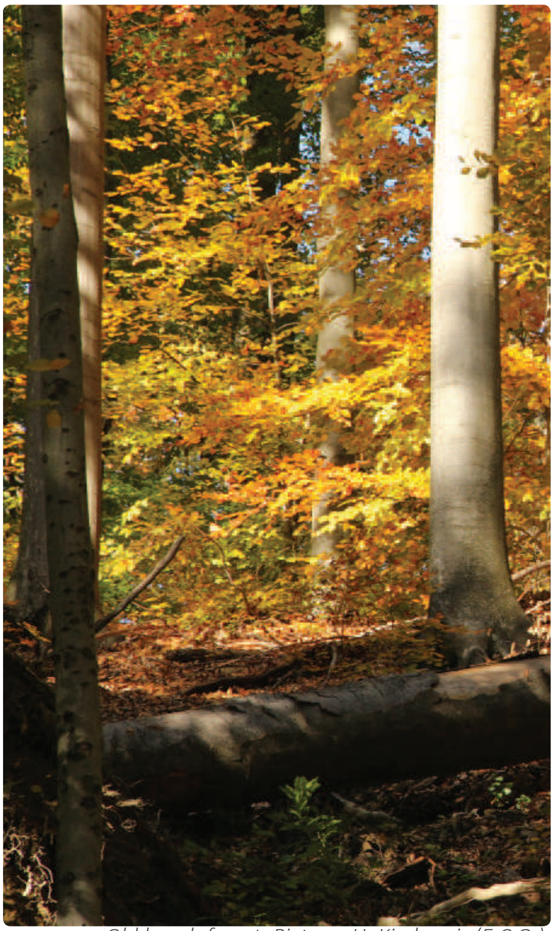
Historic development of the forest

Unfortunately, no scientific research on the history and development of the forest in the given area was conducted.

Fungi on deadwood. Picture: H. Kirchmeir (E.C.O.)

Human influence

In the forest, an ancient Neolithic site of 4,000 to 3,000 BC and a Trypillian site of 3,000 to 2,000 BC were discovered. Also, near the forest massif there are the remains of settlements dating back to 12th century AD, and Ivankivtsi Village, situated in the east of the component part, dates back to 13/14th century. During the existence of the Polish state, the land belonged to the family of the Counts Potocki, and at the time of Russia (17th century to 1917) to different landlords. The first notifications about the protection status of Satanivska Dacha as a site with valuable beech forests are known from 1929. During the Soviet period (from 1939 on), the state forestry enterprise was created. From the period before the Second World War until the 1970s, a lot of valuable forests were logged. The site was proposed for conservation, but the forest reserve was only officially established in the 1970s, and in 1996 it became part of the Podilski Tovtry National Nature Park.



Old beech forest. Picture: H. Kirchmeir (E.C.O.)

Nature disasters

In 1992, a windbreak was registered. Such phenomena are unusual and occur infrequently, but still they are a part of the natural dynamics and bring no harm to the beech forests.

2.b.32 Ukraine: Synevyr (062, 063, 064, 065)

Historic development of the forest

Unfortunately, no scientific research on the history and development of the forest in the given area was conducted. It is known only that this forest exclusively developed naturally without any human intervention. The high integrity of the proposed beech forests is given by the high level of naturalness. It was documented that the forest area was undisturbed without human and forest management impact during a long period. Dendroecological research on some of this primeval stands showed mean tree ages ranging from 250 to 350 years.

View of Synevyr. Picture: V. Pokynchereda

Human influence

This area has never been disturbed and touched by active human forest management or other activity. The extensive area of the buffer zone with surrounding beech forests ensures effective protection from active human intervention.

Standing deadwood in Synevyr. Picture: A. Mykhailyk

Nature disasters

Only windbreak and avalanches were registered. Phenomena such as windbreak are unusual and occur infrequently, but avalanches occur regularly during winter. Apart from the mentioned natural phenomena, no other natural disasters were registered in the area in the past.

2.b.33 Ukraine: Zacharovanyi Krai (066, 067)

Historic development of the forest

Unfortunately, no scientific research on the history and development of the forest in the given area was conducted. It is known only that this forest exclusively developed naturally without any human intervention. The first records and topographic material on these forests date back to 15th century. Until the 18th century, the forests were owned by Hungarian princes. After a long time, they were used as hunting areas by the House of Schönborn, a German aristocratic dynasty. Members of this family were major landowners in Transcarpathia.

Forest of Zacharovanyi Krai. Picture: V. Pokynchereda

Human influence

These forests were excluded from logging because they had been allocated for the preservation of hunting fauna and hunting by a special decree. Under Soviet Ukraine, forests were in Mukachevo, Kushnytskoho Dovzhanskiy and Forestry Enterprises. Compared with oak and fir forests, beech forests have long been outside the active sphere of economic influence, which contributed to their conservation. Only since the last century, under the influence of monoculture economy, they partly began to create monocultures of spruce in place of beech forests, which later turned out to be ecologically unstable.

Inside Zacharovanyi Krai. Picture: V. Pokynchereda

Nature disasters

Only windbreak was registered. Such phenomenon is unusual and occurs infrequently, but still it is a part of the natural dynamics and brings no harm to the beech forests.

Old beech tree. Picture: H. Kirchmeir (E.C.O.)

Coloured beech leaves in autumn. Picture: H. Kirchmeir (E.C.O.)

3. JUSTIFICATION FOR INSCRIPTION

Having inscribed the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany" on the World Heritage List, the World Heritage Committee has acknowledged the outstanding universal value of European beech forests with their unique history and evolution as a prominent example of the ongoing recolonization and development of terrestrial ecosystems after the last glacial period. Pure beech forests as a large-area climax vegetation are globally limited to Europe due to the combination of postglacial climate changes and the Beech's (*Fagus sylvatica*) extreme competitiveness and its distinct life strategy. Based on its incredible ecological adaptability, the beech has spread throughout Europe covering wide areas and shaping a broad array of different beech forest types.

Situated on the easternmost edge of the European beech forest range, the Carpathians with their natural forests represent an important section of the ongoing ecological and biological processes. The IUCN Technical Evaluation – ID No. 1133 already points out that the world heritage site "Primeval Beech Forests of the Carpathians" (Slovak Republic and Ukraine) is not representative for all types of the original beech forests (World Heritage Nomination – IUCN technical evaluation 2007). Germany added significant old-growth beech forests, extending the coverage of Europe´s original beech forests in the World Heritage List. Nevertheless, the technical evaluation of IUCN (2011) concluded that there are alternative beech forest sites of equivalent or greater value that should be considered in other State Parties.

With the inscription of the five German component parts in 2011, the UNESCO World Heritage Committee recommended a finite serial transnational nomination with other interested State Parties in order to assure the protection of this unique forest ecosystem (WHC 2011, Decision 35 COM 8.B13).

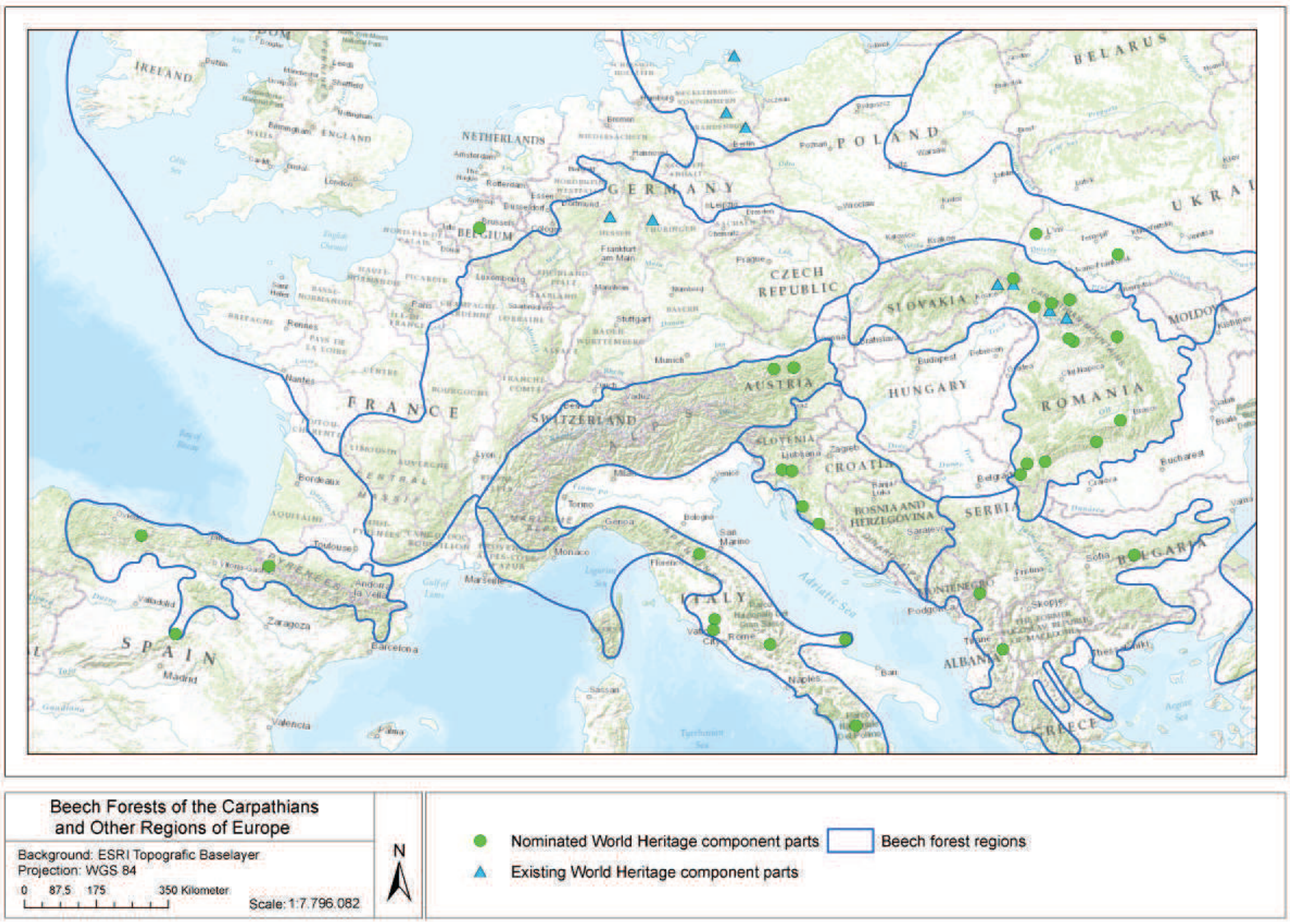
With the approval and support of Germany, the Slovak Republic and Ukraine, the World Heritage Property "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany" should be now extended by 67 additional component parts in 11 countries.

3.1.a Brief synthesis

This extension is applied for complementing important stages of beech forest development and for adding significant beech forest types not yet covered by the existing World Heritage property. This extension represents 10 out of 12 European Beech Forest Regions (Pyrenaic-Iberian, Central Mediterranean, Illyric, Moesian-Balcanic, Subantlantic-Hercynic, Alpic, Carpathian, Atlantic, Baltic, Polonic-Podolic-Moldovan) by at least one component part. Only the Pannonic (rarely any sites available) and the Euxinic Beech Forest Region (the proposed site on Crimean Peninsula could not be included by now) are not included. The additional 67 component parts are vital and indispensable for the understanding of the history and evolution of the European beech forests and complementing the existing World Heritage property with significant old-growth beech forest types.

The serial nomination of the "Primeval Beech Forests of the Carpathians and Other Regions of Europe" encompasses the most prominent and best-protected examples of the evolutionary and ecological development of the nemoral deciduous forest, which has been in progress since the last ice age.

Figure 37 (below): Overview of the existing and newly nominated World Heritage component parts



To understand the postglacial distribution process, it is important to know the location of the refuge areas of beech during the glacial period. MAGRI et al. (2006) identified 9 different clusters of isozyme data of *Fagus sylvatica*. The spatial distribution of these different isozyme-clusters give an impression of the refuge areas and the postglacial expansion process.

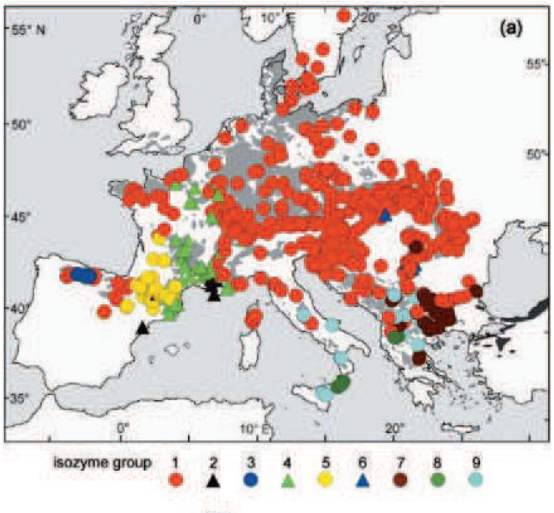


Figure 38: Spatial analysis of variance on isozyme data of Fagus sylvatica (MAGRI et al. 2006)

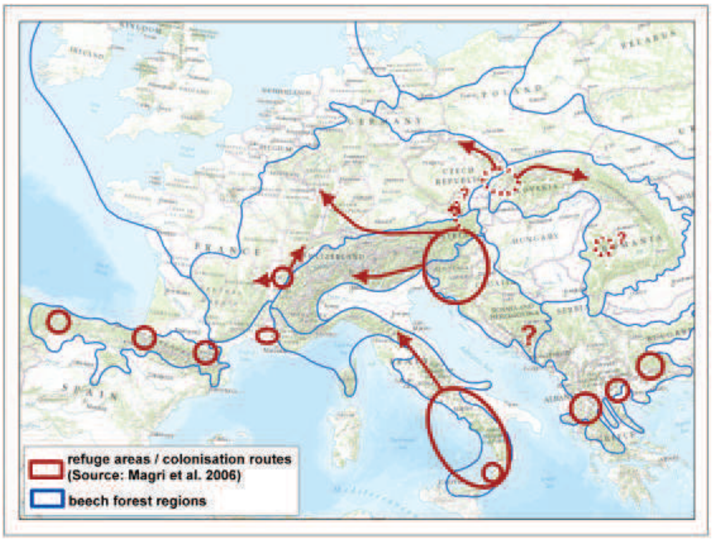


Figure 39 (above): Tentative location of refuge areas for Fagus sylvatica during the last glacial maximum and main colonization routes during the postglacial period (MAGRI et al. 2006).

The additional value of each nominated component part is given by its contribution to document the different refuge areas and expansion routes. The expansion process, influenced by the given climatic and geological site conditions as well as the different floristic realms, led to a high variety of different vegetation types of beech forest. The different floristic realms as well as the main macroclimatic characteristics are summarized in the spatial scope of the 12 European Beech Forest Regions. An important objective of the extension is to represent beech forests from all Beech Forest Regions and to demonstrate the variety of beech forest within a Beech Forest Region caused by different geological substrates, elevation and mesoclimatic phenomena.

Therefore, the additional value of each component part to the OUV is given in the following, grouped by Beech Forest Regions.

Alpic

Dürrenstein (003)

This last large scale remnant of primeval forest is well known and documented in literature as the largest example of undisturbed beech forest development in the Alps. It covers beech and beech-silver fir forests in an altitude of 800 to 1,800 m. In the core part, beeches with an age of 400 to 500 years and silver firs up to 700 years document the long history of these forest stands without human management. In total, a site of 3,500 ha is designated as Wilderness Area according IUCN I and is therefore under strict protection. The proposed World Heritage component part covers the primeval and oldest forests within this area, including natural adjacent habitats to represent this complex ecosystem mosaic entirely.

Kalkalpen (004, 005, 006, 007)

The component cluster Kalkalpen is the largest remnant of primeval beech forests with enclosures of virgin forests under strict protection in the Alps. Due to size, sea level amplitude and habitat variety, the area represents the typical set of alpine beech forest types on limestone, which is a dominant geological unit within the beech forest range in the Eastern Alps. The altitudinal gradient covers lowland beech forests in close contact to oak-hornbeam forests up to the upper border of beech, the high montane spruce-fir-beech forests. The continuum of altitudinal range and the integration of natural habitats above the beech forest belt guarantees high resilience towards global change impact. On the northern slopes of the Sengsengebirge, beech forms mixed stands together with Larch (*Larix decidua*) and Dwarf Pine (*Pinus mugo*), a combination that is not described for any other component part. The joint occurrence of these tree species is enabled by recurrent disturbance by avalanches.

Atlantic

Sonian Forest (008, 009, 010, 011, 012)

The selected areas not only represent the whole diversity of the Atlantic beech forest in Western Europe but also comprise an ample surface for natural processes to assure a long-term ecological viability for this entire ecosystem. The buffer zones will be managed in a way to preserve the particular characteristics of the beech forests in the selected areas. In addition to the surface of the selected areas and the actual presence of the buffer zones, the main selection criteria were the average stand age and the period since the last intervention or last perturbation. These evaluation criteria are not only helpful to describe the degree of naturalness of the forest but also help to indicate the basic functional capacity of the ecosystem. The area of the Sonian Forest includes the best-protected old beech stands in the Atlantic region. The soils are unperturbed since the last ice age. These component parts are part of a vast compact forest complex with regional and international protection status.

Carpathian

As the Carpathian Beech Forest Region harbors the largest occurrence of beech forests in Europe and is thus often called the motherland of the beech tree, this Beech Forest Region with its outstanding jewels deserves adequate representation in the serial World Heritage Site.

Bieszczady (035, 036, 037, 038)

The forests in the component part are characterized by a high degree of naturalness, in some parts they can even be described as virgin forest. They are characterized by large, unfragmented areas and a high diversity of forest communities and species, especially mushrooms, mosses and animals. With a size of about 3,307 ha, they are of the proposed primeval beech forests is relatively large compared to other beech forests in Europe. Further, they provide an example of a regenerative process (at the moment 80 years) of beech forests after a large natural disturbance (extremely cold winter in 1928/29). So-called gap dynamics are the main mechanism of regeneration in European beech forests, with large-scale natural disturbances being uncommon. The forests also provide valuable examples of different vegetative reproduction types at the upper beech forest limit. The component parts are linking the existing Ukrainian and Slovak component parts and give the opportunity to host flocks of the European Bison in their natural habitat.

Cheile Nerei-Beușnița (039)

The nominated property (4,294.18 ha) overlaps the Nature Reserve Cheile Nerei-Beușnița which is included into a widely forested National Park that borders on other national parks covered by beech forests, allowing to observe and protect large scale natural dynamics and evolution processes. The proposed component part integrates a multitude of beech forest types and habitats, many of them on limestone-rendzinic generated soils and on limestone rocks. The component part represents the most southern example of the Carpathian Beech Forest Region and the lowest altitude of all component parts in the Carpathians.

Codrul Secular Șinca (040)

The component part is a primeval mixed beech-silver fir forest, with an uneven-aged structure and a high degree of naturalness, located in very favorable site conditions for beech and silver-fir trees, aspects that make these stands unique in terms of biometrics. It is located at the eastern edge of the Carpathians and hosts the best examples of mixed beech-silver fir forests on cambisols. The specific soil and climate conditions lead to the highest growth rates known from this Beech Forest Region. It is important to note the high frequency of trees of ages above 350 to 400 (500) years for beech and 400 to 500 for silver fir trees, until the limit of physiological longevity when they are drying on foot. Here, the tallest silver fir tree in Romania at 62.5 m and the tallest beech tree in Europe at 55.1 m were measured (ROIBU et al. 2013). Regarding volume, the highest volume stock was 1,170 m^3/ha and the biggest growing stock (living trees and deadwood) 1,588 m^3/ha.

Funghi on beech tree. Picture: H. Kirchmeir (E.C.O.)

Codrul Secular Slătioara (041)

The component part is a primeval mixed beech-silver fir-spruce forest. It is located on the Eastern slope of Carpathians (Rarău Mountains). In comparison to Codrul Secular Șinca (040), it grows on limestone and calcareous conglomerates bedrocks. It encompasses an altitudinal gradient from 790 to 1,400 m. The forest was not affected by cuttings, as documented by the historical archive of forest management plans. The stand structure presents a higher heterogeneity and includes higher quantities of deadwood (both standing and lying, and also large individual pieces) in different stages of decay. As an example of species diversities, 108 species of Hepaticae and 343 species of Musci were mentioned in the 1940s. The component part includes also, at its upper end, the Fânețele montane Todirescu, protected alpine grassland. This forest reserve is considered the best-preserved and most important forest reserve from the north of the Romanian Eastern Carpathians.

Cozia (042, 043)

The nominated component cluster displays a high diversity of site conditions and geo-morphological characteristics being the basis for the diversity of occurring habitats and landscape features. Different beech forest communities, pure and mixed beech forests (with bith coniferous and broad-leaved species), with high degree of naturalness, cover over 95% of the area, starting from submontane until the high montane layer. With more than 3,000 ha it has a significant size. It is differing from many others due to its particular environmental conditions: gneissic bedrock, high variation of topography in the area, large altitudinal gradient (300–1,600 m.a.s.l.), rocky slopes, climatic peculiarities, i.e. a warmer climate than the rest of the Southern Carpathians, and supporting a special tree species composition (e.g. highest sessile oak stands up to 1,300 m.a.s.l., mixed beech-Scots pine stands, and acidophilous beech forests).

Deadwood. Picture: H. Kirchmeir (E.C.O.)

Domogled-Valea Cernei (044, 045, 046)

The Domogled-Valea Cernei cluster is a large complex of beech forests consisting of three component parts, Ciucevele Cernei (1,104.34 ha), Iauna Craiovei (3,517.59 ha) and Domogled-Coronini-Bedina (5,110.96 ha) that are connected by a continuous forest cover and enveloped in a common buffer zone. With a total area of almost 10,000 ha, it is the largest cluster in the Southern Carpathians. Its altitude ranges from 150 to 1,620 meters above sea level. This is the largest amplitude of altitude within the nominated component parts of the Carpathians. The huge variety in altitude leads to a large variety in forest types as well. The forests are characterized by a high degree of naturalness occurring in a landscape covered about 72% by forests predominantly formed by beech. The wider landscape is characterized by low human impact due to the low forest road density resulting of the steep slopes and rocky terrain.

Groșii Țibleșului (047, 048)

Both component parts represent important well-preserved stepping stones for the beech expansion over the Carpathian arch from north to south after the last ice age. It is an important connection to the components of the Ukrainian Carpathians. It comprises primeval pure beech and mixed beech-spruce-fir communities with scattered small depression areas of oligotrophic swamps and bogs, unique in the north of Romanian Carpathians, close to the frontier with Ukraine. Stands have complex structures, high degree of naturalness, with exemplars of exceptional dimensions and ages, and are very stable, in a status of dynamic equilibrium, located on acid soils (districambosols) developed on bedrock of Neogene volcanic origin (andesitic rocks with pyroxene).

Strâmbu Băiuț (050)

Strâmbu Băiuț comprises the most well-preserved pure beech and mixed beech-silver fir stands from the entire range of the Oriental Carpathians with remarkable stand characteristics (standing and laying wood volume, tree height, tree diameter, tree longevity, complex vertical and horizontal stand structures). This component part, together with the component part of Groşii Ţibleşului, belongs to a cluster situated in the north of the Oriental Carpathians, being a stepping stone for beech expansion over the Carpathian arch after the last ice age. This cluster is very important for the connection of the component parts from the Southern Carpathians with the components of the Ukrainian Carpathians.

Izvoarele Nerei (049)

The component part represents a quite late expansion phase of beech colonizing the Carpathian Arch, according to MAGRI et al. 2006, most probably from the northwest. Isozyme analyses show a similarity to Central European beech, but not to Balcanic beech. In spite of the late beech expansion to the Southern Carpathian areas, beech developed in the nominated component of Izvoarele Nerei, became the dominant species and even today remains dominant over other tree species. The component is an important stepping stone between the component clusters Cheile Nerei-Beușnița (039) and Domogled-Valea Cernei (044, 045, 046). The component is representative for the large contiguous and functional beech forest corridors for beech forest fauna.

Gorgany (059)

In comparison to the other beech areas from the Carpathian region, the beech forests of Gorgany Nature Reserve is a unique site which is located on the northern east macroslope of the main watershed range. It is the component part with the lowest mean temperature (0.6–1.4 °C). The component part is a reference model of the occurrence of all types of primeval beech forests of the Carpathians, successively replaced vertically of all types of primeval beech forests of the Carpathians, which are represented by the communities Piceeto-Abieto-Fageta, Piceeto-Fageta, Fageto (sylvaticae)-Piceeto (abieto)-Abietum (albae), Fageto (sylvaticae)-Abieto (albae)-Piceetum (abietis), Fageto (sylvaticae)-Piceeto (abieto)-Abietum (albae) that are main elements of the biome. These forests are an outstanding example of nutrient-poor, undisturbed, and well-preserved ecological models where all development stages and evolution cycles can be observed. The proposed area does not only complement the spectrum of the beech forests nominated to Natural Heritage, but also adds the remnants of natural beech forests to the Carpathian Beech Forest Region.

Synevyr (062, 063, 064, 065)

The beech primeval forests of the nominated component cluster make up a continuous big massif with a total area of over 1,500 ha. These forests are unique in terms of their upper forest line protection and the altitudinal beech distribution (up to 1,400 m.a.s.l.), which is extreme for the given nature-climatic conditions. Beech trees older than 300 years are documented for this cluster. The natural upper forest line is partially formed by woodland of crooked beeches where they partially become scrubs. Some nominated components are directly adjacent to the Uholka-Shyrokyi Luh component, which is already a World Heritage property and the world's biggest continuous massif of primeval forests of European beech species. It acts as important steppingstone to the cluster of Zacharovanyi Krai (066, 067). Local primeval beech forests represent an example of ongoing ecological processes in terms of the vertical expansion of beech as a result of the global climate change.

Zacharovanyi Krai (066, 067)

The component part represents the largest primeval beech forest massifs in the Carpathians on volcanic bedrock. The climax formations of pure beech forests grow here mostly on stony low-profile soils and a volcanic complex of andesite, basalt and tuff, and are distributed within the elevations of 400 to 1,085 meters above sea level. The area's ecosystems are unique because they have been formed under the conditions of a specific, cold microclimate, characteristic for pre-polonina (adjacent to alpine meadows) forests, which is not typical for the warm southern megaslope of the generally warm internal-Carpathian volcanic ridge. This fact causes practically total absence (even in the lower areas) of thermophilic species of the Quercetal fraction within beech communities. It is also characterized by the formation of relict complexes with sphagnum bogs that are unique for the Carpathians.

Beech tree and leaves. Picture: H. Kirchmeir (E.C.O.)

Central Mediterranean

Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

The five component parts represent a component cluster of 5 forests distinguished for their high naturalness, testified by the presence of fine-scaled forest mosaics, with patches belonging to all the phases of the forest structural cycle. It is the only cluster located on the main ridge of the Apennines. This cluster is spread in a wide range of mountainous environments on limestone and glacial deposits, from nutrient-poor to nutrient-rich soils and from dry to damp sites. These old-growth forests contain a large population of the oldest beeches in the Northern Hemisphere (up to 560 years old). Valle Cervara is presently the only known example of primary old-growth forest in Italy. Thanks to their abundance of old and dead trees, they harbor many rare plant and animal species.

Cozzo Ferriero (030)

The old-growth forest of Cozzo Ferriero grows on calcareous soils, at the upper altitudinal limit of the beech's range. It is located in a glacial refugial area, where beech populations persisted through the Pleistocene ice ages; thus, it is representative of a slow-colonizing contingent of nemoral species, nowadays restricted to the Southern Apennines. This, along with its extreme latitudinal and altitudinal position, guarantees beech acclimation and adaptation to climate change (drought, late frost, strong winds). This early-transition old-growth beech forest shows a bimodal diameter distribution, with the oldest cohort composed of trees 300 to 400 years old. The integrity of the stand is also demonstrated by a diffuse presence of deadwood and old-growth indicator species (e.g. *Lobaria pulmonaria* and deadwood insects). A permanent staff protects this strict (IUCN I) reserve, which covers 96 ha. The access to the old-growth forest by scientists and visitors is strictly regulated.

Foresta Umbra (031)

Foresta Umbra represents one of the most important refuge areas of beech, biogeographically isolated from the core of beech populations in the Apennines. The Gargano Promontory offers unique climatic conditions for beech survival at low-elevation (< 800 m.a.s.l.), allowing fast turnover rates and recovery of old-growth attributes. Widespread karstic landforms (dolines) create many different habitats. These particular conditions allow tree species like *Acer campestre*, *Sorbus torminalis*, and *Taxus baccata* to reach exceptional, monumental size (DBH > 80 cm; H > 30 m). This forest, classified as early transition old-growth, hosts beech trees up to 350 years, a remarkable longevity at such a low elevation. Its conservation status is also demonstrated by the presence of an isolated population of the Italian Roe Deer.

Fagus sylvatica leafs. Picture: H. Kirchmeir (E.C.O.)

Monte Cimino (032)

The nominated component part hosts a magnificent beech forest, the only case reported so far in the Mediterranean biome, with trees reaching 50 m of height. It has survived thanks to a delicate balance between fertile volcanic soils and the wet microclimate generated by the nearby volcanic lakes and the Tyrrhenian Sea. The forest, at the transition between the low-elevation and mountain belts, is one of the warmest and driest sites of the serial site, where beech is well-adapted to drought. The fertile site conditions allowed an extremely fast recovery of natural features. After the end of logging (70 years ago), this old-growth forest has accumulated exceptional high biomass stocks, both above and below ground, and has acquired a multi-aged structure with trees older than 200 years. Wind and glaze storms continuously open new canopy gaps, with abundant deadwood and natural regeneration. Because of the exceptional geomorphological and climatic situation, the beech forest is limited to the top of the volcanic mountain. Therefore the size is limited to 58 ha and can not be enlarged. To reduce the risk of extinction of this specific beech forest type (e.g. by large-scale blowdowns or forest fire) a second, similar component part, is nominated: Monte Raschio (033).

Monte Raschio (033)

The old-growth beech forest of Monte Raschio has a magnificent structure at an extremely low elevation (450 m.a.s.l.), in spite of the exceptional warm and dry site conditions, to which beech is particularly well-adapted. The survival of this high-forest in the Mediterranean biome is due to highly fertile volcanic substrates (a distinctive trait within the network), and the mitigating effect of the nearby volcanic Lake Bracciano and the Tyrrhenian Sea, that have permitted a surprisingly fast natural recovery rates in the last decades. Because of similar ecological conditions and its small size, this component part has been regarded as twin-site of Monte Cimino (032).

Sasso Fratino (034)

Sasso Fratino forest grows on flysch sandstone soils in a biogeographic transition zone (Central European/Mediterranean). It covers a large altitudinal range (600–1,600 m). This, together with the extremely variable geomorphology, allows the expression of many environmental conditions (from wet to arid and from warm to cold temperate) within a continuous beech forest. The large altitudinal gradient guarantees the acclimation/adaptation of beech to climate change. High integrity of the proposed forest is given by its large area and naturalness. This is the largest remnant of old-growth beech forest in the Northern Apennines, classified as mid-transition state. Tree-ring studies showed a well-conserved core part, with several trees almost 400 years old and scattered individuals surpassing 500 years.

Illyric

The refuge areas in the Illyric Beech Forest Region were the most important ones for the European postglacial expansion process. It was shown that most of the European beech trees in Central Europe are of the same genetic group that is typical for the Illyric region. This underlines the importance of the five component parts (in four clusters) in this Beech Forest Region.

Hajdučki i Rožanski Kukovi (022)

This component part is located in the upper zone of the beech forest belt in the northern part of the Velebit mountain ridge in the Northern Velebit National Park (IUCN II). It ranges from 1,200 to 1,500 meters above sea level and the mean annual precipitation is almost 2,000 mm. Therefore it represents the highest altitude and the highest precipitation in comparison to the other component parts in the Illyric Beech Forest Region. This area is rich in endemic fauna and flora because of its refuge function during the Ice Age.

Paklenica National Park (023, 024)

The old-growth primeval beech forests in Paklenica National Park represent the largest and the oldest dominantly beech forest complex on the east Adriatic coast and in this part of the southeastern Mediterranean basin. From ecological and biological aspect, these forest stands are unique habitats under the influence of three climate types: the Mediterranean, Continental and Alpine climate, rich with endemic and rare plant and animal species. These beech forests are not impacted by humans except for visitors and mountaineers. It is the only component part in the Illyric Beech Forest Region representing also the lower distribution belt of beech forests in the transition zone to Mediterranean oak forests. The forest is only accessible by path.

Krokar (051)

The Virgin Forest Krokar represents the former primeval forests of Borovška Gora. The forest reserve Virgin Forest Krokar belongs to the key relict beech forest communities in the northern part of the Illyric beech forest region, which belong to the origins of postglacial beech forest distribution towards Central Europe and the Carpathians. It represents the montane vegetation belt (800–1,200 m). For this reason, the component is an indispensable element of the final picture of the ongoing ecological process of European beech forest distribution.

Standing deadwood. Picture: H. Kirchmeir (E.C.O.)

Snežnik-Ždrocle (052)

Snežnik-Ždrocle is a large glacial (Pleistocene) refuge area of the northern part of the Illyric beech forest region, which belongs to the origins of postglacial beech forest distribution towards Central Europe and the Carpathians. It also covers the area of botanically and physiognomically typical subalpine beech forests (1,200–1,700), which form the tree line. For this reason, the component part is an indispensable element to understanding the ongoing ecological process of postglacial beech forest distribution in Europe.

Moesian-Balcanic

Lumi i Gashit (001)

The component part is situated in the strict nature reserve of Gashi River which is part of the huge Wilderness Gashi area of more than 10,000 ha. In the Moesian-Balcanic Beech Forest Region, it represents the western climates influenced by the Adriatic Sea and growing on flysch and schist bedrock. The beech forests are located in an altitudinal range from 700 to 1,900 meters above sea level. The full altitudinal spectrum from the lower to the upper beech distribution is included. The mixture with the endemic *Pinus heldreichii* rocky forest in the beech forest belt, and the joint occurrence of *Fagus sylvatica* and *Pinus peuce* in large stands of high integrity and in elevations higher than 1,700 m are a remarkable unique feature of tremendous value.

Rrajca (002)

The component part is situated in the Shebenik-Jablanica National Park. It is the only component part in the Moesian-Balcanic Beech Forest Region that is located on limestone. The persistence of rare Tertiary relicts in the Balkan refuge during the glacial period is underlining the importance of this component part to document the postglacial expansion process of *Fagus sylvatica*. In Rrajca, the rich occurrence of the Balkan endemic *Pinus peuce* is to be pointed out as an important plant geographic particularity and a unique feature of this site. *Pinus peuce* develops at the upper timberline and forms within the beech forest belt mixed stands with *Fagus sylvatica*. Furthermore, the geomorphological dynamics and their impact on the forest (avalanche tracks, sliding blocks and screes) are an additional value of the component part.

Detail beech forest. Picture: H. Kirchmeir (E.C.O.)

Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

The cluster of Central Balkan is formed by 9 large component parts representing the best-preserved primeval beech forests of the mountain ridge in the Central Balkan National Park. In comparison to the other component parts, the bedrock is formed of magma-plutonic, sedimentary and metamorphous rock in this Beech Forest Region. They represent the whole variety of different altitudinal zones, from small beech trees on the rocks at the timberline at 1,700 m.a.s.l. in Sokolna and Peeshti Skali reserves, to the giant trees of beech with height of 50 meters in Boatin reserve. The latter is the only component part representing the genetic variety of Moesian Beech (*Fagus sylvatica var. moesiaca*). In total, the cluster covers an area of almost 11,000 ha embedded in a large National Park.

Polonic-Podolic-Moldovan

Roztochya (060)

The old-growth beech forests of Roztochya represent the extreme northeastern limits of the range of beech. It is the largest and best-preserved example of this ecotype in the central part of the Beech Forest Region. The forests belong to the West Podolskiy geographical ecotypes, characterized by unique adaptability to extreme climatic conditions, namely to low humidity and a dry summer, which is especially important in the context of global climate change. The strong continental climatic influence is demonstrated by the presence of *Quercus robur* and *Pinus sylvestris* within the beech forests.

Satanivska Dacha (061)

The component part Satanivska Dacha is the biggest beech forest by area, described in the scientific literature, on the eastern border of *Fagus sylvatica*. This forest massif has an insular character. The beech forests of the Satanivska Dacha belong to the East-Podolian geographical ecotype. They are characterized by a unique adaptation to the climatic conditions, namely to a low humidity and a dry summer, which is especially important in the context of global climate change. For this ecotype, an annual sum of precipitation of 500 mm and an average humidity of 50% at 13:00 are characteristic. The trees are up to 160 years old, which is the upper age limit for this region.

Pyrenaic-Iberian

Hayedos de Ayllón (053, 054)

This component cluster consists of two component parts and is located in the Mediterranean bioclimatic region. It constitutes the southwestern frontier of Europe’s beech range. Influenced by a Mediterranean climate and surrounded by Mediterranean vegetation formations, these beech forests are likely to reflect unique genetic ecotypes in adaptation to xeric conditions. Until recently, these beech enclaves were thought to have a recent origin as a result of recolonization migration from the Balkans through the Pyrenees and the Iberian mountain range. However, recently some scientists are considering the existence of a glacial refuge of beech in these mountains. For over 20 years now, Hayedo de Montejo has been an important research site for physiological and genetic beech adaptation to drought and climate change.

Hayedos de Navarra (055, 056)

This cluster is comprised by two component parts, located in the Alpine bioclimatic region. It comprises the last remnants of primeval beech forests in the Pyrenaic-Iberian Beech Forest Region (BFR) and, by extension, in Western Europe. In a continental-humid climate and over nutrient-rich soils, these montane fir-beech forests are unique in this Beech Forest Region. They mark the global western boundary of this type of mixed forest. They are close to one of the few scientifically demonstrated glacial refuge areas in the north of the Iberian Peninsula and, for that reason, they are likely to show some relevant genetic differentiation within the global range of beech. Both component parts display a high degree of integrity, are undisturbed and are extensive enough to efficiently maintain ecological processes. There are no signs of timber extraction in the past and the forest is characterized by old-growth structure with monumental trees.

Hayedos de Picos de Europa (057, 058)

This cluster consists of two component parts. The stands are pure beech forests in genuine Atlantic conditions with a hyper-humid ombroclimate. Special features in each of the component parts comprise severe conditions on karstic rocky slopes in Canal de Asotín (058), and natural succession in contact with related habitats such as birch or oak forests in Cuesta Fría (057). It is situated close to a glacial refuge area in the northwest of the Iberian Peninsula and in the expansion path of a recent beech forest to the west along the Cantabrian range. These beech forests represent a high degree of naturalness. These pristine conditions are due to their inaccessibility (Canal de Asotín) and protection status as a National Park for the past 96 years (Cuesta Fría). Maturity is apparent, judging from the presence of stands with high age stand structure, tree recruitment in gaps, abundant deadwood and other ongoing ecological patterns and processes.

Inside an old beech forest. Picture: H. Kirchmeir (E.C.O.)

3.1.b Criteria under which inscription is proposed (and justification for inscription under these criteria)

Among nature's most outstanding creations are the beech forests in postglacial Europe, which developed in a very short period of time by immigration of the beech (Fagus sylvatica). Together with the Carpathian primeval forests and ancient beech forests of Germany, these 67 new component parts attest to the ongoing developmental process in the scope of which the beech has come to dominate the tree layer, and has formed species-rich biocoenoses.

Inscription on the World Heritage List is proposed under criterion ix:

"Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals." The serial nomination "Primeval Beech Forests of the Carpathians and Other Regions of Europe" comprises outstanding examples of the evolutionary and developmental processes of beech forests since the last glacial period, giving rise to a terrestrial ecosystem that has shaped an entire continent in a globally unique manner. In addition to the "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany", the newly nominated beech forests in 67 component parts in 11 countries will enhance the existing World Heritage property to give an overall and comprehensive picture of the European postglacial development process of beech forest. With this extension, all glacial refuge areas and genotypes of beech are covered. The basic line of arguments in the nomination of the existing property remains mainly unchanged:

The nominated primeval and ancient Beech Forests are an outstanding and globally unparalleled example of the ongoing ecological processes outlined below:

1. One single tree species – *Fagus sylvatica* – has come, over the course of postglacial expansion, to absolute domination over the natural vegetation of a major part of an entire continent – Europe – and, based on intraspecific genetic differentiation, has adapted to the highly varying local conditions within the overall territory, the boundaries of which being defined by climate. The beech, which

is young in terms of developmental history and thus still highly competitive, has not yet arrived at its climatic boundaries in certain areas. The beech is still showing tendencies of expansion.

2. The complete replacement of a climax ecosystem by a new one is a consequence of global climate change in the postglacial period. The mixed oak-linden forests, which are predominant in the zone of nemoral deciduous forests, have evolved into beech forests. The beech forest, which is a climax eco-system shaped by a single tree species, has been diversifying in biogeographic and ecological terms over the course of late postglacial evolution. This makes beech forests the last witnesses of Europe's natural vegetation, which has been prevailing since the beginning of the Subatlantic period up to today's climate conditions. This makes beech forests a key representative of nemoral deciduous forest biomes.

3. The European beech forests are an outstanding and unique example of the extraordinary regenerative power and for the survival of a climax ecosystem with longstanding habitat tradition to the present day. Despite fragmentation and isolation within cultural landscapes and a long history of settlement, distinct structures and processes characteristic for pristine wilderness still exist.

4. Beech forests are an outstanding example for climate affecting ecosystem services with the ongoing carbon fixation in growing biomass and the ongoing and permanent carbon storage in the topsoil. They also represent the ability of nemoral deciduous forest ecosystems to regenerate degraded soils and revitalize its ecosystem functions in a unique manner.

Together with the World Natural Heritage "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany", the nominated "Primeval Beech Forests of the Carpathians and Other Regions of Europe" tell a comprehensive and concise story of how the postglacial forests have been developing in Europe. With the nominated component parts, the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany" are substantially complemented by the following important aspects that are indispensable to understand the history and development of European beech forests and are currently not represented by the inscribed World Heritage property:

- The enlargement of the ecological spectrum with significant regionally, biogeographically and ecologically different beech forest types and their specific plant and animal life, covering the main 10 European Beech Forest Regions (Pyrenaic-Iberian, Central Mediterranean, Illyric, Moesian-Balcanic, Subatlantic-Hercynic, Alpic, Carpathian, Atlantic, Baltic, Polonic-Podoloc-Moldovan)
- The completion of the history of postglacial areal expansion
- The addition of examples of the postglacial extension process from the Pyrenaic, Apennine and South Carpathian refuge areas
- The completion of the climatic gradient from the most Western to the most Eastern and Southern to Northern expansion of *Fagus sylvatica* forests in Europe
- The involvement of specific compartments of typical landscape complexes, e.g. sea shore cliffs, mires, lakes, streams, rocks, and boulder fields, as last remnants of European ancient deciduous forest landscape
- The gene pool within one and the same species *Fagus sylvatica*.

Treetop of an old beech tree. Picture: H. Kirchmeir (E.C.O.)

From the perspective of developmental history, beech forests as large-area climax vegetation are a postglacial and geographically limited European phenomenon. Throughout its natural range, spanning all altitudinal levels in Europe, the beech shows a tendency toward a unique dominance and formation of pure stands. These are definitely the prevalent natural vegetation in Central Europe including the Carpathians, most areas of Western Europe and Southern Europe's mountain ranges, where stands assume different forms. A globally unparalleled feature is the fact that European beech forests reflect the biological potential to naturally populate and shape major areas under unfavorable migratory conditions. Because of its widespread distribution over a range of degrees of latitude, from planar to montane altitudinal belts, and its broad habitat amplitude, there are multiple biogeographic Beech Forest Regions with a host of beech forest types depending on trophic levels, altitudinal level, and mesoclimate. This outstanding wealth and diversity of different habitats and shapes of European beech forests, which is a consequence of their developmental history, can only be fully represented by the nomination of several component parts throughout Europe. By the proposed extension, examples from all relevant floristic realms, from the expansion processes and from all relevant glacial refuge areas are given.

3.1.c Statement of Integrity

The beech forests of the nominated "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are the best and most intact primeval and old-growth relics in Europe.

With the "Primeval Beech Forests of the Carpathians and Other Regions of Europe", the best primeval and old-growth beech forests of Europe are nominated as representatives of the "European Beech Forests" showing the highest degree of maturity and naturalness. In an intense selection process from 2012 to 2014, supervised by the German Federal Agency of Nature Conservation (BfN), a list of about 150 potential primeval and old-growth beech forests was compiled by a group of experts from all European countries. From this list, the best-suited sites were selected by applying a set of indicators. These indicators include the additional value as a contribution to the OUV, the area covered by the site, protection regime, forest continuity, duration of the absence from use, structural diversity, completeness of natural dynamic processes, fractions in primeval forest relics, favorable buffer and networking potentials, and representativeness for the respective biogeographic region and the ongoing ecological processes following the last ice age. As all of Europe's natural areas, many of the beech forests of the nominated component parts are not completely unaffected by human activity and, like all natural areas, are undergoing continuous change. Especially during the last 1,000 years, beech forest ecosystems have been generally impacted by human activity throughout Europe, and partly drastically so. As compared to the potential natural distribution area, the present area has shrunken by 90% in Central Europe alone. The primeval forests in the West and Central European center of distribution of the European beech forests have largely vanished. Genuine remnants of primeval forests with beech (*Fagus sylvatica*) as the primary tree species to form populations are found only on a relatively small scale in East-Central and Southeast Europe (Carpathians, Dinarides, Balkan) on the most eastern limits of the beech forest habitat. Therefore, it is of uppermost importance to raise global awareness on these last remnants of the former widely distributed natural ecosystem in Europe.

Beech trees with different ages. Picture: H. Kirchmeir (E.C.O.)

The integrity of the nominated 67 component parts is mainly following a spatial gradient from southeast to northwest. While the history of forest development in the Carpathians and large parts of the Balkan still have significant leftovers of primeval beech forests, human interventions in forests in the western part of Europe were stronger and more devastating. Consequently, the sites of primeval forests in the central/western part are generally smaller or for some reason even missing. To give a full picture of the European postglacial development of beech forest expansion from the refuge areas, the most suited examples of old-growth forest were selected, in case primeval examples are missing. The ongoing dynamic natural processes in these strictly protected sites will inevitably lead to a permanent increase of naturalness of the sites which were under human management several decades ago. Even those sites that were under direct human influence in the past and that have been exempt from any use or timber extraction for several decades already start to show typical structural features (e.g. high amount of deadwood, mosaic of gaps and old stands) similar to primeval beech forests. However, there is no way to reproduce these primeval forests. Still existing ancient beech forests in the central and western parts of Europe are mostly relics which particularly favor the occurrence of natural large animal fauna and highly specialized deadwood inhabitants. Against this cultural-historical backdrop, the best old-growth beech forests in the central and western parts and the most representative primeval beech forests in the southeastern part of Europe, all of high integrity, have been included in the extension to the World Natural Heritage "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany".

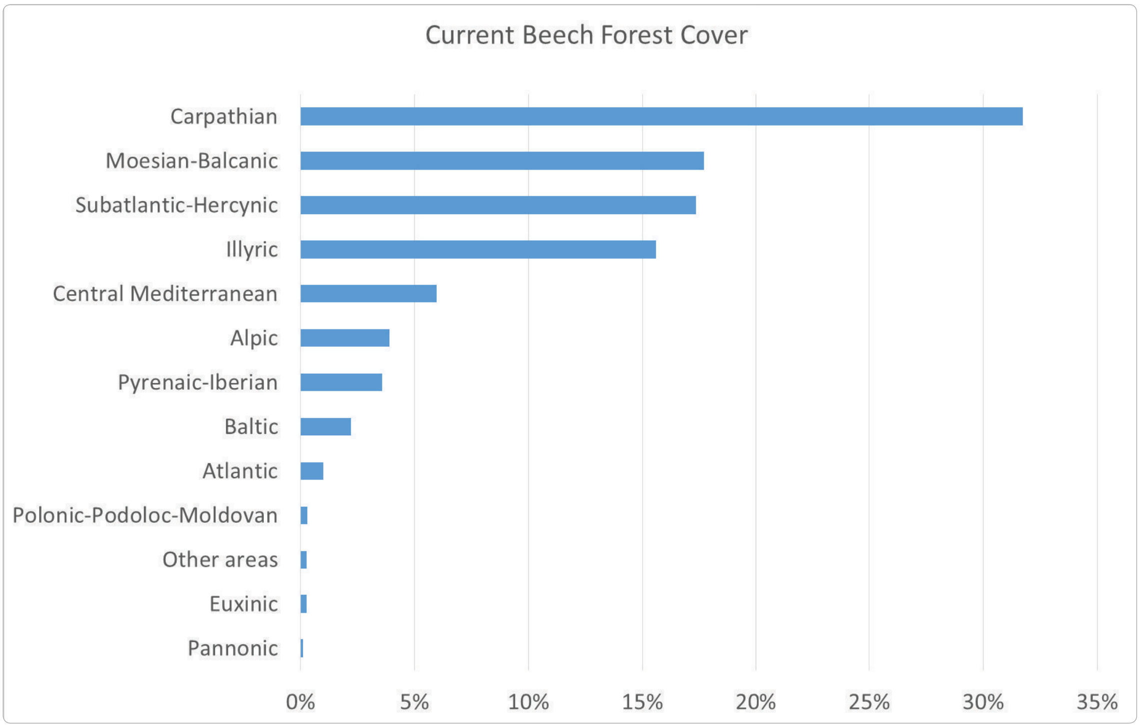
Completeness

The nominated component parts, as an extension to the existing World Natural Heritage "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany", contain all elements pertaining to the complete illustration of the outstanding universal value of the ongoing ecological process following the last glacial period. They are the best remnants in terms of complete and comprehensive ecological patterns. Throughout this extension nomination, 10 of 12 Beech Forest Regions in Europe are represented by component parts of primeval or ancient beech forest.

Throughout the screening process, which included all European countries, a list of all potential primeval and ancient beech forest sites in Europe was compiled. From this overall overview of about 150 sites, the best examples were selected (see indicators in the section above). The primary selection criterion was the adequate representation of all relevant Beech Forest Regions in Europe to give a complete picture of the European beech forests. Based on climatic and floristic criteria, the potential range of beech forests in Europe is divided into 12 Beech Forest Regions (see Figure 4). 10 out of the 12 regions (Alpic, Atlantic, Baltic, Carpathian, Central Mediterranean, Illyric, Moesian-Balcanic, Polonic-Podoloc-Moldovan, Pyrenaic-Iberian, Subatlantic-Hercynic) represent 99.3% of the current beech forest distribution in Europe. These ten regions are represented by the existing and now nominated component parts. Regarding the two regions that are left/not represented, the Pannonic Beech Forest Region comprises only beech forests on extrazonal sites, and the Euxinic Beech Forest Region is mainly represented by beech forests on the Crimean Peninsula.

The existing World Heritage property in Germany, the Slovak Republic and Ukraine represents three of these Beech Forest Regions (Carpathian, Baltic and Subatlantic-Hercynic BFR). By the nomination of the new additional 67 components in 33 component clusters, the Pyrenaic-Iberian BFR (3 component clusters), the Central Mediterranean BFR (6 component clusters), the Illyric BFR (4 component clusters), the Moesian-Balcanic BFR (3 components), the Alpic BFR (2 component clusters), the Atlantic BFR (1 component cluster) and the Polonic-Podolic-Moldovan BFR (2 component clusters) are added. The Carpathian BFR, representing the highest density of primeval beech forests in Europe, is extended by 12 additional component parts. The new component parts in the Carpathian BFR now illustrate the southern part of the Carpathian Bow, including an important refuge area and adding new steppingstones between

Figure 40: Current beech forest distribution within the 12 Beech Forest Regions.

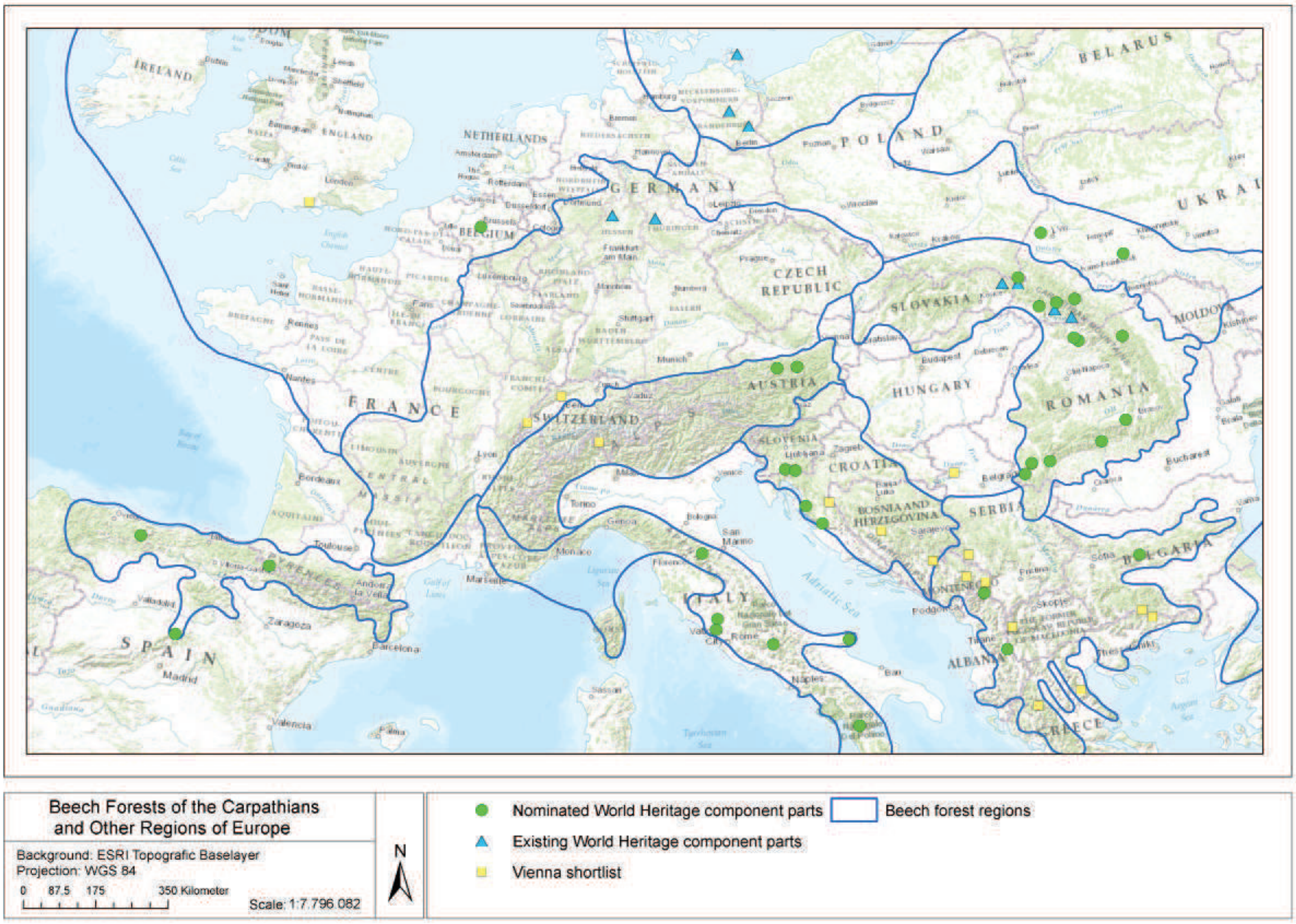


existing sites to enable dynamic exchange of species and genes.

Within each of the BFR's, the most suitable sites to represent climatic, geological and floristic diversity were selected. The size of the site, the length of the period without direct human intervention and the spatial position (steppingstone function) were additionally taken into account. A legally defined strict protection regime was a pre-requisite for selection. The component parts, as an extension to the existing World Natural Heritage "Primeval Beech Forests of the Carpathians and Ancient Beech Forest in Germany", now contain all elements pertaining to the complete illustration of the outstanding universal value of the ongoing ecological processes following the last glacial period. From rejuvenation to degradation, from the gap in the forest canopy to the closed beech canopy, from the beech sapling to the majestic giant tree, the entire development cycle of natural beech forests is present in each of the component parts and not lacking in any element. Owing to old age and large surface area, the territories show typical features of mature beech forests.

Deadwood as bird breeding place. Picture: H. Kirchmeir (E.C.O.)

Figure 41 (below): Map of Beech Forest Regions in Europe and the location of potential component parts from the screening process.



Other relevant Beech Forests in Europe

Within the screening process (2012–2014), a list of 48 sites was identified that would be suitable to represent a European Network of primeval beech forests (Vienna Shortlist, see Table 71)

Table 71: Vienna Shortlist. Result of the screening process 2012–2014 of primeval (virgin and old-growth) beech forests in Europe with sufficient protection status and size that provide additional value to the OUV (without existing WH sites in Germany, Slovakia and Ukraine).

Beech Forest Region	Country	Name of the identified site	Part of extension	Size (ha)
Alpic	Austria	NP Kalkalpen	yes	5,250
Alpic	Austria	Wilderness Area Dürrenstein	yes	1,870
Alpic	Switzerland	Valle di Lodano	no	300
Atlantic	Belgium	Part of the Sonian Forest	yes	270
Atlantic	Great Britain	Part of New Forest NP	no	2,481
Baltic	Sweden	Söderasen NP	no	1,625
Carpathian	Poland	Part of Bieszczady NP	yes	3,300
Carpathian	Romania	Cluster Cerna Valley – Valea Higeg	yes	1,727
Carpathian	Romania	Izvoarele Nerei (Semenic-Cheile Carasului NP)	yes	4,680
Carpathian	Romania	Cluster Cerna Valley – Cerni soara	yes	1,367
Carpathian	Romania	Groșii Țibleșului	yes	346
Carpathian	Romania	Strâmbu Băiuț	yes	600
Carpathian	Romania	Cozia	yes	3,390
Carpathian	Romania	Banat Cluster – Cosava Mica	yes	729
Carpathian	Ukraine	Gorgany	yes	753
Central Mediterr.	Italy	Sasso Fratino (Foreste Casentinesi, Monte Falterona e Campigna NP)	yes	780
Central Mediterr.	Italy	Foresta Umbra (Gargano NP)	yes	180
Central Mediterr.	Italy	Cozzo Ferriero (Pollino NP)	yes	95
Central Mediterr.	Italy	Mt. Cimino	yes	57
Central Mediterr.	Italy	Cluster of NP Abruzzi, Lazio & Molise	yes	936
Euxinic	Ukraine	Crimea NR	no	1,000
Illyric	Bosnia & Herzegovina	Plješivica Virgin Forest	no	38,8
Illyric	Bosnia & Herzegovina	Janj Forest Reserve	no	295
Illyric	Bosnia & Herzegovina	Perucica	no	1,434
Illyric	Croatia	Hajdučki i Rožanski Kukovi (Northern Velebit National Park)	yes	1,290
Illyric	Croatia	Part of NP Paklenica	yes	2,030
Illyric	Slovenia	Snežnik-Ždrocle	yes	720
Illyric	Slovenia	Krokar	yes	74
Moesian-Balcanic	Albania	Lumi i Gashit	yes	1,260
Moesian-Balcanic	Albania	Rajca	yes	2,130
Moesian-Balcanic	Bulgaria	Cluster of Central Balkan NP	yes	11,000
Moesian-Balcanic	Greece	Cluster of Rhodope – Nature Monument Chaidou Rhodope	no	88
Moesian-Balcanic	Greece	Cluster of Rhodope – Virgin Forest Frakto Rhodope	no	207
Moesian-Balcanic	Greece	NP Pindos	no	554
Moesian-Balcanic	Greece	NP Olympos	no	242
Moesian-Balcanic	Kosovo	Bjeshket e Nemuna	no	6,750
Moesian-Balcanic	Macedonia	Dlaboka Reka	no	144

Moesian-Balcanic	Montenegro	Part of NP Biogradska Gora	no	1,600
Pannonic	Serbia	Papratzki do (in Frusca Gora NP)	no	62
Polonic-Podolic-Moldovan	Ukraine	Podilsky Staniv Toutiy	yes	300
Polonic-Podolic-Moldovan	Ukraine	Roztochya BR	yes	384
Pyrenaic-Iberian	Spain	Hayedos de Asturias – Peloño	yes	112
Pyrenaic-Iberian	Spain	Cluster Hayedos de Ayllón – Tejera Negra	yes	255
Pyrenaic-Iberian	Spain	Cluster Hayedos de Ayllón – Montejo	yes	71
Pyrenaic-Iberian	Spain	Hayedos de Navarra – Aztaparreta	yes	175
Pyrenaic-Iberian	Spain	Hayedos de Navarra – Lizardoia	yes	64
Pyrenaic-Iberian	Spain	Hayedos de Asturias – Brañagallones	yes	100
Subatlantic-Hercynic	Switzerland	Montricher, Combe de la Verrière	no	100

From the 48 sites listed in the Vienna Shortlist, 32 are included in this extension nomination. The State Parties of the remaining 16 sites have been invited to participate, but were not able to join because of various reasons:

Bosnia & Herzegovina:	Not interested
Great Britain:	Not interested
Greece:	Not interested (some sites already on the tentative list for other criteria)
Kosovo:	Missing ratification of the World Heritage Convention
Macedonia:	Not interested
Montenegro:	Not interested (site already on the tentative list for other criteria)
Serbia:	Not interested
Sweden:	Not interested
Switzerland:	National revision of World Heritage tentative list still in progress until 2018
Ukraine (Crimean P.):	The Crimean Peninsula was not available for discussion (other sites nominated)

With the exception of the Euxinic Beech Forest Region (would have been represented by the Crimea Nature Reserve) and the Pannonic Beech Forest Region (would have been represented by the Papratzki do in Frusca Gora NP), all other regions are represented by either existing World Heritage component parts or component parts of this extension nomination. As the Euxinic and the Pannonic Beech Forest Region represent less than 1% of the current beech forests in Europe, the fact that these two regions are not represented is not a significant restriction to the OUV.

Area size

The serial property, which comprises representative beech forests, is sufficiently sized to allow for all relevant processes required for the long-term preservation of the ecosystems and the biodiversity contained. With this extension, the European dimension is fully represented by the 15 existing and 33 new component parts/clusters of the extension. The 67 nominated component parts add a total area of more than 61,000 ha to the existing World Heritage property, which has a size of 33,670 ha. The diverse beech forest types are represented across all altitudinal and trophic levels. However, only a combination of the component parts will be able to illustrate the ongoing ecological process since the last ice age with all of its facets and its diversity of habitats and species. The average property size of each cluster is about 1,800 ha, with the individual size of the nominated component parts varying widely. As many of the component parts are within a cluster forming an ecologically connected unit, the total size of the component cluster is more relevant than the size of the single component parts within the cluster. The plausible minimum sizes to protect the flora and vegetation, as well as the specific developmental stages and forest habitats are 30 to 40 (100) ha (e.g. KORPEL 1995), in order to comply with this criterion. With areas ranging from about 58 ha (Monte Cimino) to more than 11,000 hectares (Central Balkan National Park), they are representatively illustrating the typical forms and natural dynamic processes of European beech forest ecosystems. Buffer zones with a total area of more than 217,000 ha will cushion them against adverse external influences. The actual sizes of the component parts (Table 4) will moreover guarantee sufficiently large minimum populations of the characteristic zoocoenoses, reaching from soil fauna and arthropods through small and medium-sized mammals to most bird species (SCHERZINGER 1996). The habitat size of large mammals and some birds of prey are significantly larger than the proposed component clusters. However, the protection of large mammals and birds of prey are beyond the scope of this World Heritage Nomination under criterion ix. The smaller component parts of Monte Cimino and Monte Raschio (58 ha and 74 ha, respectively) are located at the top of volcanic mountains. Beech is restricted to the top of these mountains and therefore the component parts cannot be enlarged. As these two sites represent specific site conditions on volcanic substrate in the Mediterranean Beech Forest Region, they are of high importance although they are (naturally) small.

Together with the buffer zones and the surrounding densely wooded or sparsely used landscapes, which enclose the individual sites, the nominated component parts are in an outstanding initial situation to emphasize and safeguard the existing integrity of the nominated property of the European beech forests. The buffer zones are under the control of the management authorities, which will guarantee the the full functional effectivity of buffer zones.

Huge deadwood in a beech forest. Picture: H. Kirchmeir (E.C.O.)

Adverse effects of development and/or negligence

There are no known serious effects that might neglect, impact or destroy the property. The management of the nominated component parts is coordinated and executed by the respective protected area administrations. The component parts are characterized by low fragmentation as well as high networking, buffering, and developmental potential.

3.1.e Protection and management requirements

The protection and management requirements for this multinational serial property need activities and management structures on several levels.

At the first level, management bodies, responsible for the implementation of the strict protection regime at site level, are already in place. These local management bodies are responsible for law enforcement and stakeholder participation. Depending on the historic development of the different countries, the management structures and governance approaches are very diverse. While in some countries, nature conservation is still a more or less top-down approach, in others the involvement of local stakeholders in a participation process is an important management approach. Throughout the integration of this diversity of management approaches in one single World Heritage property, an enhancement of knowledge and experience exchange and an improvement of management strategies is to be expected.

To enable a cooperation process between the different component parts within a country and between the 13 countries involved, appropriate management structures have to be established at national level (national steering groups) as well as at international level (Joint Management Committee). To facilitate the cooperation process, a permanent Joint Management Coordination is to be established. This coordination should act as a platform for information exchange, is in charge of organizing meetings on a regular basis, and gives technical support to the Joint Management Committee as well as to the working groups that are interacting on thematic issues at component part level.

This management structure is described in detail in the Integrated Management System in Chapter 5.

In order to ensure enduring protection of the property, all nominated component parts are subject to strict protection on a permanent legal basis preventing negative human influences (e.g. timber extraction, construction of infrastructure). This protection system is within the responsibility of each of the countries or respective local provincial/regional government. In most cases, the components are part of a national park, wilderness area or other internationally recognized conservation area, which usually ensure strict protection. In some cases, protection is guaranteed by national protected area categories like strict nature or strict forest reserves. In a few cases (Sonian Forest (008, 009, 010, 011, 012), Codrul Secular Șinca (040), Groșii Țibleșului (047, 048), Strâmbu Băiuț (050)), protection is ensured by the (forest) Management Plan in place (strict forest reserve or non-intervention management) and the corresponding legislation. The protection status, determined by the forest management plan, is fostered by designation through the Fauna-Flora-Habitat Directive and by bilateral contractual agreements between the responsible government and land managers. The Belgium component parts are located in different administrative units and are protected by the Flemish forest decree, the governmental decisions, the forest law and the Walloon forest decree. They are strictly protected Forest Reserves corresponding to IUCN category 1a. In the mentioned Romanian component parts, the land is state owned. Therefore the State Party has the full management empowerment on these sites. Groșii Țibleșului (047,048), Strâmbu Băiuț (050) and Codrul secular Șinca (040) are strictly protected through the forest Management Plan approved by an order of the Ministry of Environment, Water and Forests. The whole area is protected in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests, similar to other forest scientific reserves. The protective status corresponds to the IUCN 1a category. In 2011, the owner of the forest signed a memorandum with WWF Romania and the administrator of the forests, in which WWF is mandate to undertake actions to declare the forest as natural reserve of national interest and the owner committed himself not to carry out any logging operations in the area.

The details on the protection status are found in chapter 4.

The legal definition of the protection status is a prerequisite, but effective protection additionally needs effective law enforcement. To guarantee that the protection status is not violated, the integration of relevant local stakeholders in a participative way is a crucial task. The design, extent and depth of these processes vary between the individual component parts and countries. The designation of the new components, the international reputation, and the focus on the local and national administrations help to foster the protection status and to enhance a long-term protection of the sites. Participation of the local stakeholders is guaranteed by the design of the Integrated Management System. Integrated Management Panels on the local level will ensure the integration of stakeholders into the management process.

Mosses. Picture: H. Kirchmeir (E.C.O.)

3.2 Comparative analysis

Nemoral deciduous forests of the world

For the most part, the occurrence of deciduous forests is limited to the Holarctic of the Earth's Northern Hemisphere. They are found throughout the nemoral zones due to climatic reasons and are limited to moderate climate conditions with a minimum vegetative period of four months, a cold season in winter, and humid-(semihumid) conditions. The genus of beech (*Fagus*) is a typical element of deciduous forests. It comprises 14 species in total that exist under humid climate conditions in the three major Holarctic regions of deciduous forest: in the east of North America, in Europe/West Asia, and in East Asia. Its counterpart in the Southern Hemisphere is the cognate Nothofagus genus (*Fagaceae*) with its approximately 45 species native to the Austral and Antarctic zones as well as the Australian floristic realm, to New Zealand, and to New Guinea.

Fagus spread all over the Northern Hemisphere during the early Tertiary (PETERS 1997). There are two species in Europe and West Asia: *Fagus sylvatica* and *Fagus orientalis*, which are sometimes regarded as one single species according to recent scientific findings (DENK, GRIMM & HEMLEBEN 2005). The distribution of *Fagus sylvatica* ranges from the Mediterranean montane level through the mountainous regions and downs of Central Europe to the North/Central European lowlands, South Scandinavia, and Great Britain. Throughout its area of distribution, *F. sylvatica* is a dominant forest-forming species. In general, *F. orientalis* and *F. crenata* also form and dominate forests while other *Fagus* species are found in mixed forests rich of woody species at varying proportions. According to KLEOPOW 1941 (quoted in WALTER & STRAKA 1970), *Fagus sylvatica* is evolutionary more recent than *Fagus orientalis*, which is very closely related to *Fagus crenata* in Japan. As opposed to the genus Nothofagus found in the Southern Hemisphere, there are only deciduous *Fagus* species, with all of them being relatively competitive and shade tolerant. When in their optimum range, they are capable of supplanting almost any other tree species (PETERS 1997, HOFFMANN & PANEK 2006).

There is but one widespread species of the *Fagus* genus native to North America: *Fagus grandifolia* comprising a *var. Mexicana* with a disjunctive relic habitat. A total of 11 species including six local endemites and five more common species have been described for East Asia. *Fagus crenata* and *F. japonica* are widely found in Japan's nemoral zone. *Fagus longipetiolata*, *F. engleriana* and *F. lucida* are found in South China up to the laurel forest region in the meridional zone (MEUSEL et al. 1965, PETERS 1997). 36% of the Earth's forests may still be regarded as primeval (FAO 2006); however, these are exclusively found in unsettled or sparsely settled regions with little infrastructure (KNAPP et al. 2008). In contrast, the Holarctic deciduous forest regions are among the most densely populated areas in the world, which are growth centers of modern industrialized civilizations. It therefore comes as no surprise that deciduous forests have seen a massive displacement during the history of settlement, with only a few relics being found even on a global scale.

The current floristic discrepancies between the Earth's major deciduous forest regions are primarily a result of the Quaternary climate change (WALTER & STRAKA 1970, LANG 1994). The consequences of glaciation turned out more extreme in Europe than in North America (ARCHIBOLD 1995). The ice cover in Siberia and in Central Asian mountain ranges was comparatively less pronounced, resulting in the forest coverage being fragmented to a lesser extent than was the case in Europe and North America. In glacial Japan, the glaciers rose to an altitude of 2,700 meters and above.

Europe

Being associated with the climate's steadily decreasing oceanity from west to the east, the beech forest distribution in Europe is determined by climatic parameters. The beech forests' eastern and northern boundaries are roughly correspondent to the distribution limit of *Fagus sylvatica*, which is confronted with increasing winter cold (< -30 °C) in the east and north as well as with aridity (annual precipitation < 500 mm) (cf. SCHRÖDER 1998). Beech forests with *F. sylvatica* form the potential and current climax vegetation in large parts of Europe. In global comparison, *F. sylvatica's* absolute dominance should be emphasized, which forms pure stands predominantly and particularly in Europe.

Another striking feature is the poverty in species of the European deciduous wood flora: there are 53 European species as opposed to North America with 124 species (ELLENBERG in LANG 1994). Due to its developmental history, Europe is dominated by anemophilous species.

Deadwood in an old beech forest. Picture: H. Kirchmeir (E.C.O.)

West Asia (East Europe)

With the Colchic, Hyrcanic, Caspian, and Caucasian forests at the Black Sea, on the montane level of the Caucaus Mountains as well as on the southern edge of the Caspian Sea, West Asia is the prime relic area of Arcto-Tertiary forests in West Eurasia. The northern slope of the Alborz is covered by the Caspian forests, stretching over 800 km from Southern Azerbajan across North Iran almost up to the Turkmen border in a width of only some 70 km. Beech forests made up of *Fagus orientalis* are found in the middle and upper montane belts. The beech is accompanied by a host of maple species, lime trees, oaks and hornbeams. It is assumed that the Caspian forests have developed without any interruption caused by glacial impact as opposed to other forests in the deciduous forest zone. Today, the Caspian forests in their entirety represent the most significant, albeit receding remainder of primeval forests in the world's deciduous forest zone (KNAPP 2005).

North America

The North American deciduous forest zone has seen the transformation of 50% of all forests into farmland and pastures in less than 400 years. The remaining deciduous forests are mostly managed and can be considered to be relatively near-natural only in terms of the composition of tree species. *Fagus grandifolia* is widespread in Eastern North America. There are, however, no large-area pure *Fagus grandifolia* forests. The natural *Fagus grandifolia-Acer saccharum* ranges south of the Great Lakes have been stripped of forests almost entirely and are densely populated ("corn belt" of the USA). Obviously, there are no primeval forests left with the exception of the World Heritage Site Great Smokey Mountains National Park in America's eastern deciduous forest regions.

East Asia

East Asian deciduous forest areas have shrunken to approx. 25% of their natural distribution range. During the last approx. 6,000 years of cultural history, they have been pushed back in a similar way as in Europe. Today, some major woodlands are found only in South and, in particular, Northeast China. These areas saw the cutting down of all forests at the beginning of the 20th century, which left the vast region devoid of any primeval forests and with only a very few old forests. The forest development in the wake of said deforestation was once again suppressed in the 1960s during the Cultural Revolution. Established in 1961, the Changbai Shan National Park on the Korean border comprises, in its core zone of 196,463 ha, the most important near-natural deciduous forest stands in Manchuria. However, this does not include any *Fagus* forests. Near-natural forests are currently found in the montane domains of Central and South Japan as well as in the lowlands of North Japan (ARCHIBOLD 1995). Forests here are dominated by *Fagus crenata* (SCHRÖDER 1998), which unfolds its shaping force at the montane level (WILMANNS 1989). It is associated with maple, oak, and alder, with an understory frequently being formed by Dwarf Bamboo.

World Natural Heritage properties in deciduous forests regions outside of Europe

(Source: Natural site datasheet from World Conservation Monitoring Centre, www.unep-wcmc.org)

Great Smokey Mountains (USA, area 209,000 ha, World Natural Heritage since 1983)

There are two World Heritage Sites in the nemoral deciduous forest regions in Eastern North America. The Mammoth Cave National Park has been inscribed as a paleontologic find spot, and the Great Smokey Mountains National Park as the last primeval forest range in Eastern North America. The lower altitudinal belts are dominated by oak species and the higher ones by conifer species. Of particular note is a ravine forest, comprising 20 different species of deciduous trees and conifers. The Canadian Hemlock (*Tsuga canadensis*) is mainly found in the low to middle altitudinal belts and is associated with Red Spruce (*Picea rubens*) at 1,500 m and above. The park's high altitude areas form the largest coherent range of virtually pristine *Picea rubens* populations. Being a mixed tree species, *Fagus grandifolia* is found throughout, albeit at low proportions.

Huanglong scenic and historic interest areas (China, area 60,000 ha, World Natural Heritage since 1992)

Huanglong is situated within the transition zone between the eastern wetland forests and the montane conifer woodland of the Jing Zang plateau. Some 65% of the area are covered by forests. Mixed forest, which is dominated by Chinese Hemlock (*Tsuga chinensis*), Dragon Spruce (*Picea aspertata*) and maple species, is found at altitudes from 1,700 m to 2,300 m. At levels between 2,300 m and 3,600 m, forests are mostly shaped by conifers and show subalpine characteristics. This zone is followed by alpine mats, snow, and granite at above 3,600 m. There are no *Fagus* species.

Jiuzhaigou valley scenic and historic interest area (China, area 72,000 ha, World Natural Heritage since 1992)

This protected area is located in the Szechuan upland and is shaped by temperate conifer and deciduous forests. The level of afforestation is approx. 65%. In Jiuzhaigou, there are protected pristine conifer forests and two bamboo species serving as an important food source to the Giant Panda (*Ailuropoda melanoleuca*). More accurate data on the vegetation is not available; however, the flora roughly corresponds to the flora in the

Huanglong scenic and historic interest area. There are no *Fagus* species.

Mount Emei/Leshan Giant Buddah (China, area 15,400 ha, World Natural Heritage since 1996)

The Mt. Emei protected area is shaped by five vegetation levels; vegetation coverage amounts to 87%, 52% of which being woodlands. At levels below 1,500 m, the vegetation is dominated by subtropical indeciduous forests, with indeciduous and deciduous mixed forests and mixed coniferous/non-coniferous forests being typical at higher levels. Above 2,800 m, there are subalpine coniferous forests and shrubbery. These forests are home to over 3,200 plant species, accounting for 10% of the Chinese flora. There are no *Fagus* species.

Fungi and mosses on deadwood. Picture: H. Kirchmeir (E.C.O.)

Mount Huangshan (China, area 15,400 ha, World Natural Heritage since 1990)

Beside the Huangshan Oak (*Quercus stewardii*), deciduous forests are also populated by a *Fagus* species (*Fagus engleriana*) that reaches a mere 20 m and is mostly multi-stemmed. Huangshan is home to endemic vegetation forms covering up to approx. 56% of the protected area. Below a level of 800 m, the vegetation is shaped by the Masson's Pine (*Pinus massoniana*) together with the Huangshan Pine (*Pinus hwangshanensis*). The latter is found at levels between 600 and 1,100 meters above sea level. Above 1,100 m, there are deciduous forests. *Fagus engleriana* is not found as a dominant mixed tree species here.

Shirakami Sanchi (Japan, area 16,139 ha, World Natural Heritage since 1993)

Beside the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany", the Japanese World Natural Heritage is the only World Natural Heritage site owing its outstanding significance to a *Fagus* species. It comprises the last pristine populations of *Fagus crenata*, which is endemic to Japan. The protected area is situated in the northwest of Honshu Island, North Japan. *F. crenata* is restricted to montane habitats with a humid-cool climate and heavy snowfall during winter months. Starting from the areas of retreat of the last ice age, *F. crenata* reached its current refuge approx. 8,000 years ago. In the course of time, a forest community has evolved which is rather rich in species as compared to Europe. There are an estimated 500 plant species, with many of these being endemic to the region. This results in the ecosystems, which are furthermore limited to montane zones, being of different composition than the European beech forests. For example, an understory is frequently formed by the Dwarf Bamboo (ARCHIBOLD 1995).

In a nutshell, the global comparison indicates that the conservation status of nemoral deciduous forests is rather critical not only in Europe, but also outside of it because of the loss of wooded areas and degradation of the remaining woodland. Exceptions are but a few individual national parks, World Heritage sites, and the Caspian deciduous forests. Forests housing *Fagus* species are mostly of the mixed type without the beech being dominant at a large scale. Due to the glacial period that shaped Europe and, in particular, to the recolonization having taken an idiosyncratic course, the unique evolutionary processes in the European beech forests contrast strongly with other continents.

European beech forests

From the 26.7% of forest area in Europe, the boreal conifer zone occupies the largest portion. At present, the fraction in the non-coniferous forest region is markedly lower. In the absence of human intervention, major parts of Europe, in total amounting to approx. 910,000 km^2, would be occupied by *Fagus sylvatica* forests (BOHN et al. 2002/2003) with *F. sylvatica* still showing some potential for expansion. In the north, the European beech forests are mainly found in the lowlands while in the south of Europe reaching far into the montane zones. The entire lowlands from Northern France to Southern Sweden and Northeastern Poland, as well as the downs and mountainous regions of Central and South Europe are potentially covered by *Fagus sylvatica* forests. In Southern Europe, e.g. Sicily, they are found in the form of the upper forest belt in the Nebrodi National Park at altitudes over 1,200 meters above sea level. In total, 86 different mapping units can be differentiated (BOHN et al. 2002/2003). The European beech forests have been exploited to such a degree during the past millennia that they could survive in their natural shapes only in some inaccessible pockets and isolated peripheral zones. The primeval forests that still exist are therefore spread across Europe in rather small patches and located in larger areas particularly in the mountain ranges of the Carpathians at the eastern border of their natural range rather than in the *Fagus sylvatica* core habitat.

World Heritage properties in the deciduous forest regions of Europe

(Source: Natural site datasheet from World Conservation Monitoring Centre, www.unep-wcmc.org)

Six World Heritage properties with non-coniferous forests are contained in the nemoral deciduous forest regions of Europe. Beside the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany", which are to be complemented by the nominated component parts, other regions with relevant beech forest fractions are of particular significance that represent various biogeographic regions. This includes the Plitvice Lakes and Pirin sites with “Illyrian Balkan Beech Forests”, as well as Mont Perdu with its montane portions of the "Atlantic-West European Beech Forests". As a consequence of the different biogeographic regions, altitudinal zones, and the history of postglacial development, these are markedly different from the beech forests of the nominated component parts as representatives of the “European Beech Forests”, which is the reason why they cannot be seen as substitutes for the latter.

There are no or hardly any appreciable beech forest portions in the two remaining World Natural Heritage properties.

Białowieża Forest (Poland and Byelorussia, area 141,885 ha, World Natural Heritage since 1979, 1992 (criterion vii), 2014 criteria ix, x)

Białowieża Forest conserves a diverse complex of protected forest ecosystems which exemplify the Central European mixed forests terrestrial ecoregion, and a range of associated non-forest habitats, including wet meadows, river valleys and other wetlands. This site is characterized by a relatively large area of natural old-growth forests, which hardly show any human influence. With more than twenty European main forest types as well as an exceedingly rich fauna, woodlands here show the qualities of typical primeval forests. However, *Fagus sylvatica* is not found in Bialowieza. The large and integral forest area supports complete food webs including viable populations of large mammals and large carnivores (wolf, lynx and otter) amongst others. The richness in deadwood, standing and on the ground, leads to a consequent high diversity of fungi and saproxylic invertebrates.

Plitvice Lakes National Park (Croatia, area 19,200 ha, World Natural Heritage since 1979, criteria vii, viii, ix)

70% of Plitvice is woodlands. 72% of the overall forest area (9,676 ha) is dominated by pure *Fagus sylvatica* stands. These forests are shelter to bears, wolves, and rare birds. However, the outstanding universal value is determined by the gorgeous karst lake landscapes rather than by the forests. The area ranges from 417 to 1,180 meters above sea level, with the main portion, including the Plitvice Lakes, being located above 600 m.

Lying deadwood covered by mosses. Picture: H. Kirchmeir (E.C.O.)

Pirin National Park (Bulgaria, area 40,060 ha, World Natural Heritage since 1983, criteria vii, viii, ix)

60% of the total area is covered by the National Park’s forests, with the largest fraction being mixed conifer forests of the altimontane zone. At the montane level, there are also fir-beech forests with *Fagus sylvatica*. They are characterized by a high portion of relic and endemic species. Dominating species at the timberline are the Bosnian Pine (*Pinus heldreichii*) and Macedonian Pine (*Pinus peuce*). Individual *Pinus leucodermis* populations are up to 500 years old, while others are 45 m high. The subalpine zone is dominated by *Pinus mugo* thickets.

Durmitor National Park (Montenegro, area 32,000 ha, World Natural Heritage since 1980, criteria vii, viii, x)

The canyon of the Tara River is Europe’s deepest chasm. The primeval forests of Mlinski are among the primary factors for the National Park's protection status, covering 50% of the park area and being composed of deciduous forests, conifer forests, sub-alpine and alpine mats. Dumitor boasts one of the last primeval pine forests in Europe, while the Beech (*Fagus sylvatica*) is only of secondary importance as a mixed tree species.

Mont Perdu (France and Spain, area 31,189 ha, World Natural Heritage, mixed site, since 1997, criteria vii, viii)

Located in the Central Pyrenees, the World Natural Heritage runs along the Spanish-French frontier area in the limestone massif of Mont Perdu. The northern portion with an area of 11,055 ha lies in France, while the southern part with its 20,134 ha is located in Spain. Altitudinal zones range from 600 m in the "Midi Pyrénées" region to up to 3,352 m to the mountain ranges around Monte Perdido/ Mont Perdu. Five vegetation types have been described for the domain. Sub-Mediterranean vegetation is mostly found in the southern valleys. The colline type is dominated by sessile oaks, while montane mixed forests are formed by *Fagus sylvatica* and *Abies alba* in montane zones. The vegetation of the subalpine level is determined by *Pinus uncinata*, *Vicia argentea*, and the endemic *Borderea pyrenaica*. Over 1,500 plant species are found in the protected area, 50 species of which being considered to be endemic to the Pyrenees. The region's beech forests document the montane Pyrenean type "Atlantic-West European Beech Forests".

