FRAMEWORK JOINT ASSESSMENT OF CURRENT FOREST MANAGEMENT SITUATION IN BUFFER ZONES OF TARGET AREAS

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1. Introduction

This framework is intended to provide a joint foundation for preparation of Deliverable D.T2.3.1 – Joint assessment of current forest management situation in buffer zones of target areas. All project partners are expected to contribute to this assessment with analysis of the present situation in forest management in buffer zones and surrounding forests. This analysis will form the common basis for the development of a common strategy on sustainable forest management.

Forest management practices will be reviewed for the buffer zones of the project pilot areas, as well as generally within the countries of this project. Grumsin and Germany will be covered by City of Angermünde and HNEE, Kalkalpen and Austria will be covered by NPK and EWS, Snežnik, Krokar and Slovenia will be covered by SFS, Paklenica and Croatia will be covered by NP Paklenica, and Poloniny and Slovakia will be covered by NFC.

This framework defines the common categories, which are considered important for sustainable and close-to-nature forestry, which is the type of forest management that the eventual sustainable forest management strategy will support. The aim of this study is to provide the basis for comparisons of existing forestry systems in Central Europe and identify existing best practices and potential ways forward.

2. State of play of forest management situation in Central Europe

2.1. Germany

2.1.1. Grumsin buffer zone

2.1.1.1. DESCRIPTION OF BUFFER ZONE

The overall management responsibility for the component part Grumsin regarding the World Heritage is the Biosphere Reserve Schorfheide-Chorin, under the Ministry of Agriculture, Environment and Climate Protection of Brandenburg.

The buffer zone around the WH Beech forest component part Grumsin is (as can be seen in the Figures below) has 0 to 1000 meters width around the core zone area.

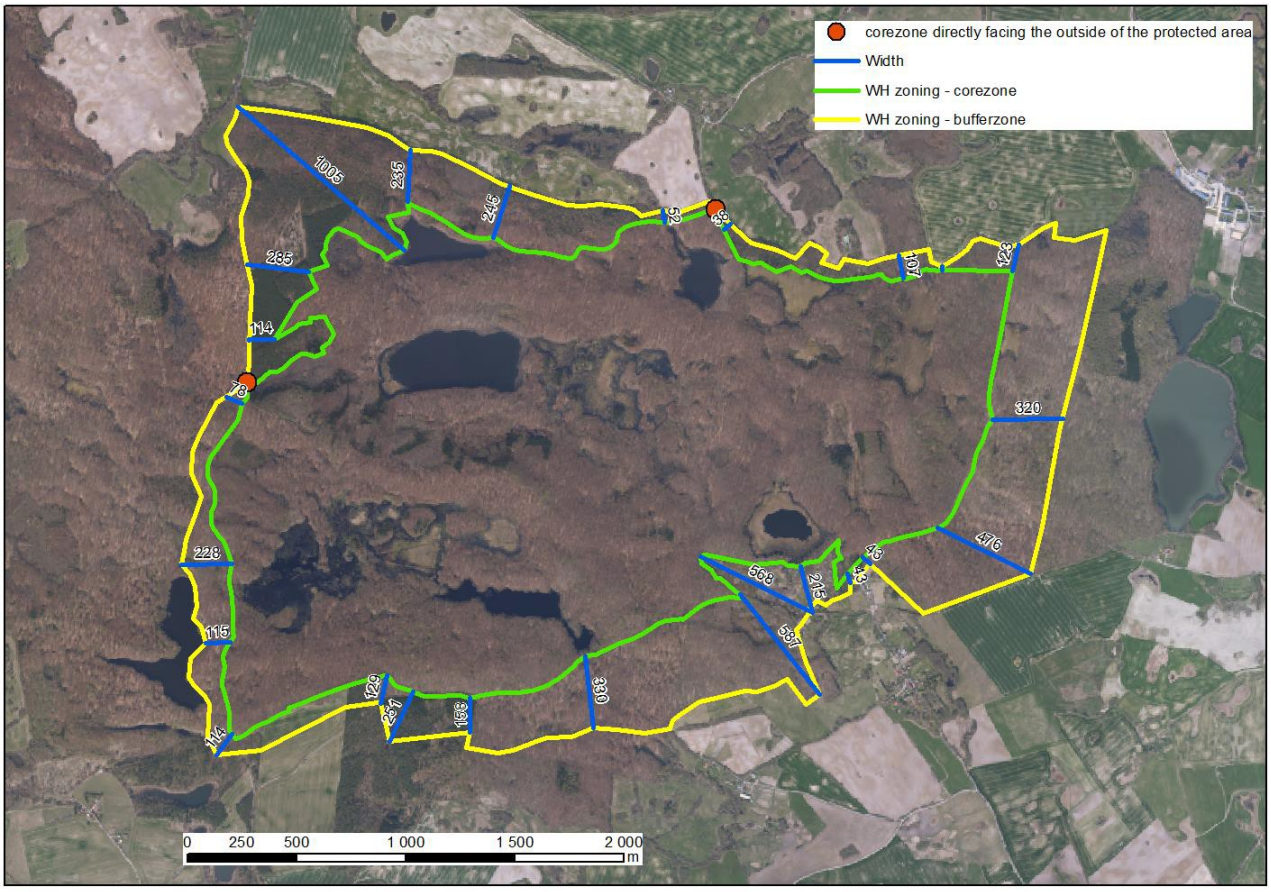


Figure 1: Grumsin buffer zone with its width in meters

The buffer zone was defined by the Biosphere Reserve Schorfheide Chorin administration during the nomination process for the World Heritage and follows in the northern and southern part the land use (e.g. forest edge, if touching agricultural land) or infrastructure (e.g. forest roads). In other parts (e.g. in the east), the border of the buffer zone does not follow clear orientation in the terrain or specific criteria.

The buffer zone is mainly covered by close-to natural beech forests, but in some parts the buffer zone includes agricultural land (e.g. in the south an agricultural field and in the north grassland) covering 1-2% of the buffer zone area.

Around 25 % of the buffer zone is declared as core zone of the Biosphere Reserve and therefore strictly protected and out of forestry use (see Figure 2: black line).

The buffer zone is touching directly agricultural land in the north and south on a total length of around 7 km, whilst it is bordering forest in the east and west. Looking at the bigger landscape matrix, the Grumsin beech forest forms almost an island between agricultural areas and is connected to wider forest areas only in the west.

For the rest of the buffer zone in private ownership there is no data existing, if and how intensive private owners are using their forests for forestry activities within the limits of the legal frame.

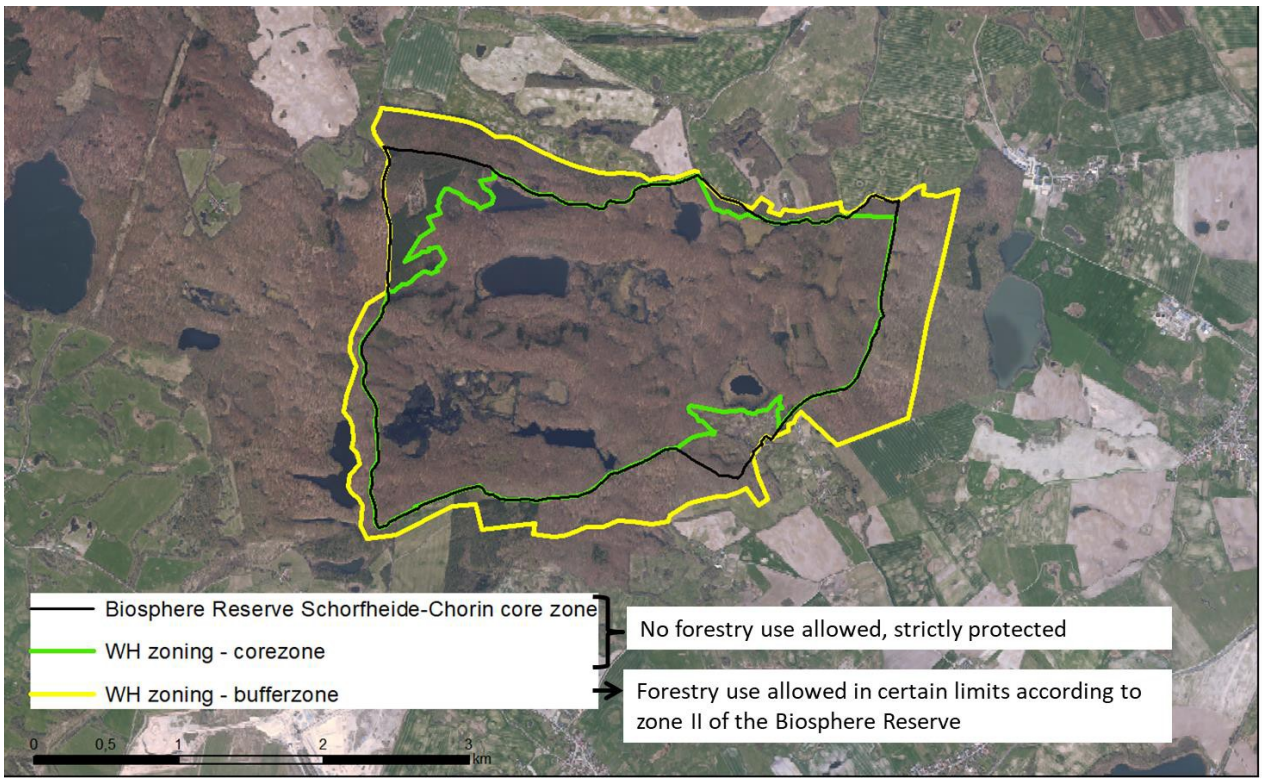


Figure 2: Grumsin buffer zone zoning and forestry uses within the zones

The full buffer zone area of the WH component part is within the Natura 2000 Habitats area DE *2949-302* thus underlying the principles of the EU Habitats Directive.

About 80% of the buffer zone is covered with Natura 2000 forest habitat types, 70 % of the area being Natura 2000 Beech forest habitat types. To a large extend that is (67%) 9130 - *Asperulo-Fagetum* beech forests in the conservation status B and smaller areas in C and development stage (E) and 9110 – *Luzulo fagetum* beech forests in development stage (E) to a smaller share (3%).

Further there occur hornbeam, oak and wetland forests e.g. 9170 - *Galio-Carpinetum* oak-hornbeam forests in conservation status B and C to a small share (4%) and 91D1 - *Sphagnum* birch woods in conservation status B to a small share (4,5%).

Additionally, within the buffer zone occur water-related habitat types with a cover of 7 % e.g. 3150 - Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation in conservation status C and 7140 - Transition mires and quaking bogs in B, C and development stage (E).

Further grassland Natura 2000 habitat types are growing on a very small share of less than 1% and non Natura 2000 habitat types (agricultural fields and coniferous forest plantations) are mapped on about 13% of the buffer zone area.

The named conservation status of the Natura 2000 habitat types above gives a hint on the structure of the forests, nevertheless it is a mix calculation of the categories: habitat structures (including dead wood) & occurrence of relevant species as well as damages/negative impacts to the ecosystem.

The inventory of the habitat structures and species consists of five criteria – including the amount of deadwood and biotope trees.

Deadwood within the Natura 2000 inventory of Brandenburg for the most occurring habitat type in the region 9130 (*Asperulo Fagetum* beech forests) is defined with >35cm diameter and

- >40m³/ha lying and standing (A),
- 21-40m³/ha lying or standing (B) and
- ≤ 21m³/ha lying or standing (C).

The inventory data for the single criteria is not publically available, so there is no information on specific amounts of deadwood within the buffer zone. The mix calculation for habitat structures & species inventory shows that most of the beech forest habitat types in the buffer zone are in conservation status B (good) and some in C (intermediate to bad), conservation status A is not existing in the buffer zone.

Important facts about the situation of the protection regime are that around 24% of the buffer zone area of the WH component part is in protection zone I (black line on map 2) of the Biosphere Reserve decree of 1990 and thus defined as core zone under a strict protection regime without any commercial use. Within these areas, the only activities allowed are security management along trails, game management and research activities coordinated by the Biosphere Reserve.

The larger part of the buffer zone area of the WH component part is in protection zone II of the Biosphere Reserve decree of 1990 that is defined as Nature Conservation Area and allowing forestry activities within the limits of the Biosphere Reserve decree[1]. Thus harvesting is allowed within the buffer zone areas of protection zone II (of the Biosphere Reserve) within the limits of the forest law of the federal state of Brandenburg as well as the Biosphere Reserve decree[2] and the EU Habitats Directive. The Biosphere Reserve decree allows selective logging, shelterwood cuttings and clear cuts <0,3ha. Any canopy opening, including sanitary cutting bigger than 0,3ha is not allowed. The collection of mushrooms, berries and medical herbs is also not allowed. In specific areas, tendering operations in young stands are allowed. Artificial restoration is only allowed with special permission.

Furthermore, the construction of new forest roads, new forest huts and new hunting infrastructure is only allowed in specific areas. The same regulation applies to the maintenance of existing roads, huts and hunting infrastructure.

Hiking is only allowed on official roads and marked trails, while camping, making fire or bathing is not allowed

[1] Verordnung über die Festsetzung von Naturschutzgebieten und einem Landschaftsschutzgebiet von zentraler Bedeutung mit der Gesamtbezeichnung „Biosphärenreservat Schorfheide-Chorin“ (https://bravors.brandenburg.de/verordnungen/natsgschorfhv)

[2] Verordnung über die Festsetzung von Naturschutzgebieten und einem Landschaftsschutzgebiet von zentraler Bedeutung mit der Gesamtbezeichnung „Biosphärenreservat Schorfheide-Chorin“ (https://bravors.brandenburg.de/verordnungen/natsgschorfhv)

The differentiation of the protective buffer zone proposed by the coordination office guideline on buffer zone management is correlated to the core zone of the BR (protective buffer zone (map 2: black line), and landscape buffer zone out of the black line on map 2, however the differentiation between the two buffer subzones has not been made official yet.

A specific share of the buffer zone (around 51%) of the WH component part is in the ownership of NGOs or the federal state that support the goals of non-forestry use of the forest. There is a strategy by the Federal State and the Biosphere Reserve to increase this area by land-purchase.

There is no circular protective buffer zone around the WH core area at the moment. Referring to the Guidance Document requirement: "To protect the beech forests in the component parts from these negative, man-made influences, a minimum buffer zone of 100 m has to be established towards economically managed forests." In some parts, the buffer zone is narrower than 50 meters in general. About 49% of the buffer zone area is covering economically managed forests and the core zone is directly attached to these managed forests, so there is no circular protective buffer zone on this 49%. However, there are no publically available data about the intensity of usage of the managed private forests.

Further, it is not measured or scientifically proven that the buffer zone is large enough to buffer external influences and maximize their resilience to change, as this also depends on the land use connected to the buffer zone.

At some parts the core zone touches forest in the buffer zone that is already under strict protection or owned by NGOs or state organisations not using the forests (51% of the buffer zone area) as mentioned above (see Figure 3).

The creation of a minimum 50 m wide circular protective buffer zone covering privately owned property would mean larger changes in regulations or setting up attractive compensation mechanisms that are not in place at the moment. There is no research data on the buffering area needed to lower the concrete impacts on the WH forest Grumsin depending on the surrounding land-use.

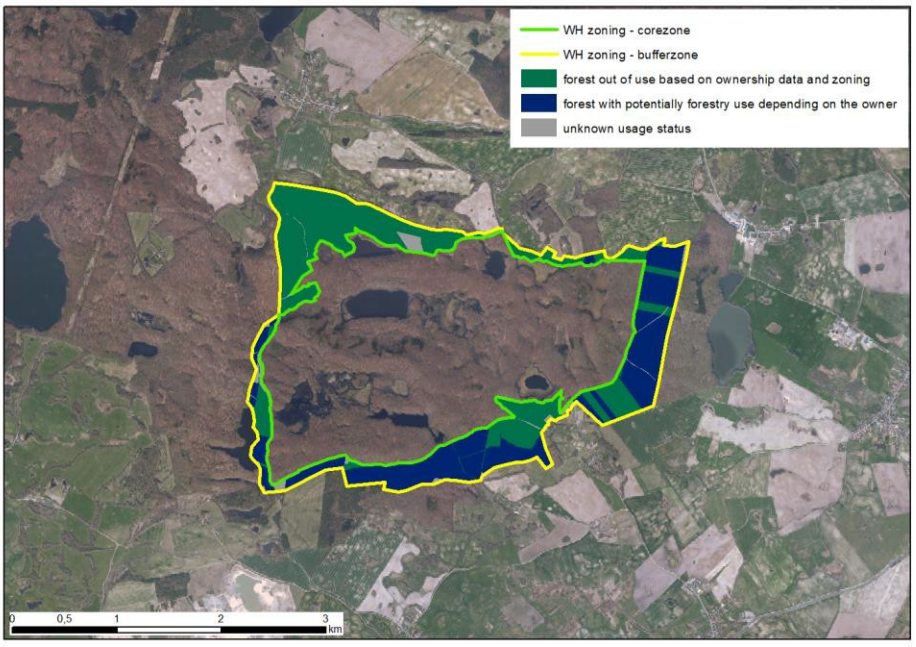


Figure 3: Forestry use within the Grumsin buffer zone (Anna Kalándrova)

In order to assess the actual state of management in the buffer zone, the BEECH POWER project conducted a rough data analysis. The zoning and ownership data shows that 51% of the buffer zone is out of forestry

use (see Figure 3: green areas) as part of the buffer zone is in ownership of NGOs or state organisations supporting nature conservation goals.

Within the core zone of the BR and areas owned by NGOs and state institutions (51 % of the buffer zone of the WH component part) the following activities are taking place:

- game management is conducted according to a game management plan agreed by the Biosphere Reserve and the Lower Nature Conservation and Hunting Authority of the counties. Hunting is implemented according to a game management plan that foresees 1-3 driven hunts. The game management plan also defines a quiet zone in the core of the area where no hunting is implemented.

Within the further protection zone II of the BR in private ownership the following activities area relevant:

- forestry activities within the limits of the Forest Law of the federal state of Brandenburg as well as the Biosphere Reserve decree and the the EU Habitats Directive – logging is allowed including canopy opening up to 0,3 ha, for the transport of the timber skidder trails have to be used;
- hunting according to the hunting law and game management plans agreed between private hunting communities and the lower hunting authority of the counties. Generally, the hunting plans should be based on browsing monitoring data and should be high enough to ensure natural forest regeneration, but there is no research or monitoring data about this topic publically available. The areas of the buffer zone that are not owned by NGOs or state institutions are under regular hunting regime and often the number of hunted game is not high enough to ensure natural regeneration in the forest. There is no specific focus on more effective hunting management in the surrounding of the WH component part and thus the deer population is high and also moving into the component part. Research results show that the deer populations are as high to have in influence on the tree species composition of the regeneration in the WH core area;
- visitors are mainly hiking on marked trails and forest roads, but from sometimes the ranger service also finds hikers taking shortcuts through the forest. This can also happen as not everywhere around the area are information boards, what is allowed and what is not allowed.

Defined development goals within the Natura2000 management plans for the beech forests in the buffer zones are:

- admitting natural dynamics and succession,
- conversion into another into another biotope type (mainly from pine forest to beech forest),
- Creation of more natural structures/ increase of structural diversity,
- Extensification/ reduction of the trophic state.

Planned concrete measures within the buffer zone according to the Natura 2000 management plan are:

- Single tree logging oriented on the minimum exploitable size (according to the silvicultural guideline in Brandenburg, this is for beech on intermediate soils 60cm BHD and on rich soils 75 cm BHD),
- Implementation of a plenter or group selection system,
- Selective logging,
- Extraction of tree species that do not belong to the habitat type,
- Conservation of a share of old growth wood of 10%,

- Conservation or support of the structural and species richness on the forest edges through thinning of the forest stand – change of the forest edge,
- Natural development of the forest edge,
- No soil treatment measures on historical old forest sites,
- Extraction of hunting infrastructure,
- Extraction of waste.

The planned measures are proposals and are no obligations for the landowners.

2.1.2. Federal State of Brandenburg (Germany) in general

2.1.2.1. Type(s) of forestry in place

2.1.2.1.1. DESCRIPTION OF STATE OF PLAY

The description is provided for the Federal State of Brandenburg as the Forest Law and further conservation strategies are mostly referring to the federal state level.

37% of the area of the Federal State of Brandenburg is covered by forests, therefore ranging among the most forested states of Germany. The North of Brandenburg is less forested (38 %) than the South (43 %), the centre of Brandenburg only shows a fraction of 34 %. Nevertheless, the area of Schorfheide in the northeast has the largest area of connected forests in the federal state.

57% of the forests are privately owned, 25 % are Brandenburg state forest, 7 % corporate & municipal forest, 6 % German federal forest and some other smaller ownership categories. The private forests of Brandenburg belong to almost 100,000 forest owners (MIL 2013).

70% of the forests are pine forest (*Pinus sylvestris*), oak forests are covering 6.7% of the federal state's surface, *Fagus sylvatica* 3.3 %. The composition of the tree species is regionally different. The proportion of deciduous trees decreases from north to south. While the northern region has a proportion of 30.1% deciduous trees, the central region has about 25.9% and the south only 19.5% (MLUL 2015). The tree species follow this trend with beeches mainly in the North, oak forests located rather in the middle of the state ending with mainly pine stands in the South. A total of 51 tree species were recorded. In addition to pine, oak and beech, these are mainly black alder, ash, birch and maple as well as larch, Douglas fir, and spruce.

Regarding the historical development and impacts on the forests, it should be mentioned that the large forests of the state of Brandenburg emerged about 10,000 to 12,000 years ago after the last Ice Age. Within a few hundred years, almost the entire land area was covered with forest. The type of forest was changing over the time from pioneer species to more oak, maple and beech. The intervention of man and his settling in the region about 4,000 years ago caused the forest areas to shrink considerably. In addition to the need for land for settlements, roads and paths and for agriculture, people needed large quantities of timber and firewood and extensive pastures for their herds. Thus, over the centuries, the forest areas decreased strongly, because of the strong population growth and unsustainable consumption.

During Medieval times, the north-eastern part of Germany was dominated by oak and beech forests. As industrialization started to change the whole economy increasing the hunger for resources in the late 18th century, more and faster growing woods were needed. Harsh climatic conditions with little precipitation, especially during summertime, and poor sandy soils with little water retention left only one option in the selection of a fitting tree species. Today, still 70 % of the forest in Brandenburg are monoculture pine forests (MLUL 2015).

Naturally, Brandenburg would be covered with mixed forests consisting mainly of beech, oak, small-leafed lime, hornbeam, and pine trees. But as humans are interfering in the natural processes and form the landscapes according to their needs, only 9% of the forests is classified as very close to nature plus 5% close to nature (MIL 2010). 40 % of Brandenburg's forest stands are classified as culture-bound (due to historical reasons) and are characterized by for this habitat foreign species, primarily coniferous trees (*Pinus sylvestris*; MLUL 2015). The percentage of mixed or deciduous stands has risen to a number of about 26 % in the past 15 years. This change can be seen primarily in the composition of trees which make up the next generation – the rejuvenation. 69% of the regeneration is classified as natural, and 25% as artificial (MIL 2010).

Another improvement can be seen in the development of the tree's age. Today, trees which are older than 100 years characterize 18 % of the forested areas. This includes not only broadleaf species but at the same level also coniferous trees. But still, due to the reforestation after World War II, most stands average from 40 to 60 years old. Only beech forests break this rule, almost a quarter of the stands are 140 years old or even older. The average age of this tree species ranges between 60 and 100 years. 68% of the forests are classified as one-layer, 31% as two-layer and only 1% as diverse-layer forests. The regeneration 20-130cm high is influenced by browsing – 31% of the beeches and 68% of the oaks are damaged by browsing (MLUL 2015).

Another factor showing the naturalness of a forest site, is the amount of either lying or standing deadwood per hectare. Brandenburg's stock on average adds up to 11 cubic meters per hectare and is higher in broadleaf forests (20.2 m^3/ha) compared to coniferous stands (8.4 m^3/ha). This difference is especially noticeable remarkably looking at standing biotope trees measuring more than 40 cm diameter at breast height. Here the share is twice as high in deciduous than in coniferous forests. 98 % of the forests are defined to be in permanent use for wood production.

The actual health state of the forests in Brandenburg has been drastically decreased in 2019 stating on 37% of the forested area a severe damages (in 2018 it was still 11%), on 49% is declared a warning level and only 14% are declared without damages. 62% of the beech sample trees of the forest state inventory show severe damages as a consequence of the drought stress from 2018 combined with an ongoing tense water balance situation and warm to hot weather conditions in 2019. Older beech trees show more damages in terms of loss of leaf mass. The average reduction of leaf density in the crown was assessed for beech trees to be 31% in 2019. The assessment about the actual health state of the forests (2019) concludes that beeches in forests with closed canopy, understorey middle-age beech stands under beech and beech regeneration are less affected by damages than sun-exposed beeches (e.g. on the forest edges, southern slopes), beeches on loamy soils or beeches on stands with formerly good water supply.

Forests without forestry use cover 12,671 ha (1.21 % of the total forest area), forests with limited forestry utilization being Natura 2000 forest habitat types cover 4.91 % of the total forest area (MIL 2013). 34% of Brandenburg´s forests are certified by PEFC (Programme for the Endorsement of Forest Certification Schemes), 3% by FSC (MIL 2010).

LEGAL FRAMEWORK

Describing the legal framework for forestry practice the document will refer to national laws as well as on federal state level as Germany is a federal system with the consequence that the tasks are split between the national and the federal states. Both legislative instances are responsible for predefined duties. The autonomy of the federal states is founded in existence of separate legitimacies, laws and competencies, thus having their own federal state constitution. Therefore, every federal state has their own executive, judicative and legislative. This is a main point in understanding German forest legislation, which is structured in two main parts:

NATIONAL FOREST ACT

The National Forest Act has the purpose to protect the forest because of (1) its economic use, (2) the significance for the environment, and (3) especially for the sustainable ecosystem balance, the climate, the water balance, pollution abatement, fertility of the soil, the landscape frame, agriculture and infrastructure as well as recreation of the population.

The focal point is to ensure a balance between the interests of society and private forest owners. Furthermore a sustainable economic use should be ensured, as well as subsidized. This directive acts as the basis for legislation for all federal states. Hence it can be considered as a general framework.

FEDERAL-STATE FOREST ACT OF BRANDENBURG

The Forest Act of Brandenburg on federal state level is handling state and federal state affairs as well as being responsible for execution of such. The forest management is under responsibility of the Ministry for Agriculture, Environment and Climate Protection (MLUK). The forest administration is split into two entities - the state forest company (Landesforstbetrieb) and the forestry authority (Forstbehörde/Hohheit). The state forest company is responsible for forestry management (including harvesting, replanting, etc.) on the state-owned forest areas. Within the buffer zone of the WH component part Grumsin is no state forest area.

The forestry authority is responsible that the forest law is respected and further it is responsible for managing subsidy programmes for private forest owners.

GERMAN FEDERAL CONSERVATION ACT

Germany is party to key international nature conservation treaties such as the Convention on Biological Diversity and CITES. Among the most important European directives relating to nature conservation are the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC).

The primary source of nature conservation law in Germany is the Federal Nature Conservation Act (new act entered into force 2010), which also implements the Habitats Directive and the Birds Directive in national law. Alongside on species provisions protection and protected areas, the Act includes provisions on landscape planning, interventions in nature and landscape, biotope networks, marine nature conservation, access to nature and landscape for recreational purposes, and the participation of recognised nature conservation associations in certain decision making processes.

The Federal Nature Conservation Act is supplemented in each of the sixteen German states by federal state level legislation that may vary in detail. It is therefore essential to consult the relevant nature conservation act in each of the federal states.

Nature conservation responsibilities are allocated in Germany along federal lines. Besides international cooperation, the federal government's main responsibility when it comes to protecting the natural resources is legislative.[3]

The Federal Nature Conservation Act defines several types of protected areas. They can be classified by size, protection purpose and conservation objective, and by the resulting restrictions on land use. The main types are nature conservation areas, national parks, biosphere reserves, landscape protection areas, nature parks and Natura 2000 sites. Two or more protected areas of different types can overlap or even cover the same area of land. For example, many nature conservation areas are simultaneously designated as Natura 2000 sites and large areas of the nature parks are designated as landscape protected areas.

[3] https://www.bfn.de/en/activities/law.html

„Naturschutzgebiet“ (nature conservation area)	Function: Protection of areas (Biotope and species protection) Initiation: Can be created by decree-law by the agency of nature protection	§ 23 BNatSchG
“Nationalparke” (national parks)	Function: big-sized landscapes of national importance. Most of which are not or scarcely influenced by human action. The areas should mostly develop themself naturally. Are part of preservation of creation and biodiversity.	§24 BnatSchG
“Biosphärenreservat” (biosphere reserves)	Function: should protect grand scale Nature- and cultivated landscapes. Preservation and fostering of historical developed landscapes, biodiversity and biotope diversity. Experimental use of sustainable economic use, as model regions.	§25 BnatSchG
“Landschaftsschutzgebiet” (landscape protection areas)	Function: Recreation of the productivity of the ecological balance, preservation of the landscape, recreation of the population Initiation: Can be created by decree-law by the agency of nature protection	§ 26 BNatSchG
“Naturparke” (nature park)	Function: large-scale cultivated landscapes, where protection and preservation of biotope- and biodiversity are connected to tourism and recreation of the population. The sustainable land use also plays a role.	§27 BNatSchG
„Naturdenkmal“ (nature heritage/memorial)	E.g.: Old trees, wells, rock formations, areas up to 5 ha Initiation: Can be created by decree-law by the agency of nature protection	§ 28 BNatSchG

„Geschütztes Biotop“ (protected biotope)	Function: Protection of biotopes within landscapes from conventional and sustainable use	(§ 30 BNatSchG, § 18 BbgNatSchAG)
“Natura 2000 – Schutzgebiete“ (Natura 2000 protected areas)	Function: Are part of the interconnected European Ecological Network (directives: 92/43/EWG [FFH] + 79/409/EWG [bird protection] They should secure the protection and development of biotopes	§ 32 BNatSchG

NATURE CONSERVATION IMPLEMENTATION LAW BRANDENBURG (from 2013)

The law is oriented on the National Conservation Act (2010) and supplements this.

There are several strategies and programs on national and federal-state level of Germany that are relevant in relation to forest conservation management:. Most of them are tied to international strategies.

German National Strategy on Biodiversity (2007)

The strategy is the German National Biodiversity Strategy and Action Plan (NBSAP) regarding the implementation of the Convention of Biodiversity (CBD).

According to article 6 of the Convention of Biodiversity each member state needs to develop a National Biodiversity Strategy and Action Plan (NBSAP) for the implementation of the COP decisions, in order to integrate the CBD objectives into national policies and in order to report about progress, success and failure. In this way each member state integrates conservation and sustainable use of biodiversity into national plans and decisions. NBSAPs measure the progress of incorporation of the CBD into national law and national policies.

Programme of Measures for Biological Diversity in Brandenburg (2014)

The aim of the programme is to contribute to reach the goals on national level.

National Forest Strategy 2020 (from 2010)

The 2020 Forest Strategy - a strategy for forests both as natural areas and as economic areas - addresses these complex interrelations and different demands. It identifies nine action areas, and for each of these it outlines the existing challenges and opportunities, analyses possible conflicts of interest and formulates potential solutions. The nine action areas comprise:

1. Mitigating and adapting to climate change
2. Property, work and income
3. Raw materials, use and efficiency
4. Biodiversity and forest conservation

5. Silviculture
6. Hunting
7. Soil protection and water management
8. Recreation, health and tourism
9. Education, public relations and research

The objective is to show ways of achieving a viable balance between the growing demands on forests and their sustainable productivity.

There is a need for further research and information in some areas. Answers are needed to questions relating to the adaptation of forests to climate change, the interrelations between and impacts of forest management and nature conservation, the efficient use of raw materials and to the maintenance and development of the value-added potential for forestry and wood-based industries. Practical research, transfer of innovation and information, education and consumer guidance therefore constitute important measures in nearly all the Forest Strategy's action areas.[4]

Several conservation NGOs criticize certain aspects of the strategy in terms of concrete and more ambitious goals taking into account the ecosystem services of the forests.

A new Forest Strategy 2050 of the German Ministry for Food and Agriculture is under preparation.

Forest Programme 2011 (Brandenburg)- Joint action for the protection and the benefit of rural landscapes[5]

Referring to hunting, the the German Hunting Law is based on the federal hunting law („Bundesjagdgesetz“) in its version of 1976. As an outline law, it is completed by the laws of the federal states and their application dispositions.

