

BEECH FORESTS AS WORLD HERITAGE IN ASPECT TO THE NEXT EXTENSION OF THE ANCIENT AND PRIMEVAL BEECH FORESTS OF THE CARPATHIANS AND OTHER REGIONS OF EUROPE WORLD HERITAGE SITE

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Abstract: Beech forests were first protected under the World Heritage Convention in 2007 as the *Primeval Beech Forests of the Carpathians (Slovakia and Ukraine)*. After two latter extensions in 2011 and 2017, the Natural World Heritage site is currently named the *Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe (Albania, Austria, Belgium, Bulgaria, Croatia, Germany, Italy, Romania, Slovakia, Slovenia, Spain and Ukraine)* and consists of 78 component parts in 12 European countries. It aims to ensure the preservation of beech gene pool, ecosystem and species diversity of beech forests, their future renewal and expansion, in regard to the development and use pressures they encounter and the biodiversity they support. Additionally, this World Heritage site aims to depict the beech expansion after the last Ice Age, spreading over a large percent of the continent to form one of the most significant forest ecosystems in Europe. The third extension nomination has been developed in 2020 and proposes the inscription of additional 30 component parts, a considerable step towards the complete overall picture of post-glacial beech re-colonization process and beech ecosystem diversity across Europe. With this extension 8 additional European countries would join this property, including the Republic of Serbia. The extended property would consist of over 100 component parts in 20 European countries, a pan-European network of protected areas with joint protection and management goals to represent a platform for policy making and knowledge exchange. This paper presents the genesis of this extremely complex World Heritage property and the work done to expand it over the protected beech forests in Serbia, in preparation of the first Natural World Heritage nomination for the Republic of Serbia.

Key words: Natural World Heritage, beech forests, Republic of Serbia, nomination, UNESCO.

Извод: Букове шуме су првобитно заштићене 2007. године као добро светске баштине *Нейџакнуће букове шуме Карпатиа (Словачка и Украјина)*. Након два наредна проширења, 2011. и 2017. године, ово добро светске природне баштине тренутно носи назив *Древне и неџакнуће букове шуме Карпатиа и друћих реиона Европе (Албанија, Аустрија, Белија, Бујарска, Хрватска, Немачка, Италија, Румунија, Словачка, Словенија, Шпанија и Украјина)* и састоји се од 78 компоненти у 12 европских земаља, а са циљем да се очува генетички диверзитет букве, специјски и екосистемски диверзитет букових шума, њихова будућа обнова и ширење у односу на развојне и експлоатационе притиске са којима су букове шуме суочене и на биодиверзитет који одржавају. Додатно, ово добро светске природне баштине има за циљ да представи експанзију букве након последњег леденог доба, када је ова врста заузела велики део континента, градећи најзначајније шумске екосистеме у Европи. Трећом номинацијом проширења овог добра, припремљеном током 2019. године, предлаже се уписивање додатних 30 компоненти, што представља значајан корак ка комплетирању опште слике пост-гласијалне колонизације букве и диверзитета букових шума широм Европе. Овим проширењем се добру светске природне баштине придружује још 8 европских држава, међу којима је и Република Србија. Проширено добро би се састојало од преко 100 компоненти у 20 европских земаља, као паневропска мрежа заштићених подручја са заједничким циљевима заштите и управљања, али и као платформа за развој политика и размену знања. У раду се представља настанак овог веома комплексног добра светске баштине и активности на његовом проширењу на заштићене букове шуме у Србији у оквиру припрема прве номинације природне баштине за Републику Србију.

Кључне речи: светска природна баштина, букове шуме, Република Србија, номинација, UNESCO.

INTRODUCTION

Why protect beech forests?

European beech (*Fagus sylvatica* L.) is a deciduous tree species endemic to Europe, therefore the beech forests are exclusively European vegetation type (Vološčuk *et al.*, 2013). With almost pan-European distribution, beech forests represent one of the most significant forest types of the northern hemisphere Temperate Broadleaf Forest Biome (Vološčuk, 2013a; Karadžić, 2018). Total area of the beech dominated forests in Europe is estimated at approximately 15 Mha, excluding the Caucasian Mts, with the largest forested areas in the south-eastern European mountains, Carpathians, Dinaric and Balkan Mountains, as well as in the central and southern Germany and France (Brunet *et al.* 2010; Vološčuk, 2013b).

Beech originated in the Tertiary Epoch and, having survived the alternating glacials of the Quaternary Period in refuge areas of the southern and south-eastern Europe, entered the expansion phase after the last Ice Age with high ecological competitiveness, to colonize the continent over a wide spectrum of habitats (Vološčuk, 2013a, 2014; Magri *et al.*, 2006; Knapp & Fichtner, 2011). However, beech is best adapted to humid climate, thriving in regions without a pronounced dry season, with mild winters and humid summers, which makes it most abundant broad-leaved tree species in Central Europe and in mountain regions of Southern Europe (Karadžić, 2018; Rugani *et al.* 2013; Knapp & Fichtner, 2011).

As one of the main tree species building up forest ecosystems in Europe (Vološčuk, 2014; Rugani *et al.* 2013), beech deeply influences the internal forest climate by its dense foliage and canopy shape, significantly reducing the amount of light reaching the interior of beech forests (Karadžić, 2018), conditioning the soil formation, regeneration cycles, food chains and supporting specific biodiversity (Vološčuk, 2014). Beech forests are among the most valuable terrestrial ecosystems in Europe, as they support a significant part of European biodiversity (Knapp & Fichtner, 2011; Vološčuk *et al.* 2013). It is estimated that up to 10,000 species of animal live in beech forests (Britz, 2015; Vološčuk *et al.* 2013).

If left undisturbed, the landscape of the temperate Europe would be dominated by beech forests as the climax ecosystem. However, beech forests today only cover a fraction of their potential natural distribution area (Commarmot *et al.*, 2013; Britz, 2015; Knapp & Fichtner, 2011; Vološčuk *et al.* 2013; Ibsch, 2014). The natural beech forests are scarce in Europe, accounting for only 2.8% of the European forests (Russian Federation excluded), having been exposed to the devel-

opment pressures for centuries, i.e. the expansion of settlements, infrastructure and agricultural land, as well as the forest utilization (Knapp & Fichtner, 2011; Vološčuk, 2013a; Sabatini *et al.* 2018; Commarmot *et al.*, 2013; Rugani *et al.* 2013; Bengtsson *et al.* 2000). Beech forests that escaped clearance in front of agriculture, settlements or infrastructure, are largely managed for timber production, as beech ranks high in terms of wood quality. The beech forest management aimed for timber production, however, has far-reaching effects on the forest structure and biodiversity (Lonsdale *et al.* 2008; Winter, 2012).

Forest management in Europe

Due to the high human population densities, temperate broadleaved forests in Europe have been transformed by human activities to a larger extent than any other forest biome (Brunet *et al.*, 2010; Knapp & Fichtner, 2011; Vološčuk *et al.* 2013).

First forest order prescribing the management in all forested areas of south-central Europe was passed in the second half of XVIII century by Maria Theresa. It was in force up to the year 1852, when the first Austrian forest act was passed, prohibiting clearing and reduction of forests and prescribing the basic measures for sustainable forest management, added that special forest units for its implementation were organized (Hahn & Fanta, 2001).