Summery beech forest. Picture: H. Kirchmeir (E.C.O.)

Škocjan Caves (Slovenia, area 413 ha, World Natural Heritage since 1986, criteria vii, viii)

The Škocjan Caves have been nominated because of the limestone caves and collapsed dolines. In the buffer zone of the Škocjan Caves, also a significant amount of beech forests is located. The newly proposed component part Ždrocle in this nomination is partly located within this buffer zone.

Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany (Slovak Republic and Ukraine, Germany, area 33,670 ha, World Natural Heritage since 2007/2011, criterion ix)

The World Heritage property is composed of 15 component parts in Germany, Slovakia and Ukraine. The montane to subalpine primeval beech forests represent the "Carpathian Beech Forests" and are completed by the beech forests in Germany. The primeval beech forests of the Carpathians are an outstanding example of intact montane nemoral forests, which have been preserved in their complexity. This is a singular, complete, and comprehensive example of a forest dominated by a single tree species, which is the beech tree. Forest dynamics here were allowed to proceed without interruption or interference since the last ice age. Nowadays, they are amongst the last pure beech forests in Europe to document the undisturbed postglacial repopulation of the species, which also includes the unbroken existence of typical animals and plants. Wolf, lynx, and bear deserve particular mentioning here. The primeval beech forests of the Carpathians are the linchpin for the nomination of the German component parts that, in the center of the beech's distribution range, are an essential part of the ecological processes underway since the last ice age. The five German sites represent the best-conserved ancient beech forest in the center of beech distribution in Europe. They document the beech distribution in the Subatlanic-Hercynic and Baltic Beech Forest Region and are indispensable for the understanding of postglacial beech distribution from south to north.

Summary on the comparative analysis on existing world heritage sites

Beside the "Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany", only few of the existing world heritage sites include beech forest in their property. Significant examples of old-growth and primeval beech forests are represented in Mont Perdu (Spain and France) and Plitvice Lake National Park (Croatia). Beech forests are also included in the Pirin National Park (Bulgaria) and in the Durmitor National Park (Montenegro). To some extent, beech forests are included in the buffer zone of Škocjan Caves (Slovenia). As these beech forests are already included in an existing World Heritage site, they are not included in this extension nomination. Despite of this, it would be of high importance to include these existing sites into a Network of

European Beech Forests to foster close cooperation in management issues and scientific research.

Screening of tentative list

The current tentative list encompasses the following sites that also include beech forests to some extent and which are not part of this nomination dossier:

- Fungal Flora of Bukovské Hills (Slovakia)
- Western Caucasus (Re-nomination) (Russia)
- Český ráj (Czech Paradise) Rock Cities (Czech Republic)
- Parco Nazionale della Sila – Sila, Gran Bosco d'Italia (Italy)
- The Tara National Park with the Drina River Canyon (Serbia)
- The broader region of Mount Olympus (Greece)
- Zagorochoria – North Pindos National Park (Greece)
- Biogradska Gora National Park (Montenegro)

The Fungal Flora of Bukovské Hills (Slovakia) is planned to be nominated under the criterion x (biodiversity). The site is proposed to protect an outstanding biodiversity of fungi growing in old-growth/primeval mixed fir-beech forests. The site might also fit into the extension nomination of "Primeval Beech Forests of the Carpathians and Other Regions of Europe", but there are several better suited sites in this specific area already inscribed in the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany".

The beech forests in the Western Caucasus are comprised by *Fagus orientalis*, which is not in the scope of this nomination. The Český ráj (Czech Paradise) Rock Cities are focusing on the geomorphological phenomena of sandstone sculptures, and beech forests are not having status of ancient or primeval forests. The main purpose of Parco Nazionale della Sila is to protect the native forest of *Pinus laricio* and its geological composition. Beech is part of mixed forests, but is not mentioned in the criteria of nomination in the tentative list. The proposed nomination of Tara National Park is based on criterion x (biodiversity). The nomination emphasizes the relict stands of Serbian Spruce (*Picea omorika*). Beech is mixed with coniferous tree species, but is not mentioned as a specific target of protection in the description. The following three sites, Mount Olympus, North Pindos and Biogradska Gora, have been also been recommended for inclusion into the „Primeval Beech Forests of the Carpathians and Other Regions of Europe" nomination, but the State Parties have not accepted the invitation to this joint nomination.

The comparative analysis comes to the conclusion that there is no similar property inscribed or in preparation. None of the sites do have their focus on the Pan-European expansion process of *Fagus sylvatica* and none of the examined properties are anywhere near the spatial dimension to do so. Some of the existing (Mont Perdu, Spain and France, and Plitvice Lake National Park, Croatia) include old-growth beech forest of significant quality that could add additional value to the "Primeval Beech Forests of the Carpathians and Other Regions of Europe". These two sites together with, in case of successful nomination, the three sites from the tentative list Mount Olympus and North Pindos (Greece), as well as Biogradska Gora (Montenegro) should be integrated into a network of scientific cooperation and information exchange with the "Primeval Beech Forests of the Carpathians and Other Regions of Europe".

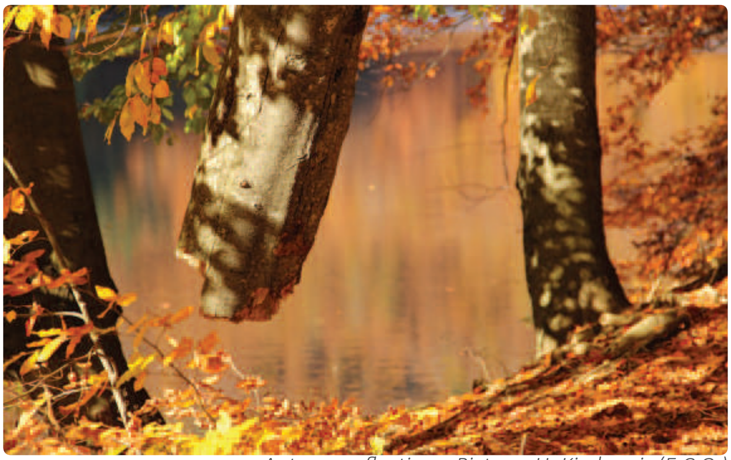
3.3 Proposed Statement of Outstanding Universal Value

3.3.a Brief synthesis

The "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are a serial property comprising 82 component parts in total. They represent an outstanding example of anthropogenically undisturbed, complex temperate forests and exhibit the most complete and comprehensive ecological patterns and processes of pure and mixed stands of European beech across a variety of environmental conditions. They contain an invaluable genetic reservoir of beech and many species associated and dependent on these forest habitats.

3.3.b Justification for Criteria

The "Primeval Beech Forests of the Carpathians and Other Regions of Europe" are indispensable to understand the history and evolution of the genus *Fagus*, which, given its wide distribution in the Northern Hemisphere and its ecological importance, is globally significant. These undisturbed, complex temperate forests exhibit the most complete and comprehensive ecological patterns and processes of pure and mixed stands of European beech across a variety of environmental conditions, such as climatic and geological conditions, throughout all relevant European Beech Forest Regions. They compromise all altitudinal zones from the coast up to the forest line in the mountains and, furthermore, include the best remaining examples of the outer boundaries of the European beech forest range. Beech is one of the most important elements of forests in the Temperate Broadleaf Forest Biome and represents an outstanding example of the recolonization and development of terrestrial ecosystems and communities since the last ice age. The continuing



Autumn reflections. Picture: H. Kirchmeir (E.C.O.)

northern and westward expansion of beech from its original glacial refuge areas in the eastern and southern parts of Europe can be tracked along natural corridors and steppingstones spanning the continent. More recent changes in the distribution pattern of this species relate to direct influences of human disturbance and the more complex effects of anthropogenically induced climate change. Both historic and present serial patterns of distribution represent natural evolutionary strategies for adapting and surviving environmental change. The dominance of beech across extensive areas of Europe is a living testimony of the tree's genetic adaptability.

3.3.c Statement of Integrity

The selected beech forest sites not only represent the full serial diversity found across Europe, they are also of sufficient size to maintain natural processes necessary for the long-term ecological viability of the wider ecosystem. Buffer zones including surrounding protected areas (nature parks, biosphere reserves) are managed sympathetically to ensure the long-term conservation of the particular character of the designated beech forests together with its inherent attributes. Next to criteria such as the extent of the forest area and the presence of an effective buffer zone, key characteristics which were also used in the site selection process included the average age of the forest stand and the period elapsed since it was last managed or actively disturbed. The evaluation criteria used in the selection process helped to describe the degree of naturalness of a forest, but also provide some indication of the inherent functional capacity of the ecosystem. Finally, where appropriate, special emphasis was given to connectivity between beech forests and the surrounding complementary habitats as a perceived prerequisite for ecosystem functioning and adaptation to environmental change.

3.3.d Statement of authenticity for properties nominated under criteria (i) to (vi)

Not relevant, as this property is nominated under criterion (ix)

3.3.e Requirements for protection and management

Long-term protection and management is ensured through national legal protection such as national parks, core areas of biosphere reserves or other types of protected areas. Effective implementation of an integrated management plan and a multilateral integrated management system is required to guide the planning and management of this serial property. Key management issues include forest fire control and conservation of monumental old trees, conservation and management of mountain meadows, river corridors and freshwater ecosystems, tourism management, research and monitoring. Cooperative management agreements with local groups and tourism agencies can enhance the achievement of management goals and ensure local community engagement in the component parts.

Beech forest in autumn. Picture: H. Kirchmeir (E.C.O.)

Beech leaves detail. Picture: H. Kirchmeir (E.C.O.)

4. STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY

4.a Present state of conservation

Assessing the naturalness (or wilderness) of a beech forest is a difficult task, as natural ecosystems present a huge variety in structure and species composition. The definition of wilderness from the European Guidelines on Wilderness in Natura 2000 (EUROPEAN COMMISSION 2013) can serve as target development stage (if not already reached) for the component parts: *"A wilderness is an area governed by natural processes. It is composed of native habitats and species, and large enough for the effective ecological functioning of natural processes. It is unmodified or only slightly modified and without intrusive or extractive human activity, settlements, infrastructure or visual disturbance."*

There are several GIS-based studies which measure wilderness based on wilderness quality on a regional, national or even global scale (ORSI et al. 2013; PLUTZAR et al. 2013; CARVER et al. 2011; FISHER et al. 2010; FRITZ et al. 2000; MCCLOSKEY & SPALDING 1989). However, assessing and monitoring wilderness (or naturalness as one indicator of wilderness) on site level is a challenging task. MACHADO (2003) gives examples for a general system to assess naturalness, but the approach is too general to determine different stages of naturalness within beech forests. The Kalkalpen National Park in Austria has implemented a monitoring system on permanent plots where naturalness is measured by 11 indicators according to the hemeroby approach described by GRABHERR et al. (1998). This concept allows for monitoring the development process from former managed to natural beech forest ecosystems (MAYRHOFER et al 2015). For the existing world heritage sites in Germany, another comparative appraisal of the degree of naturalness by applying by applying a methodology that is both ecological and compatible with monitoring (BUCHENWALDINSTITUT in BUBLITZ 2005 and SCHNEIDER 2008) is available to some extent. Degrees of naturalness were rated on a one-hectare sample area according to precisely defined features specific for natural and/or primeval beech forests, with the primary parameters being population structure, dynamics, and deadwood quantities (SCHNEIDER 2008).

To obtain comparable baseline data for monitoring the integrity and the state of conservation on a similar methodological approach for all component parts of the existing and extended World Heritage component parts, the concerted action of all responsible monitoring institutions in the 13 countries will be needed. This is defined as one important objective in the Joint Management Systems.

The more natural a beech forest, the more complete is its development cycle: this is a result of the formation of ecosystems that have shaped the beech forests over the last millennia. The small-scale endogenous rhythm in the beeches' cycle of growth and decay, as well as the seasonal rhythm allow for the formation of mosaics of rather sunny and shady, as well as richly structured areas, to which the variegated fauna and flora, characteristic of Central Europe, have adapted. Therefore, only a complete development cycle can illustrate the entire functional and biological diversity of a beech forest.

A summary of the naturalness of the component parts is given in Table 67. The table gives an overview of the history of the sites; if they are primeval or if historic timber exploitation was given (Table 73), but the current state is close to natural now (ancient). A detailed description of each of the sites can be found in the section below.

Table 72: State of naturalness of the 67 component parts

ID	State Party	Component part/cluster	State of naturalness
001	Albania	Lumi i Gashit	Old-growth forest with fragments of virgin forest
002	Albania	Rrajca	Old-growth forest with significant parts of virgin forest
003	Austria	Dürrenstein	Old-growth forest with significant parts of virgin forest
004–007	Austria	Kalkalpen	Old-growth forest with fragments of virgin forest
005–012	Belgium	Sonian Forest	Old-growth forest
013–021	Bulgaria	Central Balkan	Majority virgin forest
022	Croatia	Hajdučki i Rožanski Kukovi	Majority virgin forest
023–024	Croatia	Paklenica National Park	Majority virgin forest
025–029	Italy	Abruzzo, Lazio & Molise	Old-growth forest with significant parts of virgin forest
030	Italy	Cozzo Ferriero	Old-growth forest
031	Italy	Foresta Umbra	Old-growth forest
032	Italy	Monte Cimino	Old-growth forest
033	Italy	Monte Raschio	Old-growth forest
034	Italy	Sasso Fratino	Old-growth forest
035–038	Poland	Bieszczady	Majority virgin forest
039	Romania	Cheile Nerei-Beușnița	Majority virgin forest
040	Romania	Codrul Secular Șinca	Majority virgin forest
041	Romania	Codrul Secular Slătioara	Majority virgin forest
042–043	Romania	Cozia	Majority virgin forest
044–046	Romania	Domogled-Valea Cernei	Majority virgin forest
047–048	Romania	Groșii Țibleșului	Majority virgin forest
049	Romania	Izvoarele Nerei	Majority virgin forest
050	Romania	Strâmbu Băiuț	Majority virgin forest
051	Slovenia	Krokar	Majority virgin forest
052	Slovenia	Ždrocle	Old-growth forest with fragments of virgin forest
053–054	Spain	Hayedos de Ayllón	Old-growth forest with fragments of virgin forest
055–056	Spain	Hayedos de Navarra	Old-growth forest with significant parts of virgin forest
057–058	Spain	Hayedos de Picos de Europa	Old-growth forest with significant parts of virgin forest
059	Ukraine	Gorgany	Majority virgin forest
060	Ukraine	Roztochya	Old-growth forest with significant parts of virgin forest

061	Ukraine	Satanivska Dacha	Old-growth forest with fragments of virgin forest
062–065	Ukraine	Synevyr	Majority virgin forest
066–067	Ukraine	Zacharovanyi Krai	Majority virgin forest

Table 73: Duration of process protection in the nominated component parts

ID	State Party	Component part/cluster	Processes under legal protection since	Remarks
001	Albania	Lumi i Gashit	Since 1996 (Establishment of the Strict Nature Reserve by Decision of Council of Ministers).	The remoteness and the location in the former border exclusion zone ("kloni") are the main reasons why forests on the slopes of the Gashi River were not heavily impacted and in some parts even primeval forest patches remained.
002	Albania	Rrajca	Since 1996 with DCM no. 102 as Strict Nature Reserve. Later on with the establishment of the Shebenik-Jabllanicë National Park on 21.05.2008 by Decision of Council of Ministers no. 640 (as IUCN II category designation).	The area of Rajca with its primary forest complexes has been conserved due to its isolation and its remoteness with very difficult access. Now, because of its status as central PA zone, the component is not affected by human influence.
003	Austria	Dürrenstein	Since 1942 (Rothwald I) and since 2013 respectively (whole area).	Rothwald I: human use at no time in the past.
004–007	Austria	Kalkalpen	Since 1997 (Establishment of the National Park).	Varies from 25 years to a single usage 250 years ago, up to stands with no human use ever.
008–012	Belgium	Sonian Forest	008: since 1993, with extensions in 1999 and 2010; 009: since 2007; 010: planned for 2016; 011+012: 2015.	008: area of 18.5 ha without use since 1983, the oldest reserve in Flanders; 009: extended with 010 as a result of this UNESCO process in 2015 (at the latest in 2016); 011+012 were set aside.
013–021	Bulgaria	Central Balkan	Since the establishment of the reserves between 1948 and 1987, and of the National Park in 1991.	Since establishment of the National Park there is no intensive use of natural resources and no uses of forest at all. In inaccessible places, as in the reserves, forests were never used in the past
022	Croatia	Hajdučki i Rožanski Kukovi	Hajdučki and Rožanski Kukovi (IUCN Ia) was proclaimed Strict Reserve on 22.01.1969. It is located in the northern part of Velebit Nature Park, inside Northern Velebit National Park (IUCN II). Northern Velebit National Park was founded in 1999.	The area of Strict Reserve is situated on the top part of Velebit Mountain, close to the upper tree line Because trees are low and deformed, not good for any commercial use, and the terrain is inaccessible, forest in this area was never exploited.
023–024	Croatia	Paklenica National Park	Paklenica NP was established by the Croatian parliament in 1949 on an area of 36 km². In 1997, the area was enlarged by 9,500 ha. Velebit Mountain was established as Biosphere Reserve by UNESCO's "Man and Biosphere Reserve Programme" in 1978. Paklenica is in the IUCN category II.	The last harvests were in 1669, in Venetian period. The first basis was founded on the regulations presented in the "Instructions for Measurement, Evaluation and Managing in the Growth of Woods in the Pertinent Municipalities in Croatia" in 1881.
025–029	Italy	Abruzzo, Lazio & Molise	Since 1923, year of establishment of the National Park, and since 1984, with the Park zonation and the establishment of the strict reserves.	All the nominated component parts are free from silvicultural uses since the 1960s; in Valle Cervara and Coppo del Morto, some areas have never been harvested. Up to the Second World War, part of these forests may have been used as forest pasture.

ID	State Party	Component part/cluster	Processes under legal protection since	Remarks
030	Italy	Cozzo Ferriero	Area protected between 1986 and 1993 during the establishment of the National Park. Since 1993 protected by the Pollino National Park.	No logging in the last 80 years because of the remoteness of the area. In the past, this forest may have been used as forest pasture.
031	Italy	Foresta Umbra	Falascone and Foresta Umbra are State Property, protected by the National Forest Service since 1971 and 1977, respectively. The National Park, established in 1991, protects both areas as Strict Reserves (corresponding to IUCN I protection level).	Forest harvesting stopped in the 1960s (time without any use around 50 years). A small area, the most accessible part, was silviculturally used, however, it was restricted to cutting out dry wood; part of the Foresta Umbra was used for cattle grazing.
032	Italy	Monte Cimino	The conservation of this old-growth forest remnant has been a spontaneous choice of the Municipality. It has recently been proposed to the Regional Government as Natural Monument, managed following strict nature conservation measures (equivalent to IUCN I).	The latest documented timber harvest affected the north area of the forest in 1949. Until 20 years ago, in a small area, the most accessible part, it was allowed to carrying out deadwood.
033	Italy	Monte Raschio	Since 1999, as part of the Regional Natural Park Bracciano Martignano. The zonation prescribed by the Park Management in 2014 established that the site is protected as a Strict Reserve.	Forest harvesting stopped in the 1960s (time without any use around 50 years). Until recently, the most accessible part was silviculturally used: however, it was restricted to carrying out deadwood.
034	Italy	Sasso Fratino	Sasso Fratino was the first Strict Nature Reserve (equivalent to IUCN I) established in Italy (1959). Since 1985, Sasso Fratino is awarded with the European Diploma of Protected Areas, and since 1993, it is part of the strict protection area (IUCN I) of the National Park.	The latest documented timber harvest affected the most accessible zones and was conducted by the State Forestry Agency in 1936; the impact was very low (325 m^3 of timber). The lower part of the forest may have been harvested up to the 1950s.
035–038	Poland	Bieszczady	Since 1958 (former reserves “U źródeł Solinki” and “Wetlina”) and since 1991 respectively (whole area as the Bieszczady National Park). In 1992, the UNESCO Biosphere Reserve “Eastern Carpathians” was officially established.	Submitted forests have never been subject to regular forest management. In the lower parts, there could have been occasional cutting of trees, and near the border with alpine meadows some grazing activities.
039	Romania	Cheile Nerei-Beușnița	The first protection status was granted by the Romanian Academy by Act 965/1943 for the designation of the Cheile Nerei Nature Reserve. The Cheile Nerei Beusnita National Park was established in 1990. It is also protected by Natura 2000 (SCI & SPA 2007).	The superior part of the Beusnita Valley, together with the Nera Gorges (Cheile Nerei), are very isolated and inaccessible forest areas. They were never logged or actively managed (from the forestry point of view).
040	Romania	Codrul Secular Șinca	According to the Forest Management Plan, the component parcels of the property are assigned to the most restrictive functional category, similar to other forest scientific reserves. The protective status corresponds to the IUCN 1a category.	Dendrochronological series analysis conducted in the site (ROIBU et. al. 2013) found trees more than 500 years old, indicating that this forest has not been affected by human (anthropic) intervention for the last centuries.

ID	State Party	Component part/cluster	Processes under legal protection since	Remarks
041	Romania	Codrul Secular Slătioara	Slătioara and Todirescu Meadows were declared as nature monuments in 1941 (decision 9942/19.03.1941 – M. Of. 72/1941), covering 274.24 ha and 44.43 ha, respectively. In 2000, the full area (core+buffer) of Slătioara increased to 1064.20 ha.	No use of the component parts is documented since 1897, when Adolf Guttenberg declared the area as covered with “virgin forests”.
042–043	Romania	Cozia	Since 1966 (component part Cozia Massif) and since 1990 the whole area (including Lotrișor). The proposed component parts belong to the Cozia National Park, being included in its special conservation area.	Without human use in the past. The component parts preserve primeval forests which are surrounded by a larger complex of intact forest landscape.
044–046	Romania	Domogled-Valea Cernei	In 1932, Mount Domogled Reserve was established at the proposal of Professor Al. Borza, it was among the first reservations established in Romania. National Park Domogled Valea Cernei was founded in 1990.	Since 2003, the component parts are subject to special conservation, and since 2009, the area is under integral protection.
047–048	Romania	Groșii Țibleșului	First steps in conservation originate in 2005, by the initiative of Forest District Groșii Țibleșului, followed by Ministry (2008), the Romanian Academy (2010) and the Local Councils (2011).). The protective status corresponds to the IUCN 1a category.	Indefinite period without use. No sign of intensive human use could be observed, except for small scale, patchy disturbances followed sometimes by extractions (windthrow, insect attacks).
049	Romania	Izvoarele Nerei	The Izvoarele Nerei reserve was established by the Forestry Management Plans in 1975, then enlarged (to the actual size) in 1986. The Semenic-Cheile Carasului National Park was established in 1990. The area is also protected by Natura 2000 (SCI & SPA 2007).	The superior part of the Nera Basin, composed by two river basins, Nergana and Nerganita, is a very isolated and inaccessible forest area. It was never logged or actively managed (from the forestry point of view).
050	Romania	Strâmbu Băiuț	First steps in conservation originate in early 2000, by the initiative of Forest District Strâmbu Băiuț, followed by Ministry (2008), the Romanian Academy (2010), the Local Councils (2011) and the contract of custody (2014).). The protective status corresponds to the IUCN 1a category.	Indefinite period without use. No sign of intensive human use could be observed, except for small scale, patchy disturbances followed sometimes by extractions.
051	Slovenia	Krokar	The first step for the protection of the Virgin Forest Krokar was made in the Forest Management Plan in 1961. The first formal protection was implemented with the municipality Kočevje decree in 1991. At the national level, Krokar was protected in 2005.	In the Virgin Forest Krokar area, there was no logging in the past.

ID	State Party	Component part/cluster	Processes under legal protection since	Remarks
052	Slovenia	Snežnik-Ždrocle	The first protection of the top of Snežnik was proposed in 1964. After 1980, some parts of the proposed area were protected. In 1991, the proposed area was protected in the Forest Management Plan. At the national level, the reserve was protected in 2005.	A smaller part of the forest reserve has remained without human impact. After 1991 there were no interventions in the forest reserve.
053–054	Spain	Hayedos de Ayllón	Tejera Negra and Montejo de la Sierra were designated as Natural Sites of National Interest in 1974. The Tejera Negra component part is in the core-reserve area of a Natural Park designated in 1978. Montejo de la Sierra was included in the core area of a Biosphere Reserve in 2005.	The last episodes of commercial logging of trees in Montejo de la Sierra were in 1951 and 1959. Soon after, in 1961, livestock was removed. High altitude krummholz formations and strait riverine positions in Tejera Negra were not logged and remain natural.
055–056	Spain	Hayedos de Navarra	Lizardoia and Aztaparreta were designated as Integral (strict) Reserves in 1987. The buffer area was designated as three different Special Areas of Conservation (Directive 92/43/EEC) in 2011 and 2012.	They are mountain forests, undisturbed due to a combination of inaccessibility and historical reasons. Lizardoia was always in a conflict border area, and after it was declared Spanish property (in 1859) a forest manager decision (in 1961) saved it as a reserve.
057–058	Spain	Hayedos de Picos de Europa	Since 1918, the component part of Asotín is protected as a part of the Covadonga National Park. In 1995, it was extended and renamed to Picos de Europa National Park, including also the other component part: Cuesta Fría. Biosphere Reserve since 2003.	The forest stands in selected component parts are remote areas and in some way inaccessible and for that reason have never been subject to timber harvesting. In some parts, sporadic cutting of firewood for shepherds could occur.
059	Ukraine	Gorgany	The entire area since 1996.	It was documented that the forest area was undisturbed without human and forest management impact for a long time.
060	Ukraine	Roztochya	The core area and a buffer zone are under the strict protection since 1984.	There are notes that the area was without human management or impact since the 19th century.
061	Ukraine	Satanivska Dacha	The nominated area (211.9 ha) meets the IUCN category 1 (strictly protected zone of the national nature park). The buffer zone of the nominated component part (559.0 ha) is protected by the IUCN category 2 (controlled recreation zone of the national nature park).	Without human impact for almost 40 years, since 1977.
062–065	Ukraine	Synevyr	Since 1974 (former nature reserve “Synevyr Lake”) and since 1989 as Synevyr National Nature Park	The beech primeval forests of the nominated component parts have never been subject to regular forest management. In the higher parts, there could be occasional cutting of trees by shepherds.
066–067	Ukraine	Zacharovanyi Krai	Since 2000 (as nature reserve) and since 2009 as Zacharovanyi Krai National Nature Park (NNP). Nominated area meets the IUCN category 1 (strictly protected zone of the NNP), the buffer zones are IUCN category 2 (controlled recreation zone of the NNP).	No nature use is registered.

Summer view on Lumi i gashit. Picture: B. Lushaj

4.a.1 Albania: Lumi i Gashit (001)

Current Status

The total area of the nominated component part is 1,261.52 ha, with a buffer zone of 8.978,03 ha. The coverage of beech forest at the component part is around 1,000 ha and it is not spread uniformly at the component part. This also means that only around 20 per cent of the component part are not covered by beech forest.

The area has been protected informally for more than 150 years. Since 1996, the area has been protected by DCM. The component part is located at altitudes between 900 and 1,700 m.a.s.l. As candidate for the nomination process, some hundred hectares in the upper valley would qualify. In particular the Beech Forests on steep slopes in the montane zone, partly mixed with *Abies alba* and *Picea abies*, as well as with *Pinus heldreichii* (endemic for the Balkans and Southern Italy), should be considered.

Based on ecological values, the nominated component has an extremely valuable beech forest, which is characterized by a near-natural structure and near-natural dynamics.

The inclusion of a *Pinus heldreichii* rocky forest in the Beech Forest belt and the joint occurrence of *Fagus sylvatica* and *Pinus heldreichii* in large stands of high integrity and in elevations higher than 1,700 m are a remarkable unique feature of tremendous value. The integrity is expressed by the structure of the forests (old trees and high deadwood share) and by the occurrence of the virgin forest indicator lichen *Lobaria pulmonata*, which is growing on the stems of old Beech trees.

Trends

The nominated component part covers around 42% of the Strict Nature Reserve (SNR with an area of 3,000 ha). It represents one of the best-preserved wilderness sites of the Alps. Large parts of the area are characterized by high altitude and very long distance from the routes/difficulty of reaching the site, which have been exempt from any human use for at least 100 years. The management of the area does not implement any management measures in this part of the wilderness area (with the exception of selected wildlife management measures). Thus, no pre-determined status of the area is being conserved, but natural processes and dynamics can take place without any human influence.

There is also a plan in the nearest future, to implement a large Albanian Alps National Park, which would cover a massive area of around 50,000 hectares and include the existing areas of Gashi River Strict Nature Reserve, Thethi and Valbona Valley National Parks, plus areas surrounding the three protected areas.

Information on state protection

In 1996, by the Decision of Council of Ministers (DCM), the first three Strict Nature Reserves in Albania were established. Gashi River was among them. SNR are strictly protected areas, in accordance with IUCN category I. It is expected to better protect the wildlife in the nominated component and better ensure a conservation of the natural values of the beech forests with the establishment earlier this year of the National Agency of Protected Areas, a special structure that manages the Protected Areas.

View of Rrajca. Picture: H. Knapp

4.a.2 Albania: Rrajca (002)

Current Status

The total area of the nominated component part is 2,129.45 ha, with a buffer zone of 2,569.55 ha.

Most of the area within the component part is occupied by old-growth beech forests with different degree of naturalness. With increasing distance to the last settlement, the human impact is decreasing significantly. The areas higher than approximately 1,230 m.a.s.l. on both sides of the Bustrica Valley and their tributaries are covered by a close, old and virgin-like Beech Forest. Bustrica is a mountain river with its source below the peak of Shebenik (2,250 m.a.s.l.). Beech trees expand to the gravel islands in the narrow riverbed and grow in mixture with *Abies alba*, *Pinus peuce*, and *Sorbus cf. aria*.

The wooded steep slopes are characterized by lower and deeper valleys of creeks. Along rock walls and boulder fields, the natural timberline within the Beech Forest belt is formed. Avalanche tracks, sliding blocks, and screes are expressing the tremendous geomorphological dynamic and its impact on the forest structure.

From an ecological point of view, the nominated component has an extremely valuable beech forest, which is characterized by a near-natural structure and near-natural dynamics.

The cluster of old-growth forests is characterized by complex communities with rare indicator species like Balkan Lynx (*Lynx lynx balcanicus*) and other large carnivores like Brown Bear and wolfs.

Trends

The nominated component part covers around 6.3% of the total area of the Shebenik-Jabllanica National Park, or approximately 15.2% of the component part Rrajca.

The proposed site is covered by broadleaf and mixed forests, all of them with the presence of beech communities. Most of them are not or only slightly affected by human intervention. Being part of the Albanian Protected Areas Network ensures long-term protection of the beech forests in the Park.

According to the national legislation, the national parks are awarded the highest legal protection, which does not allow any human activities, besides scientific researches and passing of visitors through marked trails. A draft Management Plan for Shebenik-Jabllanica National Park is at the final stage of approval.

Information on state protection

In 1996, by DCM, the first three Strict Nature Reserves in Albania were established, and Rrajca was among them, with an area of 4,700 hectares. Today Rrajca is part of the Shebenik-Jabllanica National Park, which was established in 2008 by a DCM. In 2015, the National Agency of Protected Areas was established, which is expected to ensure a better conservation of the natural values of forest beeches in the nominated component part.

Springtime in „Hundsau". Picture: R. Pekny (Wilderness Area Dürrenstein)

4.a.3 Austria: Dürrenstein (003)

Current Status

The total area of the nominated component part is 1,867.45 ha. Thereof, approximately 1,200 ha are currently covered by forest. About 1,000 ha of it (approximately 80% of the forested area) are covered by beech forest. Consequently, about half of the total area of the nominated component part is covered by beech forests. This also means that only around 20 percent of the forested parts of the component part are not covered by beech forest.

The nominated component part compromises 277 ha of primeval forest. The area has been protected informally since the year 1875. Since 1942, the area is protected by law. The component part is located at altitudes between 950 and 1,600 m.a.s.l. and is dominated by beech-fir forest communities on limestone mainly compromising montane and altimontane Asperulo-Fagetum and Adenostylo-glabrae-Fagetum beech forests. Estimates indicate that about 30% of the total biomass in the component part is represented by deadwood.

Concluding, from an ecological point of view, the nominated component has an extremely valuable beech forest, which is characterized by a near-natural structure and near-natural dynamics.

The most prominent flagship species of the area are, for instance: White-backed Woodpecker (*Dendrocopos leucotos*), Grey-headed Woodpecker (*Picus canus*), Ural Owl (*Strix uralensis*), Barbastelle Bat (*Barbastella barbastella*), and Rosalia Longicorn (*Rosalia alpina*).

Trends

The nominated component part covers about 88% of the wilderness area.

Large parts of the area are characterized by mixed forests of beech, fir and spruce, which have been exempt from any human use for at least 250 years. Any management measures in this part of the wilderness area (with the exception of selected wildlife management measures) are prohibited. Thus, no pre-determined status of the area is being conserved, but natural processes and dynamics can take place without any human influence.

Only selected, temporally limited measures are set in order to support the conversion of secondary, managed spruce forests towards mixed deciduous forests with a larger proportion of deciduous tree species. Whenever possible, natural regeneration processes triggered by natural processes such as wind, snow, ice or bark beetles are prioritized. Less than 5% of the wilderness area are subject to these measures. These measures are implemented outside the world heritage component part.

Information on state protection

In 2003, "Wilderness Dürrenstein" was recognized as the first Austrian "Area of the Wild", Category I, according to criteria of the International Union for Conservation of Nature/IUCN.

"Wilderness Dürrenstein" aims at protecting endangered organisms, communities and ecosystems; no specific situation is to be preserved, but conditions that aid natural processes without human intervention.

Landscape of Kalkalpen National Park. Picture: F. Sieghartsleitner (Kalkalpen National Park)

4.a.4 Austria: Kalkalpen (004, 005, 006, 007)

Current Status

The component parts of the Kalkalpen National Park extend over an area of 5,251.66 ha and are covered with about 4,100 ha of woodland, 3,400 ha of which are beech forests.

The ecosystem monitoring inventory, which started in 1994, is the basis for the assessment of human impact in forest ecosystems. The analysis of 1,900 recorded and 400 re-recorded inventory points shows that 26% of the whole National Park forests (nearly 17,000 ha) can be classified as natural, and 50% as near-natural (MAYRHOFER et al. 2015). About three quarters of the forest area in the component parts are older than 140 years. Thereof, 23% are older than 200 years and 5% are even older than 250 years. Silvicultural utilization has been excluded on the whole territory since the establishment of the National Park in 1997. The high age of forest stands shows that the greater part of the forests has been out of use for a much longer time. Many stands have been used only once, others remained entirely undisturbed.

A dendroecological study in three virgin forest stands shows an average tree age ranging from 277 to 328 years. Highlight was a 525 years old beech tree which can be defined as the oldest dendrochronologically dated beech tree in the Alps. The presence of different natural forest development phases and the high proportion of deadwood, about 56 m^3 per ha on average, result in a high habitat quality of the beech forests. These conditions enable the occurrence of rare relic beetles and viable densities of the White-backed Woodpecker (MAYRHOFER et al. 2015).

Trends

The area Kalkalpen covers about a quarter of the total area of the National Park and is embedded in the wilderness zone. The aim of the management in this wilderness zone is the conservation of natural processes, which are a part of the natural development of ecosystems and without human influence.

Regulating measures like the bark beetle or game management are conducted only or primarily in the management zone. The wilderness zone, and therefore also the proposed area, is guaranteed as a 100% non-intervention zone, also in the future. Under these conditions, the natural development of the forests in the component parts is ensured on the long term. Due to natural tree aging, deadwood accumulates and the occurrence and density of primeval forest indicator species will remain on a high level. Long-term forest monitoring data confirm this trend: The National Park forests already indicate an increase in naturalness within the last 10 years (MAYRHOFER et al. 2015).

Information on state protection

The Kalkalpen National Park has been recognized as Category II according to the criteria of the International Union for Conservation of Nature. The area is also protected under the EU Birds Directive and the Habitats Directive (Natura 2000) and has been designated as a wetland of international importance (Ramsar Convention of Wetlands).

The wilderness zone, in which the component parts are located, is defined as a strict non-intervention area per official decision of the district authorities.

Autumn in Sonian Forest. Picture: P. Huvenne

4.a.5 Belgium: Sonian Forest (008, 009, 010, 011, 012)

Current Status

The total area of the proposed Belgian component parts is 269.31 ha with a buffer zone of 4,650.86 ha. Approximately 75% of the forested area or 202 ha are covered with beech forest. This means that about 20% are not covered by pure beech stands.

The total area was protected as a landscape by Royal Decree in 1959. This protection aims to conserve the relief and main characteristics, but the strict protection of the parts proposed as UNESCO World Heritage was done by specific decrees later on.

The nominated component parts comprise 269.19 ha of beech dominated strict forest reserve. The entire area is protected as a whole since 2015; parts of the area have been informally and later formally declared as strict reserve in 1983, 1995, 2007 and 2010.

The component parts are located between 80 and 130 m.a.s.l. and are dominated by beech forest communities on loessic acid loam comprising the phytosociological associations of Milio-Fagetum and Endymio-Fagetum (Atlantic subtype of the Asperulo-Fagetum) with *Hyacinthoides non-scripta*. The most prominent flagship species are: *Dendrocopos medius, Hericium erinaceus, Nyctalus leisleri, Caliprobola speciosa, Sphiximorpha subsessilis, Gnorimus nobilis* and the endemic *Carabus auronitens var. putseysi.*

Trends

The nominated area covers about 6% of the total Sonian Forest.

The component parts were all either recently established as strict reserves (unmanaged) or are protected by management planning and will become strict reserves in the near future, also as a result of this UNESCO candidacy. These unmanaged strict reserves have been gradually extended over the last decades. After installation of non-intervention, the stands gradually renaturalize from clearly man-made stands with low amounts of deadwood, to diverse stands with still increasing amounts of above-ground biomass, both living and dead. In the buffer zones and the matrix of the forest, management aims at gradual conversion of even-aged monospecific beech stands to more diverse stands, through selective small-scale close-to-nature interventions. The protection as Natura 2000 zone is a key issue in the new Management Plans and is implemented in the connecting buffer zone.

Information on state protection

The forest reserves are strictly protected areas, in accordance with IUCN category I. The component part Forest Reserve "Joseph Zwaenepoel" (008) is in fact the oldest and largest beech forest reserve in Belgium. Component part 009 is protected as a forest reserve since 2007. The aim of the forest reserves is to protect and observe the natural processes in the forest ecosystem, excluding human impact. The procedures to protect the component parts 010, 011 and 012 as strict forest reserve have been started.

Beech forest of Dzhendema reserve. Picture: A. Ispirev (Central Balkan National Park)

4.a.6 Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

Current Status

The oldest beech forests in the 9 reserves, covering an area of 10,998.91 ha, are proposed as World Heritage property. The area of the reserves that is not included in the component parts and a part of the territory of the Central Balkan National Park (CBNP) are proposed as as buffer zone with total area of 11,720.85 ha. The virgin beech forests in the reserves present many ecotypes with an amazing diversity of abiotic and biotic elements and processes: from small beech trees on the rocks of the timberline (5 m high, 20–30 cm in diameter) in Sokolna and Peeshti Skali, to the giant trees of Moesian Beech (50 meters high and more than 1 m in diameter) in Boatin. In the Park, there are xerothermic and mesophilic beech forests, old-growth forest more than 240 years old, beech forests on silicate and limestone, wide altitude range–from 650 masl to 1,700 masl, many expositions, soils etc. All these beech forests are natural ecosystems in dynamic balance, providing the opportunity to study and monitor the immense variety of the ecological conditions and evolutionary processes. The average age of the beech forests in the Park is 135 years, and 56% of them are more than 150 years old. They are well preserved, especially in hardly accessible, gorgeous places. Besides their natural protection, the Bulgarian legislation has protected the most significant beech forests since the 1940s and all of them since 1991. The most prominent flagship species of the area are, for instance: Brown Bear (*Ursus arctos*), Grey Wolf (*Canis lupus*), White-backed Woodpecker (*Dendrocopos leucotos*), Ural Owl (*Strix uralensis*), Eurasian Pygmy Owl (*Glaucidium passerinum*), and Golden Eagle (*Aquila chrysaetos*).

Trends

The nominated area covers around 55% of the reserve's territory of the Park and around 15% of whole Park's territory.

The proposed area is covered by broadleaf and mixed forest, all of them with the presence of beech communities. Most of them are not or only slightly affected in their natural development by human intervention. Being part of the Bulgarian Protected areas network ensures the long-term protection of the beech forests in the Park.

According to the national legislation, the reserves have the highest legal protection, which does not allow any human activities besides scientific researches and passing of visitors on marked trails. As reserves are declared examples of natural ecosystems, they host typical and/or remarkable wild plant and animal species and the habitats. Along with the Protected Area Act (PAA) and the Management Plan, the reserves and the Park are managed mainly for conservation of natural ecosystems and the processes occurring in them.

Information on state protection

The CBNP was established around 9 nature reserves as People's Park in 1991 to conserve the unique natural scenery and heritage of this area and protect the customs and livelihood of the local population. In 1998, with the adoption and entry into force of the Protected Areas Act, the strict reserves kept their status while Central Balkan People's Park turned into a National Park, category II according To the category system of the Protected Areas Act and the IUCN.

Lichen in Hajdučki i Rožanski Kukovi. Picture: S. Renje (Northern Velebit National Park)

4.a.7 Croatia: Hajdučki i Rožanski Kukovi (022)

Current Status

These forests occupy the highest regions of the Park where they grow at altitudes between 1,200 and 1,500 meters in conditions characterized by large amounts of snow, low temperatures, a short growing season and strong winds.

The trees in this forest are typically curved in the lower part of the trunk due to the pressure of snow cover and wind. The tree layer is dominated by Common Beech (*Fagus sylvatica*), but Sycamore (*Acer pseudoplatanus*) is also very common. Closer to the mountaintop, trees become more and more deformed and take krummholz shape.

Large complexes of preserved forests are suitable habitats for species of large carnivores: bear, wolf, lynx and wildcat, and their presence in this area is a sign of well-preserved ecosystems.

Hajdučki and Rožanski Kukovi Strict Reserve is ranked among the most interesting speleology sites in the world. The reason for this lies in the existence of a large number of deep pits and caves in a relatively small area. Due to their uniqueness and isolation of habitats, the vast majority (70%) of subterranean species are endemic. Among them is one of the symbols of Northern Velebit, the Velebit Leech.

Trends

Hajdučki and Rožanski Kukovi is a Strict Reserve, i.e. an area of land distinguished by unaltered or slightly altered overall natural environment, earmarked exclusively for the conservation of its original natural character, scientific research which does not affect biological diversity, monitoring the state of nature, and education which does not endanger the free development of natural processes; any business or other activities are prohibited in strict nature reserves. The reserve has only basic infrastructure: tiny stone shelters and a couple of mountain trails, and no permanent settlements.

Information on state protection

The value and the beauty of Velebit's nature were recognized a long time ago: within the UNESCO's MAB program (Man and Biosphere), in 1978, the Velebit Mountain was included in the network of World biosphere reserves. Three years later, Velebit Mountain was proclaimed Nature Park. It includes two National Parks: Paklenica National Park (proclaimed 1949) and Northern Velebit National Park (proclaimed 1999). The Strict Reserve Hajdučki and Rožanski Kukovi is situated inside the Northern Velebit National Park.

Subalpine beech forest in Paklenica National Park. Picture: G. Lukač (Paklenica National Park)

4.a.8 Croatia: Paklenica National Park (023, 024)

Current Status

The old-growth beech forests in Paklenica National Park represent the largest and the oldest dominantly beech forest complex on the East Adriatic coast and this part of the southeast Mediterranean basin. From ecological and biological aspect, this forest stands are unique habitats for insects, butterflies, amphibians, reptiles, birds, and mammals. Ecological research on some of this old-growth beech stands showed mean tree ages ranging from 200 to 250 years, especially in the higher part of National Park.

Based on the forest map, it can be said that more than 50% of the National Park forests are older than 150 years. Very good indicators for age and important structures of this beech forest are birds. The large viable populations of the White-backed Woodpecker (10–15 breeding pairs in total), Black Woodpecker (5–10 pairs), Grey-headed Woodpecker (15–20 pairs), Middle Spotted Woodpecker (5–10 pairs), Lesser Spotted Woodpecker (20–25 pairs), Ural Owl (2–3 pairs), Eagle Owl (8–10 pairs), Spotted Flycatcher, Wood Warbler, and the different species of tits and nuthatch are the best indicators of the very good quality of these beech forests.

The area of the National Park is a habitat of four European large carnivores: the Wolf, the Brown Bear, the Eurasian Lynx, as well as the Wildcat; and one of the hot spot for bats, with 24 noted species making it the richest in Croatia.

Trends

Only research and monitoring activities are allowed in the area of the Paklenica NP. Regarding human impact, visiting the area is only allowed on paths and trails. Such kind of management has been implemented in the Management Plan and is important for the planning period 2017 to 2027, when any kind of human impact will be excluded from the component part.

The National Park’s aim is to protect and conserve the area’s original natural character, karst habitat and great biological diversity. In the area, only monitoring, education and visits, without endangering the free development of the natural processes, richness and biodiversity, are allowed. The National Park area has only basic infrastructure: tiny stone shelters, mountain trails, and no permanent settlements.

The beech forests are free to expand into the upper grasslands in the future, in case that the climate warming will continue.

Information on state protection

Paklenica NP was proclaimed in the year 1949 and, thanks to many phenomena, the surface of the NP was enlarged in 1997. The Velebit Mountain is a UNESCO Biosphere Reserve since 1978. In 1981, the entire mountain was proclaimed as a Nature Park. In 1999, the northern part of Velebit was proclaimed the Northern Velebit National Park.

Autumn colours in Val Cervara. Picture: B. D'Amicis

4.a.9 Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

Current Status

Most of the area within the component parts is occupied by old-growth beech forests with different degrees of naturalness. Valle Cervara and Coppo del Morto are close to the steady-state stage of advanced old-growth forests, with inverse J-shaped or rotated sigmoid DBH distribution. The other stands (Coppo del Principe, Selva Moricento, Val Fondillo) have an uneven-aged structure, typical of advanced demographic transition. Total deadwood amounts are within the range of values reported for Mediterranean mountains (50–100 m^3/ha), mostly coarse woody debris. In the upper, steep slopes, deadwood can be naturally removed by avalanches and snow-creep. Large (DBH ≥ 50 cm) standing dead trees are relatively frequent (5–12 per ha). These high-mountain forests are characterized by slow forest turnover (short growing seasons and often rocky soils), and consequently reduced dead biomass in respect to stands on more favorable sites. The cluster of old-growth forests is characterized by complex communities with rare indicator species like woodpeckers (7 species), among which the rare White-backed Woodpecker (*Dendrocopos leucotos*) and Middle Spotted Woodpecker (*Dendrocopos medius*) and other important bird species linked to old-growth forests, like *Accipiter gentilis, Ficedula albicollis, Certhia familiaris*, deadwood insects (*Osmoderma eremita, Rosalia alpina*), lichens (e.g. *Lobaria pulmonaria* and the extremely rare *L. amplissima*), fungi and bats (*Barbastella barbastellus*). The Marsican Brown Bear, the Apennines Wolf and the Wildcat are also present in these areas.

Trends

Thanks to their strict conservation, all component parts will develop according to natural dynamics in the next decades. Gap-dynamics with localized wind-blows will improve the complexity of the uneven-aged structure of these forests, through a fine-grained shifting mosaic and accumulation of deadwood.

Such changes will be evident especially in Coppo del Principe, Selva Moricento and Val Fondillo, old-growth forests in the transition stage. Valle Cervara and Coppo del Morto will maintain their complex structure through a shifting mosaic, in the absence of large-scale natural disturbances.

The buffer areas are free to develop according to natural dynamics. Some actions can be planned to speed up the conversion of highly artificial stands, when present. Under the expected climate warming, the shrublands/grasslands above the forest line will guarantee the conservation of the beech forest.

Information on state protection

The National Park was established in 1923 by National Law. In 1984, the official zonation was adopted, and the first strict reserves (equivalent to IUCN I) were established. The Management Plan, approved by the Directive Board in 2010, expanded the strict reserves: 4 of the component parts fall within this rigorous conservation regime.

In 1967, the Park was granted the European Diploma of Protected Areas. The Diploma was renewed throughout the years and is still valid (last extension in 2012).

Beech forests in Cozzo Ferriero. Picture: G. De Vivo

4.a.10 Italy: Cozzo Ferriero (030)

Current Status

Cozzo Ferriero extends over an area of about 96 ha (altitudinal range 1,700–1,900 m) in the Municipality of Rotonda (PZ) on the Basilicata side of the Park. The site is a strict reserve of the National Park, where the natural environment is preserved in its integrity (equivalent to IUCN I).

This early-transition old-growth beech forest is characterized by a bimodal diameter distribution, with the oldest cohort composed of trees 300 to 400 years old. The establishment of new cohorts stresses the presence of natural disturbance dynamics. The stand has about 490 trees/ha (some of them can reach diameters of 1 m). One third of the total volume is concentrated in large trees (diameter > 60 cm). The absence of human activity for many decades (at least 80 years) has allowed a diffuse presence of deadwood (70 m^3/ha, with many large snags and logs) and old-growth indicator species (e.g. *Lobaria pulmonaria*). Cozzo Ferriero remains far from any road, so that even wood gathering by local inhabitants can be excluded. The richness of both standing and lying dead trees, as well as its abundance in plant and wood-inhabiting insects, makes this forest unique in Southern Italy.

Many flagship species indicators of the old-growth status are present: the bat *Barbastella barbastellus*, the birds *Dryocopus martius*, *Dendrocopos medius*, *Ficedula albicollis*, typical deadwood insects like *Rosalia alpina* and *Cucujus cinnaberinus*, lichens like *Lobaria pulmonaria*, and many fungi. This area is also interested by the presence of the Apennines Wolf (*Canis lupus*) and the Wildcat (*Felis silvestris*).

Trends

Since only research and monitoring activities are allowed in the Strict Reserve of Cozzo Ferriero, no human alteration of the component part will be realized in the future. This management orientation has been integrally implemented by the National Park Plan and the Forest Plan of the Municipality to which the site belongs.

Alongside with the accumulation of repeated natural heritage, the dominant cohort will progressively fade away as the forest will enter the most advanced stages of old-growth development.

The beech forests will also be free to expand into the upper grasslands in the future, in case that the climate warming continues.

Information on state protection

Cozzo Ferriero is recognized as Strict Reserve (equivalent to IUCN I) by the National Park's Management Plan of 2011. In 2014, the Park received the EUROPARC certification for the European Charter for Sustainable Tourism in Protected Areas.

Inside Falascone Reserve. Picture: G. Piovesan

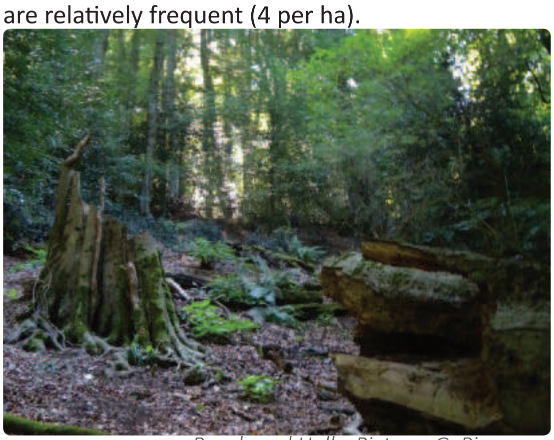
4.a.11 Italy: Foresta Umbra (031)

Current Status

Almost the entire area within the component part is occupied by an old-growth beech forest, characterized by an uneven-aged structure typical of an intermediate demographic transition.

Huge biomass accumulation is possible thanks to the site fertility, testified by the high stature of the forest (trees with height above 40–45 m) and the abundance of very large trees, often reaching diameters of 100 to 120 cm. Beside beech, the canopy is often occupied by tree species with exceptional size, like *Taxus baccata*, *Sorbus torminalis* and *Acer campestre*.

A widespread regeneration of yew and holly accompanies that of beech. Total deadwood amounts are within the range of values reported for old-growth forests of Mediterranean mountains (70 m^3/ha), mainly as coarse woody debris on the ground. Large (DBH ≥ 50 cm) standing dead trees are relatively frequent (4 per ha).



Beech and Holly. Picture: G. Piovesan

Trends

The favorable site conditions in these low-elevation forests sustain very fast turnover rates. In the next decades, the ongoing process of natural mortality will open many new gaps that will allow the forest to evolve toward a more advanced structure.

Thanks to the predominant flatness of the area, abundant quantities of dead biomass are expected to be produced to sustain the detritus chain and the associated biodiversity.

The numerous small gaps opened, together with the ruggedness of the microtopography, will favor the persistence in the forest of all the many tree species with different ecological requirements. Especially the Reserve Falascone, occupying one fourth of the component part (48 ha, 26%), is totally fenced and allows the study of Mediterranean forest dynamics under the exclusion of domestic and wild grazing (only wild boars have so far been observed in the reserve).

Information on state protection

All the component part's area is managed as strict nature reserve (equivalent to IUCN I) by the National Forest Service (CFS), set aside to protect biodiversity and the karst landscape. The Gargano National Park recognizes it as part of its strict conservation zone. Human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation status. Scientific research, environmental monitoring and education are planned by the Park and Community Forest Service authorities.

Lobaria at the base of monumental beech trees. Picture: G. Piovesan

4.a.12 Italy: Monte Cimino (032)

Current Status

The Monte Cimino beech forest is candidate as a Natural Monument of the Lazio Region, protected as Strict Reserve (corresponding to IUCN I) since 2015. It occupies an area of 57.54 ha on the top of a volcanic mountain, between 950 and 1,053 m.a.s.l. The vegetation is classified into the association Allio pendulini-Fagetum sylvaticae.

This old-growth forest is classified as mid-transition old-growth stand, where gaps opened by fallen trees (wind-induced mortality) are occupied by beech regeneration or go through a typical micro-succession with *Sambucus* and *Acer spp*. As a consequence of past management and bioclimatic position (low elevation environment with fast turnover rates), such stands are not characterized by very old trees (maximum age slightly exceeds 200 years).

The forest is characterized by high above- and below-ground biomass and carbon stock. Stand volume is 707 m^3/ha.

Dead biomass is scarce (19 m^3/ha), but only because fallen logs were removed by local population until some years ago. This practice is now forbidden: although wrong from the ecologically point of view, it allowed to avoid logging of this magnificent forest. Large snags are not abundant (1 every hectare), and are a consequence of frequent windstorms, producing large quantities of coarse woody debris.

Trends

Thanks to the strict reserve preservation, the old-growth forest will continue to increase its naturalness by new gap openings, new cohorts recruiting and deadwood accumulation.

The presence of highly fertile volcanic substrates and the low elevation will permit surprisingly fast natural recovery rates in the next decades. The structure will become more uneven-aged, alongside with the development of a finer grained mosaic of cohorts.

Larger gaps will provide a regeneration niche to light-demanding mesophilous tree species like maples, limes and wild cherry.

In the buffer zone, the conversion of old chestnut coppice to high-forest will allow beech to expand outside the core area, at lower elevation. This will generate a mixed forest with beech, chestnut, sessile oak, limes and wild cherry.

Information on state protection

The candidate forest belongs to the Natura 2000 network, as it has been acknowledged as SCI in 1995 and SPA in 1999. The component part hosts the priority habitat 9210* Apennines beech forests with Taxus and Ilex. It has recently been proposed to the Regional Government as Natural Monument, managed following strict nature conservation measures (IUCN I). Since the 1970s, the core area has been managed as a Strict Reserve, following a sustainable forestry plan.

At the border of the old-growth beech stand. Picture: G. Piovesan

4.a.13 Italy: Monte Raschio (033)

Current Status

The Monte Raschio beech forest is a Strict Reserve (equivalent to IUCN Ia) in the Regional Natural Park of Bracciano-Martignano. It occupies an area of 73.73 ha on the top of a volcanic mountain, between 400 and 554 m.a.s.l., around the top of Monte Raschio. The vegetation is classified into the association Fraxino orni-Fagetum sylvaticae.

This old-growth forest is classified as early-transition old-growth stand, where gaps opened by fallen trees (drought- or wind-induced mortality) are occupied by regeneration of beech, *Quercus cerris* and *Acer sp.pl*. As a consequence of past management and bioclimatic position (low elevation environment with fast turnover rates), such stands are not characterized by very old trees (maximum age slightly exceeds 100 years, in spite that many trees with DBH > 90 cm are present).

The forest is characterized by high above- and below-ground biomass and carbon stock. Stand volume is 632 m^3/ha. Dead biomass is scarce (29 m^3/ha), but only because fallen logs were removed by local population until some years ago. This practice is now forbidden: although wrong from the ecologically point of view, it enabled to avoid logging of this magnificent forest. Large snags are moderately abundant (5 per hectare). Especially in the last years, with increasing size and age of larger trees, windstorms are increasingly producing large quantities of coarse woody debris.

Trends

Thanks to the strict reserve preservation, this early old-growth forest will continue to increase its naturalness by new gap openings, new cohorts recruiting and deadwood accumulation. The presence of highly fertile volcanic substrates and the low elevation will permit extremely fast natural recovery rates in the next decades.

The structure will become increasingly uneven-aged, alongside with the development of a finer grained mosaic of cohorts. Larger gaps will provide a regeneration niche to light-demanding mesophilous tree species like maples, elm, Turkey oak, hornbeam, limes and wild cherry.

In the buffer zone, the conversion of old chestnut coppice to high-forest and pine plantations will allow beech to expand outside the core area. This will generate a mixed forest with beech, chestnut, oak, limes and wild cherry.

Information on state protection

The Regional Park was established in 1999 by Regional Law. The Management Plan, approved by the Park in 2014, established that the component part is in the strict reserve zone.


View of Sasso Fratino Integral Reserve. Picture: N. Agostini (Comunità del Parco)

4.a.14 Italy: Sasso Fratino (034)

Current Status

Sasso Fratino is a strict reserve (IUCN I) in the Foreste Casentinesi National Park, protected informally since 1914, and by law since 1959. It occupies an area of 781.43 ha on a northeast slope, covering an elevation gradient between 650 and 1,520 m.a.s.l.

Most of its area is occupied by pure or mixed beech forests, pertaining to high-mountain Galeopsi-Fagetum association in the upper part and to mixed beech-fir forests of the Cardamino chelidoniae-Fagetum at lower elevation. Rock/scree areas under recolonization from grassland and shrub communities are also present.

In the most remote part of the Reserve (1,200–1,500 m), there is an old-growth forest in an advanced demographic transition stage, with an uneven-aged DBH distribution and many tree cohorts recruited in canopy gaps.

At lower elevation, the stand is in the early transition to old-growth, but a warmer/longer growing season and the good soil fertility will allow a fast recovery of natural attributes. Dead biomass is within the range of old-growth Apennines beech forests (65 m^3/ha, remarkable if considering the steep slope), and consists of mainly coarse woody debris. Large snags (DBH ≥ 50 cm) are frequent (4 per ha).

Trends

Scientific research and surveillance are the only human activities allowed within Sasso Fratino. In the next decades, the strict protection will allow a progressive accumulation of natural heritage, allowing the old-growth structure to evolve to the most advanced (steady state) stages of development. Many gaps/patches of different size will open, allowing the establishment of new tree cohorts pertaining to beech and fir regeneration, as well as the other tree species present in the area. The production of abundant necromass of different types (beech/fir) will allow to maintain and improve the presence of rare species in the area (e.g. the Black Woodpecker).

The planned management for the forests in the buffer area is oriented to trigger natural dynamics toward a higher complexity of natural ecosystems (e.g. conversion of old coppices to high forest, transformation of planted pure fir stands to mixed fir and deciduous trees forests).

Information on state protection

Sasso Fratino became a Strict Reserve in 1959. It is buffered by the Riserve di Stato Casentinesi (equivalent to IUCN II), established in 1977, and other public (regional) component parts (Demanio). All are managed by CFS-UTB Pratovecchio.

Sasso Fratino obtained the European Diploma for Protected Areas in 1985. Since 1993, the entire area is included in the Foreste Casentinesi National Park. In 2009, the National Park Management Plan classified Sasso Fratino, with other areas in the Park, as strict reserves.

Beech forest with wild garlic at the upper limit of the forest. Picture: S. Kucharzyk

4.a.15 Poland: Bieszczady (035, 036, 037, 038)

Current Status

The total area of submitted beech forest of primeval character is 3,307.02 hectares. The buffer zone consists of the remaining area of Bieszczady National Park, which is a total of 24,564.46 hectares. Bieszczady National Park was established in 1973; however, initially on a small area. Most of the nominated forests became part of the Park in 1991. The altitude in the component part ranges from 700 to 1,260 meters above sea level.

In the component part, the following habitat types are occurring (according to the EU Habitats Directive): (9130) Asperulo-Fagetum beech forests, (9110) Luzulo-Fagetum beech forests, (9140) Medio-European subalpine beech woods and (9180) *Tilio-Acerion* forests of slopes, screes and ravines (sporadically). These forests are characterized by the structure and dynamics typical of natural processes. Due to the high altitude, the richness is not very high and ranges from 300 m^3/ha at the upper limit of the forest to 600 m^3/ha in the lower parts.

Deadwood is on average 12% of the biomass of living trees, which is associated with the rejuvenation of the stands due to the harsh winter of 1928/1929.

Flagship species include large predators like Brown Bear, Wolf, Lynx and Wildcat, but also the large populations of their prey: Red Deer, Wild Boar and Roe Deer. The Bieszczady National Park protects the natural relations between these species without any regulations of the wildlife numbers.

Trends

The nominated forests represent 11% of the total area of the Bieszczady National Park. They represent only a small part of the large area covered by the protection of natural ecological processes (69% of the park is strictly protected).

A predominate proportion of the forested areas is occupied by forests in their natural condition (75%), where forest felling was carried out in a way that did not alter the proportions in species composition typical to particular communities.

The aim of the primeval forest protection is preservation of the natural cycle of development through strict protection. It consists of abandoning any human intervention, merely supervising and observing the dynamic processes occurring in forest stands.

Information on state protection

Like most Polish national parks, also Bieszczady National Park has the second category, according to the criteria of the International Union for Conservation of Nature (IUCN). However, it has the largest area of strictly protected forests in Poland (18,000 ha). There is no action undertaken in this area, including conservation measures, and human presence is limited to touristic traffic on designated hiking trails and scientific research.

Beech forest of Cheile Nerei-Beușnița. Picture: D.-O. Turcu

4.a.16 Romania: Cheile Nerei-Beușnița (039)

Current Status

The total area of the nominated component part is 4,292.27 ha, enveloped in a buffer zone of 5,959.87 ha. The forest stands are characterized by a high degree of naturalness; they represent one of the largest remnant natural forests. The reserve is integrated in a landscape covered by more than 80% by forests, predominantly formed of beech.

The nominated component part area is protected since 1943, first by The Romanian Academy by Law 965/1943 for the designation of the Cheile Nerei Nature Reserve, then by Ministry Order 7/1990. The area is under strict protection as a Nature Reserve according to Law 5/2000. The component is part of Cheile Nerei-Beusnita National Park founded in 1990. The area is also protected by EU regulations, under Natura 2000 (ROSCI0031 and ROSPA0020, 2007). The nominated component part is under the most strict protection regime according to the Romanian law, being included in a nature reserve inside a national park.

From an ecological point of view, the nominated component part has valuable virgin beech forests, with very high degree of naturalness, grouped in the habitat types: Asperulo-Fagetum beech forests (9130), Medio-European limestone beech forest of the Cephalanterion-Fagion (9150), Galio-Carpinetum oak-hornbeam forests (9170) and *Tilio-Acerion* forests of slopes, screes and ravines (9180*). The nominated component part consists mainly of beech forests with high degree of naturalness, indicated by large and old trees and large quantities of deadwood.

Trends

The nominated component part is entirely integrated in the Cheile Nerei-Beusnita NP, in the part with integral protection, classified as IUCN category II. The National Park boundaries overlap with the Natura 2000 sites Cheile Nerei and Beusnita (ROSCI0031 and ROSPA0020, since 2007). The nominated component part is under the most strict protection regime according to the Romanian law, being included in a nature reserve in a National Park. Considering the mentioned protection status, it is expected that safety measures are continued or even intensified in the future.

It also aims at:
- maintaining and, where necessary, restoring the favorable natural conservation status of the ecosystems (forests, grasslands, waters, etc.);
- maintaining and, where necessary, restoring the favorable natural conservation status of the landscape elements;
- protecting the wilderness zones and maintaining the natural ecological processes;
- updating information on the monitoring of habitats and species.

Information on state protection

The nominated component part is included in the strictly protected zone of the national park (no intervention). The management objective is to preserve and protect representative samples for the national biogeographical space including natural elements of special value in terms of physico-geographical, floristic, faunistic, hydrological, geological, soils or other characteristics offering the possibility to visit the park for scientific, educative, recreational or touristic purposes.

Inside Șinca forest. Picture: RPL OS Padurile Sincii RA

4.a.17 Romania: Codrul Secular Șinca (040)

Current Status

The proposed component part consists mostly of primary forest ecosystemic structures, that are very complex and in an advanced stage of dynamic balance, structured over centuries of natural evolution, with no human influences (if there are any human influences, they are minimal).

The ecosystems in the site represent samples of existing natural habitats in the region, of a special value, given by the complex, multi-year structure, with multi-century elements, that reach the physiological age limit.

The vegetation is typical of the mountain level: the middle sub-level of beech forests and beech with resinous, and the upper sub-level of spruce forests.

The ecosystems are very valuable through their great compositional diversity, with a natural mix of species, in which *Fagus sylvatica* and *Abies alba* are predominant alongside with: *Picea abies*, *Acer pseudoplatanus*, *Ulmus glabra*, *Carpinus betulus*, and *Betula pendula*. The estimates show an impressive volume stock of about 1,200 m^3/ha and a growing stock (living trees and deadwood) of about 1,600 m^3/ha.

The nominated component hosts a large number of species of endemic flora and fauna, rare or vulnerable and also of community interest.

Trends

The forest will continue to evolve trough natural processes and dynamics, without any silvicultural intervention whatsoever.

The regeneration processes will occur naturally as in the present, with old trees dying on foot and eventually falling down, creating regeneration gaps that will be covered by nearby tree seedlings. Only research and monitoring activities are allowed and moreover encouraged in the site (and guided tourism as well), so that the researchers gain a deeper insight in this kind of living laboratories which allowed us to better understand how the nature is self-equilibrating and how it gained stability and resilience over time.

This management orientation has been integrally implemented by the Forest Plan of the Municipality to which the site belongs.

Information on state protection

The component part consists in primary beech and mixed beech-silver fir forest strictly protected through the forest management plan approved by an order of the Ministry of Environment, Water and Forests. The whole area was included in the functional category 1.5O, in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests. The protective status corresponds to IUCN 1a category.

General view of Slătioara Forest. Picture: I. Ichim

4.a.18 Romania: Codrul Secular Slătioara (041)

Current Status

The nominated component part Codrul Secular Slătioara has only one component, with a size of 609.12 ha, surrounded by a buffer zone of 429.43 ha and it is under protection since 1941. Before this, no signs of human use are known until 1897, when the forests of the area were described as "virgin".

The component is included in the Natura 2000 site Rarău-Giumalău (ROSCI0212), covering about 24% (42% including the component buffer zone) of its area. The beech forests cover the main area (60%), while in the upper zone spruce forests are present.

Three main habitat types (according to the European Habitats Directive) are found inside the candidate: (91V0) Dacian beech forests (Symphyto-Fagion) (48% of area), (9110) Luzulo-Fagetum beech forests (12%) and (9410) *Picea abies* acidophilous forests in mountainous regions (Vaccinio-Piceetea) (40%).

The forest stands are uneven-aged, with many cohorts of trees, including frequently Silver Fir and Norway Spruce.

The stands are naturally regenerated, their dynamics being driven by natural disturbances (small scale windthrows or insect attacks).

Trends

The candidate is under strict protection and also part of the Natura 2000 site Rarău-Giumalău. For the moment, there are no plans for extending the total area under protection (as it was increased in 2000 to 1,064.2 ha of strictly protected area, category T1, in the Forest Management Plans). A better use for scientifically purposes is expected, following the extensive inventory of different taxa, conducted in 2015.

Coarse woody debris in a mixed stand. Picture: I. Ichim

Information on state protection

The component includes part of Codrul Secular Slătioara Forest Reserve and Todirescu Meadows, under protection since 1941. Before this, no signs of human use are known until 1897, when the forests of the area were described as "virgin". Now, it is protected by Romanian law (Law 5/6.03.2000). Subsequent to these, the component is also included in the Natura 2000 site Rarău-Giumalău.

View on Olt Defile in Cozia National Park. Picture: P. Prundurel (Cozia National Park)

4.a.19 Romania: Cozia (042, 043)

Current Status

From the total area of the nominated component parts (3,389.2 ha), approximately 3,350 ha (over 99%) are covered by forest, a very small area (< 1%) is covered by other types of natural ecosystems: rocky habitats and seminatural dry grasslands and scrublands. About 3,200 ha of the nominated component parts (c. 95%) are covered by beech forest types, and only around 5% of it are covered by non-beech ecosystem types.

All the forests in the nominated component parts are primeval forests and they are part of a larger intact forest complex (over 8,000 ha) of Cozia and Narăţu Massif. Due to the natural protection offered by the topographical configuration of the area and the narrow strait of Olt Defile, the forests were protected from economic use from ancient times until the first half of the 20th century. In 1966, the Cozia Massif was declared Natural Reserve and the forests were placed under strict protection.

In 1990, Cozia National Park was established with a surface of 16,721 ha, of which about 95% are forests, extended on the right mountain side of Olt River in in Narăţu and Doabra Massif. The strictly protected status of the primeval forests of the National Park was enforced again in 2003 by including these into the strictly protected area of the park.

Steep mountain ridges and steep rocky slopes of Olt Defile, which border the Cozia component parts, are natural barriers which contribute to the protection of the nominated area against anthropogenic disturbances.

Trends

According to the protections status of the Cozia National Park (CNP), the protection objective of the component cluster of Cozia is to keep the environmental conditions in a natural status, to preserve the structure and the functions of ecosystems, and the biological diversity in the long term. The framework legislation regarding the regime of protected natural areas and the CNP Management Plan provisions exclude any form of exploitation or use of natural resources and any form of land use. Only activities related to forest fire prevention, pests and insects control are allowed, with the approval of the CNP administration. This protection objective is also designed for most of the buffer zone of the component parts.

Considering that the management objective of the area is to maintain the forest ecosystems in their primary status, the same management measures will be maintained in the future: limiting any activities that could have negative impacts on forest structure, natural processes and dynamics.

Information on state protection

The component parts are included in the strictly protected zone of CNP (II IUCN). The management objective of this zone is to preserve and protect representative samples for the national biogeographical space, including natural elements with special value in terms of physico-geographical, floristic, faunistic, hydrological, geological, pedological or other type of characteristics offering the possibility to visit the park for scientific, educative, recreational or touristic purposes.

General view on Domogled-Valea Cernei. Picture: O. Merce

4.a.20 Romania: Domogled-Valea Cernei (044, 045, 046)

Current Status

The total area of the component parts is 9,732.26 ha, with a buffer area of 51,464.28 ha. The forest stands of all three proposed components are characterized by a high degree of naturalness occurring in a landscape covered with about 72% of forests predominantly formed of beech. The elevation of the component parts ranges from 160 to 1,620 m.a.s.l.

The three component parts (Coronini-Bedina, 5,110.96 ha; Iauna Craiovei, 3,517.59 ha; and Ciucevele Cernei, 1,104.34 ha) are under integral protection since 2009, being natural reserves established by Law no. 5 of 2000. The component parts are part of the Domogled-Valea Cernei National Park founded in 1990.

From an ecological point of view, the component parts have valuable beech forests, as well as a number of other habitats (forests, grasslands and rocky slopes) of great importance (EU Habitats types 9530*, 9180*, 8160*, 6110*, 6230*, 4070*, etc.).

Illyrian Fagus syvatica forest. Picture: S. Milanovici

Trends

Following the above mentioned features, it is expected to continue or even intensify safety measures in the future.

The following aspects are also aimed at:

- revegeting areas with Banat Black Pine affected by forest fires (this activity is only allowed in the habitat 9530*);

- reontroduce native extinct or endangered species in the park;

- update information on the monitoring of habitats and species;

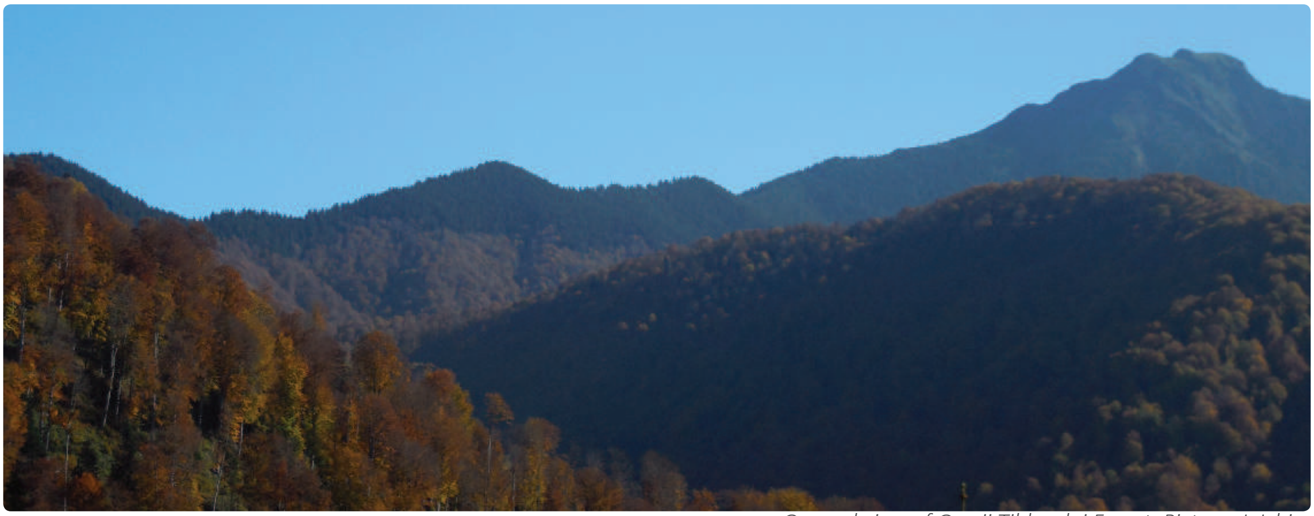
- develop an ecological guide;

- implement a specialized tourism in various fields: karst science, ornithology, botany, silvocinegetic, geology;

- staff training for the visitor center, information points and entry points of the National Park.

Information on state protection

The component parts are under integral protection since 2009 and they are a part of Domogled-Valea Cernei National Park founded in 1990 as a Category II of IUCN. Also, the National Park boundaries overlap with the Natura 2000 site Domogled Valea Cernei (ROSCI0069 Domogled-Valea Cernei) and a Special Protection Area (ROSPA0035 Domogled-Valea Cernei).



General view of Groșii Țibleșului Forest. Picture: I. Ichim

4.a.21 Romania: Groșii Țibleșului (047, 048)

Current Status

The nominated component parts of Groșii Țibleșului comprises an area of 346.37 ha, surrounded by a buffer zone of 563.57 ha. About 70% of the forest stands are composed by beech with more than 140 years of age, reaching ages of up to 180 years (BIRIŞ et al. 2012). The component parts harbor Asperulo-Fagetum beech forests (9130) (17% of the total area) and, to a major part, Dacian beech forests (Symphyto-Fagion) (91V0) (71% of the total area) of the European Habitats Directive (BIRIŞ et al. 2012).

The forest stands are mostly uneven-aged, with many cohorts of trees, dominated by Beech but including also Sycamore Maple or Silver Fir. The stands are naturally regenerated, their dynamics being driven by natural disturbances (windthrows or insect attacks).

The component accommodates important protected species, such as *Vipera berus, Pernis apivorus, Accipiter nisus, Falco tinnunculus, Strix uralensis, Picus canus, Dryocopus martius, Bonasa bonasia, Lynx lynx, Canis lupus, Felis silvestris,* and *Ursus arctos*. Although the first efforts to protect the area were undertaken only in 2005, now it is included, now being included in the most restrictive category of the Forest Management Plans (similar to scientific reserves).

The forest has an uneven-aged structure, frequently with large trees corresponding to higher ages. Deadwood of different sizes and qualities support the non-intervention and its continuous supply.

Trends

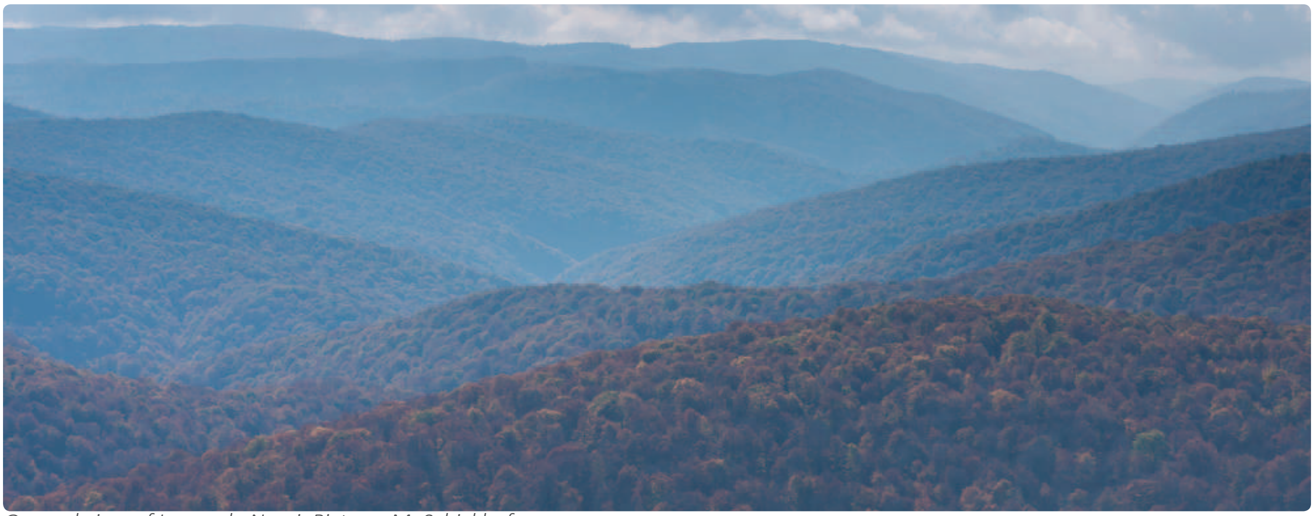
The component parts are under strict protection and, for the moment, there are no plans for extending the total area under protection (it was just included in a strictly protected area, the category T1 in the Forest Management Plans).

A better use for scientifically purposes is expected; an extensive inventory is planned in the next future.

Inside Groșii Țibleșului. Picture: L. Teodosiu

Information on state protection

The component parts consist of primary beech and mixed beech-silver fir forests strictly protected through the Forest Management Plan, approved by an order of the Ministry of Environment, Water and Forests. The whole area was included in the functional category 1.5j, in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests, which establish a strict protection regime, similar to other forest scientific reserves. The protective status corresponds to IUCN Ia category.


General view of Izvoarele Nerei. Picture: M. Schickhofer

4.a.22 Romania: Izvoarele Nerei (049)

Current Status

The total area of the nominated component part is 4,677.21 ha, enveloped in a buffer zone of 2,494.83 ha. The forest stands are characterized by a high degree of naturalness; they represent one of the largest remnant virgin forests of Europe. The reserve is integrated in a landscape covered by more than 80% by forests predominantly formed of beech.

The protection status of the nominated component part was first established by the Forest Management Plans (in 1975, enlarged in 1986), then by Ministry Order 7/1990. The area is under strict protection as a Nature Reserve according to Law no. 5 of 2000. The nominated component part is included in the Semenic-Cheile Carasului National Park, founded in 1990.

From an ecological point of view, the component part has valuable virgin beech forests, with a very high degree of naturalness, grouped into two habitat types: (9130) Asperulo-Fagetum beech forests and (9110) Luzulo-Fagetum beech forests.

The forests of the nominated component part show a very high degree of naturalness, with very large trees (the maximum recorded are over 50 m tall and over 1.3 m in diameter), also very old trees (over 400 years, with a maximum recorded of 477 years). Large quantities of deadwood are also present, with an average of 87 m^3/ha (11% of the standing volume).

Trends

The nominated component part is under the strictest protection according to the Romanian law: Nature Reserve with no intervention status. The area is entirely integrated in the Semenic-Cheile Carasului National Park, in the part with integral protection, classified as IUCN category II. Also, the national park boundaries overlap with the Natura 2000 sites Semenic-Cheile Carasului (ROSCI0226 and ROSPA0086).

Considering the mentioned protection status, safety measures are expected to continue or even be intensified in the future. The following objectives are targeted:
- maintaining and, where necessary, restoring the favorable natural conservation status of the ecosystems (forests, grasslands, waters, etc.);
- maintaining and, where necessary, restoring the favorable natural conservation status of the landscape elements;
- protecting the wilderness zones and maintaining the natural ecological processes; and
-updating information on the monitoring of habitats and species.

Information on state protection

The nominated component part is included in the strictly protected zone of the NP, with no intervention. The management objective is to preserve and protect representative samples of the national biogeographical space including natural elements with special value in terms of physico-geographical, floristic, faunistic, hydrological, geological, pedological, or other type of characteristics offering the possibility to visit the National Park for scientific, educative, recreational or touristic purposes.

Terminal development stage of beech forest. Picture: V. Radu

4.a.23 Romania: Strâmbu Băiuț (050)

Current Status

The nominated component part Strâmbu Băiuț consists of one component part, with a size of 598.14 ha, surrounded by a buffer zone of 713.09 ha. The component is included in the Natura 2000 site Codrii Seculari de la Strâmbu-Băiuț (ROSCI0285), covering about 25% (51% including the buffer zone) from the site area.

Regarding Natura 2000 habitat types, the whole area is covered by Dacian beech forest (Symphyto-Fagion) (91V0). The most important vegetal association types are: Pulmonario rubrae-Fagetum (Soó 1962) Tauber 87 (899 ha, 78% of the area) and Symphyto cordati-Fagetum Vida 1959 (254.4 ha, 22% of the area).

The forest stands are mostly uneven-aged, with many cohorts of trees, dominated by Beech but including also Sycamore Maple or Silver Fir.

The stands are naturally regenerated, their dynamics being driven by natural disturbances (windthrows or insect attacks).

The component accommodates important protected species, such as *Rosalia alpina, Vipera berus, Ciconia nigra, Dryocopus martius, Pernis apivorus, Strix uralensis, Lynx lynx, Felis silvestris, Canis lupus,* and *Ursus arctos.*

Trends

The candidate is under strict protection and also forms part of the Natura 2000 site Codrii Seculari de la Strâmbu-Băiuț. For the moment, there are no plans for extending the total area under protection (it was just included in a strictly protected area, the category T1 in the Forest Management Plans). A better use for scientifically purposes is expected; an extensive inventory is planned in the next future.

Old growth beech forest. Picture: V. Radu & S. Balea

Information on state protection

The component part consists of primary beech and mixed beech-silver fir forest, strictly protected through the Forest Management Plan approved by an order of the Ministry of Environment, Water and Forests. The whole area was included in the functional category 1.5j, in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests, which establish a strict protection regime, similar to other forest scientific reserves. The protective status corresponds to IUCN Ia category.

Deadwood in Krokar. Picture: S. Pelc (Slovenian Forest Service)

4.a.24 Slovenia: Krokar (051)

Current Status

The component part Virgin Forest Krokar covers 74.50 ha and represents the remnants of primeval forests of the region Kočevsko, which were untouched due to their inaccessibility until the end of the 19th century.

The forests of Krokar are older than 120 years. The old-growth forest phase prevails in Krokar (95%). The prevailing tree species in the nominated component area are Beech (94%), Fir (3%), and Maple (*Acer pseudoplatanus L.*, 3%).

The growing stock was 641 m^3/ha in 2014 (46 permanent sample plots). In the entire area of the forest reserve, the average number of all (beech and fir) dead trees per hectare was 54 and dead biomass was 83 m^3/ha.

In Virgin Forest Krokar, the White-backed Woodpecker is found, which is a typical species dependent on large areas of unmanaged deciduous forests.

Forest stand in Krokar. Picture: T. Hartman (Slovenian Forest Service)

Trends

The nomination component part Virgin Forest Krokar is embedded in the large Natura 2000 area, covering more than 100,000 ha. The ongoing natural processes in Virgin Forest Krokar are part of the natural development of ecosystems and are without human influence. Virgin Forest Krokar is important for research on natural processes and on biodiversity conservation, which remain the main aim also in the future.