In Germany, the hunting right belongs to the landowner. The two guiding principles of hunting practise are (1) the hunting estate system and (2) the game management duty of the hunting right owner. The hunting estate system differs from the licence system applied. The size of the property and the regulations on federal state level decide, if a private hunting territory or a shared hunting territory (pooling together several smaller territories within one administrative district) is possible. In a private hunting territory, the hunting rights belong to the landowner, if he has a hunting permit and his agricultural, forestry or fish farming area amounts to at least 75 unbroken ha. In shared hunting territories, which are all hunting areas that do not have the size of a private hunting territory and that are located within the administrative boundaries of a district, the hunting right belongs to the hunting cooperative, which is the association of the landowners. Generally, the hunting cooperative leases out the hunting right.[6]

Hunting on federal state level is regulated by the Federal Hunting Law of Brandenburg (2003) and is managed and controlled by the Lower Hunting Authorities on county level – for the Beech forest Grumsin meaning mainly the county of Uckermark and to a small share the county of Barnim. The Lower Hunting Authority agrees with the hunters on plans with numbers of hunted deer and controls them. It is foreseen that the plans should be based on the browsing monitoring data and should be high enough to enable natural regeneration.

UNESCO MANAGEMENT

[4] https://www.bmel.de/EN/topics/forests/forests-in-germany/forest-strategy-2020.html
[5] https://mluk.brandenburg.de/sixcms/media.php/9/Waldprogramm2011_en.pdf
[6] https://www.face.eu/sites/default/files/germany_en.pdf

Regarding the UNESCO management of the WH component part, in Germany exists a national steering group (Lenkungsgruppe) for the five German Beech Forest UNESCO component parts that is coordinated by the Hessian Ministry of the Environment, Climate Protection, Agriculture and Consumer Protection.

Members of the steering group are: the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the Federal Agency for Nature Conservation (BfN), representatives of the relevant ministries of the four federal states involved (Brandenburg, Thuringia, Mecklenburg-Western Pomerania and Hesse), as well as representatives of the five component parts Jasmund, Serrahn, Grumsin, Hainich and Kellerwald.

According to the information provided by the coordination of the steering group the task of this group is to take decisions for the German component parts and for the international cooperation and to organise joint public relation activities (e.g. development and maintenance of the Website, of the World Heritage App and flyers).

The resources at the steering group are limited to the tasks above and do not display additional capacities for e.g. to coordinate joint projects or to forward information from the national or European level to local stakeholders or the public.

Regarding forest management planning and implementation, private and communal forests apart from a certain size need to have site-specific and detailed forest management plans that are usually elaborated by specialized consulting offices. They are normally elaborated for a 10 years timeframe, but the proposed measures need to be adapted, if the circumstances changes e.g. stand structure changed by storm.

The beech forest stands higher than 15 m according to the federal state silvicultural guidelines (“Green Folder”) are normally managed with thinning harvesting every 5-7 year. Nevertheless, this guideline is mainly for federal state owned forests and can be an orientation for private owners.

FORESTRY METHODS IN USE

The main silvicultural methods used in Brandenburg are depending on the forest type and structure

- Shelterwood cutting
- Seedtree method
- Clearcutting (mainly in pine forests)
- Femelschlag/group selection system
- Plenter/Selective system
- Close-to-nature forestry (ProSilva)
- Agroforestry (almost not used)

In terms of functions of the forests, all forest functions (water management, cultural heritage, protection, nature conservation, and forest use) should be conserved, but are mainly subject to personal assessment and point of view of the forester, if there are not legal limits e.g. through protected areas or water protection area.

To the project knowledge there is no public consultation process for the elaboration of the forest management plans.

2.2. Austria

2.2.1. Kalkalpen buffer zone

2.2.2. DESCRIPTION OF BUFFER ZONE

The Buffer Zone of Kalkalpen National Park mainly represents the whole National Park area. Only in the southern parts of the Park some area is not part of the buffer, as the park here has some enclosures that are not National Park. The Natura 2000 protected area covers the whole National Park and the closer surrounding (see Figure 4**Napaka! Vira sklicevanja ni bilo mogoče najti.**).

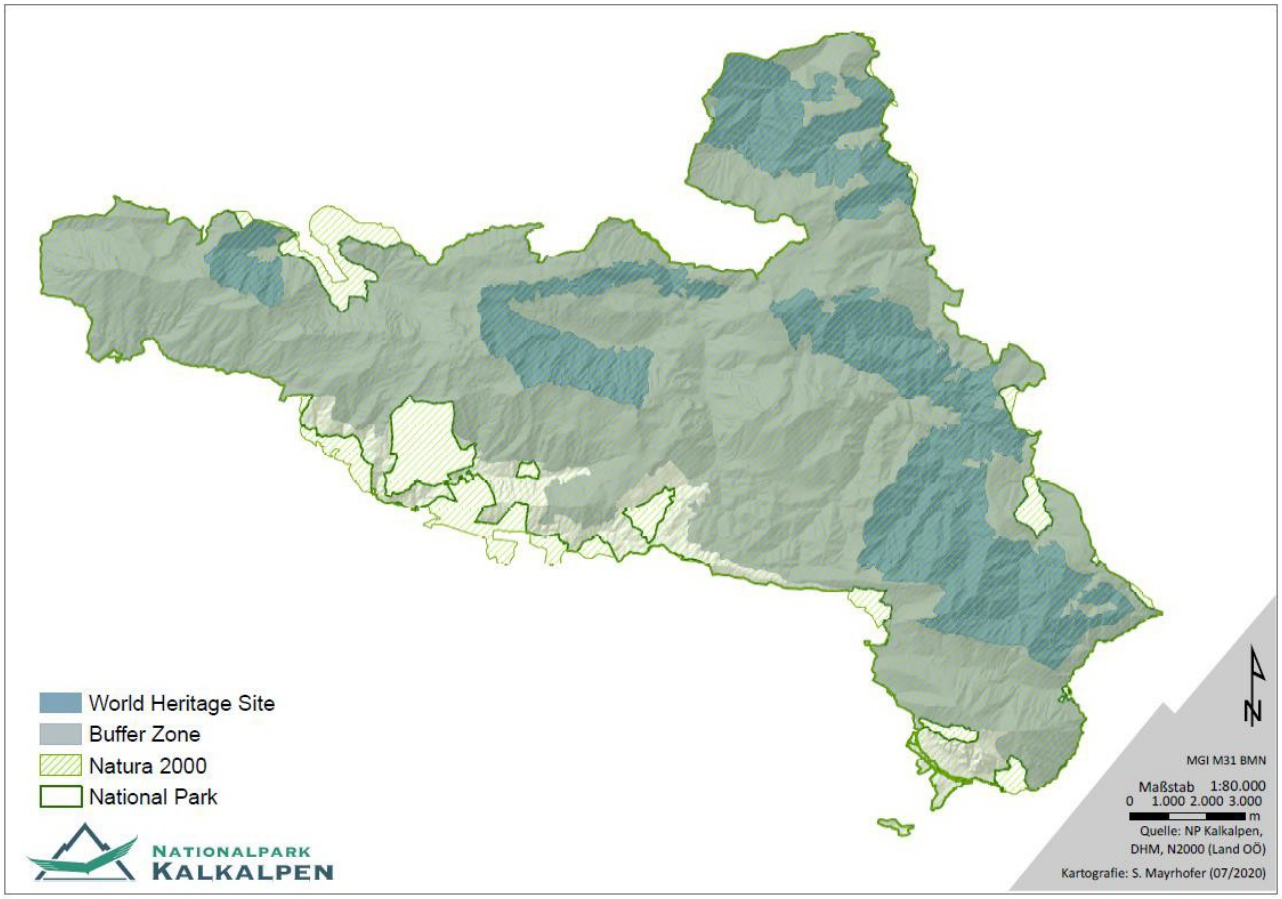


Figure 4: Zonation of Kalkalpen National Park: WH-site, buffer zone and Natura 2000 site

About three quarters of the buffer zone is covered by forests. The forests mainly can be described as central European submountainous and mountainous beech forest. The protected area counts six beech forest associations: *Cyclamini Fagetum*, *Helleoboro nigri-Fagetum*, *Cardamine trifoliate-Fagetum*, *Adenostylo glabrae-Fagetum*, *Saxifrago rotundifoliae-Fagetum* and *Galio odorati-Fagetum*. At higher altitude, the mixed beech forests are substituted by mountainous spruce and mixed spruce-silver fir forests (*Adeonostyles grabrae-Picetum*, *Adenostylo alliariae-Picetum*). At azonal sites, one can also find pine and larch forests, ravine and slope forests, fluvial forests, in some cases also spruce mire forests and, of course, also former *Picea abies* plantations.

The naturalness of the National Park forest is quite high: 67% of the forests are classified as natural and near natural. The same applies for the forests in the buffer zone. An age analysis of the forest stands in the buffer zone shows that more than 50 % are older than 160 years (see Figure 5**Napaka! Vira sklicevanja ni**

bilo mogoče najti.) .The average proportion of dead wood for the whole National Park lies within 34 cubic meters per hectar.

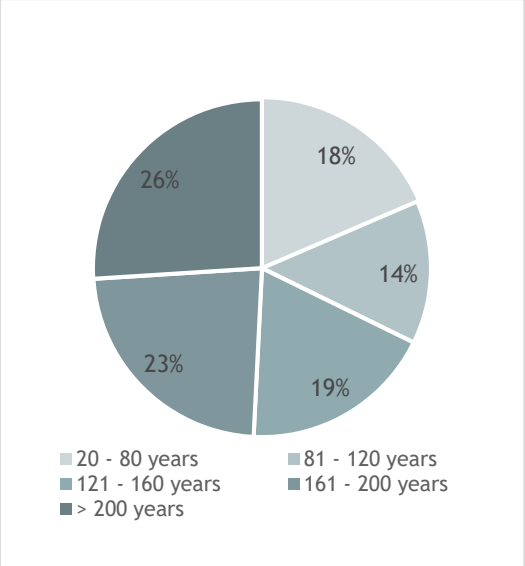


Figure 5: Forest age in the buffer zone

24 % of the buffer zone is covered by non-forest area. Thereof more than a third of this area is covered by rocks and debris, a quarter by high montane and alpine grassland. The rest is covered by cultural landscape, dry grassland/shrub and rock vegetation, wetland habitats and moving and still water bodies.

The buffer zone (and also the National Park area) does not allow any silvicultural utilization. Phyto-sanitary cuttings are only allowed at the border of the National Park (see Figure 6**Napaka! Vira sklicevanja ni bilo mogoče najti.**) and there are strict guidelines for the bark beetle management, which is only done to protect the surrounding forests from bark beetle expansion from the National Park. The rest of the area is a so called “forest wilderness area”.

Experts of the National Park are supervising the bark beetle management. To protect endangered species (e.g. golden eagle, capercaillie, etc.), bark beetle management is temporarily forbidden in special areas (eagle nest, leks, etc.). A strict proportion of dead wood has to remain in the forests (debarking).

The bark beetle management zonation is located at least 50 meters away from the World Heritage Site to ensure that no negative impact is harming the OUV.

Next to roads and trails some trees are cut because of security measures.

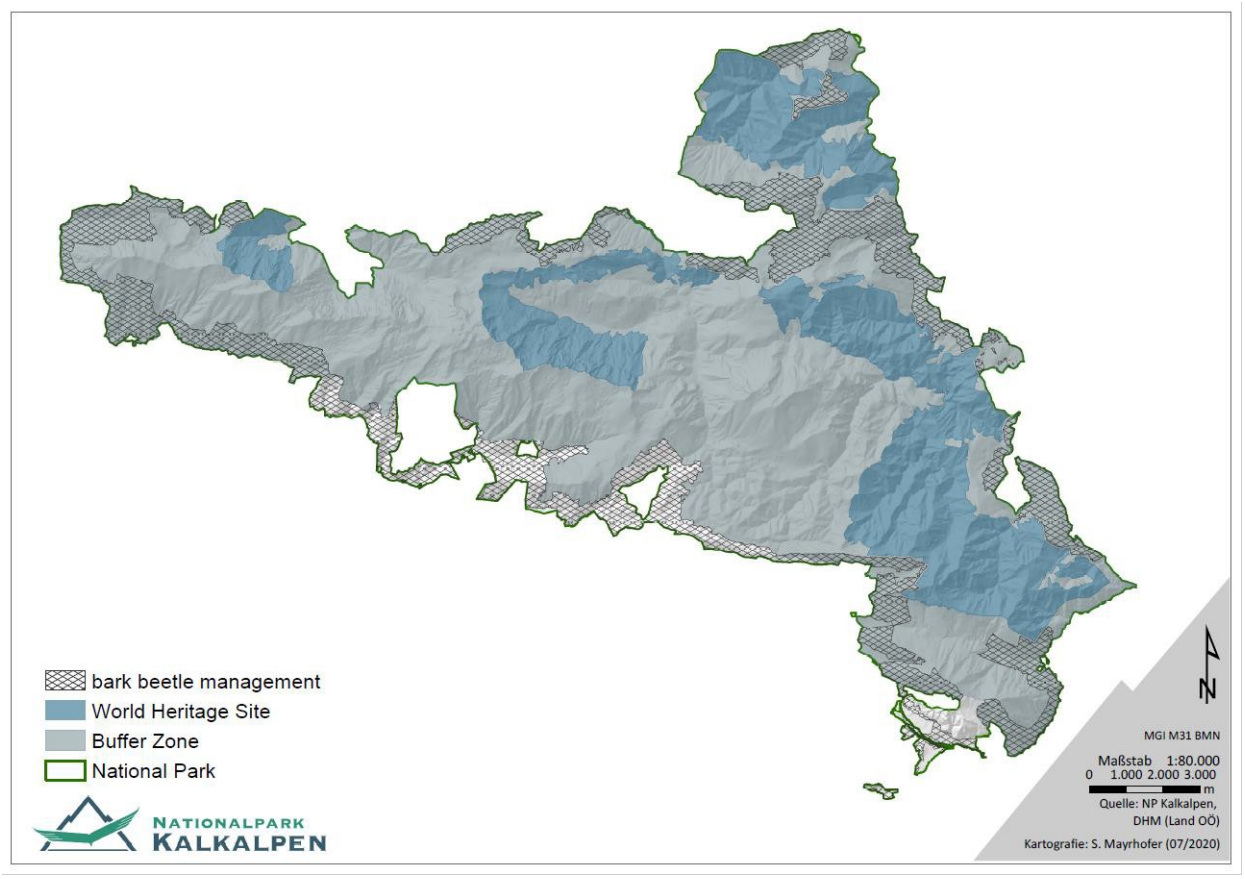


Figure 6: Bark beetle management zonation in Kalkalpen National Park

Kalkalpen National Park is legally protected by the National Park Act. The Act decides between a nature zone and a conservation zone. Last one consists of cultural landscape and therefore allows measures to protect the high cultural diversity (species and habitats).

As shown in the Coordination Office's "Overview about the current management regime and the management operations in the buffer zones of the UNESCO WH site Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" some activities are legally allowed in Kalkalpen National Park's buffer zone. The National Park Act is not that restrictive – many of these allowed activities are not used by the Park Administration

- Hay making meadows (Allowed on special Permission)
    - Allowed in the conservation zone to conserve the cultural landscape (Natura 2000 habitats and species)
- Pastures, cattle grazing (Allowed on special Permission)
    - Allowed in the conservation zone to conserve the cultural landscape (Natura 2000 habitats and species)
- Security management along and maintenance of existing trails (Allowed on special Area)
- Artificial restoration (Allowed on special Permission)
    - Not forbidden by the National Park Law, not used by Park Administration
- Tendering operations in young stands (Allowed on special Area)

    - Allowed by the National Park Law, not used by Park Administration
- Selective logging (Allowed on special Area)
    - Allowed by the National Park Law, not used by Park Administration
- Collecting mushrooms, berries, medical herbs (Allowed on special Area)
    - Allowed in the conservation zone for own consumption
- Sanitary cuts (Allowed on special Area – bark beetle management area)
- Infrastructure – maintaining of existing
    - Trails, roads, settlement, watch towers, natural hazard management, managed alp huts, cellular phone tower, electrical power lines, pipelines, hunting infrastructure
- Watch towers, look-outs (new) (Allowed on special Permission)
- Trails (hiking, riding, biking) (new) (Allowed on special Permission)
- Natural hazard management (new) (Allowed on special Permission)
    - If public safety is overweighing natural protection (e.g. a public road on the boarder of the National Park)
- Hunting infrastructure (new) (Allowed on special Permission)
    - Hunting infrastructure is needed for an efficient game management, that conserves the natural forest vegetation
- Cellular phone tower, electrical power lines, pipelines (new) (Allowed on special Permission)
- Public roads, railway (new) (Allowed on special Permission)
    - Kalkalpen National Park is still minimizing its road network by setting roads out of maintenance
- Hiking, riding, biking on trails (Allowed on special Area)
    - The trails for biking, hiking and riding are essential for an effective visitor management
- Extreme sports (paragliding, climbing, rafting…) (Allowed on special Area)
    - Paragliding is allowed on special area (take off-points, overflying zone), climbing is allowed on a special area. Canyoning will be forbidden in the new version of the Mangementplan Directive.
- Expedition to caves (Allowed on special Permission)
    - In general it is not forbidden to access a cave. The access to the scientific valueable Klara-cave is only allowed for speleologists with special permission.

Kalkalpen National Park has some problems with the subdivision of the buffer zone to protective and landscape subzone. The UNESCO WH area should be surrounded by the protective buffer zone, which is not possible, as in some cases cultural landscape (landscape subzone) is neighbouring the WH area.

2.2.3. Austria in general

2.2.3.1. Type(s) of forestry in place

Austria is a forested land. About half of the Austrian state area is covered by forests. This means that more than 4 million hectars are stocked with trees. Divided by the Austrian population about 0,5 ha of forest is available for every citizen for recreation. About 800.000 ha of forests are considered as protective forests.

Spruce still is the main tree species with a proportion of 57,4%. The natural proportion of spruce is estimated at 35%. Nevertheless, the proportion of spruce is already declining. The occurrence of beech and maple is increasing and therefore, also mixed forests with a high proportion of deciduous trees species. This means that forest management in Austria is becoming more and more sustainable.

The proportion of dead wood in the Austrian forests counts 30,9 m^3/ha. All deadwood with a diameter more than 10 cm is included. The average dead wood value consists of 40% lying dead wood, 35% stumps and 25% of standing dead wood. Deadwood has an unequal distribution: whereas high proportions of dead wood are located in the mountainous forests of the Alps, the lower forests show quite considerably lower volumes of dead wood.

A study concerning the naturalness of the Austrian forests is only available from 1998. Results indicate that 3% of Austria's forests have not been subject to significant human impact, and 22% can be classified as semi-natural. Natural forests are located in the Central Alps as well as in the northern and southern peripheral zones of the Alps with mainly limestone dominated sites. Forests classified as "moderately altered" cover a proportion of 41%. These forests are all commercially exploited, yet the potential natural vegetation is at least partly present. 27% are classified as being "altered" and 7% as "artificial". These stands have been intensively exploited and their tree species composition does not reflect the original natural conditions (Grabherr et al. 1998).

In 2018, the Austrian Forest Strategy 2020+ was developed by the responsible Ministry in coordination with with 85 organisations concerning forest policies. The strategy aims a sustainable, multifunctional forest management. The following seven fields of action were developed:

- Contribution of the Austrian forests to climate protection,
- Health and vitality of the forests,
- Productivity and economic aspects,
- Biological diversity in the Austrian forests,
- Protective function of the Austrian forests,
- Social and economic aspects of the Austrian forests,
- Austria's international responsibility for sustainable forest management.

FOREST ACT

The legal framework for forest utilization in Austria is the Forest Act 1975, which firstly introduced new aspects like the conservation of the forests functions. The Forest Act was revised in 2002. Clearcutting of more than 2 ha is illegal in Austria, whereas felling areas larger than 0,5 ha requires approval by forestry authorities. Clearcuttings are not allowed in stands younger than 60 years. Used forest stands have to be reforestated within 5 years (reforestation) or 10 years (natural rejuvenation). Forest owners also have to prevent the forests from forest pests and actively combat forest pests that increase in dangerous quantities.

As a big exception in Austria, Kalkalpen National Park has an exemption from the Forest Law on 79 % of its area. This means that bark beetle combating only has to take place on the borders of the National Park to prevent the surrounding forest owners from negative impacts.

The majority of Austrian forests are privately owned (82 %), with state owning 18 %. Farmers own about half of the private forest. These forest properties are very fragmented with average property only averaging around 9,29 ha. Consequently, there are a large number of forest owners (about 145.000). Forest management and utilization is done according to the Forest Law.

Forest management planning is only done by big forest owners like the Austrian Federal Forests. Every ten years they make an inventory and develop a forest utilization plan, which has to be approved by the responsible forest authority.

As there is no silvicultural utilization, Kalkalpen National Park has no forest planning. The management plan regulates in great detailed how the bark beetle management is conducted. 88 % of the National Park area is owned by the republic (Austrian Federal Forests), 11 % is privately owned and 1 % is owned by the communities.

FOREST INVENTORY

The federal forest office is periodically conducting an Austrian-wide forest inventory. The inventory is a tool to monitor the current forest conditions and the changes of forest ecosystems. The results of the forest inventory are used as a tool for decision-making in forest and environmental policy.

NATURE CONSERVATION ACT

As mentioned before, Austria has nine different Nature Conservation Acts. The Nature Conservation Acts of the different federal states serve the implementation of the Habitats and Birds Directives. In the case of Kalkalpen National Park, the Act of Upper Austria is applicable. This act aims to conserve the nature and landscape. In detail, this means the protection of natural processes, the diversity of plants, animals and fungi as well as their natural habitats and natural resources, the diversity, specific character, beauty, recreational value of landscapes, minerals and fossils as well as natural caves and their visitors.

The Act allows for establishment of:

- Nature conservation areas,
- Landscape conservation areas,
- Protected parts of landscape,
- Natural monuments,
- Protection of natural caves,
- European nature reserve.

The National Park Act replaces the Nature Conservation Act in the protected area.

HUNTING ACT

Austria also has nine hunting laws. In the following text the hunting law of Upper Austria is described.

The Upper Austrian Hunting Act regulates the content of hunting rights and their exercise, the hunting areas, the hunting license, the avoidance and compensation of hunting and game damage, as well as the representation of the interests of the hunters. The practice of is also done for hunting protection and the observance of rules. Hunting protection is responsible for protecting the game from poachers or food shortages. The hunting rules regulate the seasonal closure of huntable animals, the rest of the hunt, the limitation of the usage of traps and other local prohibitions. The shooting of ungulates (is the same as that of wild boar) is regulated by a shooting plan, that is has been approved by the responsible authority.

As Hunting and Fishing is not allowed in Kalkalpen National Park, the National Park Act substitutes the Hunting Act as well as the Fisheries Act.

Game management in Kalkalpen National Park is based on the situation of the vegetation (browsing) and is coordinated with the forest authority, the hunting community, and the farmers. The joint work programme is applied for three years. The management plan of the National Park also regulates the aims and the practice of the game management. The prior aim is the reduction of the human impact. Management is only done to conserve the natural diversity of vegetation and to avoid conflicts with the neighbouring land owners. Game management is done only on 50 % of the National Park area. The regulation is conducted with professional hunters, lead-free munition, on the basis of sex and age to ensure a sustainable reduction and lots of other limitations.

NATURA 2000

Kalkalpen National Park (zone A) and its closer surroundings (Zone B and C) are designated as European nature reserve. The Act lists the occurring species and habitats according to the Habitats and Birds Directives. The activities allowed and all the conservation measures only concern Zone B and C. For the area of the National Park it is referred to the management plan directive of the National Park.

UNESCO MANAGEMENT IN AUSTRIA

The governance scheme for UNESCO management in Austria is not very clear. Austria actually has nine cultural and one natural UNESCO World Heritage sites. The inclusion in the World Heritage list has no direct effects on the protection status of the sites in a national context. The State Parties have to conserve the sites by anchoring the protection in national law. Regarding the cultural sites this is done by diverse City Conservation Laws, monument protection, zoning plans, etc. Actually, the two Austrian World natural Heritage sites of “Ancient and Primeval Beech Forests of the Carpathians and other Regions of Europe” are not explicitly legally mentioned. The protection for the WH-site Kalkalpen is given by the National Park Law, the Natura 2000 Directives, and the management plan directive. The responsible authority for UNESCO World Natural Heritage in Austria is the Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology, that is the so called national focal point for the Austrian sites.

A national steering group consisting of members of the protected areas and the national focal point was installed in 2018. The national steering group regularly meets and therefore ensures the communication and coordination between the members and develops common projects and activities. The National Steering Group also participates in the yearly Joint Management Committee Meeting, participates in international meetings concerning the WH-topics and communicates the Austrian concerns to IUCN and UNESCO. The periodic reporting also is done by the National Steering Group.

As mentioned above, Kalkalpen National Park does not meet all recommendations from the Coordinations Office’s “Overview about the current management regime and the management operations in the buffer zones of the UNESCO WH site Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe”

The buffer zone contains cultural landscape that is used for grazing or hay making. These forest free areas are hotspots for biodiversity and habitats for many species listed on the Habitats Directive. So giving up the utilization of this cultural landscape is not an option. Therefore, the area has to move to the landscape conservation buffer zone. The park administration just applied for a project where this buffer subzoning is one topic.

Regarding the forests in the buffer zone the National Park Act allows some measures like artificial restoration, tendering operations or selective logging. Kalkalpen National Park has defined the preservation of forest wilderness within its boundaries as a priority target. Process conservation is deemed to be the main tool for this. Therefore, these measures are not used.

Collecting mushrooms, berries and medical herbs is only allowed in the conservation zone (not in the nature zone). All of the conservation zone therefore should be integrated in the landscape buffer zone. The installation of new infrastructure is not explicitly forbidden. Infrastructure plans have to be authorized by the responsible authority, which examines if the planed project contradicts the protective objectives of a national park. In the southern parts of the buffer zone (National Park border) the installation of an avalanche barrier was authorized due to the greater public interest. Hunting infrastructure also has to be authorized by the responsible authority. To fulfilll the goals of the game management in the protective area this infrastructure is essential. The game management zone therefore will also be integrated in the conservation buffer zone.

The WH core and buffer zone also contains hiking, biking and riding trails. Hiking and biking is allowed on some designated forest roads. These roads have to be maintained because they are essential for bark beetle management and cultural land use. Additionally, the roads are used to reach alpine huts. The alpine huts are magnets for visitors and play an important role in the promotion of the National Park ideals and also for the guidance. Currently, there are no solutions to solve this conflict.

2.3. Slovakia

The boundary modification of the Slovak component parts has been carried out in order to consistently capture all the highly valuable areas that are necessary for the expression of the OUV. In general, the boundaries were modified in order to adjust them to existing strict nature reserves (in most of the cases, this included their enlargement compared to their delineation from 2007, as in case of Stužica, Udava, partly in Vihorlat), and also in order to add new parts of natural forests that have not been systematically included in the nomination dossier from 2007.

The table below summarises the area of the Slovak WH property as proposed to be modified in the renomination project consists from six component parts in two clusters.

Number	Name of the component part	Zone	Surface area (ha)	Cluster name
1.	Havešová	core zone	167.86	Poloniny
		buffer zone (protective function)	164.04	
		buffer zone (landscape conservation function)	6,309.80	
2.	Rožok	core zone	74.35	Poloniny
		buffer zone (protective function)	48.76	
		buffer zone (landscape conservation function)	1,089.95	
3.	Stužica - Bukovské vrchy	core zone	1,742.26	Poloniny
		buffer zone (protective function)	703.55	
		buffer zone (landscape conservation function)	4,990.56	
4.	Vihorlat	core zone	1,552.75	Vihorlat
		buffer zone (protective function)	607.79	
		buffer zone (landscape conservation function)	246.12	
5.	Kyjovský prales	core zone	289.35	Vihorlat
		buffer zone (protective function)	104.44	
		buffer zone (landscape conservation function)	0.0	
6.	Udava	core zone	455.79	Poloniny
		buffer zone (protective function)	71.04	
		buffer zone (landscape conservation function)	743.58	
Sum		core zone	4,282.36	
		buffer zone (protective function)	1,699.63	
		buffer zone (landscape conservation function)	13,380.02	

The results of mapping of natural/ancient/old-growth forests served as a basis for the elaboration of the current proposal. As Slovakia reported in 2016 in the State of Conservation report, within the project

supported by a grant from Switzerland, the National Forestry Centre of Zvolen mapped more than 7,000 hectares of forest habitats in Poloniny and in Vihorlat in 2014, in accordance with the Methodical Procedure on Delimiting Natural Forests to Identify the State of Forests and to Identify Primeval Forests and Natural Forests within the UNESCO World Heritage Property.

2.3.1. Poloniny cluster buffer zone

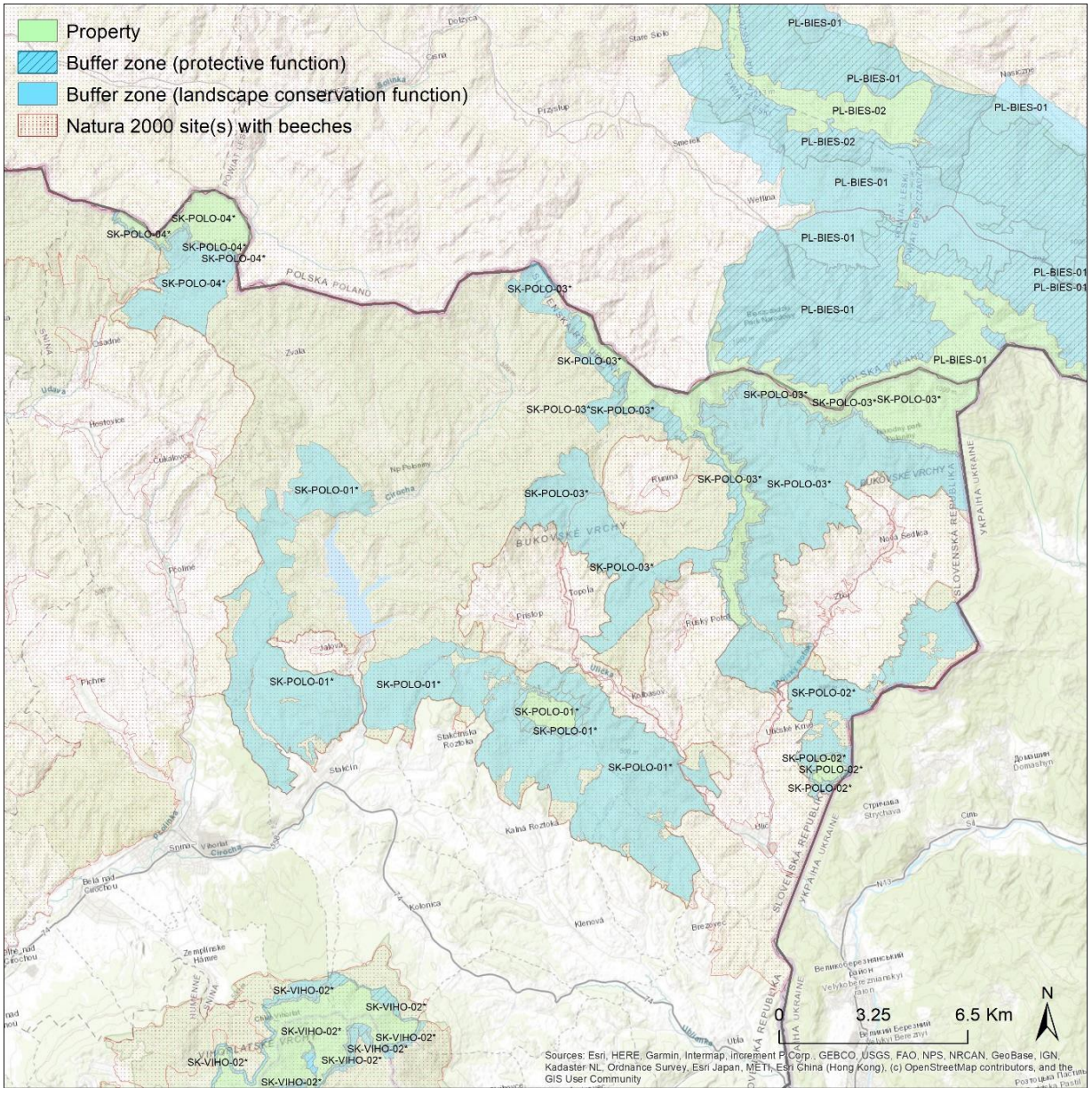


Figure 7: Map of the Poloniny cluster

The whole area of the component cluster is covered by forest, apart from small plots with inconsiderable area. The dominating woody plant is the European beech (*Fagus sylvatica*). Pure beech forests dominate in the whole region. The occurrence of silver fir (*Abies alba*) is present at more humid sites in the component parts Stužica-Bukovské vrchy and Udava. The beech forests are represented by two sub-alliances. The first sub-alliance of herb-rich beech forests (*Eu-Fagenion*) (EUNIS code G1.63), which includes associations with

the predominant *Dentario bulbiferae-Fagetum*. Typical species, such as the coralroot bittercress (*Dentaria bulbifera*), bittercress (*Dentaria glandulosa*), purple lettuce (*Prenanthes purpurea*), and fescue (*Festuca drymeya*) occur. Associations of the second sub-alliance maple forests (*Acerenion*) represented by beech-maple forests (*Aceri-Fagetum*) (EUNIS: G1.65) prevail in higher ground near the timberline. The herbaceous layer is represented by species, such as maiden sorrel (*Acetosa alpestris subs. Carpatica*), alpine lady-fern (*Athyrium distentifolium*) and especially the broad buckler fern (*Dryopteris dilatata*). The forests at the highest elevations below the timberline are influenced by the peak location and therefore the trees stay smaller.