Compared to the XVIII century forestry, which focused on ways of ensuring natural regeneration or selective cuttings in shelterwood systems, the middle XIX century forestry strongly favored the economic approach to attaining the maximum forest rent. The creation of pure, even-aged conifer stands, fast-growing and providing high-quality wood, replaced the mixed broadleaf stands, area regulation and balanced distribution of age classes. A definite rotation length striving for a constant maximum annual yield became the canon of forest management (Agnoletti *et al.* 2009; Britz, 2015). Most of the traditional silvicultural treatments focused on timber production have considerably shortened forest development cycle, up to only 10–40% of the potential lifespan of tree species, thus originating homogenous, even-aged stands which lack the typical structural attributes of old forests (Barbati *et al.* 2012).

In managed forests, deadwood occurs mainly as a logging waste and stumps, whereas large logs and snags are rare. Surveys from several European countries have shown that the average dead wood volume in present day production forests is less than 10 m³/ha. The amount of deadwood in unmanaged forests is 10–20 times higher than in managed, production forests (Christensen *et al.* 2005). It should be noted

that only 5% of European forests include trees older than 140 years, while area covered with old-growth forests in Europe is estimated to be approximately 3 Mha, mostly located in Sweden and Finland, as well as in the mountains of central and eastern Europe, most notably the Carpathian Mountains (EEA, 2016).

Beech forests management

Shelterwood forest management system was dominant way of beech forest utilization in most European countries from XIX through most of XX century (Brunet *et al.*, 2010; Hahn & Fanta, 2001; Knapp & Fichtner, 2011). Shelterwood management involves the thinning of forest canopy after a mast year to establish a dense natural regeneration, after which the remaining seed trees are cut, resulting in single-layered and even-aged stands, with small amount of dead wood and small capacity of harboring beech forest related biodiversity.

In contrast, beech forests managed with *selective, single stem or group harvest* systems retain the multi-layered and multi-aged stand structure, but this type of forest management also significantly reduces the amount of dead wood by removing the old and senescent trees, negatively effecting the forest dependent biodiversity (Brunet *et al.*, 2010; Christensen *et al.* 2005). Nonetheless, the selective harvest is often referred to as *close-to-nature forestry, nature-based forestry, near-natural forestry, continuous cover forestry, multi-aged forestry, green-tree retention, nature-oriented silviculture, naturalistic silviculture* or *ecological silviculture* (Matović *et al.* 2019).

The most biodiversity damaging forest management system is a clear-cut system (EEA, 2016; Hahn & Fanta, 2001). Extensive clear-cutting produces a rapid shift in structure and loss of habitat, while tree extraction involves the use of large, heavy machinery that causes damage to the soil, vegetation and other features, all of which is decidedly damaging to overall biodiversity (Hahn & Fanta, 2001).

Beech forests with no or low human impact, although rare in Europe, can still be found locally and in most cases are related to the extreme inaccessibility and remoteness of their habitats (Europarc-España, 2017; Sabatini *et al.* 2018; Britz, 2015; Commarmot *et al.*, 2013). Most of these undisturbed beech forests have survived in mountainous areas, mainly in the geographic regions of the Carpathians, the Balkans and the Alps (Commarmot *et al.*, 2013).

Since nature protection and close-to-nature forest management are gaining more recognition in Europe, the awareness of the significance of such undisturbed forests as reference sites has arisen, for they provide insight into the structure and development of natural

forests to accommodate the ecologically-based forest management (Diaci, 1999; Willim *et al.* 2019; Christensen *et al.* 2005; Vandekerckhove *et al.* 2009; Rugani *et al.* 2013; Bengtsson *et al.* 2000).

Undisturbed beech forests are characterized by the uneven age structure, representing all beech development phases, from seedlings to the very old, senescent trees. Clear vertical diversification leads to the gap dynamics regeneration, where the mortality of canopy trees is a prerequisite for the regeneration of beech (Wirth *et al.* 2009; Glatthorn *et al.* 2018). Since beech is a shade-tolerant tree species, groups of seedlings can establish under small canopy openings and persist for longer periods of time, sustaining themselves only on scarce, moving sun flecks, even after canopy gaps are closed (Rugani *et al.* 2013).

Along with the significant amounts of dead wood, both standing and in soil, the gap dynamics generates a complex, multi-layered stand structure of undisturbed beech forests, with natural species composition and ecological processes (Europarc-España, 2017; Christensen *et al.* 2005; Rugani *et al.* 2013; Glatthorn *et al.*, 2018). Deadwood is an important component in the functioning of forest ecosystems, as it plays an important role in biogeochemical cycles, trophic chains, natural regeneration, and is an important element in carbon storage, as well as in providing key niches for many species (Vandekerckhove *et al.* 2009; Harmon *et al.* 1986).

The importance of preserving these forests for biodiversity conservation is well recognized (Barbati *et al.*, 2012; EEA, 2016), as they are vital for biodiversity dependent on the undisturbed forest characteristics, which includes many of the rare and threatened species (Kirchmeir & Kovarovics, 2016a; Sabatini *et al.* 2018). The scarcity of such forests implies that related biodiversity has become threatened (Bengtsson *et al.* 2000), which has accounted for these forests to become one of the key issues in the conservation policies of the European Union (Europarc-España, 2017; Knapp & Fichtner, 2011). Old-growth forests are considered as "reference stands" for each forest type, including the beech forests, regarding the Habitats Directive and the Natura 2000 network. Moreover, they provide the forestry criteria to achieve conservation objectives of species or habitats, especially in protected areas (Europarc-España, 2017; Sabatini *et al.* 2018).

It can be argued that under such conservation policies and tendencies of the EU, the initiative arose to create a Pan-European internationally protected area which would include "the best of the last" (IUCN 2007; IUCN 2011) fragmented remnants of the undisturbed, natural and close-to-natural beech forest ecosystems (Knapp & Fichtner, 2011). The beech forest

protection initiative lead to the inscription of European beech forests on the Natural World Heritage list, as well as to three extension nominations so far, with the goal to synchronize management policies across the European countries, assuring the survival of these forest types, which are characteristic for Europe and globally significant (Vološčuk, 2013a).

World Heritage – the Convention and the UNESCO Programme

The Convention Concerning the Protection of the World Cultural and Natural Heritage, known as the *World Heritage Convention* (furthermore referred to as the *Convention*), is one of the most ratified international agreements, with 193 signatory countries. Created in 1972, the mission of the Convention is to identify and protect the world's natural and cultural heritage considered to be of Outstanding Universal Value, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole (UNESCO, 2017; IUCN, 2006).

In order to provide better insight and presentation of World Heritage sites, a World Heritage List was established, listing the sites under two categories: Cultural and Natural World Heritage. So far, 1092 sites in 167 countries of the world have been listed, 845 of which are Cultural Heritage sites, while only 209 are Natural Heritage sites and 38 are mixed sites including both natural and cultural world heritage (<https://whc.unesco.org/en/list/>).

Within its World Heritage Programme, the UNESCO (*United Nations Educational, Scientific and Cultural Organization*) facilitates the protection of cultural and natural heritage sites on behalf of the international community. UNESCO World Heritage Center in Paris, established in 1992, is the main focal point and coordinator within UNESCO for all matters related to the Convention (<https://whc.unesco.org/>). However, the implementation of the Convention is entrusted to the World Heritage Committee, which decides on whether a property is inscribed on the World Heritage List, examines reports on the state of conservation of inscribed properties and requests State Parties to take actions when properties are not being properly managed. The World Heritage Committee consists of representatives from 21 State Parties and holds yearly sessions. Even though Committee member's term of office is 6 years, most State Parties choose it voluntarily to be only 4 years, in order to give other State Parties an opportunity to take part in the Committee (<https://whc.unesco.org/en/committee/>).