There are some considerations that Virgin Forest Krokar should be legally protected also as a nature reserve according to the nature conservation legislation in Slovenia in order to even strengthen the protection and improve the management of the forest reserve. Potential enlargement could also be considered. According to the research on the old-growth forest reserve network in Slovenia, the area that is covered by this network is too small from the biodiversity conservation perspective (covering 1% of the forests in Slovenia).

Information on state protection

Virgin Forest Krokar is the largest forest reserve with primeval forest character in Slovenia. It was protected as Forest Reserve by governmental regulation, with the aim to preserve undisturbed processes of forest ecosystems. With the same legal act, the forest reserve Borovec and protective forests that represent the buffer zone, were declared. According to the IUCN protected areas categories, the category 1.a could be assigned to the component part Virgin Forest Krokar.

View on Mountain Snežnik. Picture: H. Kirchmeir (E.C.O.)

4.a.25 Slovenia: Snežnik-Ždrocle (052)

Current Status

Snežnik-Ždrocle is the largest forest reserve in Slovenia, comprising 720.24 ha. It lies in the Javornik-Snežnik geographical region, which is entirely covered by forests and is larger than 40,000 ha. Snežnik-Ždrocle is part of the forests that represent a core habitat area of large carnivores. Due to their well-preserved nature, and sustainable and close-to-nature forest management, these forests are also the habitat of endangered species such as the Ural Owl, Eurasian Three-toed Woodpecker, White-backed Woodpecker and others.

The population density of these species in the Snežnik area is the highest or among the highest in Slovenia. The area is also part of the Natura 2000 network. All the Beech forests in the forest reserve are part of the broader zone of habitat type Illyrian *Fagus sylvatica* forests (Aremonio-Fagion). In the least accessible parts of the Snežnik-Ždrocle area, there was no human influence in the past. The key characteristics of Snežnik-Ždrocle forest reserve are the subalpine Beech forests (Polysticho lonchitis-Fagetum). These forests cover ridges, peaks and northern slopes between 1,300 and 1,600 m.a.s.l.

The authenticity of subalpine Beech forests is emphasized by their unique floristic composition and physiognomy, which is due to the extreme ecological conditions. Subalpine Beech forests on Snežnik form a sharp tree line passing in the dwarf pine stands and subalpine Dinaric meadows. The growing stock of the forests in the component part is low due to the presence of the subalpine beech forests and dwarf pine stands.

Trends

The most visible trend is the development of vegetation in the zone of subalpine beech forests. In the last hundred years, the dwarf pines covered a substantial part of the grassland, which were used for summer grazing sheep until 1900. The boundary between dwarf pine and beech forest is fairly sharp, although the slow spread of beech forest on the slopes upward is expected. In the bottom of a ravine below the top of Snežnik, outside the beech forests, the habitat of *Cerastium dinaricum* is found, which is the only known habitat of this species in Slovenia.

In accordance to the goals of the Natura 2000 network, it is necessary to occasionally remove some dwarf pines in order to ensure the existence of this species in Slovenia. There are some considerations that Snežnik-Ždrocle should be legally protected also as a Nature Reserve according to the nature conservation legislation in Slovenia in order to strengthen the protection and management of the protected area.

Information on state protection

The proposed area is protected as Forest Reserve according to the governmental Regulation on protective forests and forests with a special purpose. With the same legal act, the protective forests that represent part of the buffer zone, were declared. Part of the area is protected as Nature Reserve. The proposed area is declared as Natural Value of National Importance. According to the IUCN protected areas categories, the category 1.b could be assigned to the proposed area.

View of Tejera Negra. Picture: G. Cerezo

4.a.26 Spain: Hayedos de Ayllón (053, 054)

Current Status

The component parts are in a good state of conservation. As can be observed in the data from the Forest Inventory, the lower diameter classes of beech (regenerated) have a strong push and vitality. A heterogeneous tree structure exists, with the presence of big and old trees (beeches, oaks and Mediterranean oaks) which provide a multitude of microhabitats to a rich biodiversity, adapted to the nemoral conditions of deciduous forest.

The volumes of deadwood are similar to those characteristic of a mature forest. The self-supporting natural dynamics in both areas are working properly. Also, an interesting mixture of dominant tree species occurs in the component part of Montejo de la Sierra.

The upper areas of the component part of Tejera Negra have never been exploited to obtain timber and have a krummholz pattern.

Despite being surrounded by a Mediterranean climate environment and despite the long distance to the nearest beech forest (the Iberian Range and the Cantabrian Mountains), the beech forest ecosystem maintains its basic characteristics as a relict.

Trends

In the absence of strong disturbances, beech should be slowly displacing the oaks to become the dominant species of a mature forest in the future. However, if trends on climate change are confirmed, this pattern of succession could be changed. Higher temperatures and more intense and long droughts would intensify competition phenomena and it would cause an acceleration on large and old trees' death. It seems logical that an increase in aridity will favor the expansion of the most drought-tolerant tree species. However, there are also other expected effects of climate change: rising temperatures in spring may favor photosynthesis, and also reduce late-frost damage to beech and oak (*Quercus petraea*). The increased concentration of CO_2 in the air could promote the growth of trees and improve drought resistance. All these questions make monitoring these beech forests to obtain information on the adaptability of the species to changes in a future scenario of uncertainty of great interest.

Information on state protection

The selected component Tejera Negra is part of the area of the Reserve (IUCN category I-B) inside the Natural Park Sierra Norte de Guadalajara (IUCN category V), also declared as Natura 2000 area (ES0000164, "Sierra de Ayllón").

The selected component Montejo de la Sierra is part of the core area (IUCN category I-B) in the Sierra del Rincón Biosphere Reserve, also declared as Natural Site of National Interest and Natura 2000 area (ES3110002, "Cuenca del río Lozoya y Sierra Norte").

Beech forest of Lizardoia. Picture: A. Senosiain

4.a.27 Spain: Hayedos de Navarra (055, 056)

Current Status

The component parts are currently in an excellent state of conservation. The natural dynamics are assured and the general structure of the woods favor this objective. Both component parts are covered by a beech and fir forest with different grades of dominance of beech. It is thought that the competence relationship of the two species is a cycle where the dominance of one species is followed by a stage of dominance of the other species.

In Atzaparreta, high rates of deadwood and mature stages of development are characteristic, as well as good regeneration dynamics with frequent gaps where the natural regeneration takes part. This site has never been logged, so the natural dynamics remain unbroken. The site Lizardoia has 20 ha of forests which have never been logged. Although the other forests in the zone/area were logged for the first time in the 1950s, the forest managers decided to spare/save that area of 20 ha, making it possible to maintain its virgin state. The rest of the component part's area remains in good conditions and preserves the diversity of plant and animal species of the ecosystem. Concerning the buffer area, it is a set of three SAC with their own Management Plan, where different natural values are identified. Those natural values have their own protective measures and improvement actions that ensure their resilience and thrive in the system. That fact makes the buffer area a suitable zone to protect both sites, as it ensures an environment suitable for the continuation of the natural dynamics of the sites.

Trends

In the Integral (Strict) Reserves, any kind of human intervention is excluded, and a natural development of the habitat is expected. The natural development trends of the mixed beech forest in both component parts will be driven by the natural regeneration processes, through the fall of trees due to wind, snow, senescence or other biotic and abiotic forces.

There are no specific studies yet about forest dynamics in the sites, but a monitoring program has been established in the Special Areas of Conservation's Management Plans to ensure the attainment of different conservation objectives. Some indicators as: presence of deadwood, presence of gaps in the canopy, and presence of secondary tree species, have been identified and will be assessed and monitored. There is a special interest in research on possible changes in the forest composition, e.g. alternant dominance of beech and fir in particular stands over time, and the role of other secondary tree species.

Information on state protection

Both sites are Integral Reserves, a regional conservation type equivalent to IUCN category Ia. Lizardoia and Aztaparreta were designated as Integral Reserve at the same time in 1987.

The buffer area is a set of three SAC, called Roncesvalles-Selva de Irati, Larra-Aztaparreta and Larrondo-Lakartxela, all of them designated in 2011.

View of Cuesta Frìa. Picture: O. Schwendtner

4.a.28 Spain: Hayedos de Picos de Europa (057, 058)

Current Status

The component parts are currently in a good state of conservation.

In Cuesta Fría, the old-growth structure is kept by natural dynamics (few windthrows). This causes high rates of deadwood and frequent gaps where the natural regeneration takes part.

The component part Canal de Asotín presents an equilibrated mature forest and a vigorous regeneration settling on previous open areas (upper forest limit and avalanche corridors).

Protection is guaranteed at both locations thanks to a sufficiently large buffer zone (14,253 ha) forming part of the Picos de Europa National Park (IUCN category II) and Biosphere Reserve.

A variety of phytosociological communities are present for beech forest: Epipactido helleborines-Fagetum (xerophilous), Carici sylvaticae-Fagetum (basophilous) and Luzulo henriquesi-Fagetum (acidophilous). Also related birch and oak forests are present.

A rich faunal community with some flagship species demonstrates the good status of conservation of these forests.

Trends

In the component parts, any human intervention is excluded. Today, the future trends of both sites are unknown, the only sure thing is that those changes will happen in a natural dynamic framework. The natural trends of the beech forests of the sites are the natural regeneration processes, driven by the fall of trees due to wind, snow, senescence or other biotic or abiotic forces.

Beech forest of Cuesta Frìa. Picture: O. Schwendtner

Information on state protection

Picos de Europa National Park was classified as category II according to the criteria of the International Union for Conservation of Nature (IUCN). Human presence is limited to touristic visitors on designated hiking trails on Canal de Asotín (no trails are appointed in Cuesta Fría) and scientific research.

Inside Gorgany Nature Reserve. Picture: Iu. V. Klimuk

4.a.29 Ukraine: Gorgany (059)

Current Status

The total area of the nominated component part is 753.48 ha. Hemeroby analysis shows that 57.5% of the nature reserve forests were classified as a primeval. The first information about the preservation of the object dates from 1935 when Metropolit Andrey Sheptytskyi founded the first Cedar Reserve “Gorgany”. On 12th September 1996, Gorgany Nature Reserve was established by the Decree of the President of Ukraine.

A nique feature of the proposed area is the occurrence of mixed beech primeval forests in the holistic phylogenetic complex of beech, beech-fir, beech-fir-spruce, spruce, Swiss pine-spruce, and spruce-Swiss pine communities of mountain forests that are distributed in the ranges from 710 to 1,535 meters above sea level.

On the nominated component part, all types of primeval beech forests of the Carpathians occur, which are represented by the communities Piceeto-Abieto-Fageta, Piceeto-Fageta, Fageto (sylvaticae)-Piceeto (abieto)-Abietum (albae), and Fageto (sylvaticae)-Abieto (albae)-Piceetum (abietis).

Local primeval forests serve as an example of ongoing ecological processes on the expansion of beech due the global climate change. These forests present an outstanding example of undisturbed, well-preserved ecological models where all development stages and evolution cycles can be observed.

Trends

The nominated component part covers 26% of the total area of Gorgany Nature Reserve. Most of the territory is characterized by mixed forests of beech, fir and spruce. It is documented that in the past, the forest area was not impacted by humans and forest management.

The Administration of Gorgany Nature Reserve does not implement any management measures in the nominated component part and its buffer zone. Thus, the primeval status of the area is conserved. All natural processes and dynamics take place without any human influence.

Snowdrop and bitter cress. Picture: Iu. V. Klimuk

Information on state protection

Gorgany Nature Reserve was established by the Decree of the President of Ukraine № 831/96 from 12th September 1996. According to the “Regulations on Gorgany Nature Reserve”, management measures are forbidden on the entire territory of Gorgany Nature Reserve. The protection status of the candidate areas and their buffer zone is the IUCN category Ia, which ensures their integrity and preservation. The access to the primeval forest by scientists and visitors is strictly regulated to minimize human impact.

Inside Roztochya Nature Reserve. Picture: V. Pokynchereda

4.a.30 Ukraine: Roztochya (060)

Current Status

The nominated area is surrounded by a buffer zone consisting of forest reserves. These forests of the buffer zone are mainly of natural origin, but artificial forests were planted until the establishment of the Reserve in 1984. In the nominated area there are all signs of natural forests.

Most forests in the buffer zone are aged over 100 years. The proposed area (384.81 hectares) consists of pure beech, pine, pine-oak-beech and oak-beech forests. The old-growth beech forests have a multi-age structure with single trees of over 200 years, and a lot of deadwood (sometimes up to 20%), which indicates the absence of human intervention in natural processes. Pine-oak-beech and pine and beech forests have a complex two and three-tier structure; the developed understory is rich in grass. Stands are highly productive (350–450 m^3/ha).

The upper tier is formed by beech, pine and oak, and the second tier by hornbeam. These forests experienced human impact in the past: pine and oak were considered as valuable commercial species. In case of non-interference in the natural processes, the number of pine and oak trees will decrease in the stands and beech will become the dominating species. The nominated area is the habitat of many rare plant and animal species: *Cephalanthera damasonium, C. rubra, Corallorhiza trifida, Cypripedium calceolus, Daphne mezereum, Digitalis grandiflora, Epipactis helleborine, Galanthus nivalis, Hedera helix, Huperzia selago, Lilium martagon, Listera ovata, Melittis sarmatica, Neottia nidus-avis,* and *Platanthera chlorantha.*

Trends

The nominated area covers about 20% of the Nature Reserve's total area. In the pure beech forest, natural regeneration is good, beside beech, the sycamore and maple are well developing.

The protection of rare pine-beech and pine-oak forests is difficult, because pine, a less durable species, is displaced. Oak-beech forests are also replaced by beech, accordingly a shrinkage of old-oak trees, through close occurrence of carbonates can be observed as well.

The administration of the Nature Reserve has never undertaken any commercial activities in that part of the reserve; and that part is planned to be free of human impact in the future. Thus, natural processes occur with little or no human impact.

In the buffer zone, there are natural and artificial forests (planted before 1984), but there are no human influences planned in the future as well.

Information on state protection

The core area and the buffer zone are under strict protection, all human influence is excluded. The protection status of the candidate areas and the buffer zone is Ia according IUCN which ensures their integrity and preservation. The access to the forest by scientists and visitors is strictly regulated to minimize human impact.

Forest of Satanivska Dacha. Picture: M. Riabyi, Podilski Tovtry NNP

4.a.31 Ukraine: Satanivska Dacha (061)

Current Status

The nominated component part is located within 350 to 390 m.a.s.l. and dominated by beech forests on limestone (Asperulo-Fagetum). Thus, from an environmental point of view, these are extremely valuable beech forests, which are characterized by close-to-nature structure and dynamics. The component part is situated on the eastern limit of the beech's range. Its unique geographical features, the climatic ecotype characteristics and the identified ecotype of *Fagus sylvatica subsp moesiacal* are typical for the area.This *Fagus* is well-adapted to dry climate conditions, low precipitation and humidity compared to the Carpathian region, ensuring its endurance to climate change.

The nominated beech forest. Picture: V. Pkynchereda

Trends

Most of the territory is characterized by deciduous forests of beech, which have not been subjected to human influence for at least the last 100 years. Forestry Administration does not carry out any economic activities in the component part. Thus, natural processes and dynamics are taking place without any human influence.

Deadwood in Satanivska Dacha. Picture: V. Pokynchereda

Information on state protection

The nominated component part Satanivska Dacha is situated within the core zone of the Podilski Tovtry National Nature Park (IUCN category I), and holds 0.07% of its total territory.

View of Synevyr. Picture: V. Pokynchereda

4.a.32 Ukraine: Synevyr (062, 063, 064, 065)

Current Status

The total area of the nominated component part is 2,865.04 ha and the area of buffer zone 1,090.80 ha. The first protected area, the Nature Reserve Synevyr Lake, was established here in 1974. On 05.01.1989 by the Resolution of the Ministers' Council of Ukraine SSR # 7 Synevyr National Nature Park was established.

Most of the proposed area is covered by pure and mixed beech primeval forests in an altitude ranging from 800 to 1,450 meters above sea level.

In the component parts, the following habitat types occur: (9130) Asperulo-Fagetum beech forests, (9110) Luzulo-Fagetum beech forests and (9140) Medio-European subalpine beech woods.

Local primeval forests serve as an example of ongoing ecological processes on the vertical expansion of beech due the global climate change.

These forests present an outstanding example of undisturbed, well-preserved ecological models where all development stages and evolution cycles can be observed.

The most important species of this area are: *Rosalia alpina, Lissotriton montandoni, Dendrocopos leucotos, Aquila chrysaetos, Strix uralensis, Lynx lynx, Felis silvestris, Ursus arctos,* etc.

Trends

The nominated component parts cover over 7% of the total area of Synevyr National Nature Park, and together with buffer zone almost 10%. Most of the territory is characterized by pure beech forests and mixed forests of beech, fir and spruce. In the forest area, neither human nor forest management impact was documented in the past. Moreover, the Park Administration does not carry out any commercial activities in the nominated component part. Thus, natural processes and dynamics are taking place without any human influence.

Inside Synevyr. Picture: V. Pokynchereda

Information on state protection

The component parts are located in the core zone of of the Synevyr National Nature Park, which corresponds to the category I of the classification according to the IUCN. The regime of the zone aims to preserve endangered species of living organisms, groups and ecosystems; no special measures are applied, instead, under protection, natural processes occur without human intervention.

Inside Zacharovanyi Krai. Picture: V. Pokynchereda

4.a.33 Ukraine: Zacharovanyi Krai (066, 067)

Current Status

The area of the nominated component parts is 1,258.23 ha and consists of 100% beech forest. The area of the buffer zone is 1,275.44 hectares. Both the area of the component parts and that of the buffer zone are officially protected since 2000.

In 2009, they became part of the newly created Zacharovanyi Krai National Nature Park. Pure climax beech forests (Fageta sylvaticae) are distributed in a wide range of altitudes, from 400 to 1,085 meters above sea level. Among them are the most unique beech-sycamore blueberry primeval forests (Fagetum sylvaticae myrtillosum), dwarf beech communities (Fagetum sylvaticae humile), and sorb- beech (Sorbeto-Fagetum humile).

About 20% of the biomass in this area is deadwood. Thus, from an ecological point of view, these are extremely valuable beech forests, which are characterized by close-to-nature structure and dynamics. The most important species are: *Picus viridis* and *Dendrocopos leucotos*.

Forest of Zacharovanyi Krai. Picture: V. Pokynchereda

Trends

The nominated site covers 41% of the Zacharovanyi Krai National Nature Park. Most of the territory is characterized by pure beech forests that have never been subjected to human influence. The Park Administration does not carry out any commercial activities in the nominated component part. Thus, natural processes and dynamics are taking place without any human influence.

Old growth beech forest. Picture: V. Pokynchereda

Information on state protection

The component parts are situated in the core zone of the Zacharovanyi Krai National Nature Park, which corresponds to the category I of the classification according to the IUCN. The regime of the zone aims to preserve endangered species of living organisms, groups and ecosystems; no special measures are applied, instead, under protection, natural processes occur without human intervention.

4.b Factors affecting the property

At present, the nominated component parts are not subject to any substantial factors that might have a direct impact on the beech forests or their integrity. Most of them are subject to some type of long-term protection as large-scale protected areas (see chapter 5). Furthermore, all of the component parts are free of silvicultural exploitation. Potential direct influences are averted by the buffer areas, which are subject to the regulations of the national park, and biosphere reserve ordinances as well as the stipulations contained in the management plan.

(i) Development pressures

Most of the nominated component parts are embedded into ample forest landscapes merging into areas, which are, at most, sparsely populated with minor villages. In the process of the selection of suitable sites for the extension, the time being exempt of any use was a key criterion. Thus, the areas had already been mostly exempt from any development pressures even before. With the exception of the Sonian Forest close to Brussels in Belgium, there are no big cities near the nominated component parts. The buffer zones largely consist of wooded areas that are often almost unmanaged. The current, already mostly very strict conservation status of the component parts, the proposed buffer zones and the fact that most components are part of a larger protected area ensure that eventual, unforeseen development pressures or changes in the surrounding rural areas are cushioned or rendered ineffective.

(ii) Environmental pressures

There is no known environmental pressure significantly jeopardizing the beech forests contained in the nominated component parts. However, a certain risk could be related to climate change, particularly if precipitations further decrease in component parts which are already at the lower limit concerning annual precipitation. Continuous aridity during the vegetation period might be detrimental to the beeches' vitality; however, the existence as beech forest with its biodiversity as such is not threatened. A study (MANTHEY et al. 2007) has revealed that *Fagus sylvatica* most definitely is, under all climatic conditions relevant to the *Fagus* genus, the most competitive in comparison with all *Fagus* species.

The climatic amplitude of *Fagus sylvatica* is such that it will not be maxed out by the climate change.

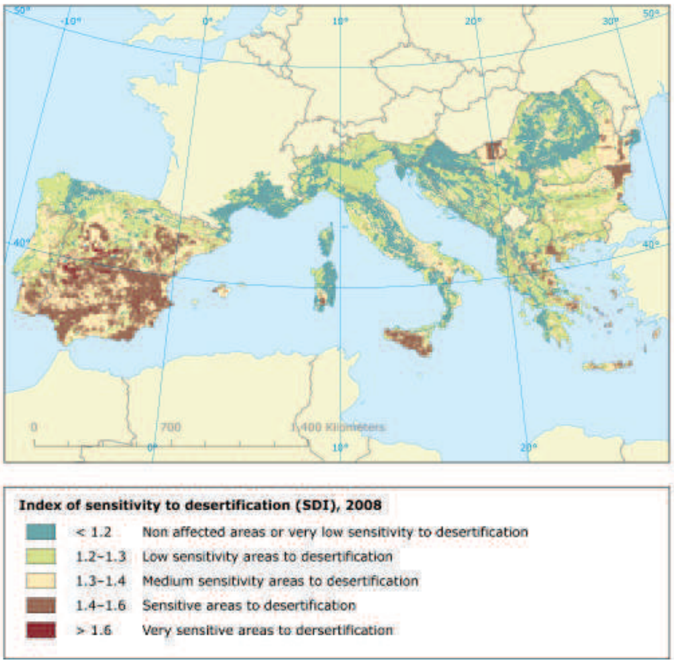


Figure 42 (above): Map from the DISMED project showing the sensitivity to desertification and drought as defined by the Sensitivity to Desertification Index (SDI) based on soil quality, climate and vegetation parameters. Source: DOMINGUES & FONS-ESTEVE 2008 .

However, Figure 9 indicates a realistic risk of desertification in the Mediterranean region, which also may affect the component parts in South and Southeastern Europe.

Being an integral part of the more recent forest development in Europe, the atmospheric element input from anthropogenic sources (predominantly agriculture, industry, the energy sector, and traffic) has been impacting the growth of forests in Europe since the very first days of industrialization, but have been constantly decreasing since the 1980s (Figure 10).

Deadwood and ferns. Picture: H. Kirchmeir (E.C.O.)

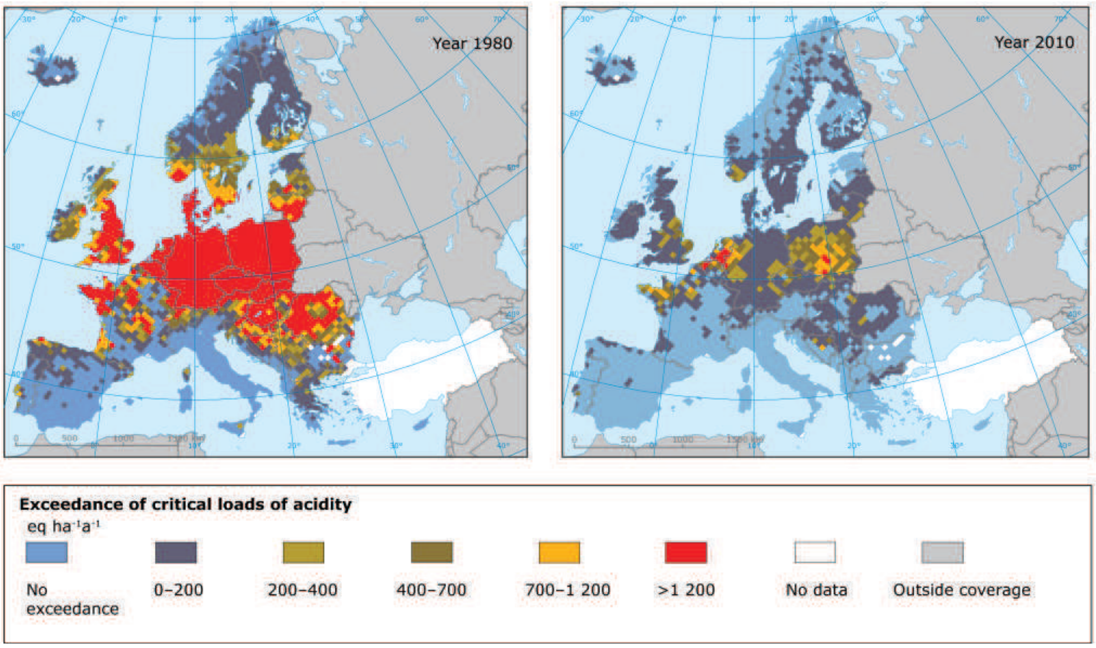


Figure 43: Maps showing changes in the extent to which European ecosystems are exposed to acid deposition (i.e. where the critical load limits for acidification are exceeded). Source: Deposition data collected by European Monitoring and Evaluation Programme (EMAP)

Element input is found to exceed the critical loads for acids and/or nitrogen in many of the deciduous woodlands, particularly in Central and Eastern Europe. Element input is currently dominated by nitrogen compounds, which also holds true for acid deposition. Relevant quantities of sulphur compounds will not find their way into the forest ecosystems any more, thanks to a successful air pollution control policy. Despite being located remote from industrial and traffic sources, the nominated component parts are yet impacted by acidifying and eutrophent developments. However, no profound deleterious effects on the beech stands resulting from element input have so far been observed in the nominated component parts. The nominated beech forests are not assumed to be in acute peril, for beech ecosystems are considered to be rather stable in terms of nitrogen deposition, and are sufficiently buffered against acid deposition. The European air pollution control policy in force is expected to entail a further reduction in the emission of pollutants and nitrogen in particular, which is thought to bring about an additional improvement of the load situation in natural and near-natural terrestrial ecosystems.

Game density is high, particularly in smaller patches of forests in Western or Central Europe due to missing large predators such as wolf or lynx and through feeding in winter time by man. Thus, in certain cases, wildlife management around the components may become necessary, but without undermining the strict non-intervention policy within the components. Larger components which stretch across Eastern Europe are seldom facing problems related to game density due to the

Furthermore, invasive species are becoming increasingly problematic across Europe (Figure 8). Due to buffer zones and rather intact ecological structures, there are no immediate risks or threats related to invasive species within the components. However, given the dynamics related to invasive species dispersal, neobiota should be closely monitored in the nominated components.

At present, there are no developments to be made out that might have a negative impact on the beech forests in the nominated component parts and their integrity.

(iii) Natural disasters and risk preparedness (earthquakes, floods, fires, etc.)

The beech forests of the nominated component parts are not seriously threatened by natural disasters.

Being situated all across Europe, the nominated component parts are exposed to different natural disasters reaching from eventual wildfire risk in Southern Europe, drought in areas with continental climate, extreme cold at the upper limit of the beech range or the risk of snowbreak or avalanches in mountainous areas. Storm-related windfall is the most frequent threat across many component parts. However, given the basic understanding of natural processes and dynamics, these natural disasters are integral part of the natural processes

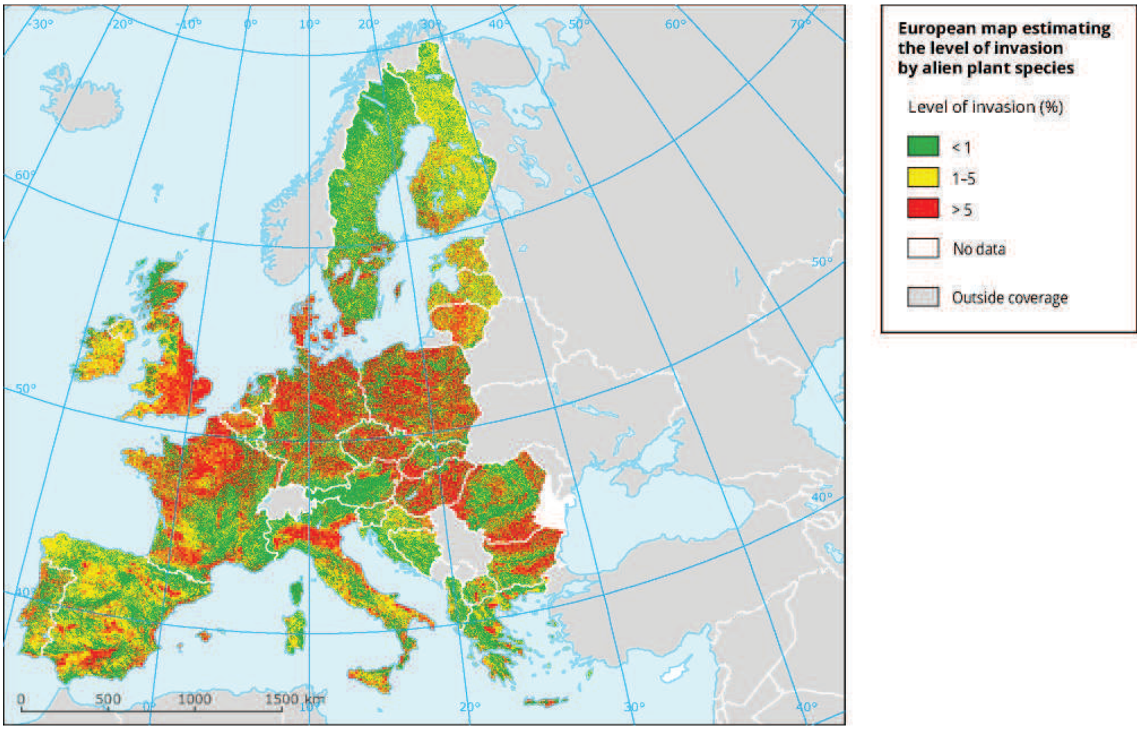


Figure 44: Estimation of invasion of alien plant species in Europe (Source: European Environment Agency (EEA))

to be conserved by the component part. Natural disasters initiate gap dynamics by opening up individual areas within the tree canopy for processes of rejuvenation. Thus, the nominated component parts are not exposed to an increased risk of destruction by natural disaster. Moreover, local natural disasters are an integral part of free flowing natural processes to be protected by the component part. Only smaller component parts should be protected from human introduced fires or increased wind exposure by opening the canopy in the neighboring forest stands by harvesting timber.

(iv) Responsible visitation at World Heritage Sites

Most of the protected areas encompassing the nominated component parts allow visitors to experience primeval or ancient beech forests with their typical structure and species composition. In most of the components, selected hiking trails allow tourists to experience nature as day visitors or holiday guests and to pursue sound nature leisure activities such as hiking. However, some components are even completely closed for visitors and only guided excursions or researchers are allowed to enter the area. Conclusive visitor statistics of the protected areas and information facilities are detailed in chapter 5.h., showing a wide range of visitor numbers and infrastructures. Visitor numbers range from 30 to 2,000,000 per year, but mostly referring to the complete protected area or buffer zone surrounding the component parts. Consequently, none of the nominated component parts shows significant disturbances of the beech forests caused by visitors. To ensure sustainable and responsible visitation, several components have visitor management plans, visitor monitoring, or restrictions regarding the number of visitors in place. Usually visitors do not have any significant impact on a forest ecosystem in comparison with logging or intensive browsing by increased game populations, as there is almost no impact by visitors on the flow of materials or the regeneration success. However, there might be a significant risk that neobiota are introduced by visitors.

(v) Number of inhabitants within the proprty and the buffer zone

The visitor traffic in the protected areas does not affect the beech forests in the nominated component parts. There are no discernible influences that might have a direct and substantial impact on the integrity of the nominated beech forests.

The component parts are in general completely unoccupied. Eventual seasonal human activity (e.g. shepherds) may occur in the buffer zone. Several components comprise a limited number of hiking trails.


Treetop of an old beech tree. Picture: H. Kirchmeir (E.C.O.)

5. PROTECTION AND MANAGEMENT OF THE PROPERTY

5.a Ownership

Permanent protection of the property is ensured by the ownership structure of the component parts. Most of the nominated component parts are entirely publicly owned. The owners are either local, regional or provincial administrations, particularly in countries of Eastern and Southeastern Europe.

Some component parts are managed by state enterprises (e.g. Ukraine, Austria) and can consequently be considered publicly owned. Private property plays no noteworthy role and is only relevant in small parts or certain components. In case that there is private property, contractual arrangements or legislative protection ensures long-term conservation.

Table 74: Ownership of the component parts

ID	State Party	Component part/ cluster	Owner	%
001	Albania	Lumi i Gashit	State: Regional Directorate of Protected Areas (RAPA) in Kukes	100
002	Albania	Rrajca	State: Regional Directorate of Protected Areas (RAPA) in Elbasan	100
003	Austria	Dürrenstein	Private: Austrian Federal Forest Enterprise (ÖBf) (Company is state owned)	66
			Private: Forest Administration of Lungau	34
004–007	Austria	Kalkalpen	Private: Baufond der Katholischen Kirche Österreichs	6
			Private: Austrian Federal Forest Enterprise (ÖBf) (Company is state owned)	94
008	Belgium	Sonian Forest	Provincial: Walloon Region	2
009	Belgium		Provincial: Walloon Region	5
010	Belgium		Provincial: Brussels Region	14
011	Belgium		Provincial: Brussels Region	9
012	Belgium		Provincial: Flemish Region	70

013–021	Bulgaria	Central Balkan	State	100
022	Croatia	Hajdučki i Rožanski Kukovi	State	80
			Private	20
023–024	Croatia	Paklenica National Park	State	90
			Private	10
025–029	Italy	Abruzzo, Lazio & Molise National Park	Municipality: Property of the Municipalty of Villavallelonga	100
			Municipality: Property of the Municipaltiy of Pescasseroli	100
			Municipality: Property of the Municipaltiy of Pescasseroli	100
			Municipality: Property of the Municipaltiy of Opi	100
			Municipality: Property of the Municipality of Lecce nei Marsi	100
030	Italy	Cozzo Ferriero	Municipality: Property of the Municipality of Rotonda	100
031	Italy	Foresta Umbra	State	100
032	Italy	Monte Cimino	Municipality: Municipality of Soriano nel Cimino	100
033	Italy	Monte Raschio	Regional: Property of Lazio Region	100
034	Italy	Sasso Fratino	State	100
035–038	Poland	Bieszczady	State: Owned by the State in perpetual usufruct of the Bieszczady National Park	100
039	Romania	Cheile Nerei-Beușnița	State: National Forest Administration – ROMSILVA	100
040	Romania	Codrul Secular Șinca	Municipality: Sinca Village	100
041	Romania	Codrul Secular Slătioara	State: National Forest Administration – ROMSILVA	100
042–043	Romania	Cozia	State: National Forest Administration – ROMSILVA	100
044–046	Romania	Domogled - Valea Cernei	State: National Forest Administration – ROMSILVA	100
	Romania	Groșii Țibleșului	State: National Forest Administration – ROMSILVA	100
049	Romania	Izvoarele Nerei	State: National Forest Administration – ROMSILVA	100
050	Romania	Strâmbu Băiuț	State: National Forest Administration – ROMSILVA	100
051	Slovenia	Krokar	State: Republic of Slovenia	100
052	Slovenia	Snežnik-Ždrocle	State: Republic of Slovenia	100
053-054	Spain	Hayedos de Ayllón	Municipality: Montejo de la Sierra municipality	22
			Regional: Property of the Junta de Comunidades de Castilla-La Mancha	78
055–056	Spain	Hayedos de Navarra	Municipality: Municipality of Ochagavía	27
			Municipality: Municipality of Isaba	73
057–058	Spain	Hayedos de Picos de Europa	Municipality: Municipality of Posada de Valdeón	60
			Municipality: Municipality of Oseja de Sajambre	40
059	Ukraine	Gorgany	State: Gorgany Nature Reserve	100
060	Ukraine	Roztochya	State: Roztochya Nature Reserve	100
061	Ukraine	Satanivska Dacha	State: State Enterprise “Yarmolynetske Forestry”	100
062–065	Ukraine	Synevyr	State: Synevyr National Nature Park	100
066–067	Ukraine	Zacharovanyi Krai	State: Zacharovanyi Krai National Nature Park	79
			State: State Forestry Enterprise “Dovzhanske Forestry”	21

5.b Protective designation

The protective designation of the individual component parts strongly varies between the individual countries. Most of the nominated component parts are of superior importance for conservation and thus have already been protected for a long time by national legislation and international conventions and treaties. Several sites are recognized by IUCN as Strict Wilderness Area (IUCN Management Category I) or National Park (IUCN Management Category II) and many component parts are designated and recognized Natura 2000 or Ramsar sites (see *Table 74*).

Alongside with the various international designations, all sites are strictly protected by national or provincial legislation and regulations.

In a few cases (Sonian Forest (008, 009, 010, 011, 012), Codrul Secular Șinca (040), Groșii Țibleșului

(047,048), Strâmbu Băiuț (050) protection is ensured by the (forest) management plan in place (strict forest reserve or non-intervention management) and corresponding legislation. The Belgium component parts are located in different administrative units and are protected by the Flemish forest decree, the governmental decisions, the forest law and the Walloon forest decree. They are strictly protected Forest Reserves corresponding to IUCN category 1a. In the mentioned Romanian component parts, the land is state owned. Therefore, the State Party has the full management empowerment on these sites. Groșii Țibleșului (047, 048), Strâmbu Băiuț (050) and Codrul Secular Șinca (040) are strictly protected through the forest management plan approved by an order of the Ministry of Environment, Water and Forests. The whole area is protected in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests, similar to other forest scientific reserves. The protective status corresponds to the IUCN 1a category. In 2011, the owner of the forest signed a memorandum with WWF Romania and the administrator of the forests, in which WWF is mandate to undertake actions to declare the forest as natural reserve of national interest and the owner committed not to make any cuttings in the area.

Considering the fact that only component parts were selected for the nomination which had already been exempt from any use for decades or centuries, the protective designation already proved to be efficient and able to preserve the respective component parts.

Table 75 provides a comprehensive overview of the protective designations of the individual component parts.

Table 75: Overview of the protection status of the component parts

ID	State Party	Component part/cluster	Protection status	Year
001	**Albania**	Lumi i Gashit	Declaration as Strict Nature Reserve – Decision Nr. 102	1996
002	**Albania**	Rrajca	IUCN Cat. II Designation	2008
002			Establishment National Park Shebenik-Jabllanice – Decision Nr. 640	2008
003	**Austria**	Dürrenstein	Recognition by IUCN (Cat. I)	2003
			Legal declaration as Nature Conservation Area	1942
004–007	**Austria**	Kalkalpen	Wilderness Certificate	2015
			Natura 2000 Standard data form	2014
			Local Decision District Kirchdorf	2013
			Local Decision Steyr Land	2013
			European Protected Area	2005
			Ramsar Certificate	2004
			Conservation Act Upper Austria	2001
			IUCN Cat. II Designation	1997
			Management Plan Decree	1997
			National Park Act	1996
			Agreement between the Federal Government and the Province of Upper Austria on the establishment and maintenance of the Kalkalpen National Park	1996
008–012	**Belgium**	Sonian Forest	Summary of legal foundations	2015
			009+010: Governmental decree on the designation of the Special Protection Area of Conservation BE1000001: “Sonian Forest with neighbouring edges and wood estates and the Woluwe Valley-Sonian Forest complex-Woluwe Valley” as part of the Natura 2000 network	2015
			009+010: Order on nature conservation of 1 March 2012	2012
			008–012: Cooperation agreement between the three regions for the consultation model as part of the structural vision on the Sonian Forest	2012
			008–012: Decision on general measures Natura 2000	2011
			008: Ministerial decision on the extension of the strict forest reserve “J Zwaenepoel”	2010
			011+012: Ministerial decision: declaration as Outstanding Natural Site	2009
			011+012: Forest Decree	2008

ID	State Party	Component part/cluster	Protection status	Year
			008–012: Declaration of intention between the 3 regions with regard to the structural vision/scheme for the Sonian Forest	2008
			009: Governmental Decree giving the statute of forest reserve to several parts of the Sonian Forest, which includes the recognition of Grippensdelle as part of the forest reserve	2007
			009+010: Act on land settlement-CoBAT (protection of heritage)	2004
			008: Governmental decision on the designation of the "Flemish ecological network"	2003
			008: Governmental decision on the designation of the Special Areas of Conservation as part of the Natura 2000 network	2002
			009+010: Governmental Decree on protection of natural habitats, as well as of wild fauna and flora	2000
			008: Ministerial decision on the extension of the strict forest reserve "J Zwaenepoel"	1999
			008: Nature Decree	1997
			008: Ministerial decision on the declaration of the strict forest reserve "J Zwaenepoel"	1995
			008: Governmental decision on forest Reserves	1993
			008: Forest Decree	1990
			Law on the conservation of nature	1973
			011+012: Royal Decree: declaration as Protected Landscape (part 2)	1971
			008–012: Royal Decree: declaration as Protected Landscape	1959
			008–012: Monument and Landscape Decree	1931
			009+010: Forest Law	1890
013–021	**Bulgaria**	Central Balkan	Reserves orders for designation and changes in the area	2015
			Pan Parks Certificate	2010
			European Diploma Certificate	2009
			Natura 2000 decision of the European Commission	2008
			Designation order SPA Natura 2000	2008
			Pan Parks Certificate 2005–2008	2005
			Natura 2000 Standard data form	2005
			Pan Parks Certificate 2003–2004	2003
			CBNP Recategorization Order	1999
			CBNP Designation order	1991
022	**Croatia**	Hajdučki i Rožanski Kukovi	Nature Protection Act	2013
			Regulation on proclamation of the Ecological Network	2013
			Regulation on establishment of the Northern Velebit National Park Public Institution	1999
			Settlement on Registration Strict Reserve Hajdučki i Rožanski Kukovi	1969
			Act Proclaming Hajdučki and Rožanski Kukovi (Crests) a Strict Nature Reserve	1969
023–024	**Croatia**	Paklenica National Park	Nature protection law	2013
025–029	**Italy**	Abruzzo, Lazio & Molise National Park	Natura 2000 Sites Designation (Directive 92/43/C)	2014
			Resolution on the renewal of the European Diploma of Protected Areas	2012
			National Law establishing the National Park	1923
030	**Italy**	Cozzo Ferriero	Natura 2000 Sites Designation (Directive 92/43/CE)	2014
			National Law Establishing the National Park	1993
031	**Italy**	Foresta Umbra	Nature 2000 Sites Designation (92/43/CE)	2014
			Regional Law establishing SPAs (Dir_79/409 CE)	2005
			National Law establishing Gargano National Park	1995

ID	State Party	Component part/cluster	Protection status	Year
032	**Italy**	Monte Cimino	Resolution of the Municipality for establishing the Natural Monument	2015
			Natura 2000 Sites Designation (Directive 92/43 CE)	2014
033	**Italy**	Monte Raschio	Natura 2000 Sites Designation (Directive 92/43/CE)	2014
			Regional Law establishing Lago di Bracciano Natural Park (L.R.36/99)	1999
034	**Italy**	Sasso Fratino	Natura 2000 Sites Designation (Directive 92/43/CE)	2014
			National Law establishing the Foreste Casentinesi National Park	1993
			Release of the European Diploma for Protected Areas	1985
			National Law establishing Riserve Biogenetiche Casentinesi	1977
			National Law establishing Riserva Integrale Sasso Fratino	1959
035–038	**Poland**	Bieszczady	Council of Ministers Regulation of 3 November 1999 changing the regulation on the Bieszczady National Park	1999
			Official establishment by UNESCO trilateral, Polish-Slovak-Ukrainian Biosphere Reserve "Eastern Carpathians" including, among others, Bieszczady National Park	1998
			Official establishment of the UNESCO two-sided, Polish-Slovak Biosphere Reserve "Eastern Carpathians" including, among others, Bieszczady National Park	1992
			Establishment of the Bieszczady National Park	1973
039	**Romania**	Cheile Nerei-Beușnița	Government Emergency Ordinance no. 57/2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna	2007
			Government Decision no. 230/2003 on the delimitation of biosphere reserves, national parks and natural parks and the establishment of their management	2003
			Law no. 5/2000 regarding the approval of the Plan for national territory management, 3rd Section, protected areas	2000
			Environment Minister's order 7/1990 concerning the establishment of national parks	1990
			Cheile Nerei-Beusnita National Park Constitutive Act	1990
040	**Romania**	Codrul Secular Șinca	Forest Management Plan of UPI Comuna Sinca 2015	2015
			Scientific documentation for the proposal for approval of the protected area Codrii Seculari Sinca	2011
			Decision no. 34/13.07.2011 of Local Council of Sinca Village	2011
			Contract of Association for Biodiversity Conservation no. 870/07.04.2011	2011
041	**Romania**	Codrul Secular Slătioara	O.U.G. 263/2000	2000
			Law no. 5/2000 regarding the approval of the Plan for national territory management, 3rd section, protected areas	2000
			Ministry decision no. 9942/19.03.1941 (M. Of. no. 72/1941)	1941
042–043	**Romania**	Cozia	Ministry order issued by the Ministry of Agriculture, Forests, Waters and Environment no. 552/2003 regarding the internal zonation of national and natural parks in terms of conservation necessity for biological diversity	2003
			Law no. 5/2000 regarding the approval of the Plan for national territory management, 3rd section, protected areas	2000
			Ministry order no. 7/1990 concerning the establishment of national parks	1990
			Decision no. 659/1966 of Argeş Regional Council for declaring Cozia Massif as nature reserve	1966
044–046	**Romania**	Domogled-Valea Cernei	Government Decision no. 230/2003 on the delimitation of biosphere reserves, national parks and natural parks and the establishment of their management	2003
			Law no. 5/2000 regarding the approval of the Plan for national territory management, 3rd section, protected areas	2000
			Environment Minister's order no. 7/1990 concerning the establishment of national parks	1990
047–048	**Romania**	Groșii Ţibleșului	Custody Convention	2014
			Decision of the Local Council Groșii Ţibleșului	2011

ID	State Party	Component part/cluster	Protection status	Year
			Romanian Academy – Nature Monuments Commission Approval	2010
			Scientific documentation for the proposal for approval of the protected area	2008
			Ministry of Agriculture and Rural Development Approval	2008
049	**Romania**	Izvoarele Nerei	Government Emergency Ordinance no. 57/2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna	2007
			Government Decision no. 230/2003 on the delimitation of biosphere reserves, national parks and natural parks and the establishment of their management	2003
			Law no. 5/2000 regarding the approval of the Plan for national territory management, 3rd section, protected areas	2000
			Environment Minister's Order 7/1990 concerning the establishment of National Parks	1990
050	**Romania**	Strâmbu Băiuț	Custody Convention	2014
			Decision of the Local Council Strâmbu Băiuț	2011
			Decision of the Local Council Lăpuș	2011
			Romanian Academy – Nature Monuments Commission Approval	2010
			Scientific documentation for the proposal for approval of the protected area	2008
			Ministry of Agriculture and Rural Development Approval	2008
051	**Slovenia**	Krokar	Decree on protective forests and forests with special purpose	2005
			Rules on the designation and protection of natural values	2004
052	**Slovenia**	Snežnik-Ždrocle	Rules on the designation and protection of natural values	2015
			Decree on protective forests and forests with a special purpose	2005
053–054	**Spain**	Hayedos de Ayllón	Law 5/2011 on Declaration of the Sierra Norte de Guadalajara Nature Park	2011
			Declaration of Sierra del Rincón's Core area of the Biosphere Reserve	2005
			Hayedo de Montejo – Declaration of Natural Site of National Interest	1974
055–056	**Spain**	Hayedos de Navarra	Foral Decree 231/1998 – Master plans for the Use and Management of the Integral Reserves of Lizardoia and Aztaparreta	1998
			Foral Law 6/1987, on regional planning requirements for protection and land use in Navarre	1987
057–058	**Spain**	Hayedos de Picos de Europa	Designation and management plan as Site of Community Importance and Special Protection Area for Birds (Natura 2000)	2015
			Designation as National Park	1995
059	**Ukraine**	Gorgany	Statement of Gorgany Nature Reserve	2014
			Decree of President of Ukraine about establishing Gorgany Nature Reserve	1996
			Law of Ukraine on Nature Reserve Fund of Ukraine	1992
060	**Ukraine**	Roztochya	Law of Ukraine on Nature Reserve Fund of Ukraine	1992
			Order of creation of nature reserve	1984
			Decree of Cabinet of Ministries of USSR	1984
061	**Ukraine**	Satanivska Dacha	Presidential Decree about establishment of Podilski Tovtry National Nature Park	1996
			Law on Nature Reserve Fund of Ukraine	1992
			Decree of the Council of Ministers about conservation status of Satanivska Dacha	1985
062–065	**Ukraine**	Synevyr	Law on Nature Reserve Fund of Ukraine	1992
			Decision about establishment of Synevyr National Nature Park	1989
066–067	**Ukraine**	Zacharovanyi Krai	Presidential Decree about establishment of Zacharovanyi Krai National Nature Park	2009
			Law on Nature Reserve Fund of Ukraine	1992

5.c Means of implementing protective measures

Functional protection within the component parts and their buffer zones is generally ensured by

- The designation of protected areas by law or ordinances,
- The administrative bodies responsible for the management of the component, and
- The management plans specifically devised for the protected areas including the component parts.

Since primeval or ancient beech forests as such only require limited active management, the main task is to enforce a strict non-intervention strategy in place in all of the nominated components.

The implementation of individual measures remains within the responsibility of the respective management bodies at component part level, approved by the state ministries, but they are also of multilateral interest.

Beech tree leaf. Picture: H. Kirchmeir (E.C.O.)

The responsibility to coordinate the management of the respective national component parts including the required reporting resides with a steering group made up of representatives of the state parties including, where applicable, the respective regional authorities, the so-called national steering groups, which are an integral part of the Inzegrated Management System (see Chapter 5e).

With the extension nomination, ***the state parties of Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Romania, Slovenia, Spain, Poland, and Ukraine,*** make a major contribution towards the preservation of a property of outstanding universal value. All protective endeavors undertaken in the component parts follow an ecosystem approach. They are intended to safeguard the ongoing evolutionary and natural dynamic processes to preserve the entire biological diversity of the beech forests.

In general, measures of the responsible authorities and management bodies include, for instance:

- Enforcement of non-intervention policy
- Visitor management (if considered necessary)
- Buffer zone management
- Stakeholder involvement

Enforcement of non-intervention policy

In the component parts of the property, a strict non-intervention policy is implemented. As forest management, like extraction of biomass by logging, changing structure by thinning or harvesting timber and driving on forest floors with heavy machinery, has the most relevant impact on the natural process cycle, it is of uppermost importance that these forest management activities are effectively prohibited.

Grazing or impact of anthropogenically increased game populations are strictly avoided. Grazing and game browsing of natural forest regeneration has a long-term influence on the regeneration success of different tree species. Thus, grazing has to be fully excluded from the component parts. In most of the larger component parts in regions with existing predator populations, game regulation is redundant. Smaller component parts embedded into managed forest systems and lacking predator populations might require active game management measures to control the game population on a close to natural level.

Construction of any new infrastructures like roads, houses, pipelines, power lines, cell phone towers and others is prohibited in the component parts. Maintenance of existing infrastructure is possible, as long as no significant negative impact on the property is to be expected.

Visitor management (if considered necessary)

Visitors can enter the component parts as long as there are no adverse impacts on the property. Hiking trails, particularly if already existing, is possible. However, a dense network of new hiking trails needs to be avoided. A visitor management concept should coordinate the activities to guide visitors in a way that negative disturbance is reduced to a minimum. If possible, trails and information boards should be placed in the buffer zone.

Buffer zone management

All component parts are fully or partly surrounded by buffer zones. According to Oliver Martin & Giovanna Piatti (2009, p52) buffer zones can have multiple functions:

1. Protection of values of the protected area (including the OUV)

Maximize the connectivity of WH property with other natural lands

2. Integrate WH property with landscape scale conservation and sustainable use

In the case of the 67 nominated component parts, all three functions are represented, although not all functions are realised in each component part. Obligatory is the protective function that is implemented for all component parts. The analysis of threads shows that not all of them can be avoided or reduced by buffer zones. Climatic change or negative impact through human introduced emissions are beyond the protective function of buffer zones. However, buffer zones and adequate management of these buffer zones can mitigate negative impact caused by human land use practice at adjacent areas. If the component parts are close to agricultural lands, buffer zones can protect from impact of pesticides or fertiliser. In case that the property is bordering to economically managed forests, the most likely negative impact on the property is due to forest activities leading to a significant reduction of the canopy of adjacent forest stands of the property. Clear-cuts and shelterwood cutting may cause these reductions of the canopy. Opening of the canopy of adjacent stands leads to a change of the light regime, microclimate and wind exposure. This might have direct negative impacts on trees inside the property by sunburn, wind throws or unnatural changes in regeneration and herbal plant layer. To protect the beech forests in the component parts from these negative human introduced influences, a minimum buffer zone of 50m is established as a common standard. However, in most cases the buffer zone is much wider. In total 217 thousand hectares of buffer zone are established, which represents an average width of more than 1000m around the component parts.

A buffer zone is only absent, when there is no negative impact from bordering areas to be expected. This is the case, when the border is located on the step ridge of a mountain and it is very unlikely, that negative impact will hit the forest of the component part beyond the ridge. In addition, when a river forms the border and there is no evidence of negative potential impacts across the river, buffer zones might not be installed. The geomorphology was taken into consideration in the design of the buffer zone as well. Uphill of the component parts buffer zones are designed wider than at the downhill side as human impact is much more likely to reach far larger distance in the direction of slope (release of nutrients, anthropogenic caused avalanches by removing forest stands etc.).

View of an old beech forest. Picture: H. Kirchmeir (E.C.O.)

In many of the component clusters, the buffer zone shows important connection function. As for the component parts only the oldest and undisturbed forest stands have been selected, several of this stands are connected by buffer zones. In many cases, the buffer zone take the whole protected area in which the component parts are located. It links the beech forests with other ecosystems within the national park, the biosphere reserve or protected landscape.

Examples of sustainable land use can only be developed in those buffer zones, which are not part of strictly protected reserves.

In the case of managed forest it is obligatory that the density of the tree layer should not be opened to more than 60% by human activities. Human introduced openings of the crown layer larger in diameter than one length of a tree have to be avoided. Only selective logging might be permitted in the buffer zone. This limitation will guarantee that the micro-climate within the component part forest is not disturbed by human activities outside the component part. Selective logging needs specific knowledge and techniques, which could be promoted through buffer zone management.

To guarantee the functionality of the buffer zone, all of the buffer zones are located on sites that are under direct or indirect control of the management authority that is in charge of the component part or is under direct control of the State Party (e.g. state owned forest properties). In the case that a strictly protected forest is directly bordering to private forest without legal regulation, the buffer zone is located inside the strict reserve to guarantee full control on the buffer zone management.

Stakeholder involvement to ensure favorable local perception

The involvement of relevant stakeholders, like NGOs, forest management representatives or forest administrations, hunting and tourist associations, as well as representatives of local landowners and communal administrations, needs to help to ensure a positive local perception of the World Heritage property and to increase the respect to the necessary protection measures. The Integrated Management Panels (see chapter 5.e) are local platforms of communication between the component part management and stakeholders.

Implementation of the protective measures in the individual component parts

Having ratified the World Heritage Convention, the countries committed themselves to implement the regulations of the Convention. Within political and administrative structures of the respective countries, the countries are responsible to ensure proper provisions of the management and protection of the individual nominated component parts. The responsibility for the concrete implementation on site resides with the individual protected area managements or regional administrations. The immediate execution of the protective instruments of the individual component parts is ensured by the protected area administrations based on their capacities of public administration. The direct responsibility to implement the provisions contained in the laws and ordinances on conservation lies with the respective national or regional authorities.

Mostly, there are detailed plans relating to the administration of each area. The plans guarantee the areas to be protected and, among others, govern in detail the fields of, for instance, visitor management, forest management, wildlife management, risk management, public relations, and biodiversity conservation.

Albania: Lumi i Gashit (001)

In accordance with the Decision of the Council of Ministers no. 102, dated 15.1.1996, “Gashi River” is proclaimed as “Strict Nature Reserve” with a surface of 3,000 ha.

The component part Lumi i Gashit is part of the above Strict Nature Reserve. According to the Protected Areas law (2002 and amended in 2008), first level of protection is applied at the SNR. According to the legislation for this level of protection, guarding and passing through paths of the persons that use/managed the land is allowed in the reserves. But almost all activities are prohibited: cutting of trees and bushes, construction of any kind, hunting and fishing, lighting of fires, grazing, domestic animals’ passage and construction of objects for their shelter, establishment of recreational, amusement and sports complexes, passing through paths (except for the person that uses/manages the land), circulation with vehicles of any kind, sailing in boats, canoe and other means of sailing, etc. Any other activity to be performed in the area with the first level of protection shall be subject to environmental permit.

By law, all human activities in the Protected Area have to be in compliance with the Management Plan (2015–2020, to be approved) of the area and under the supervision of the PA Management Committee.

Albania: Rrajca (002)

The component part Rrajca is part of Protected Area Shebenik-Jabllanice, which is designated as a National Park by the Decision of the Council of Ministers no. 640, dated 21.05.2008. Referring to these DCM, the PA is divided in four zones/areas: central area, area of sustainable use, recreational area, and area of traditional use. The component part Rrajca is located at the “core zone” of the PA. According to the Protected Areas law (2002 and amended in 2008) and DCM no. 640/2008, the first level of protection is applied at the core zone. According to the legislation for this level of protection, guarding and passing through paths of the persons that use/managed the land is allowed in the reserves.

But almost all activities are prohibited: cutting of trees and bushes, construction of any kind, hunting and fishing, lighting of fires, grazing, domestic animals’ passage and construction of objects for their shelter, establishment of recreational, amusement and sports complexes, passing through paths (except for the person that uses/managed the land), circulation with vehicles of any kind, sailing in boats, canoe and other means of sailing, etc. Any other activity to be performed in the area with the first level of protection shall be subject to environmental permit. By law, all human activities in the PA have to be in compliance with the Management Plan of the area and under the supervision of the PA Management Committee. The Management Plan 2015–2024 is in the approval process.

Austria: Dürrenstein (003)

In 1942, the area of the Wilderness Area Dürrenstein was first declared a nature conservation area. In 1988, the nature conservation area "Rothwald II" was established. In 1997, a project funded by the nature conservation program of the European Union was carried out in order to pave the way for the first wilderness area in Austria. In 2011, the wilderness area was decreed by national law. Two years later, the IUCN officially recognized the area as Category I Wilderness Area. After an extension of the original area in 2013, the total area now compromises 3,500 ha, thereof 277 ha of primeval forest.

Austria: Kalkalpen (004, 005, 006, 007)

The 4 component parts Kalkalpen are protected as a national park (National Park Act 1996). In addition, they benefit from different conservation categories (IUCN II, Ramsar, Natura 2000) and their respective legal provisions. The National Park Act regulates the establishment and operation, a decree controls the aims and measures of the management.

The Kalkalpen National Park consists of a Natural and a Managed Zone. 96% of the proposed area lies within the Natural Zone that aims at minimal human influence, 4% within the Managed Zone, which is mainly formed by cultural landscape. This allows land-use according to the principles of organic farming and sustainable forest management. Both forms of usage are not conducted within the component parts.

Fishing and hunting activities are not allowed. To ensure natural forest rejuvenation, a game regulation has been established that is conducted mainly outside the component part. 91% of the proposed area has been declared a game resting area.

Due to legal decisions of the public authorities, 75% of the National Park area is free from phytosanitary measures that are stipulated by the Austrian Forest Act to prevent insect calamities. The component parts lie within this wilderness zone. Prohibitions of access only exist in wetlands. Visitors are allowed to visit the area.

All these provisions and regulations ensure a minimum of human influence and a maximum of natural development and, therefore, guarantee the long-term protection and preservation of the component part.

Belgium: Sonian Forest (008, 009, 010, 011, 012)

The five component parts were all recently established as strict reserves (unmanaged) with the oldest part dating back to 1983 (see list of acts in *Table 73*). These unmanaged strict reserves have been gradually extended over the last decades. After installation of non-intervention, the stands gradually re-naturalize from clearly man-made stands with low amounts of deadwood, to diverse stands with still increasing amounts of above-ground biomass, both living and dead. Due to this legal protection, human intervention is restricted to walks by pedestrians and research/monitoring activities in the stands.

A large patch of legal instruments also protects the surrounding forest complex, even strengthens its biodiversity and heritage value. The royal decree to protect the landscape/site dates back to 1959, but also more recent instruments strictly limit the exploitation of the ecosystem services in the stands around the buffer zones (Forest decree, nature decree, see list of acts in *Table 73*).

Recent formal political decisions ensured the implementation of the UNESCO process and strengthened the community around the Sonian Forest (2012, 2014).

Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

The Central Balkan National Park was designated as a People's Park by the law of Bulgaria since 1991. In 1999, according to the Protected Areas Act (PAA), the Park was reclassified as a National Park (Category II according to the Law and IUCN). All nine component parts, since their establishment in the period 1948 to 1987, always had the highest level of protection and no human intervention was allowed (Category I according to the Law, Ia according to IUCN). According to the legislation, only guarding, scientific researches and passing of visitors through determined visitor trails are allowed. As for the rest of the National Park, outside the component parts including the buffer zone, the regimes are also quite restrictive and do not allow some human interventions. For example, hunting and fishing are not allowed in the National Park (and its reserves). According to the Bulgarian constitution and the Protected Areas Act, the reserves and the national parks in Bulgaria are exclusive state property. All human activities in the Park have to be in compliance with the Management Plan of the area and with the Protected Areas Act. Some of the activities which might have a high impact on the territory (only in the multifunctional zone) are subject to procedures for EIA and appropriate assessment procedures for their compatibility with the objections of Natura 2000.

Deadwood. Picture: H. Kirchmeir (E.C.O.)

Croatia: Hajdučki i Rožanski Kukovi (022)

Hajdučki and Rožanski Kukovi is a strict reserve, IUCN category Ia. It is defined as an area set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring. The Reserve is situated inside the Northern Velebit National Park, IUCN category II. Forests in the Reserve are not managed or exploited. The management is regulated within the Management Plan of the Northern Velebit National Park. It contains action plans: the forest ecosystems conservation program and monitoring of forest ecosystems. The component part is under non-intervention regime. The buffer zone is located within the National Park and is under the regulation of the management plan.

Croatia: Paklenica National Park (023, 024)

The nominated beech forests are located in the area of the National Park, and covered by strict protection under Croatian law for the protection of nature (NN 2013). The strict protection means “complete and permanent cessation of direct human interference in ecosystems, wildlife components and natural processes.” In this area, non-invasive scientific research and visitor flow on designated trails are allowed. In general, the forests of the National Park Paklenica are not managed unless unpredicted and extraordinary events occur (fire, gradation of insects, etc.). In these cases, appropriate actions (especially fire control) will be undertaken in cooperation with the State Institute for Nature Conservation. Additionally, according to the Law of Nature Protection, a Program for the protection of forest ecosystems must be developed as a part of this management plan. The component parts are situated in the strictest conservation zone 1a (according to the management plan).

Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

The Abruzzo, Lazio and Molise National Park was established by national law of Italy in 1923. The National Law on Protected Areas (n. 394) defined the criteria according to which a National Park zonation should be established in 1991. This zonation has been implemented in the two management plans of the National Park that prescribed the state of strict reserve, corresponding to IUCN I, for all the component parts. No human intervention is allowed and the area may be accessed exclusively on excursion trails. No mountain biking, climbing, and horse trekking is allowed in strict reserves, as well as collecting flowers, mushrooms and wild berries, hunting, fishing and free camping. The latest Management Plan extends until 2020. All the component parts fall within the Natura 2000 SCI/SPA “Parco Nazionale D’Abruzzo”, for which a management plan that describes the natural resources of the Park, defines its zonation and regulates the possible activities in its territory, has recently been compiled (valid until 2024).

Italy: Cozzo Ferriero (030)

The component part Cozzo Ferriero is located in the Pollino National Park, which has been established by National Law in 1993 (DPR 15/11/1993). It is therefore subject to the National Law on Protected Areas (n. 394) of 1991, which defined the criteria according to which the National Park zonation must be established. This zonation has been implemented in the management plan of the National Park that prescribed the state of strict reserve (corresponding to IUCN I) for the component part. No human intervention is allowed and the area may be accessed exclusively on excursion trails. No mountain biking, climbing, horse trekking is allowed in strict reserves, as well as collecting flowers, mushrooms and wild berries, hunting, fishing and free camping. The Park Management Plan is currently under evaluation of the Regional Administration.

The Forest Management Plan of Rotonda, the Municipality hosting Cozzo Ferriero, classifies the site as "protection forest", where only monitoring and research are allowed. Its validity is 2008 to 2017.

The component part falls within the Natura 2000 SCI "Fagosa-Timpa dell'Orso", but a management plan is not yet available for it. The Habitat Directive management indications have been adopted by the Regional Administration through specific regional acts (Deliberazione della Giunta Regionale della Basilicata n. 2454 of 22/12/2003 and n. 655 of 06/05/2008).

Italy: Foresta Umbra (031)

The component parts are located in two State Natural Reserves, Falascone and Foresta Umbra, established in 1971 and 1979, respectively (managed by the National Forest Service, CFS-UTB), and are embedded in the Gargano National Park, established by National Law in 1995, which includes the area of both Reserves. The National Law on Protected Areas (n. 394) in 1991 defined the criteria according to which the National Park zonation must be established. This zonation has been implemented in the Management Plan of the National Park (2010), which prescribed the status of strict reserves, corresponding to IUCN I, for the component parts. No human intervention is allowed and the area may be accessed exclusively on excursion trails. Tourists can visit the area, remaining on trails and without damaging the flora and fauna. No access is currently possible to the fenced core of the property (Falascone). The Management Plan will be valid until 2020.

All the component parts fall within the Natura 2000 SCI "Foresta Umbra" and the SPAs "Promontorio del Gargano", "Foresta Umbra" and "Falascone", but a Natura 2000 Management Plan is not yet available.

Italy: Monte Cimino (032)

Since 1970, the core area of 57 ha (locally called "La Faggeta") has been described as beech forest under natural dynamics in the Forest Management Plan of the Municipality that prescribed the status of a Strict Reserve (corresponding to IUCN I) for the component part. In 1995 and 1998, it was proposed as Site of Community Interest (SCI)/Special Protection Area (SPA) "Monte Cimino (Versante Nord)". In 2008, it was officially recognized as SCI by the European Union and, in the same year, the SCI's Management Plan was published.

The latest Forest Management Plan developed by the Municipality, valid until 2025, prescribes a strict reserve preservation for the property, with logging prohibited for the site. The Forest Plan prescribes also that the buffering parcels (made of chestnut coppice forests) must be managed only with small, localized silvicultural actions in order to increase their naturalness degree and let the beech expand with its regeneration.

The establishment of the Natural Monument under evaluation by the Region Lazio will guarantee the implementation of the protective measures through a Management Plan, giving this area an officially recognized Strict Reserve status (corresponding to IUCN I) by the Region Lazio.

Beech forest on steep terrain. Picture: H. Kirchmeir (E.C.O.)

Italy: Monte Raschio (033)

Monte Raschio is located in the Natural Park Bracciano-Martignano, established by Law of the Lazio Region in 1999. The National Law on Protected Areas (n. 394) in 1991 defined the criteria according to which a Park's zonation must be established. The Regional Law established that the area of Monte Raschio is of high naturalistic value, a fact acknowledged by the Park's Management Plan, that assigned the state of a Strict Reserve (equivalent to IUCN I) to the property. No human intervention is allowed and the area may be accessed exclusively on excursion trails. The Management Plan was adopted in 2014. The component part os situated within the Natura 2000 SPA IT6030085 "Bracciano-Martignano", in particular in the SCI "Faggete Monte Raschio and Oriolo", for which a Management Plan was adopted in 2009.

Italy: Sasso Fratino (034)

The Strict Reserve of Sasso Fratino, as well as the biogenetic reserves in the buffer zone (Riserve Biogenetiche Casentinesi), are managed by the State Forest Service (Corpo Forestale dello Stato – Ufficio Territoriale per la Biodiversità, CFS-UTB). Specifically, they are managed by CFS-UTB of Pratovecchio with its own staff and funding, independently from the Foreste Casentinesi National Park.

Sasso Fratino was established in 1959. The National Law on Protected Areas (n. 394) defined the criteria according to which a National Park zonation should be established in 1991. The National Park coordinates the activities within a larger territory including the reserves, cooperating with the CFS-UTB in their management and conservation, as well as in monitoring and research projects. According to the zonation reported in the National Park's Management Plan, approved in 2009 and expected to be updated every ten years, Sasso Fratino and some of the nearby reserves pertain to the strict protection zone (equivalent to IUCN I), while most of the buffer area is protected as IUCN II. The reserves in the buffer zone are almost entirely (98.7%) made up of public property (State or Regions). The National Park has its own staff and funding. No human intervention and access is allowed in the Strict Reserve. The property is situated in the Natura 2000 SCI/SPA "IT4080001-Foresta di Campigna, Foresta la Lama, Monte Falco" and "IT4080003-Monte Gemelli, Monte Guffone", but a Management Plan is not yet available for them.

Poland: Bieszczady (035, 036, 037, 038)

The nominated forests are located in the area covered by strict protection in Bieszczady National Park (69% of the park). Under Polish law (Act of 16 April 2004 on Nature Conservation, Journal of Law 2004, No. 92, item. 880), the strict protection means "complete and permanent cessation of direct human interference in ecosystems, wildlife components and natural processes." In this area, non-invasive scientific research and tourist traffic on designated trails are allowed.

This area is also the central zone of the Eastern Carpathians Biosphere Reserve.

The buffer zone area covering the remaining part of the Bieszczady National Park include areas under strict protection (65%), active protection (35%) and landscape protection (less than 1%). Strict protection in the buffer zone means no human activity in the area. Active protection applies to the reconstruction of forest species composition distorted by the former management of forests and meadow ecosystems (mowing, grazing). Landscape protection applies to small areas of public roads and settlements. The area is a part of the central and buffer zone of the Eastern Carpathians Biosphere Reserve.

Romania: Cheile Nerei-Beușnița (039)

The nominated component part is included in the strictly protected zone of the Cheile Nerei-Beusnita National Park, ensuring a very strict regime of protection through which the structure and ecological processes are preserved in an undisturbed state. According to the framework legislation regarding the regime of protected natural areas, conservation of habitats, wild flora and fauna (OUG no. 57/2007, approved with modifications and additions by the law no. 49/2011, with subsequent modifications and additions), it is forbidden to develop any human activity in strictly protected zones, with the exception of research, education and ecotourism with the limitations described in the Management Plan with the agreement of the Scientific Board of the protected area. These legal provisions are implemented in the strictly protected zone of the National Park through the Management Plan of the NP elaborated in 2015. This plan forbids any form of use of the natural resources in the strictly protected zone and also the use of lands in any way. With the approval of the NP administration, activities such as prevention of insect outbreaks, research and educational activities, etc. are allowed.

The buffer zone is included in the National Park, which ensures its protection.

Romania: Codrul Secular Șinca (040)

The entire component part is strictly protected under the provisions of the Forest Management Plans (the previous plans and also the current one, renewed in 2015). According to this, the forest management units that belong to the nominated component part are assigned to the most restrictive functional category, similar to other national forest reserves. The management measures for this category forbid exploitations of wood or of any other recource. Actions are undertaken by WWF Romania to further increase the protective status of the forest by declaring it as national natural reserve. In this respect, WWF signed an agreement with the owner and the administrator of the forest in 2011. The property is entirely included in the

Natura 2000 sites ROSCI0122 "Muntii Fagaras" and ROSPA0098 "Piemontul Fagaras".

Romania: Codrul Secular Slătioara (041)

The component part's protective status (the most restrictive protection status, non-intervention) is recognized by both the administrator (National Forest Department) and the local community. The Forest Management Plans ranked all the management units of both the component part and the buffer area in the most restrictive category, similar to other forest reserves (non-intervention status). Monthly meetings with all involved foresters, but also with the local people, authorities, and NGOs are held periodically to highlight the importance of the forest reserves.

Romania: Cozia (042, 043)

The nominated component cluster is included in the strictly protected zone of the Cozia National Park (CNP), which ensures a very strict protection regime through which the structure and ecological processes are preserved in an undisturbed state. According to the framework legislation regarding the regime of protected natural areas, conservation of habitats, wild flora and fauna (OUG no. 57/2007, approved with modifications and additions by the law no. 49/2011, with subsequent modifications and additions), it is forbidden to develop any human activity in strictly protected zones, with the exception of research, education and ecotourism with the limitations described in the Management Plan with the agreement of the Scientific Board of the protected area and of the Management Board of the Scientific Reserve. These legal provisions are implemented in the strictly protected zone of the CNP through the Management Plan of the CNP elaborated in 2015. This plan forbids any form of use of the natural resources in the strictly protected zone and also the use of lands in any way. With the approval of the CNP administration, activities for preventing and fighting against forest fires and for the prevention of insect outbreaks are allowed. The buffer zone is also located within the CNP.

Romania: Domogled-Valea Cernei (044, 045, 046)

The component parts of the cluster are part of the integral protection of the Domogled-Valea Cernei National Park.

According to the framework legislation regarding the regime of protected natural areas, conservation of habitats, wild flora and fauna (OUG no. 57/2007, approved with modifications and additions by the law no. 49/2011, with subsequent modifications and additions), it is forbidden to develop any human activity in strictly protected zones, with the exception of research, education and ecotourism with the limitations described in the Management Plan with the agreement of the Scientific Board of the protected area. These legal provisions are implemented in the strictly protected zone of the National Park through the Management Plan of the NP, elaborated in 2015.

This plan forbids any form of use of the natural resources in the strictly protected zone and also the use of lands in any way. With the approval of the NP administration, activities such as prevention of insect outbreaks, research and educational activities, etc. are allowed. The buffer zone is also located within the Domogled-Valea Cernei National Park.

Autumn reflections of a beech forest. Picture: H. Kirchmeir (E.C.O.)

Romania: Groșii Țibleșului (047, 048)

The status of the Forest Reserves was assumed by the National Forest Department at all levels: directorate, forest district, and working unit. The legal background is the Ministerial Order 3397/2012 regulation protection (no logging) in old-growth forests in Romania. The Forest Management Plans assigned all management units to the most restrictive category (strict forest protection, non-intervention). The local communities were informed about the importance of the forests and their current protection status. Many meetings with local foresters, local people, authorities, and NGOs were held to highlight the importance of the forest reserves. The buffer zone is is controlled by the same management unit as the component part.

Romania: Izvoarele Nerei (049)

The nominated component part is under the strictest protection according to Romanian law: Nature Reserve with non-intervention status.

The nominated component part is included in the strictly protected zone of the Semenic-Cheile Carașului National Park, ensuring a very strict regime of protection through which the structure and ecological processes are preserved in an undisturbed state. According to the framework legislation regarding the regime of protected natural areas, conservation of habitats, wild flora and fauna (OUG no. 57/2007, approved with modifications and additions by the law no. 49/2011, with subsequent modifications and additions), it is forbidden to develop any human activity in strictly protected zones, with the exception of research, education and ecotourism with the limitations described in the Management Plan, with the agreement of the Scientific Board of the protected area. These legal provisions are implemented in the strictly protected zone of the National Park through the Management Plan of the NP, elaborated in 2015. This plan forbids any form of use of the natural resources in the strictly protected zone and also the use of lands in any way. The nominated component part is also protected under Habitats and Birds Directives, as well as the buffer zone, of which some parts are included in the National Park and are therefore protected under the National Park regulations.

Romania: Strâmbu Băiuț (050)

Strâmbu Băiuț is strictly protected through the Forest Management Plan approved by an order of the Ministry of Environment, Water and Forests. The whole area is protected in accordance with the Ministerial Order no. 3397/2012 for the protection of virgin forests. The status of the forest reserves was assumed by the National Forest Department at all levels: directorate, forest district, and working unit. The Forest Management Plans ranked all management units in the most restrictive category (non-intervention). The local communities were informed about the importance of the forests and their current protection status. Many meetings with local foresters, local people, authorities, and NGOs were held to highlight the importance of the forest reserves. The buffer zone is is controlled by the same management unit as the component part.

Slovenia: Krokar (051)

With the governmental decree on protective forests and forests with a special purpose from 2005, the Virgin Forest Krokar was protected as Forest Reserve with the strongest regime. This regime means that any human activities, which could in any way influence the natural condition and further development, are forbidden. Only activities that are necessary for the Forest Reserve Management within public forest service and public nature conservation service are allowed. Non-destructive research and education activities could be allowed, but only on the basis of special permit from the Ministry responsible for forestry, issued upon positive opinion from Slovenia Forest Service and from the Institute of the Republic of Slovenia for Nature Conservation. In the buffer zone Forest Reserve Borovec, no forest management activities are allowed. However in the vicinity of forest roads, educational trails, hiking trails or any other trail for public use, the removal of trees that pose a threat to traffic and people is allowed. In the rules on the designation and protection of natural values adopted by the Ministry responsible for the environment, the Virgin Forest Krokar was designated as ecosystem of natural value of national importance in 2004. In the general guidelines on ecosystems of natural value, all activities and interventions which would have a negative influence on biocoenosis are forbidden.

Slovenia: Snežnik-Ždrocle (052)

With the governmental decree on protective forests and forests with a special purpose from 2005, the Forest Reserve Snežnik-Ždrocle was protected. However, in comparison to the Virgin Forest Krokar, it was protected under a milder regime. The milder regime of protection was designated due to existing hiking trails, mountain huts and a forest road that divides the Forest Reserve part Ždrocle from Snežnik. For this milder regime, the regulations concerning the strongest protection regime are valid in general (any human activities which could in any way influence the natural condition are forbidden, non-destructive research and education activities must be officially allowed). However, visiting the Forest Reserve on the forest educational trail or on the public trail is allowed. In the rules on the designation and protection of natural values adopted by the Ministry responsible for the environment, all parts of the Forest Reserve Snežnik-Ždrocle were designated as natural value features in 2004. The Snežnik part was designated as natural value of national importance, the Ždrocle part was designated as natural value of local importance. In 2015, the Forest Reserve Snežnik-Ždrocle was, as a whole, designated as ecosystem and geomorphological natural value feature of national importance. All activities and interventions which would have a negative influence on biocoenosis are forbidden.

Spain: Hayedos de Ayllón (053, 054)

The component part Tejera Negra (053) is part of the area of the Reserve (IUCN category Ia) inside the Sierra Norte de Guadalajara Natural Park (IUCN category V), also declared as Natura 2000 site (ES0000164, “Sierra de Ayllón”). The component part Montejo de la Sierra (054) is part of the core area (IUCN category Ia) in the “Sierra del Rincón” Biosphere Reserve, also declared as Natural Site of National Interest and Natura 2000 site (ES3110002, “Cuenca del río Lozoya y Sierra Norte”). Tejera Negra and Montejo de la Sierra were designated in 1974 as Natural Sites of National Interest. The Tejera Negra component part is situated in the core reserve area of a Natural Park established in 1978. The component parts are recognized as strictly protected core areas of Biosphere Reserves (non-intervention). The buffer zone is located in the buffer zone of the Biosphere Reserve with regulated management.

Spain: Hayedos de Navarra (055, 056)

The measures provided for the protection of the selected component parts are prescribed/determined by the lawlaw (Ley Foral 9/1996) related to the management of the Integral Reserves of Lizardoia and Aztaparreta. Specifically, this law provides that all activities are prohibited in the Integral Reserves, except for activities with a scientific or educational purpose, which may be permitted.

No other conservation measures are considered necessary in the components, since these areas are considered “Mature forest under natural evolution, without human intervention”.

The compliance with the provisions of this law is ensured by monitoring for monitoring and surveillance by rangers and technicians from the Agency for Biodiversity Conservation (Government of Navarra).

In the buffer zone, a variety of management options are considered, from reserve areas without human use to areas with a sustainable forest management, always under Nature conservation goals, as the whole area is legally declared as SAC (Natura 2000 Special Areas of Conservation).

Spain: Hayedos de Picos de Europa (057, 058)

The component parts are protected as National Park and Biosphere Reserve. Since 2011, the management bodies of the National Park are: the management administration, the technical committee, the custodial director and the co-directors designated for each of the Regional Governments.

The management is the main decision-making body. It is composed by the counsilor of each of the Autonomous Communities that share the National Park; moreover, another representative may be designated for each Autonomous Community.

The technical committee is the technical coordination body of the Park, composed by the custodial director and a forestry technician for each of the Autonomous Communities that share the National Park.

Park management is comprised by the three co-directors or forestry technicians, and on a rotational basis, one of them carries out the function of the custodial director.

Ukraine: Gorgany (059)

The nominated component part is a state property.

According to the Regulations, the Gorgany Nature Reserve is a non-profit, scientific-research, nature-protection institution of National importance and corresponds to the structure of the Nature Reserve Fund of Ukraine. It is protected as national property for which a special regime of protection, reproduction and use are established. The protection status of the candidate area and its buffer zone is according to the IUCN category Ia (Strict Nature Reserve), which ensures their integrity and preservation. The access to the primeval forest is strictly regulated for scientists and visitors to minimize human impact.

In 1935, the Metropolit Andrey Sheptytskyi founded the first Cedar Reserve “Gorgany”. In 1940, the government of the Ukrainian Soviet Republic adopted a Decree “About establishing the Gorgany Nature Reserve” (50,000 ha), but this project was not implemented because of the war. From the 1950s to the 1980s, numerous small reserves, monuments of nature and protected sites were established on the territory of the Nadvirna Forestry Enterprise. In 1974, Yurkevych suggested to establish the Gorganske Protected Forestry. On September 12 1996, according to the Decree of the President of Ukraine, the Gorgany Nature Reserve was finally established. Protected sites of National importance came to be composite parts of this protected area. They are: Dzhurdzhi, Sadky, Chernyk, Hnyliak, Novobudova, Elmy, Dovzhynets and Stoly. The buffer zone is situated within the Gorgany Nature Reserve.

Ukraine: Roztochya (060)

The nominated component part is state property. It was declared as Strict Nature Reserve by a

Decree of the Cabinet of Ministers of USSR in 1984 and by Order of creation of a nature reserve in the same year. The status was proclaimed by national Ukrainian law (Law of Ukraine "On Nature Reserve Fund of Ukraine" from 1992). According to the national law, any kind of human influence is forbidden. Before 2013, it was allowed to cut sick trees with the aim of not spreading the disease. The forests of the proposed area are protected from hunting, mushroom picking and logging.

Ukraine: Satanivska Dacha (061)

The nominated component part is located in the core zone of the Podilski Tovtry National Nature Park, which has strict limitations on use according to the Ukrainian legislation (Law of Ukraine "On Nature Reserve Fund of Ukraine" from 1992). In fact, only non-invasive research is allowed there. Direct protection of this area is provided by the ranger service of Podilski Tovtry National Nature Park. Details of protection are laid down in the National Park's Management Plan: Project of territory organization of the Podilski Tovtry National Nature Park.

Ukraine: Synevyr (062, 063, 064, 065)

The nominated component parts are located in the core zone of the Synevyr National Nature Park, where, according to the Ukrainian legislation (Law of Ukraine "On Nature Reserve Fund of Ukraine" from 1992) strict limitations on use apply. In fact, only non-invasive research is allowed there. Direct protection of this area is provided by the ranger service of Synevyr National Nature Park. Details of protection are laid down in the National Park's Management Plan: Project of territory organization of the Synevir National Nature Park.