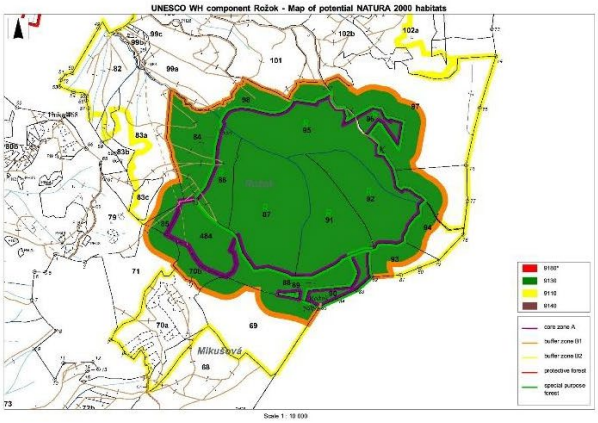
Lime-maple forest associations (*Tilio-Acerion*) (EUNIS: G1.B5) with tree species like the wych elm (*Ulmus glabra*), sycamore maple (*Acer pseudoplatanus*), and small-leaved lime (*Tilia cordata*), occur in more humid soils and rock screes. The herbaceous undergrowth is dominated by perennial honesty (*Lunaria rediviva*), dog's mercury (*Mercurialis perennis*) etc. Various species of fern are also common.

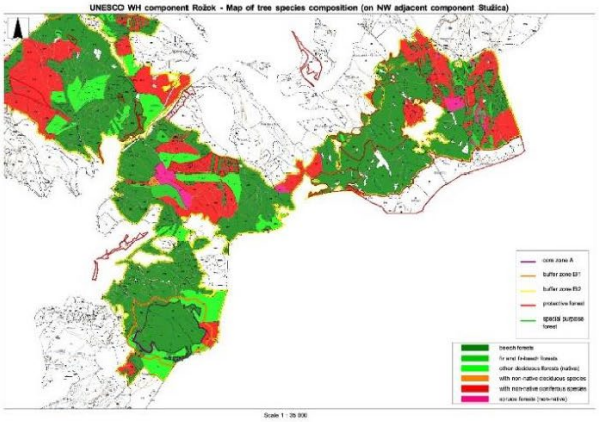
The smallest percentage of the component cluster is covered by alliance *Luzulo-Fagion* (EUNIS: G1.61), present at localities with acid soil.

2.3.1.1. DESCRIPTION OF BUFFER ZONE IN POLONINY CLUSTER BY COMPONENTS

COMPONENT ROŽOK

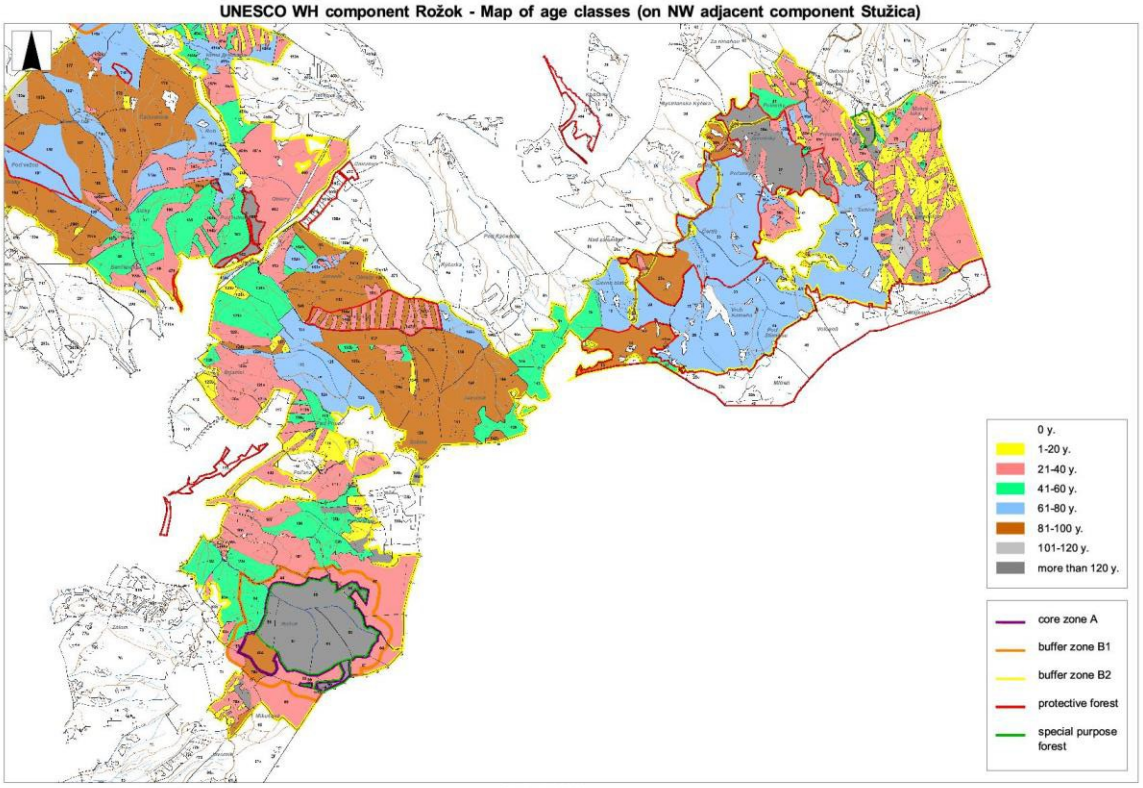
Core zone and B1 buffer zone (protective buffer zone) is potentially habitat 9130 *Asperulo-Fagetum* beech forests. The real vegetation is in the core zone mostly pure beech forest and in the buffer B1 zone also with other natural deciduous species and in one forest stand also with non-natural coniferous species. According to the European forest types in the Core zone and B1 zone is only Carpathian submountainous beech forest present. In the B2 zone (landscape conservation buffer zone) are present also altered forest with prevalence of non-native coniferous (purple stands on the map).





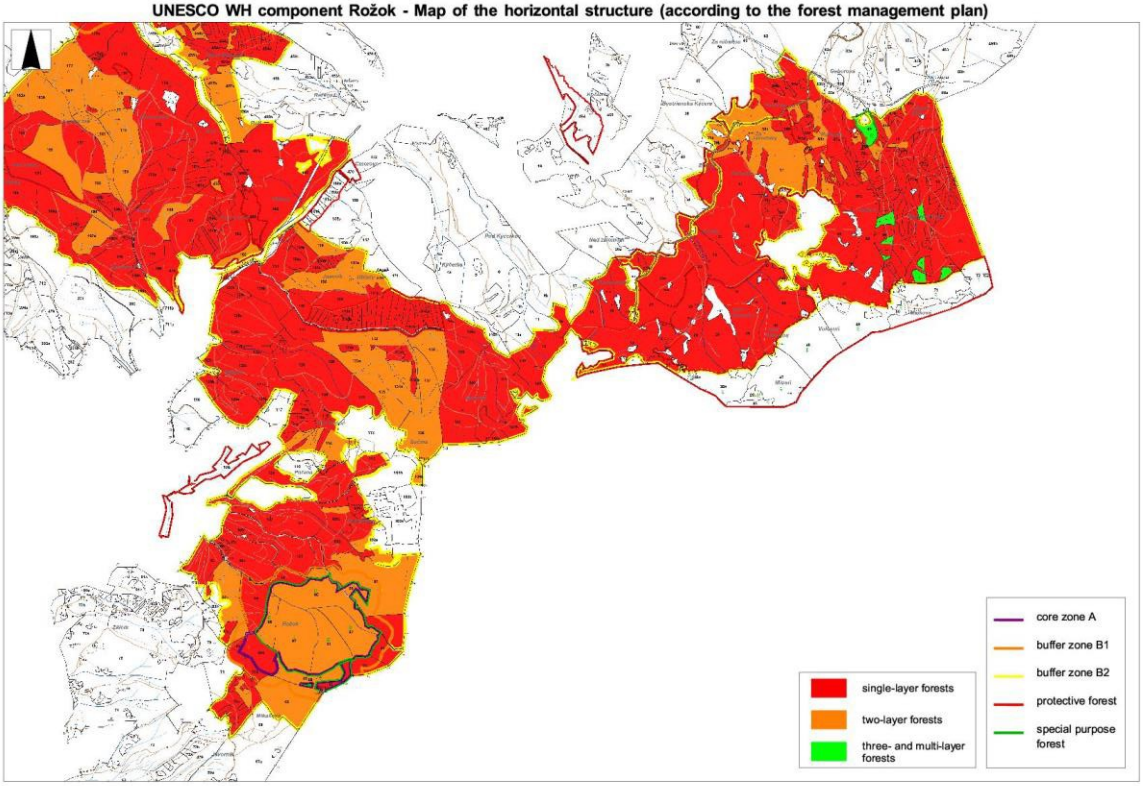
The structure of the core zone is an old-growth forest with the age of more than 120 years and according to the forest management plan, it is decribed as a two layers forest. The surrounding buffer zones consist mostly of even aged forests with different age younger than the forest in the core zone (age classes management in the past. Clear cutting and shelterwood systems in stripes contribute to the quite uniform forest stands).

UNESCO WH component Rožok - Map of age classes (on NW adjacent component Stužica)



Scale 1 : 35 000

UNESCO WH component Rožok - Map of the horizontal structure (according to the forest management plan)



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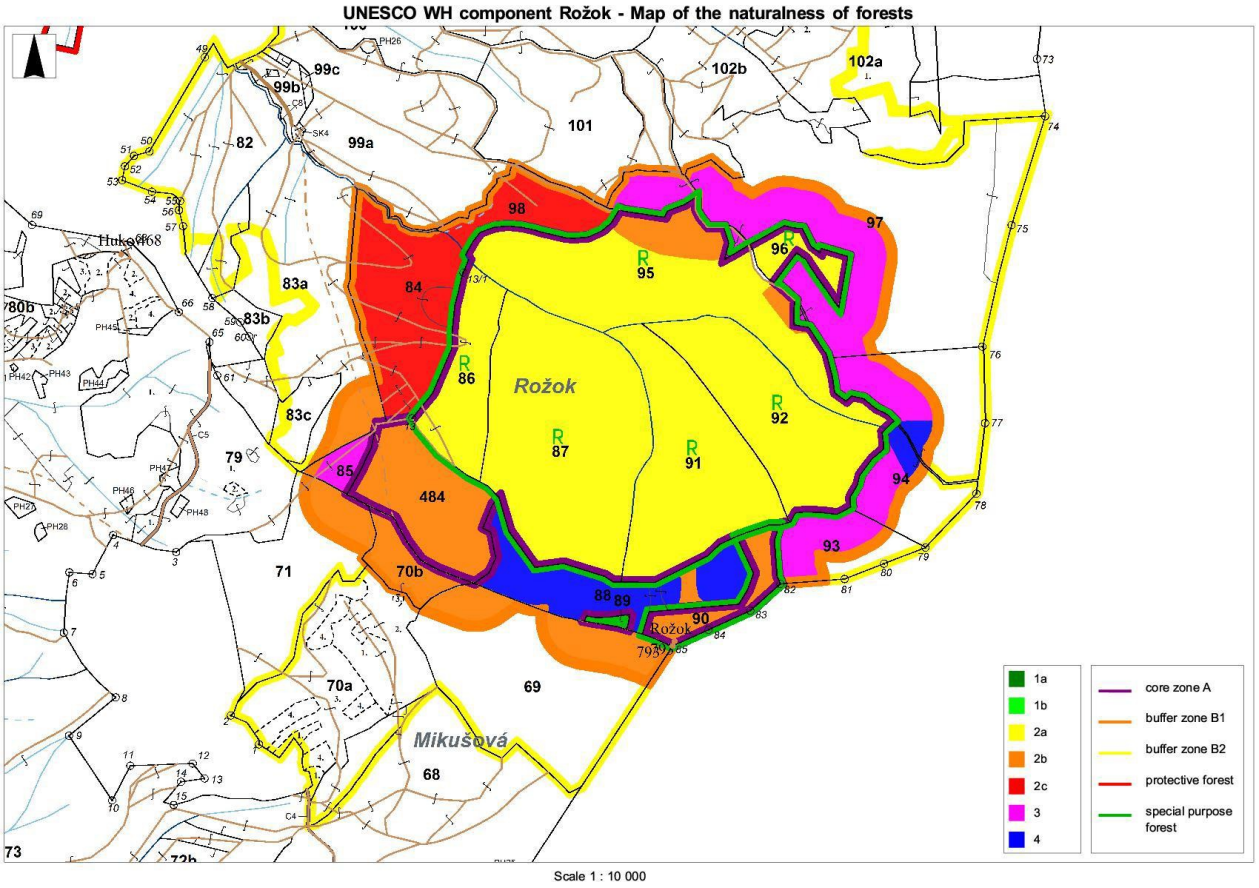


The core zone was mapped as 2a Natural forest, but in the B1 there are present also the parts mapped as changed forest.

Mapping scale
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to Natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting.

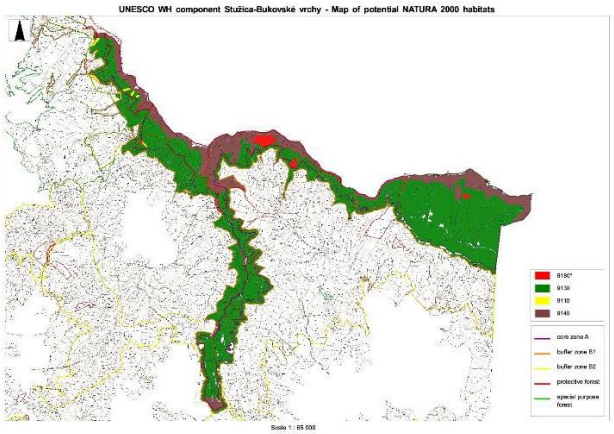
There are forest roads and skidding places present in the B2 zone and some small meadows.

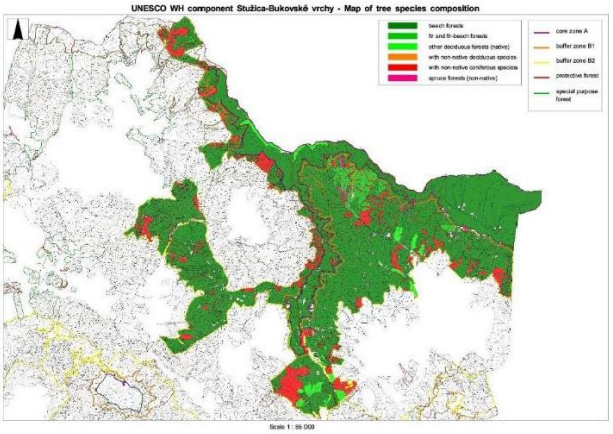
COMPONENT STUŽICA

Core zone and B1 buffer zone are mostly covered by potentially habitat 9130 *Asperulo-Fagetum* beech forests. On the mountain ridges, there is present habitat 9140 Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*. Some small parts are covered by habitat 9110 *Luzulo-Fagetum* beech forests and also habitat 9180 *Tilio-Acerion* forests of slopes, screes, and ravines.

The real vegetation is in the core zone mostly pure beech forest and also fir-beech forests. In the buffer B1 zone and B2 also there are forest stands also with non-natural coniferous species. And also some stands with their prevalence.

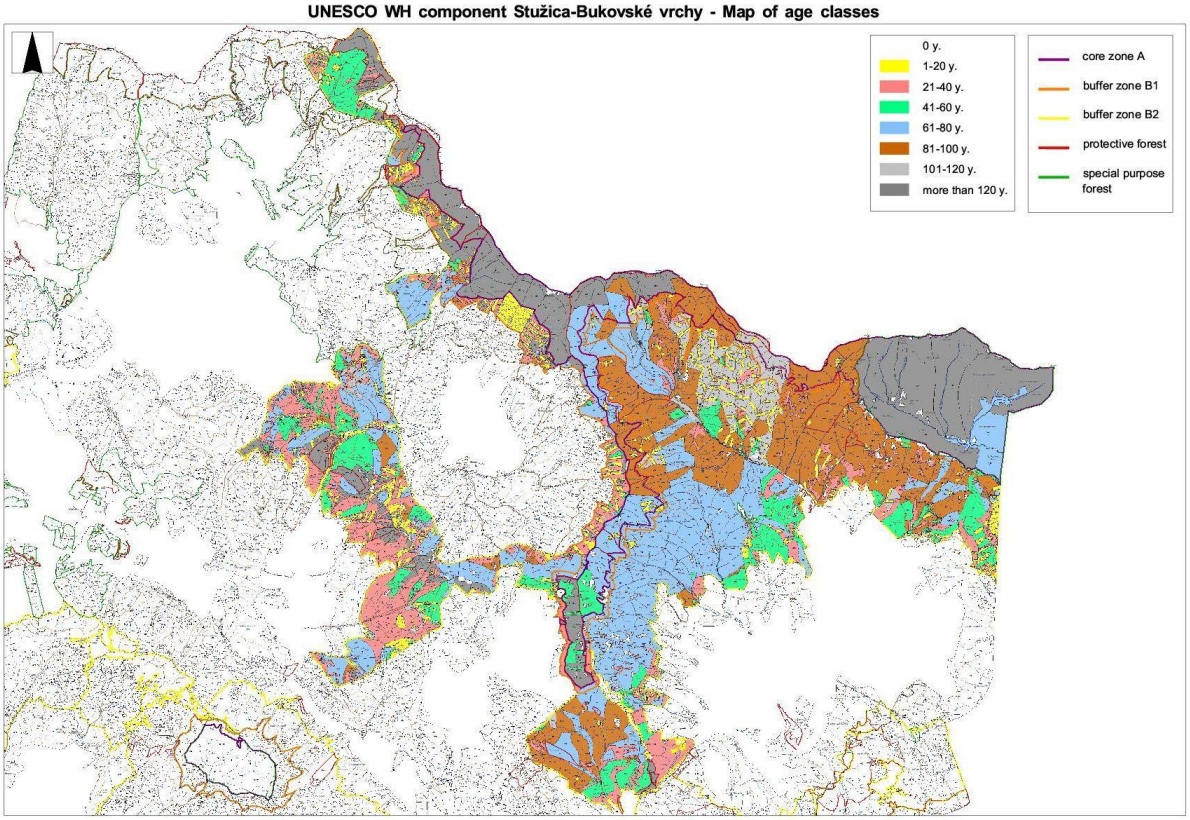
According to the European forest types in the core zone and B1 zone are only Carpathian submountainous beech forest, Carpathian mountainous beech forests and Ravine and slope forest present. In the B2 zone are present also changed forest with prevalence of non-native coniferous (purple stands on the map).





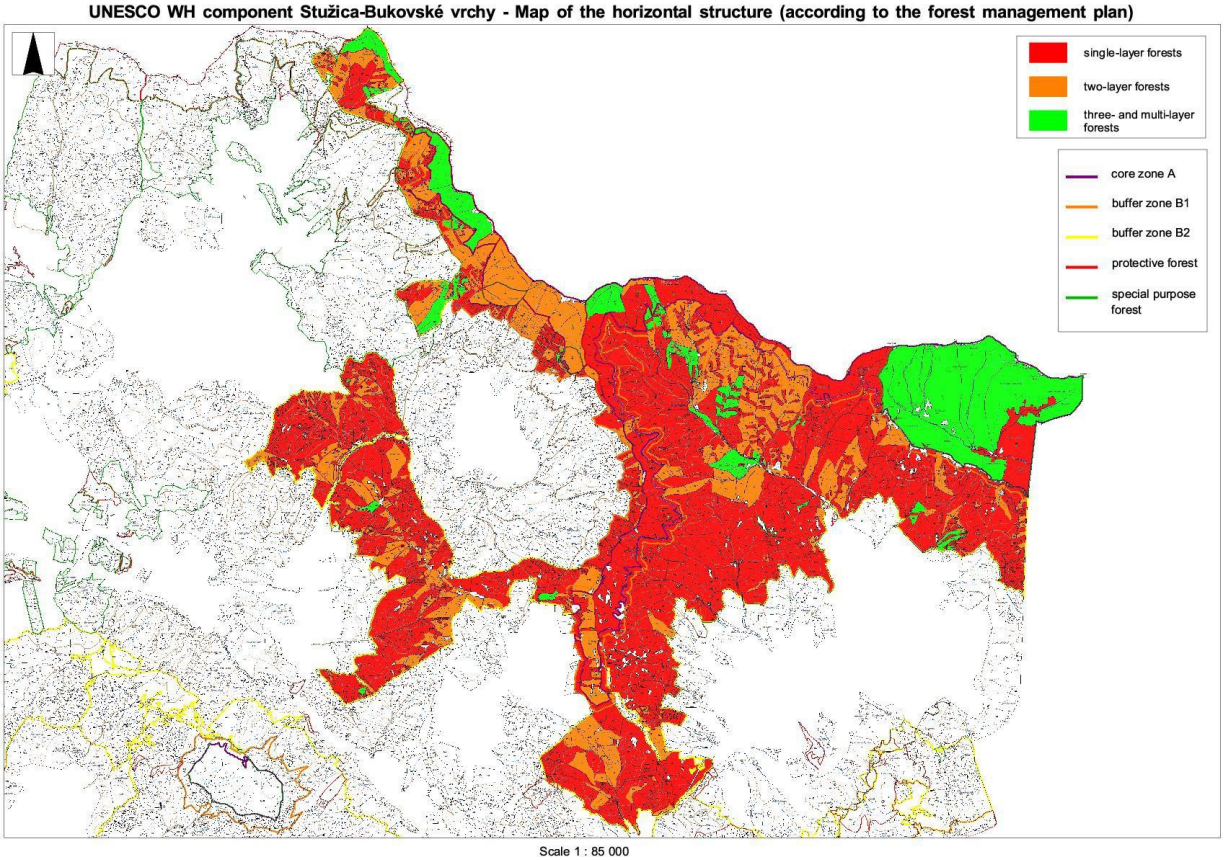
The structure of the core zone is partly in the old reserves old forest with the age of more than 120 years and according to the forest management plan, it is decribed as a tree layers forest, but it can be seen on the map that also a large amount of younger even aged stands were included in the core zone. The surrounding buffer zones consist mostly of even aged forests with different age (age classes management in the past. Clear cutting and shelterwood systems in stripes contribute to the quiet uniform forest stands).

UNESCO WH component Stužica-Bukovské vrchy - Map of age classes

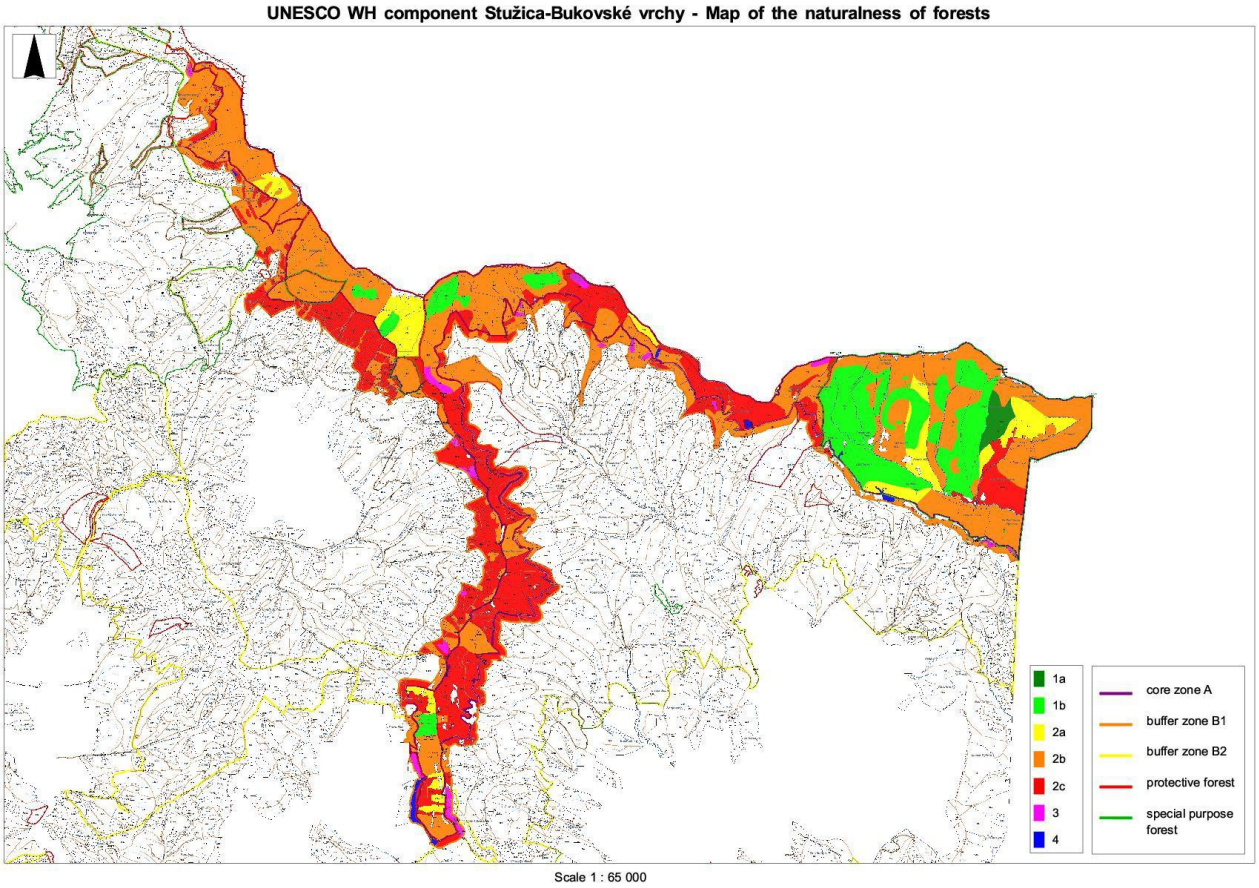


Scale 1 : 85 000

UNESCO WH component Stužica-Bukovské vrchy - Map of the horizontal structure (according to the forest management plan)



Scale 1 : 85 000



The core zone was mapped as Natural forest, with some parts of close to virgin and virgin forests in the old state natural reserve Stužica. In the B1 there are present also the parts mapped as changed forest and 2c Natural forest with slightly changed tree species composition and simplified structure are in prevalence.

Mapping scale:
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to Natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting

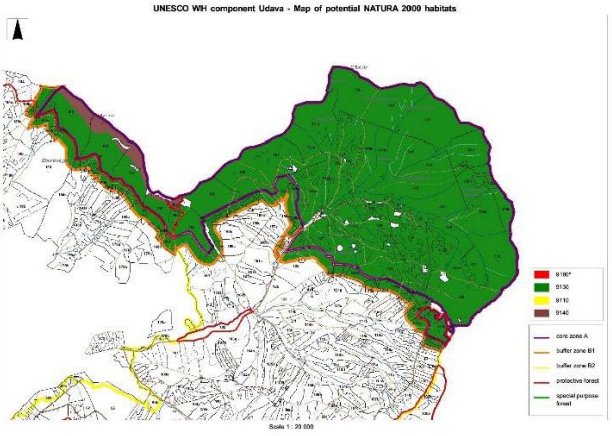
There are forest roads and skidding places present in the B2 zone and some small meadows.

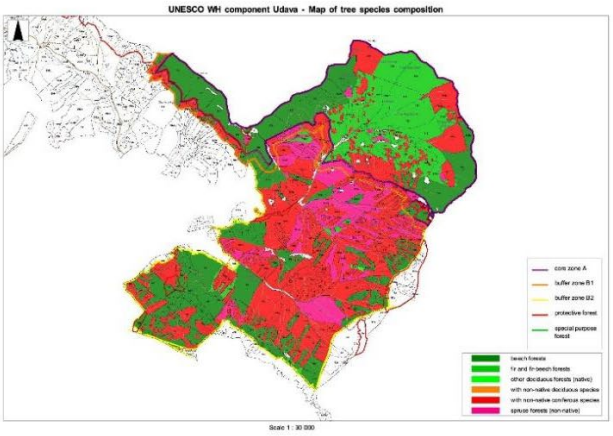
COMPONENT UDAVA

Core zone and B1 buffer zone are mostly covered by potentially habitat 9130 *Asperulo-Fagetum* beech forests. On the mountain ridge, there is a small presence of habitat 9140 *Medio*-European subalpine beech woods with *Acer* and *Rumex arifolius*.

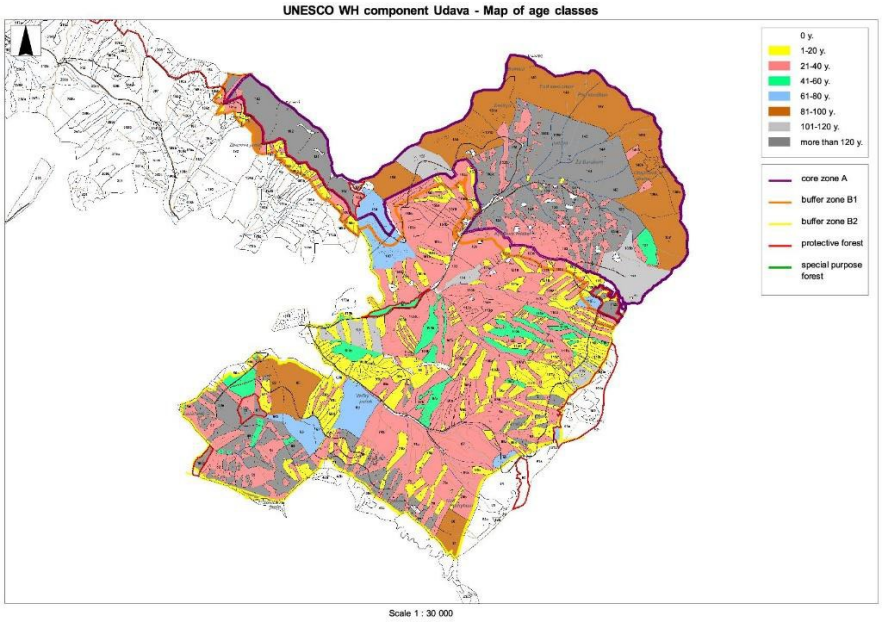
The real vegetation in the core zone is mostly fir-beech forests and pure beech forest. However, there are also present mixtures of non-native coniferous species with dominance of beech. In addition, some stands with the prevalence of non-native coniferous species. In the buffer B1 zone and B2 also there are forest stands also with non-natural coniferous species. Moreover, many stands with their prevalence.

According to the European forest types in the Core zone and B1 zone are Carpathian submountainous beech and Carpathian mountainous beech forests. Moreover, changed forest with prevalence of non-native coniferous (purple stands on the map). In the B2 zone are present also changed forest with prevalence of non-native coniferous (purple stands on the map).

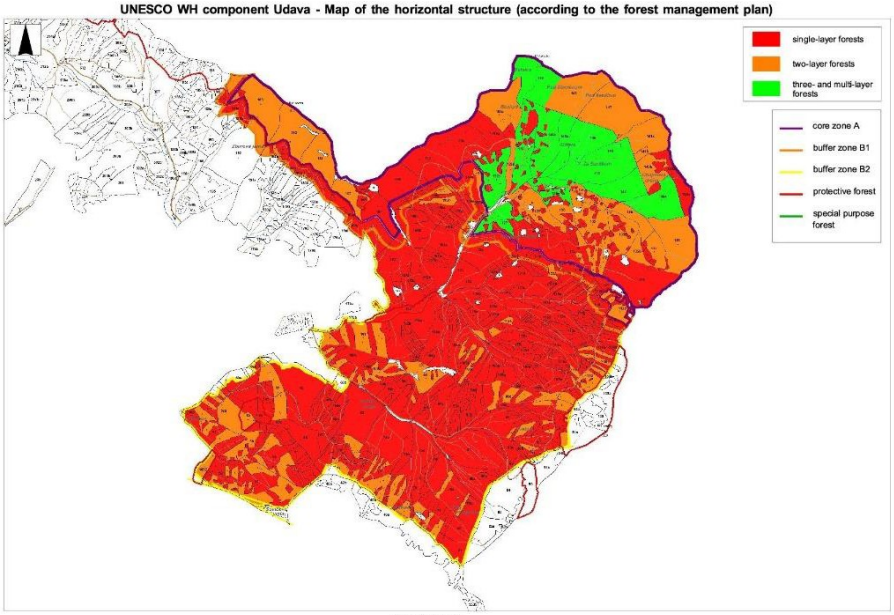




The structure of the core zone is partly old forest with the age of more than 120 years and according to the forest management plan, it is decribed as a tree layers forest, but you can see on the map that also big amount of younger even aged stands were included in the core zone. The surrounding buffer zones consist mostly from younger even aged forests (Age classes management in the past. Clear cutting and shelterwood systems in stripes contribute to the quiet uniform forest stands).