Each State Party to the World Heritage Convention is entitled to nominate a property on its territory to be protected under the Convention and inscribed on the World Heritage List. State Parties need to submit to the World Heritage Committee an inventory of properties on their territory which are suitable for the inscription, the inventory being referred to as a Tentative List. A property cannot be nominated by a State Party unless it was first inscribed on the Tentative List (UNESCO, 2017; <https://whc.unesco.org/en/tentativelists/>). No less than one year after this inscription the State Party can submit the nomination dossier to the World Heritage Centre, which then forwards it to the corresponding Advisory Bodies of the World Heritage Committee: ICCROM (*International Centre for the Study of the Preservation and Restoration of Cultural Property*), ICOMOS (*International Council on Monuments and Sites*) and IUCN (*International Union for Conservation of Nature*).

A nominated Cultural Heritage will be evaluated by ICCROM and ICOMOS, Natural Heritage by IUCN, while mixed properties will be evaluated by all of the Advisory Bodies. After a nominated property is independently evaluated by the Advisory Bodies, they respectively provide the World Heritage Committee with the evaluation and their recommendation regarding the inscription decision, which is to be voted on by the World Heritage Committee on the annual Sessions of the World Heritage Committee (UNESCO, 2017; <https://whc.unesco.org/en/faq/9/>).

The success for inscriptions of natural and mixed World Heritage properties has ranged between 20% and 80% of the submitted nominations per year since the begging of the implementation of the Convention. In recent decades, the average number of nominations has risen, but the rate of inscription has fallen to approximately 30 to 50% per year, partly due to the fact that many of the most iconic natural properties have been inscribed in the early years of the Convention, which is reflected in the high rate of inscription at this time. However, there is a noticeable trend of stricter application of the Operational Guidelines over time by the World Heritage Committee and by IUCN as its Advisory Body on Natural Heritage (Badman *et al.*, 2008).

Outstanding Universal Value

The World Heritage Committee sets the precise criteria for the inscription of properties on the World Heritage List, as well as the requirements for their nomination and the future management and reporting, all provided by the document entitled *Operational Guidelines for the Implementation of the World Heritage Convention*, which is frequently revised by the Com-

mittee as to reflect the new concepts, knowledge or experiences, last updated in 2017 (UNESCO, 2017; <https://whc.unesco.org/en/guidelines/>).

To be inscribed on the World Heritage list, a property must meet one or more of the 10 Outstanding Universal Value criteria, of which I-VI apply to cultural and VI-X to natural heritage. A nominated property must also meet certain conditions of integrity (cultural and natural properties) and/or authenticity (cultural properties only). Natural sites nominated individually or serially, besides meeting one or more OUV criteria (VI-X), need to meet the stringent requirements of integrity (UNESCO, 2017; IUCN, 2006).

IUCN (2006) suggests the following principles in understanding the concept of Outstanding Universal Value (further on: OUV) of the Natural World Heritage:

- *Outstanding*: properties should be exceptional: World Heritage Convention sets out to define the geography of the superlative – the most outstanding natural and cultural places on Earth;
- *Universal*: as the scope of the Convention is global, so the inscribed properties should hold the significance to all people of the world; properties cannot be considered from a national or regional perspective;
- *Value*: what makes a property outstanding and universal is its ‘value’, the defined worth of a property in terms of its global importance, based on a set of clear standards or criteria.

A Natural World Heritage must have adequately delineated boundaries to incorporate all the attributes which convey the OUV and to ensure the integrity and/or authenticity of the property. The boundaries should include sufficient areas immediately adjacent to the area of OUV in order to protect the property's heritage values from direct effect of human encroachments and impacts of resource use outside of the nominated area (UNESCO, 2017).

For all the natural properties, bio-physical processes and landform features should be relatively intact. However, it is recognized that no area is totally pristine and that all-natural areas are in a dynamic state, and to some extent involve contact with people. Human activities, including those of traditional societies and local communities, may be consistent with the OUV if they are ecologically sustainable. Additionally, a nominated property must have an adequate protection and management system in place to ensure its safeguarding, including appropriate legal, boundary and buffer zone provisions and a management plan or system ensuring that the uses supported by the property are ecologically and culturally sustainable (UNESCO, 2017; IUCN, 2006).

Even though there is no official form of a management plan set by UNESCO (Kruse *et al.*, 2009), it is a necessary tool to achieve that the World Heritage properties are managed in a way to ensure that their OUV, including the conditions of integrity and/or authenticity, is sustained or enhanced over time (UNESCO, 2017; IUCN, 2006). As there are still many State Parties of the World Heritage Convention which do not have the instrument of a management plan in their national nature protection legislative, a proof of a functioning management system needs to be provided in the obligatory management chapter of a nomination dossier, along with the land ownership information and means of implementing the protective measures (Kruse *et al.*, 2009).

For the management of a transnational property, the establishment of a joint management committee or similar body to oversee the management of the whole of a trans-boundary property is recommended (UNESCO, 2017; Kruse *et al.*, 2009). Common elements of an effective management system of a complex WH property include a shared understanding of the property by all the stakeholders, their involvement in planning, implementation, monitoring, evaluation and feedback cycles, as well as the allocation of necessary resources, capacity-building in an accountable and transparent management system (Vološčuk *et al.* 2013).

The inscription of European beech forests on the World Heritage list

The first effort to nominate European beech forests as Natural World Heritage (hereinafter referred to as NWH) occurred in 2003, when Slovakia nominated a serial natural property consisting of undisturbed, complex beech forests in the Carpathian Mountains, near the Ukraine border (IUCN, 2007). However, this nomination was not discussed at the 28th Session of the World Heritage Committee, at the request of the State Party, i.e. Slovakia (WHC, 2004), following the IUCN recommendation for a joint nomination by the State Parties of Slovakia and Ukraine as the only efficient approach at conservation of these bordering Carpathian forests (IUCN, 2007; WHC, 2007).

On January 31st 2006, the State Parties of Slovakia and Ukraine have jointly submitted the nomination concerning the protection of remnant primeval beech forests in the Carpathians as Natural Heritage (Anonymous, 2006; IUCN, 2007; WHC, 2007). At its 31st Session, the World Heritage Committee (hereinafter referred to as WHC) adopted in 2007 the Decision 31 COM 8B.16, inscribing these undisturbed beech forest ecosystems on the World Heritage list as *the Primeval Beech Forests of the Carpathians (Slovakia and*

Ukraine), under Criterion IX (WHC, 2007; UNESCO, 2017). Criterion IX requires properties to “*be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals*”. Properties nominated under criterion IX must be of “*sufficient size and to contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain*”, as the condition of integrity (UNESCO, 2017; IUCN, 2006; Badman *et al.*, 2008).