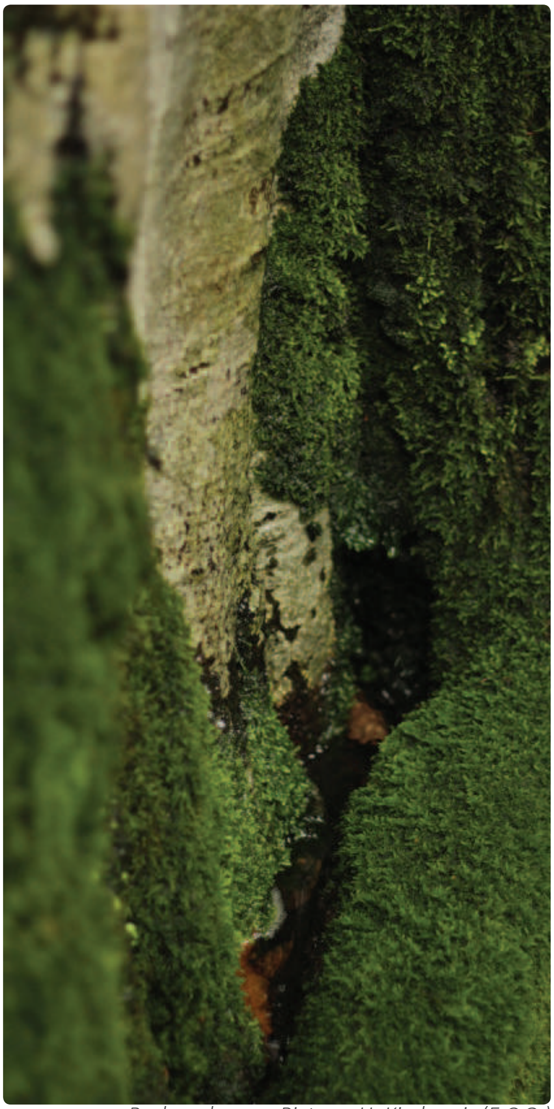
Ukraine: Zacharovanyi Krai (066, 067)

The nominated component parts are located in the core zone of the Zacharovanyi Krai National Nature Park, which has strict limitations on use, according to the Ukrainian legislation (Law of Ukraine "On Nature Reserve Fund of Ukraine" from 1992). In fact, only non-invasive research is allowed there. Direct protection of this area is provided by the ranger service of Zacharovanyi Krai National Nature Park. The details of the protection are given in the in National Park's Management Plan: Project of territory organization of the Zacharovanyi Krai National Nature Park.

5.d Existing plans related to municipality and region in which the proposed property is located (e.g. regional or local plan, conservation plan, tourism development plan)

The national and international protection regimes for the component parts, outlined in chapter 5.b, are part of strongly varying political and administrative contexts. Given this high diversity in administrative organization, there are a considerable number of different plans, strategies, programs and action plans in place.

Table 76 provides an overview of the most relevant plans and strategies.



Bark and moss. Picture: H. Kirchmeir (E.C.O.)

Table 76: Most relevant plans and strategies related to the component parts

ID	State Party	Component part/cluster	Administrative Level	Existing Plans, Strategies	Year
001	Albania	Lumi i Gashit	National	National Biodiversity and Action Plan	2000
002	Albania	Rrajca	National	National Biodiversity and Action Plan	2000
003–007	Austria	Kalkalpen	Municipal	General Agreement of the Communities	2007
			Municipal	General Agreement of the Communities, Summary	2007
008–012	Belgium	Sonian Forest	Municipal	Structural Vision on the Sonian Forest	2008
013–021	Bulgaria	Central Balkan	Municipal/ Regional	Summary of Regional and Municipal Plans	2015
			Municipal	Municipal Development Plan Karlovo	2014
			Municipal	Municipal Development Plan Sopot	2014
			Municipal	Municipal Development Plan Sevlievo	2014
			Municipal	Municipal Development Plan Aprilci	2013
			Municipal	Municipal Development Plan Teteven	2013
			Municipal	Municipal Development Plan Troyan	2013
			Municipal	Municipal Development Plan Pavel banya	2013
			District	Development Strategy of Lovech District	2013
			District	Development Strategy of Gabrovo District	2013
			District	Development Strategy of Stara Zagora District	2013
			District	Development Strategy of Plovdiv District	2003
022	Croatia	Hajdučki i Rožanski Kukovi	National	Public Institution's Charter (Statut)	2014
			National	Nature Protection Act	2013
			National	Physical Plan	2012
			National	Management Plan	2007
			National, international	The Birds Directive	1979
023–024	Croatia	Paklenica National Park	National	Law for nature protection	2015
025–029	Italy	Abruzzo, Lazio & Molise National Park	Regional	Management Plan of the Natura 2000 SCI/ SPA “Parco Nazionale D’Abruzzo”	2014
			National	New Management Plan of the National Park	2010
030	Italy	Cozzo Ferriero	National	Pollino National Park Management Plan	2011
			Municipal	Forest Management of the Municipality of Rotonda	2008
031	Italy	Foresta Umbra	Regional	Gargano National Park Management Plan	2010
032	Italy	Monte Cimino	Municipal	Soriano nel Cimino Forest Management Plan	2015
			Regional	Management Plan SCI-SPA Monte Cimino	2008
033	Italy	Monte Raschio	Regional	Lago Bracciano-Martignano Regional Park Management Plan	2010
034	Italy	Sasso Fratino	National	National Park Foreste Casentinesi Management Plan	2009
035–038	Poland	Bieszczady	Regional	Annual Protection Tasks approved by the Minister of the Environment	2015
			Regional	A Draft of the Protection Plan for a period of twenty years, which is currently subject to legal proceedings	2015
			National	The Program of Conservation and Sustainable Use of Biological Diversity, along with the Action Plan for 2014–2020	2014
			Regional	Environmental Protection Program of the Podkarpackie Voivodeship for 2012–2015	2013
039	Romania	Cheile Nerei-Beușnița	National	National Strategy for Regional Development 2014–2020	2013
			Regional	Management Plan of the Hydrographic Area Banat	2011
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Regional Environmental Action Plan	2006
041	Romania	Codrul Secular Slătioara	National	National Strategy for Regional Development 2014–2020	2013

ID	State Party	Component part/cluster	Administrative Level	Existing Plans, Strategies	Year
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Regional Environmental Action Plan	2006
042–043	Romania	Cozia	National	The Environmental Action Program for Central and Eastern Europe (AEPCEE)	2010
			Regional	Tourism Development Strategy for Valcea County	2007
044–046	Romania	Domogled-Valea Cernei	National	National Strategy for Regional Development 2014–2020	2013
			Regional	Management Plan of the Hydrographic Area Banat	2011
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Local Development Strategy of Baile Herculane City	2007
			Regional	Regional Environmental Action Plan	2006
047–048	Romania	Groșii Țibleșului	National	National Strategy for Regional Development 2014–2020	2013
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Regional Environmental Action Plan	2006
049	Romania	Izvoarele Nerei	National	National Strategy for Regional Development 2014–2020	2013
			Regional	Management Plan of the Hydrographic Area Banat	2011
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Regional Environmental Action Plan	2006
050	Romania	Strâmbu Băiuț	National	National Strategy for Regional Development 2014–2020	2013
			National	National Tourism Master Plan of Romania 2007–2026	2007
			Regional	Regional Environmental Action Plan	2006
051	Slovenia	Krokar	Municipal	The decision to Commence the Preparation of Municipal Spatial Plans for the Area of Kočevje Municipality (Official Gazette of RS, no. 79/07), p. 11007–11010	2007
			Municipal	Decree on the Spatial Planning Conditions for the Local Community Kočevska Reka in the Municipality of Kočevje (Official Gazette of RS, no. 52/01), p. 5459–5466	2001
			Municipal	Decree amending the Spatial Components of the Long-term Plan of the Municipality of Kocevje for the Period 1986–2000 and the Medium-term Social Plan of the Municipality Kocevje for the Period 1986–1990, amended in 1999 (Official Gazette of RS, no. 71/2000), p. 8895–8915	2000
052	Slovenia	Snežnik-Ždrocle	Municipal	Decree on the Spatial Plan of the Municipality Loska dolina, Amendments 2013	2013
			Municipal	Decree on the Spatial Plan of the Municipality Loska dolina 2012	2012
			Municipal	Decree Amending the Spatial Components of the Long-term Plan of the Municipality Ilirska Bistrica for the Period 1986–2000 and the Social Plan of the Municipality Ilirska Bistrica for the Period 1986–1990, amended in 2003 (Official Gazette of RS, no. 78/2004)	2004
053–054	Spain	Hayedos de Ayllón	Regional	Management Plan of the SAC “Sierra de Ayllón”	2015
			Regional	Management Plan for the Special Area of Conservation “Cuenca Río Lozoya and Sierra Norte”	2014
	Spain	Hayedos de Ayllón	Regional	Forestry plan of the Community of Madrid 2000–2019	

ID	State Party	Component part/cluster	Administrative Level	Existing Plans, Strategies	Year
055–056	Spain	Hayedos de Navarra	Regional	Foral Decree 244/2011, of 14th December, designating the "Larrondo Lakartxela" Site of Community Importance as a Special Area of Conservation and approving its Management Plan	2011
	Spain	Hayedos de Navarra	Regional	Foral Decree 9/2011, of 7th February, designating the "Roncesvalles – Selva de Irati" Site of Community Importance as a Special Area of Conservation and approving its Management Plan	2011
057–058	Spain	Hayedos de Picos de Europa	Regional	Decree 4/2009, of 15th January, by which the Recovery Plan of the Cantabrian Capercaillie (*Tetrao urogallus cantabricus*) for Protection in the Community of Castile and Leon.	2015
			Regional	Decree 28/2008, of 3rd April, approving the Plan for the Conservation and Management of Wolves in Castile and Leon.	2008
			Regional	Decree 108/1990 of 21 June, establishing a Protection Status of Brown Bear in the Community of Castile and Leon and approving the Recovery Plan of the Brown Bear.	1990
059	Ukraine	Gorgany	Regional	Management Plan of Gorgany Nature Reserve	2014
			National	State Program on Establishing the National Ecological Network of Ukraine for 2000–2015	2000
060	Ukraine	Roztochya	Regional	Legal Entity	2015

5.e Property management plan or other management system

Protection of the outstanding universal value of the nominated component parts can be guaranteed by well-established local management bodies and an efficient multilateral management system.

All state parties representing the existing World Heritage Property are well aware of the outstanding universal value of the World Heritage Property "Primeval Beech Forests of the Carpathians and Other Regions of Europe". Due to this responsibility, they jointly undertake to preserve those for present and future generations. Based on this thoroughly shared understanding of the property, the conservation of the outstanding universal value and the integrity of the property and the nominated component parts are already secured and will be secured in the future by an effective multilateral management system. This aims at protecting the evolutionary and biological processes in accordance with the criterion applied for in chapter 3. Trendsetting for this is a harmonized general principle for the protection of a common World Heritage Property.

The new "Integrated Management System" (IMS) is based on the existing and approved IMS of the inscribed World Heritage Property "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany" and the corresponding Joint Declaration of Intent between the Ministry of Ecology and Natural Resources of Ukraine, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of the Federal Republic of Germany and the Ministry of the Environment of the Slovak Republic concerning the Cooperation on the Protection and Management of the Joint World Heritage property "Primeval Beech Forests of the Carpathians (Slovak Republic and Ukraine) and the Ancient Beech Forests of Germany (Germany)" (signed on the 14th of May 2014 in Bonn). The new version of the Joint Declaration of Intent was extended to the new State Parties and will be signed after the inscription (Annex).

The Integrated Management System (hereinafter referred to as IMS) for the serial nomination shall not be seen as a closed document. In the course of time, it will be updated, adjusted and corrected if necessary in the process of its implementation. The IMS is a key tool for the transfer of the knowledge acquired by scientific methods into the real world of nature conservation to identify and implement steps and measures to maintain a long-term integrity and communication of nominated localities. The IMS quality and implementation efficiency depends on the support of the involved stakeholders and parties. The integrated management system is based on the extension and development of existing instruments and mechanisms supposed to ensure and promote the long-term conservation of the primeval and ancient beech forests as a serial property.

The management of the component parts takes place at two different levels. All of the component parts nominated as extension to the existing World Heritage property have legally approved management and monitoring plans in place. These plans are based on a strict non-intervention policy. State parties guarantee the strictest level of protection for the inscribed property (equivalent to IUCN Category I (Wilderness areas) or core zones according to Category II (National Parks)). The aim of the management is the protection and conservation of the outstanding universal value of the property. The main objective of the management is to leave the component parts to their spontaneous self-regulating development, free of anthropogenic intervention. Designated buffer zones can be subject to regulatory management measures aimed to secure and enhance ecological stability of forest stands and to protect the property from negative impacts from outside.

On its second level, the Integrated Management System covers the overall management of the serial property as a whole with specific objectives, organizational instruments and an appropriate management structure described below.

Objectives of the IMS

General Objectives

Based on results of the previous processes of World Heritage nomination and the requirements defined by the Operational Guidelines, a set of joint clear objectives for an integrated management system has been agreed by all participating state parties. The proposed IMS for the present extension of the serial World Heritage Property builds upon these previous experiences. The general objectives are shared by all involved State Parties and are as follows:

i. **To ensure the most effective conservation of the property** with all abiotic and biotic components, geo- and biodiversity, and ecological processes to secure a lasting homeostasis and self-reproduction of the respective ecosystems and their protection against both anthropic and anthropogenic factors.

ii. **To maintain and expand the existing, ecologically connected complex of primeval and natural beech forests** that encompass and connect (link) the component parts in 13 European countries. This should be achieved through the conservation of other remaining natural beech forests within proposed corridors and/or stepping stones connecting the component parts and measures supporting the succession of managed semi-natural beech forests adjacent to and between the component parts. On the long term, the expanded area should turn into a continuous buffer zone encompassing the component parts that will support the exchange of biological information between the properties. This network is supposed to serve as a system of stepping stones facilitating the exchange between species, keeping the genetic reservoir and enabling an ongoing migration process of species.

iii. **To use the serial property of primeval forests for scientific research** to acquire knowledge transferable and applicable on the level of sustainable, close-to nature and continuous-cover forestry through mimicking of selected primeval forest patterns; at the same time also serve the call for enhancement of landscape ecological stability not only on national but also on European level.

iv. **To use the natural heritage for enhancement of ecological and environmental education, awareness of primeval forests and their intrinsic, innate values** in communities on local, national and global level. Educational activities should be carefully chosen to maintain the integrity and conservation of the component parts, to preserve their naturalness and uniqueness and to avoid devastation or degradation.

v. **To allow for the sustainable use of natural resources in the broader region through the support of traditional crafts, products and ecotourism without compromising**

the conservation objectives. The latter has the beech primeval forests as one of its attractions and thus may serve as a source of income for the nearby communities.

Organization of management

Given the large number of component parts and state parties, the integrated management structure for the proposed extended serial property must be kept as simple and as transparent as possible to ensure efficiency. Because existing legal frameworks are able to secure the conservation of the property and the nominated component parts, sheer conservation of the property is not the sole objective of the Integrated Management System (IMS). Much more, it is oriented towards specific transboundary issues and coordination of activities (e.g. mobilization of the public resources, awareness raising campaigns, research, monitoring and reporting, knowledge exchange, etc.).

Because the territory of the serial property is embedded into varying specific legal, executive and administrative systems, the management of the serial property requires superior structures that are locally, nation-wide and internationally supported on a political level. For that purpose, the Joint Management Committee (JMC) for the Integrated Management of the "Primeval Beech Forests of the Carpathians and Other Regions of Europe" will be established based on the already existing JMC of the existing property "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany". The JMC has been entrusted to further developments and adjustments of the integrated management, as well as its coordination. Given the considerably increasing number of countries that are part of the property, a permanent coordination will be established to coordinate the individual components.

The Integrated Management System is based on a combination of both the top-down, government-driven and bottom-up, local population-driven approach. The top-down approach with the so-called Joint Management Committee (JMC) as its main channel is supported by National Steering Groups (NSGs). It focuses on the conservation issues and the maintenance of the serial properties' overall integrity, as this basic principle may not be compromised by any further deliberations. So-called Integrated Management Panels (IMP) focus on benefiting the local population through activities that comply with the IMS objectives and at the same time address issues of local development mainly in the areas of forestry, ecotourism, label development or marketing.

A functioning IMS requires certain steering and management structure to account for the management requirements of UNESCO WHC, ensure bottom-up participation of stakeholders and to be able to coordinate the large number of countries and components.

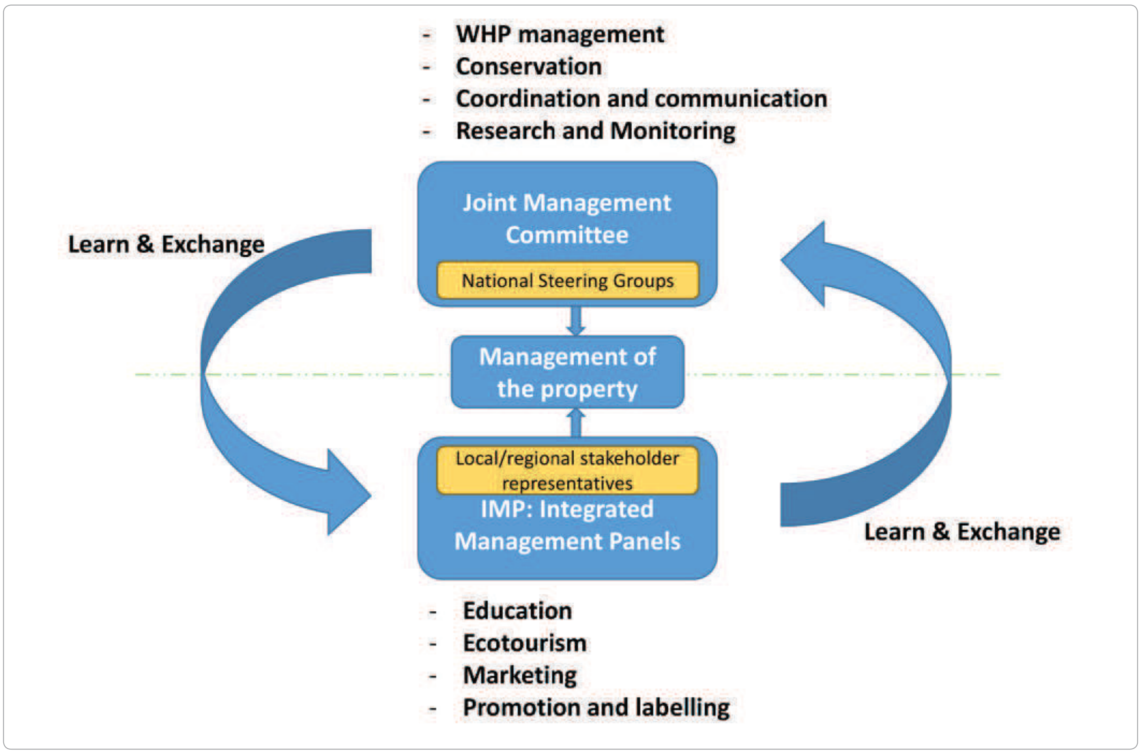


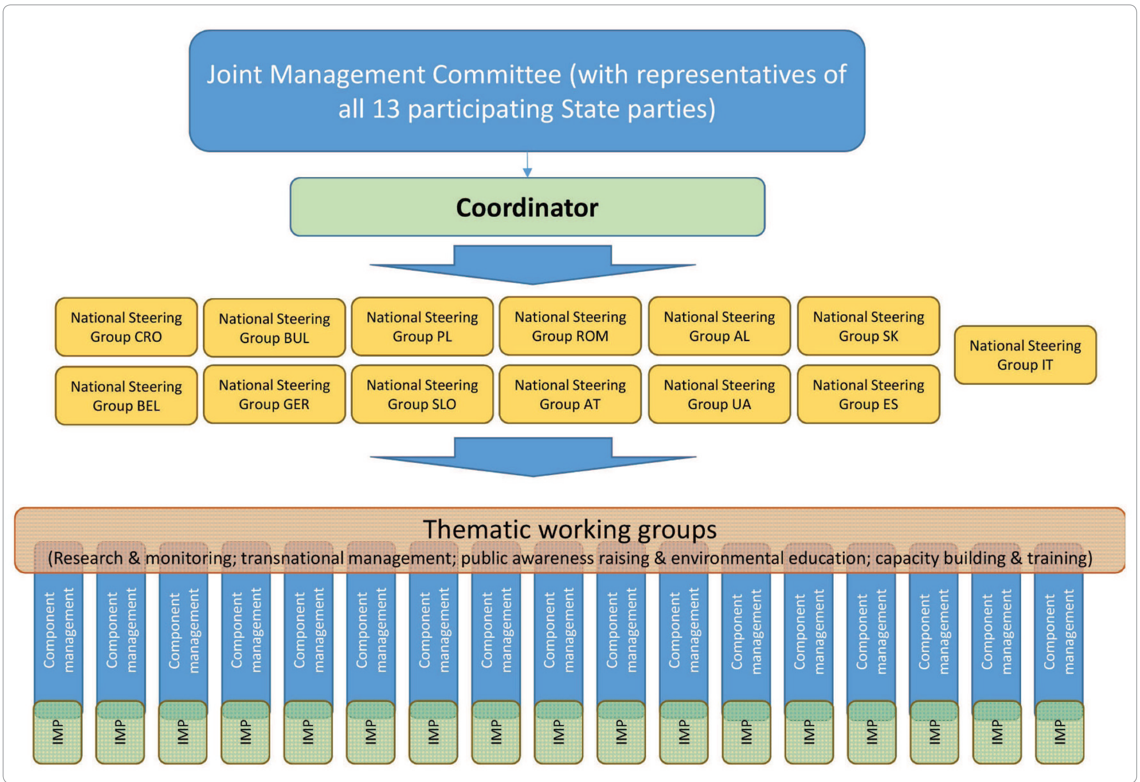
Figure 45: Combined Top-down and Bottom-up IMS model

Thus, the management system consists of the following committees or groups:

- Joint Management Committee for the Integrated Management of the "Primeval Beech Forests of the Carpathians and Other Regions of Europe" (JMC)
- National Steering Groups
- Integrated Management Panels for stakeholder participation (IMP)
- Thematic working groups

Deadwood. Picture: H. Kirchmeir (E.C.O.)

Figure 46: Organizational structure of the IMS



Joint Management Committee for the Integrated Management of the "Primeval Beech Forests of the Carpathians and other Regions of Europe" (JMC)

The principal mechanisms of the cooperation between the countries in the management of the proposed multilateral serial property are based on the concepts and action plans developed and facilitated by the Joint Management Committee. This includes regular meetings and consultations, permanent E-mail contact among the JMC members and participation of the JMC members in cross-border cooperation.

If a need arises, the JMC can bring outstanding issues to the attention of the respective ministries.

The JMC meets at least once a year and prepares reports on the state of the properties on a 6 years basis according to the World Heritage periodic reporting cycle. It coordinates the serial nomination monitoring based on a unified methodology and reports to the ministries and national UNESCO committees on emerging problems in the pursuit of the integrated management goals. The JMC initiates steps necessary to assure scientific research and monitoring. The committee is responsible for the implementation of the serial properties integrated management policy into practice, both in terms of the conservation management and the foreseen expansion of the buffer zones.

Decisions will be met in consensus of all participation countries. In case of voting, each State Party has one vote.

Members of the JMC

Each State Party nominates its representatives for the JMC. Participants of the JMC should be representatives of the Ministries for Environment and/or Nature Conservation on national level, and in Austria, Belgium, Germany, and Spain on the level of federal state or autonomous communities, and/or representatives of the relevant protected areas and/or experts. Irrespective of the number of representatives, any State Party has only one vote when decisions or recommendations are made.

Function:

- Representing the World Heritage property to UNESCO
- Coordination of UNESCO reporting and of transnational activities
- Strategic planning
- Information exchange between the activities of the individual components and countries
- Initiation of projects and information about multilateral funding opportunities for working groups
- Lobbying at international level to ensure support and awareness for the property
- Proposing thematic transnational action plans

Within the first three years after designation of the statute of the JMC, the legal basis and the financing scheme is agreed between all member states in multilateral agreements. A Joint Declaration of Intent was already developed and has been agreed in a meeting at the 11th of January 2016 in Vienna within all 13 State Parties (the State Parties of the existing World Heritage and of the expansion; see digital annex).

It is planned to have one regular meeting per year (and additional extraordinary meetings if required and by prior consent of all State Parties). The chair of the Joint Management Committee is assumed by a State Party on a rotational basis, starting with the founding State Parties and, after that, in alphabetical order of the name of the State Party in English starting with Albania. Meeting venue: to be proposed by the chair;

The meetings should be held in English unless agreed otherwise and conclusions will be taken by consensus. Meeting Documents will be distributed six weeks in advance before a meeting.

Coordinator of Transnational Joint Management (CTJM)

In order to achieve the assigned tasks, a Coordinator of Transnational Joint Management will be appointed by the JMC to coordinate the activities of the JMC and to support the cooperation and project development between the local managements of the component parts.

Function:

- Contribute to the development of common standards for management planning, data collection, reporting
- Coordinate the elaboration of thematic transnational action plans by working groups
- Coordinate the research and monitoring of the serial property, the buffer zones and the connecting corridors/stepping stones
- Implement public relations work (including maintenance of a Web-Page on the World Heritage property)
- Develop and maintain its own GIS-aided database containing all necessary layers pertaining to the World Natural Heritage status

The Coordinator of Transnational Joint Management is hosted in one of the countries for a period of 3 to 6 years. The hosting country supports the Coordinator by significant support in resources (office, staff, means of communication). Belgium offers to host the chair of the coordinator in the Sonian Forest for a first period, which was welcomed by the other countries. A groupe of countries (e.g. Austria, Belgium and Spain) would take over the costs of the coordinator or would support the work of the IMS for the first 3 to 5 years.

Thematic working groups

International thematic working groups are the main working tool of the JMC. These working groups comprise experts and professionals of the individual component parts of the property and work on specific topics and projects. Each working group has one responsible coordinator from one of the component parts, who is being selected by the working group and is in charge for a 3-year period. He or she is the main link to the JMC and the Coordinator of Transnational Joint Management.

The active participation within the working group is voluntary. Depending on current developments or changing priorities, thematic or regional working groups may be established. The activities of the working group are mainly project based. Through the EU funding structure, it is unlikely to have all component parts included in one project. Therefore, specific groups of component part managements can participate in specific projects with the working group.

Members:

Nominated experts from the individual component parts of the property; temporary involvement of IMP or JMC is optional.

Function:

Working on specific topics and projects which require transnational attention

- Scientific cooperation
- Contribution to the development of common standards for management planning, data collecting, reporting
- Preparation of data and information for the joint monitoring
- Development of special joint action plans
- Preparation of joint projects and programs
- Exchange of knowledge and experience

National Steering Groups

In order to ensure political support on both municipal and state levels and to ensure adequate participation at national level, all State Parties have established national steering groups. This becomes even more important given the fact that many countries have more than one component.

The existing coordinated management of the German component parts (= “koordiniertes Management für die deutschen Nominierungsgebiete”) remains unaffected.

Members:

These steering groups comprise representatives of ministries (nature conservation, forestry, defense, foreign affairs, etc.), representatives of protected areas administrations of world heritage sites, as well as stakeholders from local communities and scientists from research institutions. The national steering groups are set up on the specific needs of each country.

Function:

- Discuss relevant issues and threats at national level
- Give recommendations to JMC and IMPs
- Lobby at national and subnational/regional level to ensure support and awareness for the property

IMP: Integrated Management Panels for stakeholder participation

A JMC-assisted creation of Integrated Management Panels (IMP) on local level of the component parts is foreseen in order to achieve a balanced representation of of the interests of all stakeholders willing to participate in the pursuit of IMS objectives. The panel will integrate the management of the component parts with the local stakeholders in a participative manner. In many component parts, such participative structures are already established as part of the existing management structures (e.g. in National Parks, Biosphere Reserves, etc.). The objectives of the IMS regarding the World Heritage will be integrated into the existing participative structures. If missing, these structures have to be built up. The JMC will provide the panel with the vital information on the opportunities for both sensitive and sensible utilization of the World

Natural Heritage label, as well as the goals and criteria to be met. A commercial label in different languages was elaborated by the existing World Heritage State Parties to support commercial activities. The IMP will be active mainly in the fields of forestry, public relations and lobbying, and ecotourism (transportation, services), for which it will set up dedicated working groups.

The IMPs are organized locally, more or less one for each component part. In Germany, for instance, they are to be congruent with the existing advisory councils of the component parts (Nationalparkbeirat/Förderverein des Biosphärenreservates). If the IMPs want to meet bi- or multilaterally, they will announce this to the JMC.

Members:

Local stakeholders and representatives of local/ district administration and of the protected area administration.

Function:

- Lobbying at local level to ensure support and awareness for the property
- Initiating local activities for sustainable development around the property
- Providing advice in management issues relevant for local stakeholders and adequate representation of local interests.

Practical management mechanisms of components

Practical conservation management of the individual component parts is continuously realized by the competent authorities/administrations of regional authorities/State Parties and is not within the responsibility of the JMC. Special heritage-specific activities in the areas of nature conservation, science, awareness raising and territorial planning are coordinated by the JMC and carried out by the responsible local administrations through the available legal framework. However, relevant results of their activities are reported annually to the JMC.

Besides state and regional budgets, JMC and working groups are supposed to prepare and submit projects for various schemes, in particular those supposed to promote international cooperation, such as the EU-funded programs INTERREG or LIFE. These projects will aim at the elaboration of feasibility studies, management plans, rehabilitation of habitats, ecotourism development, development of eco-corridors and other activities. Funds for scientific research will be aggregated from dedicated scientific projects. Multilateral research and cooperation projects will be prepared and submitted e.g. within the EC Horizon 2020 framework program, INTERREG, LEADER and others.

Institutional work plan

Derived from general objectives, a number of specific, interrelated objectives are within the responsibility of the integrated management system. A working plan will be developed in the first three years after designation under the leadership of the JMC and the Coordinator of Transnational Joint Management.

Given the recommendations of UNESCO and the large number of countries taking part in the serial property, the IMS is required to meet a number of challenges at a multilateral level. The working plan will thus give specific activities and target values to reach the following objectives:

- **Objective I**: *Coordination of joint activities concerning the serial property and facilitating knowledge exchange, research activities and communication between the individual components and countries*
- **Objective II:** *Ensuring the most effective conservation of the serial property by common standards for conservation and coordinating monitoring activities*
- **Objective III:** *Promoting sustainable land resources management in buffer zones, connecting ecological corridors and stepping stones of the serial property*
- **Objective IV:** *Strengthening institutional and human resources capacities*
- **Objective V:** *Promote environmental education and awareness*

The Joint Management System is evaluated in regular cycles, with the results being presented and discussed by national and multilateral boards and forums and, if required, adjusted and optimized based on the evaluation results. There is a Joint Management Committee (JMC) meeting at regular intervals for the purpose of harmonization and coordination at the multilateral level.

5.f Sources and levels of finance

The long-term funding of the nominated component parts is guaranteed by corresponding allowances in the national budgets of the countries including implementation, monitoring, environmental education, and research. Any funds for the necessary and specific collaboration at the multilateral level are provided by the individual nation states. Currently, all component parts have a management in place which is able to preserve the OUV and manage the component part. This usually comprises nature conservation authorities and protected area management bodies with a fixed annual budget. Costs for specific, bi- or multilateral projects will be born by the nation states involved. Furthermore, there are EU funds such as INTERREG or Horizon 2020 available for selected projects. Further financial means for specific projects will be available from foundations, municipalities, nature conservation organizations (e.g. for educational projects, monitoring, land acquisitions) and from donations.

Table 77: Levels of finance in the component parts

ID	State Party	Component part/ cluster	Personnel cost in thousand euro	Material cost in thousand euro	Sum in thousand euro
001	Albania	Lumi i Gashit	2	1	3
002	Albania	Rrajca	2	1	3
003	Austria	Dürrenstein	253	313	566
004–007	Austria	Kalkalpen	1645	3273	4918
008–012	Belgium	Sonian Forest	2252	1975	4227
013–021	Bulgaria	Central Balkan	455	91	546
022	Croatia	Hajdučki i Rožanski Kukovi	202	122	324
023–024	Croatia	Paklenica National Park	236	2500	2736
025–029	Italy	Abruzzo, Lazio & Molise National Park	4664	637	5301
030	Italy	Cozzo Ferriero	2000	2115	4115
031	Italy	Foresta Umbra	1440	33	1473
032	Italy	Monte Cimino	410	0	410
033	Italy	Monte Raschio	1740	297	2037
034	Italy	Sasso Fratino	200	18	218
035–038	Poland	Bieszczady	3829	974	4803
039	Romania	Cheile Nerei-Beușnița	100	12	112
040	Romania	Codrul Secular Șinca	5	10	15
041	Romania	Codrul Secular Slătioara	16	3	19
042–043	Romania	Cozia	100	42	142
044–046	Romania	Domogled-Valea Cernei	121	16	137
047–048	Romania	Groșii Țibleșului	175	4	179
049	Romania	Izvoarele Nerei	100	3	103
050	Romania	Strâmbu Băiuț	50	5	55
051	Slovenia	Krokar	4	1	5
052	Slovenia	Snežnik-Ždrocle	12	3	15
053–054	Spain	Hayedos de Ayllón	860	207	1067
055–056	Spain	Hayedos de Navarra	79	10	89
057–058	Spain	Hayedos de Picos de Europa	561	2016	2577
059	Ukraine	Gorgany	34	2	36
060	Ukraine	Roztochya	59	34	93
061	Ukraine	Satanivska Dacha	8	1	9
062–065	Ukraine	Synevyr	80	3	83
066–067	Ukraine	Zacharovanyi Krai	20	2	22

5.g Sources of expertise and training in conservation and management techniques

Based on professional expertise, research cooperations, staff training and citizen involvement, the administrative bodies of the reserves are in a position to guarantee that management plans are implemented in line with the protection of the outstanding universal value.

The protected area administrations and the nature conservation authorities responsible for the nominated component parts all have in-depth knowledge in the subject matter. The employees involved in the protection and management of the nominated component parts are highly skilled graduates. Also, the personnel involved in the day-to-day management has long-standing experience in nature conservation and management. Moreover, in many components there is a long-time tradition in ecological research in the territories.

The texts below provide an overview of the individual expertise and training situation in the component parts.

In order to maintain this extraordinary expertise, most protected area or regional nature conservation administrations organize frequent trainings for their staff. Furthermore, there are numerous exchange opportunities within international umbrella organizations such as EUROPARC or IUCN. Training usually aims at enhancing specific competences fit to the individual context and challenges of the component parts.

In the case of a successful nomination, the working groups of the IMS provide a vital source of training and knowledge exchange within the European network of beech forest components. Particularly, Germany has ample previous beech forest and World Heritage specific training experience due to the previous extension nomination.

Many component parts consider local representatives and stakeholders as well as citizens as vital part of a source of information of the area. Thus, respective arrangements for participation were established in the past in order to provide additional local expertise and often as well workforce for the support of the property.

Given the significance of the components for science in general, most components have a long history of cooperation with external institutions such universities, private research institutions and NGOs such as the European Wilderness Society. These well-established cooperations allow to quickly access any expertise eventually needed and ensure continuous investigation of this natural heritage.

Beech forest with deadwood. Picture: H. Kirchmeir (E.C.O.)

View of Lumi i gashit. Picture: B. Hallaci

5.g.1 Albania: Lumi i Gashit (001)

Cooperation with research institutions

The environment-monitoring program, also including the biodiversity and forests in the protected zones, is carried out every year, but in limited parts of the territory, and is conducted with the contribution of academic experts or NGOs, which transmit information about the condition of the fauna and flora to the NEA (National Environment Agency). The EU IPA 2010 Program for Albania, in collaboration with various experts (Albanian and foreign), has drafted a Management Plan for the three protected Alp zones, including the component Gashi River.

Publications

As in the case of two other PAs in the Alps (Thethi and Valbona Valley), presentations have been made for Gashi component in social media etc., in addition to various publications or flyers, but not periodically.

Capacity building and training for the staff

Training and capacity building of the forest service and protected area staff have been ongoing. Some of them were realized with PA staff, within the context of the completed project for drafting the Management Plan of the three Alps PAs. Various trainings have been developed in the area from central structures of the Ministry of Environment and the National Agency of Protected Areas (NAPA, established in February 2015).

Citizen participation

Many citizens of the area outside of the component part are participating in various discussions or scientific activities. In particular, this has been obvious during the formulation and discussions of the Management Plan of protected areas. A European Union project of Environment and Climate Regional Accession Network (ECRAN) has just started the planning process of a new mapping of the Alps with an active participatory approach of Alps citizens.

Old beech tree. Picture: L. Shuka

View of Rrajca. Picture: F. Brazhda

5.g.2 Albania: Rrajca (002)

Cooperation with research institutions

The environment-monitoring program, here including the monitoring of biodiversity and forests in the protected zones, is carried out every year, but in limited parts of the territory, and is conducted with the contribution of academic experts or NGOs. Some organizations have conducted scientific activities in PA Shebenik-Jabllanice, such as PPNEA (Albanian NGO) that has worked in this zone to monitor wild fauna and flora with the support of EURONATUR. Foreign experts (Czech) have carried out a pedagogical study of the land area some years ago. The IUCN, in collaboration with Cooperazione Italiana and the Albanian Ministry of Environment, has drafted a Management Plan for Shebenik-Jabllanice National Park through a project where many experts were committed (Albanian and foreign).

Publications

For the Rrajca component part, as for the whole Shebenik-Jabllanice National Park, there have been ongoing publications of flyers, presentations in social media etc., though not periodically; to name a few: "Together for a clean environment", "Rrajca, strict and scientific natural reserve", flyers from PPNEA, etc.

Capacity building and training for the staff

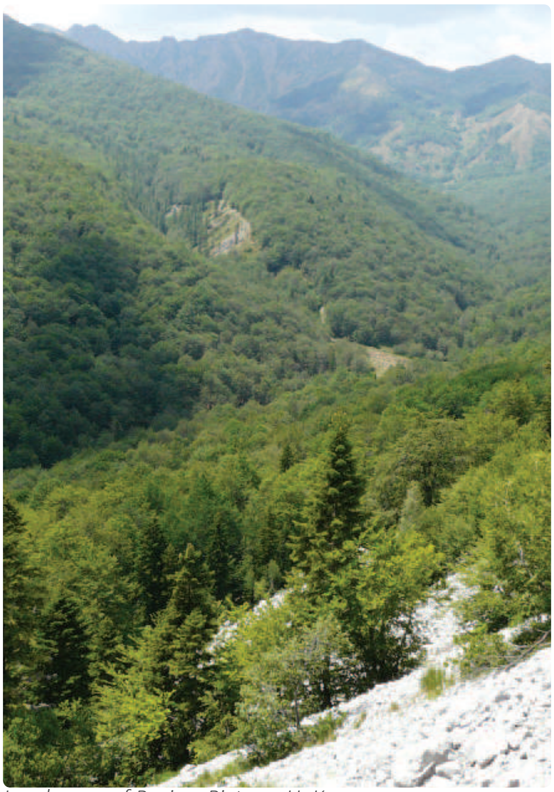
The staff of the National Park frequently attends seminars in order to improve their knowledge.

Various trainings have been developed in the area from central structures of the Ministry of Environment and the National Agency of Protected Areas (NAPA).

Several training sessions and workshops have been conducted with the staff of PAs during the formulation period of the PA's Management Plan.

Citizen participation

The formulation of PA Shebenik-Jabllanice's Management Plan took many years, during which several activities and discussions with the public were organized. Participants from the PA areas contributed in the discussions by giving their own opinion.



Landscape of Rrajca. Picture: H. Knapp

Inside Rothwald. Picture: H. Knapp

5.g.3 Austria: Dürrenstein (003)

Cooperation with research institutions

Due to its limited human capacity, the management of the Wilderness Area is not capable to carry out all research projects with its own staff. Its own research activities only cover a small part of most prioritized research activities.

As a consequence, the management additionally relies on research carried out by external (research) institutions. Thus, implementation of specific research is also linked to the research interest of external institutions.

There are two ways how research is carried out in the Wilderness Area. On the one hand, the management of the area commissions research projects, which are carried out in cooperation with external institutions (such as universities). On the other hand, persons or institutions can propose research projects to the management of the area. External research proposals require formal approval by the Scientific Advisory Board of the Wilderness Area. This board critically evaluates the quality and content of the proposals.

Publications

The management frequently publishes scientific news from the Wilderness Area Dürrenstein in its own scientific series "Silva Fera". This journal serves as an important tool for the management of the area to make new scientific findings and results accessible to a broader public.

Capacity building and training for the staff

The staff of the management frequently attends seminars in order to improve their knowledge. Particularly rangers of the area receive frequent training to impart new scientific findings and to keep up-to-date with the current state of research.

In general, the management of the area sees itself as a focal point of contact for specific training. Furthermore, the management is involved in ongoing training programs. These activities include the training of both students and teachers.

Citizen participation

In December 2013, the Board of Trustees "Freunde des Wildnisgebietes Dürrenstein" was established. Members of the board support the activities of the Wilderness Area by initiating marketing measures. This means that they address specific sponsors, supporters and potential members by creating enthusiasm and gaining support for the needs of a wilderness area. Furthermore, the board sees itself as a body to carefully protect the area against over-commercialization or "jungle tourism development".

Avalanche path. Picture: R. Pekny (Wilderness Area Dürrenstein)

View on Kalkalpen National Park. Picture: E. Mayrhofer

5.g.4 Austria: Kalkalpen (004, 005, 006, 007)

Cooperation with research institutions

The Kalkalpen National Park is part of the international UNECE program "Integrated Monitoring of Ecosystems" that researches the impact of air pollution on ecosystems. Data collection and the analysis are conducted by the National Park management, while complex evaluation and modeling is carried out by the Austrian Federal Environmental Agency.

The University of Agricultural Sciences and Natural Resources in Vienna/Austria is currently working on a project concerning climate change and their impacts on forest ecosystems. For this purpose, the Kalkalpen National provides a comprehensive volume of data.

The Kalkalpen and Gesäuse National Park, as well as the Wilderness Area Dürrenstein initiated the project "Netzwerk Naturwald". The joint aim is to create a coordinated network of stepping stones and thus to ensure the long-term functional networking of the three existing protected areas. Meanwhile the project succeeded in permanently dedicating an area of 130 ha to ecological connectivity.

Publications

The National Park authority announces activities and progress in its yearly Activity Report. The park has its own publication series, which is used for publishing research results. In irregular intervals, results are also published in scientific journals.

Capacity building and training for the staff

National Park staff frequently uses internal and external seminars for further education and training. National Park rangers that are in charge of visitor guidance have to attend a special training. A certificate course ensures the high quality of the pedagogy in all Austrian National Parks. The National Park Authority offers advanced training courses that are obligatory for certified rangers on a regular basis.

Citizen participation

The Board of Trustees is an advisory committee that harmonizes and coordinates the aims and tasks of the National Park with various interest groups (land owners, hunters, communities, conservation organizations, etc.). The committee and the holding of the General Meeting are also included in the National Park Act.

Steep territory in Kalkalpen National Park. Picture: F. Sieghartsleitner (Kalkalpen National Park)

Morning light in Sonian Forest. Picture: F. Vaes

5.g.5 Belgium: Sonian Forest (008, 009, 010, 011, 012)

Cooperation with research institutions

All Belgian universities and scientific institutions have been working in the Sonian Forest, or still are. They cover a wide range of disciplines, e.g. silviculture, ecology, biology, climate or soil science, history, archaeology, social sciences, and topography/geography/teledetection.

An elaborate monitoring program of forest dynamics is ongoing in Forest Reserve "Joseph Zwaenepoel" (008), with repeated inventories. This program was complemented with detailed inventories of several species groups in all 5 components.

Impressive collections of old data are preserved, but scattered among the managing authorities, the national archives and scientific institutes. Recently, a project proposal was submitted to the Belgian Federal Science Policy Office to create a public, common access to all these Sonian Forest data.

The Sonian Forest plays a major role in scientific networks on both national and international level, such as the ICP-Forests monitoring (Level II plot), BELAIR network or LT(S)ER network.

Publications

The joint communication strategy covers different target groups. A website in 4 languages, a gazette every 6 months, a digital newsletter 10 times/year and a number of free folders (basic walking map, rules of behavior,…) are widely spread. Many ad hoc and scientific publications cover the Sonian Forest.

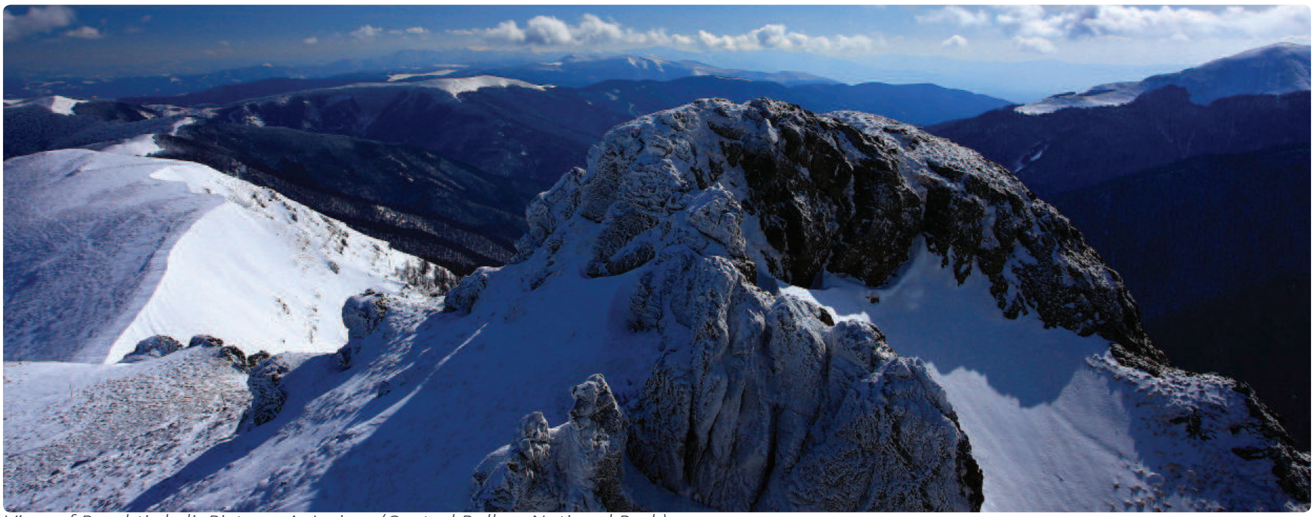
Capacity building and training for the staff

The three managing authorities of the Sonian Forest provide regular training to the staff working in the forest. They have regular access to publications dealing with forest management, nature conservation and recreational management. Since "INVERDE", a regional training center on nature management, has one of its headquarters in the Sonian Forest, many training sessions are actually given in the forest. The audience of these include staff of communities, nature NGOs, etc.

Citizen participation

In April 2012, the three regional governments agreed on a consultation model for the Sonian Forest. It provides participation on political, administrative and public level. In addition to regular consultation between the three ministers, the three managing administrations and the project collaborators, advisory boards are set up in which the local authorities are represented, as well as all stakeholders on local or regional level.

Beech regeneration. Picture: P. Huvenne



View of Peeshti skali. Picture: A. Ispirev (Central Balkan National Park)

5.g.6 Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

Cooperation with research institutions

Due to lack of expertise, the National Park administration carries out most of the researches on the Park's territory in cooperation with the different institutes of the Bulgarian Academy of Sciences, NGOs and universities.

For example, comprehensive researches and assessments on the abiotic and biotic components, and the cultural and socio-economic characteristics of the park are carried out in the process of preparation of its Management Plan. Teams of various experts participate in the studies and assessments. In case that the Park administration needs particular expertise, it assigns the corresponding researches to scientific institutions.

Specific research studies are are assigned to experts according to the needs defined by the Management Plan of the site. Practically, concrete activities are assigned in projects realized by the Central Balkan National Park Directorate as a beneficiary or partner.

Publications

There is a common communication strategy for CBNP and its nine reserves. It aims at public awareness of the conservation value of the area and the administration's work for its protection. The information channels of the Directorate are a website with news section, digital newsletter and profiles in social networks.

Capacity building and training for the staff

Experts from Central Balkan National Park Directorate participate at workshops organized by the Ministry of Environment and Water, where methodological guidelines are given for the implementation of the national legislation, and practices are exchanged between the colleagues from different PA. Experts also participate in regional workshops organized by international institutions and projects and thus gain experience related to the management of other similar territories. Park rangers also receive annual training for improving the control over the Park territory.

Citizen participation

Timely information and participation of stakeholders in the preparation and effective implementation of strategic management documents are essential challenges for the administration of the NP. To encourage and ensure participation of key stakeholders, key elements of the Collaborative management approach were implemented from the management of the Park: a representative forum of stakeholders (Public Advisory Council to the Park Directorate) was established and a Partnership Agreement was adopted.

Numbered beech trees. Picture: S. Renje (Velebit National Park)

5.g.7 Croatia: Hajdučki i Rožanski Kukovi (022)

Cooperation with research institutions

Research projects within the National Park are conducted by numerous collaborators and associates: scientific and specialist institutions, individuals and professional organizations. The National Park has a good collaboration with the Ministry of Environment and Protection of Nature, the State Department for Nature protection, the State Museum of Natural History in Zagreb, BIUS – the Biology Students Association, the Croatian Natural History Museum, the Croatian Mycological Society, the Faculty of Forestry (Zagreb), the Croatian Forest Research Institute (Jastrebarsko), the Faculty of Veterinary Medicine (Zagreb), the Croatian Botanical Society, the Institute of Ornithology of the Croatian Academy of Sciences and Arts, the Senj City Museum, the Croatian Geological Survey, the Faculty of Science (Zagreb), the Biological Department of the University of Zagreb, the Botanical Garden Fran Kušan in Zagreb, and different speleological sections.

Publications

Since its establishment, the Public Institution Northern Velebit National Park has published numerous informative and educational materials on the Park. Our publications include informative brochures and posters, two natural science guidebooks and a multimedia DVD about the Park.

Capacity building and training for the staff

The staff of the National Park Northern Velebit has the possibility to monitor high value biodiversity in this area. That includes the constant monitoring of some animals: bear, wolf, woodpeckers, owls, birds of prey, and bark beetles. Every year, the staff attends different workshops for example in 2015, a lecture on DNA use for the determination of Brown Bears, project LIFE in the Dinaric Alps and Croatia; and the project “The establishment of long-term scientific monitoring of natural forest ecosystems in Croatia”.

Citizen participation

Every year special attention is given to the celebrations of the 12th December, the International Mountain Day. On this day, the National Park organizes presentations and cultural program for the inhabitants of surrounding area. Every year, there are students doing their practical work, and people working as volunteers on maintenance and monitoring programs.

Beech forest detail. Picture: H. Kirchmeir (E.C.O.)

View of Paklenica National Park. Picture: G. Lukač (JU NP Paklenica)

5.g.8 Croatia: Paklenica National Park (023, 024)

Cooperation with research institutions

At the moment, three protected areas (Northern Velebit National Park, Paklenica National Park and Nature Park Velebit) are located in the Velebit Mountain. Between these three Public Institutions, cooperation is effective. In order to provide complex scientific researches, Paklenica NP collaborates with the Ministry of Environment and Protection of Nature, the State Department for Nature Protection, the State Museum of Natural History in Zagreb, the Biological Department, the University of Zagreb, the Botanical Garden Fran Kušan in Zagreb, the Botanical Garden of the Botanical Department of the University of Zagreb, the Natural Department of the Public Museum in Zadar, the Geographical Department of the University of Zadar, the Department for Geography in Zagreb, the Department for Ornithology of the Croatian Academy of Science and Arts, the University of Cadiz from Spain, the Archaeological Museum in Zadar, the University of Vienna, Erasmus partnership with France, etc.

Publications

In 2013, the Public Institution Paklenica NP started with a local newsletter "Paklina". This newsletter gives information about biodiversity and important activities for people living in the surroundings of the National Park. Some articles were published in the Croatian magazine "Natura Croatica"

Capacity building and training for the staff

The staff has the capacity to monitor some plant and animals groups, like common birds, birds of prey, and chamois, and to offer education to groups of schoolchildren and students. There are regular workshops for the Department of NP Conservation, Promotion and Use. Every year in October, a two-day meeting is held with all Public Institutions for protected areas in Croatia. Additional workshops for Natura 2000 species and monitoring of common birds species, as well as lectures on important protected areas in Croatia and on Velebit Mountain are performed.

Citizen participation

Students and schoolchildren participate in workshops in the framework of international or national days (e.g. Night of Bats, 29.08.2015), or green action on the International Day for Biological Diversity and Day of Nature Protection in Croatia. Students from different countries (France, Germany, Austria, Croatia, and Hungary) perform practical work. In last 20 years, more than 50 students were engaged in practical work in Paklenica NP.

Argynnis paphia. Picture: S. Vujčić-Karlo (JU NP Paklenica)

Beech branches covered in mosses and lichens. Picture: B. D'Amicis

5.g.9 Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

Cooperation with research institutions

The Park has limited resources to perform field research with its own personnel who are restricted to monitor priority animal species like the Apennines Chamois and the Marsican Brown Bear. However, the Park cooperates with many research institutions regarding the most disparate research topics: currently, the forests within the property are studied through specific research studies performed by the University of Tuscia, the University of Naples Federico II", and the University of Rome 3.

It is also often the case that research institutions ask the Park to perform specific studies: in this case, the Scientific Commission will evaluate the project and decide whether to give the required authorization to realize the studies.

Publications

The Park does not have a dedicated journal to publish the main results of its activities, but it maintains a specific section on its website (www.parcoabruzzo.it) dedicated to disseminate the results of research activities.

Capacity building and training for the staff

The Park's personnel regularly attends courses/seminars to increase its scientific knowledge in specific fields. Rangers and Forest Guards periodically attend seminars and conferences organized by the Park on key species and habitats, to improve their skill to monitor and protect Habitat Directive species.

The Park also provides courses for tourist operators and schoolteachers. Specific projects on environmental education are established in cooperation with the schools of the territory.

Citizen participation

Citizens of local communities are represented by the so-called Community of the Park, which includes the Mayors of all Municipalities of the Park. It can be consulted for specific needs and cooperates in the Economic Development Plan of the Park. On specific topics, the Park can address the interested stakeholders directly, through a public consultation.

Red vole on forest floor. Picture: B. D'Amicis

Old-growth beech forest. Picture: G. De Vivo

5.g.10 Italy: Cozzo Ferriero (030)

Cooperation with research institutions

The Park cooperates with many research institutions regarding the most disparate research topics, like: Germoplasm conservation of Bosnian pine (University of Florence, University of Tuscia); Constitution of an old-growth forest network (coordinated by the Interuniversity Centre for Biodiversity, Phytosociology and Landscape Ecology of Rome); and the LIFE Project MAKING GOOD NATURA (coordinated by the Interuniversity Consortium for Socioeconomic and Environmental research, University of Molise).

The Park has limited resources to perform field research with its own personnel, which is why their research activity is restricted to monitoring priority animal species like the wolf and the otter.

Publications

The Park does not have a dedicated journal to publish the main results of its activities, but it maintains a specific section on its website (www.parcopollino.gov.it) dedicated to disseminate the results of research activities.

Capacity building and training for the staff

The Park annually organizes courses/seminars for its personnel about administration jurisprudence, environmental protection, and protected areas management. Also, the Park's personnel working on different topics can attend seminars/workshops organized by other institutions. The Park offers free courses and seminars on its activities to inform the communities and the schools of its territory.

Citizen participation

Citizens are invited to participate in the Park's activities through open seminars or technical meetings with stakeholders. Citizens of local communities are represented by the so-called Community of the Park, which includes the Mayors of the 56 Municipalities of the Park. It can be consulted for specific needs and cooperates in the Economic Development Plan of the Park. On specific topics, the Park can address the interested stakeholders directly, through a public consultation.

Inside Cozzo Ferriero. Picture: G. De Vivo

Gargano old-growth beech forest. Picture: G. Piovesan

5.g.11 Italy: Foresta Umbra (031)

Cooperation with research institutions

The research projects within the National Park are almost exclusively conducted in cooperation with universities, such as those of Bari, Foggia, and Viterbo. The Italian Institute for Environmental Protection and Research (ISPRA) has been involved in genetic analyses on the wolf population. The Park is EMAS certified, which requires a report on the realized studies and researches for its annual confirmation.

Publications

Research results are publicized through a dedicated section of the National Park's website, and on social networks. Essays related to specific research topics are also printed. The Park can organize or participate in conferences to disseminate the results of research within its territory.

Capacity building and training for the staff

The National Park's personnel is periodically trained through specific courses on important topics (e.g. wolf monitoring), organized by the National Park or by other institutions, such as the Ministry of Environment, the Region and others.

Citizen participation

Citizens can attend free events/conferences organized by the National Park to disseminate the research results. The Park has a specific office dealing with interactions with citizens. The Park can also inform and interact with citizens through social networks. In the Community of the Park, representatives of the citizens (mayors of the Municipalities situated in the Park) can interact with the Park's Administration.

Snow in the Foresta Umbra. Picture: C. Strizzi

Large beech trees on Monte Cimino. Picture: G. Piovesan

5.g.12 Italy: Monte Cimino (032)

Cooperation with research institutions

The Municipality promotes research and monitoring projects in accordance with universities, research centers, public institutions in general, and professionals. These projects address the state and dynamics of forest ecosystems, their flora and fauna, as well as archaeological research (on the top of Monte Cimino).

The first archaeological research was conducted at the end of the 19th century, which confirmed the presence of a stone wall for the defense of a settlement dating back to the end of the Bronze Age (7th to 5th century BC/700–400 BC). In 2009 and 2010, in cooperation with the Soprintendenza per i Beni Archeologici dell'Etruria Meridionale and the Sapienza University, the Municipality has started a new, intensive research campaign for an extensive description of the site.

Publications

The Municipality communicates most of its activities, like those related to the study and conservation of the old-growth beech forest of Monte Cimino, on its website or on local news websites.

Capacity building and training for the staff

This task is guaranteed by the collaboration with the DAFNE Department of the University of Tuscia and the National Forest Service (CFS).

Citizen participation

The outcomes of archaeological excavations carried out on Monte Cimino are presented at the Polo Turistico Municipale. At the Antiquarium Cimino, visitors can get to know more about the surrounding territory, especially about its history. The Antiquarium Cimino organizes conferences, field excursions, and guided tours. In addition, a new office for promoting and informing about Soriano's territory and its historical development is about to be launched.

Sunrise in Cimino. Picture: G. Piovesan

Optimal stage of the structural cycle. Picture: G. Piovesan

5.g.13 Italy: Monte Raschio (033)

Cooperation with research institutions

The Park cooperates with research institutions in most research topics, often regarding specific monitoring issues. Currently, the forests within the property are studied through specific research studies performed by the University of Tuscia.

Publications

The main activities and scientific discoveries relevant for the Park are disseminated through press releases or via the Park's website.

Capacity building and training for the staff

The Park's personnel regularly attends courses/seminars at the Regional Administration to increase its scientific knowledge or technical capacity (e.g. damage to infrastructure or goods caused by wild animals) in specific fields.

Citizen participation

Citizens of local communities are represented by the so-called Community of the Park, which includes the Mayors of all Municipalities of the Park. It can be consulted for specific needs and cooperates in the Economic Development Plan of the Park. On specific topics, the Park can address the interested stakeholders directly, through a public consultation.

Singular beech bark. Picture: G. Piovesan

View of Sasso Fratino Integral Reserve. Picture: N. Agostini (Comunità del Parco)

5.g.14 Italy: Sasso Fratino (034)

Cooperation with research institutions

Since the establishment of the Reserve, research and monitoring projects have been coordinated both by the CFS-UTB of Pratovecchio and the National Park. The two Institutions cooperate in order to minimize efforts and optimize the resources by establishing common targets. The research projects can target either Sasso Fratino exclusively or the wider set of Biogenetic Reserves, or the entire territory of the Park.

Research and monitoring activities are conducted in cooperation with research institutions (e.g. universities), specialized external professionals, and research scholarships to experts. Funding of such research activities is sustained by both institutions according to their independent budgets.

The research and monitoring is mainly targeted to describe the structure and composition of forest ecosystems and their dynamics, also considering the floristic and faunistic components.

Publications

The National Park publishes the newsletter “Crinali” twice a year, plus essays dedicated to spread the results of research studies intermittently. CFS-UTB publishes a scientific book series on Riserve Casentinesi. Both institutions publish in scientific journals with the academics involved in specific research.

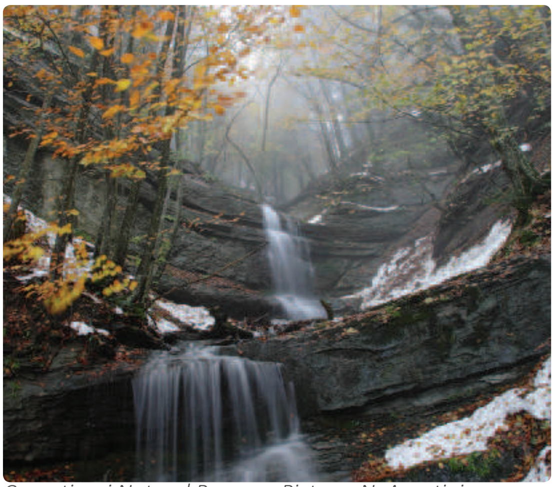
Capacity building and training for the staff

The personnel of both the National Park and the CFS-UTB, together with the environmental guides and the tour operators of the territory, participate in frequently organized workshops and seminars, organized by both institutions which are often open to the public.

The National Park also supports its personnel to attend external conferences or workshops focused on management and conservation of natural resources.

Citizen participation

One of the aims of the National Park is the divulgation of its activities, realized through adequate communication tools, as well as the involvement of citizens. Although the strict preservation of Sasso Fratino limits the tourists’ access to the reserve, in the immediate surrounding territory, they are involved in numerous free activities, like citizen science or volunteering projects.



Casentinesi Natural Reserve. Picture: N. Agostini (Comunità del Parco)

Beech forest at the upper limit of the forest. Picture: S. Kucharzyk

5.g.15 Poland: Bieszczady (035, 036, 037, 038)

Cooperation with research institutions

Bieszczady National Park, like other Polish national parks, has a Scientific Council consisting of 20 specialists representing a variety of scientific areas. In the park, including the nominated forests, scientific research is undertaken by scientists from external scientific institutions with the approval of the Park director. There are about 30 to 40 researches conducted every year. These studies cannot harm wildlife. The Park also has its own research laboratory aimed primarily at monitoring of natural resources.

Publications

Bieszczady National Park issues two series of scientific publications: "Annals of Bieszczady", issued every year since 1992 (23 volumes) and "Monographs of Bieszczady" (16 volumes). In addition, the Park has issued so far dozens of publications of popular character.

Capacity building and training for the staff

The National Park organizes regular training for employees on various fields of nature as well as organizational and legal issues. Training also includes use of new technologies. In addition, employees of the park participate in various external trainings, depending on their function.

Citizen participation

Representatives of local communities participate in the Scientific Council of Bieszczady National Park, which is an advisory body to the director of the Park.

Forest of primeval character in the Pasmo Graniczne Range - winter view. Picture: S. Kucharzyk

Beech forest of Cheile Nerei. Picture: D.-O. Turcu

5.g.16 Romania: Cheile Nerei-Beușnița (039)

Cooperation with research institutions

The Cheile Nerei-Beusnita National Park, like other Romanian national parks, has a Scientific Council consisting of specialists representing a variety of scientific areas.

Over time, the National Park Administration has established collaborations with a number of universities and research institutes that have conducted various studies in the park.

Most of the members of the Scientific Council of the Park conduct their own research in the area, on behalf of their institutions (research institutes, universities).

Publications

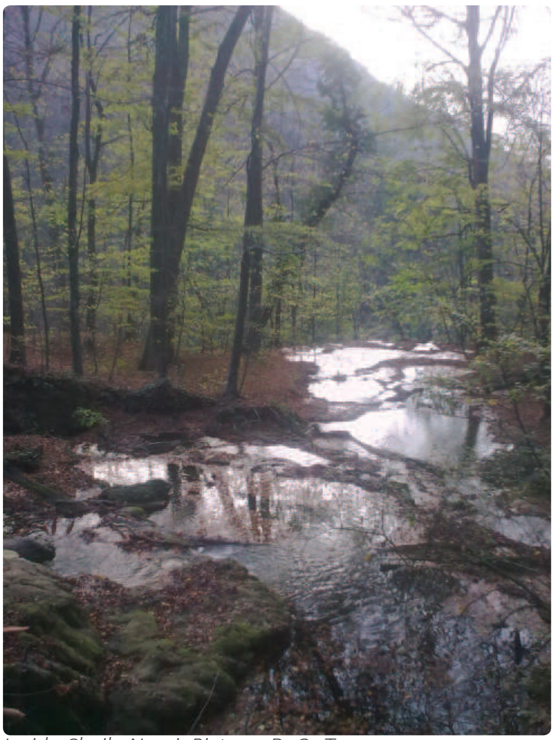
The cluster management does not have its own publication yet. The NP has a website (www.cheilenereibeusnita.ro), and it is also present on social media. Local media regularly report on the National Park. A detailed list of the publications on the area can be found in the Bibliography section.

Capacity building and training for the staff

The National Park organizes regular training for employees on various fields, like training courses in tourism, environmental management, communication skills development, GIS and management of protected areas. In the last few years, many courses and trainings were organized at national and international level to train the National Park staff.

Citizen participation

The citizens and local communities play an active part in the decisions of Cheile Nerei-Beusnita National Park and in the environmental issues in the region by participating in meetings and workshops organized to accomplish and approve the Management Plan. The Stakeholder Board of the National Park, an active body in the Park's management, includes interested citizens and the representatives of the communities.



Inside Cheile Nerei. Picture: D.-O- Turcu

Inside Șinca Forest. Picture: RPL OS Padurile Sincii RA

5.g.17 Romania: Codrul Secular Șinca (040)

Cooperation with research institutions

Due to its limited human capacity, the management of the component part is not capable to carry out research projects with its own staff. Consequently, the scientific research relies mainly on collaboration with external experts, research institutes, universities, professional associations or consultants who are proposing research projects. Among the past and present research … research collaborators are the following: WWF Romania, Ștefan cel Mare University of Suceava, Transilvania University of Brasov, National Research and Development Institute for Silviculture "Marin Drăcea" (INCDSMD), and Renaturopa Association. The researches are generally focused on forest structure, dendrochronology, vegetation dynamics and structure of the primeval forest (several monitoring and inventory plots are established in the forest by WWF, INCDSMD and the Forest Faculty of Suceava) and also biodiversity inventories of fauna and flora of the Sinca Village area.

Publications

The Administration of Codrul Secular Şinca forest publishes regularly information about the component part on their website (www.padurilesincii.ro). The results of scientific researches carried out by external organizations are published in individual publications (research articles, reports, guidelines, and booklets).

Capacity building and training for the staff

The management aspects of the forest reserve are discussed at the monthly meetings of the Forest District (e.g. with rangers and responsible forestvengineers). WWF is present, bringing new information and consulting regarding the forest protection at meetings with both the Forest Directorate and the Forest District.

Citizen participation

Through its representative in the Local Council, the local community is involved in the protection of these forests. Scholars from Şinca School and Făgăraş Highschool are visiting the forest, accompanied also by WWF representatives.

Deadwood. Picture: I.A. Biris (INCDS-Marin Dracea)


General view of Slătioara Forest. Picture: I. Ichim

5.g.18 Romania: Codrul Secular Slătioara (041)

Cooperation with research institutions

The component part is a common place for studies of different institutions, among them are Ștefan cel Mare University of Suceava, National Research and Development Institute for Silviculture "Marin Drăcea", Babeș-Bolyai University, Institute of Biology – Romanian Academy, and Speleological Institute "Emil Racoviță".

Publications

The results of the research conducted in the component part are published in both highly quoted or local scientific journals. For the large public, a monograph about the component part was published in 2015 (DIACON 2015).

Capacity building and training for the staff

The state for conservation as well a new challenges for the forest reserve are discussed monthly in a meeting with the people involved (rangers and responsible forest engineers). Periodically, meetings of the forest district staff involved in protection of component with specialists from university (Ștefan cel Mare University of Suceava) or research (station of the Forest Institute nearby, in Câmpulung Moldovenesc) are organized.

Citizen participation

The local community is involved in the protection of these forests by participating to different field actions organized by the custodian (National Forest Department, Forest Directorate Suceava). Especially the schools of the area are involved, participating in excursions and lectures regarding forest conservation.


Beech trees and lying deadwood. Picture: C. Tomescu

Thermo-xerophilous decidous forest. P. Prundurel (Cozia National Park)

5.g.19 Romania: Cozia (042, 043)

Cooperation with research institutions

The Administration of the Cozia National Park (CNP) develops a series of current activities concerning the conservation and monitoring of characteristic species and habitats of the park area. Beside these current activities, the administration develops projects with objectives in investigating the biodiversity of CNP or improving the conservation activities in the protected area in collaboration with external experts, research organizations and consultants. The ways in which these cooperation activities are actually conducted are: i) implementation of research projects coordinated by the Administration of CNP or having this Administration as beneficiary in partnership with research institutes, universities, professional associations, consultancy firms, experts or subcontractors for specific activities conducted by external experts or institutions, ii) Propositions of research projects made by research institutes, universities, professional associations, consultancy firms, and experts to the Management of the Park.

Publications

All aspects concerning the investigations and training activities on biodiversity conservation, as well as management measures and techniques which are carried out in the frame of CNP are published on the official website (www.cozia.ro) and/or in individual publications (reports, guidelines, and booklets).

Capacity building and training for the staff

The Management Plan of CNP includes actions regarding the training of the park staff (action F.3. of the Action Plan). The training of staff is developed either in projects whose beneficiary is the Administration of CNP, or through financing the participation of staff in seminars and training courses from the budget of the Park. The objective is that each employee participates in at least one training session per year on specific topics related to their activity field.

Citizen participation

The main way of involving citizens in the protected area is the Consultative Council of CNP which has been working together with Park Administration since the beginning. On the other hand, the Park Administration also develops actions regarding information and public awareness campaigns for protecting and promoting the values of CNP (action E.3 – Action Plan).

Mixed beech-Scots pine forest. Picture: P. Prundurel (Cozia National Park)


General view of Ciucevele Cernei. Picture: S. Milanovici

5.g.20 Romania: Domogled - Valea Cernei (044, 045, 046)

Cooperation with research institutions

The Domogled-Valea Cernei National Park, like other Romanian national parks, has a Scientific Council consisting of 15 specialists representing a variety of scientific areas.

Over time, there have been collaborations with researchers from the Ştefan cel Mare University of Suceava and the Forest Research and Management Institute Brasov who studied *Pinus nigra ssp. banatica*, and with researchers from the Babeş-Bolyai University and the Bat Protection Association in Romania who studied bat species.

Moreover, researchers from the Danube Delta National Institute for Research and Development of Tulcea studied reptiles and amphibians of Community Interest in Romania, and researchers from the University of West Timisoara studied invertebrates, birds and amphibians.

Publications

The National Park does not have its own scientific publication yet. Important information about flora, fauna and habitats can be found in the section "Biodiversity" on the website of Domogled-Valea Cernei National Park.

Capacity building and training for the staff

The National Park organizes regular training for employees from various fields on nature as well as organizational and legal issues. Training also includes the use of new technologies. In addition, employees of the Park participate in various external trainings, depending on their function (tourism, environmental education, GIS, communication skills, management of protected areas, etc.).

Citizen participation

The citizens and local communities play an active part in decisions on the Domogled-Valea Cernei National Park and environmental issues in the region through participation in meetings and workshops organized to accomplish and approve of the Management Plan.


Carpathian beech forest. Picture: S. Milanovici

General view of mixed stands in Groșii Țibleșului Forest. Picture: Forest District Groșii Țibleșului

5.g.21 Romania: Groșii Țibleșului (047, 048)

Cooperation with research institutions

The most important research was supported by WWF-DC (World Wide Fund for Nature – Danube Carpathians) and developed by a team of the Ștefan cel Mare University of Suceava. It consisted in a forest inventory in core areas of the component part and a dendrochronological analysis of the trees and of the deadwood.

Publications

Based on the collected data, two B.Sc. theses were written in the Faculty of Forestry of Ștefan cel Mare University of Suceava .

Capacity building and training for the staff

The state of conservation and the new challenges related to the forest reserve are discussed in the monthly meetings of the Forest District (e.g. with the rangers and responsible forest engineers). WWF-DC is present and bring any new consulting and information regarding the forest protection in meetings with both the Forest Directorate and the Forest District.

Citizen participation

Through its representative in the Local Council, the local community is involved in the protection of these forests, but also by participating in some of the field trips organized by the Custodian of the Reserve (WWF-DC).

Inside Groșii Țibleșului Forest. Picture: L. Teodosiu

Forest of Izvoarele Nerei. Picture: M. Schickhofer

5.g.22 Romania: Izvoarele Nerei (049)

Cooperation with research institutions

The Semenic-Cheile Carasului National Park, like other Romanian national parks, has a Scientific Council, consisting of 14 specialists representing a variety of scientific areas.

Over time, the National Park Administration has established collaborations with a number of universities and research institutes that have conducted various studies in the park, for example: the National Forest Research Institute has carried out research on natural forests, and uneven-aged forestry systems ("close-to-nature forestry"); the Banat University of Agricultural Sciences and Veterinary Medicine performed research on grasslands, peat bogs and limestone habitats; the "Ştefan cel Mare University of Suceava engaged in research on forest biometrics, and uneven-aged forestry systems; etc.

Publications

Like many national parks in Romania, this NP does not have its own publication yet. Important information about flora, fauna and habitats can be found on the website of the National Park (www.pnscc.ro). A detailed list of publications about the area is attached in the Bibliography section.

Capacity building and training for the staff

The National Park organizes regular training for employees on various topics, for example training courses in tourism, environmental management, communication skills development, GIS and management of protected areas. In the last years, many courses were organized at national and international … level, attended by many of the National Park employees.

Citizen participation

The citizens and local communities play an active part in decisions on the Semenic-Cheile Carasului National Park and environmental issues in the region through participation in meetings and workshops organized to accomplish and approve of the Management Plan. The Stakeholder Board of the National Park, an active body in the Park's Management, includes interested citizens and the representatives of the communities.

Old beech tree. Picture: D.-O. Turcu

Beech forest of Strâmbu Băiuț. Picture: V. Radu

5.g.23 Romania: Strâmbu Băiuț (050)

Cooperation with research institutions

With the financial help of WWF-DC (World Wide Found for Nature – Danube-Carpathians), research studies toward a better understanding of this forest were started; the main partner was Ștefan cel Mare University of Suceava, for topics regarding inventory, forest structure, and dendrochronology. The other involved institutions were the Babeș-Bolyai University, and ETH Zurich (Switzerland).

Publications

The first results of the researches were published in two B.Sc. theses of the Faculty of Forestry, Ștefan cel Mare University of Suceava.

Moreover, the brochure "Pădurile seculare de la Strâmbu Băiuț – ultimii giganți ai Maramureșului" was published.

Capacity building and training for the staff

The state of conservation and the new challenges for the Forest Reserve are discussed monthly in a meeting with the people involved (rangers and responsible forest engineers). One of the reserve keeper (WWF-DC) offers new information and plans regarding the protection within the areas in meetings to both the Forest Directorate and the Forest District.

Citizen participation

The local community is involved in the protection of these forests through its representative in the Local Council and also by participating in some of the field trips organized by the Custodian of the Reserve (WWF-DC).

Old-growth forest. Picture: V. Radu

Deadwood in Krokar. Picture: S. Pelc (Slovenian Forest Service)

5.g.24 Slovenia: Krokar (051)

Cooperation with research institutions

The main task of the public service Slovenia Forest Service (SFS) is forest management planning and only to a lesser extent research. SFS prepares the Forest Management Plan for the Virgin Forest Krokar and measurements (permanent sample plots, measurement of all trees in the forest stands). More specific research is carried out by the University of Ljubljana, the Biotechnical Faculty, the Slovenian Forestry Institute, and the Research Centre of the Slovenian Academy of Sciences and Arts. Graduation and Doctoral theses were carried out by Slovenian students and students from other European countries. Research can be conducted as fundamental research within the regular work of the institution or in the context of acquired Slovenian or international projects. Research institutions are also using the data obtained by the SFS.

Publications

A brochure was published on the Borovška forest educational trail and on nature protection in Kočevska. In 2007, a film on Forestry in Kočevsko was produced. In 2010, the publication "Living with forests", and in 2014, the book "Virgin forest: pristine nature of Kočevska" were published.

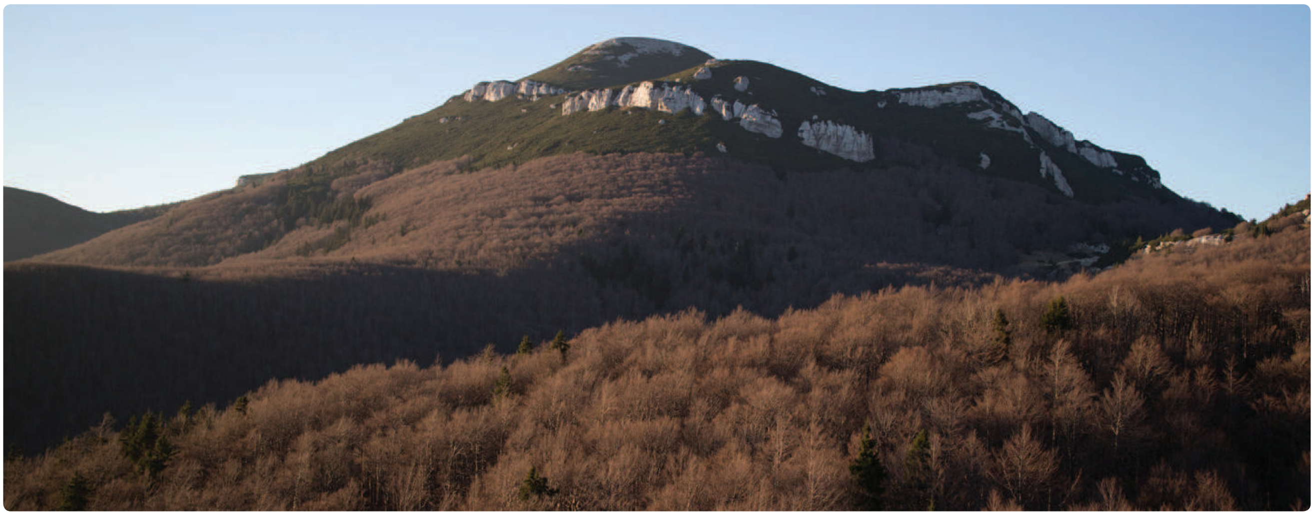
Capacity building and training for the staff

For the governance of Krokar, the Regional Forest Unit Kočevje of the Slovenia Forest Service is responsible. Employees from the Department for Forest Management Planning and from the local unit Kočevska Reka are actively involved. Specific and regular trainings on the management of the primeval forest are not taking place. Within the regular annual training of employees, topics are dedicated to the nature conservation, the visitor management and new scientific knowledge.

Citizen participation

In the framework of the project LIFE Kočevsko, running from 2014 to 2019, a group of the most interested stakeholders and well-known people from public will be formed. The members of the group will help to be successful in nature conservation of Kočevsko. Slovenia Forestry Service involves main stakeholders in Forest Management and in different events. Citizens participate in the processes of the Forest Management Plans and in different events.

View of Krokar. Picture: T. Hartmann (Slovenian Forest Service)



View of Mountain Snežnik. Picture: C. Hecke (E.C.O)

5.g.25 Slovenia: (052)

Cooperation with research institutions

Slovenia Forest Service (SFS) is in charge of monitoring the state of the forests. The data obtained are valuable both for directing the development of forests and for a variety of researches, carried out by the Forestry Institute, the Biotechnical Faculty and other research institutions. The SFS often cooperates in research activities in the Forest Reserve and in the broader area. Two permanent sample plots are located in Ždrocle; the Department of Forestry and Renewable Forest Resources at the Biotechnical Faculty carries out periodic measurements there in order to monitor the development of forest stands without logging activities. Several phytocoenological researches were carried out by the ZRC SAZU, the University of Primorsko and other institutions in the Reserve. Various graduation theses were also prepared, which provide some additional knowledge on the state of the forests in Snežnik-Ždrocle Forest Reserve.

Publications

Forest Management Plans were periodically written from 1864 to 1960, and every 10 years since then. Several works were published on the history of the area. Also, there are some publications about plants, plant associations and lichens.

Capacity building and training for the staff

The Regional unit Postojna of Slovenia Forest Service is responsible for the management of Snežnik-Ždrocle, which is also part of the Hunting area with Special Purpose Jelen. The area belongs to 4 forest management units, for which 2 local units are in charge, 4 district foresters and 3 district hunters. Support is provided by expert departments in Postojna. Employees participate each year at different training events on forest management, occasionally also in events on nature conservation.

Citizen participation

Public participation is part of the preparation process of the Forest Management Plan. Citizens and different organizations can propose initiatives and suggestions. The Draft Forest Management Plan is publicly accessible, remarks can be officially proposed. Public participation was also part of the preparation process of the Natura 2000 Management Programme and of the Regional Development Program.

Forest of Snežnik-Ždrocle. Picture: H. Kirchmeir (E.C.O)

Winter view of Tejera Negra. Picture: G. Cerezo

5.g.26 Spain: Hayedos de Ayllón (053, 054)

Cooperation with research institutions

Every year, different study requests from various institutions are received regarding the component part Tejera Negra, among them: Among them: Área de Biodiversidad y Conservación of the King Juan Carlos University, Centro de Estudios Hidrográficos (CEDEX), Centro Regional de Estudios del Agua of the University of Castilla-La Mancha, Laboratorio de Etología of the University of Valencia, Sociedad Micológica de Madrid, National Museum of Natural Science, National Agricultural Research Institute (INIA), Centro de Investigación Forestal (Cifor), Technical University of Munich and Departamento de Botánica of the University of Granada.

The component part Montejo de la Sierra also receives numerous study requests from different institutions.. There is one collaboration that stands out for the importance of the results and the long period of time (since 1992): the research collaboration agreement between the Regional Government of Madrid and the Technical University of Madrid. In recent years, the King Juan Carlos University has also played an important role in this site.

Publications

Two essential books were published about the Montejo forest (GIL et al. 1999; GIL et al. 2010), and also several scientific papers.

Capacity building and training for the staff

The staff (technical staff and rangers) of both management institutions attend different courses each year, with matters related to the conservation of endangered species (fauna and flora), invasive alien species, geological heritage conservation, sustainable forest management, forest fires, and environmental education in protected areas.

Citizen participation

In the component part of Montejo de la Sierra and Tejera Negra, the citizen participation processes are mainly related to the area of the Sierra del Rincón Biosphere Reserve and to the Sierra Norte de Guadalajara Natural Park. Different sectors of society in their respective geographical areas have been and will be consulted about the planning and management of the sites, through the designated organ of participation, a permanent Governing Board in the case of the Sierra Norte de Guadalajara Natural Park.

Inside Montejo de la Sierra. Picture: O. Schwendtner

Forest of Hayedos de Navarra. Picture: O. Schwendtner

5.g.27 Spain: Hayedos de Navarra (055, 056)

Cooperation with research institutions

Some universities in the north of Spain are involved in the component parts and work in research related to biology, ecology and forest dynamics. The two universities of Navarre, the Public University of Navarre (UPNA) and the University of Navarre (UN), perform several researches related to natural sciences in the component. Also, researchers from the University of the Basque Country (UPV) and the University of Lleida (UdL) work in several theses or projects relating to the component parts.

The Pyrenean Ecology Institute (CSIC) is a public research center working for a better understanding of the performance, structure and dynamics of the mountain systems and also has an interest in the component parts. One of its goals is to evaluate the effect of global change on the structure and dynamics of mountain ecosystems.

Another institution, the Sociedad de Ciencias Naturales Aranzadi, a significant non-governmental research entity in the field of biodiversity, but also in anthropology and history, is interest in the component parts.

Publications

The agency responsible for managing this area does not publish any journal with scientific news related to the component parts, but there is an informative periodic publication called “Entornos de Navarra”, where several articles on research or general information on the component parts are published.

Capacity building and training for the staff

In the last 4 years, the staff of the agency in charge of the management of the component parts attended seminars ... related to preventing negative impacts on ecosystems, LIFE projects and Natura 2000 network, new technologies (Territorial Information System and GPS, GIS for mobiles and tablets), and wildlife management: *Dendrocopos leucotos, D./ Dendrocopos medius, Neovison vison, Chiroptera*, vultures and Bonelli’s Eagle, birds of prey, wildlife mortality, and exotic species management.

Citizen participation

In the process for designation of the three SAC, citizens took part in a participatory process, which consisted in several meetings and surveys of opinion. The citizens were asked about their opinion on the recognition, objectives and management measures of the SAC.

Currently there are other ways for citizen participation, normally through consults to Municipalities or other organizations such as Cederna-Garalur, a non-governmental organization dedicated to the development of the mountain areas in Navarre.


View of Hayedos de Picos de Europa. Picture: O. Schwendtner

5.g.28 Spain: Hayedos de Picos de Europa (057, 058)

Cooperation with research institutions

Many research institutions are interested in the component parts, due to their ecological wealth and variety. The researches cover different aspects, like the dynamics of a variety of ecosystems, flora and fauna research, ecosystem restoration projects, etc.

There are many research permissions granted to the following institutions: INIA-Madrid (National Agricultural Research Institute), Autonomous University of Barcelona, University of Oviedo, University of León, National Museum of Natural Science (Madrid), Evolutionary Biology Institute-CSIC (Barcelona), Environmental Hydraulics Institute of the University of Cantabria, Natural Resources Institute of the University of Oviedo, and Atlantic Botanic Garden of Gijón.

The National Park also offers internships for students, it has signed an agreement with the University of León and other educational institutions.