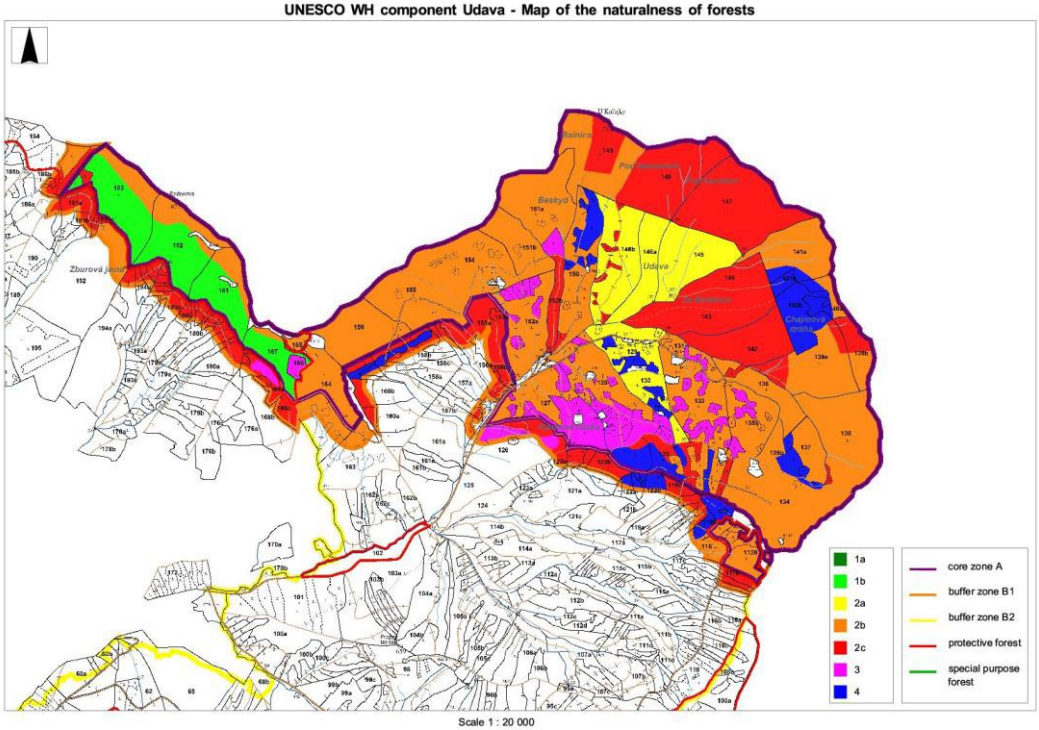


UNESCO WH component Udava - Map of the horizontal structure (according to the forest management plan)



Scale 1 : 30 000

UNESCO WH component Udava - Map of the naturalness of forests



Scale 1 : 20 000

The core zone was mapped as a close to virgin forest partly only in the west part. Most forests are less or more changed in the structure mapped as natural forest 2b. But there are also the parts with changed tree species composition mapped as 3 or 4 changed forests. In the B1 zone the situation is even worse.

Mapping scale
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure

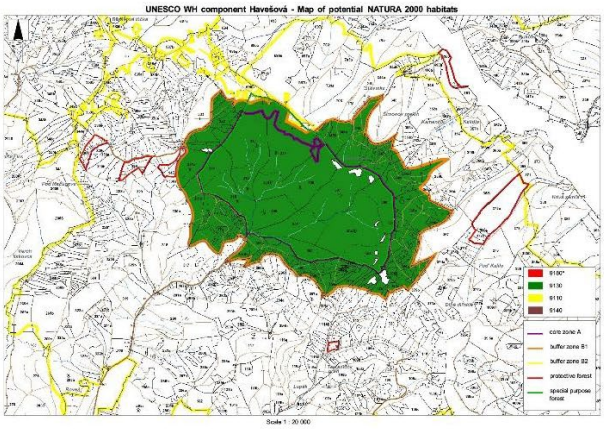
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to Natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting.

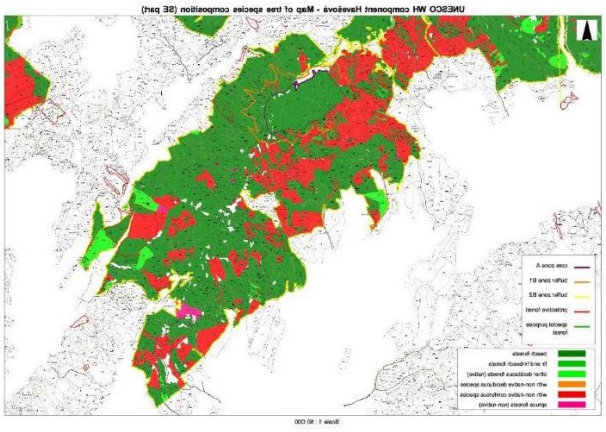
There are forest roads and skidding places present in the B2 zone and some small meadows. But the meadows are present also in the core zone.

COMPONENT HAVEŠOVÁ

Core zone and B1 buffer is potentially habitat 9130 *Asperulo-Fagetum* beech forests. The real vegetation in the core zone is mostly pure beech forest and in the buffer B1 zone also with forest stands with non-natural coniferous species. In the B2 zone are also stands with the prevalence of non-native coniferous species.

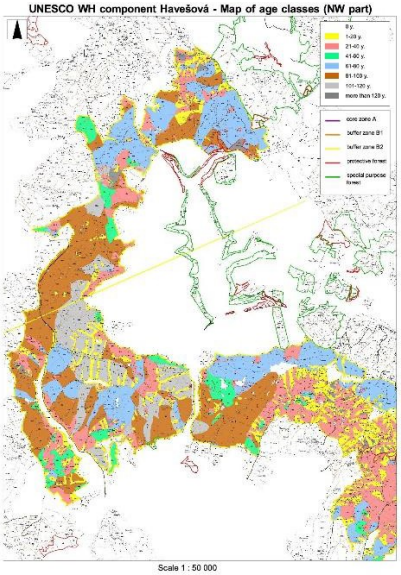
According to the European forest types in the Core zone and B1 zone is only Carpathian submountainous beech forest present. In the B2 zone are present also changed forest with prevalence of non-native coniferous (purple stands on the map).





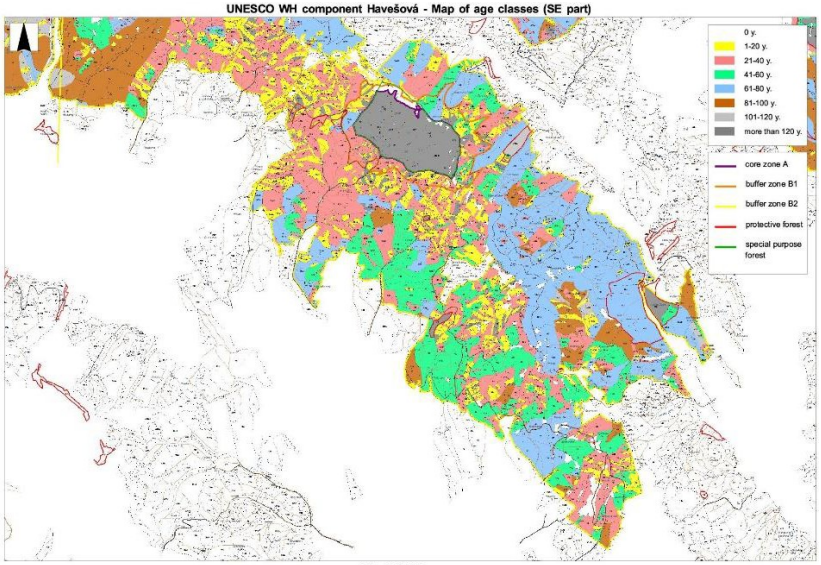
The structure of the core zone is an old forest with the age of more than 120 years and according to the forest management plan, it is decribed as a two layers forest. The surrounding buffer zones consist mostly from even aged forests with different age younger than the forest in the core zone (age classes management in the past. Clear cutting and shelterwood systems in stripes contribute to the quiet uniform forest stands).

UNESCO WH component Havešová - Map of age classes (NW part)



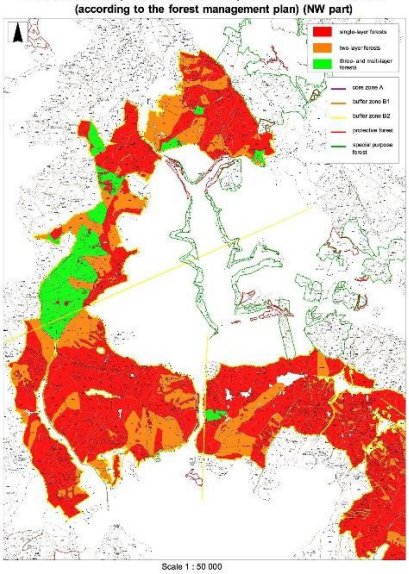
Scale 1 : 50 000

UNESCO WH component Havešová - Map of age classes (SE part)



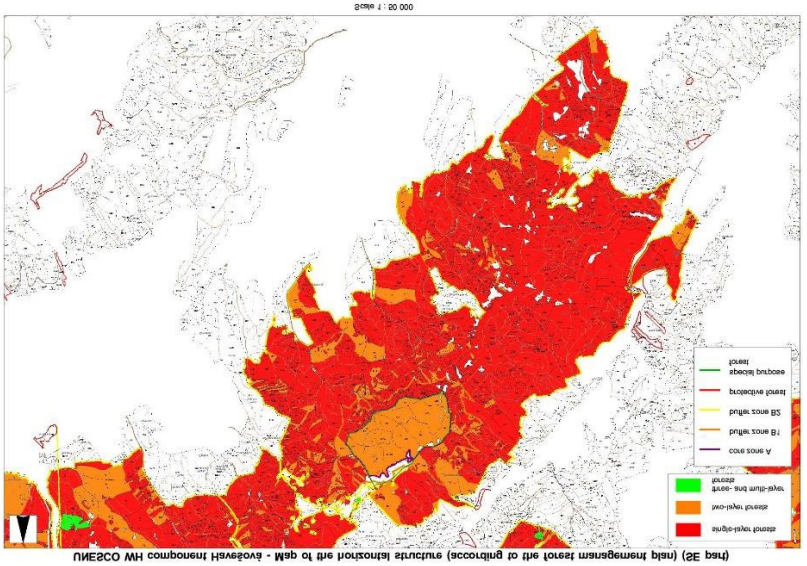
Scale 1 : 50 000

UNESCO WH component Havešová - Map of the horizontal structure (according to the forest management plan) (NW part)

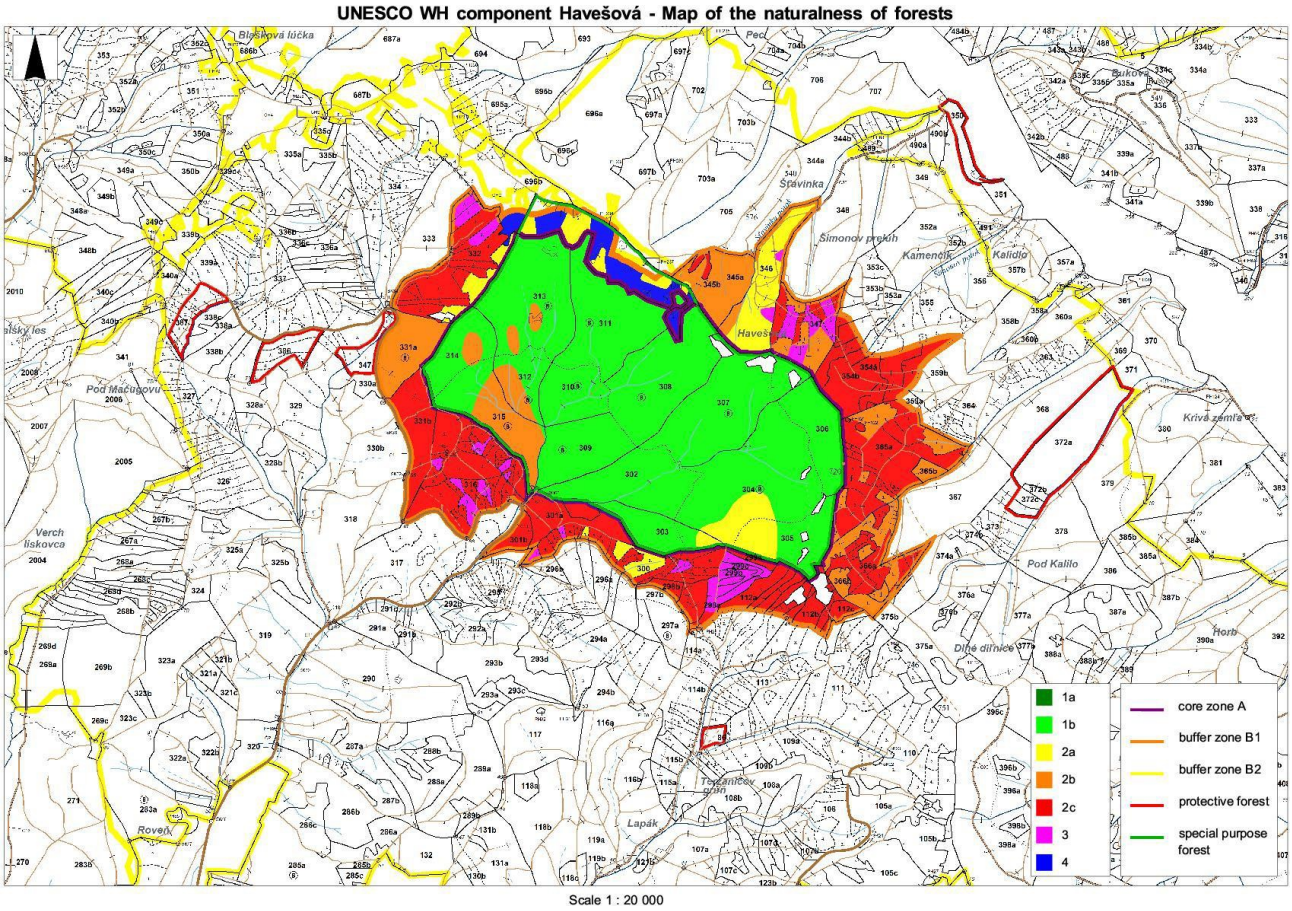


Scale 1 : 50 000

Scale 1 : 50 000



UNESCO WH component Havešová - Map of the horizontal structure (according to the forest management plan) (SE part)



The core zone was mapped as a close to virgin forest, with some parts of natural forest. In the B1 there are present also the parts mapped as changed forest and 2c Natural forest with slightly changed tree species composition or more changed 3 and simplified structure are in prevalence.

Mapping scale
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to Natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting.

There are forest roads and skidding places present in the buffer zones and some small meadows. But the very meadows are present also in the core zone.

2.3.2. Vihorlat cluster buffer zone

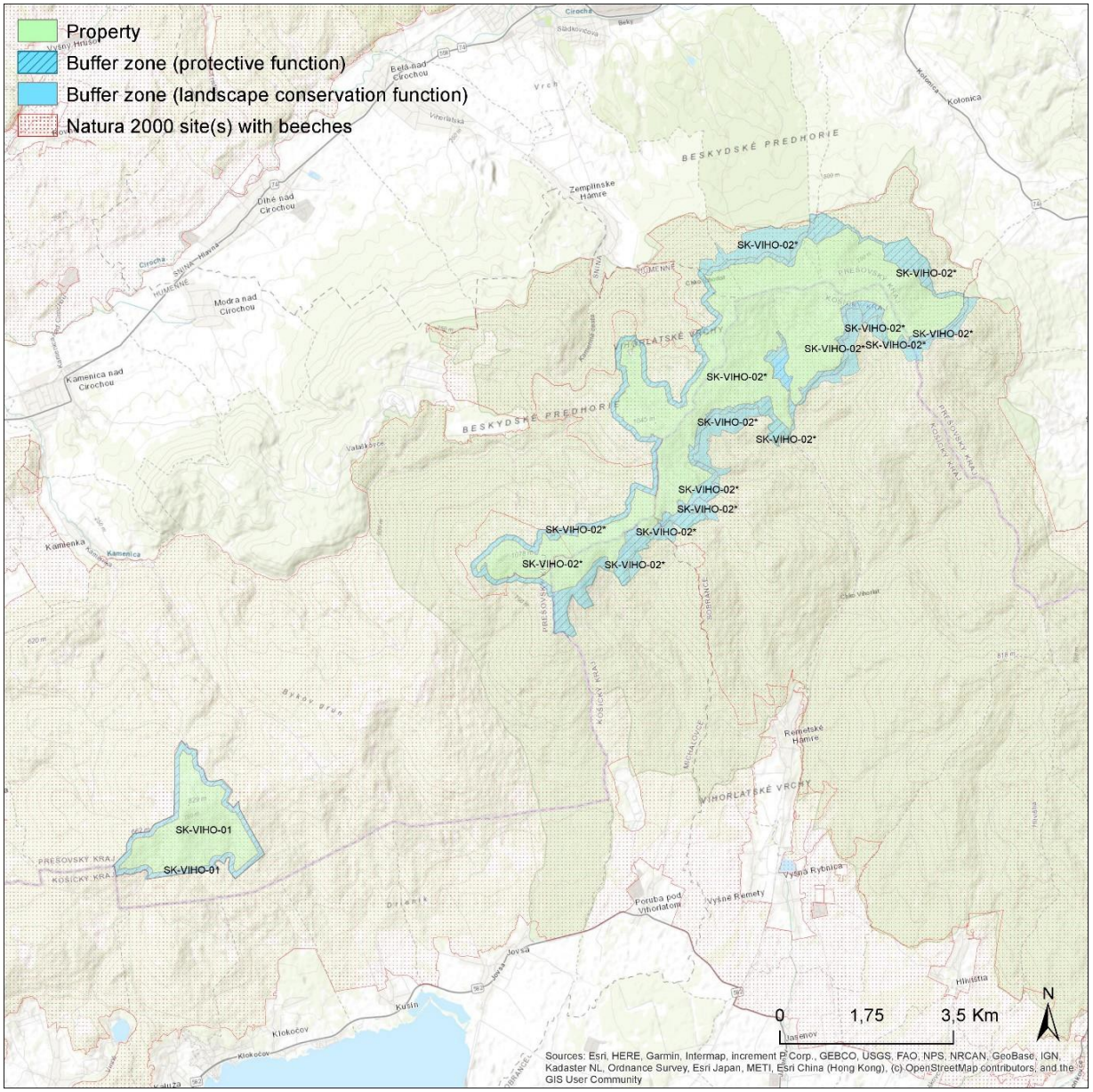


Figure 8: Map of the Vihorlat cluster

The beech forests are characterised by the absence of both spruce and fir. Hardwoods such as sycamore (*Acer pseudoplatanus*) and common ash (*Fraxinus excelsior*), however, are found in the reserves's forests due to its rocky andesite substrate. Vihorlat beech forest is an example of primeval beech forest with an area of 250–300 ha, with distinctively variable diameter and height structure. Typical selection structure is very rare, occurring only in small patches of forest where senescence is very gradual and characterised by the dying of individual trees. Due to this fact, the regeneration stage in the forest exceeds 60 years. Most often, the senescence stage lasts less than 60 years, and thus the stands often have a two-layer structure. These two-layered stands are characterised by a richly differentiated lower overstorey and a sparsely represented upper overstorey in the later phases of the senescence stage. The whole developmental cycle of these forests lasts 220–230 years, out of which 50–70 years are in the senescence stage, 90–110 years are in the maturation stage, and 60–80 years are in the optimum stage.

With increasing elevation, there are the following types of forest communities: In lower parts there is a forest community of *Fageto-Quercetum*. The herbaceous undergrowth is relatively gramineous, there prevails pilose-leaf sedge (*Carex pilosa*), white wood-rush (*Luzula luzuloides*), and wood melick (*Melica uniflora*). This community is followed by *Fagetum pauper* and *Fagetum typicum*, which have the biggest percentage. The herbaceous layer is rather poor. In spring there is dominant bittercress (*Dentaria glandulosa*), on more moist localities sweetscented bedstraw (*Galium odoratum*), and common wood sorrel (*Oxalis acetosella*) are common. The highest parts of the area are covered by a community of *Fageto-Aceretum* with the prevailing presence of beech (*Fagus sylvatica*), sycamore maple (*Acer pseudoplatanus*), wych elm (*Ulmus glabra*), and European ash (*Fraxinus excelsior*). From herbs it is necessary to mention the Carpathians subendemit heartleaf comfrey (*Symphytum cordatum*), and also East Carpathians species like the European scopolia (*Scopolia carniolica*) and the *Telekia speciosa*, which is a typical species for the Vihorlat mountain range.

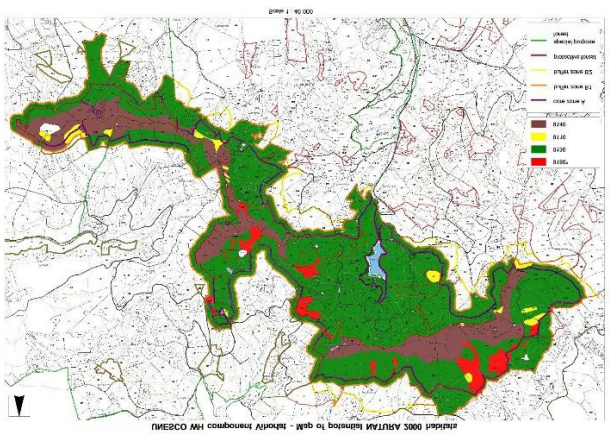
2.3.2.1. DESCRIPTION OF BUFFER ZONE OF THE VIHORLAT CLUSTER BY COMPONENTS

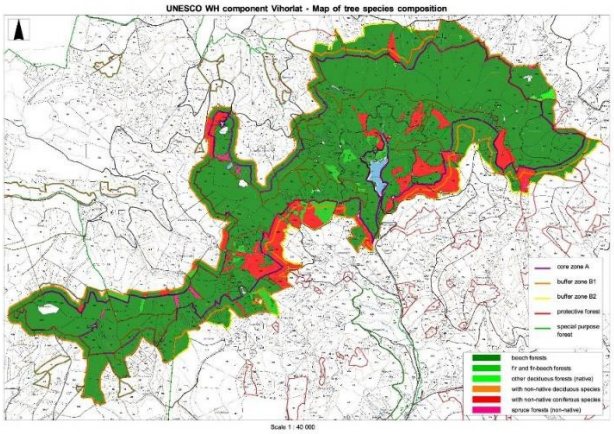
COMPONENT VIHORLAT

Core zone and B1 buffer zone are mostly covered by potentially habitat 9130 *Asperulo-Fagetum* beech. On the mountain ridges, there is present habitat 9140 *Medio*-European subalpine beech woods with *Acer* and *Rumex arifolius*. Some small parts are covered by habitat 9110 *Luzulo-Fagetum* beech forests and also habitat 9180 *Tilio-Acerion* forests of slopes, screes and ravines.

The real vegetation is in the core zone is mostly pure beech forest and also fir-beech forests. In some parts of the core zone, mostly in young stands there are stands with some proportion of non-natural coniferous tree species. In the buffer B1 zone and B2 zone there are forest stands also with non-natural coniferous species and also some stands with their prevalence.

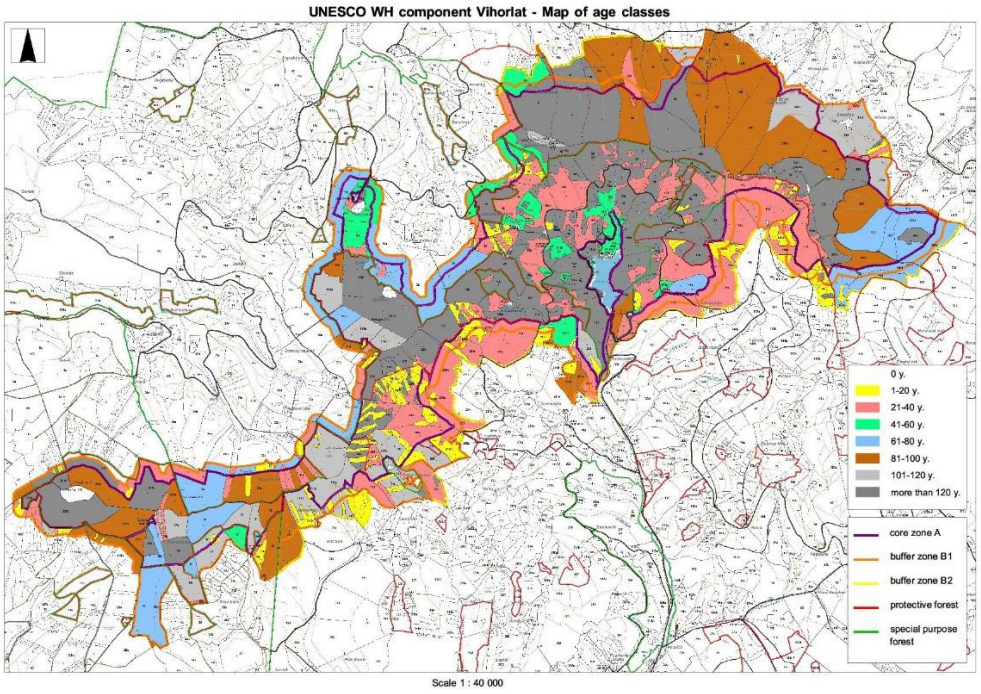
According to the European forest types in the Core zone and B1 zone are mostly Carpathian submountainous beech forest and Carpathian mountainous beech forests and in some parts Ravine and slope forest present. In the B2 zone are present also changed forest with non-native coniferous species.

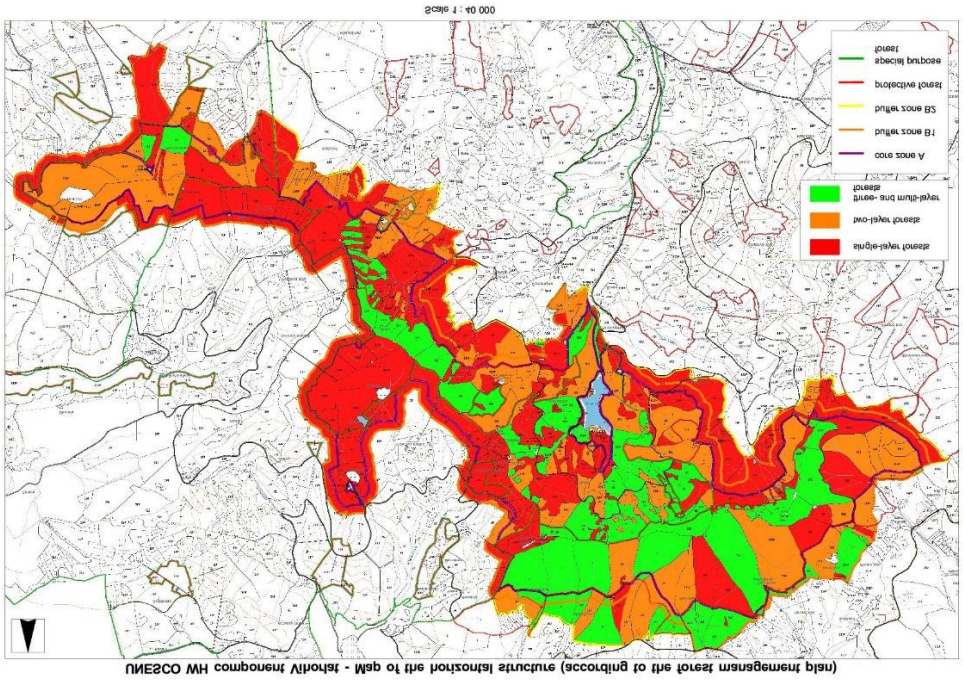


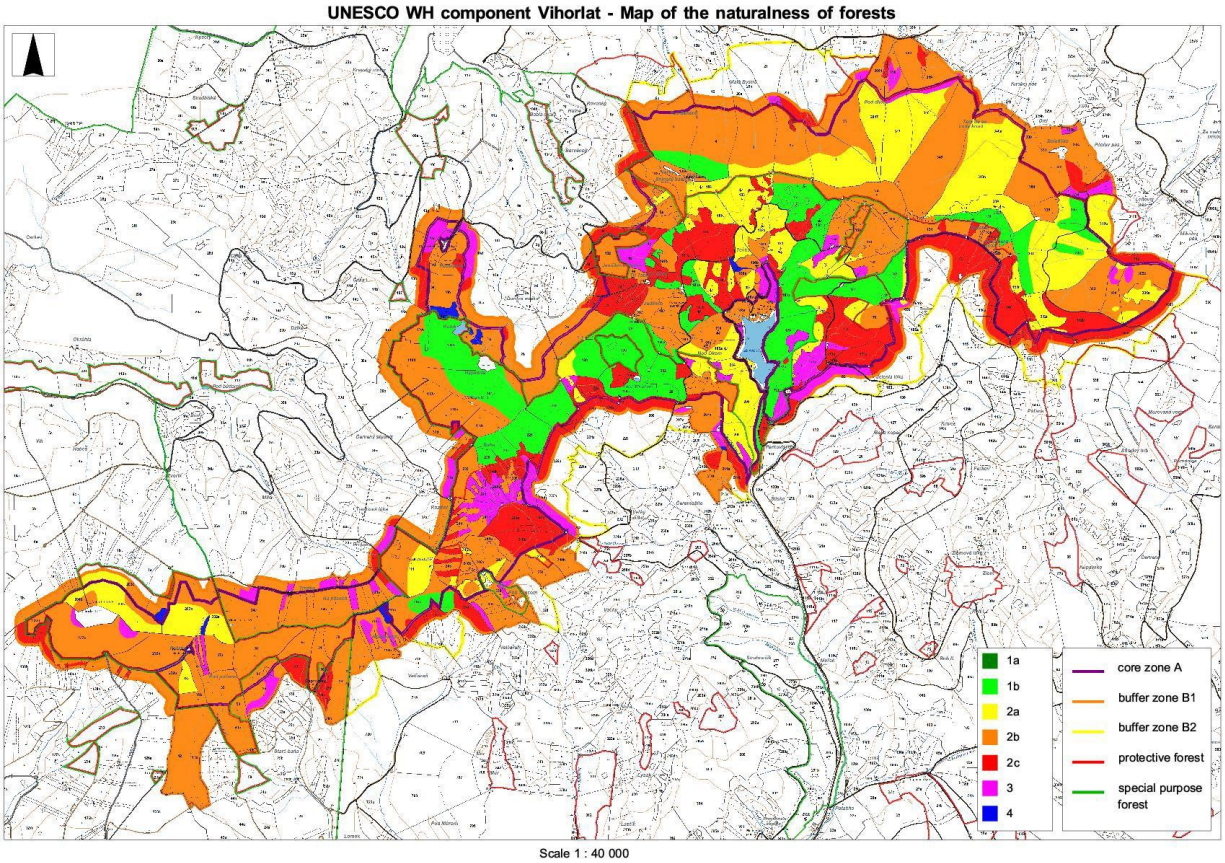


The structure of the core zone is partly old forest with the age of more than 120 years and according to the forest management plan, it is decribed as a tree layers forest (mostly in the old reserves, but you can see on the map that also big amount of younger even aged stands were included in the core zone.

The surrounding buffer zones consist mostly of younger even aged forests (Age classes management in the past. Clear cutting and shelterwood systems in stripes contribute to the quiet uniform forest stands).







The core zone was mapped as Natural forest, with some parts of close to virgin a virgin forests in the old state natural reserves. But there are mostly natural forests only and also some changed forests present. In the B1 buffer zone there are present also the parts mapped as changed forest and 2c - Natural forest with slightly changed tree species composition and simplified structure are in prevalence.