Primeval Beech Forests of the Carpathians property was inscribed as a transnational serial property of 10 components in Slovakia (4) and Ukraine (6), the component parts of which represent outstanding examples of undisturbed and complex pure-stand beech forests, exhibiting the most complete and comprehensive ecological patterns and processes across a variety of environmental conditions (WHC, 2007). Protection of these primeval beech forests as World Heritage was aimed at conserving beech forest ecosystems for future generations by protecting valuable genetic pull of European beech and the beech forest communities.

In June 2011 at the 35th Session held in Paris, the WHC adopted the Decision 35 COM 8B.13, approving the first extension of the *Primeval Beech Forests of the Carpathians (Slovakia and Ukraine)* to include the Ancient Beech Forests of Germany, thus becoming the *Primeval Beech Forests of the Carpathians and the Ancient Beech Forests of Germany (Slovakia, Ukraine and Germany)*, inscribed under Criterion IX as a transnational serial property consisting of 15 components – 6 in Ukraine, 4 in Slovakia and 5 in Germany (WHC, 2011).

The extension nomination was prompted by the IUCN evaluation of the *Primeval Beech Forests of the Carpathians (Slovakia and Ukraine)* nomination, pointing out that the nominated property was not representative of all types of beech forests and that Germany had some significant old-growth beech forests which may extend the coverage of European beech forests on the World Heritage List (IUCN, 2007; Britz *et al.* 2009). The added old-growth beech forests allowed the WH property to better represent European beech forests, their history and evolution, considering that Germany is the heartland of their distribution, with about one-fourth of the beech natural range (Britz *et al.* 2009; Vološčuk *et al.* 2013).

The German nomination clearly shifted the focus of the OUV within the Criterion IX: the initial nomination considered the component parts in the Carpathians to best represent the natural, undisturbed

beech forests, whereas the German components put the emphasis on the postglacial continental-wide expansion of beech forests. The first extension was a major step towards a comprehensive outlook on the OUV of this WH property as the outstanding series of undisturbed European beech forests to effectively preserve these unique forest ecosystems in Europe for future generations, while adopting the need to depict a broader picture was aimed at presenting the still ongoing beech postglacial expansion process (Kirchmeir & Kovarovics, 2016a). To fully represent the history and evolution of the beech forests, the property would need the inclusion of different regions of Europe the beech has reached in its continental-wide spread (Vološčuk, I. 2013a, Vološčuk *et al.* 2013), considering that the beech forests differ amongst phytogeographic zones, forming distinctive forest types of characteristic species composition, spatial structure, dynamics and overall diversity – including the genetic diversity of beech, as differing adaptations on abiotic conditions, the altitude, topography and macroclimate, as well as the nutrient and water availability (Vološčuk, I. 2013b).

In the extension decision the WHC “*commends the States Parties of Ukraine, Slovakia and Germany for their on-going commitment to ensure a comprehensive approach to conserving the primeval and ancient beech forests of Europe and for their exploration of the potential for the World Heritage Convention to further these efforts by cooperating with the support of IUCN and the World Heritage Centre, with other interested States Parties towards a finite serial transnational nomination in order to assure the protection of this unique forest ecosystem*” (WHC, 2011). Following this recommendation, the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety (BMUB) launched a Research and Development Project titled *European World Heritage Beech Forests*, with the goal of “*defining the scope of a possible finite European extension nomination to the existing trilateral World Heritage property*” (Ibisch, 2014). The project was commissioned by the German Federal Agency for Nature Conservation (BfN) and implemented by the Centre for Economics and Ecosystem Management (CEEM) at the Eberswalde University for Sustainable Development (HNEE).

The screening process lasted over two years and provided in 2014 the first comprehensive overview of ancient and primeval beech forests in Europe, which listed 126 sites (Ibisch, 2014), later to be known as the *Longlist*. Based on the inscription criteria, the 64 suitable extension sites formed the so-called Vienna *Shortlist*, setting groundwork for the next extension nominations (Kirchmeir & Kovarovics, 2016). Other significant project results included the delineation

of the 12 European Beech Forest Regions (Figure 1), which was referenced in the future extension nominations of the property.

State Parties hosting at least one of the sites on Vienna Shortlist were invited to participate in the upcoming extension nomination, resulting in an assembly of 11 countries: Albania, Austria, Belgium, Bulgaria, Croatia, Italy, Poland, Slovenia, Spain, Romania and Ukraine. Poland subsequently decided to withdraw from the nomination, which ultimately included 10 European countries and 63 component parts in 32 protected areas (Kirchmeir & Kovarovics, 2016). The extension was inscribed on the World Heritage List by the Decision 41 COM 8B. 7 of the WHC, which has again considered future extensions of the property towards a finite component composition based on the scientific criteria, such as were used in the Screening Study 2012-2014 (WHC, 2011).

After two extensions, the World Heritage site is currently named *the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe* (further on: AP BF CORE), which consists of 78 component parts¹ in 43 protected areas and covers 92023.14 ha in 12 European countries: Albania, Austria, Belgium, Bulgaria, Croatia, Germany, Italy, Romania, Slovakia, Slovenia, Spain and Ukraine. In Table 1 we have compiled all the basic data of all currently inscribed AP BF CORE component parts, segregated in line with the nomination they were inscribed in, in order to provide better understanding of this extremely complex NWH property which has been developing for almost two decades under the World Heritage Convention.

Results and Discussion

At the initiative of the Swiss Confederation, the preparation of another serial transnational AP BF CORE extension nomination was underway in 2018. Ultimately, the following 10 countries took part in the extension nomination: Bosnia and Herzegovina, Czech Republic, France, Italy, Poland, Serbia, Slovakia, Switzerland, North Macedonia and Montenegro. The nomination bearer, the Swiss Confederation, delivered the extension nomination dossier to the World Heritage Centre in January 2020. Table 2 presents the nominated component parts of the 2020 Extension Nomination Proposal (further on: 2020ENP), compiled with the corresponding data on the sizes of the core and the buffer zone and the protected area they belong to.

From 2019 on, the nomination dossier preparation was guided by the E.C.O Institute for Ecology from Klagenfurt, Austria (further on: the Coordination Office), which experience in preparing the previous extension of the property has had the major

influence on the process, making certain that a solid nomination proposal with high inscription chance was elaborated in 2020. To aid the preparation of the nomination dossier, the Coordination Office has prepared the Nomination Handbook, where all the zonation and description concepts were elaborated to reach a common understanding of the inscription criteria.

The State Parties have assigned the Focal Points for the nomination process to coordinate the 2020ENP activities and tasks in their respective countries, which were invited by the Coordination Office to attend four technical meetings during the preparation of the 2020ENP, in Klagenfurt (October 2018), Bern (May 2019), Belgrade (September 2019) and Vienna (January 2020). The meetings have had an important role in the nomination preparation, as the application of the inscription criteria and selected component parts were discussed in detail, providing the experts with a clear notion on how to proceed further with the nomination tasks.

This nomination needed to better represent beech forests across Europe and to close some significant distribution gaps, in order to represent all beech forest regions and protect the last remnants of ancient and primeval European beech forests over a full scope of environmental conditions. Most notable gaps were in the Balkan Peninsula, as well as in the far-western European territories (Figure 2).

Inclusion of the Republic of Serbia in the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe World Heritage site

The Republic of Serbia has appointed the Institute for Nature Conservation of Serbia (further on: the Institute) to prepare the nomination on the technical level and the Ministry of Environmental Protection to guide the process on the national level. Serbian National Commission for UNESCO within the Ministry of Foreign Affairs was involved in the nomination process as well. The dossier was signed by the UNESCO ambassador of the Republic of Serbia, appointed by the Serbian Government.