Publications

The National Park's Agency publishes a series of technical books, various of them refer monographically to the National Park (visitor guide, geology, amphibians and reptiles, butterflies) and others to some of the key species of the site. Also, it publishes a Bulletin of the National Parks Network.

Capacity building and training for the staff

The staff of the management authority attends many seminars every year in order to improve the management of the component parts and to gain a deeper understanding of it.

These seminars are offered from three different institutions: Environmental Training Program (OAPPNN-MAGRAMA), training program of the Global Biodiversity Information Facility (GBIF), and School of Public Administration of Castilla y León.

Citizen participation

The participative body for the National Park is the "Patronato" (National Park Council), which has 43 members and meets two times every year. Many of the members are representatives of citizen associations like environmentalist associations, agrarian associations, Municipalities, land owners, universities, etc. The functions of the Patronato are, inter alia, to promote actions to support the conservation in the National Park and to inform about these and other actions.


Inside Cuesta Frìa. Picture: O. Schwendtner

Forest of Gorgany. Picture: A.M. Klymenko

5.g.29 Ukraine: Gorgany (059)

Cooperation with research institutions

In order to provide complex scientific researches, Gorgany Nature Reserve collaborates with the State Museum of Natural History of the Ukrainian National Academy of Sciences, the National Forestry University of Ukraine, the Institute of Natural Sciences of the Vasyl Stefanyk Precarpathian National University, as well as the Institute of Ecology of the Carpathians, the Institute of Botany and the Institute of Zoology, all three of them of the National Academy of Sciences of Ukraine. Scientific researches in the Reserve are carried out by the staff of Gorgany Nature Reserve in cooperation with collaborators from other research institutions. Before approval, external research proposals require formal approval by the scientific advisory board of the Gorgany Nature Reserve. This board critically evaluates the quality and content of the proposals and makes the final decision.

Publications

Results of research conducted on the territory of the nominated component part are published in scientific journals in Ukraine and abroad and also in the "Chronicles of Nature" of Gorgany Nature Reserve.

Capacity building and training for the staff

The staff of the management frequently attends seminars in order to improve their knowledge. Particularly rangers of the area receive frequent training to impart new scientific findings and to keep up-to-date with the current state of research. In general, the management of the area sees itself as a key point of contact for offering training and internships for students, teachers and lecturers.

Citizen participation

The Administration of the Gorgany Nature Reserve closely cooperates with local NGOs such as "Kedryna", "Saturnia" and "Pro lisok" on carrying out nature-protection activities; it also cooperates with stakeholders and the local community and disseminates environmental knowledge.

Inside Gorgany. Picture: O.M. Slobodian


Inside Roztochya Nature Reserve. Picture: V. Pokynchereda

5.g.30 Ukraine: Roztochya (060)

Cooperation with research institutions

The Roztochya Nature Reserve cooperates with many research institutions and universities, such as the State Natural History Museum of Ukraine, the State Natural History Museum of Ukraine, the Ivan Franko National University of Lviv, the National Forestry University of Ukraine, as well as the Institute of Ecology of the Carpathians, the Institute of Zoology and the Institute of Hydrobiology, all three of them of the National Academy of Sciences of Ukraine.

The results of the studies conducted on the reserve are periodically published in scientific journals and the annual report "Chronicle of Nature".

Publications

The staff of the Nature Reserve frequently publishes in local newspapers, the scientific journal of the National Forestry University of Ukraine and the scientific journal of the Ivan Franko National University of Lviv.

Capacity building and training for the staff

The staff of the Nature Reserve takes part in the training courses from the Ministry of Environment and Nature Resources every year. There are also courses or seminars held by NGOs in Lviv, like WWF or others. All employees have a higher education.

Citizen participation

The Scientific and Technical Board of the Roztochya Nature Reserve includes the local community's representatives and is the main decision making body of the management of the Reserve. They work on increasing the awareness of local people on conservation and important issues of the Nature Reserve.


Bracket fungus. Picture: N. Stryamets

Inside Satanivska Dacha. Picture: M. Riabyi, Podilski Tovtry NNP

5.g.31 Ukraine: Satanivska Dacha (061)

Cooperation with research institutions

Satanivska Dacha collaborates with academic institutions: research is conducted by scientists of the Podilski Tovtry National Nature Park, the Kamyanets-Podilskyi National University, and the Institute of Ecology of the Carpathians of the National Academy of Sciences of Ukraine.

Publications

Research results are recorded in the "Chronicles of Nature" of the Podilski Tovtry National Nature Park, a collection of scientific works of the Kamyanets-Podilskyi National University.

Capacity building and training for the staff

Employees of the Yarmolinetske Forestry and the Podilski Tovtry National Nature Park attend seminars in order to obtain new knowledge. The Administration of the Yarmolynetske Forestry and the Podilski Tovtry National Nature Park act as a training ground for students, teachers and professors.

Citizen participation

In 1998, the public organization "Association of Podilskyi Naturalists" was created, members of which support the Administration of the National Nature Park with the territory management.

Forest of Satanivska Dacha. Picture: Podilski Tovtry NNP


View of Synevyr National Nature Park. Picture: V. Pokynchereda

5.g.32 Ukraine: Synevyr (062, 063, 064, 065)

Cooperation with research institutions

The Synevyr National Nature Park cooperates with many research institutions and higher educational institutions: the National Forestry University of Ukraine, the Scientific Research Institute of Mountain Forestry (Ivano-Frankivsk), as well as the Institute of Botany, the Institute of Ecology of the Carpathians, the Institute of Zoology and the State Museum of Natural History, all four of the National Academy of Sciences of Ukraine.

Publications

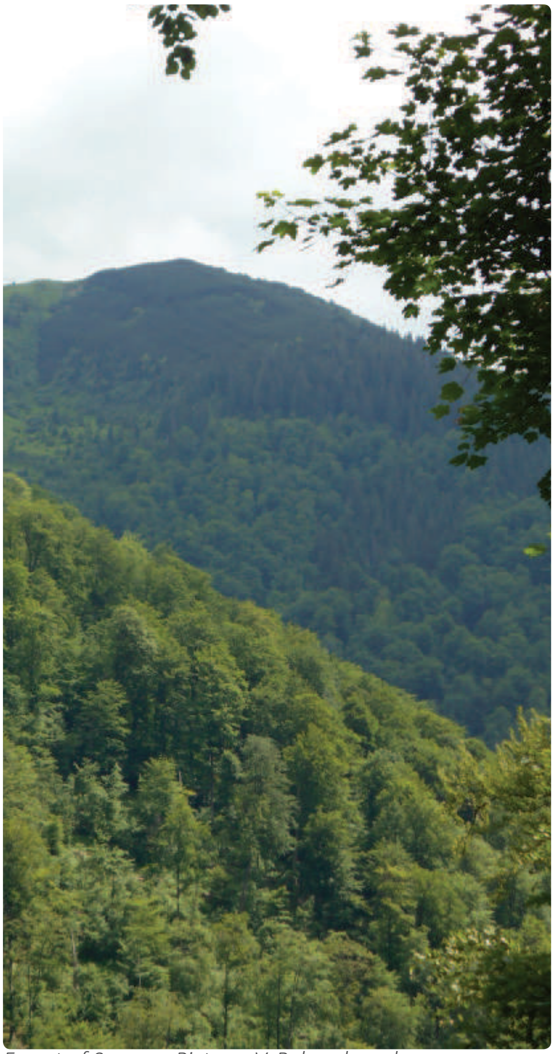
Results of research conducted on the territory of the nominated component parts are published in scientific journals in Ukraine and abroad. Also, the research results are recorded in the "Chronicles of Nature" of Synevyr National Nature Park.

Capacity building and training for the staff

The Administration of Synevyr National Nature Park regularly organizes training for staff for the purpose of improving their knowledge in the field of environmental legislation, research and environmental education.

Citizen participation

In 1998, the NGO "Syniy Vyr", and in 2002, the NGO "Crystal brook" were established. Members of the NGOs support the Administration of the Synevyr National Nature Park in the management and conduct of marketing campaigns, as well as in attracting sponsors for financial or technical assistance for the needs of the institution. NGOs also help in the protection of the National Park and monitoring the development of commercial tourism.


Forest of Synevyr. Picture: V. Pokynchereda

Old-growth forest of Zacharovanyi Krai. Picture: V. Pokynchereda

5.g.33 Ukraine: Zacharovanyi Krai (066, 067)

Cooperation with research institutions

The Zacharovanyi Krai National Nature Park cooperates with many research institutions and higher educational institutions: the State Museum of Natural History of the National Academy of Sciences of Ukraine, the Uzhgorod National University, the National Forestry University of Ukraine and others.

Publications

Results of research conducted at the National Park are published in periodicals, scientific journals and in the annual report “Chronicles of Nature”.

Capacity building and training for the staff

Employees frequently attend seminars in order to obtain new knowledge. Special trainings for researchers are often offered, as it is important that they are aware of current research findings and trends. The Administration of the park also acts as a training ground for students, engineering staff and researchers.

Citizen participation

Since 2014, the Zacharovanyi Krai National Nature Park cooperates with the European organizations “European Wilderness Society” (Austria) and with the NGO “Bergwaldprojekt”, members of which assist the Administration in the territory management.

Inside Zacharovanyi Krai. Picture: V. Pokynchereda

5.h Visitor facilities and infrastructure

Environmental education and a nature-sound experience of nature is possible in most of the nominated component parts. Visitor facilities are located outside.

National parks, nature parks, and biosphere reserves are held in high esteem by recreation seekers and tourists. Travellers increasingly consider "experiencing nature" an important holiday motivation (Forschungsgemeinschaft Urlaub und Reisen e.V. – travel analysis 2007). Thus, many protected areas offer a broad range of guided tours, trails and visitor facilities to provide an opportunity to get to know and learn to appreciate outstanding natural values. Given the motivations of visitors of protected areas e.g. to experience nature, they are also amongst the key target groups for experiencing the European ancient or primeval beech forests.

Existing visitor facilities and offers in and around the component parts create a unique synergy for an efficient, target-group oriented and successful presentation and experience of the property and its OUV without requiring larger investments. Experienced professionals allow for an optimal presentation of the property to visitors and a professional integration into the visitor offer of protected areas.

The nominated component parts are mostly embedded in larger protected areas, which have the explicit task to carry out environmental education and provide offers for recreation and experiencing nature. Most component parts dispose of a wide range of different visitor facilities and infrastructures. However, these are usually located in the surrounding of the component parts or in the buffer zone. In the nominated area of the component parts, only marked hiking trails and disperse shelters exist. Visitor facilities to accommodate for larger visitor numbers are located outside of the nominated component parts. Consequently, visitor management usually also deals with the entire protected area as such and is able to address the specific requirements for conservation with regard to wilderness and visitors in a greater context.

Table 78: Number of visitors in the nominated component parts (n.a. = data not available)

ID	State Party	Component part/cluster	Total number of visitors in 2014	Total number of visitors on guided tours in 2014	Total number of individual visitors in 2014
001	Albania	Lumi i Gashit	n.a.	n.a.	n.a.
002	Albania	Rrajca	n.a.	n.a.	n.a.
003	Austria	Dürrenstein	10,000	2,000	8,000
004–007	Austria	Kalkalpen	263,000	23,000	240,000
008–012	Belgium	Sonian Forest	> 2,000,000	> 20,000	> 2,000,000
		(Visitors per year for the entire Sonian Forest. The core zones are much less frequented than the zones close to the main entrances.)			
013–021	Bulgaria	Central Balkan	n.a.	0	n.a.
022	Croatia	Hajdučki i Rožanski Kukovi	11,800	800	11,000
023–024	Croatia	Paklenica National Park	122,000	16,500	105,500
025–029	Italy	Abruzzo, Lazio & Molise National Park	120,764	25,000	95,764
030	Italy	Cozzo Ferriero	140,000	50,000	90,000
031	Italy	Foresta Umbra	67,000	7,000	60,000
032	Italy	Monte Cimino	n.a.	n.a.	n.a.
033	Italy	Monte Raschio	1,335	1,335	n.a.
034	Italy	Sasso Fratino	140,100	14,100	126,000
035–038	Poland	Bieszczady	50,000	5,000	45,000
039	Romania	Cheile Nerei-Beușnița	25,000	100	24,900
040	Romania	Codrul Secular Șinca	600	100	500
041	Romania	Codrul Secular Slătioara	500	200	300
042–043	Romania	Cozia	25,000	5,000	20,000
044–046	Romania	Domogled-Valea Cernei	20,000	100	19,900
047–048	Romania	Groșii Țibleșului	100	20	80
049	Romania	Izvoarele Nerei	15,000	1,000	14,000

050	Romania	Strâmbu Băiuț	200	150	50
051	Slovenia	Krokar	300	200	100
052	Slovenia	Snežnik-Ždrocle	9,020	20	9,000
053–054	Spain	Hayedos de Ayllón	43,000	25,000	18,000
055–056	Spain	Hayedos de Navarra	23,924	0	23,924
057–058	Spain	Hayedos de Picos de Europa	2,085,000	157,000	1,928,000
	(Visitors per year for the entire National Park. The core zones are much less frequented than the zones close to the main entrances.)				
059	Ukraine	Gorgany	125	125	125
060	Ukraine	Roztochya	300	200	100
061	Ukraine	Satanivska Dacha	30	0	30
062–065	Ukraine	Synevyr	250	0	250
066–067	Ukraine	Zacharovanyi Krai	< 50	0	< 50

5.h.1 Albania: Lumi i Gashit (001)

Description of visitor management

In Gashi River component part, the number of visitors is limited because of the long distance and difficulty to get there. There are two roads up to Gashi River (GR). One of them can only be used with a 4x4/an off-road vehicle and it ends near the zone. From there, it takes two walking hours to reach the component part.

Another possibility to visit GR is the hiking trail from Tropoja. It is a difficult trail that requires a few hours to reach Gashi River.

According to Albanian law for Protected Areas, in restricted natural reserves such as GR (IUCN category 1, where the first scale of protection is adapted), the establishment of recreational, amusement and sports complexes, as well as passing through paths (except for the people that manage the PA), grazing, domestic animals’ passage and construction of objects for their shelter, etc. is forbidden. Any other activity (that is not forbidden by law) to be performed in the reservation or in its buffer zone shall require an environmental permit.

Visitor infrastructure

Gashi river is situated far from populated areas making it difficult to be reached by visitors or tourists. During the summer, from June to September, cattle and sheep are brought to areas surrounding the component GR for alpine farming. To ensure that people do not get lost, direction signs show the direction to the component part, where an information board indicates the entrance to the component part Gashi River.

In the future, it is planned to make areas nearby the component part more accessible, so it can be seen more easily from farther away. In a possible change of law and regulations, visitation is envisaged with a permit for small groups of visitors.

5.h.2 Albania: Rrajca (002)

Description of visitor management

The National Park Shebenik-Jabllanice can be reached by car from various directions. There are certain routes within the Protected Area Shebenik-Jabllanice where vehicles are allowed to circulate (by virtue of the Albanian Protected Areas Law, Article 6, paragraph 2, f: “circulation of means of transport out of the roads” is prohibited in the National Parks). Further inside the Peotected Area (PA), only small trails lead to Rraica. Although there are trails that cross Rraica, hardly anyone is allowed to use these trails apart from National Park employees because of Rraica's protection status. The whole component part Rrajca is part of the “core zone” of the Protected Area Shebenik-Jabllanice. By virtue of Law and the Decision of the Council of Ministers to proclaim Shebenik-Jabllanice Natural Ecosystem a “National Park”, the establishment of recreational, amusement and sports complexes, as well as passaging through paths (except for the people that manage the Protected Area), grazing, domestic animals’ passage and construction of objects for their shelter, etc. is forbidden. Any other activity (that is not forbidden by law) to be performed in the reservation or in its buffer zone shall require an environmental permit.

Visitor infrastructure

Hardly any activities are allowed in Rrajca. Only scientists or researchers may enter the zone if granted admission, whereas visitors may “visit” the zone by looking at it from afar, from a zone called “Zone of Traditional Use”. During the celebrations of traditional holidays of the region, groups of 3 to 5 visitors may visit the Protected Area and the surrounding areas accompanied by the PA staff of Elbasan region. In addition, foreign researchers may visit the PA. There are walking trails in the PA Shebenik-Jabllanice, but the direction signs need to be improved.

5.h.3 Austria: Dürrenstein (003)

Description of visitor management

Most of the visitors of the Dürrenstein Wilderness Area arrive by private car. At the two parking lots situated at the boundaries of the area, visitors have the opportunity to visit the area individually. There are several trails and forest roads enabling the visitors to individually enter the Wilderness Area by foot. Furthermore, the parking lots serve as meeting points for the guided tours offered by the management.

The primary conservation objective of the Wilderness Area is to enable natural processes in the area without any human disturbance. However, in order to increase awareness and understanding amongst visitors and the population, it is crucial to make sure that people can experience nature.

Consequently, the management of the area prepares an annual program with guided tours for interested visitors. The program includes botanical and zoological excursions as well as guided hiking tours inside the Wilderness Area.

Individual visitors are allowed to execute their legally guaranteed right to enter and hike the area, but are strictly limited to marked trails. However, large parts of the Wilderness Area are kept inaccessible for individual visitors.

Visitor infrastructure

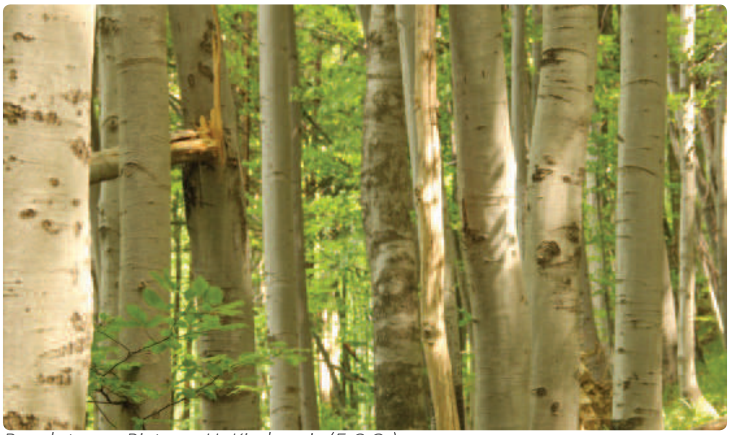
The management of the area offers a range of different topic-related excursions and guided tours into the Area in order to inform visitors and raise awareness with regard to wilderness. For instance, the management offers a visit to a thousand year old English Yew, as well as guided photography courses.

Amongst the range of different guided tours offered by the management, the excursions taking the visitor to the pristine core of the Wilderness Area are the main highlight of the complete visitor program.

In order to enable visitors to explore the area individually and learn more about the local wildlife, the management opened an interpretive trail at the edge of the Wilderness Area in April 2012. The trail focuses on owls and provides detailed information about the five species of owls which are present in the area.

In the near future, the management envisages to establish a "Wilderness Center" for visitors. This should allow to raise awareness and create broad understanding for the wilderness philosophy amongst a broader public. In order to comply with the philosophy of sustainability and energy efficiency, the Center is planned as a low emission building and will be located outside the component part.

Furthermore, two more visitor attractions will be built outside the component part in the area of the extension zone, which was added to the Wilderness Area in 2014.



Beech trees. Picture: H. Kirchmeir (E.C.O.)

5.h.4 Austria: Kalkalpen (004, 005, 006, 007)

Description of visitor management

The Kalkalpen National Park has a visitor guidance concept that conforms to the IUCN guidelines and the ecological knowledge, but also contains touristic offers for different target groups of visitors.

Basic principles for visitor management are to provide offers instead of prohibitions. Visitors are advised to keep to marked paths. The aim is that 90% of the visitors linger in 10% of the National Park area. Therefore, special hiking areas have been designated. Visitors receive information on the National Park, destinations, walking time and opening times of the mountain huts via informational material and signboards. Due to these regulative measures, the great majority of the visitors is concentrated on the main park entrances, the cycling and hiking trails and the alpine pastures.

Both individual as well as guided visitors have access to interesting and attractive possibilities for recreation and education within and outside the National Park. A yearly program offers different types of guided tours ranging from zoological or botanical topics, to hiking activities, and to survival trainings in the wilderness. One of the most important target groups are pupils. Therefore, a special school program has been developed.

The three main entrances are bundling the visitor flow and the traffic volume and can be used for visitor census. Most visitors of the Park arrive by private car. From July to September, a hiking bus is offered to the visitors two days a week.

Visitor infrastructure

The National Park Center Molln is both Headquarter of Administration and Information Center for visitors. In the valley of Enns, the Visitor Center Ennstal informs visitors and it is the main starting point for different topic-related guided National Park tours. Both visitor centers are situated outside of the component parts.

Another attractive trip destination is the Panorama Tower Wurbauer Kogel. The 21 meters high tower provides an impressive all-round view. All three visitor centers have their own exhibition that informs visitors on the main topics, which are forest wilderness, water and rocks. Located near Windischgarsten, the Villa Sonnwend National Park Lodge is a very special place for holidays or seminars in the National Park area. The Wilderness Camp, a solitude site in the forest wilderness, is used for guided multi-day tours. A touch of adventure in the wilderness is offered by bivouacs where visitors have the possibility to spend the night outdoors. This entire visitor infrastructure is located outside of the component parts.

National Park visitors can make use of six thematic trails, a path network of 200 km hiking trails, 140 km cycling tracks and 80 km bridle paths. Another eight info points and about 120 info boxes inform and channel the visitor flow.

Visitors are able to enter the proposed area and get an understanding of the beauty and value of the beech forests on a beech forest trail and various hiking paths. For example, the trail to the highest summit of the National Park gives an impressive view of the nominated beech forests.

5.h.5 Belgium: Sonian Forest (008, 009, 010, 011, 012)

Description of visitor management

The Sonian forest is intensively visited. A large group of actors promotes initiatives for visitors. Therefore the forest management does not focus on the organization of visits and guided tours, but on the facilitation of both individual and group visits.

The Common Structural Vision for the Sonian Forest intends to deal with visitor pressure by reducing the high number (64) of small parking lots step by step, aiming at a limited number of better equipped “recreational gates”. As a result of this first intervention, the visitors will be more concentrated in certain areas (at the forest edge) while reducing the pressure in the component parts. These recreational gates will be connected with high quality trails. Moreover, the access to trails and roads will be regulated for different user groups (i.e. partly separated trails for walking, cycling, horse riding, etc.) and the number of trails will be reduced in the most sensitive zones/areas (abandonment of a limited number of paths in the forest reserves). Furthermore, the forest management will invest in information and adopt a participatory approach to work together with other actors, and organize guided tours, education and tourism.

Visitor infrastructure

The whole territory of the Sonian Forest includes a trail network of over 400 km, on which marked trails are established in and between the “recreational gates” (see above). In these gates, parking lots are concentrated, toilets and information desks are set up, and more than 100 information panels are spread at the main entrances to the forest. Actually, investment programs are conducted in entrance gates with information points developing in Groenendaal, Bosvoorde, Oudergem, Tervuren, Overijse, La Hulpe, etc.

5.h.6 Bulgaria: Central Balkan (013, 014, 015, 016, 017, 018, 019, 020, 021)

Description of visitor management

In Central Balkan National Park, hiking tourism has traditionally been developed and stimulated. There are 25 official entrances for visitors, which are located at the beginning of marked hiking trails. Visitors are not permitted to leave marked trails in the Reserve (including the component parts) and in the human limited impact zones. Moreover, visitors are only allowed to use their vehicles on 4 roads in the National Park (located outside of the component parts). Other roads have restricted access and are used only for the management of the site. Visitors use mainly private cars, but also the public transport system (trains on the south side and buses on the north side), to reach the Park’s boundaries.

There are no significant tourist concentrations by territory, but regular booking of the chalets is observed. Half of the visits are during the months July, August and September and are, in general, evenly distributed among ten to twelve chalets (located outside of the component parts). It is important to note that a significant number of people visit the Park without spending the night there. In the last years, trends show an increase in one-day visits, connected with spending one or several nights in the settlements around the Park.

Since 2003, an active program for information of visitors has been applied. The e-information campaign for public information provides information through the electronic bulletin of CBNPD, as well as through other materials about the trails and chalets, activities related to biodiversity, events and competitions, information about international campaigns and dates from the nature protection calendar.

Visitor infrastructure

Hiking has always been quite popular in the Park. Some 20 mountain huts and few shelters are more or less regularly spaced along the ridge and a dense network of marked trails is maintained (approx. 80 km). The main part of this infrastructure has been established and maintained during the communist period by a centralized national tourism organization. Now the Park Administration is responsible for the creation and maintenance of marked trails and all connected infrastructure. In last years, specialized routes for cycling, horse riding and biodiversity monitoring were established.

The huts and shelters lie within the responsibility of the Bulgarian Tourist Society and its regional bodies. The maintenance of these huts is a real issue because of lack of income and because of the legislative situation, which prevents the Park from economic activities such as extraction of firewood, transport by motor vehicles, expansion of existing buildings, etc. The capacity of all chalets and shelters is around 1,470 beds (located outside of the component parts).

In some areas close to towns or villages, the Park has developed several eco-trails and interpretative routes during the last few years, offering the possibility for visitors and local people to discover and enjoy some wild nature. Some of the activities offered are particularly popular with school children and teenagers.

Three visitor centers are under construction (project funded by OPE). Several municipality visitor centers around the Park are partners of the Directorate.

5.h.7 Croatia: Hajdučki i Rožanski Kukovi (022)

Description of visitor management

Northern Velebit National Park is just beginning to develop its visitor system. An essential function of the Park will be to expand its attractions to visitors both in the narrower and wider environs. For now, there is only one official entrance to the National Park at which visitor can receive information. There are several other entrances to the Park where admission passes are not sold nor is any visitor information available. Development of tourism infrastructure must first be located in the area of the surrounding settlements, while in the Park, attempts should be made to improve the conditions of existing accommodations, hospitality and educational options, and secure conditions to reduce the negative impact of the increased number of people. In the strict reserve (including the component parts), visitor access is restricted to walking trails.

Old-growth beech forest. Picture: H. Kirchmeir (E.C.O.)

Visitor infrastructure

The Zavižan area and the Velebit Botanical Garden (located outside of the component parts) are most often visited, which primarily pertains to organized visits by bus. The Premužić Trail, as well as the Alan and Lubenovac areas are also popular, particularly among hikers. The Štirovača area is a traditional gathering place for the local population. The Park has an educational/presentation center in the Headquarters Building in Krasno. Park visitors can go sightseeing, take photographs, stroll, hike, ride bicycles and go horseback riding (on occasion). In 2006, the Premužić Trail (which passes through Hajdučki and Rožanski Kukovi Strict Reserve) was enhanced with educational content, i.e. information panels were installed on which the Park's natural treasures are presented to visitors. In 2007, the circular path in the Velebit Botanical Garden was also enhanced with information panels, and restroom facilities were installed in the immediate vicinity of the Botanical Garden. Accommodation in the Park is possible in mountaineer/hiker facilities: a mountain lodge, a mountain cottage and a mountain shelter. Accommodation capacity is modest, and the food on offer is quite basic. There are several more mountaineering facilities nearby, in the Nature Park, and it is also possible to find accommodations in the nearby locations Krasno, Sveti Juraj, Jablanac, and Senj.

5.h.8 Croatia: Paklenica National Park (023, 024)

Description of visitor management

According to the Paklenica National Park Book of Regulations (NN 157/98), the Institution applies the visitor management model. This model determines which sites are allowed to be visited, the number of visitors, the visiting mode and the organization of the Park's presentation center.

Currently, there are two official entrances to the Park at the beginning of the canyon Velika Paklenica where all day reception service is organized and visitor number and structure are being recorded since 1999. There was a steady increase of Park visitors from 2000 to 2014, with one exception: in the year 2003, the planned 5% increase in number of visitors was not reached; instead, a decrease of 3% was recorded. The main reason for the decrease in visitor numbers that year were numerous long-lasting fires on the Park's border during the peak season, the months of July and August. In the same period in 2014, the greatest number of visitors, namely 122,000 visitors, was reached. Most visitors are hikers, followed by climbers that represent 1/3 of all Park visitors. Both groups visit the Park individually, therefore individual visits account for 87%, while only 13% of visitors come to the park in organized groups. Also, foreign visitors are dominant in the Park (around 82%). Inside the nominated property, visitors must remain on marked paths. Approximately 2,000 visitors reach this area every year.

Visitor infrastructure

The touristic offer in the Park includes: a renovated mill, an archaeological site and the viewpoint Paklarić, the path Pjeskarica, a complex of underground tunnels called "Bunker" that is currently being adapted to serve the purpose of multimedia Visitor Center, the attractive cave Manita peć that can be visited only as part of a guided tour, the mountain hut Paklenica and mountain shelters. This visitor infrastructure is located outside of the component parts. Next to the Head office of the NP Paklenica, as well as partially inside the building, a Presentation Center is organized with educative and interpretative activities. Visitors come to the Park by car, bicycle, on foot or in organized groups by bus. During the most visited months (July and August), the Park provides an organized transport system from the reception to the parking lot in the Canyon Velika Paklenica, as well as a regular bus line between Zadar and the National Park. The potential activities in the Park include sightseeing, hiking, mountaineering, free climbing, alpinism, cycling, bird watching, etc. There are 150 km of trails within the Park. The most visited one is the trail that passes from the reception through the canyon of Velika Paklenica to the mountain hut Paklenica (duration around 2 hours). In addition, the trail that passes from the canyon of Velika Paklenica across Jurline and Njive to the canyon of Mala Paklenica is also popular among visitors (5–6 hours).

5.h.9 Italy: Abruzzo, Lazio & Molise National Park (025, 026, 027, 028, 029)

Description of visitor management

Within the entire Park, visitors may use the official trail network, shown in a map where 150 itineraries are outlined. Some of the trails cross the strict reserves (= component parts), but it is not permitted to leave the marked path. In the strict reserves, neither mountain biking, climbing, and horse trekking are allowed, nor collecting flowers, mushrooms and wild berries, hunting and free camping.

Several tour operators organize guided excursions in the Park. During peak visitation periods, a limitation of the number of visitors can be done in order to avoid excessive stress to animals, especially chamois and bear, which are sensitive during their maximum feeding activity. Many forest roads remain closed to vehicles through the usage of metal bars.

Specific environmental education projects are carried on by local tour operators and schools. The Park also has an Environmental Education Center that provides educational programs for schools.

Visitor infrastructure

The Parks has 9 Visitor Centers (located outside the component parts) to inform the visitors on specific topics: there is a Museum on the Wolf, one on the Marsican Brown Bear and on the park in general. In the forest of one of the component parts (Valle Cervara), an educational trail has been established to inform students and tourists about the importance of the old-growth forests.

5.h.10 Italy: Cozzo Ferriero (030)

Description of visitor management

Visitors can move through the entire Park, using the official trail network, which is shown on a map together with the provided itineraries. Some of the trails cross the strict reserves, but but visitors are not permitted to leave the marked trails. However, there are no trails crossing the area of Cozzo Ferriero. In the strict reserves, neither mountain biking, climbing, and horse trekking are allowed, nor picking flowers, mushrooms and wild berries, hunting and free camping. Unauthorized vehicles may not leave the official roads. Specific environmental education projects are carried on by local tour operators and schools. The Park also has an Ecomuseum (with free access), where is possible to virtually visit the entire territory of the Park.

Visitor infrastructure

Tourists can move freely within the Park, or ask local tour operators/official guides to accompany them in excursions.

The Park has an Ecomuseum to inform the visitors on specific topics: in the Museum, the visitors get to know more on the Park's territory, flora, fauna, history and folklore. It also has a didactic farm and it is building a polyfunctional center for conferences and events, close to the highway and not far from the Park's Headquarters.

There are also dedicated areas for open air activities, informative panels, mountain refuges, and parking areas at the beginning of the most visited zones.

5.h.11 Italy: Foresta Umbra (031)

Description of visitor management

Visitors can freely access the National Park by car on roads or by public transportation. Excursion trails are widespread and marked through specific signs. Tourists can visit the area, but they are required to remain on the marked trails and to not cause any damage to the flora and fauna. Accessing a part of the area of the component part (Falascone) is currently not possible. One thematic trail on the Natura 2000 network is being developed to allow the fruition of the Park by handicapped people. Specific picnic areas are designed.

Visitor infrastructure

A Visitor Center is available to tourists presenting a scale-map of the National Park, a xylotheque, geological samples, and samples of the emergent flora and fauna species as well as a taxidermy collection. Some samples are even located close to parking areas or in the "Giocabosco", a playing area dedicated to children, where they can play "inside and with the forest".

5.h.12 Italy: Monte Cimino (032)

Description of visitor management

Access to the beech forest of Monte Cimino is free throughout the year. The area can be accessed by a road via private vehicles or public transportation. The forest has several excursion trails. Within the forest, logging is excluded. Visitors can move, preferentially on excursion trails.

Visitor infrastructure

An innovative education trail on old-growth forests was developed in collaboration with the University of Tuscia.

5.h.13 Italy: Monte Raschio (033)

Description of visitor management

Visitors can move through the Park freely by using the existing trail network. Specific environmental education projects (Programma Giorni Verdi, Progetto Parco Anch'Io) are carried on by local associations and cooperatives. The Park also has an Environmental Education Centre that provides educational programs for schools.

Visitor infrastructure

The Park has some nature trails passing through and around the component part. Major trails outside the forests are dedicated to horse trekking or mountain biking.

5.h.14 Italy: Sasso Fratino (034)

Description of visitor management

The access to Sasso Fratino is interdicted, and visits are authorized by CFS-UTB, whose rangers accompany the visitors.

Road access is exclusively on the boundary of the property, and CFS-UTB vehicles are the only ones allowed to pass. Visitors may walk or bike on the roads and numerous excursion trails along the boundaries of Sasso Fratino and in the buffer zone, but not inside the component part. The excursion trail 00 is particularly interesting, as it runs on the mountain ridge at the top of the component part from Passo della Calla to the Camaldoli Hermitage, giving the visitor a panoramic view of the Reserve from Poggio Scali.

The access to the trail network and to the buffer zone is free of charge. Guided tours are also organized by Excursion Guides operating within the Park's territory.

The access to the areas close to the component part is possible by car or public transportation, mainly from Passo della Calla through the State Road SS310. Other access points are the Camaldoli Hermitage, Badia Prataglia, Passo dei Mandrioli or Ridracoli, where an electric shuttle service runs along the artificial lake and reaches the Lama Forest, close to the boundary of the strict reserve.

Visitor infrastructure

The Visitor Centers and Information Points are staffed with properly trained operators to help tourists in their visit to the National Park and give information on the protected area. Each Visitor Center is organized according to a specific theme, based on the natural features or the typical elements of its surroundings. These structures often host temporary exhibitions realized or coordinated by the Park, or other divulgation initiatives on nature conservation or other topics. In 2015, the itinerant exhibition "The thousand-year old Foreste Casentinesi – A travel through the old-growth forests of the Foreste Casentinesi, Monte Falterona e Campigna National Park", was organized, explaining the UNESCO process related to the ancient and primeval beech forests of Europe. In accordance with the advancement of the UNESCO process, new events and exhibitions will be organized across the territory of the Park.

The Park also manages a Botanical Garden on the flora of the Apennines and a Planetarium.

The Visitor Centers related to Sasso Fratino are those of Santa Sofia, Badia Prataglia, Camaldoli, as well as the Information Point in Campigna. In Badia Prataglia, the CFS-UTB Pratovecchio manages the Forest Museum "Carlo Siemoni", close to the historical arboretum founded in 1848 by the bohemian silviculturalist, and the Laboratory of Entomology RIN. Moreover, in Camaldoli there is the multimedia Ornithological Museum.

5.h.15 Poland: Bieszczady (035, 036, 037, 038)

Description of visitor management

The area of the Bieszczady National Park (BNP) is crossed by two public roads available for traffic (landscape protection part occupying 81 hectares). There are several parking lots located along the roads, from which tourists can go on hikes on over 140 km of trails. Road infrastructure is outside of the component parts. Trails are equipped with various facilities such as a rain shelters, resting shelters, information boards, etc. In the mountains, including the component parts, it is not allowed to camp overnight. The National Park can also be visited on horseback on designated trails, and in winter on ski. Much of the area of the Park is not available for tourism, in order to ensure calmness in animal refuges. There are several sections of hiking trails within the component part, with a total length of 17 km. There are absolutely no trails in the parts Wolosatka Stream Valley (038) and Terebowiec Stream Valley (037).

Visitor infrastructure

BNP carries out a comprehensive environmental education program directed at teachers, tourist guides, students and visitors to the park. All sorts of workshops, lectures, educational activities and field works are offered. In addition, the Park organizes permanent and temporary exhibitions presenting the natural beauty of the region.

5.h.16 Romania: Cheile Nerei-Beușnița (039)

Description of visitor management

The Cheile Nerei-Beușnița National Park is located in the southwestern part of Romania, in the small mountains of this area. There is a high number of visitors, attracted by the touristic natural features of Nera Gorges and Beușnița Valley, and also by villages like Sasca Montana, Sasca Romana, Bozovici, Ilidia, Ciclova and Oravita town. A number of 25,000 tourists are visiting the National Park every year. Non-guided (individual) tourism is practiced mostly in the more accessible areas, located in the sustainable development and sustainable management zones of the park. The strictly protected zone, in which also the nominated component part is located, is less accessible to visitors which is why there are rather few visitors. In the nominated component part, the visits are limited to the marked paths, either accompanied by a ranger, or unguided. According to the Management Plan, only a small part of the nominated component part will be accessible for guided visits organized by the Administration of the NP for groups of visitors.

Visitor infrastructure

The main access roads are the national roads DN 57 and DN 57 B, together with the regional roads DJ 571, DJ 571 C, and DJ 571 B. There are also a lot of local and forest roads, which facilitate the access to the area by car.

The National Park also has a visitor infrastructure based on well-marked hiking trails.

There is one main touristic trail crossing the National Park along the Nera river, which is used to visit the Gorges of Nera. Another trail follows the Bei river from its confluence with Nera up to its spring in Ochiul Beiului Lake, then the Beusnita river (which is a tributary of Bei river) up to its spring. These trails are used by tourists but also for scientific visits.

There are lots of touristic facilities (accommodation, restaurants, bars, etc.) in the touristic localities Oravita, Sasca Montana, Sasca Romana, Bozovici, Ilidia, Ciclova, etc. in the vicinity of the National Park.

5.h.17 Romania: Codrul Secular Șinca (040)

Description of visitor management

The Sinca ancient forest is situated on the administrative territory of Sinca Village (in the central part of Brasov County), located in the Meridional Carpathians and in the eastern part of the Fagaras Massif. The village is well connected to the national and regional road infrastructure and can be accessed from many directions (Făgăraş, Braşov, Codlea, Zărneşti, Rupea). The closest airport is in Sibiu (SBZ) at 90 km from Sercaia. The closest main town is Fagaras, at 25 km from Sercaia. From Sinca Village, the forest can be accessed through the Stramba forestry road (about 11 km) which is open/passable the whole year.

The guided tours are done with the guidance of a local person of the Forest District (usually the forest engineer responsible for the area) who accompanies the visitors in the field. For these kind of visits, there is an unmarked tourist trail. The Forest District provides the transport from Sercaia to the forest for small groups.

Visitor infrastructure

The guided tour of the forest is done on an unmarked tourist trail. No other touristic trails are planned in the future.

There are two information points for the area: one in Sercaia Village at the office of the administrator of the forests (RPL OS Padurile Sincii RA) and one in the Center for Tourist Information located in Şinca Veche.

Alongside the Stramba forestry road, which connects Sinca Veche Village with the nominated component part, there are two guest houses which offer accommodation and meals, another one is under construction. Also, in the nearby villages (Sinca Noua, Sinca Veche, Sercaita, Poiana Marului, etc.) there are many accommodation facilities.

White tree fungus. Picture: H. Kirchmeir (E.C.O.)

5.h.18 Romania: Codrul Secular Slătioara (041)

Description of visitor management

The visitors are conducted along the marked tourist trail; the visit includes detailed explanations in fixed points where explanatory panels on subjects related to the structure and processes of the old-growth forests are installed.

Visitor infrastructure

The visitor infrastructure consists of two tourist trails (one inside the component part and another one marked, passing the component part) and 6 explanatory panels.

5.h.19 Romania: Cozia (042, 043)

Description of visitor management

The Cozia National Park (CNP) is located in the center of the country close to balneal resort Călimănești-Căciulata-Cozia and the monastic complex Cozia-Turnu-Stânișoara on one of the most circulated corridor that links the south (Wallachia) with the center of the country (Transylvania). This area attracts over 150,000 visitors per year, 30,000 of them also visit the Park and the trend is rapidly increasing. Visitor management is regulated by the Visiting strategy of the CNP and the Management Plan approved by the Administration in 2013 (no. 163/28.02.2013). The document contains the perspective of the Administration regarding tourism in CNP, management principles and objectives for visitors, management actions for visitors and the development of visitor infrastructure. Usually, visitors practice unguided tourism, mostly in the more accessible areas and in the touristic spots (monasteries, waterfalls, see-sights) located in the sustainable development and sustainable management zones of the park. The strictly protected zone, in which also the nominated component parts are located, is less accessible to visitors so the number of visitors is rather low. In the nominated component cluster, visits are limited to the marked paths, either accompanied by a ranger, or unguided. According to the Management Plan, only a small part of the nominated component cluster will be accessible for guided visits, organized by the Administration of the CNP for groups of visitors.

Red fungus. Picture: H. Kirchmeir (E.C.O.)

Visitor infrastructure

The conclusion of a survey conducted by the Administration of the CNP among visitors shows an inadequate visitor infrastructure for informing and educating the visitors. The number of tourists that arrive on group trips and that use the contact data of the Administration of the CNP for getting informed about the possibilities to visit the zone is still low. One of the objectives of the visiting strategy is to develop a visitor infrastructure adapted to the requirements of conservation and to satisfying the needs for getting visitors informed. During the last years, the visitor infrastructure has improved considerably by building the Visiting Center at Brezoi, two Information Points located at Lotrisor Cascada and Varful Cozia, two of the most visited objects from CNP, and by improving 11 visiting routes. These visitor routes are marked appropriately for providing useful information to those interested in travelling through nature. At the entrance points of these routes, information boards and recycle bins for the garbage produced by the tourists that are emptied/cleaned weekly or anytime needed, are provided. In order to offer the opportunity to explore and learn as much as possible about beech forest ecosystems in the CNP, the Management Plan designs thematic trails in both component parts, at the border of the candidate area, offering detailed information about these ecosystems.

5.h.20 Romania: Domogled-Valea Cernei (044, 045, 046)

Description of visitor management

The nominated component parts are located in the National Park Domogled-Valea Cernei that is in the immediate vicinity of the resort Baile Herculane. Access is on the main road that crosses the protected area in the middle (outside the component parts). Because the park is located near a resort, tourism potential is high.

The diverse flora and fauna, with rare endemic and Mediterranean species, as well as cultural and historical aspects of the area, represent a particular interest for tourists. Stands of virgin forests, especially beech forests, are a tourist attraction. The vast majority of tourists visiting the component parts are from neighboring counties.

Currently, there is no entrance fee for visiting the National Park. Therefore, control and supervision of tourism activity is difficult on its surface.

The infrastructure of certain areas is

underdeveloped and some of the access roads to major landmarks are hardly accessible.

Park Administration can not provide complete tour packages because it does not have a cabin to provide accommodation and other facilities for tourists. For tourism development, cooperations with local communities and travel agencies will be developed to enhance eco-tourism.

Visitor infrastructure

The main access road is the national road 66A (D.N. 66A), but there are also local and forest roads. These roads allow access for cars.

5.h.21 Romania: Groșii Țibleșului (047, 048)

Description of visitor management

One of the local persons of the Forest District (either the ranger or the forest engineer responsible for the area) accompanies the visitors in the field. The visitors are guided along the tourist trail, which offers information panels on subjects related to the value of old-growth forests.

Visitor infrastructure

The visitor infrastructure consists of one tourist trail and 2 information panels.

5.h.22 Romania: Izvoarele Nerei (049)

Description of visitor management

The Semenic-Cheile Carasului National Park is located in the southwestern part of Romania, in the largest mountains of this area. There is a high number of visitors, attracted by the touristic villages/cities Valiug, Garana, Brebu Nou, Secu, Resita, Anina, etc. An estimated number of 15,000 of them also visit the National Park. Unguided individual tourism is practiced mostly in the more accessible areas and in the touristic part of the NP, located in the sustainable development and sustainable management zones of the park. The strictly protected zone, in which also the nominated component part area is located, is less accessible to visitors, so the number of visitors is rather low. In the nominated component part area, the visits are limited to the marked paths, either accompanied by a guide, or unguided. According to the Management Plan, only a small part of the nominated component part will be accessible for guided visits organized by the Administration of the NP for groups of visitors.

Visitor infrastructure

The main access road is the regional road DJ 582, but also the national roads DN 58, DN 58A, DN 57. There are also a lot of local and forest roads, which facilitate the access to the area by car.

The National Park also offers visitor infrastructure based on well-signed hiking trails.

There is one touristic trail crossing the component part from north to south, on the main ridge between Nergana and Nerganita rivers. This trail is used for scientific visits, but not so much by regular visitors, because the southern end of the trail (at the exit from the NP) is very far from any locality, which makes the trail very long and difficult.

There are lots of touristic facilities (accommodation, restaurants, bars, etc.) in the touristic localities Valiug, Garana, Brebu Nou, Secu, Resita, Anina, etc.

5.h.23 Romania: Strămbu Băiuț (050)

Description of visitor management

The visitors are conducted along the marked tourist trail; the visit includes detailed explanations in fixed points where information panels on subjects related to the structure and processes of the old-growth forests are installed.

Visitor infrastructure

The visitor infrastructure consists of two tourist trails (one inside of the component and another one marked, passing the component) and 6 information panels.

5.h.24 Slovenia: Krokar (051)

Description of visitor management

Visitors of the Virgin Forest Krokar who arrive either by bus or by own transport are usually welcomed by the guide from SFS at the agreed location in Kočevska Reka or Borovec. Guided by the expert, the visitors arrive at the primeval forest, at the Borovška forest educational trail. The tour can be carried out from the direction Borovec (Inlauf) or from Ravne (the turning on the forest road). Such excursions are previously announced and agreed. There is no accurate data on individual visits. With the aim of increasing awareness and understanding of the importance of pristine nature, nature conservation and appropriate behavior in the forest in general, there are several information boards for the visitors. Some recreation or tourist visitors also contact the Tourist Association of Kočevje or Kočevska Reka, who know the rules of behavior in protected nature and guide visitors only to the edge of the virgin forest or use the Borovška educational trail. Rarely, individuals use the traditional, but unmarked path that leads to the panoramic viewpoint Krokar and to the edge of the cliffs of the river Kolpa's canyon at the edge of the Virgin Forest Reserve, despite the fact that the entry into the reserve is prohibited.

Visitor infrastructure

Currently, no special infrastructure is available for visitors of Virgin Forest Krokar, no special parking spaces, toilets, or catering facilities for visitors. In the 1990s, the SFS designed forest educational paths, among them Borovška forest educational trail. First, the placement of the trail was set that partly runs along the bottom border of the Virgin Forest Krokar. The trail was marked with special signs; moreover, the SFS installed several information boards and prepared a brochure on the Borovška forest educational trail.

5.h.25 Slovenia: Snežnik-Ždrocle (052)

Description of visitor management

The majority of the visitors to the Forest Reserve Snežnik-Ždrocle are hikers who trek to the top of Snežnik. There are several marked hiking trails leading to the top of the Mountain Snežnik that are maintained regularly. The starting points of these trails are mostly on forest roads, where arranged and marked parking places are available for cars. Bus access is possible to the holiday complex Sviščaki. Public transport is not guaranteed in the vicinity of the proposed area. In the Forest Reserve, visiting is only allowed on foot along the marked trails. In the buffer zone, motor traffic is partly limited on forest roads. At the hiking trails there are information boards, which present natural features, Natura 2000 species and the rules of behavior in the Forest Reserve. The greater part of the Forest Reserve is not accessible by marked trails; in accordance with the protection regime, these parts are not allowed for visitors.

Visitor infrastructure

Four marked hiking trails lead through the forest reserve Snežnik-Ždrocle. On top of the Snežnik Mountain, there is the mountain hut Drago Karolin, which is owned by the Alpine Association Snežnik Ilirska Bistrica. The home is open to visitors on weekends and during the whole month of August. Near the mountain hut there is also a mountain refuge, which is permanently open. Other facilities are available to visitors outside the Forest Reserve in Sviščaki, also a mountain lodge, located at a 2 hour hike from the top of Snežnik. Parking possibilities are located at the starting points of the mountain paths, but no other infrastructure (e.g. WC). There are some information boards. Snežnik and its special natural features, especially forests, are also presented on the forest educational trail Sviščaki and the forest educational trail Mašun. Close to Sviščaki in Grda draga, there is a forest hut, and on Mašun, at 13 km from Sviščaki, is the Forest House Mašun, an Information and Educational Center below Snežnik. Both buildings are managed by Slovenia Forest Service. The Forest House Mašun offers facilities for meetings, workshops, exhibitions and an information room about the Brown Bear. The forest educational trail Mašun presents a variety of information on the Snežnik forests, fauna, and history. On Mašun, there is also a guest house which offers accommodation. Slovenia Forest Service conducts guided tours by prior arrangement for the public and professional excursions in the forest educational trails for school groups and the general public.

5.h.26 Spain: Hayedos de Ayllón (053, 054)

Description of visitor management

Tejera Negra component part:

Free access to visitors is considered a compatible use in the Sierra Norte de Guadalajara Natural Park, but it is limited and regulated in the Special Protection Area, which overlaps with the component part Tejera Negra and the buffer area in Guadalajara province. In the component part, there are no paths, it is a very inaccessible place.

In the buffer area, there are two circular walking routes, marked with interpretive panels and direction signs. No guided tours are available at the moment.

In autumn, is mandatory to book the access to the interior tourism park, located at 10 km from the town of Cantalojas, three months in advance. To speed up the reservation there is a website where one can perform these steps, download brochures and information about the regulations on visitor's use of space.

Montejo de la Sierra component part:

In 1988, the regional Government of Madrid established an access control to avoid conservation problems in the beech forest. After some time, this limitation became a program of Natural Heritage interpretation, adapting two routes that were used as guided paths. Free access to the site is prohibited and only available through guided tours.

In 1997, a new route opened and the site received a new zoning: an open area for visitors was differentiated from another, more extensive area, considered strict scientific reserve which is accessible only for the development of research activities and subject to authorization of the management body.

Visitor infrastructure

Near the Tejera Negra component part, at 2 km from Cantalojas Village towards the National Park, the Interpretation Center is situated. It hosts/has several informative-educational elements, like a model scale of the National Park (1:5,000), a descriptive model of the geomorphology of the Sierra de Ayllón, descriptive panels on soil horizons, flora and fauna, as well as an interactive panel on the different ecosystems in the National Park and an audiovisual room.

Other visitor facilities are located in the buffer zone, for example the marked trails Carretas (6 km, circular) and Robledal (17 km), and parking lots for cars, located just on the edge of the buffer zone.

Around the Montejo de la Sierra component part, there are several points of interest. An Information Center on the Biosphere Reserve is located in the village of Montejo de la Sierra, at 8 km from the site. Outside of the protected site, there is a recreational area which is used as a management support and for disseminating information to the public. Then, there is a work building, named Casa del Hayedo, which is not open to the public, but which is useful for controlling the access to the beech forests. Furthermore, an old house called "Antonio López Lillo" near the river Jarama and near the entrance was restored and now hosts a small exhibition which is shown in guided tours, as an alternative in case of bad weather. There is only one existing facility in the scientific reserve area: a scaffolding tower where research equipment (for physiological and weather measurements) is installed.

5.h.27 Spain: Hayedos de Navarra (055, 056)

Description of visitor management

Located in the Western Pyrenees, the cluster is attractive to tourists because of its different natural features. The most extensive beech forest in the Iberian Peninsula, high value biodiversity, lots of trails and the beautiful natural scenery are only some of the many attractions that the area offers.

For the visitors there are staffed Information Points and parking lots at some of the entries to the buffer area of the component parts. In these Points, the visitors are properly informed about the natural features of the zone, some prohibitions and advices in order to ensure that the visitor's awareness of the environment is raised and that they can enjoy a respectful visit. When there are plenty of visitors in an area, the staff redirects the newly arriving visitors to another parking lot and, if this is the case, informs them that there are no more places to park, and restricts the passage.

Autumnal beech forest. Picture: H. Kirchmeir (E.C.O.)

There are no guided tours in the area promoted by the management agency. There are some private enterprises that offer guided tours for visitors, to show the natural and cultural heritage of the area.

Visiting the component parts is not proposed. The goal is to maintain tranquility in them because of their status as strict reserves.

The drafting of a Public Use Management Plan for the three SACs comprising the component parts is planned.

Visitor infrastructure

Ochagavia and Roncal Nature Interpretation Centers are the main facilities for the visitors. Both Centers, situated in the capitals of the valleys of Salazar and Roncal respectively, form part of the Navarra Network of Facilities devoted to environmental education. Both have fully renovated equipment and updated content (2010), supplementing information and education activities with a broad range of tourist-environmental-recreational services, thereby turning these facilities into the main focal points of attraction for such activities in the area, with the aim of assuring a sustained high level of social return.

These Centers also aim to spread their mission throughout the area, among the inhabitants of the Valleys, acting as a catalyst for the environmental activities carried out in the surroundings.

Another Nature Interpretation Centre has recently been opened in “Casas de Irati”, the heart of Irati Valley (East part), and currently another one (the old Munition Factory) is being renovated in Orbaitzeta (valley of Aezkoa), so it can be used as a Visitor Center for the western part of the Irati forest.

There are also several Information Points at the main entrances to the buffer zone, where the staff does their work giving information to the visitors and monitoring the compliance with the conservation measures. Some picnic areas have been established to concentrate the visitors in controlled zones and preserve more fragile areas. Also, there is a network of marked trails between the different valleys.

5.h.28 Spain: Hayedos de Picos de Europa (057, 058)

Description of visitor management

The component cluster is attractive to tourists because of its different features. Biodiversity, a great number of marked trails, guided tours and the beautiful scenery are only some of the many attractions that are offered.

To host that amount of visitors, there are staffed Information Points and parking lots at many of the entrances to the component parts. Here, the visitors are properly informed about the natural features of the area, some prohibitions and advices in order to ensure that the visitors' awareness of the environment is increased and that they can enjoy a respectful visit.

The Management Institution of the Park offers guided tours for interested visitors. The staff explains to the visitors what the botanical, zoological and geological values of the zone are, in order to increase their awareness and understanding. The visitor’s assessment is excellent, highlighting the good conservation status of the nature and the peacefulness of the visit.

Every year, among 4,000 and 6,000 school children participate in Environmental Education Programs organized by the Management Institution of the Park to give them environmental education and increase their awareness of the natural values.

Visitor infrastructure

The area has a wide range of facilities and infrastructure for the visitors. The National Park maintains two Visitor Centers, Pedro Pidal and Sotama, which offer audiovisual projections, permanent exhibitions, sale of publications and other information about the Park. The Visitor Centers are located outside of the component parts. There are four administrative offices, 11 Information Points, two Nature Classrooms, 33 marked official trails, 17 parking lots, 18 viewpoints and six recreation areas. There are also two renovated traditional facilities, Chorco de los Lobos and Chorco de Amieva, which were traditional constructions to hunt wolves, an enemy of the livestock farmers in the past. At present, two Visitor Centers are under construction, one in Posada de Valdeón and another one in Oseja de Sajambre.

All these visitor facilities provide the visitor with a network of Information Points and a wide range of activities to enjoy the nature and learn more about it, respecting the environment and increasing awareness of the natural values.

5.h.29 Ukraine: Gorgany (059)

Description of visitor management

One of the main objectives of the reserve is the conservation of unique natural complexes and environmental education work. In order to spread out environmental knowledge and to raise awareness of stakeholders, an environmental-educational trail for excursions was created. Visitors use forest roads to enter the area. Visits to the Reserve are strictly limited and are only allowed with permission of the Administration of the Gorgany Nature Reserve.

Visitor infrastructure

The Management of the area offers a range of topic-related excursions into the area in order to inform visitors and raise awareness with regard to wilderness. Amongst the range of excursions, those taking the visitor to the pristine core of the wilderness area are the main highlight of the complete visitor program offered by the Administration of the Reserve.

In the near future, the Management plans to establish a Visitor Center of the Reserve for visitors.

This should allow the Administration of the Reserve to raise awareness and environmental culture, and to create broad understanding of current ecological and nature-protection issues amongst a broader public.

5.h.30 Ukraine: Roztochya (060)

Description of visitor management

According to the legislation of Ukraine, recreational activities are prohibited in the nature reserve. Visitors only have access to the component parts for scientific, ecological and cognitive purposes, and when they are guided by a reserve officer. The nominated area is visited by various groups of professional foresters, biologists, and ecologists no more than 5 times a year. The number of people in a group must not exceed 40. Several times a year, small groups of individuals of up to 5 people are allowed to visit the property, to make phenology, forestry, faunal and floral regular monitoring work and external research according to the program of study.

Visitor infrastructure

Outside the nominated component parts in the territory of the reserve, the Administration maintains the Ecocenter, a Museum of Nature, which is annually visited by an average of 5,000 people, mainly schoolchildren and students.

5.h.31 Ukraine: Satanivska Dacha (061)

Description of visitor management

Most visitors of the Satanivska Dacha area are representatives of local communities, scientists, and forest workers. The main ecological goal is to preserve the natural processes without human intervention. However, to increase environmental consciousness and awareness, educational activities are conducted with students of adjacent villages and locals.

Visitor infrastructure

Visitors have access to forest roads in the area.

5.h.32 Ukraine: Synevyr (062, 063, 064, 065)

Description of visitor management

The nominated component parts are in remote locations, so they have practically no visitors. The surrounding areas are mostly visited by small groups of tourists moving along the mountain ridges who do not usually enter into the nominated areas. No hiking trails exist, so therefore organized tourism is practically non-existent.

Visitor infrastructure

Special infrastructure for tourism does not exist in the nominated component parts. Few visitors are using the existing forest roads or mountain paths that were created for the purpose of protection by the National Park Conservation Service, not for tourism development. These roads and trails are located in the periphery of the nominated areas.

5.h.33 Ukraine: Zacharovanyi Krai (066, 067)

Description of visitor management

The nominated component parts are visited by individual representatives of local population, scientists, and foresters. The main conservation goal is to preserve the natural processes without human intervention. However, to increase environmental awareness and knowledge, the entrance of tourists and the local population is allowed, so people can get a sense of pristine nature.

Visitor infrastructure

The nominated component parts are located in the remote and inaccessible part of the National Nature Park, where apart from primeval forests no other tourist highlights are found. Therefore, no tourist infrastructure exists in this area. Under the current legislation, only research activities are permitted here, but some tourists can visit this territory occasionally.

5.i Policies and programs related to the presentation and promotion of the property

The specific challenge in presenting and conveying the nominated component parts lies in the particular features of jointly and with a uniform appearance meeting their communicative function both in regional promotion and in connection with the serial property.

The joint communication strategy

A communication concept “World Heritage Beech Forests” was developed in the process of extending the property which then became the

"Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany" to ensure the best possible information, presentation, and communication of the nominated component parts. The communication strategy for the present extension nomination builds on this previous process and will be further developed in the case of a successful nomination.

This process identified relevant target groups, which remain valid also for the existing extension nomination:

- Local/regional population
- Children/adolescents
- Tourists
- Tourism businesses and associations
- Local/regional politicians and public persons
- National population
- Multipliers

These target groups are prioritized in the strategy to properly communicate the information about the nominated property. The following objectives were part of the German communication strategy in the previous extension process. They remain valid key objectives for communication activities of the present extension nomination:

Raising regional awareness: The population relates to the region and takes a conscious stance towards it. It will therefore look upon the nominated property favorably.

Informational balance: Shortcomings in the subject-specific education have been evened out with a consequent harmonization of the communication structure within the areas.

Creating areas of action: The population is offered the opportunity to get actively involved in supporting the nominated property.

Definition and reinterpretation of terms: Using a target group-specific language, it is possible to ensure the communication between the protagonists and target groups to properly convey the meaning and purpose of the nominated property and its OUV. The notions of nature conservation are also understood by persons who are not active protagonists in nature conservation.

Knowledge popularization: Knowledge and information have been popularized in terms of language and contents to ensure that any alienation through excessive knowledge and the resulting lack of interest is obviated.

Depending on the target groups, different means of communication are to be applied to reach the target groups in an optimal way. This may include means of communication such as professional website, press releases, stakeholder workshops, public presentations and exhibitions.

5.j Staffing levels and expertise (professional, technical, maintenance)

The activities in the nominated component parts are mostly carried out by bodies of the protected area managements or state administrations in charge of the management of the areas. The number of employees in all component parts is sufficient to ensure proper management of the nominated component parts. Based on a broad range of qualifications, necessary activities in the context of protection, administration, maintenance of the area, public relations, visitor management, and monitoring are usually guaranteed.

Due to the large diversity of the individual components and countries staffing, expertise and competences vary. Component parts are either managed by:

- Protected area management staff of the surrounding protected area
- Local/regional nature conservation administration in case that there is no surrounding protected area with a proper management
- Eventual management by local administrations in case the component parts are inaccessible or extremely remote

Consequently, staffing levels vary between 4 and approximately 150 active employees in the nominated component parts and surroundings (as per September 2015). Staff for instance comprise forest managers, protected area specialists, scientists, rangers or wardens, communication officers or public administration depending on the individual situation in the respective components, their specific challenges, tasks, responsibilities and resources.

Table 79: Staffing levels and expertise of the component parts

ID	State Party	Component part/ cluster	Staffing levels and expertise
001	Albania	Lumi i Gashit	The staff of Gashi River is composed of one management specialist and three rangers. They are part of the PA Administration of Kukes region.
002	Albania	Rrajca	The staff of Rrajca consists of two specialists responsible for zone management and zone monitoring, respectively, as well as two rangers. The four of them are part of the PA Administration of Elbasan region.
003	Austria	Dürrenstein	6 permanent employees of the management (thereof 1 person assigned by ÖBf), external experts for guided tours, 2–4 trainees/ year, 3 external experts in charge of wildlife management.
004–007	Austria	Kalkalpen	Kalkalpen National Park: 32 employees (25 full-time, 7 part-time), thereof 17 in administration, 10 in maintenance, 5 in research and management (1 chemist, 2 biologists, 1 graduated forest engineer), plus 2 seasonal trainees. Austrian Federal Forests Administration Kalkalpen: 17 employees (11 full-time, 6 part-time), thereof 3 graduated forest engineers, 1 wildlife ecologist, 5 foresters, 4 forest workers, 1 seasonal trainee. 60 National Park rangers (thereof 9 employees of the Austrian Federal Forests, 14 employees of the Kalkalpen National Park and 37 free employees).
008–012	Belgium	Sonian Forest	Sonian Forest – 008: 1 regional manager/forest engineer, 2 collaborators (1 administrative, 1 educational), 4 forest rangers, 11 forest workers, 2 temporary project collaborators, external experts for communication/participation, for the follow-up of the management planning, for guided tours/education. Sonian Forest – 009 and 010: 2 engineers, 1,8 administrative collaborators, 8 forest rangers, 5,8 forest wardens, 12 forest workers, external experts for communication/participation, for guided tours/education. Sonian Forest – 011 and 012: 1 regional engineer (part-time: 10%), 1 forest ranger (part-time 50%), 2 forest workers (2 x 10 days/year).
013–021	Bulgaria	Central Balkan	CBNP Directorate staff consists of 72 permanent employees. They are separated in 2 departments: Biodiversity, Control and Protection (BCP) and Administrative, Financial and Legal Activities. Each department has a department head, and the BCP department has two sections with a separate department head. 8 experts (in biodiversity, forestry, tourism, uses of pastures and medicinal plants, GIS, PR and constructions) work in the section for Biodiversity, plans, programs and projects, two of them work part-time. The park rangers belong to the section for Control and Protection. Of them, 14 are inspectors and 38 are specialists. 8 experts and specialists work in the Administrative Department.
022	Croatia	Hajdučki i Rožanski Kukovi	The Institution's internal organizational units are: Office of the General Director, National Park Conservation, Promotion and Use Department, Ranger and Technical Services Department, General and Joint Services Department. Northern Velebit National Park Public Institution currently has 19 employees. The Internal Structure and Operating Rules foresee 57 employees, which indicate the Institution's considerable under-capacity to perform its activities. 15 employees are financed from the state budget, while the rest is financed from the Park's income or projects, including seasonal workers. 12 employees have a high level of education, the rest have high school education.

ID	State Party	Component part/ cluster	Staffing levels and expertise
023–024	Croatia	Paklenica National Park	Within all departments, the Internal units of the Institution are: the Director's office, Department for protection, maintenance, conservation, promotion and utilization of national park, Department for promotion, catering and tourism activities, Rangers Department, Department for technical services and maintenance, and Department for general and common services. The Park currently employs 33 persons. 20 employees are financed from the state budget, while the rest is financed from the Park's income. Including seasonal workers, the number of employees throughout the year varies between 35 and 42. The optimum would be reached by filling of all work places envisaged by the Ordinance on Internal structure (51). Currently, according to the Park Authorities, the technical level of the Park's departments is satisfactory, while the gradual filling of work places within the Department for protection, maintenance, conservation, promotion and utilization is needed in order to achieve satisfactory expert level.
025–029	Italy	Abruzzo, Lazio & Molise National Park	The National Park has 105 permanent employees, among them 41 rangers, 5 experts of the Scientific Committee, 12 managing educational programs and visitors' centers, 1 director, and 3 people working on promotion activities. The remaining employees are dedicated to the administration.
030	Italy	Cozzo Ferriero	46 permanent employees, among which 4 are responsible for the Scientific, Promotion and Environmental Education Office, the Administrative Office, the Accounting Office, and the Permits Office. 14 people are experts of the Scientific Service, 4 manage educational programs and the Ecomuseum, 1 Director. The remaining employees are dedicated to the administration.
031	Italy	Foresta Umbra	The National Park has 23 permanent employees, 7 with technical duties. There is a Director and 2 people endorsed for promotion activities. The remaining personnel is administrative staff. The realization and management of educational projects, and the management of Visitor Centers are given to external professionals. The National Forest Service-Office for the Protection of Biodiversity (CFS-UTB) of Foresta Umbra is responsible for the protection and management of the area. 5 Permanent employees from the CFS-UTB are in charge of the maintenance of the forest stands and the related infrastructure.
032	Italy	Monte Cimino	The Municipality of Soriano nel Cimino, owner and responsible for the management of the component part, is governed by a Board (Giunta Comunale) comprised of the Mayor and 4 assessors. The Municipality has 41 employees in total but the following are specifically in charge of the management of the property: the Technical Office, with 6 employees, responsible of the direct management of the site; the Municipal Police (Polizia Municipale), with 7 employees, responsible for the surveillance of the site. Currently, the Municipality has a contract with a private society (Società MULTISERVIZI, 7 employees) for the maintenance of the site. Also, the National Forest Service has a permanent office with 4 employees, who carry out regular controls on the status and the activities within the property.
033	Italy	Monte Raschio	The Regional Park has 36 employees. Of them, 1 is the director, 15 are part of the Park's rangers, and the rest is the administrative staff.
034	Italy	Sasso Fratino	The National Forest Service, Territorial Office for Biodiversity, who directly manages the site, has 24 employees, plus 15 scientific collaborators. The National Park has 4 permanent office employees, responsible for the Promotion, Conservation, Research and Nature Divulgation Office, respectively.

ID	State Party	Component part/ cluster	Staffing levels and expertise
035–038	Poland	Bieszczady	The Directorate: 3 people Department of the Implementation of Nature Conservation: 27 people Department of Accounting and Finance: 7 people Department of Environmental Education: 13 people Department of Public Access and Communication: 5 people Department of Scientific Research and Nature Conservation Planning: 7 people Department of Administration and Property Management: 10 people Hutsul Horse Breeding Centre: 5 people Rangers Service: 6 people Independent Positions: 6 people.
039	Romania	Cheile Nerei-Beușnița	The total number of staff is 12 people: 1 park manager, 1 chief accountant, 1 IT specialist, 1 biologist, 1 specialist in environmental education and relationship with the communities, 1 chief ranger, 6 rangers.
040	Romania	Codrul Secular Şinca	The Administration of the forests included in the nominated property comprises 36 employees: 1 forest district manager, 5 forestry engineers, 3 accountants, 4 district chiefs and 23 rangers. Among those, 3 are specifically in charge with the property area (1 ranger, 1 chief district and 1 forestry engineer). WWF is also involved in this area, with one dedicated specialist in forests, with proper expertise in forest and nature conservation.
041	Romania	Codrul Secular Slătioara	The management of the protected area is coordinated by the responsible person of the protected areas, both at forest directorate and forest district level, who has proper expertise in this field.
042–043	Romania	Cozia	CNP Administration comprises 14 permanent employees: 1 manager, 2 biologists/experts in wildlife, in charge with inventory/assessment, monitoring and biodiversity conservation activities; 1 expert in charge with tourism, relations with local communities, education and public awareness; 1 forest engineer in charge with guarding the forests and the protected areas against illegal activities; 1 accountant in charge with financial and economic activities; 1 IT expert; 6 rangers. For short periods of time, for instant on the duration of certain projects, the permanent staff is completed with external collaborators and with volunteers and internship students who come there for practice.
044–046	Romania	Domogled-Valea Cernei	The total number of staff is 15 people: 1 manager, 1 chief accountant, 1 IT specialist, 1 biologist, 1 specialist in environmental education, 1 chief ranger, and 9 rangers.
047–048	Romania	Groșii Țibleșului	The management of the protected area is coordinated by the responsible person for protected areas, both at forest directorate and forest district level, who has proper expertise in this field. WWF-DC is also involved in this area, with a specialist in forests from Maramureș Branch, with proper expertise in forest conservations.
049	Romania	Izvoarele Nerei	The total number of staff is 13 people: 1 park manager, 1 chief accountant, 1 IT specialist, 1 biologist, 1 specialist in environmental education, 1 chief ranger, 7 rangers.
050	Romania	Strâmbu Băiuț	The management of the protected area is coordinated by the responsible institution for protected areas, both at forest directorate and forest district level, who has proper expertise in this field.

ID	State Party	Component part/ cluster	Staffing levels and expertise
051	Slovenia	Krokar	There is no permanent staff which would mainly deal with the virgin forest Krokar. Krokar is situated within the borders of Slovenia Forest Service (SFS), Regional Unit Kočevje. Employees of the Department of Planning are involved in the context of their regular duties; they carry out the necessary work on measurement, calculation, marking boundaries and markings, conducting excursions (150 hours/year). In the field, the virgin forest is within the responsibility of the SFS local unit Kočevska Reka, in particular the competent district foresters, in the framework of the regular annual direct control in the reserve (24 hours/year).
052	Slovenia	Snežnik-Ždrocle	The management of the Forest Reserve lies within the responsibility of the Slovenian Forest Service, Regional Unit Postojna. For the 79,500 ha of forests in the area, within which the Forest Reserve Snežnik-Ždrocle is situated, the Slovenia Forest Service employs 49 people. Four district foresters and three district hunters are each responsible for their part of the forest reserve. Other employees cover other areas of expertise (for example planning, silviculture, wildlife, work with the public) or other spatial units.
053–054	Spain	Hayedos de Ayllón	In the Sierra Norte de Guadalajara Natural Park (including Tejera Negra component part), the responsible institution, the regional administration of Castilla la Mancha employs 28 people: 1 director-curator of the Natural Park, 2 technicians on wildlife and habitats management, 2 technicians on forest management, 1 technician on game management, 3 coordinators of rangers, 15 environmental agents (rangers), 3 interpretation center administrators, and 1 administrative assistant. In the Sierra del Rincón Biosphere Reserve (including the component part Montejo de la Sierra), the responsible institution, the regional administration of Madrid, employs the following people: 2 senior technicians on management and environmental education, x forest rangers (difficult number to pin down), x specialist workers on prevention and fight against forest fires and maintenance of recreation areas (difficult number to pin down), 1 senior technician as coordinator and team leader in the Reserve, 5 senior technicians on environmental education, 2 technicians, experts on environmental education, and 2 administrative assistants.
055–056	Spain	Hayedos de Navarra	1 head of department (25 years experience), 1 biologist (10 years experience), 12 rangers (varied experience), 1 office worker (2 years experience).
057–058	Spain	Hayedos de Picos de Europa	The management institution of the National Park has the following employees: 3 graduates (2 forest engineers, 1 biologist), 3 office workers, 8 guards and keepers, 4 maintenance staff, 4 guides for guided tours.
059	Ukraine	Gorgany	16 permanent employees of the management and 13 rangers, among them: director: 1 person, deputies of director: 2 persons, scientific department: 4 persons, ecological-educational sector: 2 persons, department of preservation and the protection of natural ecosystems: 4 persons, financial-economic department: 3 persons, and staff of nature-protection scientific research divisions: 13 persons.
060	Ukraine	Roztochya	There are 29 permanent employees in the Roztochya Nature Reserve, including 5 people in administration, 4 workers of state forest protection, 8 scientists (botanists, zoologists, foresters, meteorologists, geographer, ecologist), and 12 people as support staff. All workers of the nature reserve are professionals.
061	Ukraine	Satanivska Dacha	1 Forester (the main place of work); 1 nature protection officer (the main place of work); 4 Scientists (for the monitoring) and 1 nature protection officer (for the monitoring).

ID	State Party	Component part/ cluster	Staffing levels and expertise
062–065	Ukraine	Synevyr	Number of staff as of December 2014: 40 permanent employees of the management and 90 rangers. Among them: Director: 1 person, deputy of director: 3 people, scientific department: 9 people, ecological-educational sector: 5 people, department of preservation and the protection of natural ecosystems: 11 people, financial-economic department: 11 people, staff of nature-protection scientific research divisions: 90 people.
066–067	Ukraine	Zacharovanyi Krai	There are 48 permanent staff members of the Park, 6 of them are invited scholars (academics) who combine their work in the Park with their job at the research institution or university.

Foggy beech forest. Picture: H. Kirchmeir (E.C.O.)

Sun and beech leaves. Picture: H. Kirchmeir (E.C.O.)

6. MONITORING

Monitoring essentially means a periodical, systematic, and uniform investigation of natural parameters which are hallmarks of the outstanding universal value, as well as monitoring of the management of the property whether it continuously complies with the information and criteria presented in the nomination dossier. Thus, monitoring is required to fulfill two main purposes:

- *Main purpose management monitoring:* Provision of sufficient and reliable data to provide evidence for the state of conservation of the property with specific regards to the OUV
- *Main purpose scientific monitoring:* Systematic Collection of data on natural parameters compromising the quality of primeval forests to the benefit of science, to provide information of the state of conservation and to have an early warning system regarding threats or adverse trends

The reporting requirements of UNESCO require an assessment and statement on the following issues:

- *II.2 Statement of Outstanding Universal Value*
- *II.3 Statement of authenticity and/or integrity*
- *II.4 Management*
- *II.5 Factors affecting the property*

Accordingly, monitoring exercises are supposed to substantially contribute to the standard reporting procedures by providing clear and reproducible data.

Key issues of management monitoring

The key characteristic of ancient or primeval beech forests is a strict policy of non-intervention including measures which ensure a free and undisturbed development of the property. Many of the areas are part of larger protected areas or conservation areas. Consequently, indicators for efficient monitoring encompass:

- *Organizational and structural requirements:* Number of JMC, national steering group and working group meetings, available financial and human resources at JMC, country and component level, number of projects

- *Stakeholder involvement, public awareness rising:* Number of stakeholder meetings, visitors, hits on webpage, print materials, press articles, TV/radio broadcasts, etc.

- *Efficiency of law enforcement and implementation of regulations:* Number of incidences, updates on laws and legal agreements

Key issues of scientific monitoring

Following the approach presented and already agreed by the prior extension of the property, monitoring contents explicitly address four spheres, which are of tremendous scientific interest. This type of monitoring has a long history in many of the nominated component parts of the extension, as they are often the only spots to observe and investigate late natural succession stages. Thus, a large amount of (non-harmonized, mostly site specific) monitoring activities already exists covering the following topics:

- *Determination of the natural bases, species and biotopes (inventory)*
- *Permanent observation of natural processes and alterations in the ecosystem, natural forest development dynamics, and its biocoenoses (monitoring)*
- *Special scientific questions and projects (specific ecosystem research)*
- *Social significance, visitor development or behavior, tourism (socio-economic research)*

Since the time of their establishment, most components have well-established monitoring systems in their territories to survey the most important basic parameters.

The ecological monitoring scheme to report on the status of the outstanding universal value will be based on the already agreed monitoring of the existing property "Primeval beech forests of the Carpathians and the Ancient Beech Forests of Germany" (1133bis). This monitoring approach has already been harmonized between the five German component parts and the existing World Natural Heritage property in Slovakia and Ukraine. Both the survey methodology and the data management form are to be standardized. A corresponding methodology manual will be developed at multilateral level after the extension nomination will have been successfully inscribed.

Building on existing monitoring schemes

Monitoring of the indicators, which are characteristic of the outstanding universal value, is based on representative sample areas in the territories applying a consistent methodology. Depending on indicator variability, they are determined on a daily or annual basis or, following the period of Periodic Reporting, at intervals of six years. Moreover, extensive monitoring and research programs are in place in all areas and are implemented in collaboration with research institutes, universities or specialized institutions of the state parties. Furthermore, the collection of biotic data is ensured by specific obligations to undertake surveillance and to report within the scope of the Natura 2000 network in several component parts (EU Habitats and Birds Directive). Hence, the data originate in particular from the permanent monitoring programs of the protected areas as well as from the surveys carried out by the respective institutions. This is to be continued to ensure comparability of the data sets. Additional data are only collected in new surveys in the case that there are no continuous current data sets available. Additionally, existing inventories of the areas serve as a starting point for further monitoring.