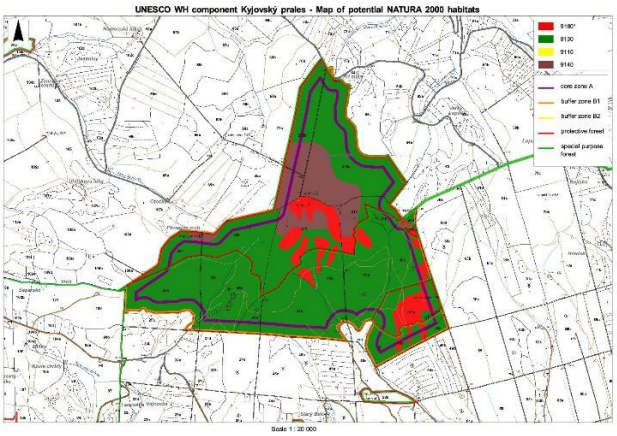
Mapping scale
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to Natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting.

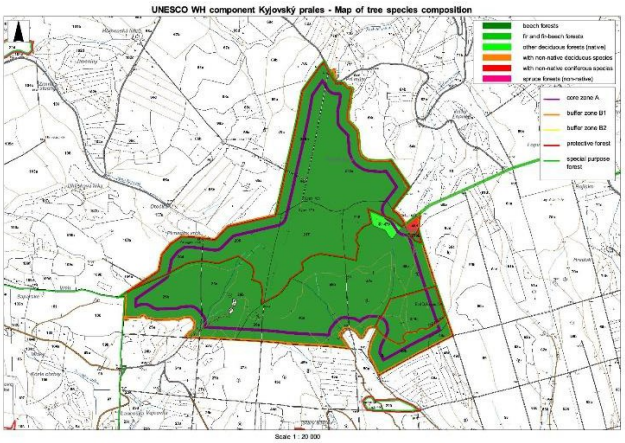
COMPONENT KYJOVSKÝ PRALES

Core zone and B1 buffer zone is mostly covered by potentially habitat 9130 *Asperulo-Fagetum* beech forests. On the mountain ridges, there is present habitat 9140 *Medio*-European subalpine beech woods with *Acer* and *Rumex arifolius*. Some small parts are covered by habitat 9180 *Tilio-Acerion* forests of slopes, screes and ravines.

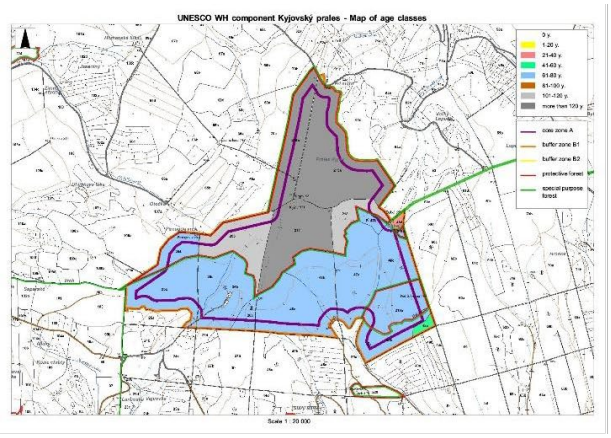
The real vegetation in the core zone is mostly pure beech forest. In the buffer B1 zone also there is one forest stand with non-natural coniferous species.

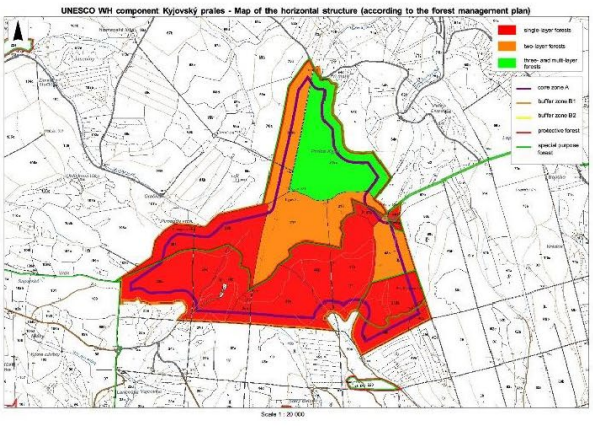
According to the European forest types in the Core zone and B1 zone are only Carpathian submountainous beech forest, Carpathian mountainous beech forests and Ravine and slope forest present.

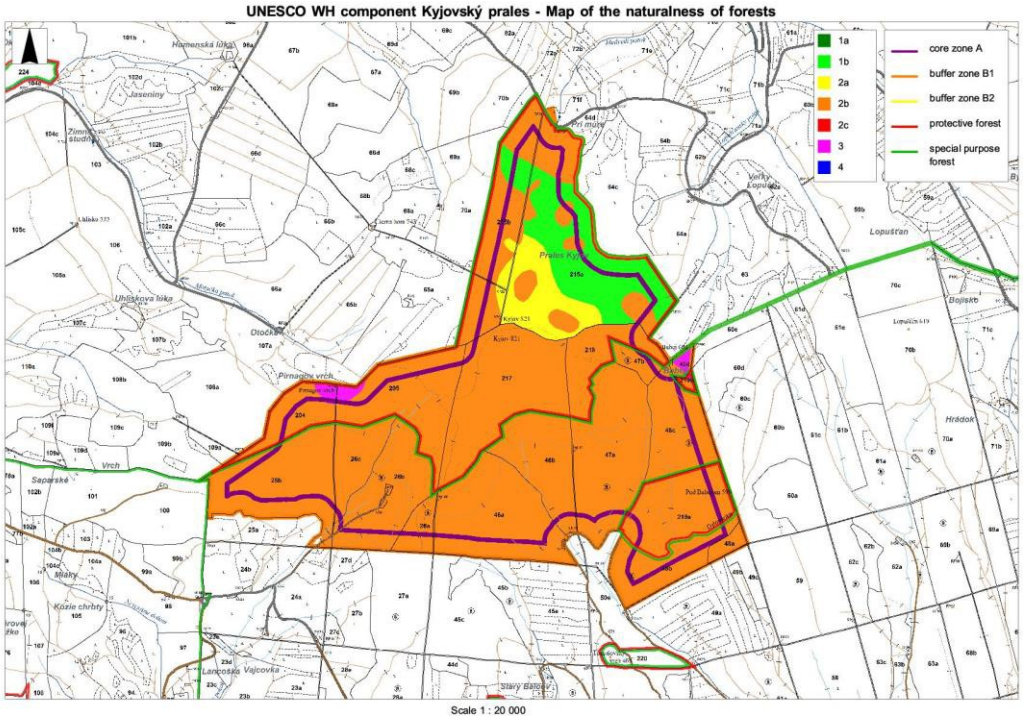




The structure of the core zone is partly old forest with the age of more than 120 years and according to the FMP it is decribed as a tree layers forest (mostly in the old reserves, but you can see on the map that the rest is a younger evenaged beevh forest. The surrounding buffer zone (only B1) consists from the same stands as a core zone.







The core zone was mapped as Natural forest 2b, with some parts of close to virgin forests 1b. In the B1 zone there are present also the parts mapped as close to natural forest, with more changed tree species composition 3.

Mapping scale
1a virgin forest (sufficient presence of dead wood and large trees pro ha)
1b close to virgin forest (insufficient presence of dead wood and large trees pro ha)
2a Natural forest with natural species composition and natural vertical and spatial structure (insufficient or missing presence of dead wood and large trees pro ha)
2b Natural forest with natural species composition and simplified vertical and spatial structure
2c Natural forest with slightly changed tree species composition and/or simplified vertical and spatial structure
3 Close to natural forest, with more changed tree species composition
4 Changed forest (non-natural species in prevalence, or clearings without sufficient natural regeneration after cutting.

UNESCO MANAGEMENT

The boundary modification of the Slovak component parts will significantly improve and provide adequate legal protection of the property. The proposal for boundary modification of the Slovak component parts was approved by the Government of the Slovak Republic on 14 October 2019 (by Resolution of the Slovak Government n. 508/2019, see: https://rokovania.gov.sk/RVL/Material/24259/1). The Governmental Resolution will therefore provide a legal basis for implementation of the adequate legal provisions, as required by the WHC. The Governmental Resolution provided basic guidelines for implementation of the legal protection regime of the Slovak component parts and their buffer zones, together with respective management arrangements.

In case of two component parts, Rožok and Havešová, the boundaries will after modification fully overlap with existing strict nature reserves with the 5th level of protection according to Slovak legislation (meaning strict non-intervention regime). In case of Stužica – Bukovské vrchy, the boundaries are partly aligned with the existing strict nature reserves (5th level of protection). The extension of Stužica – Bukovské vrchy ("southern appendix") is proposed, that would include another strict Nature Reserve Borsučiny. The ridge connecting existing nature reserves is currently under 3rd level of protection, but the proposal for the designation of a new nature reserve with 5th level of protection is foreseen in 2020. The Udava component part is similarly proposed to be aligned with the boundaries of the existing strict nature reserve. Additional extension of this component part is also proposed – inclusion of the primeval forest Rydošová. The process of the designation of a new Nature Reserve Rydošová (5th level of protection) has already started in November 2019 (pursuant to the Act on Nature and Landscape Protection).

The public consultations have been finished and the designation of the nature reserve is envisaged at the beginning of 2020. The same designation process has started in November 2019 for the Vihorlat component part, where all existing nature reserves will be merged into one strict Nature Reserve Vihorlatský prales, overlapping with the proposed component part Vihorlat. Its designation by the Government of the Slovak Republic is also envisaged at the beginning of 2020. Lastly, the newly proposed component part Kyjovský prales overlaps with the existing strict nature reserve and both the component part and its buffer zone would be therefore protected under 5th level of protection. Natural reserves included into both clusters fit the IUCN category Ib. They are under strict protection. The entrance and movement of visitors in the forest is strictly regulated and allowed only on marked tourist trails to minimise human impact. Last update: In august 2020 were nature reserves Rydošová and Vihorlat approved by the Government of the Slovak Republic.

As for the buffer zone, all newly delineated protection buffer sub-zones will be protected under 4th or 5th level of protection, in line with the recommendation from the joint WHC/IUCN Advisory mission in 2018. With regard to the landscape conservation buffer sub-zone, it will be protected under 3rd or 4th level of protection.

The current proposal will provide adequate legal protection for the property and its buffer zones. All proposed component parts are either already protected under 5th level of protection (strict non-intervention regime), or the designation process of nature reserves with 5th level of protection has already started (component parts Udava and Vihorlat). For the newly added part of the Stužica – Bukovské vrchy component part, the designation process is envisaged in 2020.

In accordance with the above-mentioned Governmental Resolution, the protection buffer sub-zone will be protected under 5th or 4th level of protection with specific management regime, very close to non-intervention. Only single-tree extraction under the permission of the State Nature Conservancy of the Slovak Republic would be allowed, aimed at ensuring the protection of the OUV of the property.

The landscape conservation buffer sub-zone will be protected under 3rd or 4th level of protection. It should be noted that from the 1st January 2020, a new amendment of the Act on Nature and Landscape Protection (n. 543/2002 Coll.) has come into force. This Act provides a basic legal framework for nature and landscape protection in Slovakia, defines different categories of protected areas, as well as five levels of protection and restrictions and regulations of management/activities according to these levels of protection.

Up to 2020, there were only few restrictions in terms of forest management in the 3rd level of protection. The State Nature Conservancy of the Slovak Republic (which was not responsible for the actual management of protected areas) had a competence to intervene in the forest management only during the approval process of forest management plans (by providing an expert opinion that was not always fully taken into

account by forest managers). In addition, forest management plans have to comply with management plans of protected areas (if such management plans exist).

The amendment of the Act on Nature and Landscape Conservation brings several changes to the system of nature protection in Slovakia and strengthens competencies of the State Nature Conservancy. From 1st January 2020, larger clear-cuts or shelter-wood cuts are forbidden in national parks, the only allowed type of management is close-to-nature forest management. Any so-called salvage logging (in case of calamities) larger than 0.3 ha must be firstly approved by the State Nature Conservancy. The forest management plans in protected areas must be prepared in cooperation with the State Nature Conservancy who will also define binding requirements for their preparation and will actively participate in their approval process (including public consultations). In addition, the amendment defines the aim of national parks to ensure natural undisturbed evolution of natural processes on least at 75 % of their area, with short-term aim to create strict protection (non-intervention) zones generally at least on 50 % of their area.

In accordance with the Governmental Resolution n. 508/209, in the landscape conservation buffer sub-zone, only close-to-nature forest management can be applied, in line with the Act on Nature Protection and the Act on Forests, and in compliance with forest management plans that would be updated in cooperation with the State Nature Conservancy. The management of the landscape conservation buffer sub-zone should improve the ecological state of the natural beech forest ecosystems and shall include natural regeneration of all tree species of potential natural forest type, regular distribution of dead wood, uneven-aged forest stands and continuous change to selective logging.

More detailed management regime of Slovak component parts will be defined by the integrated management plan that will also reflect common management guidelines and that is currently under preparation and should be finished in August 2020.

Slovakia: Poloniny (SK-POLO-01, -02, -03, -04)*

The prevailing part of the component cluster is covered by the existing natural reserves. New natural reserves should be designated in the remaining part of the component cluster in the near future. The management regime of the protected areas in Slovakia is regulated by the Act No. 543/2002 Coll. on Nature and Landscape Protection. This act specifies that the strictest, fifth level of protection is applied in these natural reserves. This prohibits any forest management activities (including salvage logging), game management activities, fishing, construction etc. Putting up tents or bivouacking is not allowed, either. For other activities, such as scientific research, building and marking tourist trails and nature trails etc., it is necessary to obtain permission. Visitors may move along the marked tourist trails only. In relation to the above-mentioned facts, it is possible to say that natural processes in this component cluster take place without significant human influence.

Slovakia: Vihorlat (SK-VIHO-01, -02)*

The area of the proposed component parts is partly owned by the State, and partly by private landowners. The area outside of the existing natural reserves was managed in accordance with the valid legislation in the field of forestry. There were valid forest management plans that were developed and approved for ten years. Part of the proposed property is located within the Valaškovce Military Territory. In the area, a special legislation superordinated to other legislation is valid. Defense of the State is superordinated also to nature protection legislation. Ministry of Defense SR and its sectoral institution, the Military Forests and Estates of the Slovak Republic responsible for the Valaškovce Military Territory take the need for nature protection into consideration. They communicate and cooperate with the Vihorlat Protected Landscape Area Administration. The management regime in the area of existing strictly protected natural reserves is non-interventional in accordance with the valid legislation in the field of nature protection. The same regime will be apllied in the proposed Natural Reserve Vihorlat. No military training activities are carried out inside the proposed property

and its buffer zone. The real Military Training Centre Valaškovce is outside of this area. The forests included into the Vihorlat cluster and its buffer zone belong to the protective zone of the Military Training Centre Valaškovce.

From vertebrates, the wild population of the European bison (*Bison bonasus*) and the sporadic occurrence of the moose (*Alces alces*) are worth mentioning. Great carnivores are represented by the grey wolf (*Canis lupus*), the brown bear (*Ursus arctos*), Eurasian lynx (*Lynx lynx*), and wild cat (*Felis sylvestris*) in the Poloniny NP. The dense forests of Vihorlat are inhabited by large carnivores like *Canis lupus*, *Lynx lynx*, and from time to time *Ursus arctos* occur here. Hoofed game is a significant factor, which influences young forest stands. The game very often also influences the species composition of the stands.

2.3.3. Slovakia in general

2.3.3.1. Type(s) of forestry in place

DESCRIPTION OF STATE OF PLAY

The forest crop land (forest stands) is 1.949.983,03 ha (Compendium of Slovak Forestry Statistics) and the area of forest holdings is 2.023.051 ha. The forests in Slovakia cover 41,2% of the whole state territory.

The state owned 769,023 ha of forest crop land, or 39.5% of its total area. At the same time, state forest enterprises managed 1,019,200 ha of forest crop land, or 52.4% of its total area. The remaining area of forest crop land was managed by non-state forest enterprises which own and manage private, municipal, community and church forests as well as forests of agricultural cooperatives.

Based on their principal functions, Slovak forests are divided into three main categories: production (72,1%), protective (17,2%) and special-purpose forests (10,7%)

Sustainable and balanced timber production, delivery of other forest related services and stable economic conditions for continual forest production cannot be maintained unless the age structure of forests is appropriate and particular age classes are approximately evenly represented. The actual age structure of a forest is compared with a so-called normal distribution on of age classes with one class covering a period of 10 years. The actual age structure of forest differs from the normal (ideal/optimal) structure. At present, the area of forests in age classes 1, 8, 9, 14 and 15+ is above normal while the area of forest in 2nd-7th age classes is subnormal (forests aged 11 to 70 years). Approximately normal is the area of forest in the 10-13th classes which are formed by mature stands of 91-130 years of age.

In terms of the vertical spatial structure, Slovak forests are divided into single-, two- and multi-storey stands. The majority of current forests (75.7%) are partially differentiated forests with a single storey resulting from the implementation of age class management system. The presence of more vertically diverse forests is limited. Two-storey stands, which are usually a transient phase of the shelterwood silvicultural system or arise from premature natural regeneration account for only 20.5% of all stands whilst multi-storey stands represent the remaining 3.8%. However, according to NFIM 2 results, the proportion of vertically differentiated forests is higher than officially stated in forest management plans. The spatial structure is assessed using stocking as its main indicator. This indicator determines a relative level of forest density (cover of forest stand area and its production space by trees). The maintenance of optimum stocking is crucial for both forest production and delivery of multiple environmental services. The average stocking was 0.82.

A long-term trend of decreasing the percentage of clearcutting continues. The clearcut accounted for 85% of the total regenerated area of forest in 1990, but at present it is only 25%. Conversely, the volume of shelterwood regeneration cuts has risen from 14% to 74% over the same period. The shelterwood system prevails in production and special-purpose forests. In protective forests and certain types of special-purpose forests in order to support their specific functions and services, more gentle methods of selection system and continuous cover forestry are applied. These methods can be implemented only in selection forests with a height and diameter differentiated structure. These forests are rare in Slovakia. The selection system and continuous cover forestry were planned only for 0.8% of the total felling area on which the latter method was more common. The selection system is mostly implemented in well accessible stands of shade-loving coniferous species or their mixtures with shade-loving broadleaf species in medium and high altitude forests. It is possible to say that selection system methods can be implemented on approximately 10% of forest land in Slovakia. Achieving the planned proportion of particular silvicultural systems and their regeneration cuts is largely impossible due to persistently high volumes of unplanned incidental felling which often resembles a clear-cut.

The density of all forest roads was 19.45 m/ha

Compared to the original mixture of tree species, the current composition is partially altered, but to a lesser extent than in other countries of Western and Central Europe. Changes have taken place over several centuries as forests have been used by mankind, firstly purely to satisfy its needs. Later, forests started to be purposely managed for timber production and certain tree species became more desirable than others. Some tree species were also unintentionally spread via management practices (e.g. hornbeam, Turkey oak, black locust). The most abundant tree species are European beech (33.6%), Norway spruce (22.7%), and English/sessile oak (10.5%). Broadleaved species are at 62.8% more common than conifer species, which has a positive impact on the biological diversity of forest ecosystems and their stability. The area of coniferous species has been decreasing; since 2005 from its original 41% down to 37.2% in 2017. This is particularly true for Norway spruce, whose percentage declined during the period by 3.6% (from 26.3% down to 22.7%). Since 2005, the area of European beech has increased by 2.6% whilst the area of noble hardwoods (maples and ash) grew from 3.3% to 4.1%

According to Forest Europe 0,55% of Slovak forests were classified as undisturbed by man, 0,44 % as plantations and the rest 90,01% as seminatural forests.

In 2017, the volume of growing stock totalled 480.25 million m^3 (underbark standing). The average volume of growing stock per hectare was 248 m^3 underbark. The volume of total current increment (TCI) in 2017 reached 12.023 million m^3, or 6.3 m^3 per hectare of forest crop land. The growing stock of broadleaved species is increasing. In 2017, its volume reached 280.23 million m^3, an increase of 12.2% (30.4 million m^3). Conversely, the total volume of coniferous growing stock has been in decline since 2010 due to the presence of harmful agents, especially in spruce forests. Since 2010, the volume has decreased by 12.14 million m^3, or 5.7%, which has already resulted in a reduce on in the total growing stock in Slovak forests by around 0.4 million m^3, or 0.08 % when compared to 2016. The stock in mature stands currently amounts to 183.5 million m^3, which accounts for 38.2% of the total growing stock and compared to 2005 it is an increase of 56.4 million m^3, or 44.4%

In Slovakia, origin of forest management dates back to the 13th century when the Hungarian king Bela IV issued the king's decree dealing with the duties of the Badin foresters in 1250 and, moreover, provisions forbidding hunting and fishing in Tatra sub-mountain areas in 1265. The first regulations for saving of forests appeared in 1573, known as the Maximilian Forest Order.

Especially significant for forestry practice in Slovakia was the edition of Theresian Forest Order in 1769 – at that time probably the most progressive piece of forestry legislation in whole Europe. Subsequently, the first legal provision dealing with management of forests according to the forest management plans as issued in 1879. The oldest forest management plans are for Holíč and Šaštín from the year 1761.

After 1918 were established, new state offices by the state forest dealing with forest management planning and there also remained some private offices.

1946 was production of FMP centralized for the whole Slovak territory.

1949-53 – first forest inventory – as a source for the state planning development

1950 – moving of head quarters of forest management planning office from state forest Banská Bystrica to Zvolen and establishing of new department in Turček.

1952 full independence of forest management office Lesoprojekta Zvolen and the end off private offices.

1956 – Act. No 2/1956 – uniting of all types of FMP for all forests except of military forests Only one producer of FMPs Lesoprojekt, Institute for forest management planning Zvolen.

After changes and splitting, the Checoslovakia in 1993, Lesoprojekt is according to the budget as contributing organisation and there was created also the first private companies for producing forest management plans.

M.1.2006 Ministry of Agriculture created National Forest Centre and from 1.9.2020 are forest management plans market products financed from public sources after legal procurement. There were created private companies, NFC no make forest management plans anymore.

Since 1.5.2010 the forest management plans is named Program of forest management as a part of nature protection documentation.

Nowadays, forestry has achieved recognition as a global issue and sustainable multi-purpose forestry has become the governments‘ policy in many countries. Forests also represent one of the greatest nature treasures. The importance of forests in the environment is anchored in the Constitution of the SR and in the general Environment Act.

Forests in Slovakia, more than in other Central European countries, has been for a long time intensively used primarily for the needs of agriculture, metallurgy and mines forestry has stopped quick decline of forests and subsequently reforest most of deforested areas. As a result of forestry activities in Slovakia is annual growing forests area. But it is also necessary to adapt forest management to changing conditions. From preference of timber production, there is need to switch our effort to non-productive functions of forests such as soil and water protection, recreational function and so on. However, it is essential that the public needs to be aware of forests importance and the need of professional, targeted and long-term management and to support the creation of suitable legal and financial conditions.

LEGAL FRAMEWORKS

The Ministry of Agriculture and Rural Development of the Slovak Republic (MARD SR) is the supreme national authority on forests. At the district level, there are eight Departments of Agriculture attached to district offices in particular regions and 49 Land and Forestry Departments based at district offices. In military forests

and forests important for national defence, the Ministry of Defence of the Slovak Republic (MOD SR) executes the state supervision through its Forestry and Hunting Office. The State Administration on Forests (SAF) is governed by the following legislations: Act No. 326/2005 Coll. on forests in the wording of the pursuant regulations; Act No. 318/2010 Coll. on forest reproductive material in the wording of the pursuant regulations; Act No. 97/2013 Coll. on land associations in the wording of the Act No. 34/2014 Coll.; Act No. 274/2009 Coll. on hunting and on amendments of particular laws in the wording of the pursuant regulations; other legislation under which the authorities of state administration on forests act as concerned authorities of the state administration. The authorities of SAF primarily deal with procedures based on the Act No. 71/1967 Coll. on administrative proceedings in the wording of the pursuant regulations (Administrative Code), especially procedures on the compilation and approval of forest management plans (FMP) including their amendments, and procedures related to game management and hunting. Of equal importance are the advisory services on forests and game management and the release of forestry related information. In addition, SAF also conducts state supervision of forests and hunting activities including tasks such as issuing permits for interventions compromising the integrity of forest properties and their protection, issuing exemptions to banned activities in forests, dealing with legal offences and other infringements associated with forests, hunting and game management. Likewise, it oversees agenda related to forest reproductive material and land associations. The state administration at the first and second level is organised through particular departments of district offices under the auspices of the Ministry of Defence of the Slovak Republic. Practical guidance and inspection of various authorities of SAF is provided by the Department of Forestry and Wood Processing of MARD SR.

At present, the SPAs in Slovakia include 836,000 ha of forest stands. Approximately 51.6% of the SPAs area overlaps with other protected areas. On the remaining area of SPAs (48.4%), the first level of protection is applied. In 2017, the Slovak Government approved management plans for the first six of the total of 41 SPAs. These plans specify protection objectives, protection measures and land use conditions including restrictions based on a higher level of protection. The national list of SCIs was last year extended to include 169 new sites covering a total area of 31,656 ha, of which forests cover 18,136 ha.

The total area of forest land in the nationally protected areas was approximately 784,000 ha. The total area of NATURA 2000 in Slovakia is approximately 1,463,000 ha. An area of mutually overlapping SPAs and SCIs is included only once. Of the total area, 951,000 ha are forest land. The overlap between NATURA 2000 network and a national network of PAs is around 776,000 ha. NATURA 2000 thus increases the area of forests under protection by approximately 578,000 ha. The existing system is very confusing for the practical management of forests in these areas. Overlapping areas are typical for an overlap of requirements and restrictions imposed by the Act on Nature and Landscape Protection within the requirements of EU directives. These requirements are often conflicting, particularly with respect to varying multiple procedures for granting approvals for and exemptions from the systematic management of forests. Additionally, it is important to realise that both NATURA 2000 and the national network of PAs also overlap in places with sites protected under other international agreements on nature conservation, e.g. UNESCO biosphere reserves (MaB), Ramsar sites and natural UNESCO World Heritage Sites. Boundaries of sites protected by international agreements are often unmarked in the field.

UNESCO natural World Heritage is under the responsibility of the Ministry of Environment, which is also representing the State Party of Slovakia at the international level for this field. The responsibility is shared with the Ministry of Foreign Affairs responsible for Slovak UNESCO sites, with other ministries they organisations manage the area such as Ministry of Agriculture (Forestry management) Military Ministry (responsible for part of Vihorlat cluster) and also the Ministry of Interior (State Administration on Forests). There were many commissions or expert panels to prepare inscription and to prepare renomination project under the responsibility of Ministry of Environment with their organisation SNC (State Nature Conservancy).

In the field there are two responsible management bodies of SNC, National Park Poloniny and Protected landscape area Východné Karpaty. They are preparing the proposal to designate both Slovak clusters and their components as nature reserves, according to existing national nature conservation legislation. The proposal should be approved by Ministry of Enviroment and Goverment.

FOREST MANAGEMENT PLANNING

National Forest Centre
The Centre encompasses four specialised institutes:

1. NFC – Forest Research Institute Zvolen is responsible for forest research and innovation, especially in silviculture, forest protection, forest ecology and monitoring, forestry politics and economics. It is also responsible for specialised tasks of the MARD SR (strategic documents, Forest Protection Service, seed inspection, etc.).

2. NFC – Institute for Forest Consulting and Education Zvolen deals with tasks of out-of-school education, public relations, forestry training and specialised forestry courses.

3. NFC – Institute for Forest Resources and Informartion in Zvolen is responsible for forest data management, data publishing and sharing including verification and update of numeric and geospatial data on all forests and forestry operations in Slovakia.

4. NFC – Forest Management Planning Institute Zvolen specialises in forest planning including framework planning, legal procurement of planners and inspection and methodological support of the actual planning process. It includes an expert Surveyor Unit dealing with legal aspects of forest assessment and forest property evaluation.

The framework planning means: forest types mapping, delineating of protective forest category, creating management models in forest regions for categories, types of forest, levels of protection etc. (very comprehensive models system) is done by State organisation National Forest Centre – Institute for Forest management planning. In addition, NFC – Institute for forest resources and information produce the aerial pictures from digital spectral camera and laser scanning data, including 3D model etc.

Private planning companies according the rules provided by standards done by NFC do Forest management plans. Forest state administration units on the regional level govern the process. However, the forest administration units are governed by Ministry of Interior of the Slovak Republic, which is a central body of all kind of state administration, not by Ministry of Agriculture.

The forest management plans are made for forest management units (of area about 4 – 10 thousand hectares) and they are revised every 10 years. The FMPs are also the part of nature protection documentation.

Forest management plans describe forest stands (forest compartmens) according to the age, tree species composition, mean diameter, mean heigts of tress etc. The FMP also contains the management plan for every spatial unit (forest stand). The forest maps are coloured according to the age classes. In addition, contain also information about forest categories, forest layers etc.

Forest management plans as a part of Nature protection documentation contains all needed forest management restriction at moment of its approval by state administration.

There are basic, binding requirements for a forest management plan including:

- Silviculture system (e.g. clearcut is permitted only in exceptional cases)

- The maximum harvesting volume. The prescribed maximum harvested volume of timber in the management unit shall not be exceeded. Where there is more than one forest owner, no single owner shall exceed the harvest prescribed for their ownership unit. (Harvested volume of timber in the compartment over the age of 50 years can exceed the maximum prescribed volume for the compartment in which it is found by no more than 15% but this has to be approved by the Licensed Forest Manager)

- Afforestation on clear-cut areas

Compliance with the Forest Act is generally the responsibility of Forest Authorities. Each forest owner or manager shall contract or employ a Licensed Forest Manager (LFM). LFM have many responsibilities connected with supervision of forestry management, harvesting and transport of timber. He shall approve and mark every logging (not required only for pre-commercial thinning in stand with age under 50 years), check and record the work carried out in the forest, keeps Forest Management Records according to the legislation requirements, cooperates with the company responsible for management plan renewal and provides them with documents and support, guides the implementation of the management plan and forest protection measures, supervises the suitability of reproductive material for reforestation, monitors health of the forest and reports to state administration, proposes preventive measures to protect forests, seed sources and applies for recognition of seed sources, proposes environmentally friendly technologies related to forest management, and, if activities which are in conflict with the legislation are found the LFM reports it to the state administration.

COORDINATION OFFICE GUIDELINES

In Slovak component parts proposal there are proposed both sub buffer zones, B1 protection and B2 landscape. Bigger landscape zone is proposed in National Park Poloniny cluster, as a part of the NP area. Before of renomination process there were still possible shelterwood cuts according to the forest management plans with maximum size of 3 hectares, and there are present also the stands with partly or more changed tree species composition, not only in ladscape zone but also in protection subzone and in some components also in the proposed core zone (mainly in Vihorlat and Udava components).

In the old Nature reserves there was non-intervention regime, only the wood falling on trails could partly be managed to make possible to follow the trails in the reserves. No extraction of wood, only cleaning of trails. But in the other parts there was proper forest management according to the law and the level of protection, also in so called NP Poloniny, which does not comply requirements for category two for NP by IUCN. The big change came from 1.1.2020 by the new amendments of acts in wich for the NP only close to Nature forestry is possible.

The definition of Close to nature forestry (CNF) was made in the Forestry act. Selective cuts or Shelterwood cuttings smaller than 0,2 ha or < 1.5 ha on steeper slopes as 40% are considered as CNF by this amendment.

There is currently still some non-timber forest products (NTFPs) being collected in some of the buffer zones especially in the neighbourhood of villages and around curret touristic trails.

Game management is currently still practiced in both custers except of old Nature reserves.

There is present forest infrastructure – forest roads, skidding trails and places, and hunting or forest trails.

Maintenance of existing infrastructure is planned to be allowed because of the need of connection of the other parts with the forest management and cannot be removed from use.

Therefore, it is expected that Slovakia will not comply with all guidelines and will need some exceptions or longer time to fullfill them.

TYPES OF FOREST MANAGEMENT USED

- Plenter/Selective system

is used only on 0,8 % in the forests, in Slovakia we recognize individual and group selection

- Femelschlag/group selection system

is the part of shelterwood system cuts

- Shelterwood cutting

we recognize two group – small area to the 3 ha and big area to the 5 ha of area of cut. Mostly is used small shelterwood system with two phases of cuts (regeneration and end phase)

- Clearcutting

is prohibited by the law but can be used in exceptions (plantation forests, scotch pine forests and by reconstructions of forests of damaged, or non native tree species composition

- Seedtree method

under shelterwood system

- Agroforestry

only started to be applied but nowadays only on agriculture land

- Close-to-nature forestry (ProSilva)

is present as a part of shelterwood system and a part of selective cutting system, and continuous forest cover system (also as a part of shelterwood system).

- Close to nature forestry -

as a part of sheleterwood system, (groups with maximum size of 0,2 ha and on the steep slopes above 40% of steepness there is possibility to make shepterwood in stripes of maximum size 1,5 ha. Newly defined in the forest act. Valid from 1.1.2020.