To prepare the nomination dossier, the Institute has collaborated with the managers of the nominated protected areas, as well as with the Institute for Nature Conservation of Vojvodina Province, as nomination includes component parts on the territory of Vojvodina Province of the Republic of Serbia. All the mentioned stakeholders were invited to participate in the technical meeting held in Belgrade and co-organized by the Institute in September 2019.

¹ A technical error should be noted in the Decision 41COM 8B.7. on the latest extension inscription, where it states that the newly formed property includes 77 components (WHC, 2017). The complete list is provided in Table 1.

First Serbian Tentative List submission (2018)

State Parties hosting the suitable sites for the next extension of AP BF CORE World Heritage site according to the Vienna Shortlist were invited in late 2017 to add the extension components on their UNESCO World Heritage Tentative Lists, as the first step towards the nomination. The deadline for submission of all documents to the World Heritage Centre to be considered by the WHC in the following year was set at the 1st of February (UNESCO, 2017). Despite the short deadline, on the 28th of January 2018, the Republic of Serbia added the components intended for the next AP BF CORE extension to its Tentative List. Only four countries, Montenegro, Poland, Serbia and Switzerland, added the extension components to their respective Tentative Lists in 2018.

The Institute prepared the first set of components which included 11 Forest Reserves selected on the basis of their naturalness and the diversity of beech forest communities, including several relict and endemic species and/or plant communities (Table 3). The objective at the time was to represent the diversity of the ancient and primeval beech forests in Serbia, focused on the Moesian region, as the dominant beech region of the country. The oldest and predominantly pure-stand beech forests under the strict protection were selected, including some of the first protected areas in Serbia, the oldest one being the Strict Nature Reserve Zeleničje, established in 1948. The long-lasting strict protection has provided undisturbed development resulting in some of the oldest preserved forests in Serbia in general. With exceptional site diversity, the selected components from Serbia would greatly improve the representation of the development history of beech forests of the Balkan Peninsula, in the context of OUV of this property, as well as they would represent a significant addition considering the role of the Balkan Peninsula in the historical and the contemporary beech forest development, maintaining some of the oldest beech forest ecosystems in Europe.

Having in mind that at this point the Coordination Office was not yet contracted by the Swiss Confederation to guide the nomination process on technical level, while lacking the time to research and comprehend all the inscription criteria, the selection of the components entered on Serbian Tentative List in 2018 was not in line with some of the criteria set by previous extensions. Most notable weakness of the first selection of components added onto Serbian Tentative List were the small sizes of the components, with the smallest one being just 0.45 ha of size (Table 3). However, these are not small, isolated forested islands, but are incorporated into continuous forest cover.

Nevertheless, the minimal size threshold of 50 ha was set by the WHC in the Decision 41 COM 8B.7 (WHC, 2017), which required an overall revision of the Serbian component parts selection.

Second Serbian Tentative List submission (2019)

Klagenfurt technical meeting of late 2018 was the kick-off meeting of the nomination dossier preparation process led by the Coordination Office. The meeting had revealed that the most of components on the Serbian Tentative List did not compile with the 50 ha minimum size criteria, requiring their withdrawal from the Tentative List and the composing of a new Tentative List Submission Form by the 1st of February 2019. For the participating State Parties which had not submitted the extension components on their Tentative Lists in 2018, the Klagenfurt technical meeting was the starting point of the entire nomination process.

All countries participating in the later nomination had submitted their extension components on the Tentative List by the deadline, with coordinated contents of the Tentative List Submission Forms in regard to the common nomination ahead. As of 2019, the World Heritage Committee regards a joint effort of the following ten State Parties to further extend the existing NWH property of AP BF CORE: Bosnia and Herzegovina, Czech Republic, France, Italy, Montenegro, North Macedonia, Poland, Serbia, Slovakia and Switzerland, out of which eight State Parties were not represented in the existing NWH property.

According to the conclusions drawn from the meeting in Klagenfurt, the Institute further studied other strictly protected beech forests in Serbia to revise component selection for the upcoming extension of the AP BF CORE World Heritage site. Eight Level I Protection Regime (further on: Lvl I PR) localities within three Serbian national parks – Fruška gora, Tara and Kopaonik, were included on the Serbian Tentative List on the 31st of January 2019.

Beech forests of Fruška gora NP in Vojvodina Province of Serbia have been selected as the only suitable component in the whole Pannonian BFR for future extension of AP BF CORE. The inclusion of the ancient beech forests within the two Lvl I PR localities of Fruška gora NP, *Papratski do* and *Ravne*, would first represent the Pannonian BFR within the future extended property which was regarded as significant additional value of these ancient forests.

The representation of the Moesian-Balkan BFR was much improved by the revised selection of six component parts from central Serbia, the two Lvl I PR localities of Tara NP, *Zvezda* and *Klisura Rače*, and the

four Lvl I PR localities of Kopaonik NP: *Kozje stene*, *Duboka*, *Metode* and *Jelak*. Within the existing property the Moesian-Balkan BFR was underrepresented by two components in north Albania and one cluster component of nine component parts on the Central Balkan massif in Bulgaria, considering that the variability of beech forest communities within the BFR depends on the differences in the species pool, geological bedrock diversity, soil types, altitudinal zones, etc. All the localities include primeval beech forests in and around deep river gorges or canyons, as habitats of strong refugial character reflected in the presence of endemic and relict species and/or relict communities, emphasizing the refugial characteristics of Balkan Peninsula during the Ice Ages, reflected the evolution history and the diversity of the beech forests.

The nominated components from Serbia

The zonation design which followed the elaborated guidelines of management requirements has revealed that not all of the selected component parts from Kopaonik NP could be nominated, although hosting scientifically valuable primeval beech forests, on accounts of the surrounding winter sports infrastructure in Kopaonik NP.

Winter tourism is the most significant human influence in Kopaonik NP, as the major winter sports center in Serbia is located around the highest peak (Pančić's Peak, 2017 m a.s.l.) in the southern part of the Park, spreading over 800 ha, with 25 ski-lifts, 62 km of Alpine skiing routes and 15 km of Nordic skiing routes. Around this ski-resort grew an urbanized area called Suvo Rudište, with over 10.500 accommodation units (Milovanović, 2019). Skiing activities on Kopaonik Mt. date back to 1930's, while the ski-center dates back to 1964, when the first ski-lift was opened (<https://www.skijanje.rs/istorija/istorija-skijanja-usrbiji/poceti-skijanja-na-kopaoniku/>). It should be noted that almost all ski related infrastructure is concentrated around this area, while the rest of the Park remains unaffected.

The buffer zone of the components located within Duboka and Brzečka river gorges in the SE part of the Park, *Duboka*, *Metode* and *Jelak*, would inevitably be exposed to the negative impact of Kopaonik ski-center development. Since we could not guarantee the adequate management requirements in the buffer zone, it was necessary to exclude these localities from the final nomination of components from the Republic of Serbia.

The final five nominated component parts include two Lvl I PR localities of Fruška gora NP, *Papratski do* and *Ravne*, two Lvl I PR localities of Tara NP, *Zvezda* and *Klisura Rače*, and one Lvl I PR locality of Kopaonik

NP: *Kozje stene*. Components from Tara NP and Fruška gora NP form component clusters, with two component parts embedded in a mutual buffer zone, while *Kozje stene* component represents a single component within Kopaonik NP.