Table 80: List of existing monitoring activities within the state parties and component parts

ID	State Party	Type	Since	Responsible Person/Entity	Data Storage Location
001	Albania	Environment (biodiversity) monitoring program	1998	NEA in association with NGO's, universities or scientific institutes	NEA
001	Albania	Fauna data	1991	Regional Forestry Directory	NEA
001	Albania	General data for Protected Areas species, habitats, etc.	2008	Regional Forestry Directory	Regional Forestry Directory and Min. of Environment
001	Albania	Monitoring of forest health – defoliation, diseases and pests	1991	Regional Forestry Directory	Regional Forestry Directory and Min. of Environment
002	Albania	Environment (biodiversity) monitoring program	1998	NEA in association with NGO's, universities or scientific institutes	NEA

002	Albania	Fauna data	1991	Regional Forestry Directory	NEA
002	Albania	General data for Protected Areas species, habitats, etc.	2008	Regional Forestry Directory	Regional Forestry Directory and Min. of Environment
002	Albania	Monitoring of forest health – defoliation, diseases and pests	1991	Regional Forestry Directory	Regional Forestry Directory and Min. of Environment
003	Austria	Bats	2001	Baar & Pölz	Wilderness Area Dürrenstein
003	Austria	Fungi	2001	Kovacs et al.	Wilderness Area Dürrenstein
003	Austria	Management measures	2013	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Monitoring of alien species	2013	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Natural forest development	1985	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Visitor monitoring	2001	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Wildlife monitoring	2013	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Woodpeckers	2001	Management Wilderness Area Dürrenstein	Wilderness Area Dürrenstein
003	Austria	Xylobiont beetles	2001	Zabransky	Wilderness Area Dürrenstein
004–007	Austria	Ecosystem monitoring (Forest Inventory)	1996	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Game monitoring	2001	Kalkalpen National Park, Austrian Federal Forests (ÖBf)	Kalkalpen National Park
004–007	Austria	Integrated monitoring of air pollution effects on ecosystems	1992	Kalkalpen National Park	Federal Environmental Agency (UBA)
004–007	Austria	Monitoring of Bark Beetle	1997	Austrian Federal Forests (ÖBf)	Austrian Federal Forests (ÖBf)
004–007	Austria	Monitoring of breeding success of the Golden Eagle	2008	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of Brown Trout	2001	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of Capercaillie	2003	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of European Otter	2009	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of Lynx	1999	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of forest rejuvenation	1999	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of karst springs	1992	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of meteorological conditions	1993	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of the biological succession of forest fire	2003	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of saproxylic beetles	2008	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of Scarce Fritillary	2012	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Monitoring of Ural Owl	2015	Kalkalpen National Park	Kalkalpen National Park
004–007	Austria	Visitor monitoring	1995	Kalkalpen National Park	Kalkalpen National Park
008–012	Belgium	Amphibians and reptiles	2005	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
008–012	Belgium	Birds of prey	2010	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
008–012	Belgium	Breeding birds	1996	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
008–012	Belgium	Bryophytes and lichens	2002	INBO	Database at INBO
008–012	Belgium	Forest health	1988	INBO – ICP Forests	Database at INBO

008–012	Belgium	Fungi	1980	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
008–012	Belgium	Fungi	2002	INBO	Database at INBO
008–012	Belgium	Lichens and lichenicole fungi	2001	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
008–012	Belgium	Natural dynamics	1987	INBO	FieldMap-database at INBO
008–012	Belgium	Saproxylic beetles	2002	INBO	Database at INBO
008–012	Belgium	Soil sampling	2000	INBO	Database at INBO
008–012	Belgium	Vegetation	2003	Brussels Environment, in association with NGO's, universities or scientific institutes	Species database of Brussels Environment
013–021	Bulgaria	10 species vascular plants – ecology and distribution	2007	Central Balkan National Park Directorate (CBNPD)	CBNPD
013–021	Bulgaria	14 species birds – ecology and distribution	2007	CBNPD	CBNPD
013–021	Bulgaria	7 species mammals – ecology and distribution	2007	CBNPD	CBNPD
013–021	Bulgaria	Forests – ecology	2009	CBNPD	CBNPD
013–021	Bulgaria	*Salmo trutta fario* – ecology and distribution	2007	CBNPD	CBNPD
013–021	Bulgaria	Soils	2004	Regional laboratories of Executive Environmental Agency	CBNPD and EEA
013–021	Bulgaria	Surface waters	2004	Regional laboratories of Executive Environmental Agency	CBNPD and EEA
013–021	Bulgaria	*Vaccinium myrtillus* – phenology and resource evaluation	2007	CBNPD	CBNPD
013–021	Bulgaria	*Zootoca vivipara* – ecology and distribution	2007	CBNPD	CBNPD
022	Croatia	Bark Beetle	2005	Hrašovec B.	Database Northern Velebit National Park, Faculty of Forestry
022	Croatia	Bird (*Emberiza hortulana*)	2008	BIOM	Database Northern Velebit National Park, BIOM
022	Croatia	Birds of prey	2008	BIOM	Database Northern Velebit National Park, BIOM
022	Croatia	Chamois	2012	Šprem N.	Database Northern Velebit National Park, Faculty of Agriculture
022	Croatia	Deposited matter in water	2010	Vebek B.	Database Northern Velebit National Park, Croatian Forest Research Institute
022	Croatia	Fungi	2004	Matočec N., Kušan I.	Database Northern Velebit National Park
022	Croatia	Monitoring of large carnivores	2009	Kusak J., Huber Đ.	Database Northern Velebit National Park, Faculty of Veterinary
023–024	Croatia	Common birds species monitoring	2015	Gordan Lukač	Veliko Rujno, Nature Park Velebit
023–024	Croatia	Common birds species monitoring	2014	Gordan Lukač	Veliko Rujno, Nature Park Velebit
023–024	Croatia	Monitoring of bats in Paklenica National Park	2012	Dina Kovač & Norma Fressel, consultants	Canyon of Velika Paklenica, Paklenica National Park
023–024	Croatia	Monitoring of Brown Bear (*Ursus arctos*) with tracks and cameras	2011	Ranger Franjo Špalj	On 6 locations in Paklenica National Park
023–024	Croatia	Monitoring of Chamois (*Rupicapra rupicapra*)	1998	Marijan Milovac	Paklenica National Park
023–024	Croatia	Monitoring of *Gentiana lutea susp. symphyandra*	2010	Ivana Adžić & Gordan Lukač	Some area of Paklenica National Park
023–024	Croatia	Monitoring of raptors	1995	Gordan Lukač	Lower part of Paklenica NP

023–024	Croatia	Monitoring of stenoendemic species Sandwort (*Arenaria orbicularis Vis.*) in Paklenica NP	2005	Gordan Lukač & Ivana Adžić	Velika and Mala Paklenica canyons in Paklenica NP
023–024	Croatia	Track monitoring of wolfs (Canis lupus)	2005	Ranger Franjo Špalj	In all of Paklenica National Park
023–024	Croatia	Permanent rain monitoring in beech forest	2001	Boris Vrbek	Perina greda in beech forest
023–024	Croatia	Petrophilous birds monitoring	1995	Gordan Lukač	2015, both canyons of Velika and Mala Paklenica in Paklenica NP
025–029	Italy	Bats	2000	Russo et al.	Management body of the protected area (Mgt-PA)
025–029	Italy	Flora	1970	Mangement body of the proteced area (Mgt-PA)	Management body of the protected area (Mgt-PA)
025–029	Italy	Forest inventory	1985	National Forest Service (CFS)	National Forest Service (CFS)
025–029	Italy	Natural forest development	2000	Piovesan et al.	Management body of the protected area (Mgt-PA)
025–029	Italy	Wildlife monitoring	2000	Management body of the protected area (Mgt-PA)	Management body of the protected area (Mgt-PA)
025–029	Italy	Woodpeckers	2006	Management body of the protected area (Mgt-PA)	Management body of the protected area (Mgt-PA)
030	Italy	Griffon reintroduction	2012	Park body	Park archive
030	Italy	Monitoring of Bosnian Pine	2011	University of Florence, University of Tuscia	Park archive
030	Italy	Monitoring of Pollino's endangered flora	2011	University of Pavia, University of Calabria	Park archive
030	Italy	Old-growth forests inventory	2012	Park body	Park archive
030	Italy	Wolf monitoring	2012	Park body	Park archive
031	Italy	Amphibians	2009	Natural studies center	Park archive
031	Italy	Amphibians, reptiles and fish	2008	University of Bari	Park archive
031	Italy	Chiroptera	2008	University of Bari	Park archive
031	Italy	Chiroptera	2009	Natural studies center	Park archive
031	Italy	Roe Deer	2009	Natural studies center	Park archive
031	Italy	Roe Deer	2014	University of Bari	Park archive
031	Italy	Roe Deer conservation	2008	University of Siena	Park archive
031	Italy	Wolf	2014	University of Bari	Park archive
032	Italy	Floristic and vegetation surveys	1997	Anna Scoppola	DAFNE – University of Tuscia
032	Italy	Forest structure	1982	Angela Lo Monaco	DAFNE – University of Tuscia
032	Italy	Forest structure (diameter and height distributions)	1970	Dr. Paltrinieri	Municipality of Soriano nel Cimino
032	Italy	Forest structure (diameter and height distributions) and dendrochronological surveys	1997	Gianluca Piovesan	DAFNE – University of Tuscia
032	Italy	Forest structure (diameter and height distributions), map of structural phases, dendrochronological surveys	2008	Gianluca Piovesan	DAFNE – University of Tuscia
032	Italy	Soil microarthropod communities	2011	Silvia Blasi	DAFNE – University of Tuscia
032	Italy	Tree-ring network	2002	Bartolomeo Schirone	DAFNE – University of Tuscia
033	Italy	Bats	2002	Natural Park Bracciano-Martignano	Natural Park Bracciano-Martignano
033	Italy	Corsican Hare	2007	ARP, ISPRA	Natural Park Bracciano-Martignano
033	Italy	International Waterbird Census	2005	Natural Park Bracciano-Martignano	Natural Park Bracciano-Martignano, Agenzia Regionale Parchi del Lazio

033	Italy	Mammals	2002	Parco Naturale Regionale di Bracciano Martignano	Parco Naturale Regionale di Bracciano Martignano
033	Italy	Raptors	2013	ARP, ALTURA, SROPU	Parco Naturale Regionale di Bracciano Martignano
034	Italy	A landslide floristic monitoring	1993	Bottacci et al.	CFS-UTB archive
034	Italy	Amphibious and small fauna monitoring	2003	Piazzini et al.	Park archive
034	Italy	Avifauna	1992	Coop. Dream, Coop Sterna	CFS-UTB archive, Park archive
034	Italy	*Canis Lupus*	2002	CFS, ISPRA Genetics Laboratory	CFS-UTB archive, Park archive
034	Italy	Census of the deer's bell	1989	Mazzarone et al.	Park archive
034	Italy	Chiropterans	2003	Coop. Dream, Coop. Cibele	CFS-UTB archive, Park archive
034	Italy	Deer experimental census	2008	Lucchesi et al.	CFS-UTB archive
034	Italy	*Felis silvestris* and mustelids	2006	Perugia University, Meldola Ecology Museum	CFS-UTB archive, Park archive
034	Italy	Forest structure and dynamics	1992	DISTAF University of Florence	CFS-UTB archive
034	Italy	Mushrooms	1983	Bernicchia et al.	CFS-UTB archive
034	Italy	National Park flora monitoring	1992	University of Florence	CFS-UTB archive
034	Italy	Ungulates' impact on forestry innovation and on rare floral species	2005	University of Florence, CFS	CFS-UTB archive
035–038	Poland	Evaluation of the effectiveness of treatments for the active protection of meadows	1998	National park service	National park service
035–038	Poland	Fish and aquatic life	2000	National park service and external experts	National park service and external experts
035–038	Poland	Forest dynamic – the forest of the primeval character (selected permanent sample plots)	1991	External experts	External experts
035–038	Poland	Forest dynamic (natural forest development) – statistical method	1993	National park service and external experts	National park service and external experts
035–038	Poland	Large carnivores and ungulates	2006	National park service	National park service
035–038	Poland	Rare and endangered species of vascular plants	2006	National park service and External experts	National park service and External experts
035–038	Poland	Visitor monitoring	1997	National park service	National park service
035–038	Poland	Xylobiont beetles	2015	National park service and External experts	National park service and External experts
039	Romania	Species and habitats monitoring	2014	Calin Uruci	Administration of Cheile Nerei Beusnita National Park
039	Romania	Species and habitats monitoring, Cheile Nerei Beusnita National Park Management Plan	2015	Assoc. prof. Alma Nicolin, Prof. Gicu-Gabriel Arsene	Banat University of Agricultural Sciences and Veterinary Medicine, Timisoara, Romania
040	Romania	Amphibians and reptiles	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
040	Romania	Birds	2014	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
040	Romania	Fish	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
040	Romania	Flora	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
040	Romania	Forest structure inventory and monitoring	2013	Cătălin Roibu, Ph.d.	University Ştefan cel Mare Suceava
040	Romania	Habitats	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras

040	Romania	Invertebrates	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
040	Romania	Mammals	2013	Asociatia Muntii Fagaras	Asociatia Muntii Fagaras
041	Romania	Habitat and species monitoring based on a systematic network	2015	Gabriel Duduman, University Stefan cel Mare Suceava	University Stefan cel Mare Suceava
042–043	Romania	Amphibians	2013	EPC	Administration of CNP
042–043	Romania	Birds	2012	C. Fantana, S. Bugariu, C. Buduleci, M. Attila	Administration of CNP
042–043	Romania	Grazing of mountain grasslands	2012	Administration of CNP	Administration of CNP
042–043	Romania	Habitats	2013	EPC	Administration of CNP
042–043	Romania	Invertebrates	2013	EPC	Administration of CNP
042–043	Romania	Large carnivores (bear and lynx)	2012	Administration of CNP	Administration of CNP
042–043	Romania	Mammals	2013	EPC	Administration of CNP
042–043	Romania	Reptiles	2013	EPC	Administration of CNP
042–043	Romania	Visitors/tourists	2003	Dragoi S. (Forest Research and Management Institute)	Administration of CNP
044–046	Romania	*Canis lupus*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	*Cervus elaphus*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	Evaluating the conservation status of habitats	2014	EPMC Consulting Cluj Napoca	Study to assess the conservation status of habitats
044–046	Romania	*Felis silvestris*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	Inventory and habitats mapping	2014	EPMC Consulting Cluj Napoca	Study on inventory and habitats mapping, distribution of each type of habitat, georeferenced data distribution areas
044–046	Romania	Inventory and mapping of species	2014	EPMC Consulting Cluj Napoca	Study on inventory and mapping of species, georeferencing of distribution areas
044–046	Romania	*Lynx lynx*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	*Primula auricula ssp. serratifolia*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	*Rana dalmatina*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	*Rana temporaria*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	*Rosalia alpina*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
044–046	Romania	Species conservation strategy	2014	EPMC Consulting Cluj Napoca	Species conservation strategy – proposals for the conservation of species of Community interest

044–046	Romania	*Ursus arctos*	2007	Cristescu Veronica	Monitoring plan for biodiversity of community and national interest – Scientific Report
047–048	Romania	Forest structure inventory and monitoring	2013	Cătălin Roibu, Ph.d.	University Ştefan cel Mare Suceava
049	Romania	Monitoring of the status of conservation of species, habitats and landscape	2015	Semenic-Cheile Carasului National Park Administration (according to the Management Plan)	Semenic-Cheile Carasului National Park Administration
049	Romania	Natural forest inventory and monitoring	2004	National Forest Research Institute (INCDS Bucharest) – Dr. Romica Tomescu, Dr. Daniel Turcu	INCDS Bucharest
050	Romania	Forest structure inventory and monitoring	2013	Cătălin Roibu, Ph.D.	University Ştefan cel Mare Suceava
051	Slovenia	Forest stands description, Forest management plan, Forest unit Ravne	1892	Slovenia Forest Service, Regional Unit Kočevje, Department for Planning	Slovenia Forest Service
051	Slovenia	Forest stands description, Forest management plan, Regional unit Kočevje	1970	Slovenia Forest Service, Regional Unit Kočevje, Department for planning	Slovenia Forest Service
051	Slovenia	Measurement of all trees in the forest stands	1961	Slovenia Forest Service, Regional Unit Kočevje, Department for planning	Slovenia Forest Service
051	Slovenia	Permanent sample plots	2004	Slovenia Forest Service, Regional Unit Kočevje, Department for planning	Slovenia Forest Service
051	Slovenia	Research sample plots	1995	University of Ljubljana, Biotechnical faculty, Department of Forestry	University of Ljubljana
051	Slovenia	Wildlife monitoring (large carnivores, capercaille)	1994	Slovenia Forest Service, State hunting reserve Snežnik	Slovenia Forest Service
052	Slovenia	Descriptions of stands with ocular estimate of growing stock and forest composition	1974	Slovenia Forest Service	Slovenia Forest Service, Regional Unit Postojna, Department for Planning
052	Slovenia	Hikers on the top of Snežnik	1961	Alpine Association Snežnik Ilirska Bistrica	Alpine Association Snežnik Ilirska Bistrica
052	Slovenia	Monitoring of forest stands on sample plots or full measurement of all trees	1926	Slovenia Forest Service	Slovenia Forest Service, Regional Unit Postojna, Department for Planning
052	Slovenia	Permanent sample plots in the Ždrocle area	2013	Biotechnical Faculty, Department of Forestry and Renewable Forest Resources	Biotechnical Faculty, Department of Forestry and Renewable Forest Resources
052	Slovenia	Protected species	2004	Institute of the Republic of Slovenia for Nature Conservation	Institute of the Republic of Slovenia for Nature Conservation
052	Slovenia	Wildlife monitoring	1994	Slovenia Forest Service, State Hunting Reserve Jelen	Slovenia Forest Service, State Hunting Reserve Jelen
053–054	Spain	Dendrochronology in beeches to predict how tree species react to temperature rise and increasing droughts in Tejera Negra	2013	Technical University of Munich & Cifor-INIA	Sierra Norte de Guadalajara Natural Park
053–054	Spain	Diagnosis and Management Proposal for adaptation to climate change in the Tejera Negra beech forest	2013	Álvarez, R. & Schwendtner, O. (Genea)	Sierra Norte de Guadalajara Natural Park
053–054	Spain	Different species of lacertids	2013	Museo Nacional de Ciencias Naturales, Madrid	Sierra Norte de Guadalajara Natural Park
053–054	Spain	Iberian flora: macroscopic algae in the Sierra Norte de Guadalajara National Park	2007	Universidad de Granada	Sierra Norte de Guadalajara Natural Par.
053–054	Spain	*Lacerta schreiberi* in Tejera Negra beech forest	2012	Laboratorio de Etología.,Universidad de Valencia	Sierra Norte de Guadalajara Natural Park
053–054	Spain	*Lobaria scrobiculata*	2012	Universidad Rey Juan Carlos	Sierra Norte de Guadalajara Natural Park
053–054	Spain	*Microtus cabrerae* in the Sierra Norte de Guadalajara Natural Park	2011	Universidad Rey Juan Carlos	Sierra Norte de Guadalajara Natural Park
053–054	Spain	Mycological catalog – Sierra Norte de Guadalajara Natural Park	2013	Sociedad Micológica de Madrid	Sierra Norte de Guadalajara Natural Park

053–054	Spain	*Saproxilic coleoptera* in mountain forests in the north of Madrid	1997	J.J. de la Rosa, Universidad Politécnica de Madrid, Doctoral Thesis	Área de Educación Ambiental. Comunidad de Madrid
053–054	Spain	Three forest inventories carried out in the Montejo beech forest (1994, 2005, 2015)	1994	Luis Gil, Universidad Politécnica de Madrid	Área de Educación Ambiental. Comunidad de Madrid
053–054	Spain	Water macroinvertebrates in the Jarama river	2011	CEDEX	Sierra Norte de Guadalajara Natural Park
053–054	Spain	Water macrophytes in the rivers of Tejera Negra beech forest	2011	Universidad de Castilla-La Mancha	Sierra Norte de Guadalajara Natural Park
055–056	Spain	*Dendrocopos leucotos census*	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Improvement of the landscape integration of forest tracks	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Distribution and state of the threatened flora	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Presence of deadwood in beech forests	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Presence of gaps in beech forests	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Preservation and improvement of the groups of secondary tree species in beech forest	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
055–056	Spain	Research about structure and floristic diversity of beech and fir forest of Aztaparreta	2011	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra	Servicio de Conservación de la Biodiversidad – Gobierno de Navarra
057–058	Spain	Annual monitoring of chamois	2015	Borja Palacios/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Annual monitoring of large raptors	2015	Borja Palacios/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Continental wetlands in the north of the Iberian peninsula: management and restoration of peat bogs and hydrophilic environments. (LIFE Project 11 NAT/ES/707, TREMEDAL)	2013	Amparo Mora/Picos de Europa National Park	Picos de Europa National Park/ www.lifetremedal.eu
057–058	Spain	Continuous monitoring of wolf populations	2015	Miguel Menendez/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Mapping threatened flora populations	2006	Amparo Mora/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Monitoring amphibians in the pond Vega de Salambre (*Rana temporaria*)	2007	Amparo Mora / Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Monitoring butterflies (transects), under the Butterfly Monitoring Scheme (BMS), Spain	2013	Amparo Mora/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Monitoring Capercaille and actions leading to its possible reintroduction (LIFE + 09 NAT/ ES/513)	2009	Borja Palacios/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Monitoring of demographic change of *Aster pyrinaeus*	2005	Conservation Area of the Picos de Europa National Park	Management body of Picos de Europa National Park
057–058	Spain	Monitoring of demographic change of threatened vascular flora: *Oxytropis foucadii, Campanula latifolia, Potentilla fruticosa.*	2005	Conservation Area of the Picos de Europa National Park	Management body of Picos de Europa National Park
057–058	Spain	Monitoring of demographic change of wildlife: *Aquila chrysaetos, Neophron percnopterus, Gyps fulvus, Gypaetus barbatus, Tetrao urogallus cantabricus, Ursus arctos, Rupicapra rupicapra, Cervus elaphus, Galemys pirenaicus, Canis lupus*, amphibians and butterflies	1996	Conservation Area of the Picos de Europa National Park	Management body of Picos de Europa National Park

057–058	Spain	Monitoring the presence of Brown Bear and genetic analysis of individuals	1995	Borja Palacios/Picos de Europa National Park	Picos de Europa National Park
057–058	Spain	Monitoring of reproduction of *Campanula latifolia*	2009	Amparo Mora/Picos de Europa National Park	Picos de Europa National Park
059	Ukraine	Monitoring of some group of plants	1999	Administration of Gorgany Nature Reserve	Administration of Gorgany Nature Reserve
059	Ukraine	Monitoring of some groups of fauna	2009	Administration of Gorgany Nature Reserve	Administration of Gorgany Nature Reserve
059	Ukraine	Natural forest development	1999	Administration of Gorgany Nature Reserve	Administration of Gorgany Nature Reserve
060	Ukraine	Birds	1985	Horban I.	Roztochya Nature Reserve
060	Ukraine	Flora	1985	Khomyn I.	Roztochya Nature Reserve
060	Ukraine	Meteorology	1985	Hrebelna V.	Roztochya Nature Reserve
060	Ukraine	Monitoring of invasive species	2000	Khomyn I.	Roztochya Nature Reserve
060	Ukraine	Monitoring of reptilias	1985	Horban L.	Roztochya Nature Reserve
060	Ukraine	Phenology	1985	Skobalo O.	Roztochya Nature Reserve
060	Ukraine	Rare flora species monitoring	1985	Ferents N.	Roztochya Nature Reserve
061	Ukraine	Alien species monitoring	1997	Senior scientist, botanist	Podilski Tovtry National Nature Park
061	Ukraine	Monitoring of fauna	1997	Senior scientist, zoologist	Podilski Tovtry National Nature Park
061	Ukraine	Monitoring of conservation measures	1978	Forester, nature protection officer	Administration of the Yarmolynetske State Forestry Enterprise
061	Ukraine	Monitoring of flora	1997	Senior scientist, botanist	Podilski Tovtry National Nature Park
061	Ukraine	Monitoring of natural forest development	1978	Nature protection officer	Administration of the Yarmolynetske State Forestry Enterprise
061	Ukraine	Visitor monitoring	1978	Nature protection officer	Administration of the Yarmolynetske State Forestry Enterprise
062–065	Ukraine	Abiotic monitoring	1991	Scientist of Synevyr National Nature Park	Synevyr National Nature Park
062–065	Ukraine	Forest monitoring	2005	Scientist of Scientific Research Institute of Mountain Forestry (Ivano-Frankivsk)	Synevyr National Nature Park
062–065	Ukraine	Monitoring of bats	2015	Scientist of Synevyr National Nature Park	Synevyr National Nature Park
062–065	Ukraine	Monitoring of some group of plants	1990	Scientist of Synevyr National Nature Park	Synevyr National Nature Park
062–065	Ukraine	Monitoring of some groups of fauna	2009	Scientist of Synevyr National Nature Park	Synevyr National Nature Park
066–067	Ukraine	Monitoring of bats	2015	A. Kotubey	Zacharovanyi Krai National Nature Park
066–067	Ukraine	Monitoring of flag species of flora and fauna	2009	A. Myhal, L. Potish, V. Lutak	Zacharovanyi Krai National Nature Park
066–067	Ukraine	Monitoring of forests state	2015	I. Shyshkanynets	Zacharovanyi Krai National Nature Park
066–067	Ukraine	Visitor monitoring	2009	E. Giga	Zacharovanyi Krai National Nature Park

6.a Key indicators for measuring the state of conservation

The two part monitoring scheme comprises management indicators as well as ecological indicators, which aim to improve scientific knowledge about the ecological dynamics and the status of forests.

Following the operational guidelines of the World Heritage Committee and recommendations for reporting, the key indicators are proposed as follows:

Key indicator related to "Statement of Outstanding Universal Value"

- Representativeness of component parts and beech forest regions (Do the component parts still give a comprehensive overview of the European beech forest development process?)

Key indicators related to "Statement of authenticity and/or integrity"

- Total area of forest in ha
- Average volume of deadwood (m^3/ha)
- Intensity of game impact
- Intensity of human impact (e.g. compliance with non-intervention policy; visitor numbers)
- Impact of natural disasters (e.g. wildfire, storms, neobiota, etc.)
- Climatic parameters (precipitation, temperature, etc.)

II.4 Key indicators for „Management"

- Degree of stakeholder involvement and satisfaction
- Number of meetings of the IMS committee
- Number of regional and transnational projects (implementation and research projects)
- Number of acquired project funds (share of third party funding)
- Number of public awareness and PR activities

Development of staffing and funding for managing the property. These indicators are suitable for a general assessment of the state of conservation of the property and the general status of the management. Thus, they provide a sound basis for the required reporting exercises. However, existing ecological monitoring schemes across all component parts go far beyond, addressing a wide range of different ecological questions reaching from soil microarthropod community, carnivore or specific beetle monitoring, frequent monitoring of forest development and plant communities to climate and alien species monitoring.

Table 81 illustrates the indicators as well as related methodology and periodicity.
The key indicators were selected in a way that they are largely congruent with the key variables monitored in most of the nominated beech forests. This should allow for the monitoring and direct comparison between the developments in the beech forests of the individual component parts. Especially the impact of climate change on the nominated component parts can be tracked this way. The structural dynamics of the forest populations are the focus of the monitoring processes.
In many component parts and state parties, a forest monitoring system is in place. Most forest monitoring systems have a usual repetition cycle of 10 years. This is meaningful, as changes in forest ecosystems are often developing rather slowly. These forest monitorings are able to provide information on age, forest structure and amount of deadwood, for example. The given periodicity of 10 years may lead to the situation that updated forest data is not available for every UNESCO reporting period.

Management (effectiveness) monitoring

Data on management processes, activities and outcomes are part of the standard documentation, which will be within the responsibility of the Secretariat of the Transnational Joint Management. Minutes of meetings, number of projects and project funding as well as documentation of staffing and PR activities give a comprehensive overview of the general activity and foci of the property and their individual managements. It particularly addresses the issue of transboundary activities.

The perception of local stakeholders is considered a key indicator for a successful management and consequently for the conservation of the property. Thus, the local members of each Integrated Management Panel (IMP) will frequently evaluate local perception by following a short questionnaire focusing on local acceptance, local problems as well as local development processes and eventual benefits related to the World Heritage Property. This allows, besides monitoring of ecological processes and the management activity, for

Table 81: Key indicators for monitoring

Indicator	Method	Periodicity
Key indicator for "Statement of Outstanding Universal Value"		
Representativeness of component parts and beech forest regions	GIS analysis and reports from component parts' managements	Every 6 years
Key indicators for "Statement of authenticity and/or integrity"		
Total area of forest	Ecological monitoring	Every 6–10 years
Average volume of deadwood (m³/ha)	Ecological monitoring	Every 6–10 years
Game impact	Ecological monitoring	Every 6–10 years
Human impact (e.g. compliance with non-intervention policy; visitor numbers)	Visitor monitoring; reports from component parts' managements	Once a year
Fragmentation of sites	Spatial analysis of average size of continuous beech forest stands	Every 6 years
Impact of natural disasters (e.g. wildfire, storms, neobiota, etc.)	Reports from component parts' managements	Every 2–3 years
Climatic parameters (precipitation, temperature, etc.)	Statistical data of meteorological stations	Every 2–3 years
Key indicators for „Management"		
Degree of stakeholder involvement and satisfaction	Focus group discussion/questionnaire	Once a year
Number of meetings of the IMS committees	Minutes of meetings/meeting documentation	Once a year
Number of regional and transnational projects (implementation and research projects)	Information from component parts' managements	Once a year
Number of acquired project funds (share of third party funding)	Internal calculation	Once a year
Number of public awareness and PR activities	Information from component parts' managements	Once a year
Development of staffing and funding for managing the property	Information from component parts' managements	Once a year

documenting monitoring of how the property is perceived locally.

General environmental and climatic parameters

Temperature, precipitation, wind directions and force as well as atmospheric humidity are continuously monitored through a closely meshed network of climate stations at national level. If there are no dedicated climate stations within the component part, the data of the nearest weather station are evaluated.

Spatial parameters

Relevant parameters such as area size, degree of fragmentation, and length of paths in every component parts are monitored based on aerial images and existing GIS data supplied by the cartographic institutes of the respective countries.

Forest structure

In particular, the forest structure has been subject to intense dynamics up to the present day due to the peculiar history of the nominated component parts. This factor is taken into account in the monitoring. The forest structure is surveyed based on living trees and deadwood. Neither the living biomass nor the spatial arrangement of the trees or the deadwood mass remains constant. These structural variables are subject to high natural cyclic dynamics especially in autochthonous natural forests. Alongside with species monitoring, the natural structural cycles and developments rank amongst the most important monitoring contents to prove integrity of the component parts because died-off vegetation, naturally decomposing deadwood, forms the basis for the biodiversity of subnatural beech forests. Large deadwood volumes and the wood being rapidly converted upon ground contact account for the significance of deadwood for the nutrient regime in beech forests, substantially affecting biodiversity.

Biocoenoses and species

Representative sample areas within the territories are already monitored intensively with regards to biodiversity, with monitoring intervals being based on the specific requirements of the species, i.e. their temporal and spatial variability. Ground vegetation, relevant natural forest indicators and endangered species of the natural beech forests are surveyed in six-year cycles. Typical bird indicator species in beech forests are evaluated in six-year cycles. Mammals are monitored periodically. According to European legislation, particularly relevant species are subject to intensified surveillance (EU Habitats Directive). The species inventory is monitored on an ongoing basis, e.g. in order to determine the repopulation by plant or animal species as well as the development of their populations. This does not only apply for invasive animals and plants but also for the natural reconstitution of biocoenoses (e.g. wildcat, lynx). Species and population figures are determined and the extent e.g. of the damage to the forest community caused by game is already being monitored within the scope of regular wildlife monitoring. As faunistic monitoring is very time consuming, only selected component parts will implement a periodic monitoring of selected key species. Fundamental research is done on project basis to reveal new knowledge in biocoenoses and species in beech forests.

Tourism-related parameters

The registration of visitor numbers, hiking trail development, and the touristic infrastructure in the nominated component parts provide important index numbers for the sites to be acknowledged while also documenting the effects of tourism in and around the area.

Table 82: Responsible parties actively contribution to the periodic reporting.

	Indicator	Key responsibility			Method	Periodicity	Location of records
		JMC	Site Mgmt	IMP			
II.2	**Key indicator for "Statement of Outstanding Universal Value"**						
	Representativeness of component parts and beech forest regions				GIS analysis and reports from component parts' managements	Every 6 years	JMC
II.3	**Key indicators for "Statement of authenticity and/or integrity"**						
	Total area of forest				Ecological monitoring	Every 6–10 years	Component part management
	Average volume of deadwood (m³/ha)				Ecological monitoring	Every 6–10 years	Component part management
	Game impact				Ecological monitoring	Every 6–10 years	Component part management
	Human impact (e.g. compliance with non-intervention policy; visitor numbers)				Visitor monitoring; Reports from component parts' managements	Once a year	Component part management
	Impact of natural disasters (e.g. wildfire, storms, neobiota, etc.)				Reports from component parts' managements	Every 2–3 years	Component part management
	Climatic parameters (precipitation, temperature, etc.)				Statistical data of meteorological stations	Every 2–3 years	Component part management
II.4	**Key indicators for „Management"**						
	Degree of stakeholder involvement and satisfaction				Focus group disc./questionnaire	Once a year	Individual IMPs
	Number of meetings of the IMS committees				Minutes of meetings/meeting documentation	Once a year	JMC
	Number of regional and transnational projects (implementation and research projects)				Information from component parts' managements	Once a year	JMC
	Number of acquired project funds (share of third party funding)				Internal calculation	Once a year	JMC
	Number of public awareness and PR activities				Information from component parts' managements	Once a year	JMC
	Development of staffing and funding for managing the property				Information from component parts' managements	Once a year	JMC

6.b Administrative arrangements for monitoring property

The monitoring of the management in the nominated component parts forms part of the tasks of the JMC, which is in charge of collecting the respective information by requesting it from the individual component parts. Furthermore, the coordinator is in charge of preparing the reports for the periodic reporting.

Ecological monitoring in the nominated component parts forms part of the continuous area monitoring and therefore rests with the respective national park or biosphere reserve administrations, which will work on certain aspects of the monitoring processes by themselves, collaborate with technical authorities, universities and institutes, and commission specialists correspondingly. The development of a methodology manual to guide area monitoring also includes a standard data format yet to be specified to allow for a smooth and quick exchange of results and information.

6.c. Results of previous reporting exercises

Given the outstanding importance for ecological research, the forest development has already undergone intensive monitoring in most of the nominated component parts. Inventory results and special issues reach far beyond these designations. Relevant monitoring activities for component parts are listed in the annex (annex 6.c) showing specific ecological or socio-economic monitoring exercises, which vary strongly between the state parties. However, all monitoring exercises show a strong link to the ecological quality of the property. Thus, the property will allow for an unprecedented opportunity for comprehensive primeval or ancient beech forest monitoring in Europe. Further monitoring results will be available in future resulting from new research activities.

Beech shadows. Picture: H. Kirchmeir (E.C.O.)

7 DOCUMENTATION

7.a Photographs and audiovisual image inventory and authorization form

See annex for the authorization forms together with the photographs and images.

7.b Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

See annex for a table of contents and the appropriate records and other documents.

7.c Form and date of most recent records or inventory of property

See annex for a table of contents and the original and summarized documents and records listed in the table below.

Table 83: Form and date of most recent records or inventory of the nominated component parts

ID	State Party	Most recent records or inventory of property	Date
001	Albania	Management Plan Albanian Alps (Gashi River), Draft	2015
002	Albania	Management Plan for Shebenik-Jabllanicë National Park 2015–2024, Draft	2015
008	Belgium	Management Plan component part 008 and Flemish area	2014
009	Belgium	Management Plan component part 009 and Brussels area	2003
011–012	Belgium	Management Plan component parts 011 and 012 and Walloon area	
022	Croatia	Management Plan Northern Velebit National Park 2007–2016	2007
023–024	Croatia	Bats in Paklenica National Park, Report	2014
023–024	Croatia	Biospeleological investigation in Manita cave	2013
023–024	Croatia	Carabid beetles in area of Paklenica National Park, Report	2011
023–024	Croatia	Chamois in Paklenica National Park, Report	2013
023–024	Croatia	Management Plan Paklenica National Park	2007
023–024	Croatia	Natura 2000 species Dinaromys bogdanovi	2014
023–024	Croatia	*Vipera ursinii* in Paklenica NP	2014
025–029	Italy	Management Plan of the Abruzzo, Lazio, Molise National Park 2010–2019	2010
030	Italy	Managament Plan Pollino National Park	2011
031	Italy	Management Plan Gargano National Park	2010
032	Italy	Cimino resolution of the Municipality for establishing the Natural Monument	2015
032	Italy	ManagementPlan-SCI-SPA-MonteCimino	2008
033	Italy	Management Plan Lago Bracciano-Martignano Regional	2014
034	Italy	Management Plan National Park Foreste Casentinesi	2009
035–038	Poland	Nature in the Bieszczady National Park	2003
035–038	Poland	The Popular Conservation Plan Bieszczady National Park	
039	Romania	Accounting Ballance Sheet for 2014 Cheile Nerei Beusnita National Park	2014
039	Romania	Annual Report 2014 Cheile Nerei Beusnita National Park	2014
039	Romania	Management Plan of Cheile Nerei Beusnita National Park	

040	Romania	Inventories in the most representative Romanian old growth forests, Roibu et al. 2013	2013
040	Romania	Exceptional trees in mixed forests of European beech and Silver fir in Ţaga Mountain (Şinca Veche, Braşov), Scientific article	2011
040	Romania	Structural patterns of beech and silver fir suggest stability and resilience of the virgin forest Sinca in the Southern Carpathians, Romania, Scientific article	2015
040	Romania	Biodiversity inventory and habitat mapping of Sinca Noua-Valea Strambei, Scientific documentation	
041	Romania	Brochure on the endangered species, biodiversity and management procedures, Forest District Stulpicani	
041	Romania	Codrul Secular Slătioara, a perl on Bucovina' Suha	2015
041	Romania	High Conservation Value Forests in Forest District Stulpicani	2015
041	Romania	Registry of Biodiversity Inventory in Forest District Stulpicani	2015
044–046	Romania	GIS database habitats and species	
044–046	Romania	Management Plan Domogled-Valea Cernei National Park	
044–046	Romania	Monitoring Plan Domogled-Valea Cernei National Park	
047–048	Romania	Training in Forest Directorate Maramures on high conservation value forests (Training Maramures Forest Directorate.jpg)	
049	Romania	Management Plan of the Semenic-Cheile Carasului National Park 2015	2015
049	Romania	Semenic-Cheile Carasului NP account summary 2013 and half 2014	2013
050	Romania	Last giants of Maramureș, Brochure	
051	Slovenia	Forest Management Plan, Forest unit Ravne 2015-2024	2015
051	Slovenia	Forest Management Plan, Regional unit Kočevje 2011–2020	2011
052	Slovenia	Forest Management Plan, Gomance, 2010–2019	2010
052	Slovenia	Forest Management Plan, Leskova dolina, 2004–2013	2004
052	Slovenia	Forest Management Plan, Mašun, 2014–2023	2014
052	Slovenia	Forest Management Plan, Okroglina, 2013–2022	2013
053–054	Spain	Management Plan, Special Area of Conservation "Cuenca Río Lozoya and Sierra Norte" (Montejo de la Sierra)	2014
053–054	Spain	Management Plan of the Sierra de Ayllón SAC (Tejera Negra)	
055–056	Spain	Larra-Aztaparreta SAC Management Plan	2011
055–056	Spain	Roncesvalles-Selva of Irati SAC Management Plan	2011
057–058	Spain	Master Plan for use and management of the Picos de Europa National Park	
059	Ukraine	Gorgany: Management Plan 2014–2022	2014
060	Ukraine	Biosphere Reserve Roztochya summary	
060	Ukraine	Plant species list of Roztochya Nature Reserve	
061	Ukraine	List of fauna of Podilski Tovtry National Nature Park	
061	Ukraine	List of flora of Podilski Tovtry National Nature Park	
062–065	Ukraine	List of fauna of Synevyr National Nature Park	
062–065	Ukraine	List of flora of Synevyr National Nature Park	
066–067	Ukraine	List of fauna of Zacharovanyi Krai National Nature Park	
066–067	Ukraine	List of flora of Zacharovanyi Krai National Nature Park	

7.d Address where inventory, records and archives are held

Find the addresses where inventory, records and archives of the nominated component parts are held in the table below.

Table 84: Addresses where inventory, records and archives are held

ID	Organization	Name	Address	Phone/Fax	E-mail
001–002	National Agency of Protected Areas	Zamir Dedej, Director	Rr. Durresit, Nr. 27, Tirana, Albania	Phone: +35 (0) 5682080733	zamirdedej@yahoo.com
003	Management Dürrenstein	Wildnisgebiet Dürrenstein	Brandstatt 61, 3270 Scheibbs, Austria	Phone +43 (0) 6649505902	office@wildnisgebiet.at
004–007	Nationalpark O.ö. Kalkalpen Ges.m.b.H.	Nationalpark O.ö. Kalkalpen Ges.m.b.H.	Nationalpark Allee 1, 4591 Molln, Austria	Phone: +43 (0) 7584 36 51 Fax: +43 (0) 7584 36	nationalpark@kalkalpen.at
008–012	Département de l'Etude du milieu naturel et agricole – DEMNA	Lionel Wibail	22, avenue de la Faculté, B-5030 Gembloux, Belgium	Phone: +32 (0) 81 62 04 39 Fax: +32 (0) 81 61 57 27	lionel.wibail@spw.wallonie.be
008–012	Instituut voor Natuur- en Bosonderzoek	Kris Vandekerkhove	Gaverstraat 4, B-9500 Geraardsbergen, Belgium	Phone: +32 (0) 2 525 02 00 Fax: +32 (0) 2 525 03 00	Kris.Vandekerkhove@inbo.be
008–012	Bruxelles Environnement – IBGE	Ben Vander Wijden	Havenlaan 86C, B-3000 Brussels, Belgium	Phone: +32 (0) 2 775 79 01 Fax: +32 (0) 2 775 76 21	bvanderwijden@environnement.irisnet.be
013–021	Central Balkan National Park Directorate	Sergey Aleksandrov	3, Bodra smyana Str., 5300 Gabrovo, Bulgaria	Phone: +35 (0) 9886761994 Fax: +35 (0) 966801277	office@centralbalkan.bg
025–029	Abruzzo, Lazio & Molise National Park	Abruzzo, Lazio & Molise National Park	Viale Santa Lucia, snc, Pescasseroli (Aq) IT, Italy	Phone: +39 (0) 086391131 Fax: +39 (0) 0863912132	info@parcoabruzzo.it
030	Pollino National Park	Pollino National Park	Complesso Monumentale Santa Maria della Consolazione, 85048 ROTONDA (PZ), Italy	Phone: +39 (0) 0973669311 Fax: +39 (0) 0973667802	ente@parcopollino.it
031	Gargano National Park	Gargano National Park	Via S. Antonio Abate, 121 71037 Monte S. Angelo (FG)	Phone: +39 (0) 0884568911 Fax: +39 (0) 0884561348	info@parcogargano.it
031	Corpo Forestale dello Stato	Ufficio Territoriale per la Biodiversità di Forseta Umbra	Località Foresta Umbra, Monte S. Angelo (FG)	Phone: +39 (0) 0884560944	utb.forestaumbra@corpoforestale.it
032	Dafne - University of Tuscia	Gianluca Piovesan / Anna Scoppola	Via SC de Lellis 01100 Viterbo Italy	Phone: +39 (0) 3804399787 Fax: +39 (0) 0761357250	piovesan@unitus.it
033	Parco Naturale Regionale di Bracciano-Martignano	Parco Naturale Regionale di Bracciano-Martignano	Via S. Antonio, 27 00062 Bracciano (RM)	Phone: +39 346 6839872 Fax: +39 (0) 0761357250	
034	Corpo Forestale dello Stato	Ufficio Territoriale per la Biodiversità di Pratovecchio	Via Dante Alighieri, 41, 52015 Pratovecchio (AR), Italy	Phone: +39 (0) 0575583763 Fax: +39 (0) 0575504085	utb.pratovecchio@corpoforestale.it
034	Parco Nazionale delle Foreste Casentinesi, Monte Falterona e Campigna	Sede della Comunità del Parco	via Nefetti 3, 47018 Santa Sofia (FC), Italy	Phone: +39 (0) 0543971375 Fax: +39 (0) 0543973034	info@parcoforestecasentinesi.it

ID	Organization	Name	Address	Phone/Fax	E-mail
035–038	Bieszczady National Park	Leopold Bekier	Ustrzyki Górne 19, 38-713 Lutowiska, Bulgaria	Phone: +48 (0) 13 461 06 50 Fax: +48 (0) 13 461 06 10	dyrekcja@bdpn.pl
039	Cheile Nerei-Beusniţa National Park Administration	Vasile Constantin	Sasca Montană Communne, Sasca Romana village, Principală St., jud. Caraş-Severin, Romania	Phone/Fax: +40 (0) 355 082 200	info@infocheilenerei.ro
040	Asociaţia Munţii Făgăraş	Former administrator of Natura 2000 sites: ROSCI0122 Muntii Fagaras and ROSPA0098 Piemontul Fagaras	Str. Octavian Goga nr 1687, loc Răşinari, 557200, jud. Sibiu, Romania	Phone: +40 (0) 372 71 30 71 Fax: +40 (0) 372 89 87 77	asociatiamuntiifagaras@gmail.com
040	Asociatia Renaturopa	Oliviu Pop	Str. Poienilor nr. 2, Bl. 211B, sc. B, ap. 37, BRAŞOV, 500419, Romania	Phone: +40 (0) 720540045	oliviu.grigore.pop@gmail.com
040	Ministry of Environment, Waters and Forests	Biodiversity Conservation Directorate	12 Libertatii Avenue, 5th district, Bucharest, Romania	Phone: +40 (0) 21 408 95 21 Fax: +40 (0) 21 408 9615; +40 (0) 21 312 42 27	cabinet.ministru@mmediu.ro
040	RPL OS Padurile Sincii RA	Urdea Sorin	str. Principală nr. 16, localitatea Şercaia, judeţul Braşov, Romania	Phone: +40 (0) 368 405 575 Fax: +40 (0) 268 245 811	padurilesincii@yahoo.com
040	WWF Programul Dunăre-Carpaţi România	Radu Vlad	Ioan Caragea Vodă 26, Corp A, Sector 1, 010537 Bucharest, Romania	Phone: +40 (0) 213174996 Fax: +40 (0) 21 317 49 97	rvlad@wwfdcp.ro
41	University Ştefan cel Mare Suceava	Gabriel Duduman	Universităţii 13, 720229 Suceava, Romania	Phone: +40 (0) 230216147, +40 (0) 230522978 Fax: +40 (0) 230521664	gduduman@usv.ro
042–043	Cozia National Park Administration	Pavel Prundurel	Brezoi, str. Lotrului, No. 8A, Valcea County, Romania	Phone: +40 (0) 350421822; +40 (0) 744551375 Fax: +40 (0) 250750256	parcn@cozia.ro; pavel_prundurel@yahoo.com
044–046	Domogled-Velea Cernei National Park Administration	Ioan Gaşpar	Băile Herculane, Strada Castanilor, Nr. 18 325200, Jud. Caraş-Severin, Romania	Phone/Fax: +40 (0) 255 560582	parcdomogled@gmail.com
047–048	WWF Programul Dunăre-Carpaţi România	Radu Vlad	Ioan Caragea Vodă 26, Corp A, Sector 1, 010537 Bucharesti, Romania	Phone: +40 (0) 213174996 Fax: +40 (0) 21 317 49 97	rvlad@wwfdcp.ro
049	Ministry of Culture	Ionut Vulpescu	22 Unirii Avenue, 3rd district, 030833, Bucharest, Romania	Phone: +40 (0) 21 223 28 47 Fax: +40 (0) 21 223 4951	cabinet.ministru@cultura.ro
049	Semenic-Cheile Carasului National Park Administration	Silvia Vasile	Petru Maior St., no. 69A, Reşiţa, Caras-Severin, Romania	Phone: +40 (0) 355 429 929 Fax: +40 (0) 255 222 200	apnscc@gmail.com
050	WWF Programul Dunăre-Carpaţi România	Radu Vlad	Ioan Caragea Vodă 26, Corp A, Sector 1, 010537 Bucharesti, Romania	Phone: +40 (0) 213174996 Fax: +40 (0) 21 317 49 97	rvlad@wwfdcp.ro
051	Slovenia Forest Service, Kočevje	Bojan Kocjan	Rožna ulica 39, 1330 Kočevje, Slovenia	Phone: +386 (0) 18950401	bojan.kocjan@zgs.si
052	Slovenia Forest Service, Postojna	Špela Habič	Vojkova 9, 6230 Postojna, Slovenia	Phone: +386 (0) 5 7000-618	spela.habic@zgs.gov.si
053–054	Dirección General del Medio Ambiente. Comunidad de Madrid.	Mariano González Sáez	C/ Alcala 16, 28014 Madrid, Spain	Phone: +34 (0) 91 438 24 09	dgmedioambiente@madrid.org

ID	Organization	Name	Address	Phone/Fax	E-mail
053–054	Dirección General de Política Forestal y Espacios Naturales	José Juarez	Plaza Cardenal Silicio nº 2, 45071 Toledo, Spain	Phone: +34 (0) 925 24 88 29 Fax: +34 (0) 925 28 68 79	dgpfen@jccm.es
055–056	Servicio de Conservación de la Biodiversidad. Gobierno de Navarra.	Director del Servicio de Biodiversidad	C/ Gongalez Tablas, 9, Pamplona, Navarra, Spain	Phone: +34 (0) 848 426671	biodiversidad@navarra.es
057–058	Dirección del Consorcio Parque Nacional Picos de Europa	Mariano Torre	C/ Arquitecto Reguera, 13 1º, 33004 Oviedo, Asturias, Spain	Phone: +34 (0) 985 241 412 Fax: +34 (0) 985 273 945	picos@pnpeu.es
059	Gorgany Nature Reserve	Gorgany Nature Reserve	Komarova Str., 7, Nadvirna, Svano-Frankivsk Region, 78405, Ukraine	Phone: +380 (0) 347520483 Fax: +380 (0) 347520482	gorgany@meta.ua
060	Nature Reserve "Roztochya"	Nature Reserve "Roztochya"	Sitchovuh Strilciv 7, Ivano-Frankove, 81070, Ukraine	Phone/Fax: +380 (0) 325933391	zaproz25@gmail.com
061	Podilski Tovtry National Nature Park	Podilski Tovtry National Nature Park	Sq. The Polish market, 6, city Kamyanets-Podilskyi, Khmelnitskyi region, 32300, Ukraine	Phone/Fax: +380 (0) 3849 51270	tovtry@mail.ru
061	Yarmolynetske State Forestry Enterprise	Yarmolynetske State Forestry Enterprise	Str. Shevchenka, 2, Settlement Yarmolyntsi Khmelnitskyi region, Ukraine	Phone/Fax: +380 (0) 3853 21425	jardlg@gmail.com
062–065	Synevyr National Nature Park	Synevyr National Nature Park	1626, Synevyr village, Mizhgiria district, Zakarpattia region, 90041, Ukraine	Phone: +380 (0) 314627618 Fax: +380 (0) 314627740	npp-synevyr@ukr.net
066–067	Zacharovanyi Krai National Nature Park	Zacharovanyi Krai National Nature Park	Str. Partizanska, village Ilnytsia, Irshava district, Zakarpattia region, Ukraine	Phone/Fax: +380 (0) 3144 79002	zacharovanijkraj@ukr.net

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*** Parc-Silva S.R.L. (1992): Studiu de sistematizare și organizare a Parcului Național Domogled Valea Cernei, Timișoara – Scientific Report.

*** Planul de management al Sitului ROSCI 0212 Rarău-Giumalău împreună cu Aria de protecție avifaunistică ROSPA 0083munții Rarău-Giumalău (in: http://natura2000.mmediu.ro/upl/ /planuri/ plan).

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*** Amenajamentul unitatii de productie IV – Râoaia, O.S. Strâmbu Băiuț [The Forest Planning unit IV –Râoaia, Forest District Strâmbu Băiuţ]. ICAS. RNP-Romsilva.

*** Amenajamentul unitatii de productie VI Ţibleş (O.S. Groşii Ţibleş ului) [The Forest Planning unit IV – Țibleș, Forest District Groșii Țibleșului]. ICAS. RNP-Romsilva.

8. Contact information of responsible authorities

8.a Preparer

Name and contact information of the coordinators of the extension nomination “Beech Forests of the Carpathians and Other Regions in Europe”:

- The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
  Stubenring 1, 1010 Vienna, Austria
  Phone: +43 (0) 1 711 00-0
  Fax: +43 (0) 1 513 16 79-9900
  E-mail: office@bmlfuw.gv.at
  Web: www.bmlfuw.gv.at

- Federal Environment Agency Austria
  Spittelauer Lände 5, 1090 Vienna, Austria
  Phone: +43 (0) 1 31304
  Fax: +43 (0) 1 31304-5400
  E-mail: office@umwelbundesamt.at
  Web: www.umweltbundesamt.at

- E.C.O. Institute of Ecology
  Lakeside B07 b, 9020 Klagenfurt, Austria
  Phone: +43 (0) 463 504 144
  Fax: +43 (0) 463 504 144-4
  E-mail: office@e-c-o.at
  Web: www.e-c-o.at

Table 85: Preparer of the nomination dossier of the single component parts

ID	Organization	Name	Address	Phone/ Fax	E-mail
001	Regional Directory of Protected Areas	Besnik Hallaci	Lgj. 2, Kukes, Albania	Phone: +355 (0) 693011533	besnikhallaci@hotmail.com
001–002	Biodiversity and Protected Areas Directorate, MoE	Ermal Halimi	Rr. Durresit, Nr. 27, Tirana, Albania	Phone: +355 (0) 694047390	Ermal.Halimi@moe.gov.al
001–002	University of Agriculture	Spase Shumka	Kamez, Tirana, Albania	Phone: +355 (0) 682351130	s.shumka@ppnea.org
002	Regional Directory of Protected Areas	Fatmir Brazhda, Bajram Kullolli	Forest Service Directory, Librazhd, Albania	Phone: +355 (0) 682520932, +355 (0) 692406534 Fax: +355 (0) 1422300	fatbrazhda@yahoo.com bajram.kullolli@gmail.com
003	Management Wilderness Area Dürrenstein	Christoph Leditznig	Brandstatt 61, 3270 Scheibbs, Austria	Phone: +43 (0) 6649505902	office@wildnisgebiet.at
004–007	Nationalpark O.ö. Kalkalpen Ges.m.b.H.	Simone Mayrhofer	Nationalpark Allee 1, 591 Molln, Austria	Phone: +43 (0) 7584 36 51141 Fax: +43 (0) 7584 36 54291	simone.mayrhofer@kalkalpen.at
008–012	Agentschap voor Natuur en Bos	Patrick Huvenne	Duboislaan 14, B-1560 Hoeilaart, Belgium	Phone: +32 (0) 476 89 85 17 Fax: +32 (0) 2 658 24 68	patrick.huvenne@lne.vlaanderen.be
013–021	Central Balkan National Park Directorate	Sergey Aleksandrov	3, Bodra smyana Str., 5300 Gabrovo, Bulgaria	Phone: +359 (0) 66801277, +359 (0) 886761994 Fax: +359 (0) 66801277	s_aleksandrov@centralbalkan.bg

ID	Organization	Name	Address	Phone/ Fax	E-mail
013–021	National Nature Protection Service Directorate, MoEW	Tsvetelina Ivanova	BLVD. “Marija Luiza” 22, 1000 Sofia, Bulgaria	Phone: +359 (0) 2 940 61 06 Fax: +359 (0) 2 940 61 27	tzvety@ moew.government.bg
022	Public Institution Northern Velebit National Park	Svjetlana Lupret-Obradović	Krasno 96, 53 274 Krasno, Croatia	Phone: +385 (0) 53 665 380 Fax: +385 (0) 53 665 390	npsv@np-sjeverni-velebit.hr
022–024	Ministry of Environmental and Nature Protection	Mirna Bojić	Radnička cesta 10, 10000 Zagreb, Croatia	Phone: +385 (0) 1 4866102 Fax: +385 (0) 1 4866 100	mirna.bojic@mzoip.hr
023–024	Public Institution Paklenica National Park	Gordan Lukač	Dr. F. Tudjmana 14a, 23244 Starigrad-Paklenica, Croatia	Phone: +385 (0) 23 369 155 Fax: +385 (0) 23 359 133	sluzba-zastite@paklenica.hr
025–029	Abruzzo, Lazio & Molise National Park	Cinzia Sulli	Viale Santa Lucia snc Pescasseroli (Aq) IT, Italy	Phone: +39 (0) 086391131 Fax: +39 (0) 0863912132	cinzia.sulli@parcoabruzzo.it
030	Pollino National Park	Dr. Giuseppe De Vivo	85040 Rotonda (PZ), Italy	Phone/Fax: +39 (0) 0972 669353	giuseppedevivo@ parcopollino.gov.it
031	Parco Nazionale del Gargano	Carmela Strizzi	Località Foresta Umbra, Italy	Phone: +39 (0) 0884 568911 Fax: +39 (0) 0884 561348	carmelastrizzi@ parcogargano.it
032	Ufficio Tecnico – Urbanistica e Lavori Pubblici	Luigi De Carolis	Piazza Umberto I, 12, 01038 Soriano nel Cimino (VT), Italy	Phone: +39 (0) 0761 742204 Fax: +39 (0) 0761 742253	urbanistica@comune. sorianonelcimino.vt.it
033	Parco Naturale Regionale di Bracciano Martignano	Andrea Cerulli	Via Aurelio Saffi 4/a, 00062 Bracciano, Roma, Italy	Phone/Fax: +39 (0) 06 62208186	acerulli@regione.lazio.it
034	Parco Nazionale delle Foreste Casentinesi, Monte Falterona e Campigna	Dr. Nevio Agostini	Via Nefetti, 3, 47018 Santa Sofia (FC), Italy	Phone: +39 (0) 0543 971375 Fax: +39 (0) 0543 973034	nevio.agostini@ parcoforestecasentinesi.it
035–038	Bieszczady National Park	Przemysław Wasiak	38-713 Lutowiska 2, Poland	Phone: + 48 (0) 13 461 03 50 Fax: +48 (0) 13 461 06 51	ph.wasiak@wp.pl
035–038	Bieszczady National Park	Stanisław Kucharzyk	ul. Bełska 7, 38-700 Ustrzyki Dolne, Poland	Phone: +48 (0) 13 461 10 91 Fax: +48 (0) 13 461 30 62	skucharzyk@bdpn.pl
039	National Research and Development Institute for Silviculture "Marin Drăcea – Timișoara branch	Daniel-Ond Turcu	Aleea Pădurea Verde, nr. 8, Timițoara, Timiș, Romania	Phone: +40 (0) 220 285 Fax: +40 (0) 256 219 962	turcu_dani@yahoo.com
040	National Research and Development Institute for Forests "Marin Drăcea"	Adrian Lorenţ	B-dul Eroilor, nr. 128, Voluntari 077190, Romania	Phone/Fax: +40 (0) 21 3503245	lorentadrian@yahoo.co.uk
041	National Research-Development Institute for Silviculture "Marin Drăcea"	Marius Teodosiu	Calea Bucovinei 73b, 725100 Câmpulung Moldovenesc, Suceava, Romania	Phone: +40 (0) 230314747 Fax: +40 (0) 230314746	marius.teodosiu@gmail.com
042–043	National Research and Development Institute for Forests "Marin Dracea"	Iovu-Adrian Biris	B-dul Eroilor, nr. 128, Voluntari 077190, Romania	Phone: +40 (0) 3503238 Fax: +40 (0) 3503245	iovu.biris@gmail.com; icas@ icas.ro
044–046	I.N.C.D.S. "Marin Dracea" - Timișoara branch	Oliver Merce	Aleea Padurea Verde, nr. 8, Timișoara, Timiș, Romania	Phone: +40 (0) 256 220 085 Fax: +40 (0) 256 219 962	oliver_merce@yahoo.com
047–048	National Research-Development Institute for Silviculture "Marin Drăcea"	Marius Teodosiu	Calea Bucovinei 73b, 725100 Câmpulung Moldovenesc, Suceava, Romania	Phone: +40 (0) 230314747 Fax: +40 (0) 230314746	marius.teodosiu@gmail.com

ID	Organization	Name	Address	Phone/ Fax	E-mail
049	I.N.C.D.S. Marin Drăcea - Timișoara branch	Daniel-Ond Turcu	Aleea Pădurea Verde, nr. 8, Timițoara, Timiș, Romania	Phone: +40 (0) 220 285 Fax: +40 (0) 256 219 962	turcu_dani@yahoo.com
050	National Research-Development Institute for Silviculture "Marin Drăcea"	Marius Teodosiu	Calea Bucovinei 73b, 725100 Câmpulung Moldovenesc, Suceava, Romania	Phone: +40 (0) 230314747 Fax: +40 (0) 230314746	marius.teodosiu@gmail.com
051–052	Ministry of the Environment and Spatial Planning	Katarina Groznik Zeiler	Dunajska 47, Ljubljana, Slovenia	Phone: +386 (0) 14787479	katarina.zeiler-groznik@gov.si
053–058	Bioma Forestal for the Ministerio de Educación y Cultura	Oscar Schwendtner	C/ Zumedia, 8, 31174, Etxauri, Navarra, Spain	Phone: +34 (0) 628 67 56 89	oskar@biomaforestal.es
059	Gorgany Nature Reserve	Olena Slobodian	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 974591990 Fax: +380 (0) 3475 204 82, 204 80	olenaslobodian@gmail.com
059	Gorgany Nature Reserve	Yuliya Klimuk	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 0663072305 Fax: +380 (0) 3475 204 82, 204 80	klimuk.yu@gmail.com
059	Gorgany Nature Reserve	Myron Shpilchak	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 673442655 Fax: +380 (0) 3475 204 82, 204 80	gorgany@meta.ua
059	Ukrainian National Forestry University	Mykola Chernyavskyy	Kobyljanska 1, 79005 Lviv, Ukraine	Phone: +380 (0) 67 3528 187 Fax: +380 (0) 3475 204 82, 204 80	mt41251@gmail.com
060	Nature Reserve "Roztochya"	Galina Stryamets	Sitchovuh Strilciv 7, Ivano-Frankove, 81070, Ukraine	Phone: +380 (0) 975879420 Fax: +380 (0) 325933391	galina.stryamets@gmail.com
061–067	Carpathian Biosphere Reserve	Vasyl Pokynchereda	Krasne Pleso Str., 77, Rakhiv, Zakarpattia region, Ukraine, 90600	Phone: +380 (0) 67 310 01-58 Fax: +380 (0) 3132 22632	Pokynchereda@ukr.net

8.b Official Local Institution/Agency

Table 86: Official local institutions/ agencies

ID	Organization	Name	Address	Phone/Fax	E-mail
001–002	National Agency of Protected Areas	Zamir Dedej	Rr. Durresit, Nr. 27, Tirana, Albania	Phone: +355 (0) 682080733	zamirdedej@yahoo.com
003	Management Wilderness Area Dürrenstein	Christoph Leditznig	Brandstatt 61, 3270 Scheibbs, Austria	Phone: +43 (0) 6649505902	office@wildnisgebiet.at
004–007	Nationalpark O.ö. Kalkalpen Ges.m.b.H.	Nationalpark Zentrum Molln	Nationalpark Allee 1, 4591 Molln, Austria	Phone: +43 (0) 7584 36 51141 Fax: +43 (0) 7584 36 54291	nationalpark@kalkalpen.at
008	Agentschap Onroerend Erfgoed	Sonian Forest	Phoenixgebouw, Kon. Albert II-laan 19 bus 5, B-1210 Brussels, Belgium	Phone: +32 (0) 2 553 16 50	info@onroerenderfgoed.be
008	Agentschap voor Natuur en Bos	Sonian Forest	Graaf de Ferraris-gebouw, Kon. Albert II-laan 20 bus 8, B-1000 Brussels, Belgium	Phone: +32 (0) 2 553 81 02 Fax: +32 (0) 2 553 81 05	anb@vlaanderen.be
009–010	Bruxelles Développement Urbain	Sonian Forest	Rue du Progrès 80/1, B-1035 Brussels, Belgium	Phone: +32 (0) 2 204 17 68/69 Fax: +32 (0) 2 204 15 58	developpement-urbain@sprb.irisnet.be

ID	Organization	Name	Address	Phone/Fax	E-mail
009–010	Bruxelles Environnement / Leefmilieu Brussel – IBGE/BIM	Sonian Forest	Thurn & Taxis-site Havenlaan 86C/3000, B-1000 Brussels, Belgium	Phone: +32 (0) 2 775 75 75 Fax: +32 (0) 2 775 76 21	info@leefmilieubrussel.be
011–012	Département de la Nature et des Forêts – DNF	Sonian Forest	Avenue Prince de Liège 15, B-5100 Namur (Jambes), Belgium	Phone: +32 (0) 81 33 58 08 Fax: +32 (0) 81 33 58 22	damien.bauwens@ spw.wallonie.be
011–012	Département du patrimoine	Sonian Forest	Rue des Brigades d' Irlande 1, B-5100 Namur, Belgium	Phone: +32 (0) 81 33 21 81 Fax: +32 (0) 81 33 24 01	Gislaine.DEVILLERS@ spw.wallonie.be
019–021	Central Balkan National Park Directorate	Cencho Iliev	3 Bodra smyana Str., 5300 Gabrovo, Bulgaria	Phone/Fax: +359 (0) 66801277	office@centralbalkan.bg
022–024	Senj Tourist Board	Viktor Samardžija	Stara cesta 2, 53270 Senj, Croatia	Phone: +385 (0) 53 881-068 Fax: +385 (0) 53 881-219	info@tz-senj.hr
025–029	Abruzzo, Lazio & Molise National Park	Scientific Services	Viale Santa Lucia, snc, Pescasseroli (Aq) IT, Italy	Phone: +39 (0) 086391131 Fax: +39 (0) 0863912132	scientifico@parcoabruzzo.it
030	Pollino National Park	Pollino National Park	Complesso Monumentale Santa Maria della Consolazione, 85048 ROTONDA (PZ), Italy	Phone: +39 (0) 0973669311 Fax: +39 (0) 0973667802	ente@parcopollino.it
031	Corpo Forestale dello Stato	Ufficio Territoriale per la Biodiversità di Foresta Umbra	Località Foresta Umbra, Monte Sant'Angelo (FG), Italy	Phone/Fax: +39 (0) 0884 560944	utbforestaumbra@ corpoforestale.it
032	Corpo Forestale dello Stato	Ufficio Territoriale	Via Madonna di Loreto, 67, 01038 Soriano nel Cimino (VT), Lazio, Italy	Phone: +39 (0) 0761 745336 Fax: +39 (0) 0761 745336	
033	Parco Naturale Regionale di Bracciano Martignano	Parco Naturale Regionale di Bracciano Martignano	Via Aurelio Saffi 4/a, 00062 Bracciano, Rome, Italy	Phone: +39 (0) 06 62208186 Fax: +39 (0) 06 62208186	parcodibracciano@ legalmail.it
034	Corpo Forestale dello Stato	Ufficio Territoriale per la Biodiversità di Pratovecchio	Via Dante Alighieri, 41, 52015 Pratovecchio (AR), Toscana, Italy	Phone: +39 (0) 0575 583763 Fax: +39 (0) 0575/504085	utb.pratovecchio@ corpoforestale.it
034	Parco Nazionale delle Foreste Casentinesi, Monte Falterona e Campigna	Parco Nazionale delle Foreste Casentinesi, Monte Falterona e Campigna	Via Guido Brocchi, 7, 52015 Pratovecchio (AR), Italy	Phone: +39 (0) 0575 50301 Fax: +39 (0) 0575 504497	infosede@ parcoforestecasentinesi.it
035–038	Bieszczady National Park Authority	Leopold Bekier	Ustrzyki Górne 19, 38-713 Lutowiska, Romania	Phone: +48 (0) 13 461 06 50 Fax: +48 (0) 13 461 06 10	dyrekcja@bdpn.pl
035–038	Regional Directorate of State Forests in Krosno	Regional Directorate of State Forests	ul. Bieszczadzka 2, 38-400 Krosno, Romania	Phone: +48 (0) 13 43 73 900 Fax: +48 (0) 13 43 73 902	rdlp@krosno.lasy.gov.pl
035–038	District Office in Ustrzyki Dolne	District Office	ul Bełska 22, 38-700 Ustrzyki Dolne, Romania	Phone: +48 (0) 13 471 10 80 Fax: +48 (0) 13 471 10 73	powiat@bieszczadzki.pl
035–038	District Office in Lesko	District Office	ul. Rynek 1, 38-600 Lesko, Romania	Phone: +48 (0) 13 469 7124 Fax: +48 (0) 13 469 7130	poczta@powiat-leski.pl
039	Cheile Nerei – Beusniţa National Park Administration	Vasile Constantin	Comuna Sasca Montană, sat Sasca Romana, str. Principală, jud. Caraş-Severin, Romania	Phone/Fax: +40 (0) 355 082 200	info@infocheilenerei.ro

ID	Organization	Name	Address	Phone/Fax	E-mail
041	National Forest Administration ROMSILVA, Suceava Forest Directorate	Forest District Stulpicani	Stulpicani, jud. Suceava, Romania	Phone: +40 (0) 230574763 Fax: +40 (0) 230574698	svstulpicani@ suceava.rosilva.ro
042–043	Cozia National Park Administration	Pavel Prundurel	Brezoi, str. Lotrului, No. 8A, Valcea County, Romania	Phone: +40 (0) 350421822 Fax: +40 (0) 250750256	parcn@cozia.ro; pavel_ prundurel@yahoo.com
044–046	Domogled Velea Cernei National Park Administration	Ioan Gaşpar	Băile Herculane, Strada Castanilor, Nr.18, 325200, Jud. Caraş-Severin, Romania	Phone/Fax: +40 (0) 255 560582	parcdomogled@gmail.com
047–048	National Forest Administration ROMSILVA, Maramureș Forest Directorate	Forest Distric Groșii Țibleșului	Str. Principală 417, 437316 Groșii Țibleșului, jud. Maramureș, Romania	Phone: +40 (0) 262388775, +40 (0) 372701722 Fax: +40 (0) 262388776	osgrosi@marasilva.ro
049	Semenic Cheile-Caraşului National Park Administration	Silvia Vasile	Petru Maior St., no. 69A, Reşiţa, Caras-Severin, Romania	Phone: +40 (0) 355 429 929	apnscc@gmail.com
050	National Forest Administration ROMSILVA, Maramureș Forest Directorate	Forest District Strâmbu Băiuț	437027 Strâmbu Băiuţ (nr. 224), jud. Maramureș, Romania	Phone: +40 (0) 262 380.412, +4 (0) 372 701 732 Fax: +40 (0) 262 380 424	osstrimbu@marasilva.ro
051	Slovenia Forest Service, Kočevje	Bojan Kocjan	Rožna ulica 39, 1330 Kočevje, Slovenia	Phone: +386 (0) 18950401	bojan.kocjan@zgs.si
052	Slovenia Forest Service, Postojna	Špela Habič	Vojkova 9, 6230 Postojna, Slovenia	Phone: +386 (0) 5 7000 618	spela.habic@zgs.si
053–054	Dirección General del Medio Ambiente, Comunidad de Madrid	José Manuel Barrueco Andrade	C/ Alcalá 16.,28014 Madrid, Spain	Phone: +34 (0) 91 438 24 75	jose.barrueco@madrid.org
053–054	Dirección General de Política Forestal y Espacios Naturales	José Juarez	Plaza Cardenal Silicio nº 2, 45071 Toledo, Spain	Phone: +34 (0) 925 24 88 29 Fax: +34 (0) 925 28 68 79	dgpfen@jccm.es
055–056	Servicio de Conservación de la Biodiversidad, Gobierno de Navarra	Director del Servicio de Biodiversidad	C/ González Tablas 9, Pamplona, Navarra, Spain	Phone: +34 (0) 848 426671	biodiversidad@navarra.es
057-058	Delegación Territorial de la Junta de Castilla y León en León	/	Servicio Territorial de Medio Ambiente de León - Av. Peregrinos, s/n, 24009, León, Spain	Phone: +34 (0) 987296100	garalvis@jcyl.es, torantma@ jcyl.es
057–058	Dirección del Consorcio Parque Nacional Picos de Europa	Mr. Mariano Torre	C/ Arquitecto Reguera, 13 1º, 33004 Oviedo, Asturias, Spain	Phone: +34 (0) 985 241 412	picos@pnpeu.es
059	Gorgany Nature Reserve	Olena Slobodian	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 974591990 Fax: +380 (0) 3475 204 82, 204 80	olenaslobodian@gmail.com
059	Gorgany Nature Reserve	Yuliya Klimuk	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 663072305 Fax: +380 (0) 3475 204 82, 204 80	klimuk.yu@gmail.com
059	Gorgany Nature Reserve	Myron Shpilchak	Komarova Str.,7, Nadvirna, 78405, Ivano-Frankivsk region, Ukraine	Phone: +380 (0) 673442655 Fax: +380 (0) 3475 204 82, 204 80	gorgany@meta.ua
059	Ukrainian National Forestry University	Mykola Chernyavskyy	Kobyljanska 1, 79005 Lviv, Ukraine	Phone: +380 (0) 67 3528 187 Fax: +380 (0) 3475 204 82, 204 80	mt41251@gmail.com

ID	Organization	Name	Address	Phone/Fax	E-mail
060	Nature Reserve "Roztochya"	Nature Reserve "Roztochya"	Sitchovuh Strilciv 7, Ivano-Frankove, 81070, Ukraine	Phone: +380 (0) 975879420 Fax: +380 (0) 325933391	galina.stryamets@gmail.com
061–067	Carpathian Biosphere Reserve	Vasyl Pokynchereda	Krasne Pleso Str., 77, Rakhiv 90600, Zakarpattia region, Ukraine	Phone: +380 (0) 67-310-01-58 Fax: +380 (0) 3132-22632	Pokynchereda@ukr.net

8.c Other Local Institutions

Table 87: Other local institutions

ID	Organization	Name	Address	Phone/Fax	E-mail
004–007	Hinterstoder-Wurzeralm Bergbahnen AG	Nationalpark Panoramaturm Wurbauerkogel	Dambach 152, 4580 Windischgarsten, Austria	Phone: +43 (0) 7562 20 046 Fax: +43 (0) 7562 20 516	panoramaturm@kalkalpen.at
004–007	Nationalpark O.ö. Kalkalpen Service Ges.m.b.H.	Villa Sonnwend National Park Lodge	Mayrwinkl 80, 4575 Roßleithen, Austria	Phone: +43 (0) 7562 20 592 Fax: +43 (0) 7562 206 14	villa-sonnwend@kalkalpen.at
004–007	Nationalpark O.ö. Kalkalpen Service Ges.m.b.H.	Nationalpark Hengstpaßhütte	Hengstpaß 60, 4581 Rosenau, Austria	Phone: +43 (0) 66488434571 Fax: +43 (0) 7584 36 54	info-hengstpass@kalkalpen.at
004–007	Nationalpark O.ö. Kalkalpen Service Ges.m.b.H.	Nationalpark Besucher-zentrum Ennstal	Eisenstraße 75, 4462 Reichraming, Austria	Phone: +43 (0) 7254 84 14 0 Fax: +43 (0) 72548414640	info-ennstal@kalkalpen.at
004–007	Österreichische Bundesforste AG	Nationalpark-betrieb Kalkalpen	Eisenstraße 75, 4462 Reichraming, Austria	Phone: +43 (0) 7254 20 505 Fax: +43 (0) 72542050520	Kalkalpen@bundesforste.at
004–007	Phyrn-Priel Tourismus GmbH	Phyrn-Priel Tourismus GmbH	Hauptstraße 28, 4580 Windischgarsten, Austria	Phone: +43 (0) 7562 526699 Fax: +43 (0) 7562 5266 10	info@phyrn-priel.net
004–007	Tourismusverband Nationalpark Region Ennstal	Tourismus-verband Nationalpark Region Ennstal	Eisenstraße 75, 4462 Reichraming, Austria	Phone: +43 (0) 7254 8414 0 Fax: +43 (0) 72548414640	info@nationalparkregion.com
004–007	Tourismusverband Nationalpark Region Steyrtal	Tourismus-verband Nationalpark Region Steyrtal	Pfarrhofstraße 1, 4596 Steinbach an der Steyr, Austria	Phone: +43 (0) 7257 8411 13 Fax: +43 (0) 7257 8411 20	info@steyrtal.at
008–012	Bosmuseum 'Jan van Ruusbroec'	NN	Duboislaan 2, B-1560 Hoeilaart, Belgium	Phone: +32 (0) 2 657 93 64	Groenendaal.anb@ vlaanderen.be
008–012	Dienst Toerisme Tervuren	NN	Markt 7A bus 2, B-3080 Tervuren, Belgium	+32 (0) 2 766 53 40	toerisme@tervuren.be
008–012	Fédération du Tourisme de la Province du Brabant Wallon	NN	Parc des Collines – Bâtiment Archimède, Avenue Einstein 2, B-1300 Wavre, Belgium	Phone: +32 (0) 10 23 63 54 Fax: +32 (0) 10 23 63 54	info@destinationbw.be
008–012	Fondation Folon	NN	Drève de la Ramée 6A, B-1310 La Hulpe, Belgium	Phone: +32 (0) 2 653 34 56	reservations@ fondationfolon.be
008–012	Koninklijk Museum voor Midden-Afrika	NN	Leuvensesteenweg 13, B-3080 Tervuren, Belgium	Phone: +32 (0) 2 769 52 11	info@africamuseum.be
008–012	Maison du tourisme de Waterloo	NN	Chaussée de Bruxelles 218, B-1410 Waterloo, Belgium	Phone: +32 (0) 2 352 09 10	info@waterloo-tourisme.be

008–012	Toerisme Hoeilaart	NN	Gemeenteplein 39, B-1560 Hoeilaart, Belgium	Phone: +32 (0) 2 657 05 04 Fax: +32 (0) 10 23 63 54	Toerisme@hoeilaart.be
008–012	Toerisme Overijse/ Centrum Druif	NN	Waversesteenweg 2, B-3090 Overijse, Belgium	Phone: +32 (0) 2 785 33 75	info@overijse.be
008–012	Toerisme Vlaams-Brabant	NN	Provincieplein 1, B-3000 Leuven, Belgium	Phone: +32 (0) 16 26 76 20 Fax: +32 (0) 16 26 76 76	toerisme@vlaamsbrabant.be
008–012	Toerisme Vlaanderen	NN	Graanmarkt 61, B-1000 Brussels, Belgium	Phone: +32 (0) 2 504 03 00 Fax: +32 (0) 2 504 03 77	info@toerismevlaanderen.be
008–012	Visitbrussels – Brussel Info Plein	NN	Koningsstraat 2, B-1000 Brussels, Belgium	Phone: +32 (0) 2 513 89 40	Info@visitbrussels.be
008–012	Wallonie-Bruxelles Tourisme	NN	Rue Saint-Bernard 30, B-1060 Brussels, Belgium	Phone: +32 (0) 2 504 02 11	info@ walloniebruxellestourisme.be
023–024	Tourist Board Starigrad-Paklenica	Marijana Marasović	Trg T. Marasovića 1, 23244 Starigrad-Paklenica, Croatia	Phone: +385 (0) 23 369 255	info@rivijera-paklenica.hr
035–038	Bieszczady Tourist Information Centre in Lesko	Tourist Information Centre	Rynek, 38-600 Lesko, Poland	Phone: +48 (0) 13 469 66 95	lesko@gminy.pl
035–038	Marshal Office of Podkarpackie Voivodeship	Marshal Office	al. Łukasza Cieplińskiego 4, 35-010 Rzeszów, skr. pocztowa 17, Poland	Phone: +48 (0) 17 850 1700 Fax: +48 (0) 17 850 1701	urzad@podkarpackie.pl
039	Ministry of Environment, Waters and Forests	Biodiversity Conservation Directorate	12 Libertatii Avenue, 5th district, Bucharest, Romania	Phone: +40 (0) 21 408 95 21 Fax: +40 (0) 21 408 96 15	cabinet.ministru@mmediu.ro
039	National Forest Administration ROMSILVA	Protected Areas Department	St. Petricani, nr. 9A, sectorul 2, Bucuresti, 023841, Romania	Phone: +40 (0) 21 317 10 05 Fax: +40 (0) 21 316 84 28	office@rnp.rosilva.ro
040	Ministry of Culture	Ionut Vulpescu	22 Unirii Avenue, 3rd district, 030833, Bucharest, Romania	Phone: +40 (0) 21 223 2847; +40 (0) 21 224 25 10 Fax: +40 (0) 21 223 4951	cabinet.ministru@cultura.ro
042–043	Ministry of Culture	Ionut Vulpescu	22 Unirii Avenue, 3rd district, 030833, Bucharest, Romania	Phone: +40 (0) 21 223 2847; +40 (0) 21 224 25 10 Fax: +40 (0) 21 223 4951	cabinet.ministru@cultura.ro
042–043	Ministry of Environment, Waters and Forests	Biodiversity Conservation Directorate	12 Libertatii Avenue, 5th district, Bucharest, Romania	Phone: +40 (0) 21 408 95 21 Fax: +40 (0) 21 408 9615; +40 (0) 21 312 42 27	cabinet.ministru@mmediu.ro
042–043	National Forest Administration ROMSILVA	Protected Areas Department	St. Petricani, nr. 9A, sectorul 2, Bucuresti 023841, Romania	Phone: +40 (0) 21 317 1005; +40 (0) 21 310 06 26 Fax: +40 (0) 21 316 84 28	office@rnp.rosilva.ro; ariiprotejate@rnp.rosilva.ro
044–046	City Hall Băile Herculane	Mayor Vasilescu Nicuşor	Str. Mihai Eminescu nr. 10, Baile Herculane, jud. Caras-Severin, Romania	Phone: +40 (0) 255 560 439 Fax: +40 (0) 255 560 321	primbh@yahoo.com
044–046	Ministry of Culture	Ionut Vulpescu	22 Unirii Avenue, 3rd district, 030833, Bucharest, Romania	Phone +40 (0) 21 223 28 47 Fax: +40 (0) 21 223 4951	cabinet.ministru@cultura.ro
044–046	Ministry of Environment, Waters and Forests	Biodiversity Conservation Directorate	12 Libertatii Avenue, 5th district, Bucharest, Romania	Phone: +40 (0) 21 408 95 21 Fax: +40 (0) 21 408 96 15	cabinet.ministru@mmediu.ro

044–046	National Forest Administration ROMSILVA	Protected Areas Department	St. Petricani, nr. 9A, sectorul 2, Bucuresti, 023841, Romania	Phone: +40 (0) 21 317 10 05 Fax: +40 (0) 21 316 84 28	office@rnp.rosilva.ro
049	Ministry of Environment, Waters and Forests	Biodiversity Conservation Directorate	12 Libertatii Avenue, 5th district, Bucharest, Romania	Phone: +40 (0) 21 408 95 21 Fax: +40 (0) 21 408 96 15	cabinet.ministru@mmediu.ro
049	National Forest Administration ROMSILVA	Protected Areas Department	St. Petricani, nr. 9A, sectorul 2, Bucuresti, 023841, Romania	Phone: +40 (0) 21 317 10 05 Fax: +40 (0) 21 316 84 28	office@rnp.rosilva.ro
051	Forestry Society Kočevje	/	Rožna ul. 39, 1330 Kočevje	Phone: +386 51 687 083	zbitorajc@gmail.com
051	Mountaineering Society Kočevje	/	TZO 16a, 1330 Kočevje	Phone: +386 41 507 853	pdkocevje@pzs.si
051	Municipality Kočevje	/	Ljubljanska cesta 26, 1330 Kočevje	Phone: +386 1 893 82 20	obcina@kocevje.si
051	Municipality Osilnica	/	Osilnica 11, 1337 Osilnica	Phone: +386 1 894 15 05	obcina@osilnica.si
051	Touristic Society Kočevje	/	TZO 47, 1330 Kočevje	Phone: +386 5 997 10 07	td.kocevje@gmail.com
051	Touristic Society Brezpotja	/	TZO 20, 1330 Kočevje	Phone: +386 5 997 10 07	info@kocevje.info
051	Touristic Society Kočevska Reka	/	Morava 37, 1338 Kočevska Reka	Phone: +386 51 308 878	elvis.rajsel@gmail.com
052	Alpine Association Snežnik Ilirska Bistrica	/	Jurčičeva ulica 1, 6250 Ilirska Bistrica	Phone: +386 5 7101 447	pd.sneznik@siol.net
052	Municipality Ilirska Bistrica	/	Bazoviška c. 14, 6250 Ilirska Bistrica	Phone: +386 5 7141 361	obcina.ilirska-bistrica@ ilirska-bistrica.si
052	Municipality Loška dolina	/	Cesta Notranjskega odreda, 1386 Stari trg pri Ložu	Phone: +386 1 7050670	obcina@loskadolina.si
053–054	Ayuntamiento de Montejo de la Sierra	Ayuntamiento de Montejo de la Sierra	Plaza Mayor, 1, 28190 Montejo de la Sierra, Madrid, Spain	Phone: +34 (0) 918697008	
053–054	Ayuntamiento de Cantalojas	Ayuntamiento de Cantalojas	C/ Mayor, s/n, 19275 Cantalojas. Guadalajara, Spain	Phone: +34 (0) 949254126 Fax: +34 (0) 652332625	almucanta@hotmail.com
055–056	Centro Interpretación Naturaleza Ochagavia	Centro Interpretación Naturaleza Ochagavia	Carretera de Izalzu s/n, 31680 Ochagavia, Navarra, Spain	Phone: +34 (0) 948890680	oit.ochagavia@navarra.es
055–056	Centro Interpretación Naturaleza Roncal	Centro Interpretación Naturaleza Roncal	Calle Julián Gayarre s/n, 31415 Roncal, Navarra, Spain	Phone: +34 (0) 948475256	info@cinroncal.es
055–056	Cederna-Garalur	Cederna-Garalur	Polígono Iciz, 31451 Iciz, Navarra, Spain	Phone: +34 (0) 948473063	pirineo.admon@ cederna.es
055–056	Junta General del Valle de Aezkoa	Junta General del Valle de Aezkoa	Calle Santa María s/n, Planta Baja, 31671 Aribe, Navarra, Spain	Phone: +34 (0) 948764375	info@aezkoa.net
055–056	Junta General del Valle de Salazar	Junta General del Valle de Salazar	Calle Rochapea s/n, Planta Baja, 31690 Ezcaroz, Navarra, Spain	Phone: +34 (0) 948890055	junta@valledesalazar.com
055–056	Junta General del Valle de Roncal	Junta General del Valle de Roncal	Paseo Julián Gayarre 5, Planta Baja, 31415 Roncal, Navarra, Spain	Phone: +34 (0) 948475035	juntageneral@vallederoncal.es
057–058	Ayuntamiento de Oseja de Sajambre	/	Carretera General s/n, 24916 Oseja de Sajambre, León, Spain	Phone: +34 (0) 987 74 03 04	info@aytoosejadesajambre.es
057–058	Ayuntamiento de Posada de Valdeón	/	C/ Cantón 2, 24914 Posada de Valdeón, León, Spain	Phone: +34 (0) 987 74 05 04	valdeon@valdeon.org

057-058	Dirección General del Medio Natural	Jose Angel Arranz	C/ Rigoberto Cortejoso 14, 47014, Valladolid, Spain	Phone: +34 (0) 983 419934	dgmn@jcyl.es

8.d Official Web address

Worldheritage.e-c-o.at

9. SIGNATURE ON BEHALF OF THE STATE PARTY

State Party	Name and affiliation	Signature
Republic of Albania		
Republic of Austria		
Kingdom of Belgium		
Republic of Bulgaria		
Republic of Croatia		
Republic of Italy		
Republic of Poland		
Romania		
Republic of Slovenia		
Kingdom of Spain		
Ukraine		

TABLES

FIGURES

ACKNOWLEDGEMENTS

This Nomination Dossier marks a milestone in a long lasting ongoing process. It started at the international conference "Natural Forests in the Temperate Zone of Europe" in October 2003 in Mukachevo, Ukraine. There in the Carpathians the idea of nominating the last big remnants of primeval beech forest started. The successful inscription of the "Primeval Beech Forests of the Carpathians" in 2007 was followed by the inscription of the first extension by 5 component parts in Germany in 2011 in order to form the "Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany".

Following the recommendations of IUCN and UNESCO, Germany started immediately after the inscription a screening process covering whole Europe to come up with a list of the most important and valuable Primeval and/or Ancient Beech Forests in Europe.

This research & development project "European World Heritage Beech Forests" was funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), commissioned by the German Federal Agency for Nature Conservation (BfN) and conducted by the Center for Econics and Ecosystem Management (CEEM), Faculty of Forest and Environment, Eberswalde University for Sustainable Development (HNEE) and E.C.O. Institut for Ecology Klagenfurt.

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Beside those mentioned above, more than 230 people have contributed to the selection of sites, the description of component parts and the negotiation of cooperation concepts on the level of ministries, component parts and scientific boards (in alphabetical order):
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Gogic (BA), Călin Gotea (RO), Nikolaos Grigoriadis (GR), Victoria Gubko (UA), Špela Habič (SI), Marjutka Hafner (SI), Besnik Hallaci (AL), Tomaž Hartman (SI), Martina Hobi (CH), Peter Hobson (GB), Ihor Horban (UA), Slavco Hristovski (MK), Michael Huber (AT), Christof Hugentobler (RO), Dănuț Iacob (RO), Ivanenko Igor (UA), Alina Teodora Șinculeț (RO), Yanitsa Ivanova (BG), Tilman Jaeger (BR), Oner Jakupovski (MK), José Juarez (ES), Michael Jungmeier (AT), Kemajl Kadriu (XK), Nexhmije Kamberi (XK), Viktor Kantsurak (UA), Ihor Khomyn (UA), Roman Kish (UA), Yuliya Klimuk (UA), Bojan Kocjan (SI), Tadej Kogovšek (SI), Alenka Korenjak (SI), Oleksandra Kuchynska (UA), Dejan Kulijer (BA), Bajram Kullolli (AL), Viorel Lascu (RO), Laura Leca (RO), Isabelle Leroy (BE), Liudmyla Liubinska (UA), Nicolás López (ES), Adrian Lorenț (RO), Gordan Lukač (HR), Crisanta Lungu (RO), Svjetlana Lupret-Obradović (HR), Michael E. Luthardt (DE), Sergio Madonna (IT), Christiana Marcu (RO), Elia Mardones (ES), Ion Irinel Marica (RO), Felipe Martínez (ES), Julio Miguel Martínez Pérez (ES), Aika Martinicorena (ES), Ioan Mârzac (RO), Simone Mayrhofer (AT), Ioannis Meliadis (GR), Oliver Merce (RO), George Mierliță (RO), Dana Mihai (RO), Marijan Milovac (HR), Vasyl Mochan (UA), Viorel Mone (RO), Joan Montserrat (ES), Amparo Mora Cabello de Alba (ES), Carlos Morla Juaristi (ES), Michaela Mrazova (SK), Hartmut Müller (AL), Jan-Peter Mund (DE), Pablo Muñoz Trigo (ES), Radu Muntean (RO), Dan Munteanu (RO), Andriy Mykhailyk (UA), Elsa Nickel (DE), Ștefan Nițu (RO), Irene Oberleitner (AT), José Miguel Olano (ES), Gianluca Olivieri (IT), Carlo Ossola (CH), Monika Paar (AT), Daniel Alexandru Paicu (RO), Petru Pârvulescu (RO), Reinhard Pekny (AT), María del Val Pérez Nevado (ES), Gianluca Piovesan (IT), Milan Piros (SK), Jean-François Plumier (BE), Dan Popescu (RO), Riccardo Primi (IT), Bohdan Prots (UA), Pavel Prundurel (RO), Giovanni Quilghini (IT), Ángel Quirós (ES), Longin Ioan Rați (RO), Gregory Reinbold (BE), María Jesús Rivera Pantoja (ES), Esther Rodríguez García (ES), Dragan Roganović (ME), Stejărel Rotariu (RO), Gertrud Sahler (DE), Julia Sauermann (DE), Aldo Schettino (IT), Bartolomeo Schirone (IT), Christel Schroeder (DE), Sabrina Schwarz (DE), Anna Scoppola (IT), Alfonso Senosiain (ES), Jutta Seuring (DE), Froilán Sevilla (ES), Muron Shpilchak (UA), Spase Shumka (AL), Tea Šilić (HR), Olena Slobodian (UA), John Samad Smaranda (RO), Erika Stanciu (RO), Cristian Stoiculescu (RO), Nenad Strizrep (HR), Carmela Strizzi (IT), Halyna Stryamets (UA), Natalija Stryamets (UA), Cinzia Sulli (IT), Marius Teodosiu (RO), Vitomir Tepavcevic (ME), Yuriy Tiukh (UA), Mariano Torre Antón (ES), Vlatko Trpeski (MK), Sorin Urdea (RO), Călin Uruci (RO), Frederik Vaes (BE), Klaas Van Dort (ES), Kris Vandekerkhove (BE), Ilse Vanderheyden (BE), Nele Vanmaele (BE), Stéphane Vanwijnsberghe (BE), Constantin Vasile (RO), Ángel Vela (ES), Živan Veselič (SI), Luis Villar (ES), Radu Vlad (RO), Ionuț Vulpescu (RO), Erich Weigand (AT), Tomasz Winnicki (PL), Jesper Witzell (SE), Stepan Yusup (UA), Janez Zafran (SI), Claudiu Zaharescu (RO), Marzio Zapparoli (IT) and Svitlana Zyman (UA).