A long-term trend of decreasing the percentage of clear cutting continues. The clearcut accounted for 85% of the total regenerated area of forest in 1990, but at present it is only 25%. Conversely, the volume of shelterwood regeneration cuts has risen from 14% to 74% over the same period. The shelterwood system prevails in production and special-purpose forests. In protective forests and certain types of special-purpose forests in order to support their specific functions and services, more gentle methods of selection system and continuous cover forestry are applied. These methods can be implemented only in selection forests with a height and diameter differentiated structure. These forests are rare in Slovakia. The selection system and continuous cover forestry were planned only for 0.8% of the total felling area on which the latter method was more common. The selection system is mostly implemented in well accessible stands of shade-loving coniferous species or their mixtures with shade-loving broadleaf species in medium and high altitude forests. It is possible to say that selectioon system methods can be implemented on approximately 10% of forest land in Slovakia. Achieving the planned proportion of particular silvicultural systems and their regeneration cuts is largely impossible due to persistently high volumes of unplanned incidental felling which often resembles a clear-cut.

Based on their principal functions, Slovak forests are divided into three main categories: production, protective on and special-purpose forests. Production forests are primarily managed for the production of

high grade timber whilst still continuing to provide other important ecological and societal functions. Integrated forest management practices are implemented to support production objectives. Timber production in these forests is limited by actual natural conditions. The highest percentage of these forests is on fertile forest soils (67.7%) suitable for all principal forest tree species (oak, beech, fir, spruce) Production forests are the most common category of forest. They cover 1,402,900 ha, or 72.1% of the total area of forest crop land. Their area has increased by 5.8% since 2000, but is 5.2% lower when compared to the year 1980.

The mentioned changes in the area are mostly caused by changes in designation of special-purpose forests. Forests with primarily protective functions are designated as protective forests. These forests protect soils, water resources, and infrastructure. They are found on sites with limited suitability for timber production. The majority of them protect soils on exposed/extreme sites (53%), or are situated beneath the tree line (15%). Due to extreme site conditions, 32% of these forests are not suitable for timber production. Their area has been slowly increasing and in 2017 they covered 335,900 ha, or 17.25% of the total area of forest crop land. Social and cultural functions are of primary importance in forests which, due to their specific societal or group benefits, have been designated as special-purpose forests. These forests are under special (functionally differentiated) management with purposeful enhancement of one or more selected functions such as water purification, recreation, nature conservation, spa/wellness, education/research, game husbandry, etc. unless these functions can be supported by standard management practices. At present, these forests cover 207,500 ha, or 10.67% of the total forest crop land. In the amendment of forest low is newly recognized also new subcategory of special purpose forests named as “virgin forest” (prales).

Water management is not included directly in the forest management plans. Only as a part of protective forests and special purpose forest categories with special management. But not the water courses management. The nature conservation needs is fully accepted through the levels, degree of nature conservation and the rules for them defined in the Nature protection act.

Public participation/consultation is present through the entire process of elaboration of forest management plans. NGOs and all other relevant stakeholders are invited to the process so the public is present through them. During the confirmation procedures, there is also a time for public unveiling of the draft of the plan, where comments can still be submitted. The public is also involved through their representatives of initiatives, NGOs etc.

Nowadays, game management planning is organizing separately from the forest managent planning. The planning is done for the 1880 hunting grounds. (from them are state managed only 150) most of them are the hunting grounds rented by Slovak huntig association (1042) and other rented grounds (622) (private asotiations). The plan is done by the hunting manager of particular hunting ground and approved by the district state office department for forestry and hunting under ministry of interior.

In many regions of Slovakia forests are being significantly impacted by game species. Forests are most vulnerable to damage in their early stages when young growth can be completely destroyed by ungulates. Spruce specimens are often damaged by stripping in small-pole and large-diameter growth stages. The effectiveness of individual protection of young trees by repellents is decreasing year-on-year. Game stock numbers are on the increase in the majority of existing hunting grounds.

There is need and also there is a willing to prepare new hunting act in this year, to solve the above menched problem, to reduce forest damages.

Sustainable forest management is ensured in the framework of forest management planning, which evaluates all implemented measures every decade, as well as determines the state of the forests, and designs new goals and guidelines (framework planning) for forest management in the future. Sustainability is

understood as sustainability of proportional/ equal timber production for next decades for forest management units. The state of the forests is also monitored through National Forest Inventory on sampling plots in grid 4*4 km every ten years.

2.4. Slovenia

2.4.1. Krokar buffer zone

The buffer zone of Krokar is the forest reserve Borovec, which includes mainly fir-beech and beech forests, which are typical for this area. The forests can be described as transitional between Predinaric mountain beech forest and Dinaric fir-beech forest. The forests here are dominated by European beech (*Fagus sylvatica L.*) and silver fir (*Abies alba Mill.*). The phytocoenosis of the forest reserve can be classified into five associations Ompalodo-Fagetum, Arunco-Fagetum, Lamio orvalae-Fagetum, Stellario montanae-Fagetum, and Allio victoralis-Fagetum. Prevailing species are European beech (78%), silver fir (11%), and maple (9%). The growing stock in 2014 was 539 m^3/ha. The average number of dead trees per hectare is 36 and dead biomass amounts to 51 m^3/ha.

The composition of forest stands is relatively diverse, with all developmental phases, with the timber tree phase being significantly predominant (70%), almost a quarter of all forest stands are uneven aged with diverse sizes of patches. Younger, juvenile developmental phases are rare, present on 6% of the area. The forest stands have excellent and very good stand structure.

The forests are older than 100 years. The old-growth forest phase prevails in Krokar and its buffer zone (95%).

Mature, evensized stands prevail, however they are unevenaged. The proportion of fir is decreasing, proportion of noble broadleaved tree species is regular at around 9% of growing stock, with the beech proportion increasing.

Forests in the Forest Reserve Borovec are categorised in the economic category of conserved forests (100%). Changed or altered tree species forests are not present in the reserve. The vast majority of forest stands are mature and older. Both standing (15 trees/ha) and felled deadwood (21 trees/ha) can be found within the reserve. Clearcuts and artificial regeneration/planting are prohibited with the Governmental Decree.

Standing dead trees of different ages and sizes reach their physiological death standing, as logging has not been practised for 25 years. Felled deadwoods are felled dead tree trunks and their branches, or trees and branches, that were felled because of abiotic conditions – snow, freezing storms, wind. Tree stumps are not present within the reserve, as there is no logging, but higher and lower residual natural tree stumps exist, depending on where the tree has broken. There are some cut tree trunks visible next to the trails, where the mountaineers after the freezing storm ensured the passage of trails (deadwood remained on site).

The entirety of forest reserve Borovec (WH buffer zone) is forested. Very small meadows are present, but their land cover is negligible.

The forest reserve Borovec (WH buffer zone) is protected by the Decree on Protective Forests and Forests with Special Purpose, as a forest reserve in a milder protection regime. Forest reserves (forests with special purpose) are forests with emphasised research function. These forests are important for research, study, and monitoring of natural forest development, biodiversity and conservation natural and cultural heritage.

The milder protection regime prohibits all economic, recreational, research and other activities, which could in any way change the existing natural conditions and affect undisturbed natural development in the future. Milder regime, however, allows the visiting of a forest reserve on forest educational trails, while being accompanied with the forest owner or employee of the public forestry service. The use of public paths within the reserve is also allowed. The activities of public forestry service, public nature conservation service, control activities of hunting and forestry, are also allowed. The competent Ministry (of Agriculture, Forestry and Food) allows maintaining the existing public paths, informational boards, which are part of forest management plans, and maintenance of cultural heritage, under condition that the works will not deleteriously affect the existing natural state or harmfully impact the future natural development. Development of new educations path is possible only with consent of the relevant Ministry. Individual

research and educational activities can be allowed, if the Ministry gives consent after acquiring opinions of the Slovenia Forest Service and Institute of Republic of Slovenia for Nature Conservation.

Thus, no harvesting activities are allowed, neither phyto-sanitary cuttings in the buffer zone of Krokar.

As shown in the Coordination Office's "Overview about the current management regime and the management operations in the buffer zones of the UNESCO WH site Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe, vast majority of activities is not allowed in Krokar's buffer zone. The exceptions are:

- Security management along and maintenance of existing trails – Allowed with special permission
    - Along established trails, their maintenance is allowed and trees or branches that could present a risk to the safety of visitors can be managed, however all wood remains on site. A special expert group from Slovenia Forest Service assesses each case individually, and aims at minimum possible intervention.
- Watch towers, look-outs (new) and trails – Allowed with special permission
    - New visitor infrastructure is according to the Decree allowed, if the competent Ministry gives its consent, as part of new educational trails. Expert opinions about such development need to be given by Slovenia Forest Service and Institute of Republic of Slovenia for Nature Conservation. However, given that the area is also part of natural value of national significance, consent has to be obtained also from the Environment Agency of Slovenia. Since the inscription on the UNESCO List, Ministry of the Environment and Spatial Planning (State Party) is also informed about any new developments, which are then also communicated with World Heritage Centre. For any larger developments, EIA procedures are envisioned.
- Hiking, riding, biking on trails – Generally allowed
    - Riding and biking are not allowed within forest reserve. Hiking is allowed on existing public paths, educational trails, and other marked paths without supervision. Entering into the Virgin Forest Krokar forest reserve (WH component part) from the buffer zone is not allowed.

There is no hunting, timber harvesting or any other kind of extractive activities going on in the buffer zone. Visiting on marked trails is allowed and is taking place. Some amount visitor activities also takes place outside of paths (skiing, snowboarding in winter, hiking, camping, camp fires), however, those instances are rare. Better visitor management is nevertheless still needed.

Only the protective buffer zone is designated for Krokar.

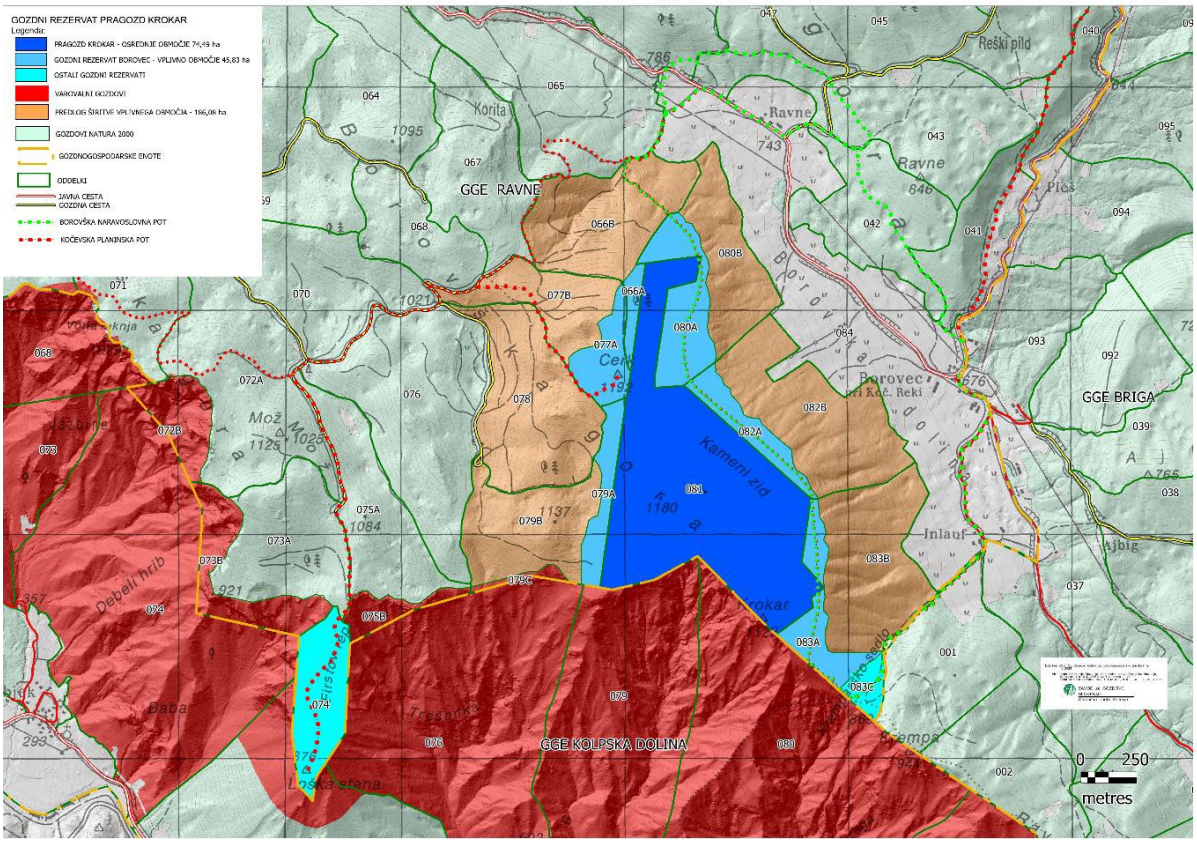


Figure 9. Krokar component part with its buffer zone and the proposed extension and other protected forests in the surroundings.

2.4.2. Snežnik buffer zone

Beech is the main tree species. Mountain beech forests (*Ranunculo platanifoilli-Fagetum*) prevail and on the exposed positions on the highest parts they turn into subalpine beech forests (*Polysticho lonchitis-Fagetum)*. All beech forests belong to 7.4 Illyrian mountainous beech forest according to New European Forest Types classification, 2010. The special features of the area are deep depressions, in which the air remains cold, and the typical spruce forests are found (*Lonicero caeruleae-Picaetum*). They belong to 3.2 Subalpine and mountainous spruce and mountainous mixed spruce-silver fir forest according to New European Forest Types classification, 2010.

The forest reserve and its buffer zone comprise the highest and partly primeval forests of the Snežnik-Javornik karst plateau. Mountain beech forests (*Ranunculo platanifolii-Fagetum var. geogr. Calamintha grandiflora*) and subalpine beech forests (*Polysticho lonchitis-Fagetum var. geogr. Allium victorialis*) form the majority of forests in this area. Due to extreme climatic conditions (strong northeastern wind, low winter temperature and abundance of snow), the beech trees at most exposed slopes and ridges have curved and twisted trunks and branches. At extreme sites the trees often reach only 10-15 m in height and 10-30 cm in diameter and grow in clusters.

In the composition of forest stands, mature, evensized stands prevail, while they are unevenaged, with significant proportion of beech pole stands. There are some very old trees in the forest stands (200-300 years), which do not reach great diameters, due to the extreme conditions. Part of the buffer zone is covered with evensized and evenaged beech pole stands.

The exposed ridges and other rocky, extreme sites, beech forms bush morphological shape. Trees with mishappen trunks reach up to 5 m and rarely exceed 20 cm of diameter. They grow in “tufts” of 3-10 trees. The transitions from extreme sites with bush and tuft shapes of tress into stands with individual and higher trees are interconnected and occur over short distances, of a few dozen meters. The moderately steep slopes are covered with trees with sable-form lower trunks, which show the effects of long-lasting snow cover.

Almost entirely pure beech stands, feature other tree species only individually, such as sycamore (*Acer pseudoplatanus*), rowan (*Sorbus aucuparia*), whitebeam (*Sorbus aria*), Norway spruce (*Picea abies*), fir (*Abies alba*).

Smaller gaps, which occur due to the deaths of individual, adult trees, are naturally rejuvenating, with primarily beech, and in smaller proportion also other tree species, notably sycamore, and on the edges of freezing depressions with spruce forests, also spruces and firs. The juvenile phase is present on 18 ha (7%) of the area.

Spruce forests in freezing depressions predominantly feature small size patch unevensized or selective structure or develop gap mature stands. The growth in “tufts” is common in these stands too. Spruce is regenerating in the shelter of mature trees or on slightly elevated surfaces, for example decomposing stumps or falled deadwood.

Forests in the buffer zone are entirely conserved natural forests, which were always regenerated in a natural way. Regeneration with planting was never practiced, and there are no transformed stands. Clearcutting forestry system has been prohibited since 1947. Mature, older stands prevail. The extreme, rocky and hardly accessible areas were not logged in the past, and the trees there reach great ages (over 300 years). The proportion of dead standing and falled trees is 14 m^3/ha (4% of growing stock).

Deadwood measurements include standing and fallen trees at the breast height of at least 10 cm in diameter. There are still some stumps present in the forests, in the areas, where logging was done in the past, as well as thinnger standing trees and fallen branches are on the ground.

The buffer area of Snežnik reserve are almost entirely covered with forests. The combined proportion of rocky outcrops, meadows and other areas (such as forest roads) is lower than 1%.

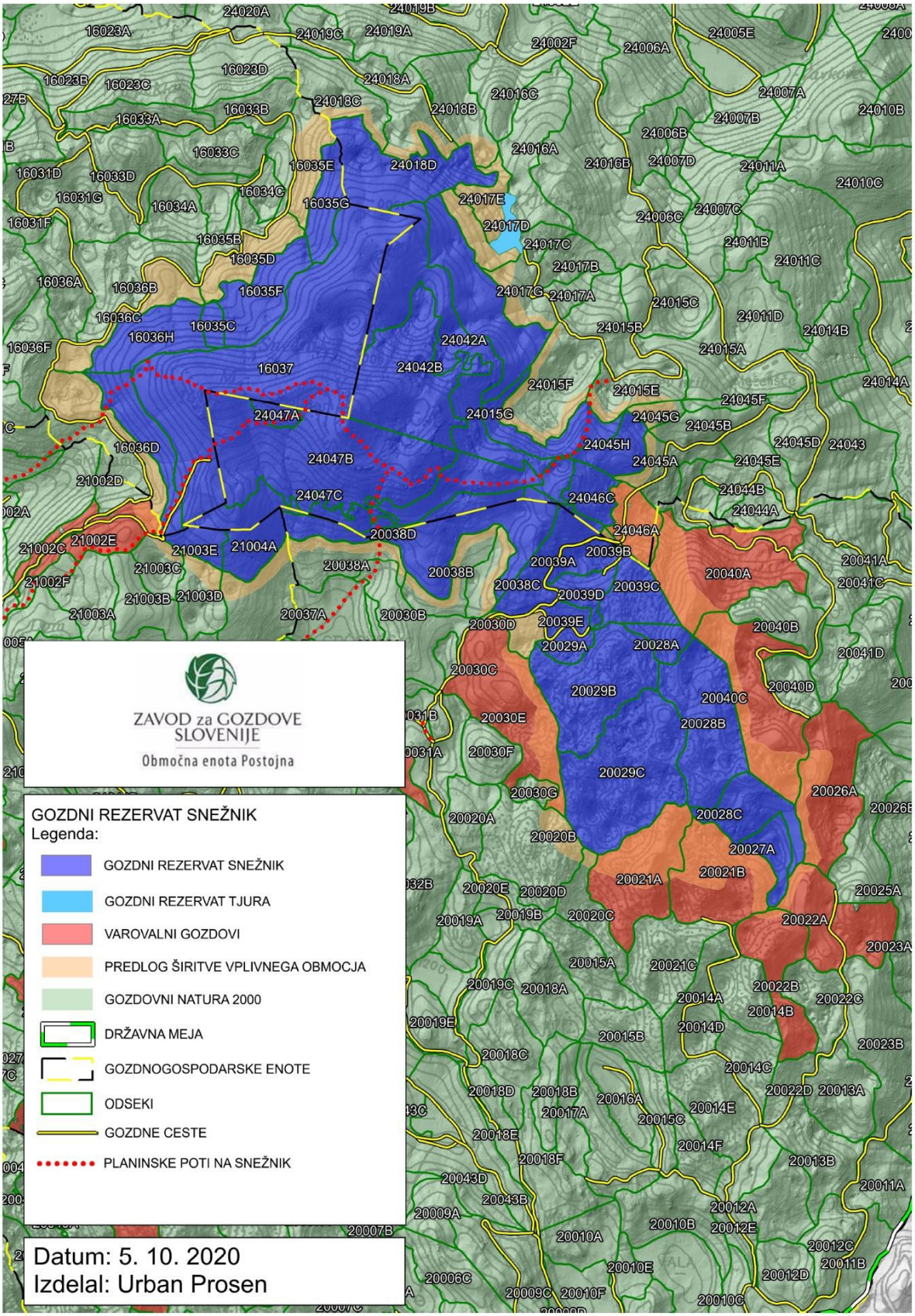


Figure 10: The component part Snežnik, its buffer zone and proposed extension, as well as other protected forests in the surroundings.

The forest reserve Snežnik (part of WH buffer zone) and the surrounding protective forests are protected by the Decree on Protective Forests and Forests with Special Purpose, as a forest reserve in a milder protection regime and protective forests. Forest reserves (forests with special purpose) are forests with emphasised research function, as well as biodiversity and protective function. These forests are important for research, study, and monitoring of natural forest development, biodiversity and conservation of natural heritage.

The milder protection regime prohibits all economic, recreational, research and other activities, which could in any way change the existing natural conditions and affect undisturbed natural development in the future. Milder regime, however, allows the visiting of a forest reserve on forest educational trails, while being accompanied with the forest owner or employee of the public forestry service. The use of public paths within the reserve is also allowed. The activities of public forestry service, public nature conservation service, control activities of hunting and forestry, are also allowed. The competent Ministry (of Agriculture, Forestry and Food) allows maintaining the existing public paths, informational boards, which are part of forest management plans, under condition that the works will not deleteriously affect the existing natural state or harmfully impact the future natural development. Development of new educational path is possible only with consent of the relevant Ministry. Individual research and educational activities can be allowed, if the Ministry gives consent after acquiring opinions of the Slovenia Forest Service and Institute of Republic of Slovenia for Nature Conservation.

Protective forests are protecting land from erosive processes, forests on steep slopes, forests under the influence of strong winds, or in flooding areas, which reduce the excessive water flows. Prot ective forests can also have emphasised function for biodiversity conservation or are forests at the timber line. Protective forests can be managed, however only if the management will improve the protective function of the forest. Some small scale cuts can be allowed for that purpose and phyto-sanitary cuts are allowed. All other interventions require special permit of the competent Ministry. Within the protective forests, which form part of the Snežnik buffer zone, harvesting is not allowed in the relevant forest management plans, phyto-sanitary cutting is allowed if needed.

Part of the buffer zone that lies within forest reserve Snežnik is protected from any human activity, apart from hiking on marked trails, including timber harvesting and phyto-sanitary cuts. The parts of the buffer zone that extend into protective forests theoretically could have some harvesting taking place, however that has been dealt with in the forest management plans, and phytosanitary cuts are allowed.

As show in the Coordination Office's "Overview about the current management regime and the management operations in the buffer zones of the UNESCO WH site Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe, vast majority of activities is not allowed in Snežnik's buffer zone. The exceptions are:

- Security management along trails – Generally allowed
    - Along established trails, their maintenance is allowed and trees or branches that could present a risk to the safety of visitors can be managed, however all wood remains on site.
- Phyto-sanitary cuts – Allowed in specific areas
    - In the part of buffer zone outside of forest reserve, phyto-sanitary cuts are generally allowed. Given that the forests are predominantly beech-dominated, insects tend not to be a problem, which is why sanitary cuts are not implemented.
- Collecting mushrooms, berries, medicinal herbs – Allowed in specific areas
    - Allowed in the part of buffer zone that is comprised of protective forests. In the parts of buffer zone that form the forest reserve, this is not allowed. The total amount that can be collected is regulated and enforced in other policies (2 kg of mushrooms per person)

- Natural hazard management (new infrastructure and maintenance of existing) – Allowed with specific permission
    - There is currently no existing natural hazard management within buffer zone, nor has any been planned.
- Maintenance of forest roads, trails, forest huts/shelters, telecommunication infrastructure – generally allowed
    - Forest reserve is traversed with one unpaved forest road and three other dead-end forest roads extend within the reserve. One of them is already being renaturalised and is out of use. The other two have restricted access. For one of them is in plan to be abandoned. The two forest roads still in use are regularly maintained. The mountain hut Drago Karolin at the summit of Snežnik (WH buffer zone) is also active and maintained, along with any telecommunication infrastructure that is present there.
- Touristic and recreational activities (hiking, extreme sports, cave expeditions) – allowed with special permission
    - Within the part of buffer zone that is within the forest reserve, touristic and recreational activities are only allowed on the existing, marked paths and trails. In the protective forests that form part of the buffer zone, such activities can be allowed, but is decided case-by-case, depending on the impact of the activity.

Commercial harvesting of timber is not practised in the buffer zone, in part of the buffer zone, it is prohibited and in the other part either not planned or not allowed as part of the forest management plans and their implementation. Phyto-sanitary cuts, can also take place only in the part of the buffer zone that extends into the protective forests. Hunting is still practiced in the entirety of the forest reserve and the buffer zone, in accordance with hunting management plans.

Snežnik only has one, protective buffer zone designated.

2.4.3. Slovenia in general

Slovenia is the fourth most forested country in Europe, where forests cover 58% of the total land area of the country (1,2 mio ha). The prevailing forests are beech, oak-beech, and fir-beech forests. Forest reserves are designated on 1% of all forests (9.500 ha), while protective forests cover additional 8% of forested land (99.000 ha). More than 70% of the forest area in Slovenia are beech forests (beech, beech-fir, beech-oak forests), with their proportion still increasing.

The average growing stock in Slovenian forests is 302 m^3/ha, with 45% of it in coniferous trees and 55% in deciduous trees. The annual increment is on average 7,5 m^3/ha. The most common species are beech (33%), spruce (30%) and silver fir (7%). However, there are altogether 72 native tree species known.

The majority of Slovenian forests are privately owned (76%), with state owning 21% and further 3% being owned by municipalities. The private forest properties are very fragmented with average property only averaging around 2,9 ha. Consequently, there are a large number of forest owners (about 413.000).

The forests in Slovenia are managed in a sustainable, close-to-nature, and multifunctional ways. The annual planned cut in 2018 amounted to 6.837.000 m^3 (48% coniferous, 52% deciduous). Out of that 6.061.000 m^3 were carried out (72% conifers, 28% deciduous) in 2018.

The history of forest management planning stretches back to 1406, when the first Forest Orders were established (Ortenburg Forest Order). In 1724, Forest Regulation was introduced to ensure sustainable wood

supply for the needs of mercury mine in Idrija. The first forest management plan was prepared for the area of Trnovski forest in 1771 by Franc Flameck. This was followed in 19th century by reforestation projects on Slovenian Karst plateau and plans for mining forests. The great leap forward was made in 1892, by dr. Leopold Hufnagl, which prepared forest management plans in Kočevsko region for the large scale management, where also the first virgin forest remains were designated to be left alone. Hufnagl and shortly after in the area of Snežnik also Schollmayer (1906) broke away from the clearcutting forestry practice towards selective cuts and control method, to allow for continuous adaptive management. At that time, Slovenia forestry moved away from clear-cut silviculture system that produced monocultures of coniferous forests across Europe. In 1947, Yugoslavia confirmed the Federal Law on Forests and from 1950s onwards general inventarisation of the all Slovenian forests is taking place. The first regional forest management plans (strategic level) were prepared in 1971. After the breakup of Yugoslavia and formation of independent Republic of Slovenia, a new Forest Law was prepared in 1993, which is still in force. Accession to the EU in 2004 also brought with it the establishment of Natura 2000 network, which got integrated with forest management planning. Therefore, forest management plans are also considered as Natura 2000 management plans for forest species and habitat types.

Snežnik area was not managed for forest production in a planned waw before 1860. The main incomes from forests were produced through beechnuts, flint mushrooms, dormouse hunting, cooking of beech wood for potash and taxes for meadows and pastures in the forests. Timber was logged without order, but only on easily accessible plot, close to the villages. Transhumance was practised, also on the summit areas of Snežnik until 1900, after it was prohibited. Since then the summit of Snežnik is reafforesting with dwarf pine, while the beech timber line is also moving upwards. The lower lying forests, partly also parts of the reserve, were used for charcoal production, which took place from the end of 18th century and was most intensive in the period between both World Wars, when most of Snežnik forests were in the Kingdom of Italy. Charcoal making stopped after 1960.

KOČEVSKO REGION - KROKAR

The Kočevje forestry region is located in the southern part of Slovenia. Most of the area lies on karst terrain, a varied landscape with mountain crests and karst valleys running in the direction characteristic throughout the Dinaric Alps. The highest peak is Goteniški Snežnik (1,289 m) and the lowest point is in Dol by the River Kolpa (190 m).

The climate here is moderately humid and well-suited for high forests. Annual precipitation is 1.800 mm. The area is sparsely populated, especially to the south. The population is 38.000 - an average of 32 people per km^2.

The total area of the region is 118,000 ha, with 93,000 ha covered by forests (79 %).

Most of the forests, 47,000 ha, are state owned (51 %), 44 % are private forests and 5 % are forests owned by local communities.

Forest accessibility: 1.436 km of forest roads and 7.571 km of skidding tracks lead to the regional forests.

The most typical forests in the Kočevje region are mixed fir-beech forests and beech forests, which cover 67 % of the forested land. The growing stock of the forests has been constantly increasing in recent decades, but there are great differences between forests in succession and naturally preserved forests with optimal growing stock. The average growing stock in Kočevje forestry region is 332 m^3/ha, the annual increment is 7,8 m^3/ha. The predominant tree species in this region are beech (37 %), spruce (28 %), and fir (18 %). They form deciduous, coniferous, and mixed forests.

The functions of the forest area are ecological, social, and productive (pursuant to the Forest Law). In this area the principal ecological functions are hydrological and biotopic and the main social function is conservation of the natural heritage. The main productive function is timber production, followed by wildlife management.

Forty forest reserves have been designated, four of them virgin forests. Their total area is 1,200 ha, 1.3% of the entire forested area. Apart from forests with special purpose, the area includes also extensive complexes of protective forests (4% area) and large number of eco-cells (2% area).

The area is known for its preserved forests with populations of wolves, brown bears, otters, foxes, wildcats, beech martens, pine martens, badgers, small and large weasels, western polecats, and lynx (repopulated in 1973 and 2019). In terms of game, the largest populations are of red deer, roe deer, wild boar, and brown hare. The southernmost population of chamois in Slovenia lives in the Kolpa canyon. Over 170 species of bird have been observed in the area, of which 100 species also nest here. In the karst caves there are numerous endemic species (e.g. *Proteus anguinus*). The entrances to the caves and dead trees accommodate numerous bat species.

The forests in the area were significantly damaged during the last decade due to natural catastrophes, most prominently during the ice storm in 2014, windbreaks in 2017 and 2018, as well as outbreak of spruce bark beetles (*Ips typographus, I. pityogenes chalcographus*). Due to sanitary cutting of damaged and bark beetle infected trees, the growing stock was lowered, as well as also the proportion of spruce in the growing stock. Extensive cleared areas were created, particularly at lower altitudes, where the forest stands are being prepared for natural regeneration, with some areas being planted with saplings, mainly spruce, oaks, and firs.

The forests are relatively well conserved, particularly fir-beech and beech stands in the mountain belt. The good preservation is shown mainly in group unevenaged structure of the forest, conserved tree composition, and conserved habitats of plant and animal species. The preservation of forests at lower altitudes is lower, due to extensive planting of spruce and past agricultural use, particularly in the vicinity of cities and villages. In these areas, the extensive spruce plantations and pioneer forests of broadleaves prevail, due to the processes of agricultural abandonment.

NOTRANJSKA REGION - SNEŽNIK

Forest reserve Snežnik belongs to **Postojna Forest Management Region**, which lies in the most north-western part of the Dinaric mountain range in the south-western part of Slovenia. The central part of the region spreads over the vast massif of Snežnik and Javorniki, covered with 44.000 ha of dense forests without settlements. At the eastern part of the massif lies, along Idrija tectonic fault, a system of karst poljes, connected with the surface and underground water streams: Babno polje, Loška dolina, Cerkniško polje, Rakov Škocjan valley, Planinsko polje. On the western side of Javorniki and Snežnik are Pivka basin and the Reka valley.

The region has versatile relief with prevailing characteristics of the high karst. The altitude is the lowest at the village Zabiče in Reka valley (440 m), the highest point is the top of Snežnik, 1796 m. The climate circumstances vary a lot due to the relief characteristics and the location on the line where the influencesof the continental and the submediterranean climate interfere. Summers are mostly moderately mild, winters are sharp with abundant precipitations, mostly snow. The amount of yearly precipitations differs, the highest amount reaches 3.000 mm on the southern slopes of Snežnik, significantly lower amount is on the northern part of the region, 1.300 mm per year.

The population in Postojna Forest Management region is 38.000 - an average of 34,6 people per km^2. The total area of the region is 107,326 ha, with 79.200 ha covered by forests (73,8 %). 60% of the forests are private, 38% are state owned the rest are in the ownership of the municipalities.

The forests of the region are accessible by 1.160 km of forest roads, together with public roads and fire protection routes there are 1.492 km of roads. Most of the forests are suitably equipped with skidding tracks.