All the component parts are protected by the Law on National Parks ("Official Gazette of RS", No. 84/2015), Law on Nature Protection ("Official Gazette of RS", No. 36/09; 88/2010; 91/2010, 14/2016 and 95/2018) and the Decree on Protection Regimes ("Official Gazette of RS", No. 31/2012) and belong to the ecologically important areas of the ecological network of the Republic of Serbia, which also include Important Bird Areas (IBA), Prime Butterfly Areas (PBA), Important Plant Areas (IPA) and Emerald network sites, as set by the Decree on Ecological Network ("Official Gazette of RS", No. 102/2010), all referenced in Table 4.

By the Law on Nature Protection (Official Gazette of RS, No. 36/09; 88/2010; 91/2010, 14/2016 and 95/2018) and the Decree on Protection Regimes (Official Gazette of RS, No. 31/2012), Level I Protection Regime of protected areas in Serbia prohibits all uses of natural resources, any kind of construction and all human activities, except for scientific research, monitoring of natural processes, controlled visits for educational and cultural purposes, implementation of necessary protective measures in case of natural disasters or diseases and maintenance of significant objects (e.g. electric transmission lines). All visits must be conducted in consultation with the managers to assure that the visitors comply with regulations, not to step away from the paths or trails, not to disturb or collect any organism and to leave no trace behind. Management goal in Level I Protection Regime is to preserve natural ecosystems and their natural dynamics undisturbed. If necessary, minimal interventions can be undertaken, but no wood is to be extracted, except if it can be expected to lead to a disease spread and further forest ecosystem damage. The managers can only apply sanitary measures after acquiring the permit from the Ministry of Environmental Protection on the basis of the expert opinions of the Institute for Nature Conservation of Serbia or the Institute for Nature Conservation of Vojvodina Province, depending on the location of the protected area in regard to the administrative division of the country.

All national parks in Serbia are protected by the Law on National Parks ("Official Gazette of RS", No. 84/2015) and their management is entrusted to the public enterprises, namely for the three relevant National Parks: PE "Nacionalni park Kopaonik", PE "Nacionalni park Tara" and PE "Nacionalni park Fruška gora". National Parks are managed according

to the ten-year management plans and annual management programs, developed in accordance with the Institute for Nature Conservation of Serbia or the Institute for Nature Conservation of Vojvodina Province and approved by the Ministry of Environmental Protection.

CONCLUSION

Widely distributed in Europe, beech forests are one of world's most unique ecosystems, accounting for a significant part of the northern hemisphere Temperate Broadleaf Forest Biome Vološčuk *et al.* 2014). The phenomenon of a single tree species dominating forest vegetation over a major part of the entire continent is unique to Europe (Knapp & Fichtner 2011). The post-glacial forest development of beech, forests and their spread throughout Europe is an outstanding example of continent-wide development of terrestrial ecosystems and communities (Knapp & Fichtner, 2011; Magri *et al.*, 2006). Considering the past, present and future development pressures on natural forest ecosystems in Europe, preserving of ancient and primeval beech forests is regarded as a globally important task.

Initiative to represent and preserve the beech forest ecosystems by the World Heritage Convention for future generations led to the establishment of the complex serial, transnational World Heritage property, which has been developing for more than 15 years, since the initial Slovakia's proposal in 2003 and has included four World Heritage nominations so far, out of which two extension nominations. The third extension nomination was prepared in 2019 and submitted on 28th of January 2020, in order to complete the picture on continental-wide proglacial spread and diversity of the European beech forests.

The Outstanding Universal Value of the European beech forests is in their unique history and evolution as a prominent example of the ongoing re-colonization and development of terrestrial ecosystems after the last glacial period, due to the combination of post-glacial climate changes and the extreme competitiveness, incredible ecological adaptability and distinct life strategy of the European beech, causing it to spread throughout Europe covering wide areas in a broad array of different beech forest types (Britz *et al.* 2009).

Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe World Heritage site is aimed to reflect the post-glacial development process of the beech and to preserve the diversity of beech forest communities across Europe, considering that the beech forms different forest communities, according to the species pull available in different floristic regions of Europe, while occupying various

distinctive combinations of environmental factors, including the climate, elevation belts and bedrock types.

The 2020 extension nomination proposes the inscription of additional 30 component parts and boundary modification of the 7 already inscribed component parts, aiming to better represent the OUV of the property, as well as to improve the integrity and protection of the existing property. In regard to the component type, 16 single components are nominated along with 8 component clusters. The nomination proposal concerns a total of 37 component parts located within 24 protected areas in 10 European countries: Bosnia and Herzegovina, Czech Republic, France, Italy, Montenegro, North Macedonia, Poland, Serbia, Slovakia and Switzerland. The 30 newly nominated component parts will contribute to the existing property with 15,986.96 ha. The nominated component parts represent 9 Beech Forest Regions: Pyrenaic-Iberian, Central Mediterranean, Illyric, Moesian-Balkan, Subatlantic-Hercynic, Alpic, Carpathian, Atlantic and Pannonic, the latter not yet represented.

By this extension, the current inscribed serial transnational NWH property consisting of 78 component parts will be extended to a total of 108 component parts from 20 countries within 61 protected areas, across 11 out of 12 Beech Forest Regions in Europe, to better show the postglacial expansion process of beech and to demonstrate the development history of European beech forest ecosystems through the series of the most natural beech forest sites in 10 European countries. Furthermore, the nominated components achieve a more complete picture of the continental character, diversity and biogeographical distribution of beech forests, by adding new attributes to the existing property, increasing the integrity of the property and closing some distribution and diversity gaps. Namely, Serbian components will greatly improve the beech forest representation within two Beech Forest Regions, the Pannonian and the Moesian-Balkan.

World Heritage property concerning the preservation of beech forests across 20 European countries will provide a solid platform for policy making, knowledge exchange and joint management activities, including research and monitoring opportunities across all the inscribed components and corridor development. The common goal of preserving the World Heritage property will result in a combined effort and foster a close international collaboration on all levels, including management, scientific research and governance, collaborating towards a common goal of management harmonization across different nature protection systems and practices.