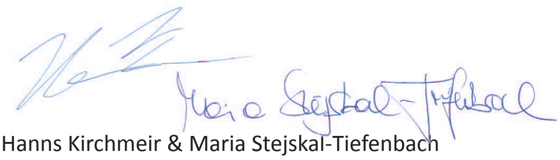
Last, but not least, we would like to express our special thanks to two people:

Hans-Dieter Knapp (BfN, DE) for being the mentor of the whole beech forest process, inviting the scientific community several times to the island of Vilm and sharing his incredible knowledge and experience with the whole group at all the international meetings and excursions.

Anna Kovarovics (E.C.O., AT), for her power in endurance and patience in the collection of component parts descriptions, materials, answering hundreds of emails and compiling all the information into this Nomination Dossier and finally giving it a wonderful layout.

With thanks to all that have contributed (including those, we might have not listed above) – it was a very pleasant work and wonderful experience to be embedded in the European Beech Forest Network!

For the project team

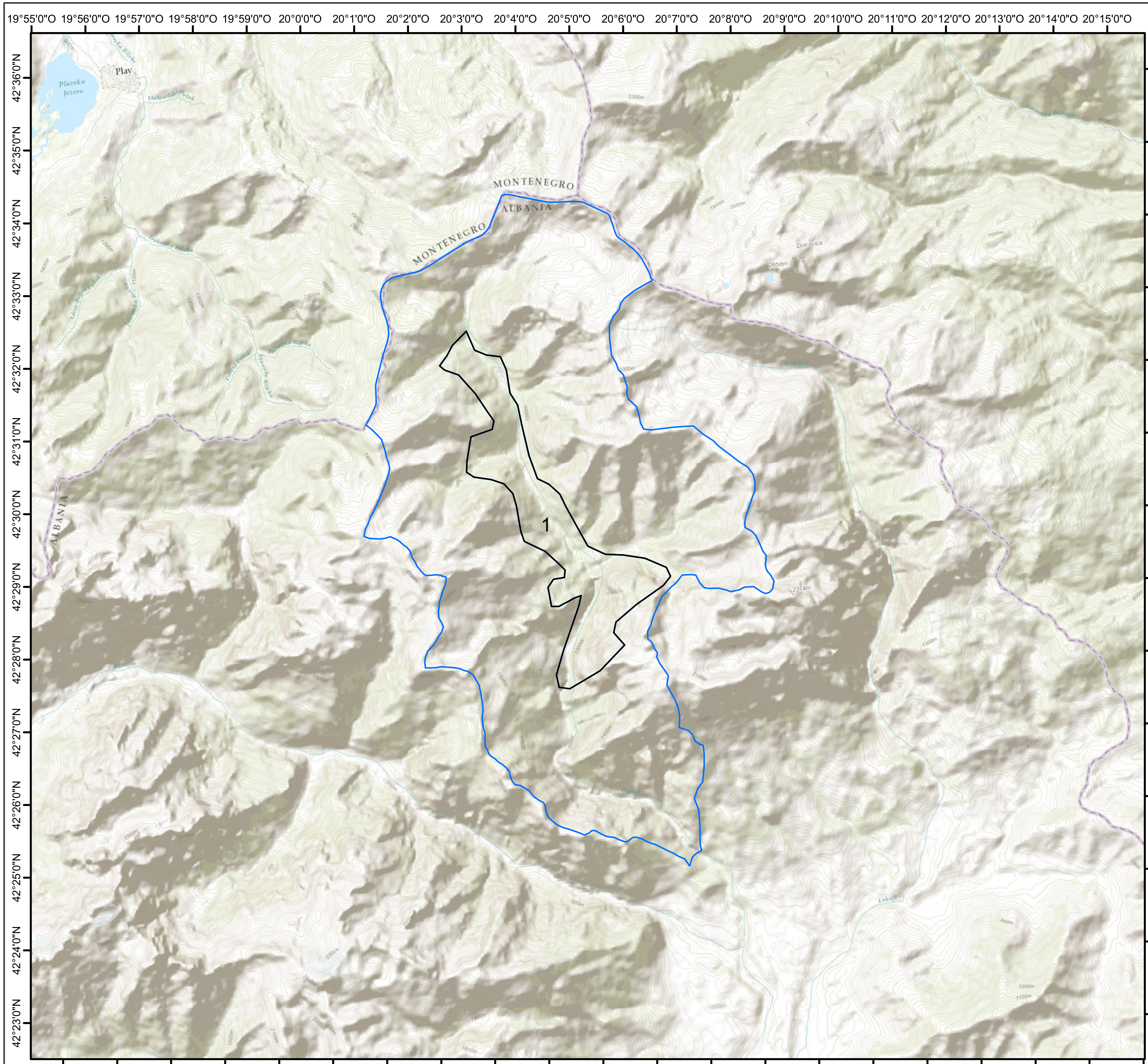


Hanns Kirchmeir & Maria Stejskal-Tiefenbach

MAPS

Annex 1.e printed maps of the nominated component parts (A3).

The extend of the property can also be seen in the interactive Web-GIS system available at http://worldheritage.e-c-o.at/map/?mapset=welterbe. At this application individual zooming is possible and satelite image as background is available.



Annex 1.e.AL_LUMI

Topographic map of the nominated component part(s) Lumi i gashit

Albania

Beech Forest Region:

Moesian-Balcanic

Component part number(s):	001
Size of property in hectar:	1,261.52
Size of buffer zone in hectar:	8,977.48

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

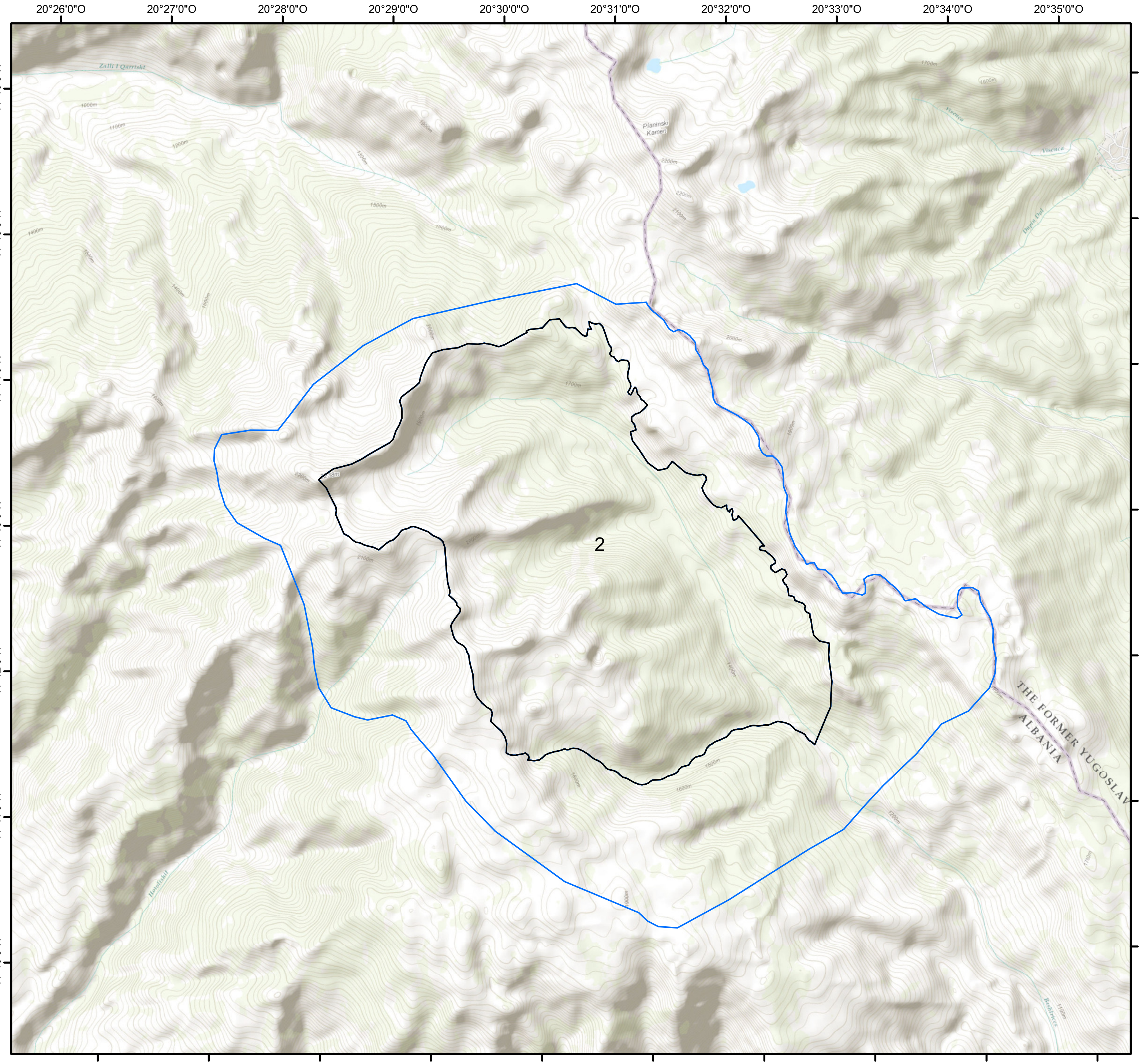
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:100.000

Date: 21.01.2016



Annex 1.e.AL_RRAJ

Topographic map of the nominated component part(s) Rrajca

Albania

Beech Forest Region:

Moesian-Balcanic

Component part number(s):	002
Size of property in hectar:	2,129.45
Size of buffer zone in hectar:	2,569.75

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

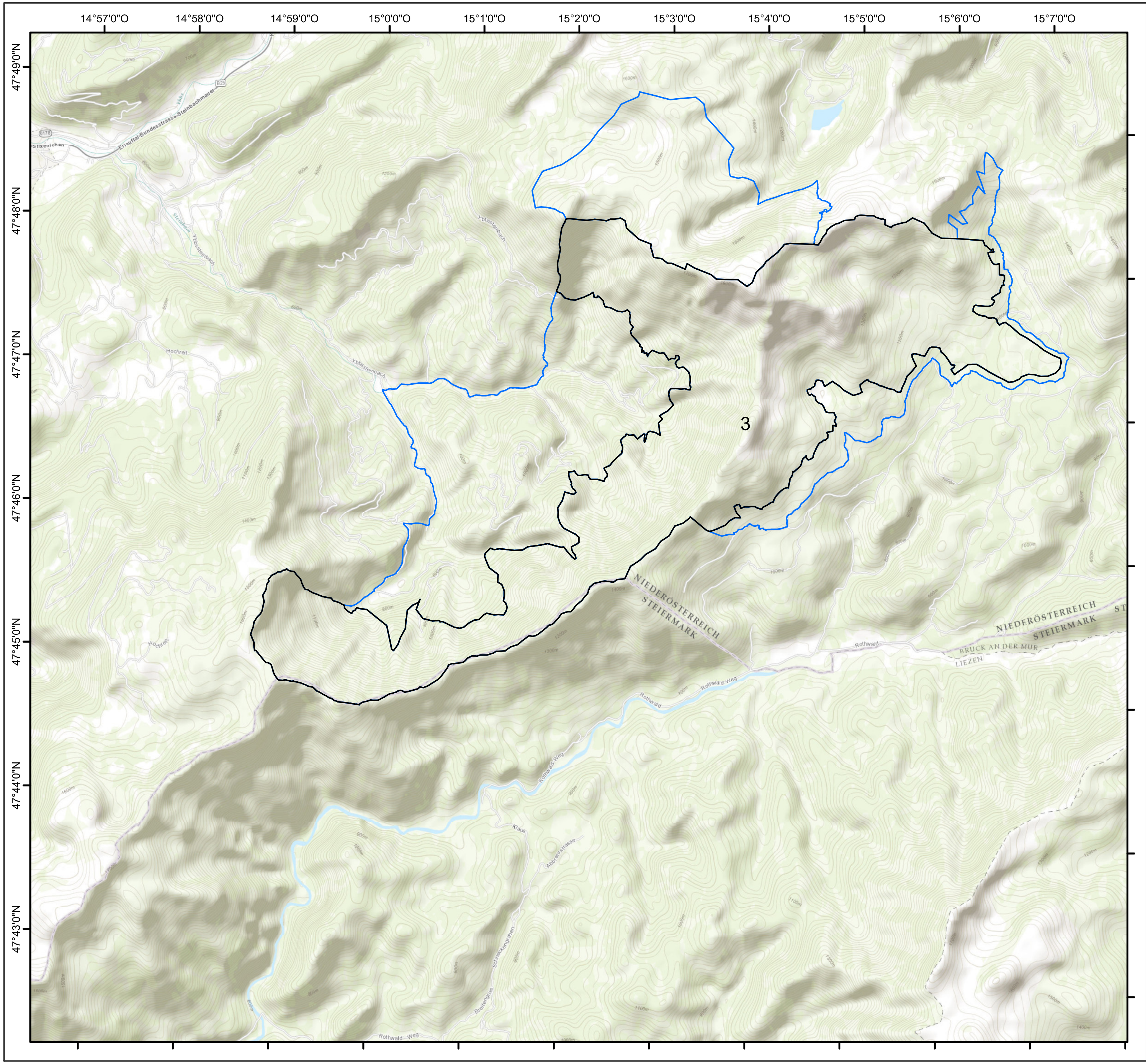
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:50.000

Date: 21.01.2016



Annex 1.e.AT_DUER

Topographic map of the nominated component part(s) Dürrenstein

Austria

Beech Forest Region:

Alpic

Component part number(s):	003
Size of property in hectar:	1,867.45
Size of buffer zone in hectar:	1,545.05

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

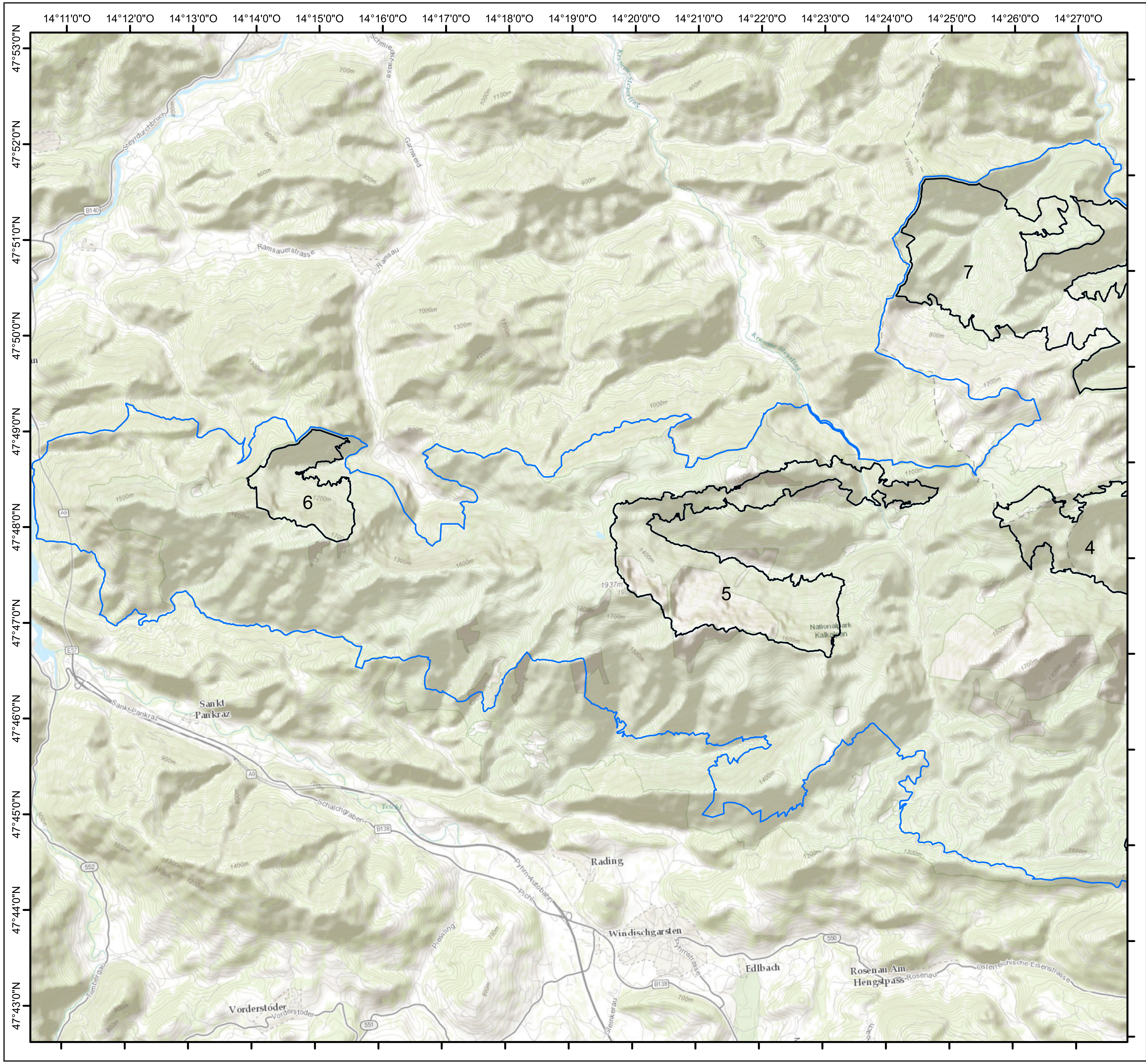
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:50.000

Date: 21.01.2016



Annex 1.e.AT_KALK_a

Topographic map of the nominated component part(s) Kalkalpen

Austria

Beech Forest Region:

Alpic

Component part number(s): 005, 006

Size of property in hectar: 5,251.66

Size of buffer zone in hectar: 14,243.26

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer

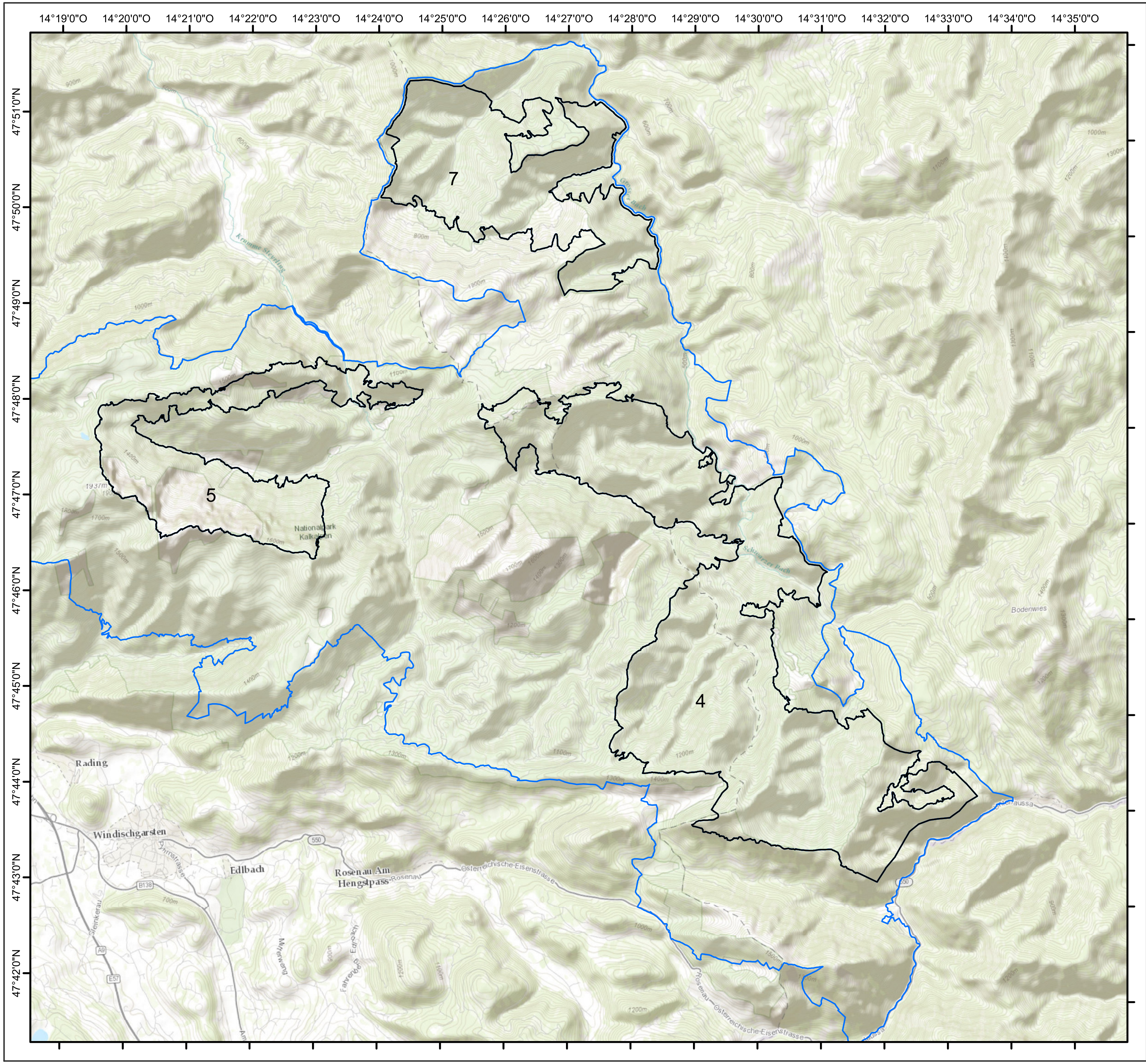
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.AT_KALK_b

Topographic map of the nominated component part(s) Kalkalpen

Austria

Beech Forest Region:

Alpic

Component part number(s): 004, 005, 007

Size of property in hectar: 5,251.66

Size of buffer zone in hectar: 14,243.26

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

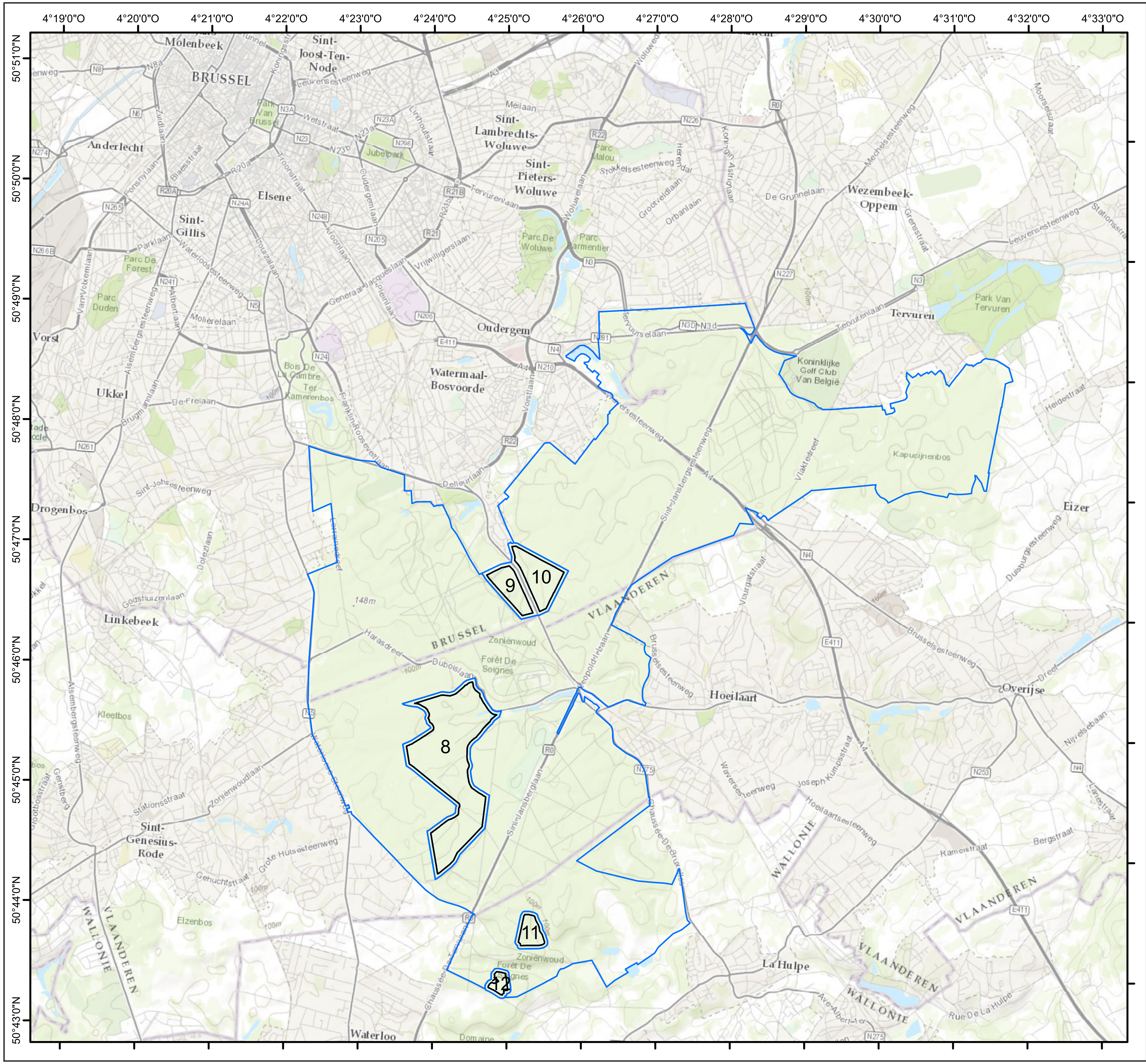
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 1 2 4 Kilometer

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.BE_SONI

Topographic map of the nominated component part(s) Sonian Forest

Belgium

Beech Forest Region:

Atlantic

Component part number(s):	008-012
Size of property in hectar:	269.31
Size of buffer zone in hectar:	4,650.86

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

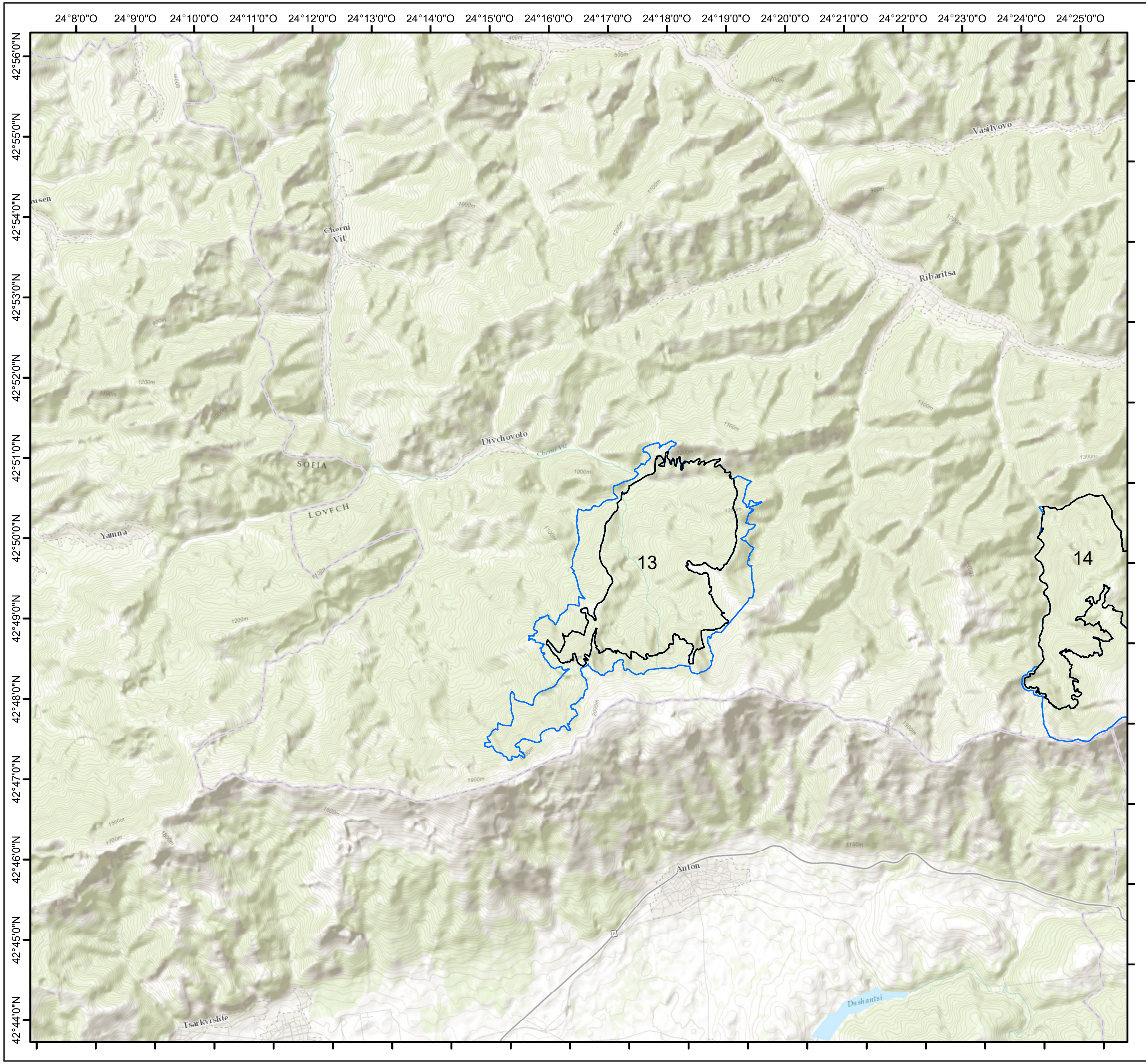
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:60.000

Date: 21.01.2016



Annex 1.e.BG_BALK_a

Topographic map of the nominated component part(s) Central Balkan

Bulgaria

Beech Forest Region:

Moesian-Balcanic

Component part number(s):	013
Size of property in hectar:	10,988.91
Size of buffer zone in hectar:	11,720.85

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

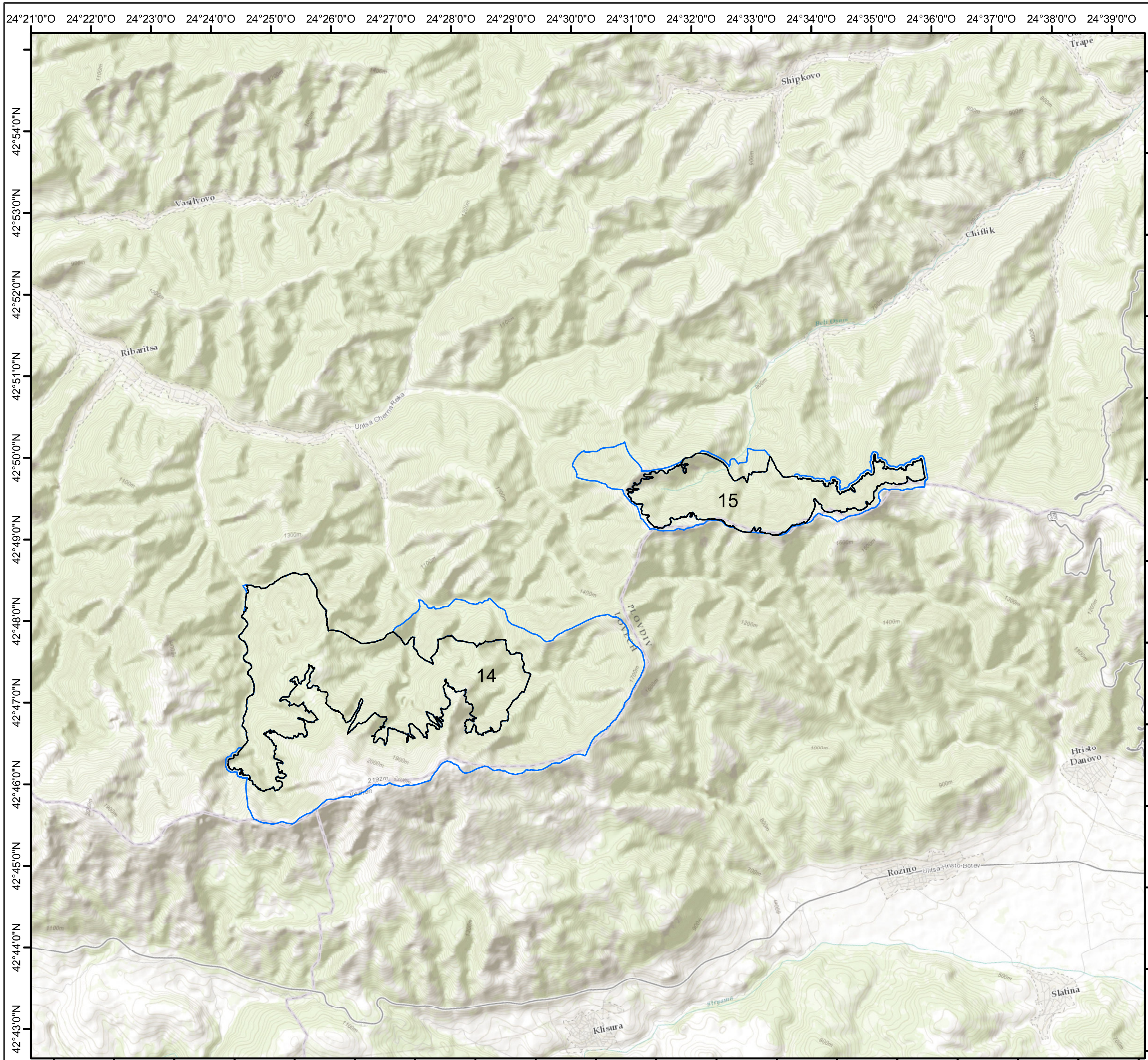
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.BG_BALK_b

Topographic map of the nominated component part(s) Central Balkan

Bulgaria

Beech Forest Region: Moesian-Balcanic

Component part number(s):	014-015
Size of property in hectar:	10,988.91
Size of buffer zone in hectar:	11,720.85

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

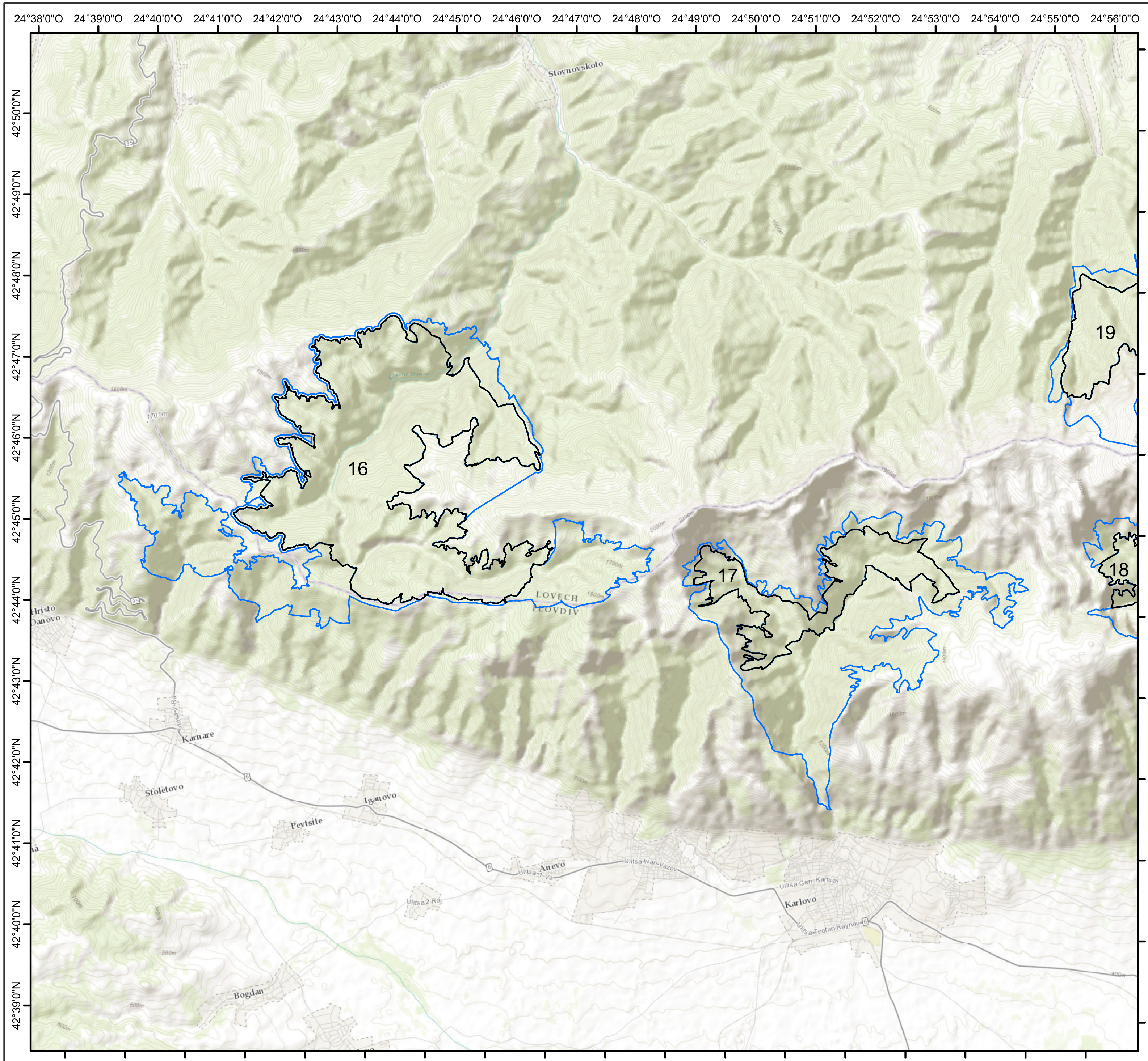
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.BG_BALK_c

Topographic map of the nominated component part(s) Central Balkan

Bulgaria

Beech Forest Region:

Moesian-Balcanic

Component part number(s):	016-017
Size of property in hectar:	10,988.91
Size of buffer zone in hectar:	11,720.85

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 1,25 2,5 5 Kilometer

Scale: 1:90.000

Date: 21.01.2016

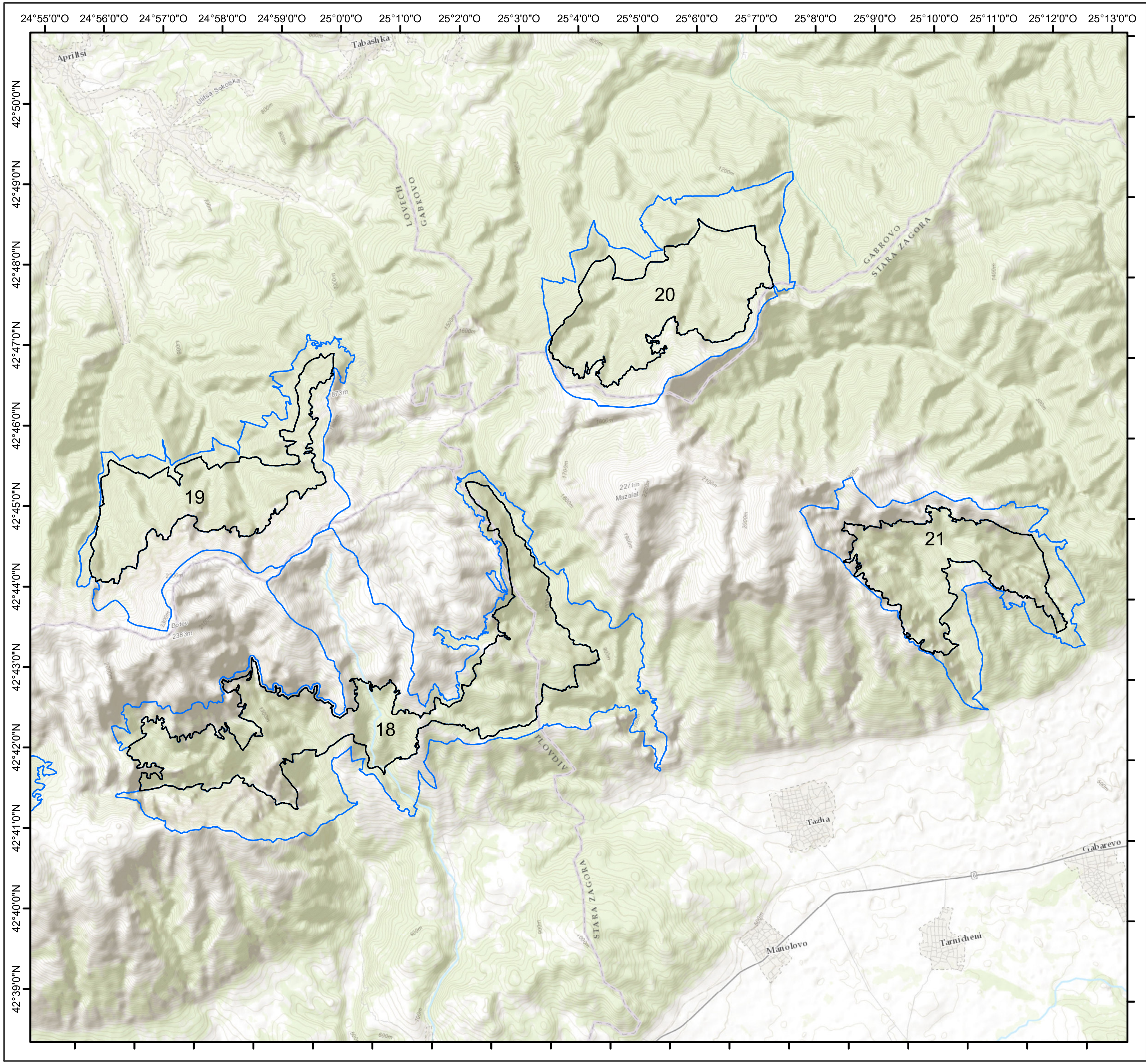
Annex 1.e.BG_BALK_d

Topographic map of the nominated component part(s) Central Balkan

Bulgaria

Beech Forest Region:

Moesian-Balcanic



Component part number(s):	018-021
Size of property in hectar:	10,988.91
Size of buffer zone in hectar:	11,720.85

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

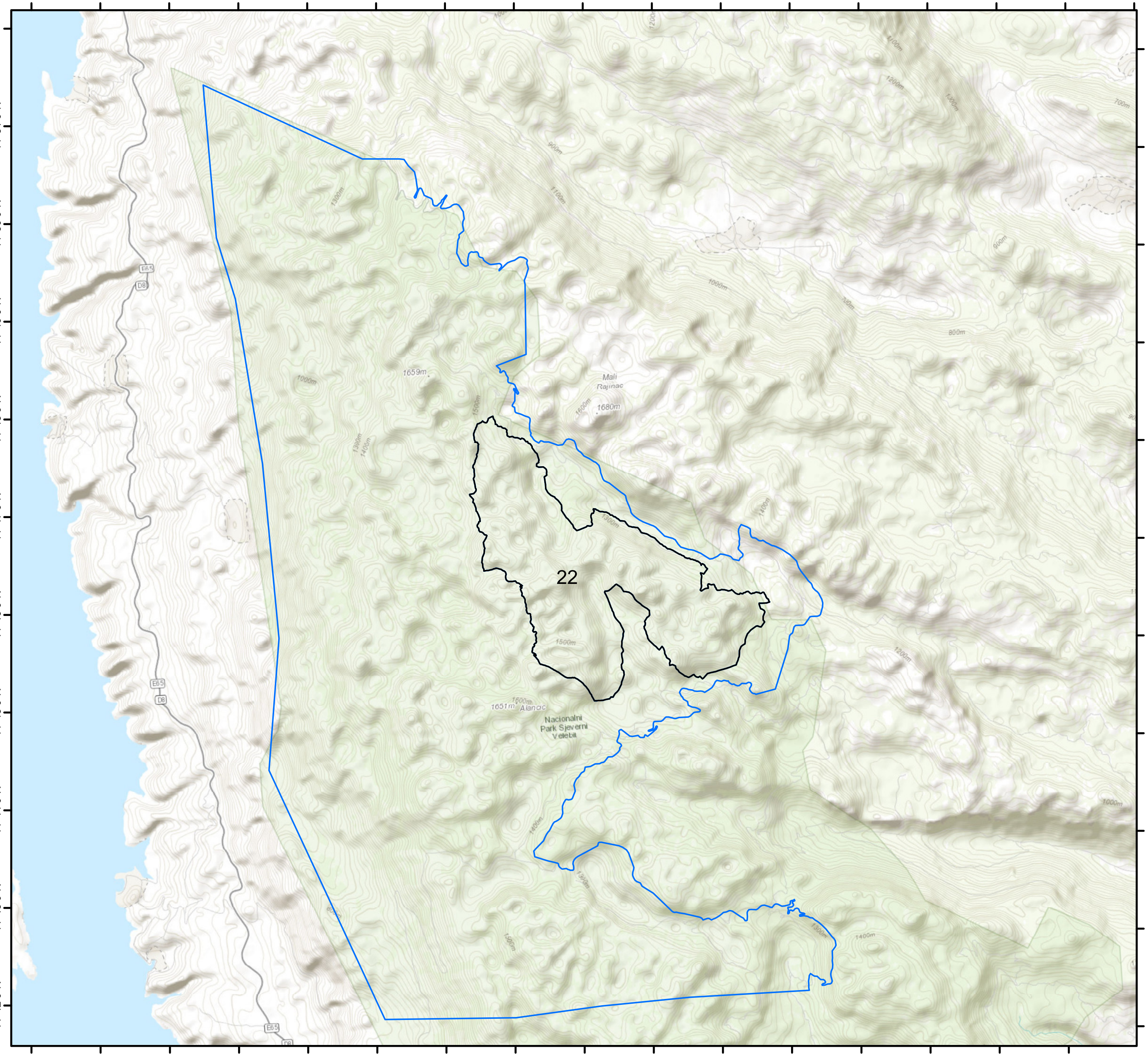
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 1,25 2,5 5 Kilometer

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.HR_HAJD

Topographic map of the nominated component part(s)
Hajdučki i Rožanski kukovi

Croatia

Beech Forest Region:

Illyric

Component part number(s):	022
Size of property in hectar:	1,289.11
Size of buffer zone in hectar:	9,869.25

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

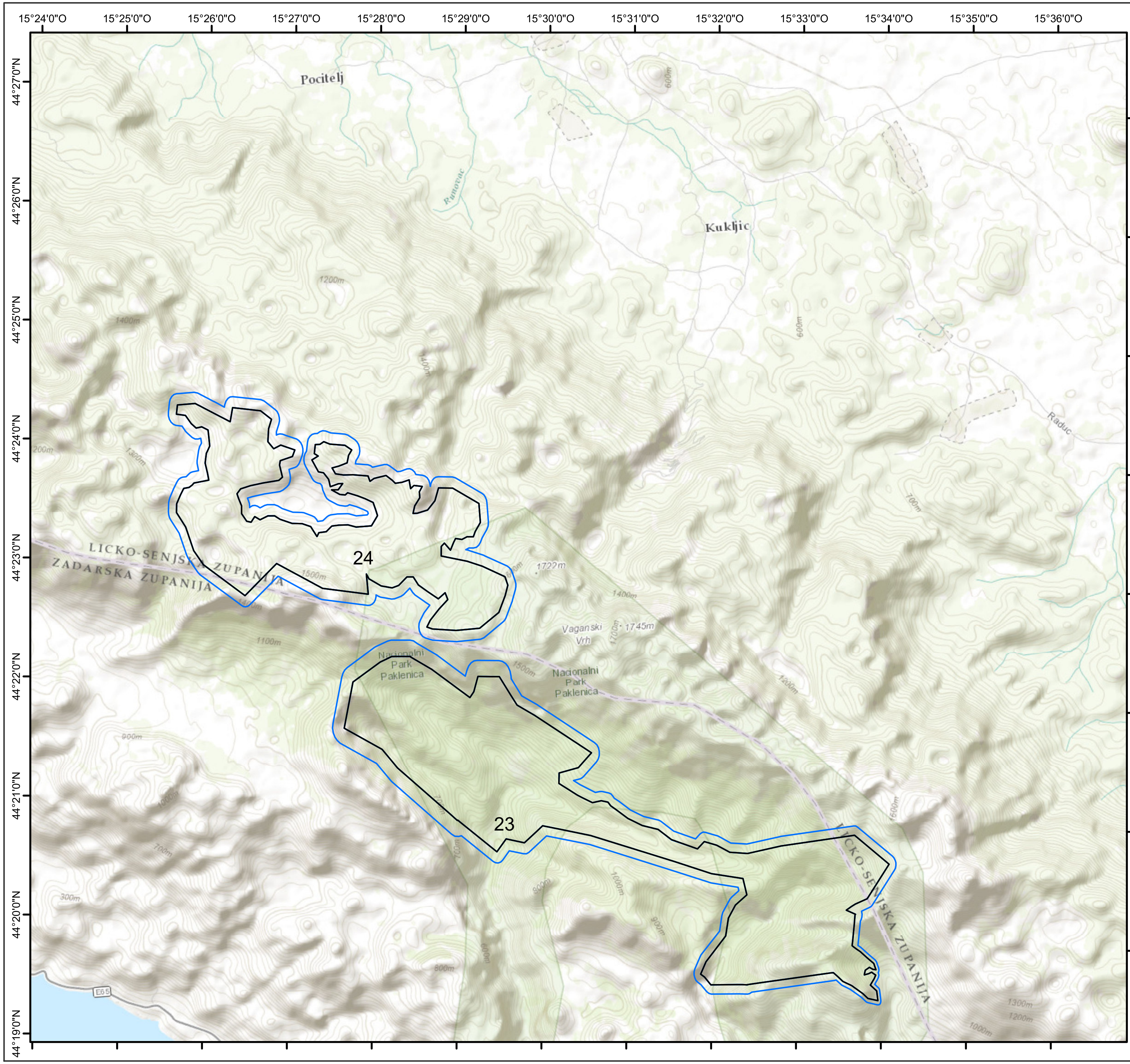
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 1 2 4 Kilometer

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.HR_PAKL

Topographic map of the nominated component part(s)
Paklenica National Park

Croatia

Beech Forest Region:

Illyric

Component part number(s):	023-024
Size of property in hectar:	2,031.78
Size of buffer zone in hectar:	810.11

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

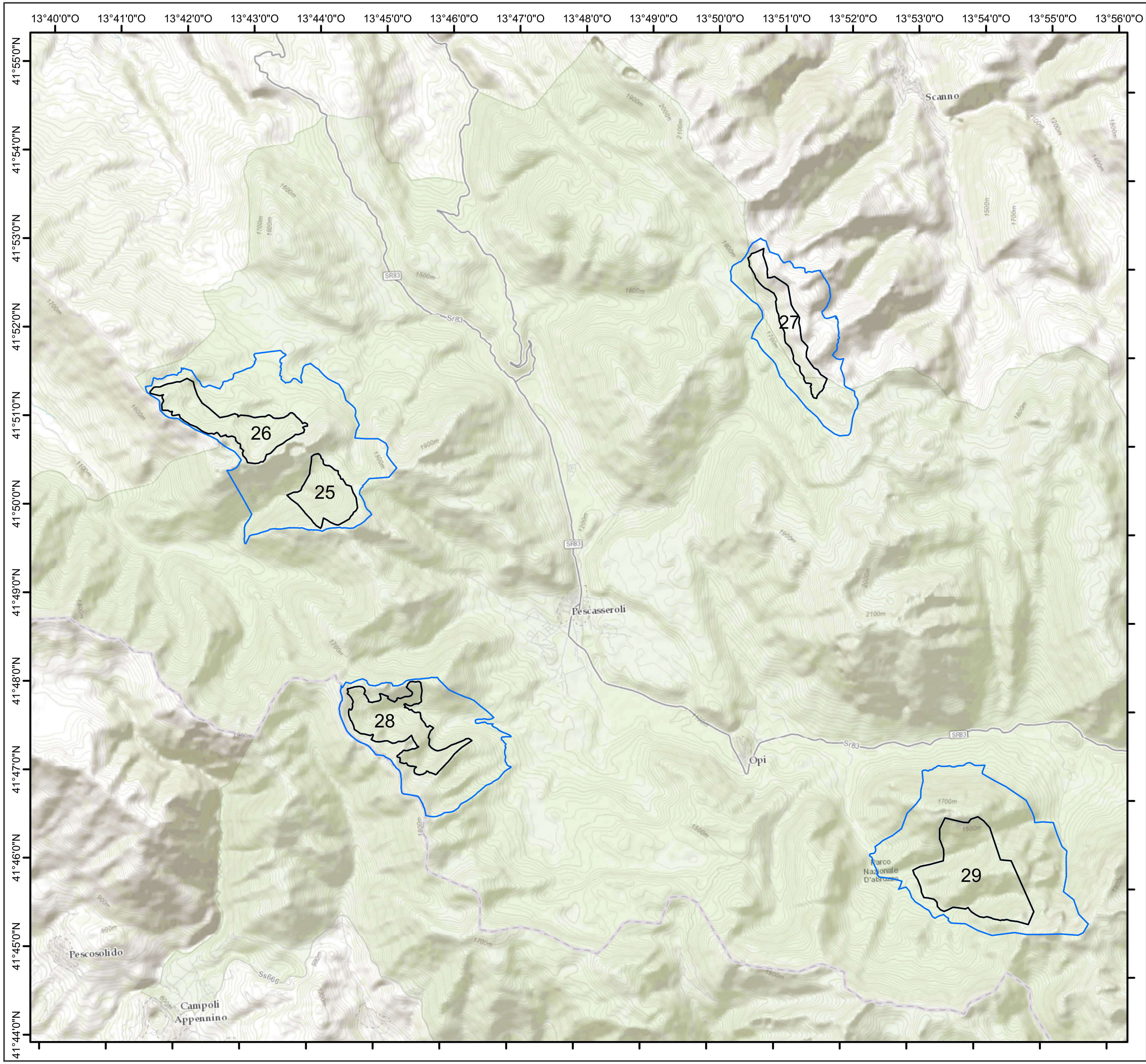
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:60.000

Date: 21.01.2016



Annex 1.e.IT_ABRU

Topographic map of the nominated component part(s) Abruzzo, Lazio & Molise NP

Italy

Beech Forest Region:

Central Mediterranean

Component part number(s):	025-029
Size of property in hectar:	936.63
Size of buffer zone in hectar:	2,314.69

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:80.000

Date: 21.01.2016

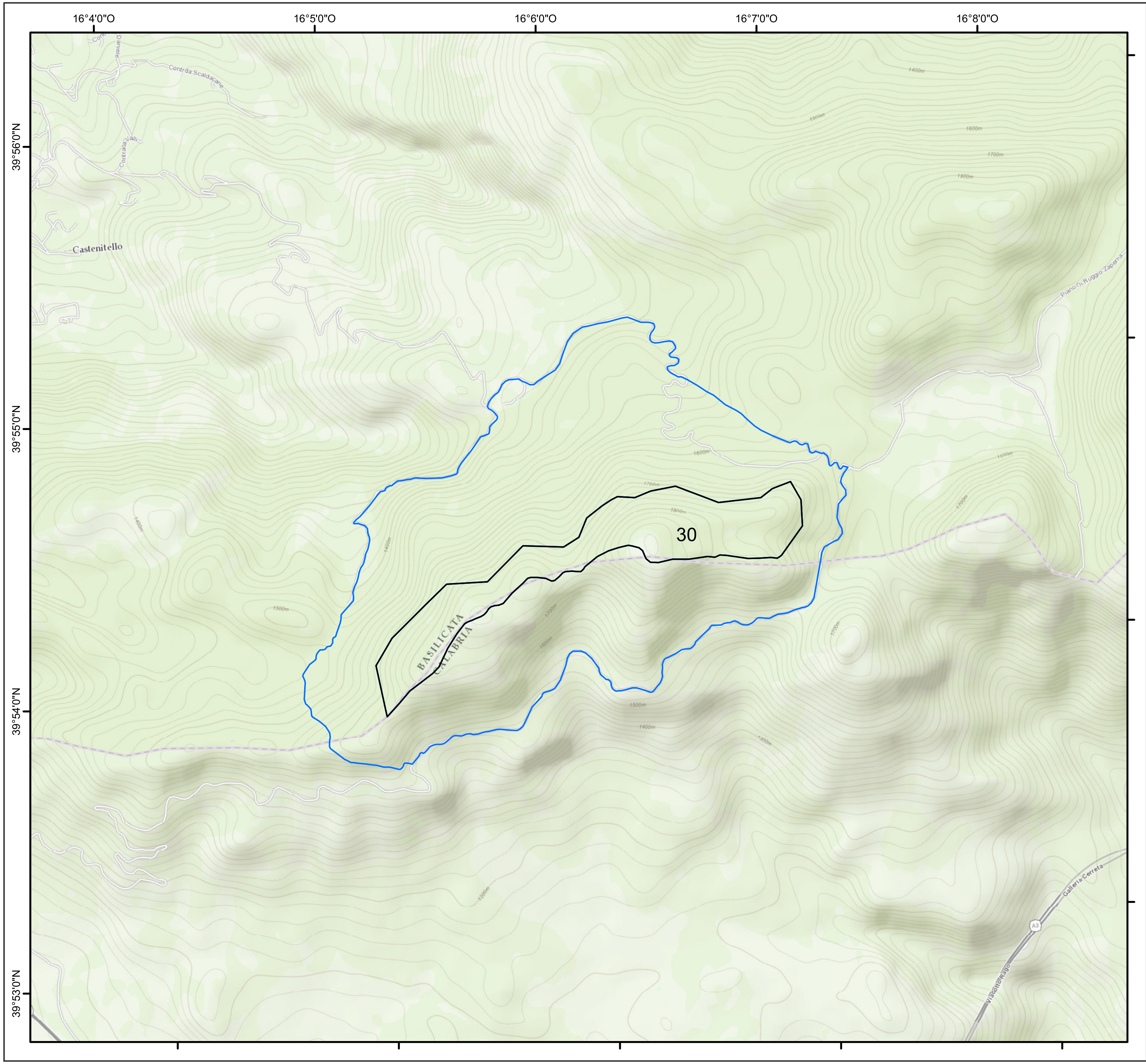
Annex 1.e.IT_COZZ

Topographic map of the nominated component part(s)
Cozzo Ferriero

Italy

Beech Forest Region:

Central Mediterranean



Component part number(s):	030
Size of property in hectar:	95.74
Size of buffer zone in hectar:	482.61

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

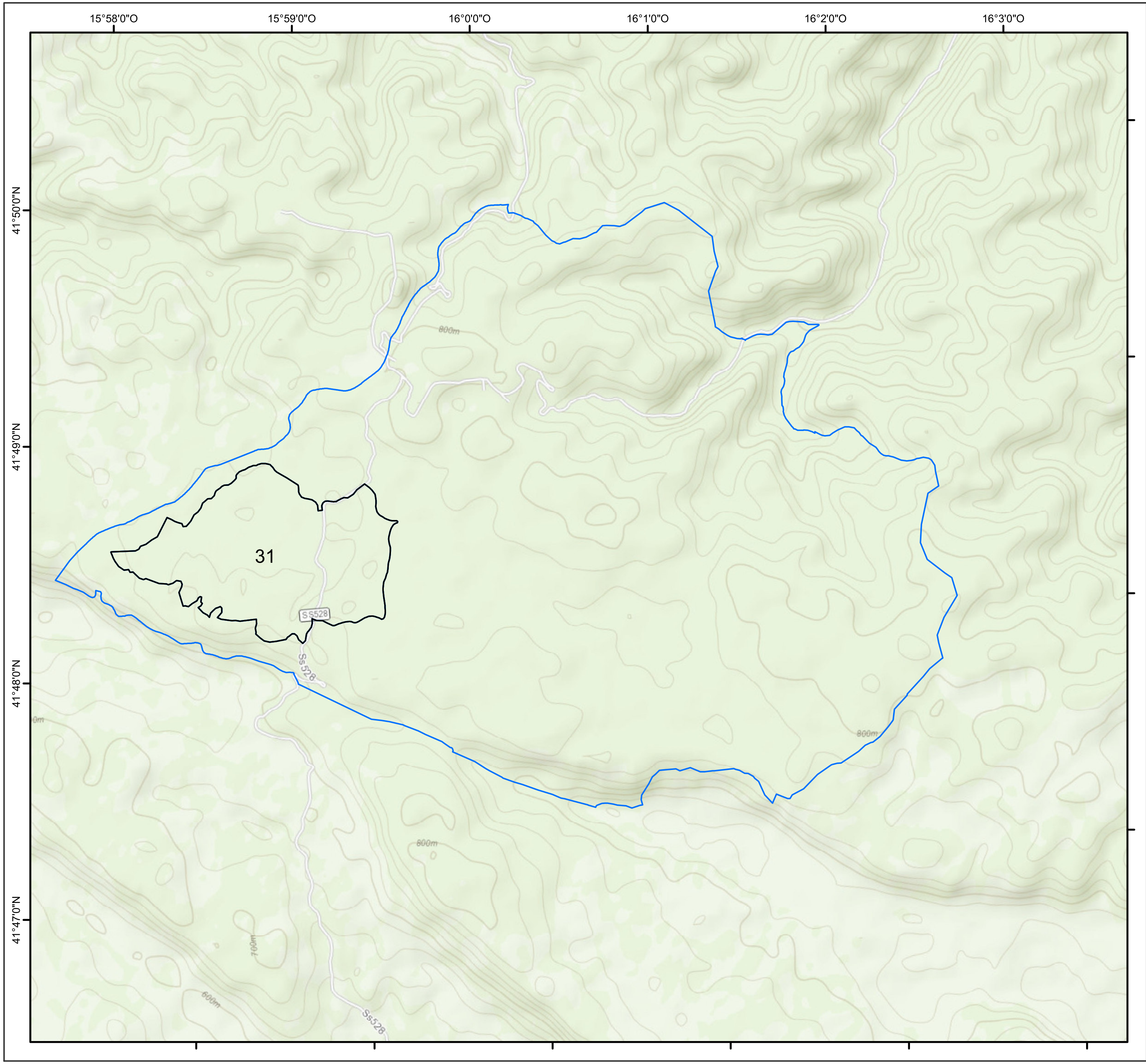
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.IT_UMBR

Topographic map of the nominated component part(s)

Foresta Umbra

Italy

Beech Forest Region:

Central Mediterranean

Component part number(s):	031
Size of property in hectar:	182.23
Size of buffer zone in hectar:	1,752.54

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

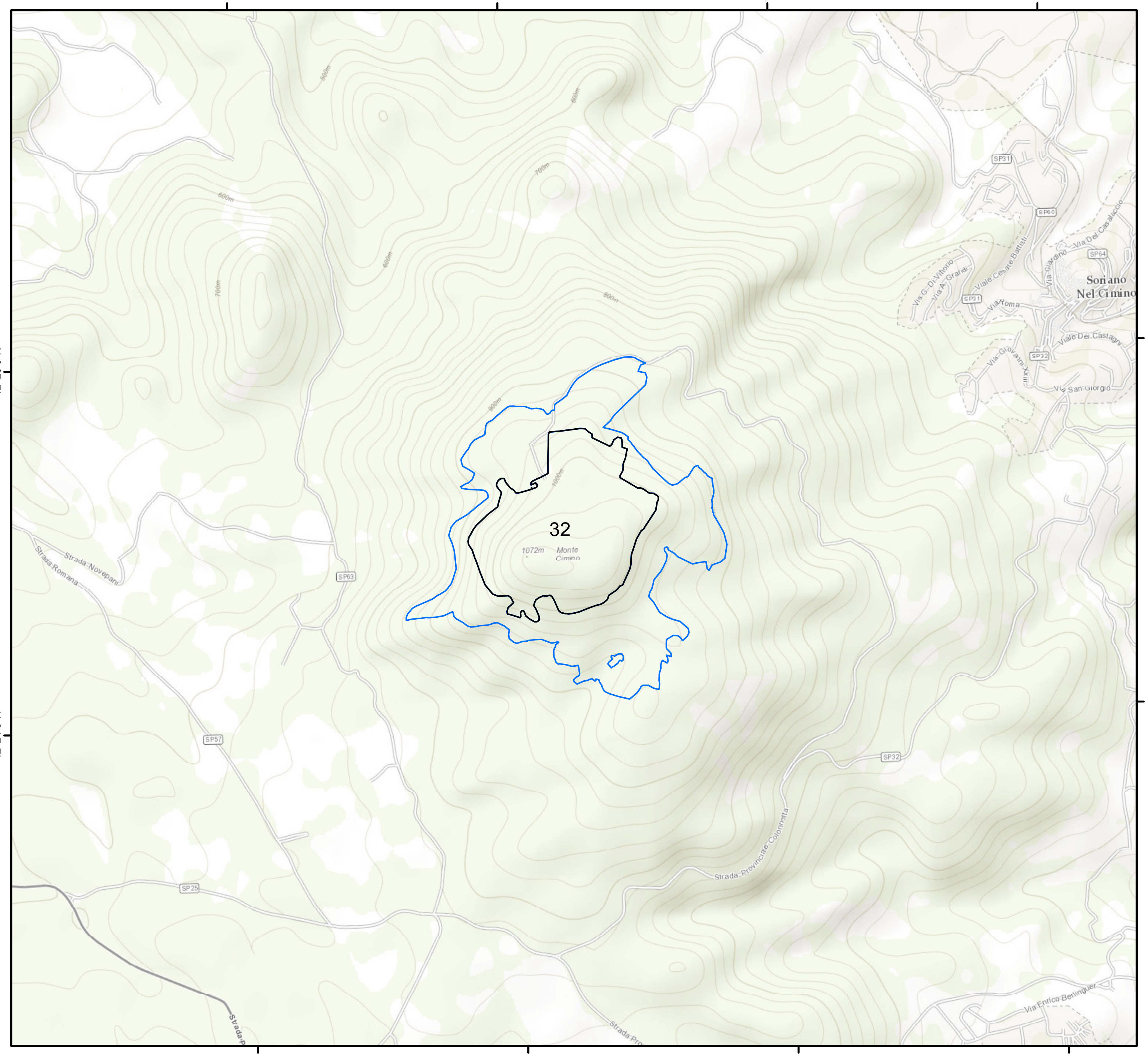
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,4 0,8 1,6 Kilometer

N

Scale: 1:30.000

Date: 21.01.2016



Annex 1.e.IT_CIMI

Topographic map of the nominated component part(s) Monte Cimino

Italy

Beech Forest Region:

Central Mediterranean

Component part number(s):	032
Size of property in hectar:	57.54
Size of buffer zone in hectar:	87.96

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 0,25 0,5 1 Kilometer

Scale: 1:20.000

Date: 21.01.2016

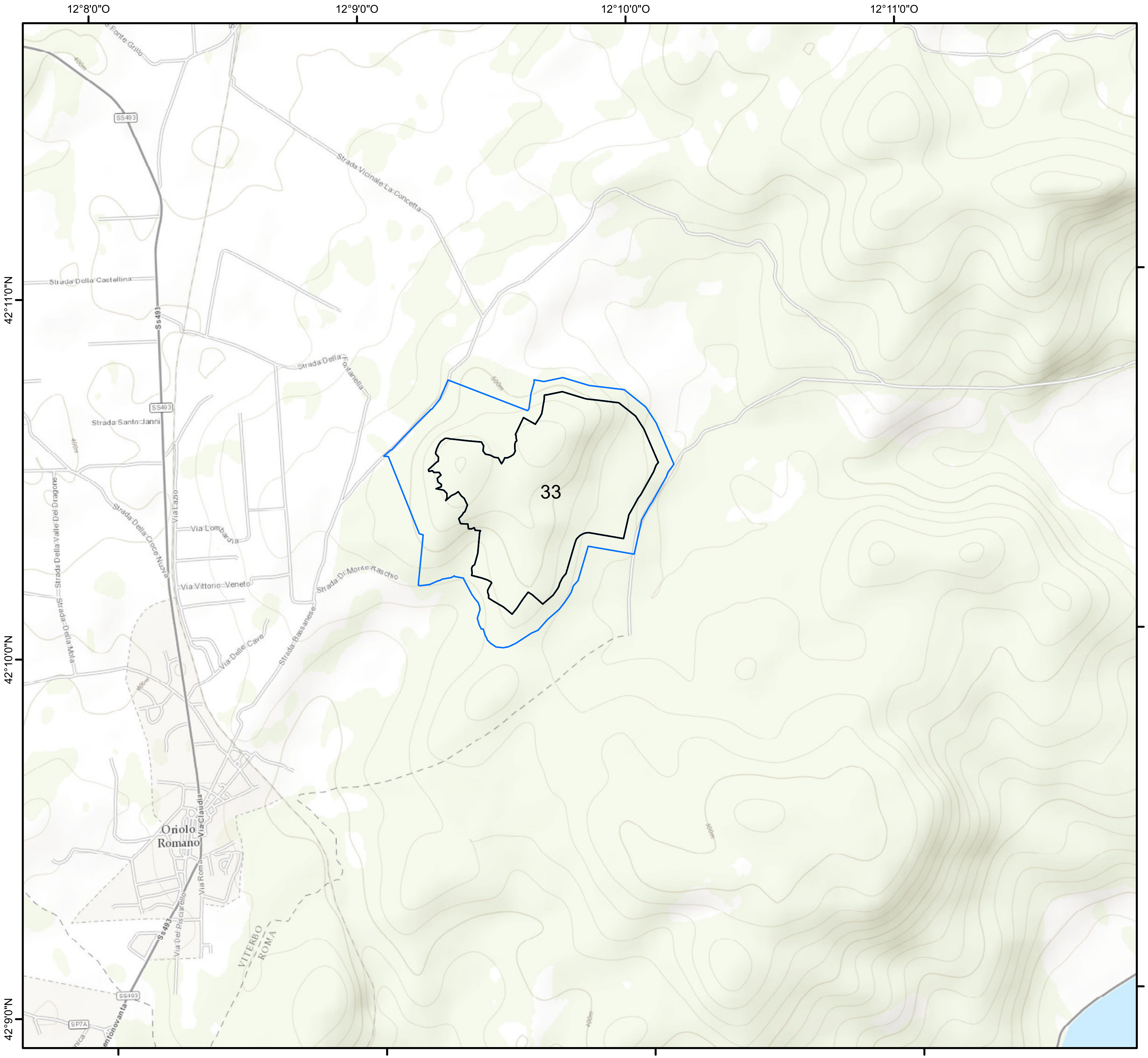
Annex 1.e.IT_RASC

Topographic map of the nominated component part(s) Monte Raschio

Italy

Beech Forest Region:

Central Mediterranean



Component part number(s):	033
Size of property in hectar:	73.73
Size of buffer zone in hectar:	54.75

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

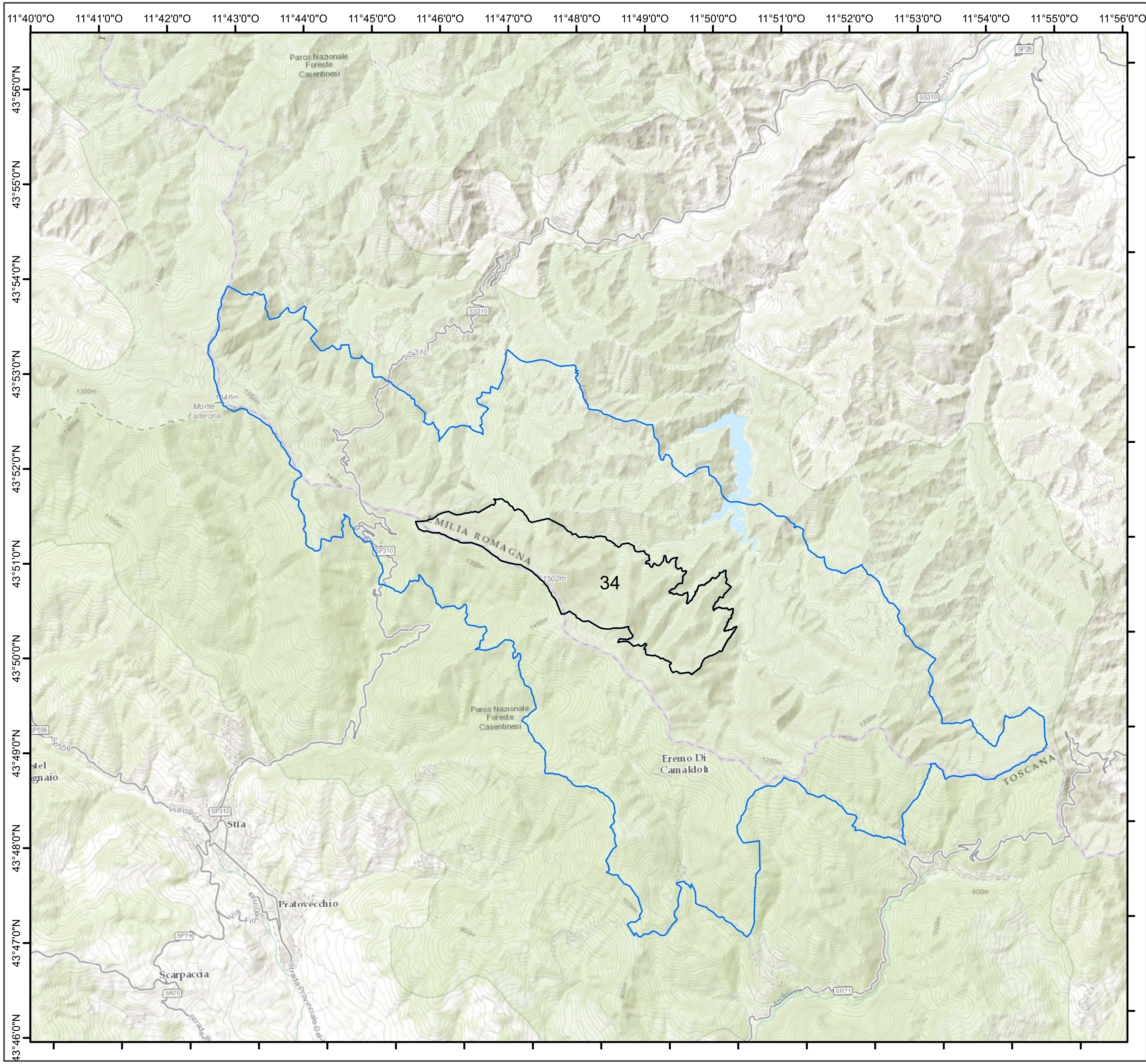
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,25 0,5 1 Kilometer

N

Scale: 1:20.000

Date: 21.01.2016



Annex 1.e.IT_SASS

Topographic map of the nominated component part(s) Sasso Fratino

Italy

Beech Forest Region:

Central Mediterranean

Component part number(s):	034
Size of property in hectar:	781.43
Size of buffer zone in hectar:	6,936.64

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

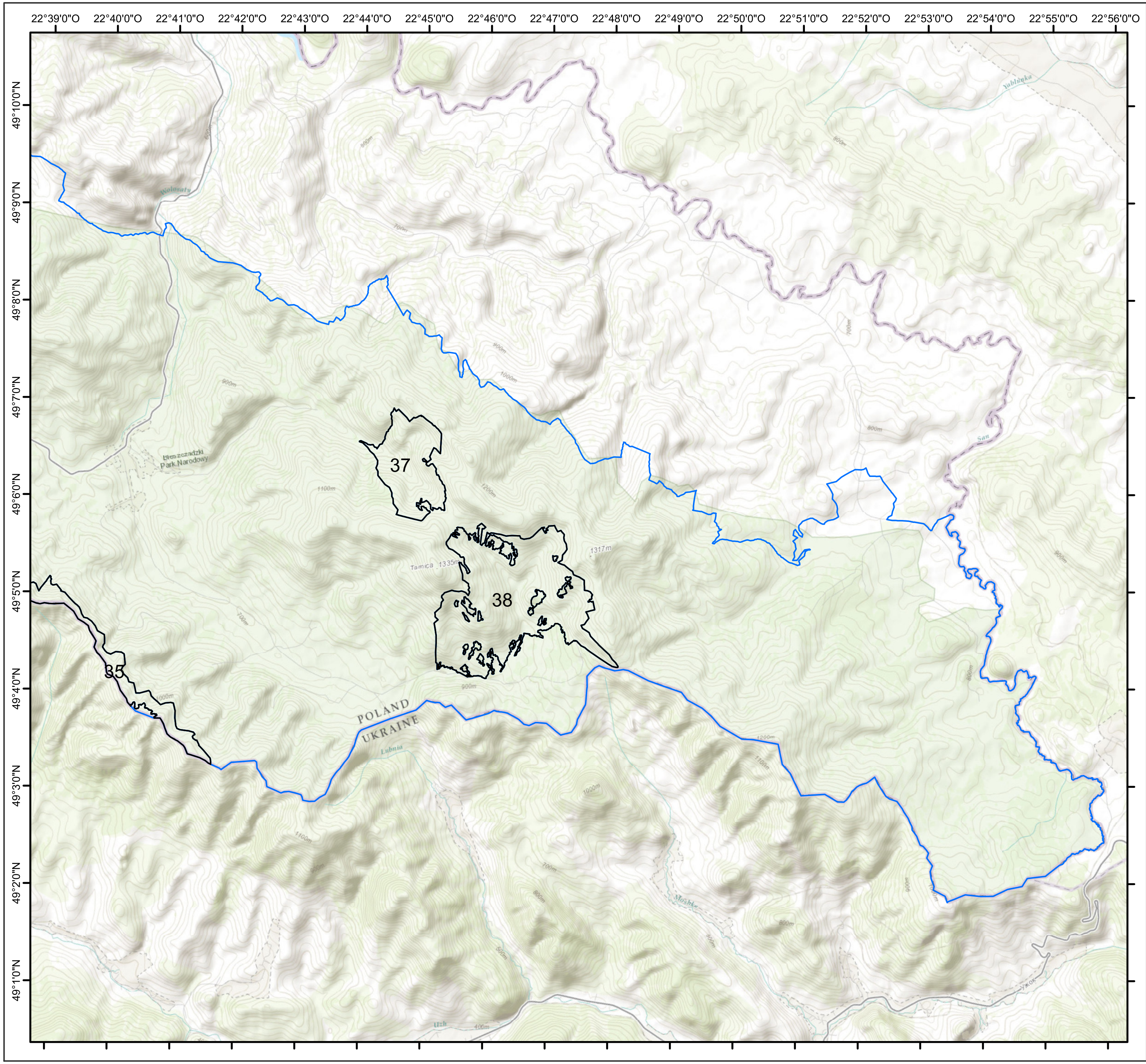
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.PL_BIES_b

Topographic map of the nominated component part(s) Bieszczady

Poland

Beech Forest Region:

Carpathian

Component part number(s):	037-038
Size of property in hectar:	3,307.02
Size of buffer zone in hectar:	24,564.46

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

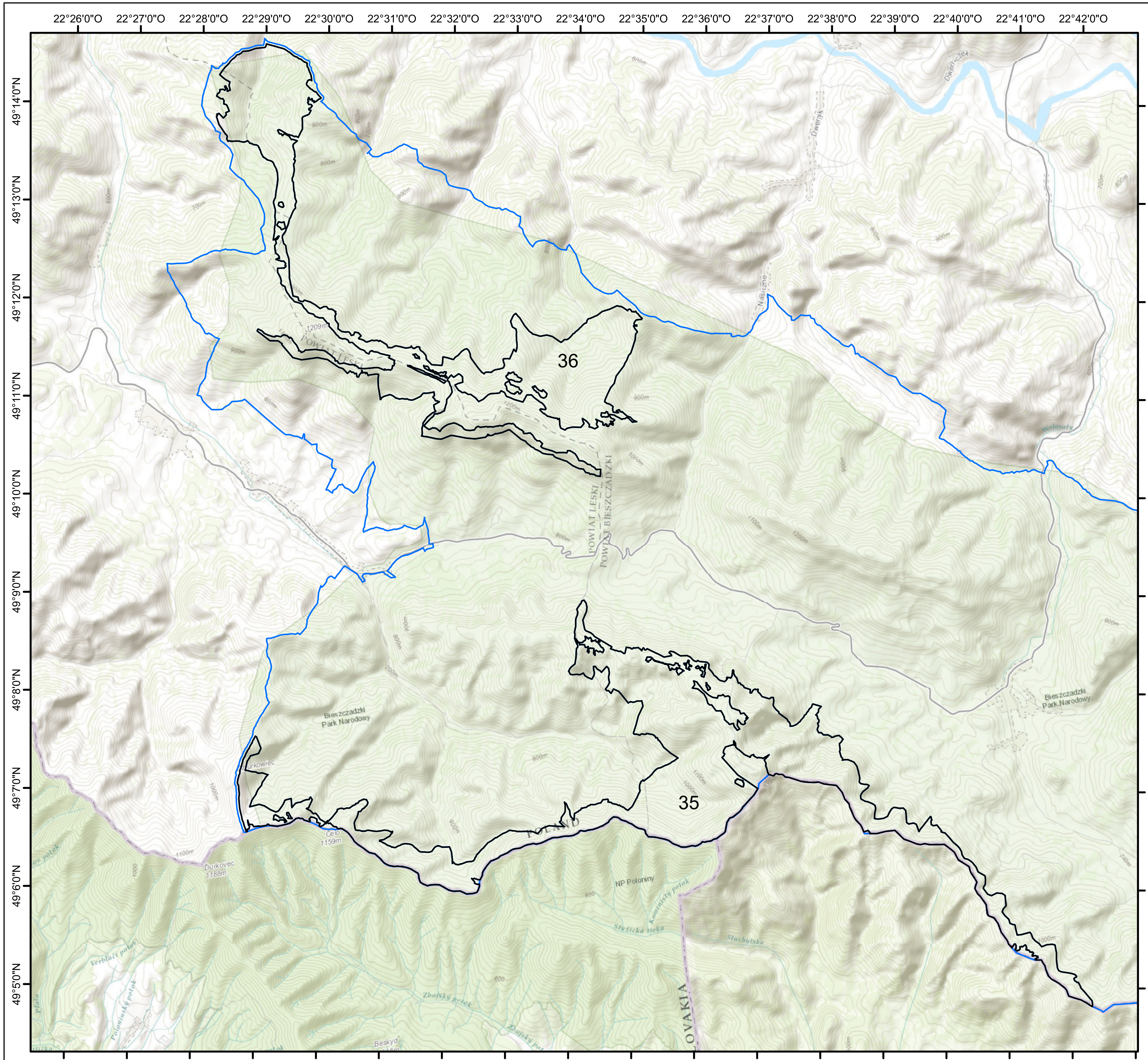
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.PL_BIES_a

Topographic map of the nominated component part(s) Bieszczady

Poland

Beech Forest Region:

Carpathian

Component part number(s):	035-036
Size of property in hectar:	3,307.02
Size of buffer zone in hectar:	24,564.46