Typical Dinaric mixed silver fir-beech forests cover 54% of the region, another 35% are beech forest of different associations. Subalpine beech forest represents 2% of the region and 1% belong to natural spruce forests in cold depressions. Others are silver fir sites, oak and other termophyle forests.

The average growing stock of all the forests in the region is 303 m^3/ha and is stable since 2013 after decades of permanent rising. The annual increment is 6,4 m^3/ha in which conifers slightly prevail. Beech is predominant tree species with 38% in growing stock, 25% is silver fir and 20,7% is spruce. Other frequent tree species are maple, oak, pine, ash. The rate of the silver fir is in significant decrease since long lasting difficulties with the regeneration of the species. High population of deer has substantial impact on it.

The functions of the forest area are ecological, social and productive (pursuant to the Law on Forestry). In this area the principal ecological functions are hydrological protective and biotopic and the main social function is conservation of the natural heritage. The main productive function is timber production, followed by wildlife management.

1.630 ha of forests in Postojna region are forest reserves, another 1.280 ha are protective forests.

The great versatility and preservation of vast forests offers favourable life conditions to numerous animal species, also protected species like wolf, brown bear and lynx (reintroduced in 1973 after extinction and in 2019 and 2020). Most important game species are roe and red deer, the wild pig, the fox, and the chamois. Dormice hunting is allowed to non-hunters with special permission too and is traditional in the region. Various species of the birds are found in this region (more than 250 species), especially in the surroundings of the lake Cerknica and Pivka intermittent lakes. Some rare and endangered forest species of birds like the Eurasian eagel-owl, the Ural owl, the whiteback and the threetoed woodpecker, the golden eagle, the capercaillie and the hazel grouse live in region too.

Like in other karst areas in Slovenia (44% of the country) numerous caves (13.000 in Slovenia) are populated with very rich troglobiotic (underground) species of fauna, many of them very rare and endemic in the Dinaric region. Postojna cave system is the richest with 85 species.

The forests in this region were significantly damaged due to natural catastrophes in the last decade, most particularly in 2014 ice storm and windthrows in 2017 and 2018. These events were followed by gradation of European spruce bark beetle (*Ips typographus*). Due to the sanitary cutting of damaged and infected trees after the bark beetle outbreak, the growing stock of forests was reduced alongside with the proportion of spruce in it. Particularly in lowland areas, large cleared areas appeared, which are now being prepared for natural regeneration, while some areas were planted with trees, mainly spruce and beech.

The status of naturalness preservation in the Postojna Forest Management area is favourable. Preserved and slightly altered forests amount to 84%, 12,3% of forests are significantly altered, and 3,5% of forests have been transformed (artificial). Significantly changed and transformed forests mainly occur in the lowlands and in the vicinity of settlements, as well as in the areas, which were used as pastures in the past, but were planted with black pine some decades ago, which was followed by afforestation with black and red pine. In parts of the forests, the proportion of spruce is higher than what would be naturally expected, due to the consequences of past forest management, which favoured the spruce plantations. Between 1960 and 1990, a considerable part of lowland forests was disturbed due to the degrading vitality of firs, due to air pollution, which was brought to the area with the westerly winds from the Po Basin in Italy. The firs were being replaced with spruce plantating. The proportion of spruce is increasing in the growing stock.

The ice storm in 2014 affected significant and widespread damage, which was followed with a bark beetle outbreak, which mainly affected spruce trees. The windbreaks in 2017 and 2018 caused the most extensive damages to the coniferous tree species (spruce and fir). Despite these damages, the majority of forest regeneration follows the natural regeration, only a small proportion of the more extensive cleared areas is being replanted with beech, noble broad leaves, firs and spruce.

LEGISLATION

The main piece of legislation regulating forestry practices is the Forest Act, which stipulates the preparation of National Forest Programme, which is prepared by the Ministry of Agriculture, Forestry and Food and

confirmed by the Government. The national programme is then also supplemented with Operational Programme, which form the basis for forest management planning on the national level. The Forest Law also establishes public forestry service, which is comprised of Slovenia Forest Service and Slovenian Forestry Institute.

Slovenia Forest Service employs almost 800 people, and is financed almost entirely from state budget (cca. 20 million EUR/year). Slovenia Forest Service deals with a number of main activities:

- Forest management planning
- Silviculture and protection of forests
- Forest techniques and rural development
- Forest animals and hunting
- Public relations

Slovenia Forest Service, however, does not carry out harvesting activities, transport, and selling and trafficking with forests and timber. Slovenia Forest Service has a central unit in Ljubljana and 14 regional units, which are further subdivided in 69 local units, as well as 8 hunting reserves with a special purpose. Altogether there are 14 forest management regions and 231 forest management units, which are then further subdivided into 30.174 compartments. Departments are then also comprised of subcompartments (53.787). Departments are long-term planning units, with borders defined on catastre boundaries, waters, etc., and usually cover about 30-50 ha. A segment is the basic planning unit, and are subdivided based on vegetation areas, usually covering between 3-50 ha.

FOREST ACT

Legal frameworks regulating in Slovenia are quite numerous. The main element is the Forest Act, which provides the bases for protection, silviculture, exploitation, and use of forests, defining forests as a natural wealth, that has to be managed sustainably, multifunctionally, and in close-to-nature way. The Forest Act already specifies that the forest management has to be compliant with principles of conservation of nature and nature values, while assuring optimal forest function as an ecosystem.

The Forest Act provides the framework for the comprehensive management of the forests, by requiring the preparation of national forest programme, forest management plans, and the ways for forest management (silviculture, exploitation, protection, forest infrastructure). The Forest Act also defines protective forests and forests with special purpose (i.e. forest reserves). The Act further regulates the traffic with forests, as well as financing of the forest management (e.g. public forestry service, works in protective forests, compensations for forest owners for protective and silvicultural measures, fire protection, pest control measures, Natura 2000 measures, etc.).

According to the Act, all Slovenian forests, regardless of ownership are subject to forest management planning that is provided by Slovenia Forest Service for free, with forest owners having to comply with relevant forest management plans.

NATIONAL FOREST PROGRAMME (NFP)

National forest programme is the foundational strategic document, which defines the national policy of sustainable development of forest management. The main principles of NFP are directed at forest conservation and assuring its multifunctional role, which include environmental, social, and economic components. The NFP includes a long-term vision of management, which integrates forestry with nature conservation, environmental protection, and economic sectors. NFP is made part of the Environmental Action Programme on the national level, with four priority tasks: climate change, nature and biodiversity, environment and health/quality of life, natural resources and waste. The NFP explicitly recognises the natural and social value of the forest for Slovenia, while also specifies that timber is the most important

renewable resource in the country. Nevertheless, the document clearly specifies that general benefits of forests are more important than its economic role. The NFP strives towards larger logging amounts in the future, however together with assured conservation and development of forests.

The NFP requires that all management in the forests comply with ecosystem approach and sustainable development of forests, linked to their biodiversity and all forest ecological, economic and social functions. Conservation of natural environment and ecological balance in the landscape is also one of the main goals of the document. Moreover, biodiversity conservation on different levels (ecosystem, species, genetic levels), landscape function of forests are also assured. The NFP also envisions Slovenian forests as one of the main CO_2 sinks, and one of the main options for transition to a cleaner energy sources. Furthermore, the protective function of the forests (e.g. erosion, waters, climatic, hygienic-health function) has to be ensured. Within the economic directions, the NFP aims for increased exploitation of the production potential of forest stands, improve the access to forests with forest roads and their proper maintenance, as well as developing a market of wood assortments in the country. The NFP further envisions increasing the share of state-owned forests, as well as improving the organisation of private owners and stop the fragmentation of the land plots. The NFP also addresses the hunting sector, where sustainable economic use of hunting species is required. The use of non-timber forest products and tourism are also addressed. Forests have to importantly contribute to the quality of life of all people.

The NFP also provides strategic guidelines for the public forestry service, forest surveillance, education, raising awareness, research, and financing.

RULEBOOK ON FOREST AND HUNTING MANAGEMENT

This rulebook determines the more detailed content and the way of preparing of management plans, management *in situ*, as well as deadlines, and confirmation procedures, including public participation and monitoring of effectiveness of the forest and hunting management plans.

Forest management plans are based on a wealth of data, which are managed by the Slovenia Forest Service, which are also spatially defined:

- Permanent sampling plots
- Subcompartments
- Stands
- Functions
- Cuts
- Implemented silvicultural, protective, conservation and other measures
- Forest roads, skidding tracks, and fire protection tracks
- Forest sites
- Heritage trees and other natural and cultural heritage in forests
- Hunting takes
- Wild animal damages
- Sampling plots for monitoring of game impact on regeneration
- Implemented measures for the game management

The entire area of Slovenia is divided into 14 forest management regions, which are then further subdivided into forest management units (3.000-6.000 ha). The units are then further subdivided into comparments (20-60 ha) and then further into subcompartments (which should not be smaller than 3 ha).

Forest management is then organised on three different levels. Forest management plans are prepared for the forest management regions, forest management unit and also on the level of forest management comparments as silvicultural plans. Regional management plans act as strategic directions between the regional level and the NFP, while the unit management plans specify the guidelines for management on the unit level. Silvicultural planning is the link between forest management plannning and carrying out work in forests. These plans form the basis for all activities carried out in forests for directing forest development. All management plans have to be updated every 10 years and include analyses of past management and its effectiveness, which have to be taken into account when preparing new guidelines.

All management plans also have to determine the functions of the forests and prescribes guidelines for implementations in each area. The Rulebook specifies 17 forest functions in three groups (ecological functions 1-4; social functions 5-14; and productive functions 15-17):

1. Protection of forest land and stands (protective function)
2. Hydrological function
3. Biodiversity conservation function
4. Climatic function
5. Protection function (protection of human properties from natural disasters)
6. Hygienic-health function
7. Defensive function
8. Recreational function
9. Touristic function
10. Educational function
11. Research function
12. Protecting natural values function
13. Protecting cultural heritage function
14. Aesthetic function
15. Timber-production function
16. Non-timber forest production function
17. Hunting management function

The functions are evaluated and categorised into three levels, on which then future management of the area depends, as well as the level of compensations for private owners. The multifunctionality of the forest has to be preserved and cannot be compromised with exploitation.

Based on the characteristics of the forest stands, the evaluation of forest functions and the structure of the forest, silvicultural goals are defined, which include:

- The structure of forest stands
- Tree composition
- Final or optimal timber volume
- Quality of forest sortiments.

This in turn defines the maximum possible cut, and general needs for silvicultural and protective measures and measures to improve or conserve the forest functions.

The Rulebook defines also the deadlines and procedures for preparation and confirmation of forest management plans, with also procedure in case EIA (environmental impact assessments) or SEA (strategic environmental assessments) assessments are necessary. The preparation of forest management plans includes public participation in the form of collecting suggestions in the early stages of the preparation and public presentations and consultations of the draft forest management plans.

RULEBOOK ON FOREST PROTECTION

This Rulebook specifies the measures needed for conservation of biological balance in forests, measures for fire prevention and damages to forests from abiotic causes, as well as measures for limiting the spread and eradication of plant diseases and insects.

Biological balance in the forests is maintained with conservation or transformations into the natural tree stands (mainly through natural regeneration and tendering measures), and assuring balanced ratio between different development phases of the forests. The measures also include planned leaving of deadwood in the forest and protection of the forests from damaging abiotic and biotic factors. Maintenance and improvement of the habitats of wild animals and ratio between forest and game species is also needed. All works in the forest should be implemented in a way and with equipment which least impact the forest ecosystem.

The Rulebook also specifies the requirements for monitoring of biological balance, by following the structure and naturalness of the forests, ratios between forest development stages, the amounts of deadwood present, areas designated for wildlife, need for sanitary cutting, etc.

Based on the specific measures from this Rulebook, a Programme of forest protection is prepared every year, which defines the needed measures.

HUNTING ACT

This act regulates game management, and its planning, conservation, and sustainable management, as well as monitoring. Game and wildlife management is done in order to ensure ecological, social, and economic functions of wildlife and its habitats, but especially for conservation of wildlife as natural wealth, conservation of biological and landscape diversity and stability of communities, prevention and compensation for damages, and sustainable management. Wildlife management is under the purview of the state. Slovenia Forest Service has to prepare hunting plans and monitor the populations. Implementation of plans is on the managers of hunting reserves with special purpose and managers of other hunting reserves, which are hunting associations (by concession).

Hunting areas with special purpose are established to carry out special tasks of conservation and directing the development of wildlife populations and their natural environment. These areas are established on the most conserved and characteristic natural areas in the country. When established, the Government also determines special tasks, managers and possible particular management regimes. The managers of these areas are Slovenia Forest Service and Triglav National Park.

Hunting management plans include long term plans of hunting management areas, annual hunting plans of hunting management areas and annual plans of hunting area. The plans are public.

The Hunting Act also specifies the conditions for formulation of eco-cells, for the purpose of conservation of game and wildlife species, where no management actions are taken.

DECREE ON PROTECTIVE FORESTS AND FORESTS WITH SPECIAL PURPOSE

This Decree determines protective forests and forests with special purpose (particularly emphasised research function), the management regimes required for them. Forests with special purpose are thus designated as forest reserves with two different management regimes. The strict protection regime prohibits all anthropogenic activities, while making exceptions only for necessary public forestry and nature conservation service, as well as surveillance. The Ministry of Agriculture, Forestry and Food can issue permits for research and educational activities, based on the opinions of Slovenia Forest Service and Institute of

Republic of Slovenia for Nature Conservation. The management of forest reserves with a milder regime is almost identical, with exception that visiting them is allowed on existing marked trails and public paths.

NATURE CONSERVATION ACT

This Act establishes measures for conservation of biodiversity and a system of protection of natural values with the aim to contribute to nature conservation.

Besides regulating the protection of species, managing invasive species, and so forth, this Act also provides the legal basis for protected areas. The Act allows for establishment of:

- Ecologically important areas
- Special conservation areas – Natura 2000
- Natural values
- Protected areas
    - Smaller/narrow protected areas
        - Natural monument
        - Strict nature reserve
        - Nature reserve
    - Wider protected areas
        - National Park
        - Regional park
        - Landscape park

The natural protected areas often overlap with forests and forests reserves. Additionally, additional protections based on this Act for the two Slovenian component parts are being prepared.

Nature reserve is an area of geotops, habitats of endangered, rare or characteristic plant and animal species, or an area important for conservation of biodiversity. This type of protected area prohibits any activities that could cause significant changes in biodiversity, its structure, and functions of ecosystems, or which would endanger the presence of plants and animals.

This Act also establishes a public service for nature conservation in the form of the Institute of the Republic of Slovenia for Nature Conservation.

NATURA 2000 DECREE

This Decree determines the Natura 2000 areas and their conservation goals and guidelines to ensure the conservation or achievement of favourable condition of wild plant and animal species, their habitats and habitat types, whose conservation is in the interest of the European Union.

The forest management plans act as Natura 2000 management plans in cases where Natura 2000 areas overlap with forests. The Institute of the Republic of Slovenia for Nature Conservation provides conservation guidelines to the forest unit management plans, which have to be integrated into the forest management plan and implemented through it.

Forestry management in Slovenia is currently well-organised and efficient. Large and expert-based public forestry service provides evidence-based forest management plans, in collaboration also with nature-conservation expert institutions and involvement of the public. While the public involvement could be

improved, there are already some activities in place to redesign the stakeholder processes in the hopes of creating more constructive processes.

The implementation of forest management plans is done well in state-owned forests, however it is more difficult to ensure that in private owned forests, due to the very small average properties, lack of interest from numerous forest owners and lack of economic incentive (for smaller properties, the costs of management interventions can outweight the profits).

The management of forest reserves is more complex. While the Decree on Protective Forests and Forests with Special Purpose specifies that the funds needed to properly manage forest reserves will come from the state budget, no special funds are available for this. While the local foresters, in theory, have the capacities to undertake surveillance and control of the forest reserves, in reality their work is mainly linked to the implementation of forest management plans on the ground. Since forest management plans do not foresee any measures within forest reserves, there is not much work outlined there for the local foresters. Due to a number of different institutions involved in the management, the management responsibilities are currently dispersed among multiple institutions. Most forest reserves are in state-owned forests, which are managed by Slovenian State Forests enterprise, however the planning of measures within the reserves and around them is in the purview of Slovenia Forest Service, with both institutions being under the supervision of the Ministry of Agriculture, Forestry and Food. However, due to a number of natural values, ecologically important areas, and Natura 2000 sites that overlap with the two UNESCO forest reserves, Ministry of the Environment and Spatial Planning and Institute of the Republic of Slovenia for Nature Conservation also hold some competencies. The inscription on UNESCO WH List gives more overview powers to the Ministry of the Environment and Spatial Planning, while they are also preparing the designation of both forest reserves as nature reserves and plans to expand their buffer zones. Therefore, the management of forest reserves and their buffer zones is currently caught in a web of different policies and legislations, and it is undecided yet who is to manage the areas. In the mean time, Slovenia Forest Service *de facto* manages both component parts, also securing EU projects to assist in this regard. The process of designation of nature reserves is seen as a way to resolve the current issues and provide a clearer path forward.

The cooperation between Slovenia Forest Service and Institute of the Republic of Slovenia for Nature Conservation is good. The cooperation includes the procedures of preparing forest and hunting management plans, as well as numerous European and other projects. In the process od preparation of forest management plans, Institute of the Republic of Slovenia for Nature Conservation prepares a draft of nature conservation guidelines, which is then coordinated with Slovenia Forest Service, on both expert and implementation levels. Nature conservation guidelines are then integrated into forest management plans, while the measures for improvement of the status of natural values and Natura 2000 areas are made part of forest management plans. The nature conservation guidelines include the determination of goals, directions and measures of management with forests and game management. Institute of Nature Conservation is involved in the procedure of plan confirmation, where they prepare formal opinions to the draft plans. A representative of the Institute of Nature Conservation is also a member of the Slovenia Forest Service Board, which confirms the plans. Another case of good practice of collaboration between Slovenia Forest Service and Institute of Nature Conservation is also European LIFE project Kočevsko, which worked on the zonation of forest area for grouses and rare woodpeckers (*Dendrocopos leucotos* and *Picoides tridactylus*), as well as special measures have been determined for the improvement of the habitats for these species.

Slovenia Forest Service is also responsible for preparation of 10-year hunting management plans and annual plans, which are coordinated with hunters in hunting management units (which differ from forest management units. On annual basis, plans for removal from nature (culling and all other losses, e.g. roadkill) per species, sex and age structure and the quantities are alaborated. The numbers are sourced from 10-year hunting management plans and are divided among hunting areas of hunting associations and hunting areas with a special purpose. Slovenia Forest Service also has an important role in management of large carnivores, as an expert institution, which monitors the populations, gives expert suggestions for their management and has an intervention group for assessment of damages.

UNESCO MANAGEMENT

The governance scheme of UNESCO management in Slovenia is quite complex. Both Slovenian component parts are protected as forest reserves, under the forestry legislation, which is in purview of the Ministry of Agriculture, Forestry and Food. The existing legislation already expects the collaborations with Slovenia Forest Service and Institute of the Republic of Slovenia for Nature Conservation. The entirety of both component parts is state-owned. State-owned forests are managed by Slovenian State Forests enterprise (SiDG), which is under direct oversight of the Ministry of Agriculture, Forestry and Food. It needs to be emphasises that forest management through forest management plans and directing the forest development, with coordination with all stakeholders is the task of Slovenia Forest Service for all Slovenian forests, regardless of ownership (state, private or municipal owned). The management, as in the implementation of planned measures, selling of sortiments, and using the forests as properties is in the hands of the forest owners, or for state-owned forests, Slovenian State Forests Ltd. Therefore, there is a key difference between the management provided by Slovenia Forest Service (more on planning level and approving of management actions) and management by implementation of planned activities by forest owners.

Krokar component part lies within Municipality of Kočevje, which also established Public Institute for Culture and Tourism Kočevje and both institutions present important stakeholders in the UNESCO management, however, their roles are not formally defined. Snežnik component part is divided between Municipalities of Ilirska Bistrica and Loška dolina, with Regional Development Agency Zeleni Kras having some oversight over touristic and other development in the wider region, but official cooperations have not been established yet in the light of UNESCO status. In the case of both municipalities, it has to be emphasised that Municipalities are important for management of UNESCO reserves, as they direct the development of land use through spatial plans and (co)finance infrastructure. The mentioned tourism and regional development institutions are important stakeholders to be involved, but not in the management of the WH component parts.

UNESCO natural World Heritage is under the responsibility of the Ministry for the Environment and Spatial Planning, which is also representing the State Party of Slovenia at the international level for this field. The responsibility is shared with the Ministry of Culture, for cultural World Heritage sites and Ministry of Education, Science and Sport, as the host of the Slovenian UNESCO Office, with other ministries being involved when needed, such as Ministry of Economy and Technological Development and Ministry of Foreign Affairs. Since the inscription of both component parts on the WH List, the Ministry of the Environment and Spatial Planning also exercises oversight over the management and planning of the development of both component parts, which as State Party to the WH Convention, they are obliged to do. In this work they involve both the Slovenia Forest Service and Institute of the Republic of Slovenia for Nature Conservation.

National Steering Group for UNESCO WH for these particular component parts have not been formally formed and is functioning on an *ad hoc* basis and lately in large part through BEECH POWER project. National WH Committee for all WH sites in Slovenia (both natural and cultural) has been formed, in which representatives of the UNESCO Office (Ministry of Education, Science and Sport), Ministry of the Environment and Spatial Planning, Ministry of Culture, Slovenia Forest Service, Landscape Park Ljubljansko barje, Regional Park Škocjanske jame, and Centre for the Management with the Heritage of Mercury Idrija have been named.

Meanwhile, since the inscription the Ministry of the Environment and Spatial Planning is also preparing the proposal to designate both Slovenian component parts as nature reserves, according to existing national nature conservation legislation. The designation of nature reserve would allow for more systematic financing and management of both component parts and thus more effective protection. However, the already complex governance scheme could get even more complicated with an additional legal framework integrated into it.

Planning process and three-level planning are described above, along with the responsibilities of management planning sector. The management plans are renewed every 10 years, unless if the conditions

change drastically (freezing storms, bark beetles). In those cases the forest management plans for units can be adapted after 6 years, while silvicultural plans are adapted as needed. While Krokar lies entirely within one forest management unit and is thus part of one forest management plan, the forest reserve Snežnik is part of four forest management units, which have temporaly distinct forest management plans (Mašun 2014-2023; Gomance 2020-2029; Okroglina 2013-2022; Leskova dolina 2014-2023).

Slovenian component parts only have the protective buffer zone, therefore the goals specified for the landscape conservation buffer sub-zone are not relevant in Slovenian case, since both components are surrounded with vast and well-preserved, traditionally sustainable, close-to-nature managed forests and Natura 2000 areas. With regard to the draft Guidance document, both Slovenian component part already comply with vast majority of outlined regimes both within the property and in the protection buffer zone, with few exceptions.

Phyto-sanitary cuttings are still possible in a part of Snežnik buffer zone, which lies in protective forests, outside of the forest reserve. Due to the mixed beech-fir-spruce forests in the region, it is expected that within buffer zone of Snežnik component part, the potential for the need of phyto-sanitary cuts will remain. However, they will be subject to expert assessment and permission.

There is currently still some non-timber forest products (NTFPs) being collected in some of the buffer zones, especially around Snežnik component part. Slovenia is currently committed to implement the prohibition of collection of NTFPs within component parts and buffer zones in the span of the next few years.

Game management is currently still practiced within Snežnik component part, which also includes commercial hunting, which is nevertheless regulated with hunting management plans and through the hunting area with special purpose which overlaps with the forest reserve. Numerous restrictions were already imposed, such as prohibition of using any hunting infrastructure or mechanisation within the forest reserve, and only individual hunts can take place. Also the number of animals taken is currently very low (a handful of animals per year, mostly chamois and red deer). Given the size of the forest reserve, it is expected that some form of game management will continue to be practiced, however the exact way in which this will be done, will have to be defined. Slovenia thus agrees with reducing game management to a minimum within the component part.

New trails are planned to be constructed within the buffer zone of Krokar component part for hiking. Relevant permissions both on national and international level are already being sought. The main intention for the establishment of a new trail is to reduce the visitor pressure on the component part itself and provide meaningful and enjoyable visitor experience. Both of these aspects need to be addressed in Krokar.

An observational tower on the summit of Cerk, on the boundary between buffer zone and Krokar component part was part of the idea for the new trail establishment. However, any plans of the implementation of this will be subject to permissions on both national and international levels. If judged inappropriate, the guidelines will be followed in this instance as well.

There is some existing infrastructure within the component part Snežnik (marked trails, forest roads) and buffer zones of both component parts (marked trails, informational boards, mountain hut on Snežnik summit). The Guidance document calls for moving of existing infrastructure outside of the component part and the protection buffer zone in a long-term perspective. Maintenance of existing infrastructure is allowed by special permission. On the summit of Snežnik, within buffer zone, a mountain hut exists. There are some long term plans to have it dismantled, however, the likelihood of this happening is relatively low. Within Snežnik component part, there are currently four unpaved, forest roads. One of those roads is a connecting road, that cannot be removed from use, while the other one is used to supply the mountain hut. If the hut will be dismantled in the future, the supply road, will also be removed from use. Other two roads are already in the process of being removed from use and overgrown.

There are currently some expeditions to caves within the buffer zone and component part of Snežnik taking place, however there are already some activities taking place to address this problem and control it, therefore it is expected that Slovenia will comply with this guideline in a few years.

There is also some trespassing and extreme sport, particularly free-ride skiing on Snežnik, happening within both component parts and their buffer zones, however some activities are already taking place to address this issue and control it. Therefore, it is expected that Slovenia will comply with this guideline in a few years.

Silvicultural systems (Matthews, 1989)

Femelschlag system/ Irregular sheltorwood system is predominant. It is used mainly on less or more ecologically stable forest sites, which are characterised with more level areas, with lower stoniness, ground area and deeper brown carbonatic soils.

Plenter (selective) system is used in beech-fir forests, which grow on more extreme sites, or areas with less stable ecologic complexes (steep and dry areas, stony parts). If the natural regeneration, with especially fir is proceding well (more than 30% of fir in the regenerational phase), this system is used also on less extreme sites (fir forests on carbonated or silicate substrate).

Freestyle silviculture is combined with the above mentioned silvicultural system. Prilagajanje rastiščnim in sestojnim značilnostim pogosto se na manjši površini uporablja kombinacija prej omenjenih sistemov (mlinšek, 1980)

Forest functions are ecological, social, and producing. The Forest Act prescribes 17 forest functions, which need to be evaluated in the forest management plans. In the area of Kočevsko, the following functions are predominant:

- Ecological
    - Hidrological (extremely emphasised across the entire area)
    - Biotopic (24% of the area)
    - Protective (23% of the area)
- Social
    - Conservation of cultural heritage (5% of the area)
- Producing
    - Timber production (extremely emphasised on 87% of the area).

Forest functions can overlap, which further accentuates the importance of the area and can demand the need for designation of protective forests or forests with special purpose. If a function strongly affects forest management, then all the measures, including timber harvesting (logging and skidding), are adapted to this, which can include designation of protected areas, taking into account protected and other conservation areas under different legislations, designation of eco-cells, temporal and/or spatial restrictions of work or visits, etc.

Forest management acquires guidelines from nature conservation, cultural conservation, and water management authorities, which are integrated into forest management plans and game management plans. The guidelines are used for determinations of the management goals and direct the planning of measures.

Public can get involved in the procedure of preparation of forest management plans with the submission of initiatives (in the last year of the validity of previous plan and during the preparation time of the new plan/revision). During the confirmation procedures, there is also a time for public unveiling of the draft of

the plan, where comments can still be submitted. The public is also involved through their representatives in the board of Slovenia Forest Service, when draft of the plan is discussed.

Sustainable forest management is ensured in the framework of forest management planning, which evaluates all implemented measures every decade (against the last decade of data and also entire past period for which there are available data on the level of forest management unit), as well as determines the state of the forests, and designs new goals and guidelines for forest management in the future. The implemented measures are compared with long-term goals. Based on this comparison, it is determined whether the forests are developing in the planned direction. State of the forests is monitored through field monitoring of forest stands and tree measurements on permanent sampling plots. Additional support to sustainability issues, are provided through forest models for checking the balances of proportions of developmental phases and tree thickness structure. Sustainability is thus not understood as only sustainability of the timber production value of the forests, but as sustainability of all forest functions, as prescribed by Forest Act.

2.5. Croatia

2.5.1. Paklenica buffer zone

WH component parts, as well as the buffer zones are located completely within the **Paklenica National Park**. The Park is located in a Dinaric karst region, extending along the coastal slope of southern Velebit, covering an area of 95 km^2, with an altitude range from 10 to 1757 m asl. (Vaganski vrh). The Oglavinovac - Javornik component part is located at the altitude 1200-1300 m asl and the Suva draga-Klimenta component part is located at the altitude 800-900 m asl.

This area is influenced by sub-Mediterranean, continental and mountain climates, and due to the complex relief, i.e. different altitudes, slopes and exposures, there is a great variety of microclimatic opportunity. The amount of precipitation ranges from about 1200 mm/year in the coastal area, while with increasing altitude the amount of precipitation increases sharply - at an altitude of 900 m it exceeds 2 000 mm / year, and in the highest part (e.g. Vaganski vrh) is about 3500 mm / year.

Such conditions have contributed to the development of large-scale diversity and the abundance of forest and plant species in a relatively small area. It is estimated that about 55 % of the Park area is covered with forests and meadow habitats, and 45 % is covered by rocks and cliffs. At the lowest parts, Downy-Oak-Oriental Hornbeam forest and coppice (As. *Querco-Carpinetum orientalis* H-ić. 1939) are developed. These forests were under the strongest anthropogenic influence and are mostly degraded along the southern border of the National Park, where the impact was the strongest. Since the prohibition of grazing, these forests are slowly returning to its original form. Above this community Autumn Moor Grass-Hop Hornbeam forests and coppice (As. *Seslerio autumnalis-Ostryetum* Ht. et H-ić. in Ht. 1950) are developed. Autumn Moor Grass - Beech forests (As. *Seslerio autumnalis-Fagetum* M. Wraber ex Borhidi 1963) are developed at an altitude of 500-900 m and are the most common beech communities in the Park. Large Red Dead Nettle - Beech forest (As. *Lamio orvalae-Fagetum* (Ht. 1938) Borhidi 1963) is a typical continental forest community, developed on the dolomites of fresh soils near the watercourses of Velika and Mala Paklenica. On extremely shallow and skeletal, dry soils, at the altitude of 400-1200 m, azonal community of Hairy Cotoneaster - Black Pine (As. *Cotoneastro-Pinetum nigrae* Ht. 1938) is developed. Pre-Alpine Beech forest (As. *Homogyno-Fagetum* Marinček 1993) form the upper limit of forest vegetation zone at the altitude of 1000-1450 m. Mountain Pine scrubs with *Lonicera borbasiana* (As. *Lonicero borbasianae-Pinetum mugi*) occupies the top belt of Velebit and it is the most compact area under the Mountain pine in the whole country.

Paklenica buffer zone area is covered with forests. According to the new European Forest Types adopted in the Enquiry for the SoEF2011 (http://www.unece.org/fileadmin/DAM/timber/publications/european-forest-type.pdf). There are 3 types of forests (**Napaka! Vira sklicevanja ni bilo mogoče najti.Napaka! Vira sklicevanja ni bilo mogoče najti.**):

- 8.1 Thermophilus Downy Oak (*Quercus pubescens*) forests
- 8.8 Illyrian thermophilus Beech forests (*Fagus sylvatica*)
- 6.6 Illyrian submountainous Beech (*Fagus sylvatica*) forests

Thermophilus deciduous Downy Oak woodland are Mediterranean forests in which with *Quercus pubescens* other species are present such as *Carpinus orientalis, Ostrya carpinifolia and Fraxinus ornus*. Thermophilus Beech forests from south-eastern Alpine and Illyrian region grow on limestone and dolomite substrate. Besides *Fagus sylvatica*, other species such as *Ostrya carpinifolia* and *Fraxinus ornus* are present as well in Thermophilus Beech forests from south-eastern Alpine and Illyrian region. In Pre-Alpine Beech forests, with *Fagus sylvatica species like Acer pseudoplatanus, Abies alba, Picea abies* are also present.