TABLES AND FIGURES

Table 1: The components comprising the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe Natural World Heritage site (Britz *et al.* 2009; Kirchmeir & Kovarovics, 2016)

	No.	State Party	Component part	Protected Area	Core zone size (ha)	Buffer zone size (ha)
Inscribed 2007	1	Ukraine	Stuzhytsia-Uzhok	Uzhansky National Nature Park	2 532	3 615
	2	Ukraine	Kuziy-Trybushany	Carpathian Biosphere Reserve	1 369,6	3 163,4
	3	Ukraine	Maramarosh		2 243,6	6 230,4
	4	Ukraine	Chornohora		2 476,8	12 925
	5	Ukraine	Svydovets		3 030,5	5 639,5
	6	Ukraine	Uholka-Shyrokyi Luh		11 860	3 301
	7	Slovak Republic	Vihorlat		Vihorlat Protected Landscape Area	2 578
	8	Slovak Republic	Stužica – Bukovské Vrchy	National Nature Reserve Stužica within Poloniny National Park	2 950	11 300
	9	Slovak Republic	Rožok	National Nature Reserve Rožok within Poloniny National Park	67,1	41,4
	10	Slovak Republic	Havešová	National Nature Reserve Havešová within Poloniny National Park	171,3	63,99
Extended 2011	11	Germany	Jasmund	Jasmund National Park	492,5	2 510,5
	12	Germany	Serrahn	Müritz National Park	268,1	2 568
	13	Germany	Grumsin	Schorfheide-Chorin Biosphere Reserve	590,1	274,3
	14	Germany	Hainich	Hainich National Park	1 573,4	4 085,4
	15	Germany	Kellerwald	Kellerwald-Edersee National Park	1 467,1	4 271,4
Extended 2017	16	Ukraine	Zacharovanyi Krai - Velykyi Dil	Zacharovanyi Krai National Nature Park	1 164,16	1 275,44
	17		Zacharovanyi Krai - Irshavka		93,97	
	18	Ukraine	Synevyr – Vilshany	Synevyr National Nature Park	454,31	253,85
	19	Ukraine	Synevyr – Strymba		260,65	191,14
	20	Ukraine	Synevyr – Kvasovets		561,62	333,63
	21	Ukraine	Synevyr – Darvaika		1 588,46	312,32
	22	Ukraine	Satanivska Dacha	Podilski Tovtry National Nature Park	212,01	559,37
	23	Ukraine	Roztochya	Roztochya Nature Reserve	384,81	598,21
	24	Ukraine	Gorgany	Gorgany Nature Reserve	753,48	4 637,59
	25	Spain	Hayedos de Picos de Europa - Cuesta Fría	Picos de Europa National Park	213,65	14 253
	26		Hayedos de Picos de Europa - Canal de Asotin		109,58	
	27	Spain	Hayedos de Navarra – Lizaroia	Lizaroia Strict Reserve	63,97	24 494,52
	28		Hayedos de Navarra – Aztaparreta	Aztaparreta Strict Reserve	171,06	
	29	Spain	Hayedos de Ayllón - Tejera Negra	Hayedo Tejera Negra Natural Park	255,52	13 880,86
	30		Hayedos de Ayllón - Montejo de la Sierra	Sierra del Rincon Biosphere Reserve	71,79	
	31		Slovenia	Snežnik-Ždrocle	Snežnik-Ždrocle Forest Reserve	
32	Slovenia	Krokar	Krokar Forest Reserve	74,50	47,90	
33	Romania	Strâmbu Băiuț	Strictly protected area in Forest Management Plans & part of N2k site Codrii Seculari de la Strâmbu-Băiuț (ROSCI0285)	598,14	713,09	
34	Romania	Izvoarele Nerei	Semenic-Cheile Carasului National Park	4 677,21	2 494,83	
35	Romania	Groșii Țibleșului - Preluci	Strictly protected areas in Forest Management Plans	135,82	563,57	
36		Groșii Țibleșului - Izvorul Șurii		210,55		

Extended 2017	37	Romania	Domogled-Valea Cernei - Ciucevele Cernei	Domogled-Valea Cernei National Park	1 104,27	51 461,28
	38	Romania	Domogled-Valea Cernei - Iauna Craiovei		3 517,36	
	39	Romania	Domogled-Valea Cernei – Coronini-Bedina		5 110,63	
	40	Romania	Cozia - Lotrisor	Cozia National Park	1 103,30	2 408,83
	41	Romania	Cozia - Masivul Cozia		2 285,86	
	42	Romania	Codrul Secular Slătioara	Codrul Secular Slătioara Forest Reserve & Natura 2000 site Rarău-Giumalău (ROSCI0212)	609,12	429,43
	43	Romania	Codrul secular Șinca	Strictly protected areas in Forest Management Plans	338,24	445,76
	44	Romania	Cheile Nerei-Beușnița	Cheile Nerei-Beusnita National Park & Natura 2000 sites Cheile Nerei (ROSCI0031) and Beusnita (ROSPA0020)	4 292,27	5 959,87
	45	Italy	Sasso Fratino	Sasso Fratino Strict Reserve in Foreste Casentinesi National Park	781,43	6 936,64
	46	Italy	Monte Raschio	Monte Raschio Strict Reserve in Regional Natural Park of Bracciano-Martignano	73,73	54,75
	47	Italy	Monte Cimino	Natural Monument of the Lazio Region	57,54	87,96
	48	Italy	Foresta Umbra	Foresta Umbra Strict Nature Reserve in Gargano National Park	182,23	1 752,54
	49	Italy	Cozzo Ferriero	Cozzo Ferriero Strict Reserve in Pollino National Park	95,74	482,61
	50	Italy	Abruzzo, Lazio & Molise - Val Fondillo	Abruzzo, Lazio & Molise National Park	325,03	700,95
	51	Italy	Abruzzo, Lazio & Molise - Coppo del Principe		194,49	446,62
	52	Italy	Abruzzo, Lazio & Molise - Coppo del Morto		104,71	415,51
	53	Italy	Abruzzo, Lazio & Molise - Selva Moricento		192,70	751,61
	54	Italy	Abruzzo, Lazio & Molise - Valle Cervara		119,70	
	55	Croatia	Paklenica National Park - Oglavinovac-Javornik	Paklenica National Park	790,74	395,35
	56	Croatia	Paklenica National Park - Suva draga-Klimenta		1 241,04	414,76
	57	Croatia	Hajdučki i Rožanski kukovi	Strict Reserve Hajdučki and Rožanski Kukovi within Northern Velebit National Park.	1 289,11	9 869,25
	58	Bulgaria	Central Balkan - Sokolna Reserve	Strict Reserves within Central Balkan National Park	824,90	780,55
	59	Bulgaria	Central Balkan - Peeshti skali Reserve		1 049,10	968,14
	60	Bulgaria	Central Balkan - Severen Dzhendem Reserve		926,37	1 066,47
	61	Bulgaria	Central Balkan - Dzhendema Reserve		1 774,12	2 576,63
	62	Bulgaria	Central Balkan - Stara reka Reserve		591,20	1 480,04
63	Bulgaria	Central Balkan - Steneto Reserve	2 466,10		1 762,01	
64	Bulgaria	Central Balkan - Kozya stena Reserve	644,43		289,82	
65	Bulgaria	Central Balkan - Tsarichina Reserve	1 485,81		1 945,99	
66	Bulgaria	Central Balkan - Boatin Reserve	1 226,88		851,22	

Beech Forests as World Heritage in aspect to the next extension of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe World Heritage site

	67	Belgium	Sonian Forest - Forest Reserve "Joseph Zwaenepoel"	Strict Forest Reserve "Joseph Zwaenepoel"	187,34	4 650,86
	68	Belgium	Sonian Forest – Grippensdelle A	Strict Forest Reserves within Sonian forest Protected Landscape, Natura2000 sites BE1000001 and BE2400008	24,11	
	69	Belgium	Sonian Forest - Grippensdelle B		37,38	
	70	Belgium	Sonian Forest - Réserve forestière du Ticton A		13,98	
	71	Belgium	Sonian Forest - Réserve forestière du Ticton B		6,50	
	72	Austria	Kalkalpen - Wilder Graben	Kalkalpen National Park and Natura2000 site AT3111000	1 149,75	14 197,24
	73	Austria	Kalkalpen - Urlach		264,82	
	74	Austria	Kalkalpen - Bodinggraben		890,89	
	75	Austria	Kalkalpen - Hintergebirge		2 946,20	
	76	Austria	Dürrenstein	Wilderness Area Dürrenstein	1 867,45	1 545,05
	77	Albania	Rrajca	Shebenik-Jabllanica National Park	2 129,45	2 569,75
	78	Albania	Lumi i Gashit	Strict Nature Reserves Gashi River	1 261,52	8 977,48