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

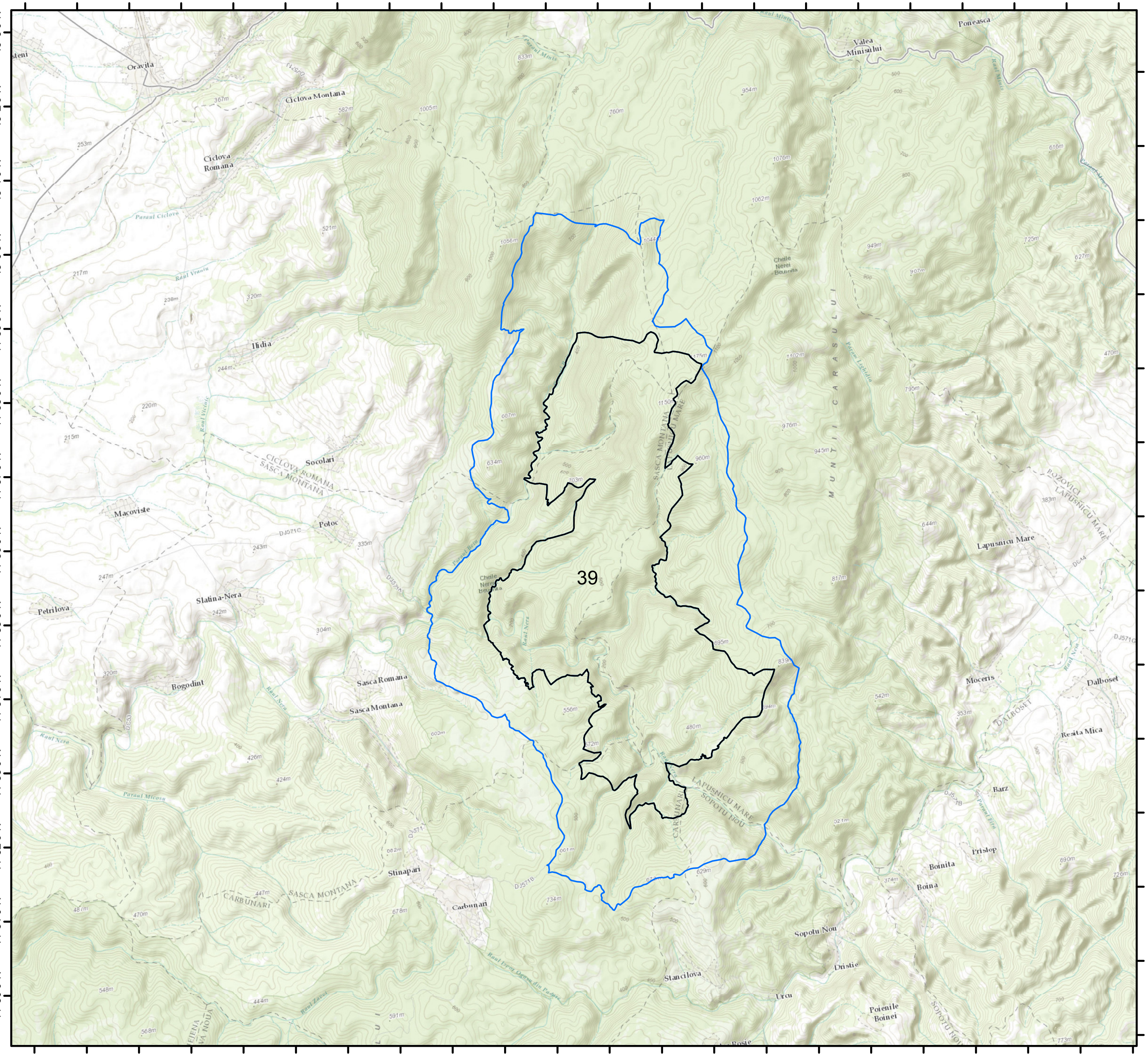
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:75.000

Date: 21.01.2016



Annex 1.e.RO_NERE

Topographic map of the nominated component part(s) Cheile Nerei-Beușnița

Romania

Beech Forest Region: Carpathians

Component part number(s):	039
Size of property in hectar:	4,292.27
Size of buffer zone in hectar:	5,959.87

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:100.000

Date: 21.01.2016

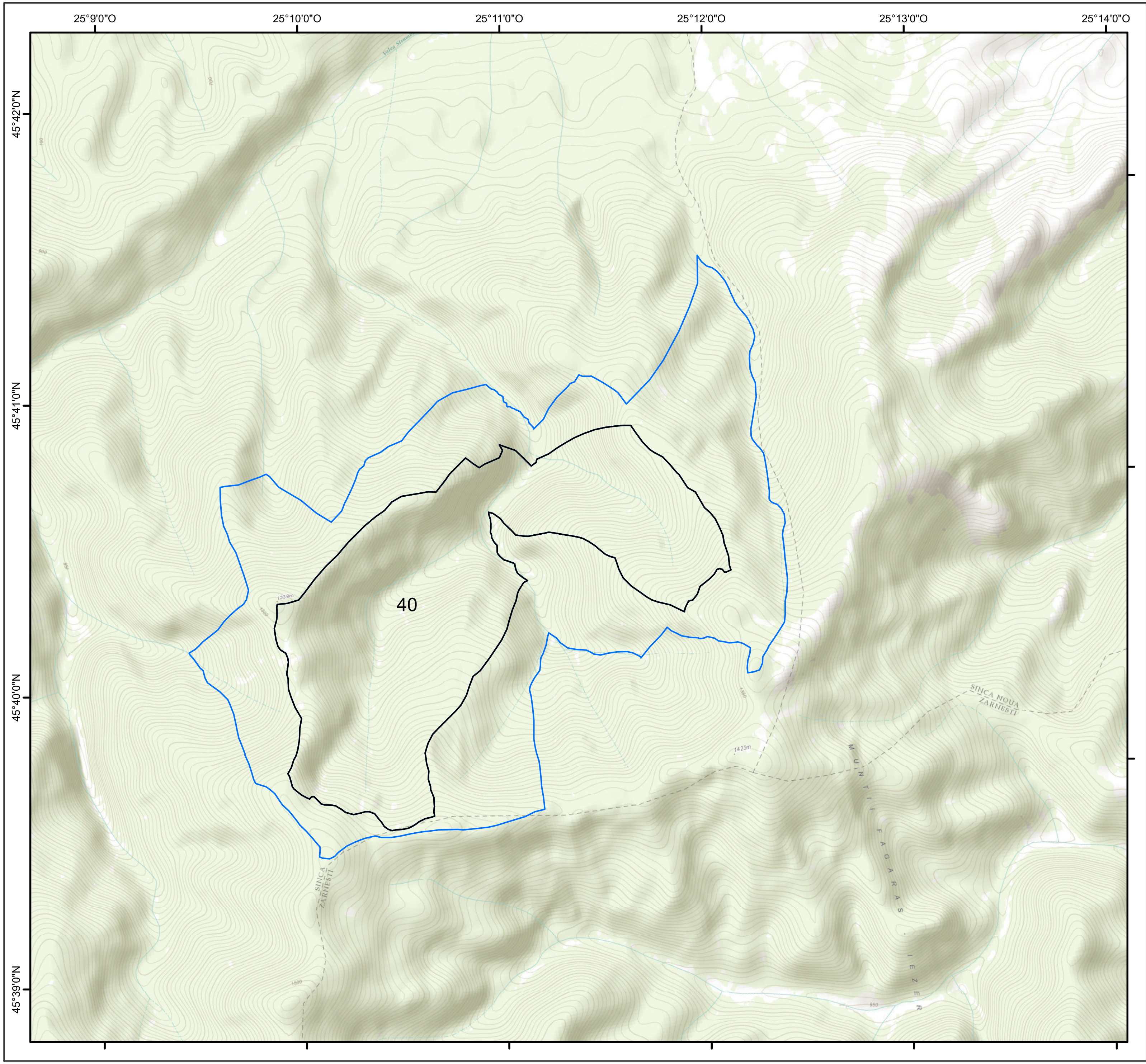
Annex 1.e.RO_SINC

Topographic map of the nominated component part(s) Codrul Secular Șinca

Romania

Beech Forest Region:

Carpathians



Component part number(s): 040

Size of property in hectar: 338.24

Size of buffer zone in hectar: 445.76

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

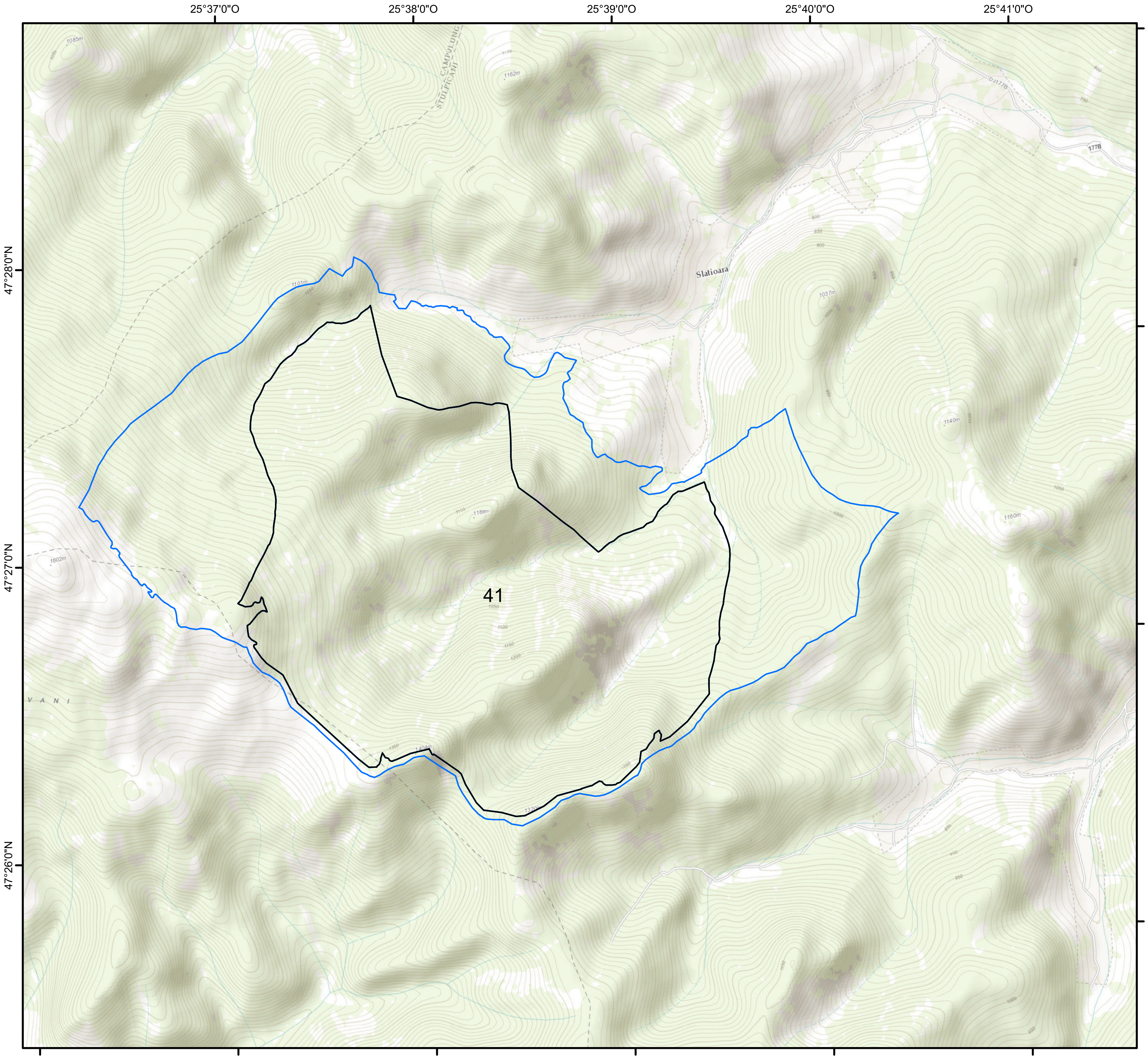
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.RO_SLAT

Topographic map of the nominated component part(s) Codrul Secular Slătioara

Romania

Beech Forest Region:

Carpathians

Component part number(s):	041
Size of property in hectar:	609.12
Size of buffer zone in hectar:	429.43

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

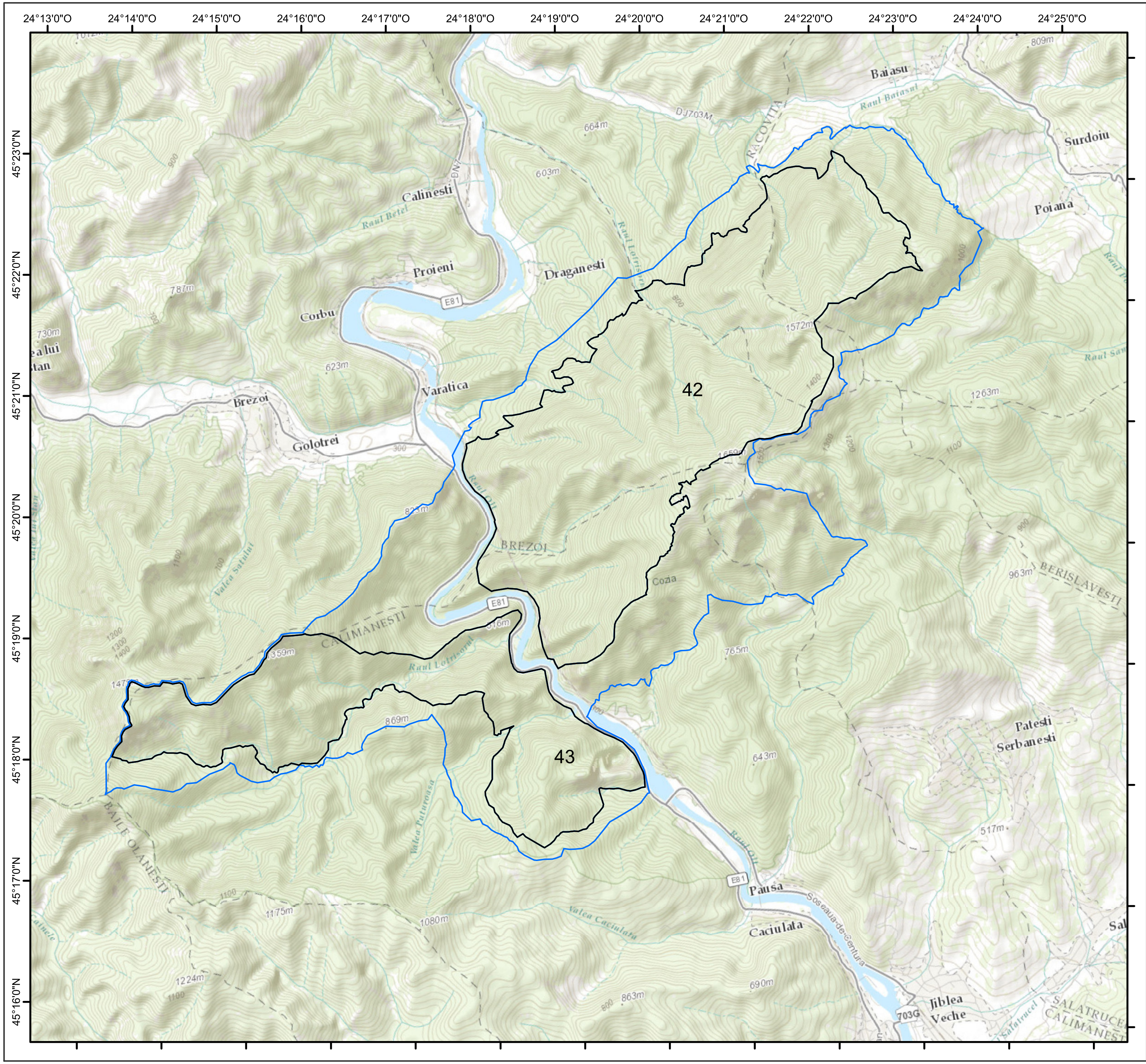
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.RO_COZI

Topographic map of the nominated component part(s)

Cozia

Romania

Beech Forest Region:

Carpathians

Component part number(s):	042-043
Size of property in hectar:	3,389.16
Size of buffer zone in hectar:	2,408.83

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:60.000

Date: 21.01.2016

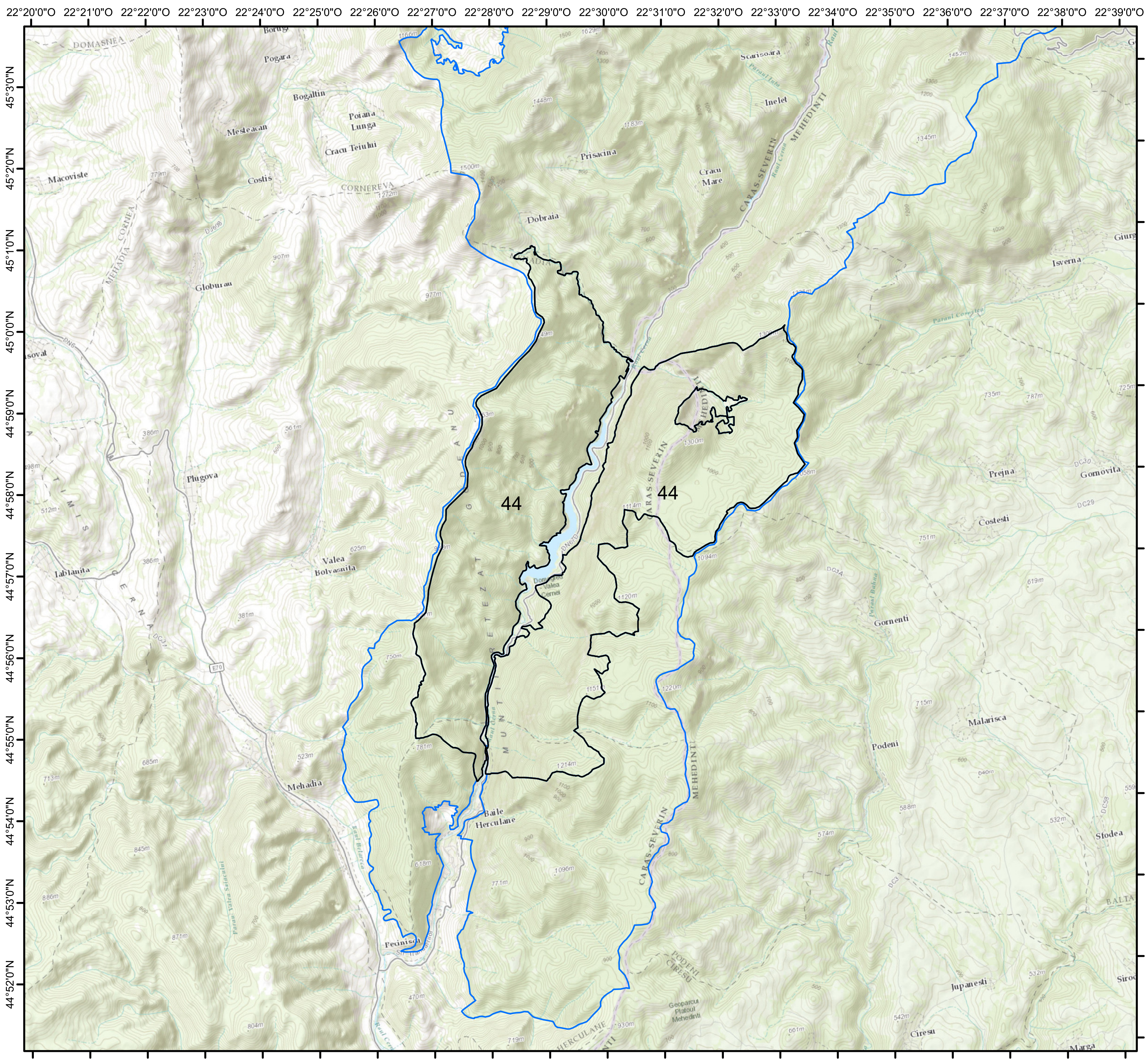
Annex 1.e.RO_DOMO_a

Topographic map of the nominated component part(s) Domogled - Valea Cernei

Romania

Beech Forest Region:

Carpathians



Component part number(s):	044
Size of property in hectar:	9,732.26
Size of buffer zone in hectar:	51,461.28

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

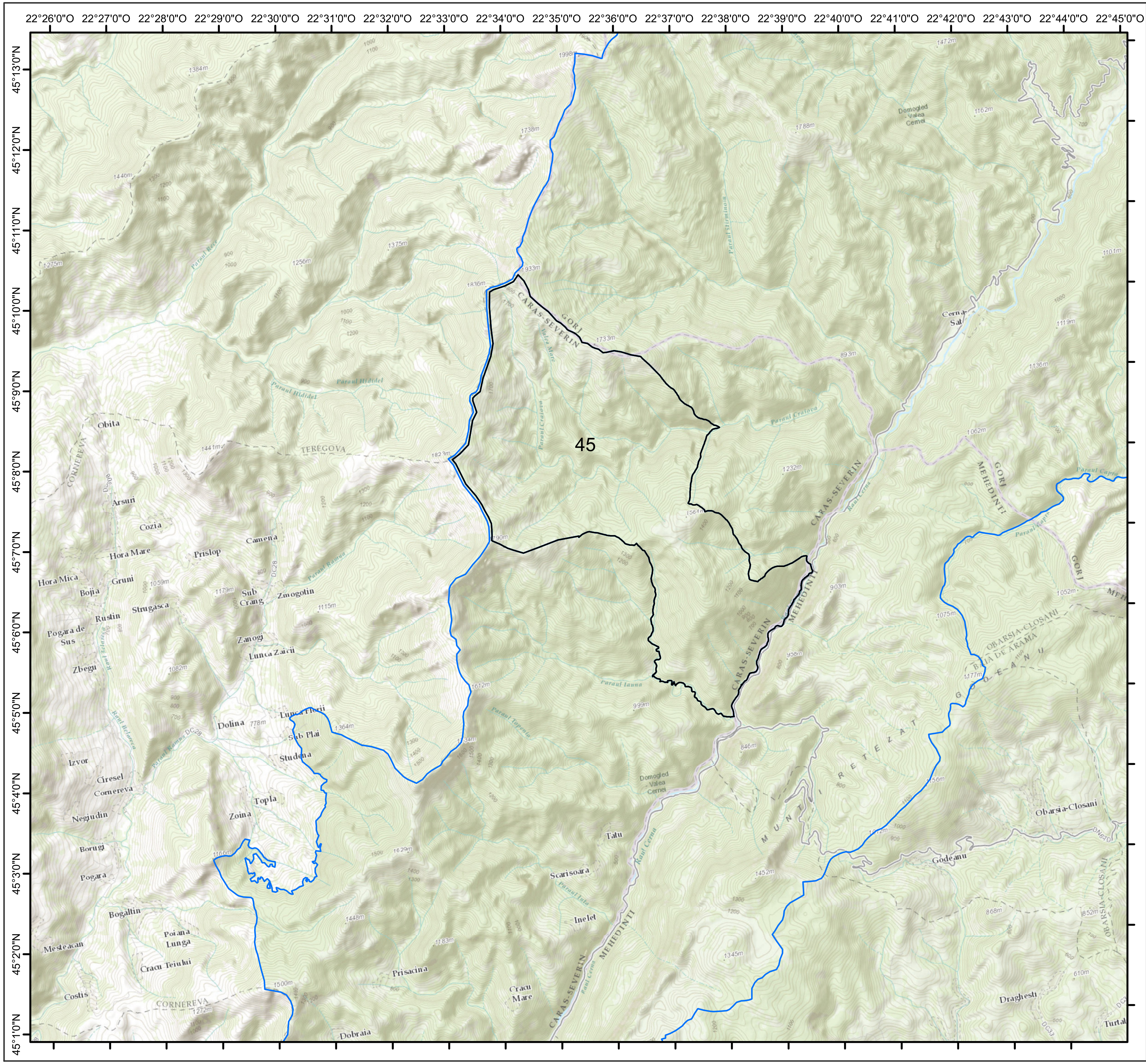
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

N

0 1,25 2,5 5 Kilometer

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.RO_DOMO_b

Topographic map of the nominated component part(s) Domogled - Valea Cernei

Romania

Beech Forest Region: Carpathians

Component part number(s):	045
Size of property in hectar:	9,732.26
Size of buffer zone in hectar:	51,461.28

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

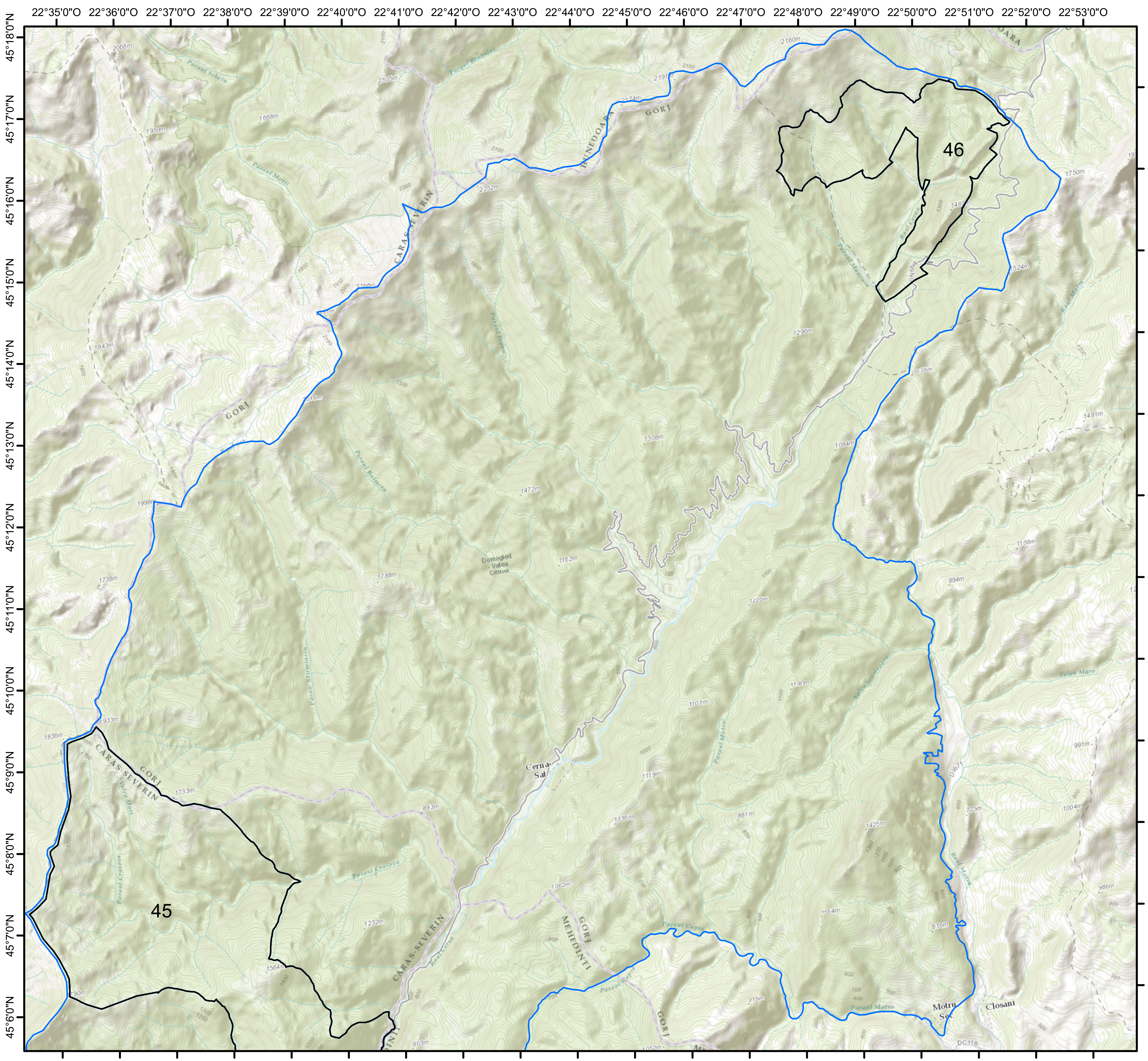
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.RO_DOMO_c

Topographic map of the nominated component part(s) Domogled - Valea Cernei

Romania

Beech Forest Region:

Carpathians

Component part number(s):	046
Size of property in hectar:	9,732.26
Size of buffer zone in hectar:	51,461.28

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

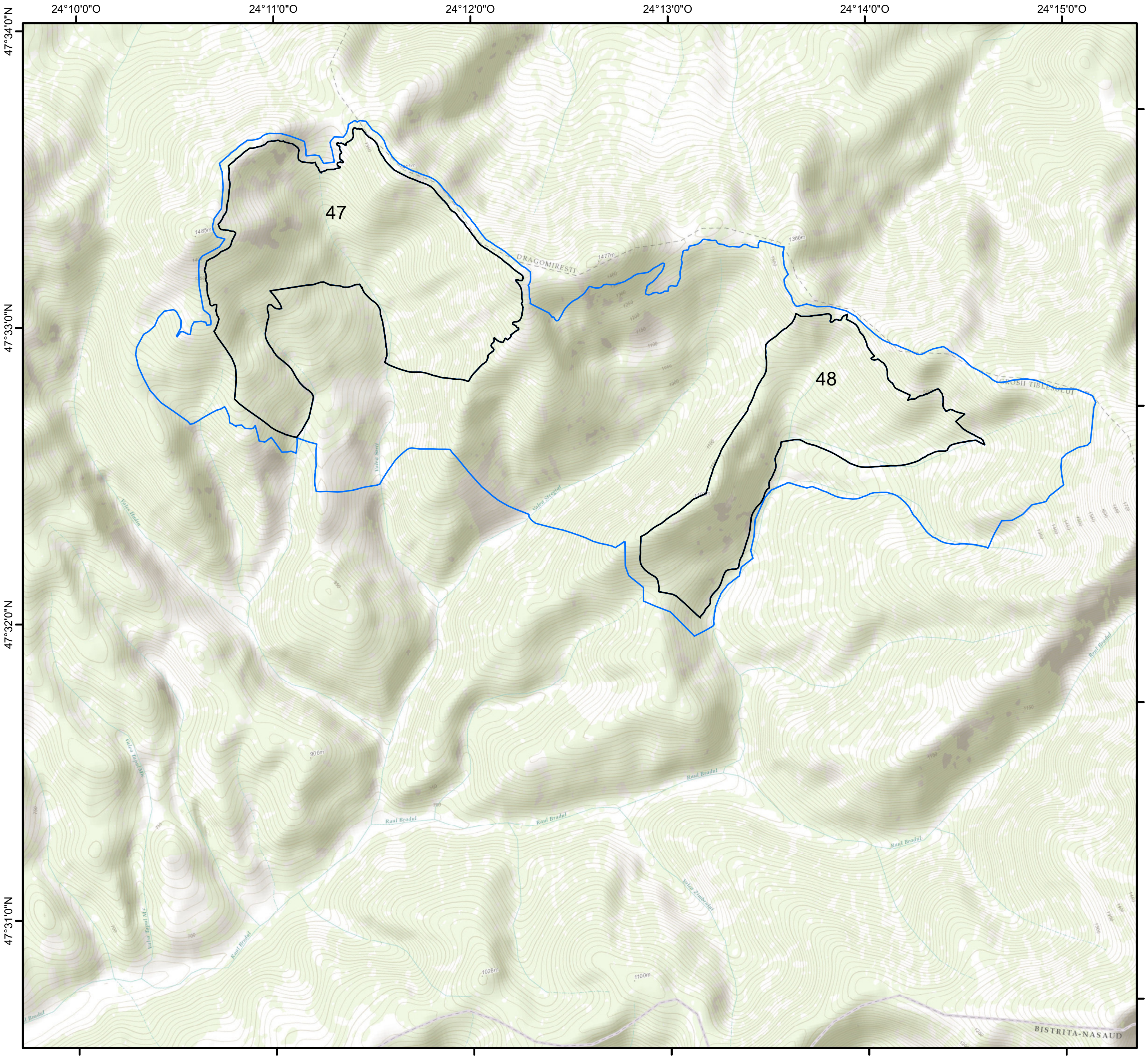
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.RO_TIBL

Topographic map of the nominated component part(s) Groșii Țibleșului

Romania

Beech Forest Region:

Carpathians

Component part number(s):	047-048
Size of property in hectar:	346.37
Size of buffer zone in hectar:	563.57

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

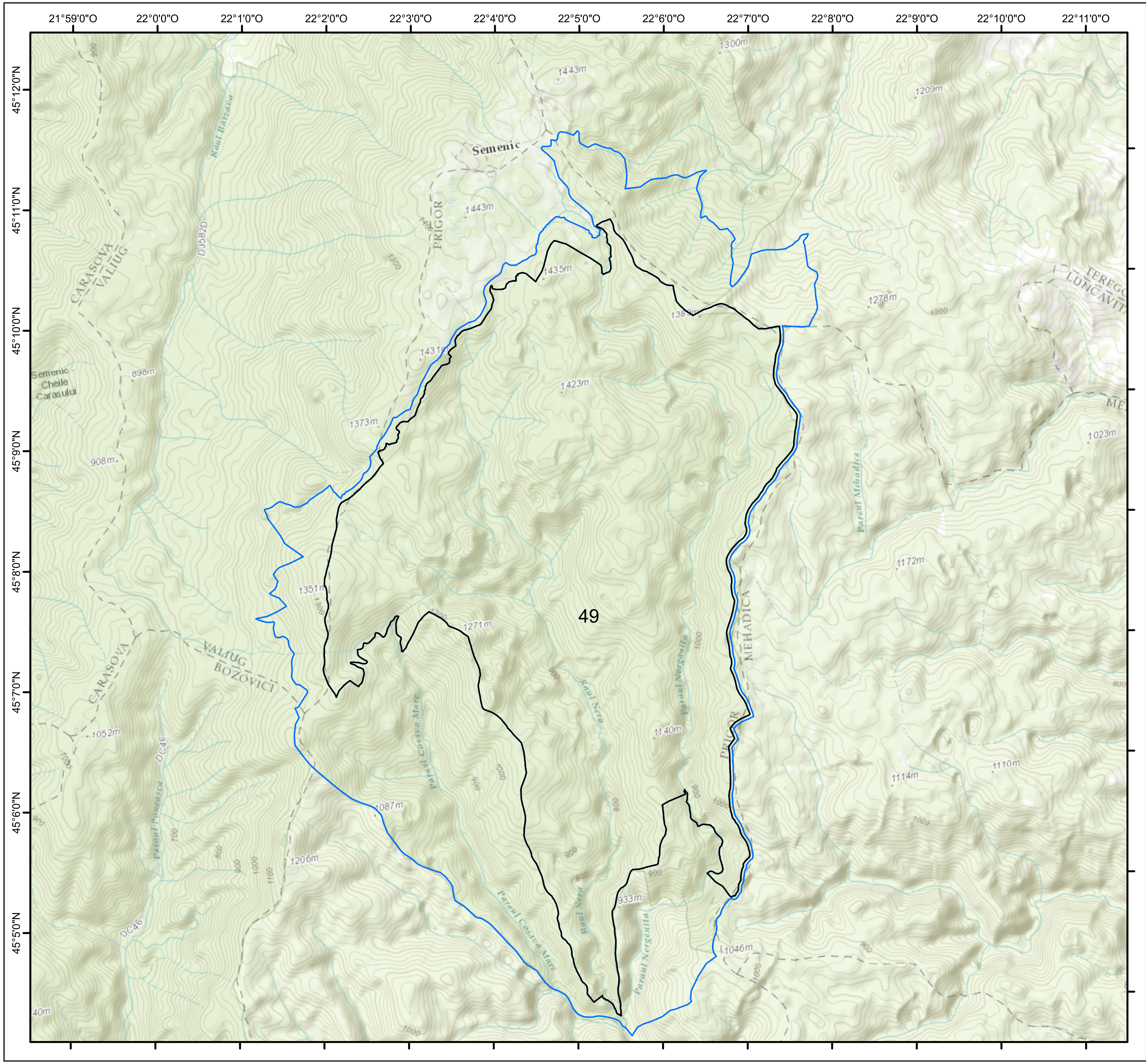
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.RO_IZVO

Topographic map of the nominated component part(s) Izvoarele Nerei

Romania

Beech Forest Region:

Carpathian

Component part number(s):	049
Size of property in hectar:	4,677.21
Size of buffer zone in hectar:	2,494.83

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

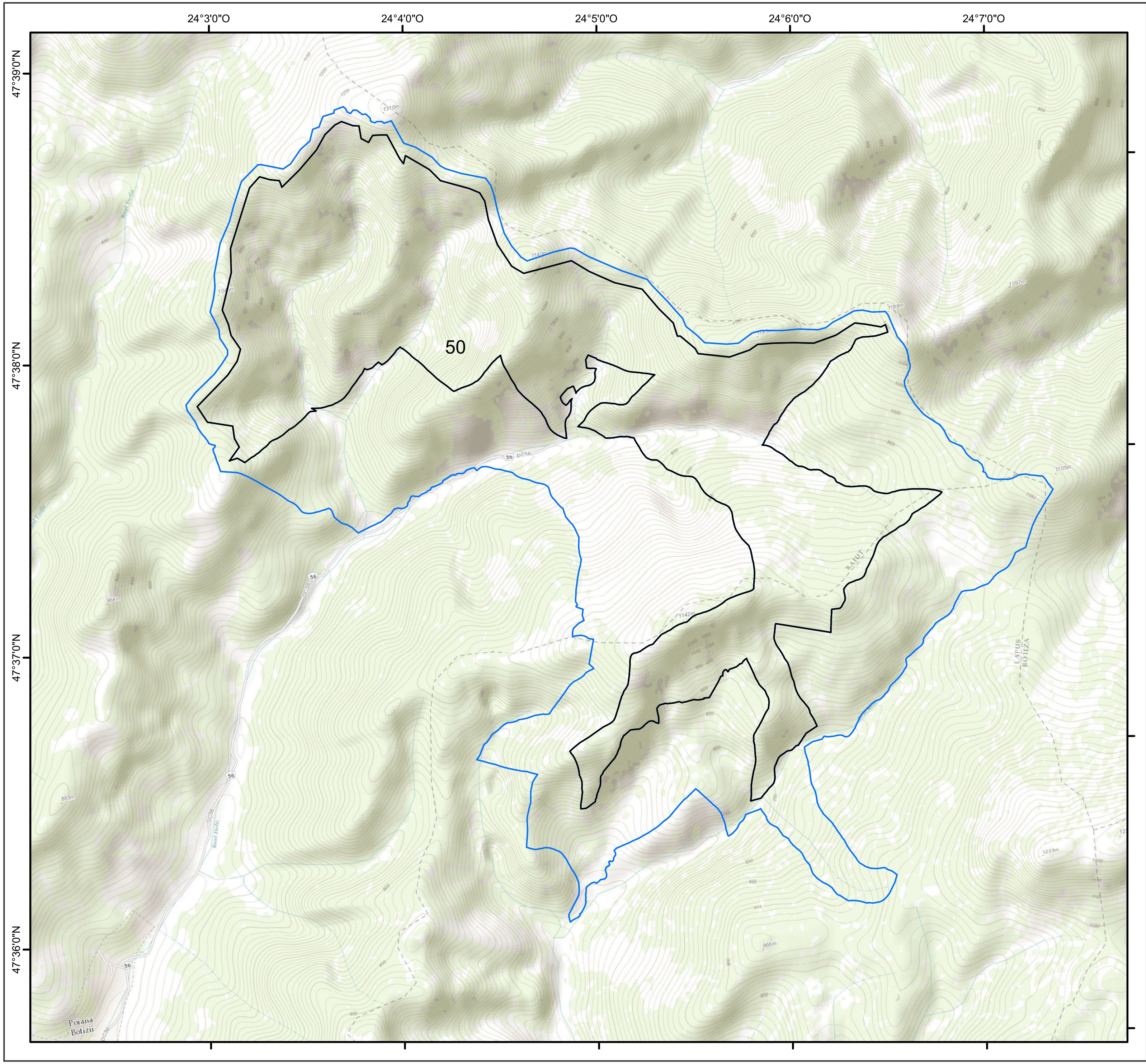
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:60.000

Date: 21.01.2016



Annex 1.e.RO_STRA

Topographic map of the nominated component part(s) Strîmbu Băiuț

Romania

Beech Forest Region:

Carpathians

Component part number(s):	050
Size of property in hectar:	598.14
Size of buffer zone in hectar:	713.09

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

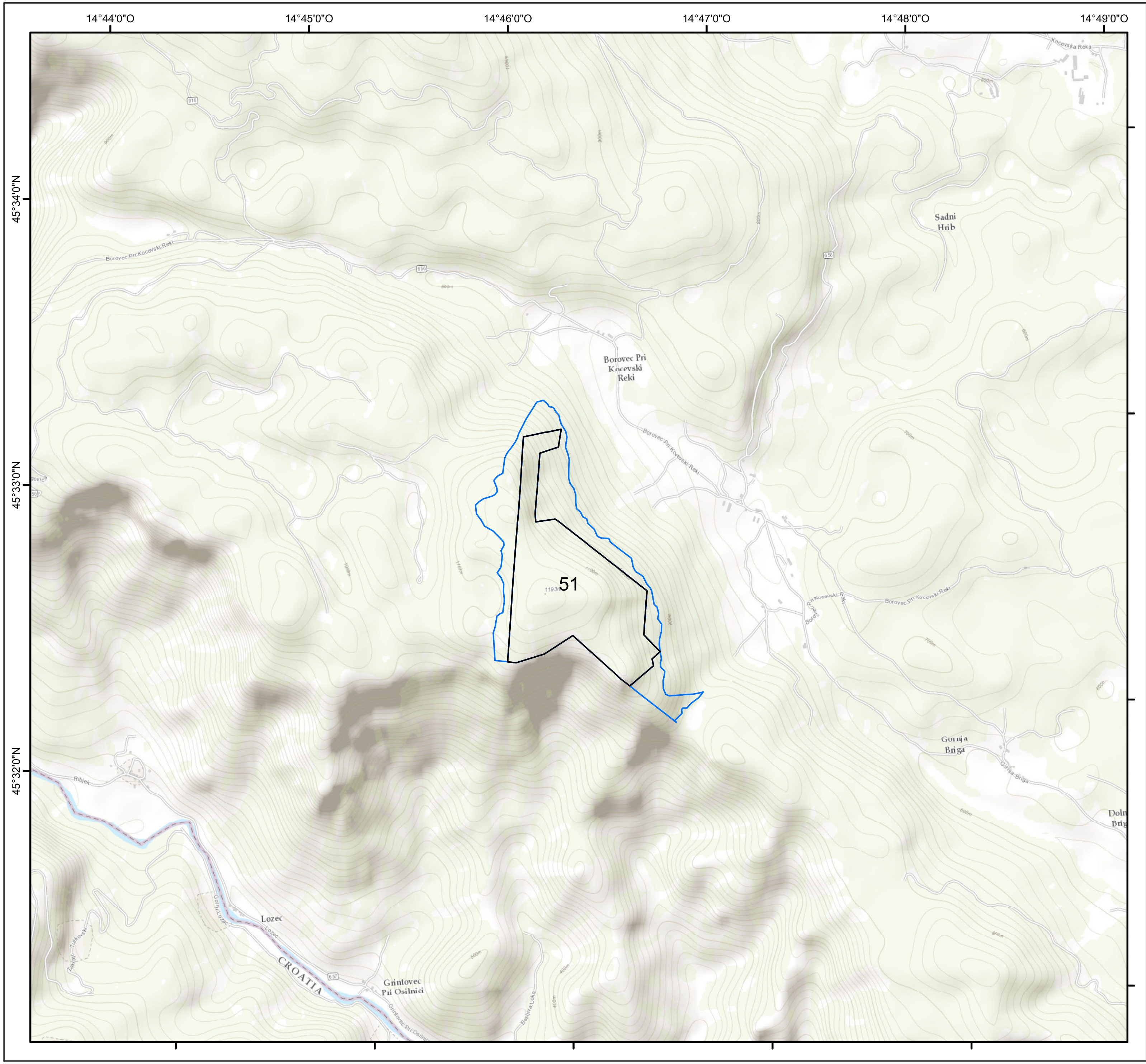
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.SI_KROK

Topographic map of the nominated component part(s)

Krokar

Slovenia

Beech Forest Region:

Illyric

Component part number(s):	051
Size of property in hectar:	74.50
Size of buffer zone in hectar:	47.90

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

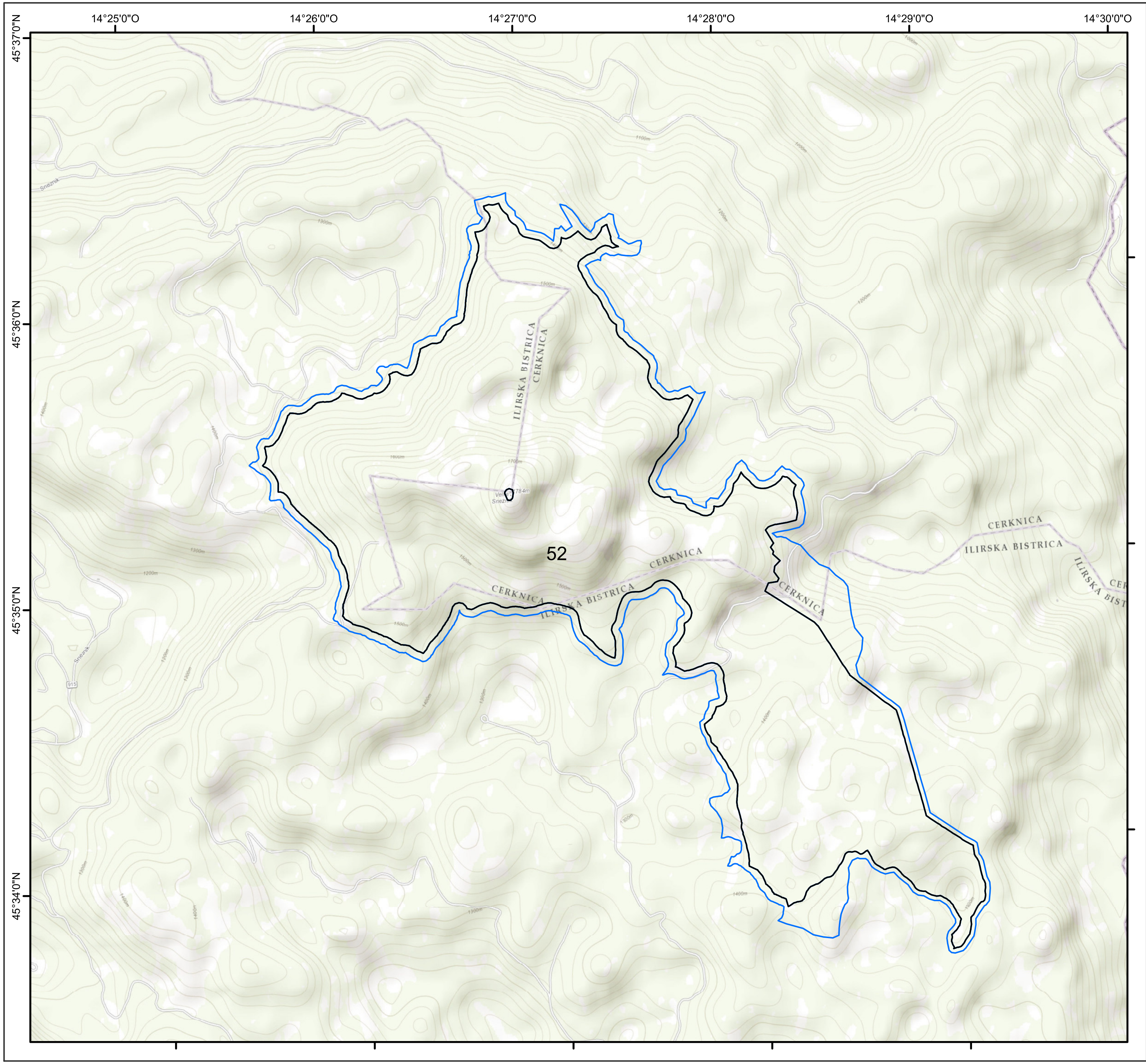
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.SI_SNEZ

Topographic map of the nominated component part(s) Snežnik-Ždrocle

Slovenia

Beech Forest Region:

Illyric

Component part number(s):	052
Size of property in hectar:	720.24
Size of buffer zone in hectar:	128.80

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

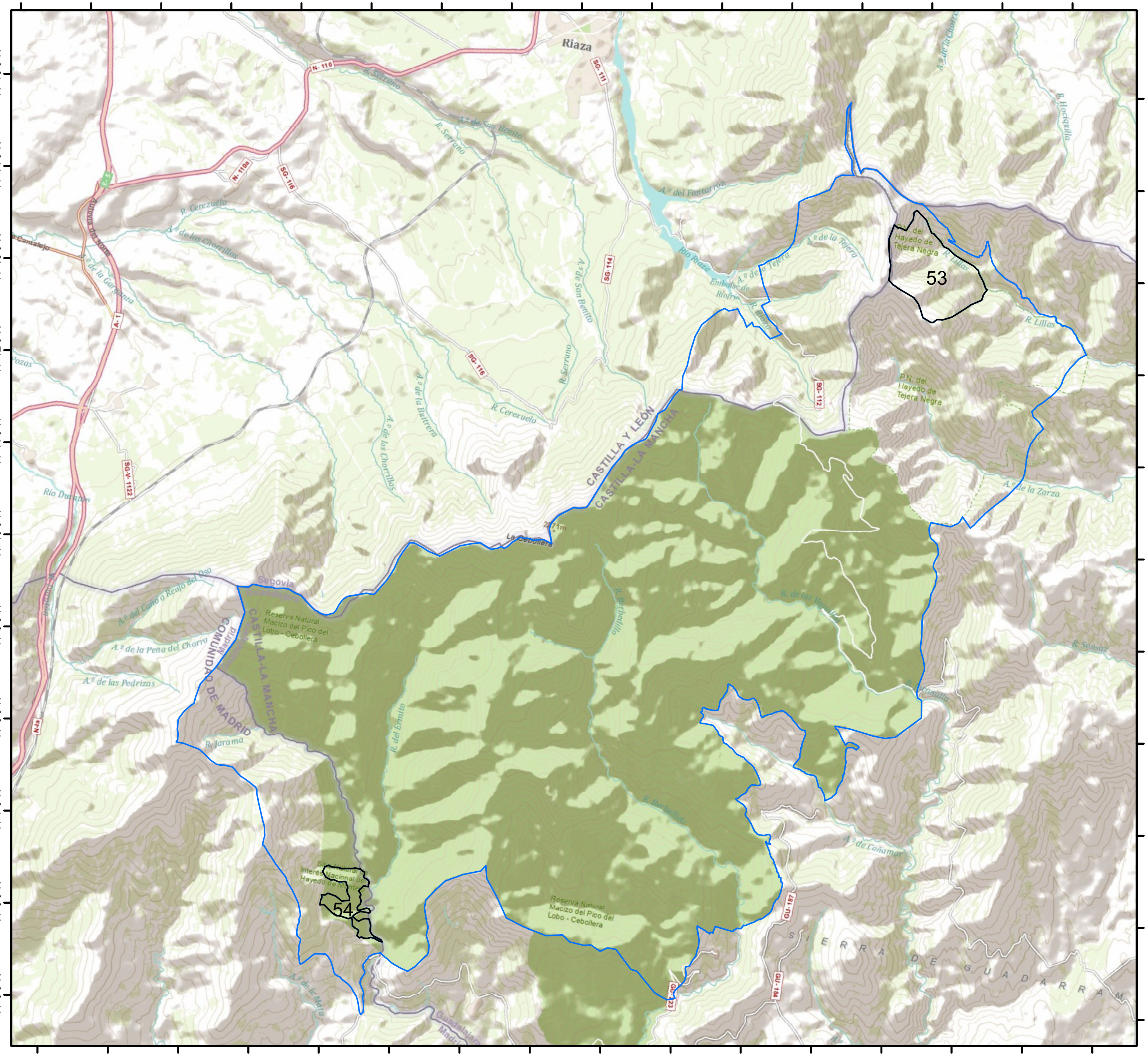
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.ES_AYLL

Topographic map of the nominated component part(s)
Hayedos de Ayllón

Spain

Beech Forest Region:

Pyrenaic - Iberian

Component part number(s): 053-054

Size of property in hectar: 327.30

Size of buffer zone in hectar: 13,880.86

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:80.000

Date: 21.01.2016

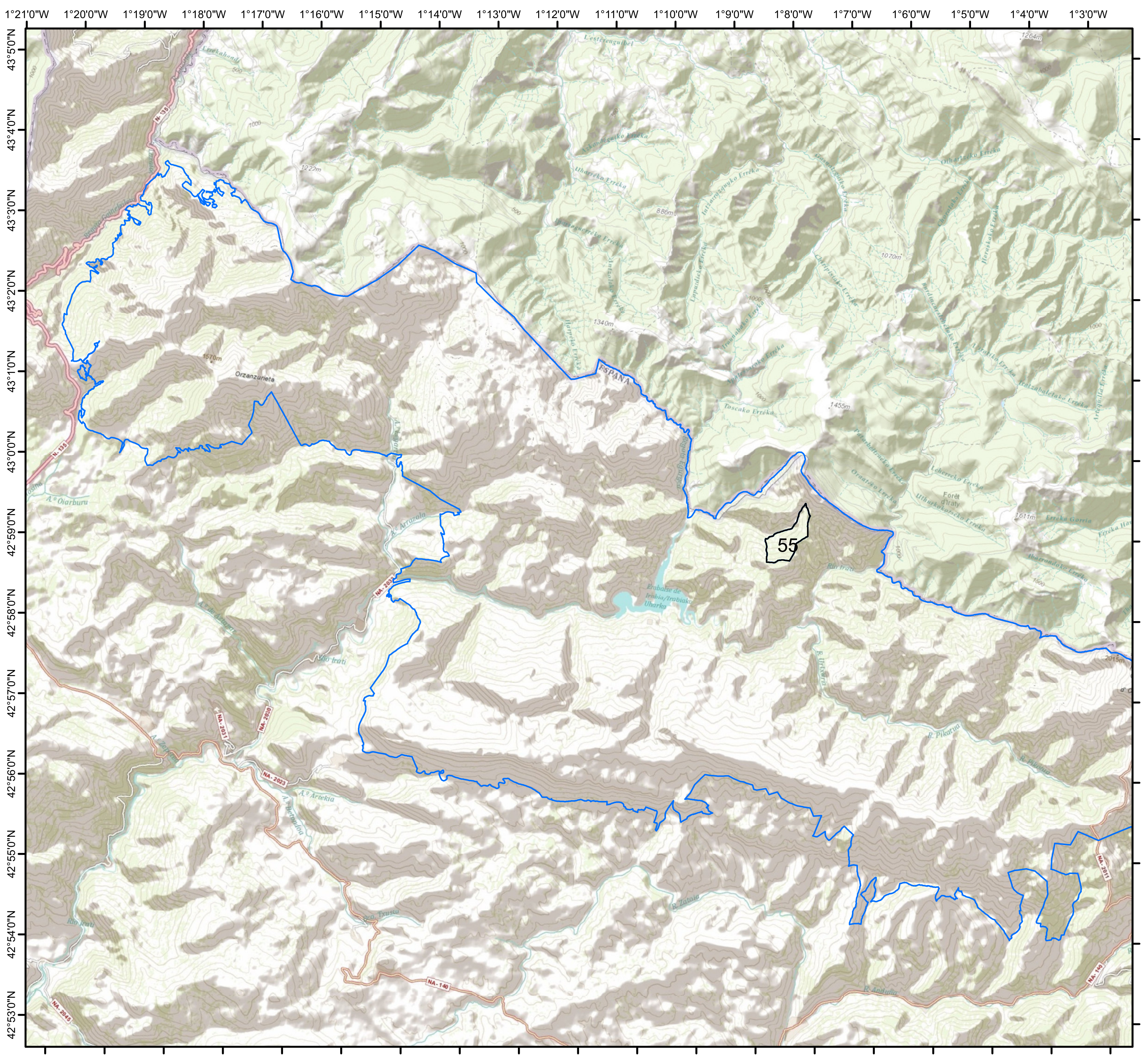
Annex 1.e.ES_NAVA_a

Topographic map of the nominated component part(s)
Hayedos de Navarra

Spain

Beech Forest Region:

Pyrenaic - Iberian



Component part number(s):	055
Size of property in hectar:	235.03
Size of buffer zone in hectar:	24,494.52

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

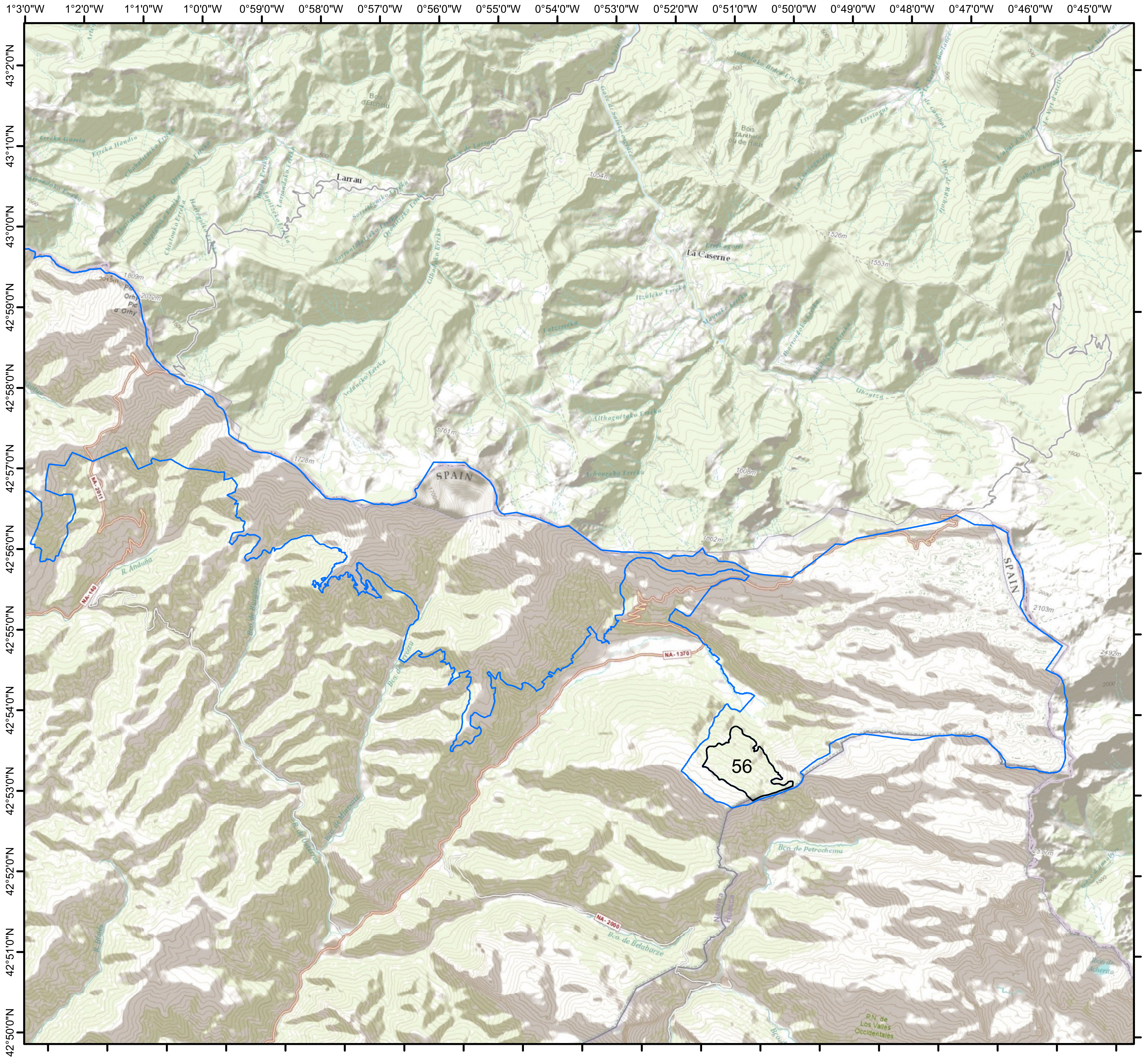
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016



Annex 1.e.ES_NAVA_b

Topographic map of the nominated component part(s) Hayedos de Navarra

Spain

Beech Forest Region:

Pyrenaic - Iberian

Component part number(s):	056
Size of property in hectar:	235.03
Size of buffer zone in hectar:	24,494.52

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:90.000

Date: 21.01.2016

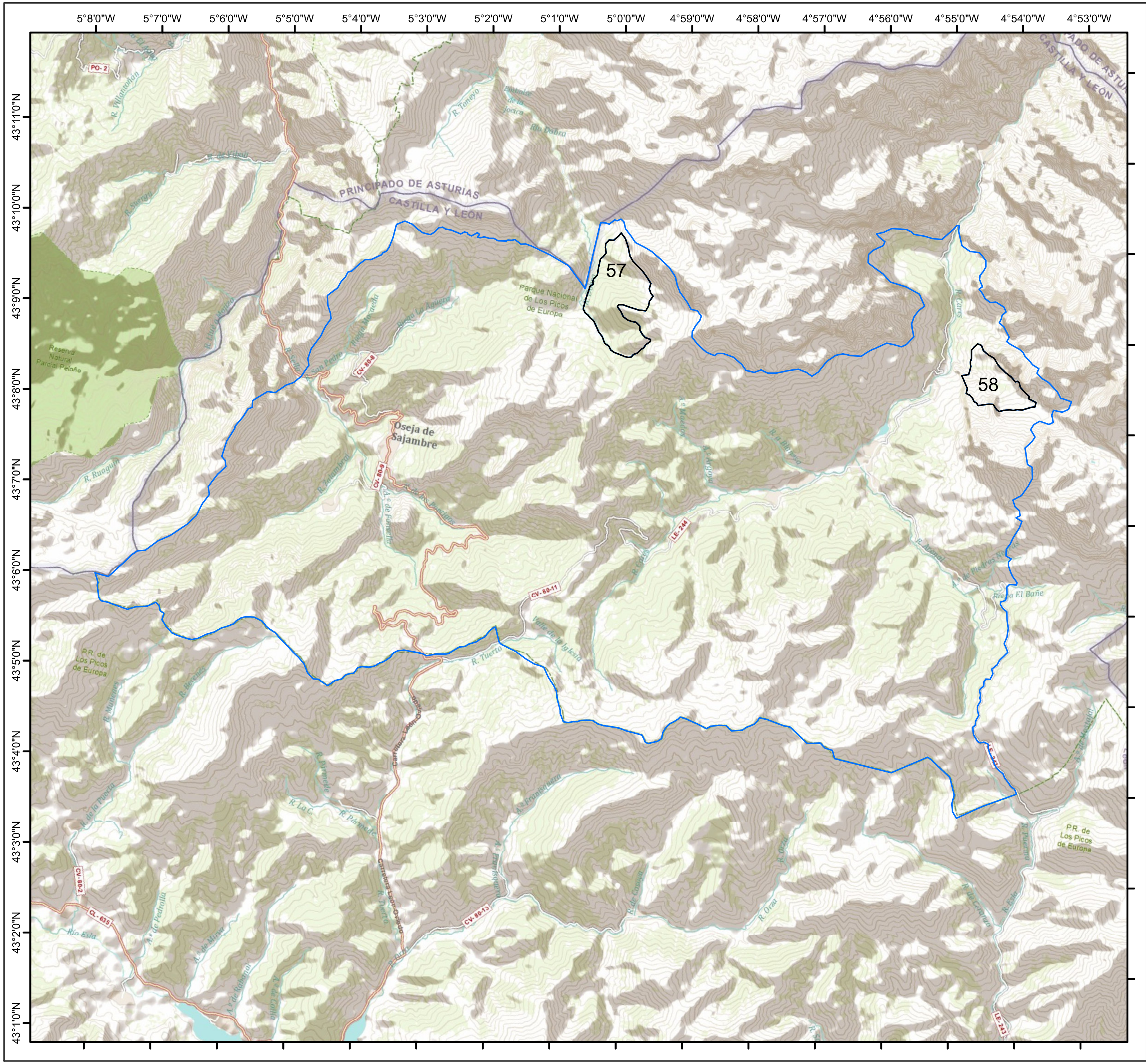
Annex 1.e.ES_PICO

Topographic map of the nominated component part(s) Hayedos de Picos de Europa

Spain

Beech Forest Region:

Pyrenaic - Iberian



Component part number(s):	057-058
Size of property in hectar:	323.23
Size of buffer zone in hectar:	14,253.00

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

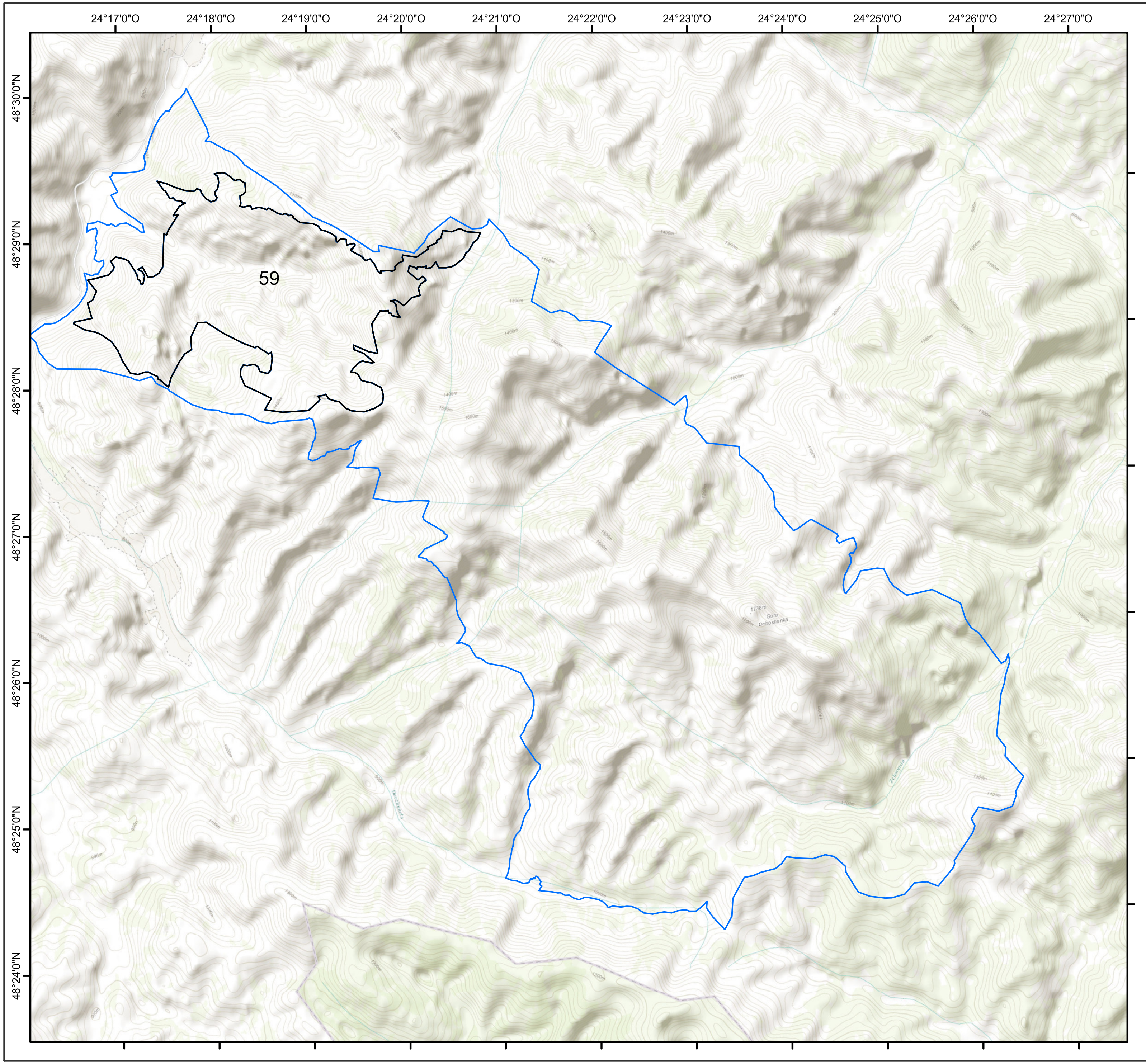
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1 2 4 Kilometer

N

Scale: 1:80.000

Date: 21.01.2016



Annex 1.e.UA_GORG

Topographic map of the nominated component part(s)

Gorgany

Ukraine

Beech Forest Region:

Carpathian

Component part number(s):	059
Size of property in hectar:	753.48
Size of buffer zone in hectar:	4,637.59

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

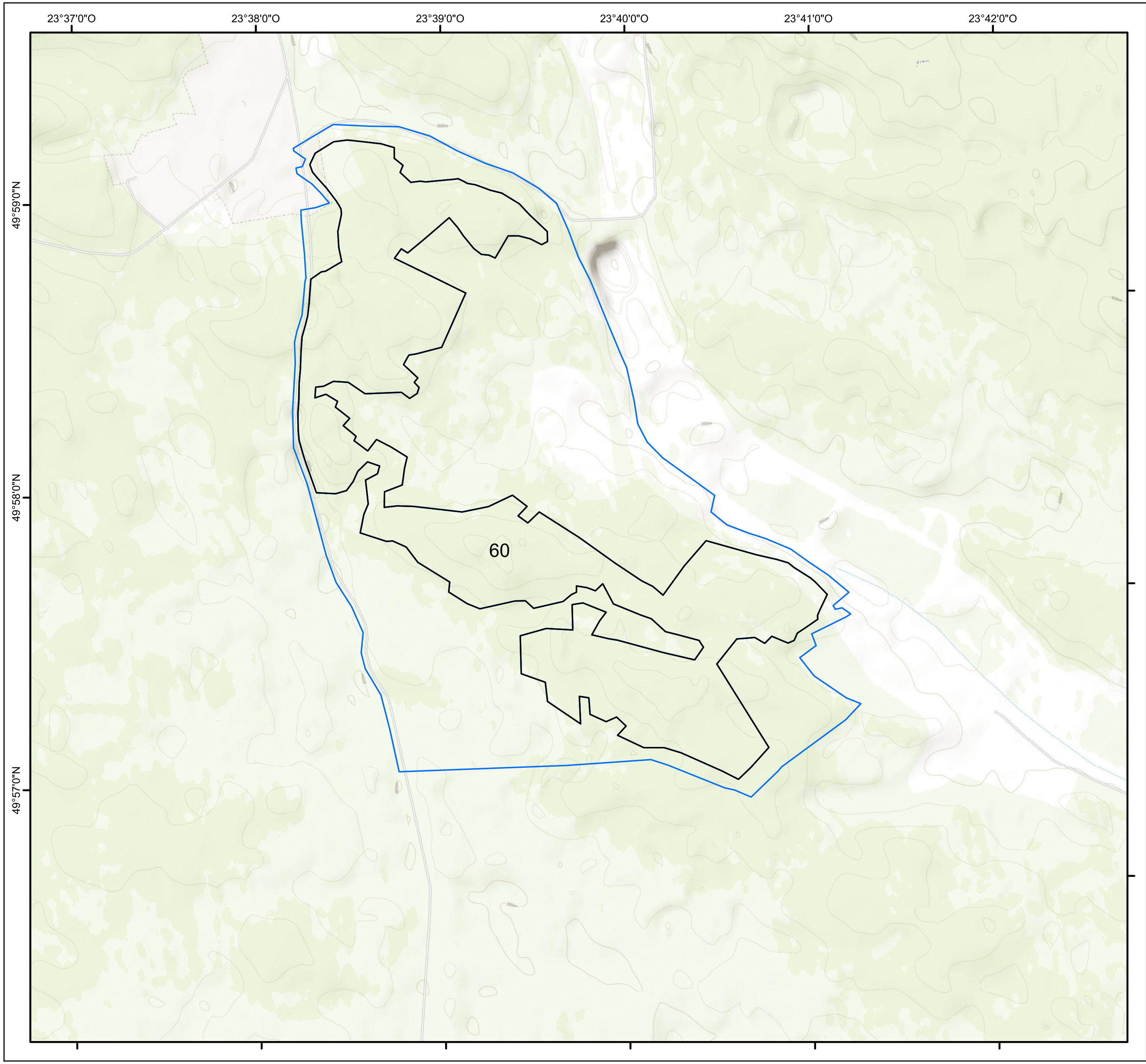
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:50.000

Date: 21.01.2016



Annex 1.e.UA_ROZT

Topographic map of the nominated component part(s) Roztochya

Ukraine

Beech Forest Region:

Polonic-Podolic-Moldovan

Component part number(s):	060
Size of property in hectar:	384.81
Size of buffer zone in hectar:	598.21

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

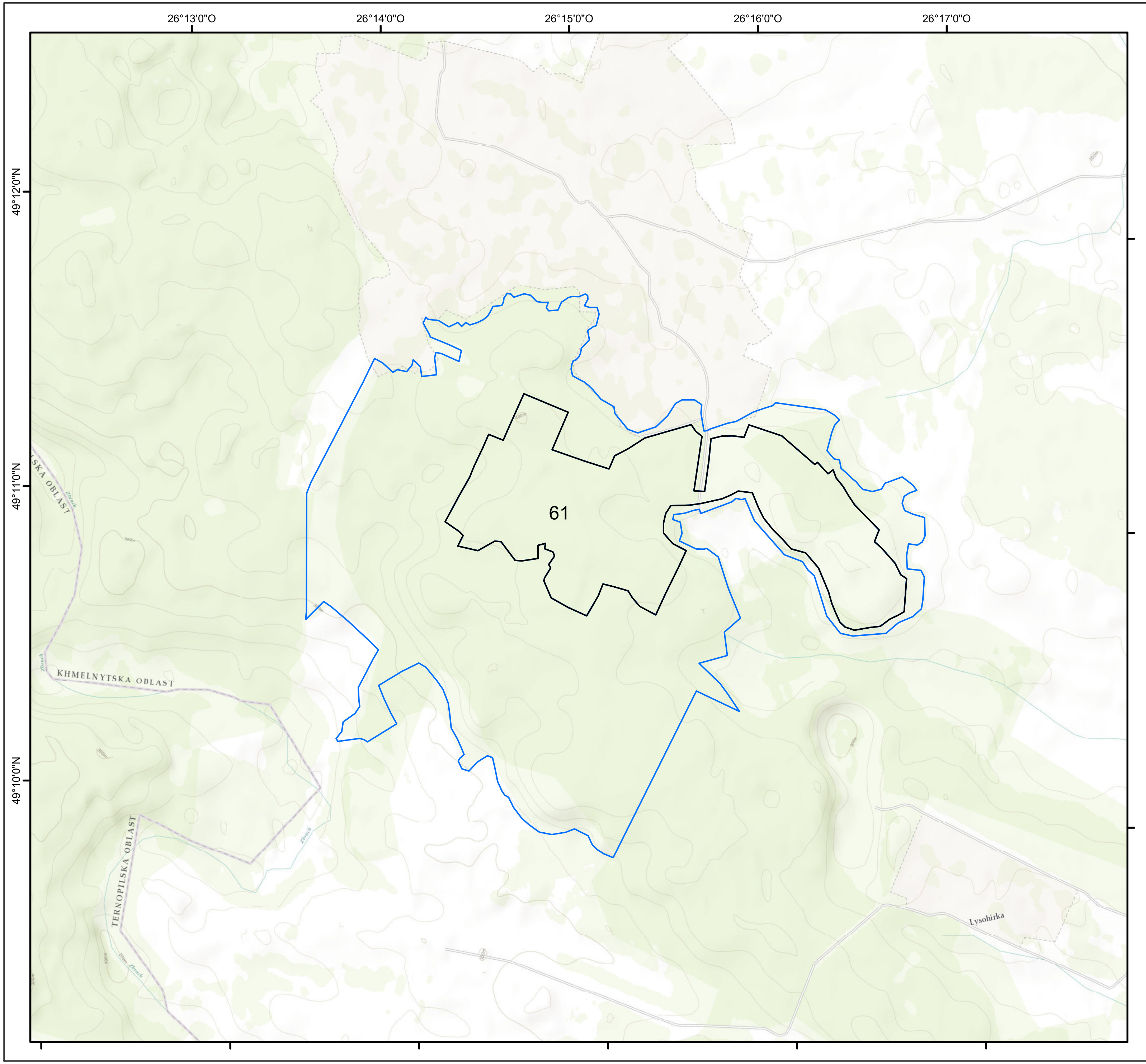
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.UA_SATA

Topographic map of the nominated component part(s) Satanivska Dacha

Ukraine

Beech Forest Region:

Polonic-Podolic-Moldovan

Component part number(s):	061
Size of property in hectar:	212.01
Size of buffer zone in hectar:	559.37

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

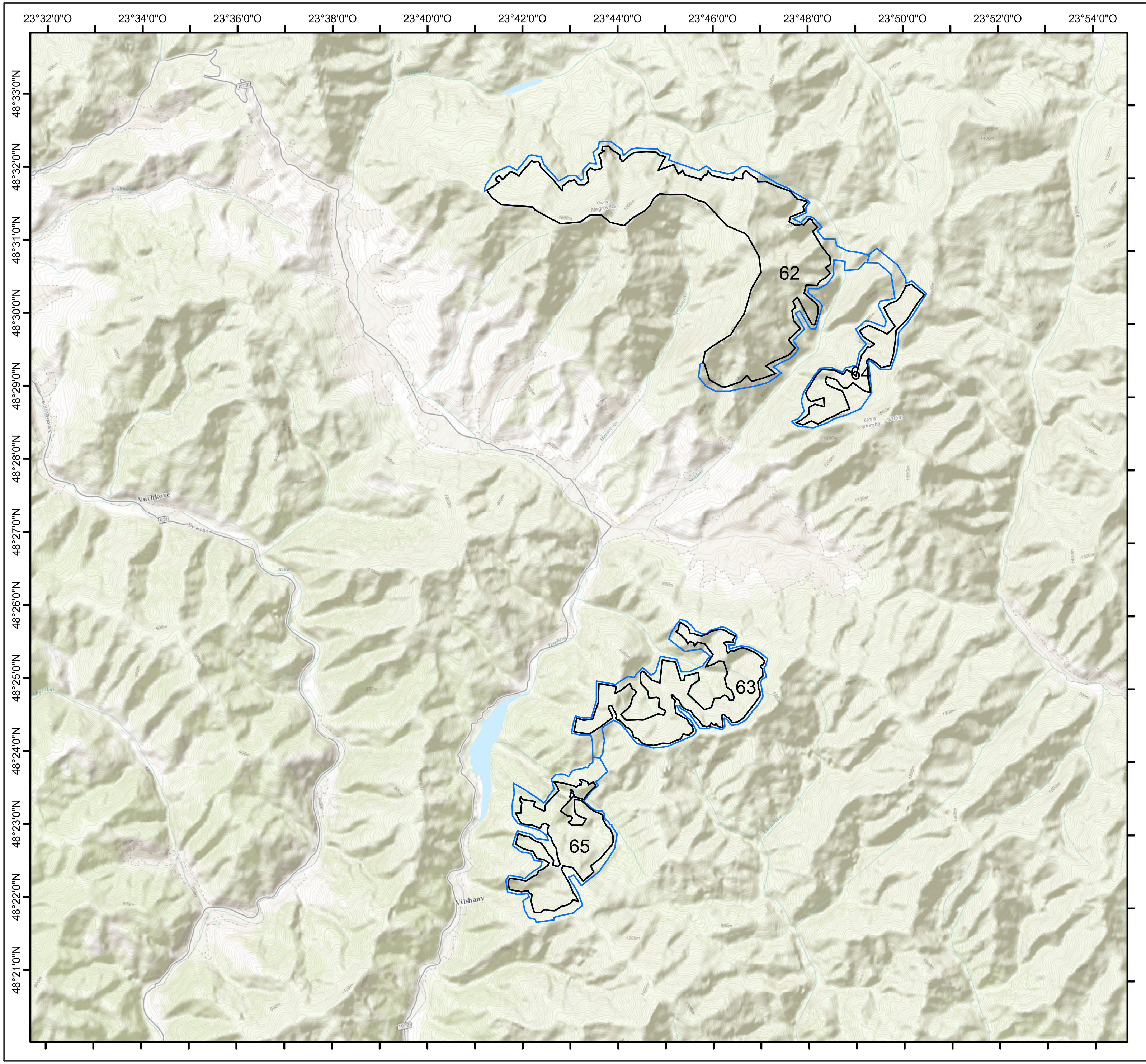
Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,35 0,7 1,4 Kilometer

N

Scale: 1:25.000

Date: 21.01.2016



Annex 1.e.UA_SYNE

Topographic map of the nominated component part(s) Synevyr

Ukraine

Beech Forest Region:

Carpathian

Component part number(s):	062-065
Size of property in hectar:	2,865.04
Size of buffer zone in hectar:	2,181.74

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 1,25 2,5 5 Kilometer

N

Scale: 1:100.000

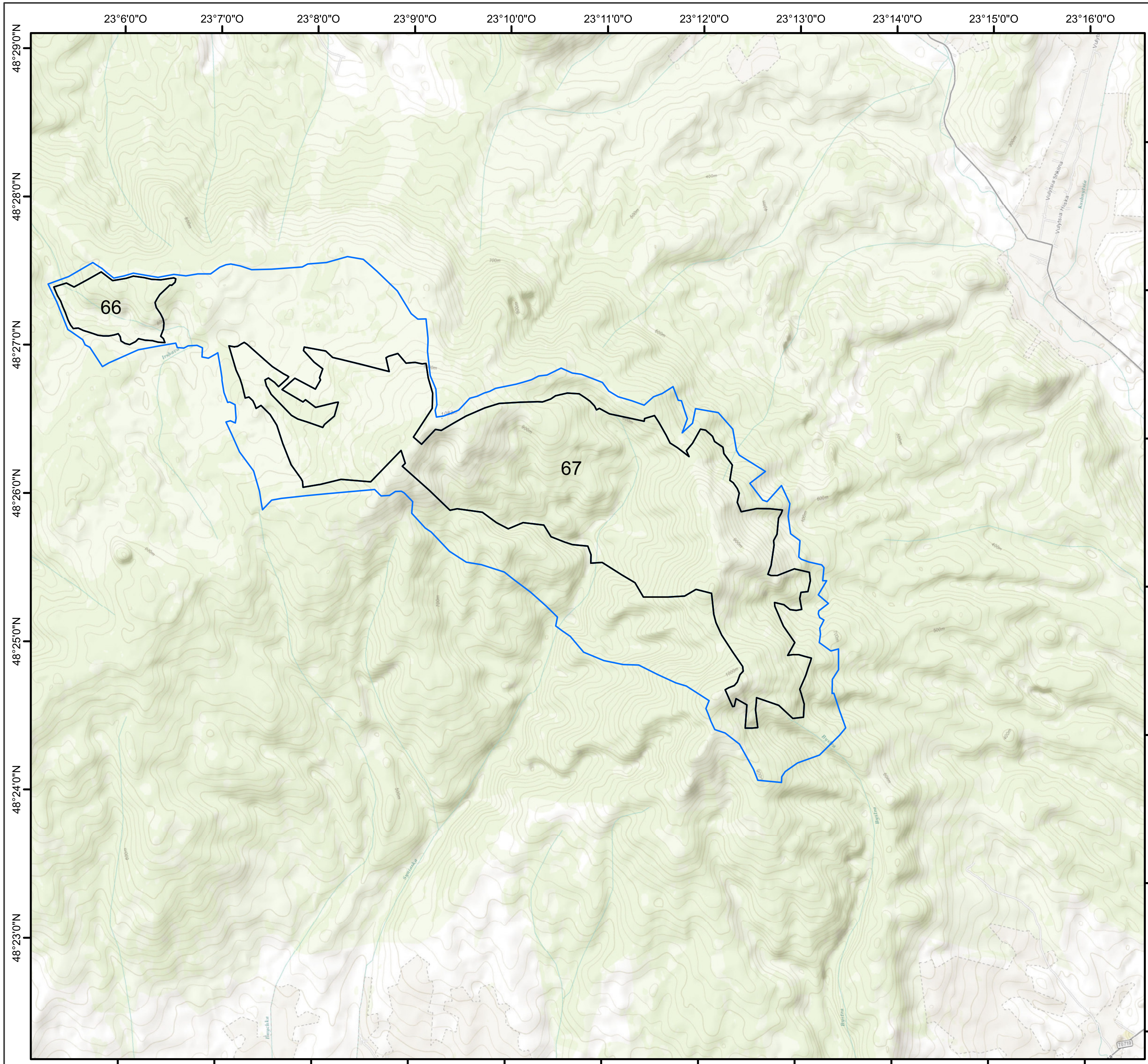
Date: 21.01.2016

Annex 1.e.UA_ZACH

Topographic map of the nominated component part(s) Zacharovanyi Krai

Ukraine

Beech Forest Region: Carpathians



Component part number(s):	066-067
Size of property in hectar:	1,258.13
Size of buffer zone in hectar:	1,275.44

Borders

World Heritage Property

Buffer Zone

Primeval Beech Forests of the Carpathians and Other Regions of Europe

Background: ESRI Topografic Baselayer
Projection: Europe Albers Equal Area Conic

0 0,5 1 2 Kilometer

N

Scale: 1:50.000

Date: 21.01.2016