Table 2: The components nominated as the 3rd extension of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe Natural World Heritage site (Kirchmeir & Kovarovics, 2020)

No.	State Party	Component part	Protected Area	Core zone size (ha)	Buffer zone size (ha)
1	Bosnia and Herzegovina	Prašuma Janj	Prašuma Janj Strict Nature Reserve	295,04	380,74
2	Czech Republic	Jizera Mountains	Jizerské hory National Nature Reserve	444,81	2 330,40
3	France	Aigoual	Aigoual Biological Strict Reserve	75,03	90,11
4	France	Chapitre	Chapitre Biological Strict Reserve	371,30	41,65
5	France	Chizé Component 1 North-West	Chizé Biological Strict Reserve	93,69	571,92
6	France	Chizé Component 2 South		62,43	
7	France	Fontainebleau	Fontainebleau Biological Strict Reserve	248,48	152,20
8	France	Grand Ventron	Grand Ventron National Nature Reserve	257,09	1 397,58
9	France	Massane	Massane National Nature Reserve	121,49	1 551,33
10	France	Py-Pas de Rotja	Py-Pas de Rotja National Nature Reserve	246,03	4 049,87
11	France	Sainte-Baume	Sainte-Baume Biological Strict Reserve	128,63	215,11
12	France	Saint-Pé-de-Bigorre	Saint-Pé-de-Bigorre Biological Strict Reserve	924,71	296,87
13	Italy	Cozzo Ferriero*	Pollino National Park	95,75	2 851,83
14	Italy	Pollinello		477,94	
15	Italy	Falascione*	Foresta Umbra Strict Nature Reserve	254,30	3 486,29
16	Italy	Pavari-Sfilzi		667,13	
17	Italy	Valle Infernale	Valle Infernale Strict Nature Reserve	320,79	2 191,36
18	Montenegro	Biogradska Gora 1	Biogradska Gora National Park	390,81	3,632,82
19	Montenegro	Biogradska Gora 2		1 913,48	
20	North Macedonia	Dlaboka Reka	Mavrovo National Park	193,27	234,70
21	Poland	Border Ridge and Gorna Solinka valley	Bieszczady National Park	1 506,05	24 330,52
22	Poland	Polonina Wetlinska and Smerek		1 178,03	
23	Poland	Terebowiec stream valley		201,00	
24	Poland	Wolosatka stream valley		586,66	

25	Serbia	Fruška gora - Papratski do	Fruška gora National Park	65.36	847.86
26	Serbia	Fruška gora - Ravne		93.43	
27	Serbia	Kopaonik - Kozje stene	Kopaonik National Park	451.47	959.89
28	Serbia	Tara - Zvezda	Tara National Park	1 873.67	4 091.99
29	Serbia	Tara - Rača		215.94	
30	Slovakia	Havešová Primeval Forest*	Poloniny National Park	167.88	6 474,84
31	Slovakia	Rožok*		74.37	1 138,89
32	Slovakia	Stužica - Bukovské Vrchy*		1 742.47	5 694,84
33	Slovakia	Udava*		448.17	822,34
34	Slovakia	Kyjovský prales	Vihorlat Protected Landscape Area	289.39	104.46
35	Slovakia	Vihorlat*		1 559.41	847.54
36	Switzerland	Forêt de la Bettlachstock	Bettlachstock–Hasenmatt Natural Forest Reserve	195.43	1 094.16
37	Switzerland	Valli di Lodano, Busai and Soladino Forest Reserves	Busai and Soladino Forest Reserves	806.78	2 330.74

* boundary modification

Table 3: Forest reserves formerly included on Serbian Tentative list as extension components of the 3rd extension of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe Natural World Heritage site

Name of the PA	Protection Date	Beech Forest Associations	Size
Strict Nature Reserve Kukavica	1980	<i>Fagetum moesiacaе serbicum (Fagetum moesiacaе montanum typicum, Fagetum moesiaе nudum – pauperum, Luzulo-fagetum moesiacaе)</i>	75.76 ha
Strict Nature Reserve Zeleničje	1948	<i>Fagetum moesiacaе montanum, Lauroceraso-Fagetum (with Prunus laurocerasus)</i>	41.70 ha
General Nature Reserve Vinatovača	1957	<i>Fagetum moesiacaе montanum</i>	37.43 ha
Strict Nature Reserve Golema Reka	1981	<i>Luzulo-fagetum moesiacaе</i>	34.60 ha
Strict Nature Reserve Vrh Željina – Pločka čuka	1985	<i>Fagetum moesiacaе montanum, Fagetum moesiacaе subalpnum</i>	20.00 ha
Strict Nature Reserve Felješana	1903,1950	<i>Fagetum montanum asperulosum typicum</i>	15.28 ha
Strict Nature Reserve Busovata	1975	<i>Fagetum moesiacaе montanum</i>	15.86 ha
General Nature Reserve Danilova kosa	1950	<i>Fagetum moesiacaе montanum</i>	6.00 ha
Special Nature Reserve Mala Jasenova Glava	1961	<i>Taxo-Fagetum moesiacaе (with Taxus baccata, Ruscus hypoglossum, Acer heldreichii)</i>	6.30 ha
Strict Nature Reserve Iznad Tatalije	1968	<i>Ilici-Fagetum montanum (with Ilex aquifolium)</i>	0,80 ha
Strict Nature Reserve Zelenika	1968	<i>Ilici-Fagetum montanum (with Ilex aquifolium)</i>	0,45 ha

Table 4: Nominated components from Serbia in the 3rd extension of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe Natural World Heritage site

Component type	Component part	Protected Area	Level I Protection Regime locality size (ha)	Core zone size (ha)	Buffer zone size (ha)	Ecologically important area of the ecological network of the Republic of Serbia	Important Bird Area	Prime Butterfly Area	Important Plan Area	Emerald network site
Component cluster	Fruška gora - Papratski do	Fruška gora National Park	71.35	65.36	847.86	14. Fruška gora i Koviljski rit	Fruška gora RS019IBA	Fruška gora 07	Fruška gora i Koviljsko-petrovaradinski rit	Fruška gora RS0000007
	Fruška gora - Ravne		95.69	93.43						
Single component	Kopaonik - Kozje stene	Kopaonik National Park	485.24	451.47	959.89	75. Kopaonik	Kopaonik RS032IBA	Kopaonik 16	Kopaonik	Kopaonik RS0000002
Component cluster	Tara - Zvezda	Tara National Park	2030.18	1 873.67	4 091.99	61. Tara	Tara RS026IBA	Tara 25	Tara	Tara RS0000009
	Tara - Rača		301.80	215.94						

Figure 1: The 12 Beech Forest Regions in Europe, as defined by the 2012 Screening Study (Ibsch, 2014)



Figure 2: Spatial distribution of the inscribed components and the nominated components as the 3rd extension of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe Natural World Heritage site (Kirchmeir & Kovarovics, 2020)



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