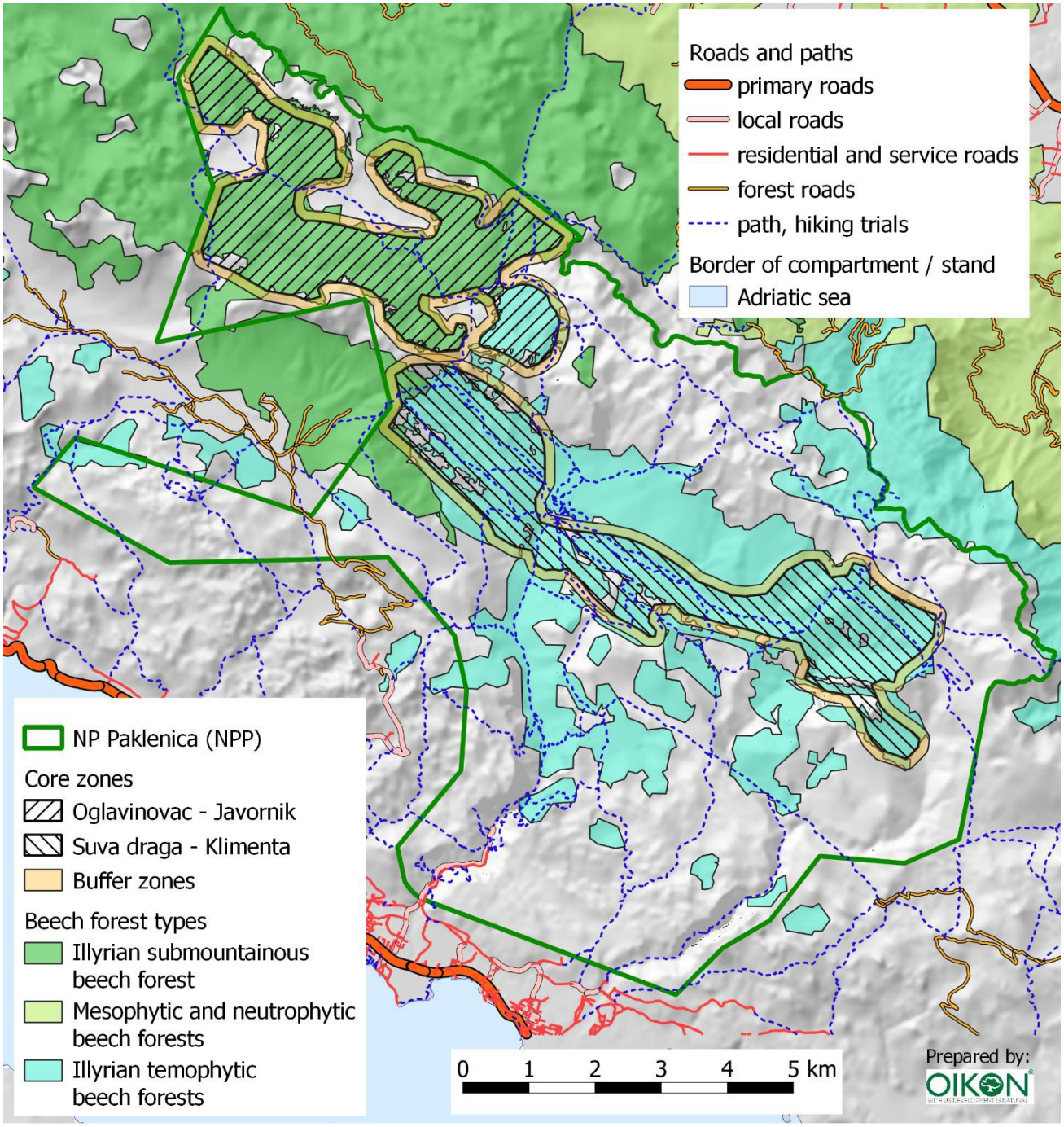


Figure 11: Beech forest types in the NP Paklenica

The traces of forest management in the Paklenica National Park date back to the time when this area was returned from Ottomans to Venice by the "Karlovački mir" in 1669. The forests were ruthlessly destroyed by irrational exploitation during previous centuries. Dalmatian government in the early 19th century tried to renew the forests, which were municipal property and opened for inhabitant's exploitation. During the 19th century in the present National Park forests were exploited for the needs of the state (Venetian Republic). Mostly black pine was cut. In 1861, the inhabitants of Starigrad and Seline received the right to cut for personal needs. This resulted in the cutting of beech, oak and other species for firewood. Logging in this period was carried out mainly in the lower, more accessible areas. In the area of the component parts , the cuttings were then very sporadic and of lower intensity.

In 1929 the forest became a state good and its exploitation was managed by an institution in Zadar. At that time pine forest prevailed and the inhabitants used it for obtaining resin called “paklina”. After the year 1945, the forests in Paklenica were logged for the restoration of the houses devastated in war. There are no records on how many trees were cut, but the forest was not destroyed. Since the proclamation of the national park in 1949, tree cutting has been banned and the whole area 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 back to 1861. The forest management program in the Park was adopted in 1980.

Forest management plan from 1900 stated that the cuttings that had been practiced until then had not devastated the forests of the area, nor had disrupted their structure. In the period from 1914 to 1945, there are no recorded data on cuttings in the National Park. There are only oral statements that the inhabitants with the right to use these forests carried out the cutting of firewood for their own needs. Immediately after 1945, logging in the Park area sought to help residents of surrounding villages to rebuild war-damaged houses and farm buildings. These cuttings, which lasted until Paklenica was declared a national park (1949), did not significantly damage the condition of these forests. After the proclamation of the park, there was no more logging in the area. Therefore, these forests are natural forests of various structures. Despite this, these forests on larger areas look like even-aged forests. It is important to mention that since there are no forest roads in the Park area, mechanization has never been used in these forests. Since the entire area is located in the National Park, felling is not permitted and is not practiced. Forests are intended for recreation (such as hiking), scientific research and education (student excursions).

As there was no intensive management in these forests, the trees are mostly more than a hundred years old. On the edge of the buffer zone, there are smaller areas of younger trees incurred by snow and wind breaks and fires. The forest on these surfaces developed spontaneously. Younger trees can also be found on the surfaces of natural grasslands that have been overgrown with forest vegetation in the last 50-70 years due to the abandonment of pastures.

As forests develop spontaneously, it is possible to find standing and lying dead trees in them. The share of these trees is not too large. All the deadwood inside the National Park borders is left as it is with exception only of the trees fallen on the marked hiking trails. In case of the hiking trails maintenance, the fallen trees are removed from the trail but still left in the vicinity as long as the visitation safety is not compromised. In the current Forestry Act (NN 18/68, 115/18, 98/19), there is no definition of the term “deadwood”. Forest inventory in the National Park is planned for 2021 and after that, data on forests in the buffer zones will be available within the Forests conservation, tending and restoration Programme development

Forests and forest land within the National Park are managed through Action Plan for forest ecosystems developed within the Management Plan. The action plan prescribes the main objectives, activities, indicative costs and time frames, as well as the measurable results. In extraordinary circumstances (fire, invasion insects, etc.) appropriate activities are undertaken in cooperation with the relevant institutions.

The Program of protection, tending and restoration of forests determines interventions on forests and forest lands within protected areas or natural values protected on the basis of nature protection regulations in the category of strict reserve, national park, special forest vegetation reserve and forest park for a period of ten years. It is renewed every ten years. For the area of the Paklenica National Park, there is currently no valid Program of protection, care and restoration of forests. However, there is a project currently being implemented on the national level, through which, Program of protection, tending and restoration of forests in protected area should be developed.

Protection sub-zone is adjacent to the component parts and surrounds them completely ensuring the obligatory protective function. The p-buffer sub-zone is also slightly narrow in some segments of the area due to the National Park border which limits the extension of the sub-zone.

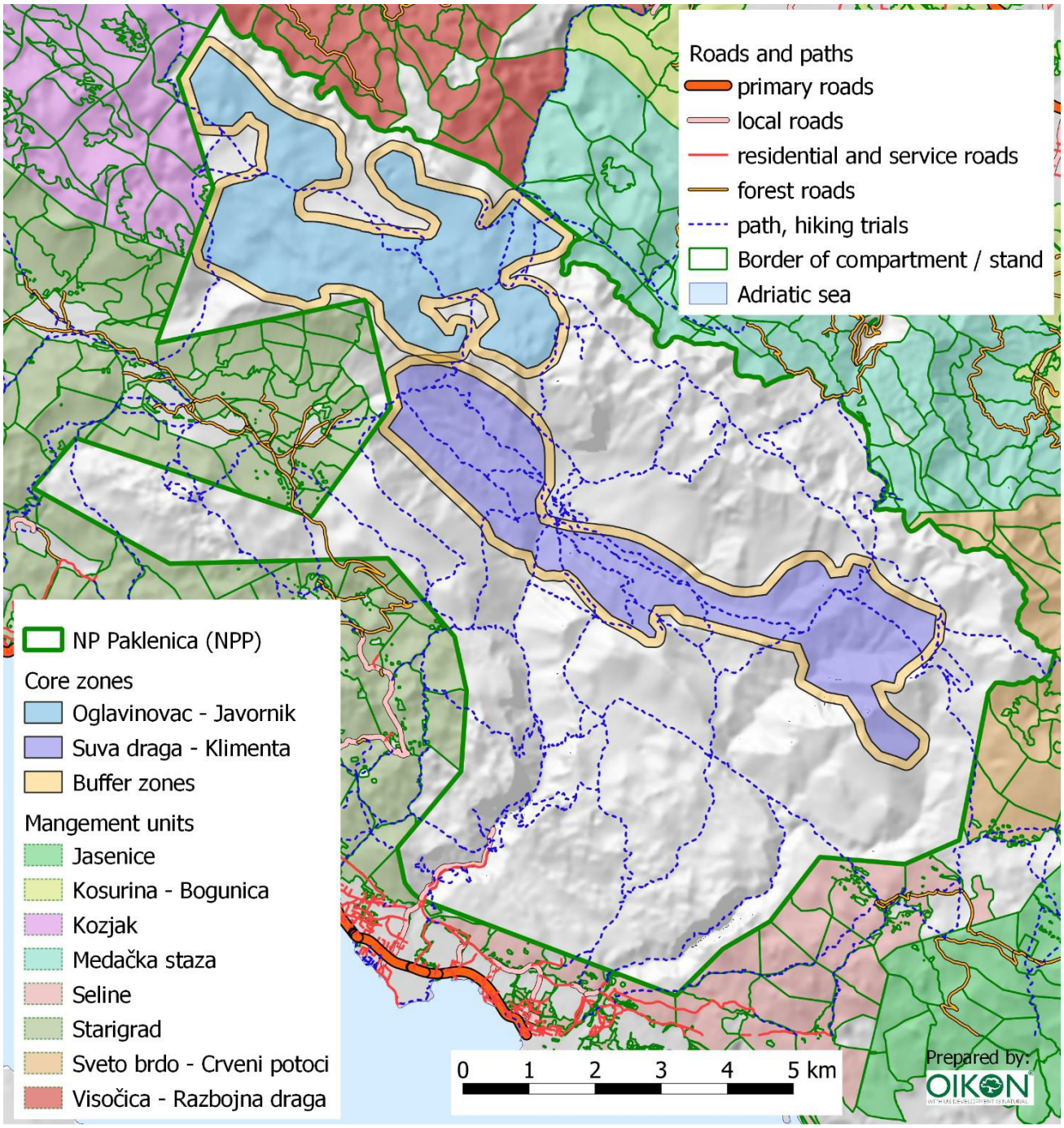


Figure 12: State management units surrounded NP Paklenica

With regard to the draft Guidance document, both Croatian component parts already comply with vast majority of outlined regimes both within the property and in the protection buffer zone.

Phyto-sanitary cuttings and collecting of non-timber forest products are not allowed in the National Park.

Buffer zone that surrounds the Oglavinovac – Javornik component part, covers the area in which forests occupy about 33% of the surface, and lands overgrown with forest vegetation occupy 3% of the area. The most common cover (58.5%) consists of mountainous grasslands and dry karst pastures. About 5% of the surface is limestone rocks and gullies.

Buffer zone that surrounds the Suva draga - Klimenta component part covers the area in which about 64% of the surface is covered by forests, and 18.4% of the area is overgrown with forest vegetation. The areas of natural rocky and mountains grasslands cover about 13% of the surface, and limestone rocks cover 4.5%.

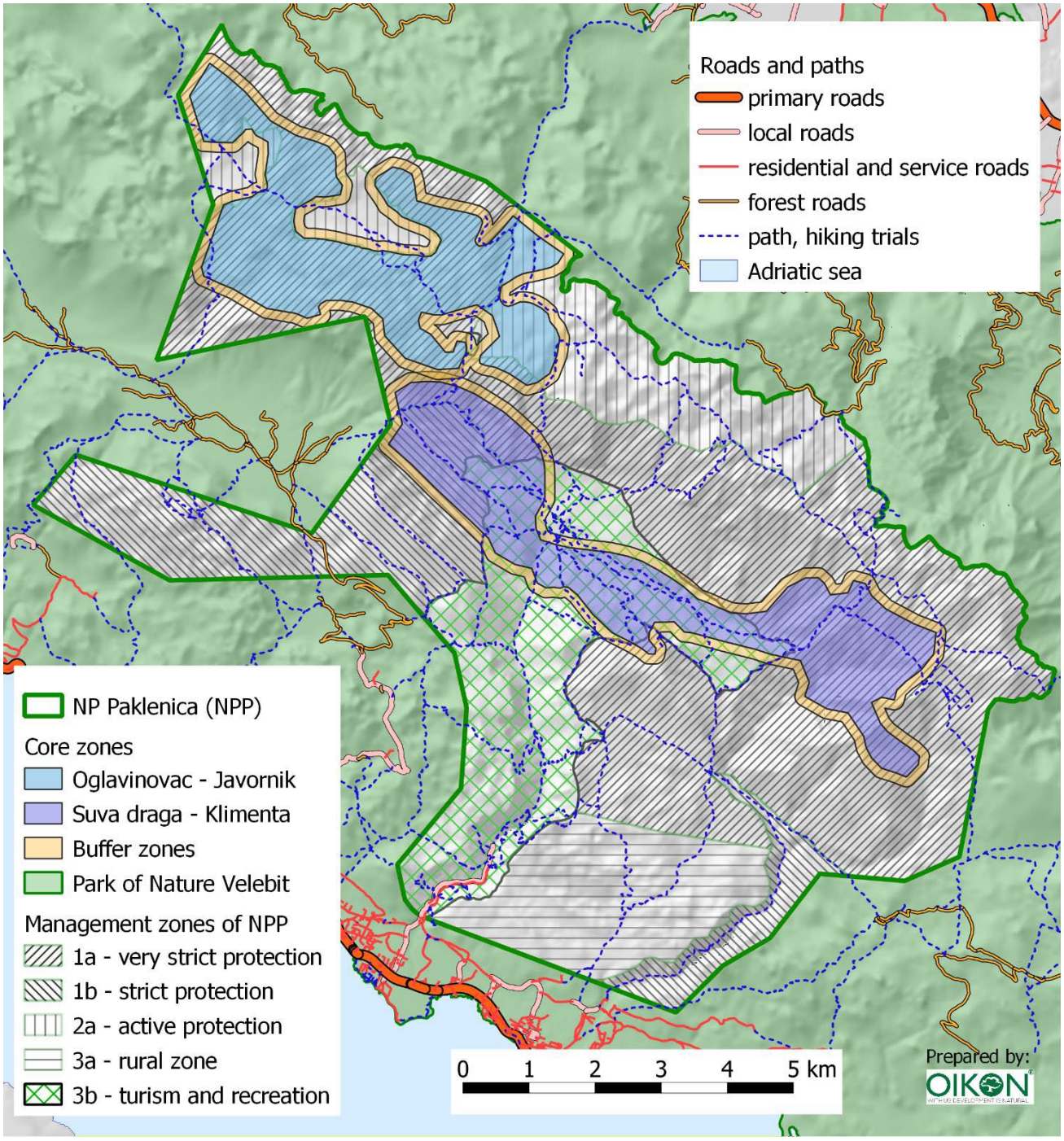


Figure 13: Management zones of NP Paklenica and core / buffer zones

Forest management is carried out based on the Management plan of the Paklenica National Park. According to the National Park zonation, the Oglavinovac - Javornik component part (and its buffer zone), the forest is mainly located in the 1a strictest conservation zone and only to a lesser extent in the 2a active habitat, species and cultural heritage conservation zone. The Suva draga – Klimenta component part (and buffer zone) are located in 1a - the strictest conservation zone, 1b - very strict conservation zone and in zone 3b - recreation and tourism infrastructure zone. The Public Institution Paklenica National Park is currently in the process of developing the new management plan in which a special effort will be put to align the National Park management zonation with the UNESCO WH zonation.

Zone 1a –strictest conservation zone

Active management of the area that would jeopardize the development of natural processes is excluded. Management is aimed at preserving, protecting and monitoring the state of ecological systems, biological and landscape diversity.

Permitted activities are:

- Guided groups by National Park staff for highly interested and motivated visitors.
- In case of emergencies, e.g. fires, heliports are used for landing of firefighting teams.
- Monitoring the condition of bird communities, forest ecosystems and endemic plant species.

Restrictions are:

Visitors are not allowed to enter this area, except for marked trails/paths that are separated in zone 1.b.

Only necessary safety projects are allowed in order to preserve and protect biological and landscape diversity.

Zone 1b –very strict conservation zone

Permitted activities are:

- Implementation of minimum activities for the purpose of preservation, protection, revitalization and monitoring of ecological systems, biological and landscape diversity and maintenance and improvement of the existing visitor infrastructure in the form of educational trails.
- Surveillance of the area and monitoring of nesting birds in forest habitats and in the canyons of Velika and Mala Paklenica.

Restrictions are:

- Only necessary safety projects are permitted in order to preserve and protect biological and landscape diversity.
- Minimum facilities for visitors (educational trails). No entry of motor vehicles, except with the permission of the competent institutions.

Zone 2a –active habitat, species and cultural heritage conservation zone

Permitted activities are:

- Area subject to active projects as a management method that ensures protection and conservation and maintenance of favourable habitat/species status.

- Implementation of measures and activities regarding the protection and preservation of cultural heritage.
- Visits in accordance with the receiving capacity for individual locations with an emphasis on monitoring the impact of visits on habitats/species.
- Improvement and maintenance of the minimum visitor infrastructure for the purpose of education and interpretation.
- Monitoring of grassland habitats, rare and endangered plant species and nesting birds of meadow habitats.

Restrictions are:

- Obligation to keep visitors on marked trails/areas intended for sightseeing and visiting.
- Minimum visitor infrastructure and educational trails.

Zone 3b –recreation and visitor infrastructure zone

Permitted activities are:

- Management of the area in accordance with the carrying capacity and in cooperation with the local community.
- Development and improvement of visitor infrastructure (educational trails, ecological camps, visitor centres) based on sustainable development and in accordance with the preservation of biological and landscape diversity.

Restrictions are:

- Prohibited development of mass tourism, restrictions determined by the carrying capacity.

UNESCO MANAGEMENT

Ministry in charge of the UNESCO WH Sites in Croatia is Ministry of culture and media. Nevertheless, the Ministry of Economy and Sustainable Development coordinates the work of Public Institution Paklenica National Park including all the obligations regarding the UNESCO WH.

Both UNESCO WH components are a part of protected area in category national park and also a part of the UNESCO Velebit Mountain Biosphere Reserve. Velebit Mountain BR is managed by Coordinating Council consisting of representatives of Public Institutions (PI) Velebit NP, Paklenica NP, Northern Velebit NP and Local Action Groups. All nature parks and national parks in the Republic of Croatia are managed by Public Institutions and are under the jurisdiction of the Ministry of Economy and Sustainable Development. The PI activities include protection, maintenance and promotion of the protected areas for the purpose of protecting and preserving the authenticity of nature, ensuring undisturbed natural processes, sustainable utilization of natural wealth, and the supervision of implementation of nature protection stipulations and activities within the protected areas. The PI are managed by Management Councils, the Directors and the Conservation Managers. The Management Councils operate the Institutions whose business is managed by the Directors of each protected area, appointed by the Minister in charge of the nature protection affairs. In order to ensure coordinated, expert and systematic performance of activities related to the management of the protected areas, the PI are divided into several departments. Management Councils consist of

representatives from Ministry in charge, local authorities, local government and employees of the Public institution.

The Coordinating Council meets periodically at least twice a year or more when necessary. The overall internal organization and management of each PI is defined by its Statute of the Public Institution and the Regulations on Internal Structure and Operating Rules. Each PI has its own Management Plan which was adopted by its Management Council after securing consent from the, at the time, competent Ministry of Culture of the Republic of Croatia and technical approval by the State Institute for Nature Protection (SINP), for a period of 10 years.

New Management Plans for the three PI are in the initial preparation within the joint project of Ministry of Economy and Sustainable Development and Croatian Agency for Environment and Nature. The project is named "Establishment of the management framework for Natura 2000 ecological network". The aim of the project is to establish the framework for management of Natura 2000 ecological network (EN), and it will be funded through European funds from EU Operating Programme Coherency and Cohesion 2014- 2020. Management plans for all three PI will be jointly coordinated and in line with the goals and activities from the BR Management Plan. The Velebit Mountain Biosphere Reserve Management Plan was developed jointly by the three PIs with the timeframe of 10 years, following the guidelines from the Lima Action Plan.

Game management planning within the national parks is carried out through Game protection program, which provides management guidelines for the period of next 10 years. Game protection program for the period 2019-2029 is currently in force and it is also the first game protection program for the Paklenica National Park. The Program must be developed by legal or natural person who holds an appropriate license from the Croatian Chamber of Forestry Engineers and Wood Technology.

Actual state in the buffer zone (cutting, hiking, hunting)

Game management within the Park, as well as within the component parts and the buffer zones, is carried out on the basis of the Game protection program. As mentioned in the previous text, game hunting and the establishment of hunting grounds in National Park is forbidden, as well as the game hunting in the zone of 200 m from the border of the park. NP is surrounded by three state hunting grounds:

- XIII/28 – „STARIGRAD PAKLENICA" (6 665 ha),
- XIII/29 – „SVETO BRDO" (14 545 ha) and
- IX/22 – „VISOČICA" (15 663 ha).

Within the Park there is a stable population of chamois (*Rupicapra rupicapra*), wild boar, red deer, roe deer, wolf, lynx and brown bear. All the mentioned species migrate daily/seasonally crossing the border of the Park. It is important to note that besides within the National Park borders, in all of the three listed hunting grounds three species of large predators (brown bear, wolf and lynx) are present.

National Park is opened for visits throughout the year. The main visitors in the Park are hikers and climbers and the main the visiting season in the Park is from early April to early November, with a peak in July and August. In May and June, besides the climbers and hikers, the number of children and students visiting the Park is also notable. Potential activities include sightseeing, free-climbing, hiking, birdwatching, etc. There are 150 km of trails in the Park, of which close to 46 km in the area of component parts and the buffer zones. Most of these trails are passing through a 3b-recreation and tourism infrastructure zone (mostly the area of component part Suva Draga-Klimenta), while very few trails are passing through other protected area (zone 1a, 1b and 2a). The most used is trail that leads from the reception through Velika Paklenica Canyon to the Paklenica mountain lodge (taking about 2 hours). In addition, the trail that passes from Velika Paklenica Canyon to Mala Paklenica Canyon, is also popular among visitors (5-6 hours). To protect natural treasures, but also to secure rapid intervention and mountain rescue in case of accidents, climbing activities inside the Park are allowed only in the southern part of Velika Paklenica Canyon in the so-called recreation zone. Currently there are up to 500 climbing routes of various lengths and difficulties in the Park, and the

creation of new routes or supplements to existing routes must be approved by the Institution. Extreme sports are not allowed in the Park.

2.5.2. Croatia in general

2.5.2.1. Type(s) of forestry in place

Area covered by forests

Forests in Croatia represent a great natural wealth, covering 49,3 % of the total mainland area (2,76 mil ha). 90 % of the total forest and forest land area is covered by forests and the rest of the area is either not overgrown (8 %) or is barren forest land (2 %). Broad-leaved species dominate on 85 % of the forest area. High forests cover 37% of the territory, and the rest are in various degradation and succession stages.

State forests make about 76% of total forest area, while the remaining 24% are privately owned. Public enterprise "Hrvatske šume d.o.o." is responsible for management of 97 % of the state-owned forests, while the remaining 3 % is managed by legal bodies owned by the state (e.g. national parks, Faculty of Forestry, Ministry of Defence etc.).

According to the Forest Act forests are classified by purpose in three categories: 52 % (1,4 mil ha) are management forests, 30 % (0,8 mil ha) are protection forests and 18 % (0,5 mil ha) are forests with special purpose.

The average growing stock in the state-owned forests amounts 274 m^3/ha, while in privately-owned forests it is significantly lower (163 m^3/ha), which gives an average of 242 m^3/ha for the whole forest management area. The largest share in total growing stock has Common Beech (37,2 %), followed by: Pedunculate Oak (11,5 %), Sessile Oak (9,4 %), Common Hornbeam (8,4 %), Silver Fir (7,9 %), Narrow-leafed Ash (3,2 %), Norway Spruce (2,3 %), Downey Oak (1,8 %), Acacia (1,7 %), Black Alder (1,7 %) and Black Pine (1,4 %). Other species participate in the total wood stock with less than 1 %. The annual increment is on average 5,87 m^3/ha.

The annual cut varies between 70 and 75 % of the average annual increment, which means that forests in Croatia are managed by the principle of sustainable management, with the preservation of the natural structure and diversity of forests and permanent increase in the stability and quality of commercial and general forest functions.

General description of forests

The general development of forestry management in Croatia through history has been realized within complex historical, social, political and economic relations. The first written document regulating the relationship between man and the forest in Croatia appears in 12th century. Forestry in Croatia was organized in the second half of the 18th century in a very short period. It began with the first inventory and mapping of forests (1764), the founding of the first forestry offices (1765 in the mountainous area and 1773 in the lowland area) and the enactment of the first regulations with legal force (1769). Establishment of the first forestry offices as basic organizational units can be taken as the official beginning of the organized development of forestry management in Croatia. In 1968, the first *Rulebook on forest management and forest improvement programs* was the first rulebook that prescribes the rules for management of all forest and forest land for the entire territory of the Republic of Croatia. With the new Forest Act in 1977, forests and forest land have been declared as a wealth of national interest and forestry as an activity of national interest. The Act also introduces the term "forest management area".

After the disintegration of Yugoslavia and proclamation of the independent Republic of Croatia, a new Act on Amendments to the Forest Act was adopted in 1990. This Act stipulates that forests and forest land may be in state or private ownership, and a public company called "Hrvatske šume" is established for the management of state-owned forests. In 2003, the Government published the first, and so far, the only National Forestry Policy and Strategy, which defines strategic activities in forestry. In 2007, the Forestry Advisory Service was established as a service that had the authority to organize and implement the planning and management of private-owned forests. The Forestry Advisory Service ceased operations in 2010, when its powers took over "Hrvatske šume d.o.o.", and at the end of 2014, based on the Amendments to the Act on Forests in 2005, the Advisory Service was re-established as a part of the Agricultural-Forestry Advisory Service. In 2018, the Service was abolished and the Ministry of Agriculture took over the responsibility.

With the accession to the EU in 2013, legal regulations that have an impact on forest management and forestry were adopted and integrated within forest management planning (e.g. Regulation on the ecological network, Ordinance on conservation objectives and bird conservation measures in the ecological network, Ordinance on appropriate assessment for the ecological network, Ordinance on the list of habitat types, habitat map, and threatened and rare habitat types etc.).

The Republic of Croatia is characterized by a major abundance of biodiversity, geodiversity and landscape diversity. Biodiversity in forests is important for conserving diversity (from genetic to landscape diversity) and enhances the resilience of forests and their ability to adapt. Forest habitats occupy about 44% of the total land area. The largest area is occupied by mixed Oak-Hornbeam and pure Hornbeam forests, followed by mesophilic and neutrophilic pure Beech forests, and coastal thermophilic Downy Oak-Oriental Hornbeam forest and coppice. According to the Croatian National Habitat Classification, a total of 105 different forest communities are represented in Croatia.

Beech forests are classified in even 19 associations. In the lowland belt Beech grows within the Oak-Hornbeam forests. Its share increases in the hilly belt, while in the mountain belt (up to 800 m) is the most common species and has the highest economic value. At an altitude of over 600 (800) m it grows with Fir, while in the subalpine belt is again the main species. In the area of the western Dinarides (Gorski Kotar, Velebit), are the largest complexes of Beech and Beech-Fir forests, covering an area of about 200 000 ha.

Preservation status

The naturalness of forests in Croatia is great, i.e. the composition of tree species is very similar to the primeval forests from which they originated. 95% of forest stands have a natural and indigenous composition of species, and the degree of preservation is extremely high. Beech is the most common species, followed by fir, spruce, black ash and oak.

Currently, protected areas in Croatia cover 759 855 ha, which is the 8,63 % of the total area (12,33 % of the land territory and 1,96 % of the territorial sea). The largest part of the protected area are nature parks (4,9 %). According to the Register of protected areas in Croatia, there are a total of 412 protected areas in 9 categories: strict reserve (2), national park (8), special reserve (80), nature park (11), regional park (2), nature monument (79), significant landscape (83), park-forest (27) and park architecture monument (120).

Common beech is one of the most common tree species crucial for the stable functioning of many nature protected ecosystems in Croatia. It is one of the key tree species in as many as 6 out of 11 nature parks (Papuk, Medvednica, Žumberak i Samoborsko gorje, Učka, Velebit, Biokovo), and 4 out of 8 national parks (Risnjak, Sjeverni Velebit, Paklenica, Plitvička jezera) in Croatia.

Due to their value and uniqueness, some national parks from Croatia are included in the lists of internationally valuable areas. The Plitvice Lakes National Park and beech forests in the Paklenica National Park and the Northern Velebit National Park are on the UNESCO World Natural Heritage List. Velebit Nature Park Paklenica and Northern Velebit National Parks, and adjacent towns and villages, are compose the area

designated as Velebit Mountain Biosphere Reserve within the UNESCO scientific program 'Man and the Biosphere' - MAB.

Relevant legal framework for forestry practices

NATIONAL FORESTRY POLICY AND STRATEGY

This document determines and defines the national forestry policy and ensures its compliance with the planning acts of the Republic of Croatia. The overall policy aim is through sustainable management, use and comprehensive protection of forest resources and biodiversity increase the contribution to the national economy, applying research results, while respecting international trends and local community rights.

It is divided into following areas:

A. Management of Forest Ecosystems
B. Forest Administration and Legislation
C. Non-timber Products-Tourism, Hunting and Other Forest and Forest Land Products
D. Timber Industry
E. Environment and Physical Planning
F. Education Research and International Co-operation
G. Public Relations and Promotion.

FOREST ACT

According to the law, forests and land under the forest management are of great interest to the Republic of Croatia and they have its special protection. Forests and forest land are of special natural wealth, and the environmental services and economic functions of forests requests a special way of planning, management and use based on the principle of sustainable forest management. Sustainable forest management means the use of forests and land under the forest management in a way and to the extent that it maintains their biodiversity, productivity, regeneration capacity, vitality and potential to meet, at the present and in the future, the appropriate ecological, economic and social functions at local, national and global level and which does not cause damage to other ecosystems. The application of these principles is achieved through:

- sustainable forest management and multifunctional role of forests, whereby many goods and services are supplied and / or provided in a balanced manner and forest protection is ensured;
- efficient use of resources, optimizing the contribution of forests, forestry sector and forest-related sectors to rural development, growth and job creation, and;
- responsibility for forests on a global scale, promoting sustainable production and consumption of forest products.

The implementation of the defined sustainable management of forests is secured through the development and implementation of different type of forest plans and programs.

ORDINANCE ON FOREST MANAGEMENT

In addition to the Forest Act, the Ordinance on Forest Management is the fundamental legislative document based on which forest management in Croatia is conducted. This Ordinance determines the detailed management of forests in every segment. The Ordinance regulates the content, deadlines and manner of preparation of forest management plans, as well as the conditions for the preparation of extraordinary revisions of plans.

ORDINANCE ON THE TYPE OF FORESTRY WORKS, MINIMUM CONDITIONS FOR THEIR PERFORMANCE AND WORKS THAT FOREST OWNERS CAN PERFORM INDEPENDENTLY

This Ordinance prescribes the types of forestry works, the minimum conditions that must be met by legal or natural persons for the performance of works in forestry, and the works that forest owners may perform independently.

The types of forestry works prescribed by this Ordinance are:

1. Development of forest management and hunting management plans
2. Forestry, forest seed production and nursery
3. Protection of forests from harmful organisms, fires and natural disasters
4. Wood extraction
5. Construction and maintenance of forest infrastructure
6. Urban forestry
7. Forest ecology and conservation of forest biodiversity
8. Selection of trees for felling (tree stamping)
9. Forest management of private forest owners.

Forestry works referred to in this Ordinance may be performed by contractors who meet the minimum requirements for the performance of forestry works and who have passed the licensing procedure of forestry contractors. The minimum conditions for the performance of forestry works include the fulfillment of the prescribed conditions of professional and technical qualification.

The conditions of professional qualification are met if all employees of the contractor (license holder) are employed full time, in appropriate jobs. The conditions of technical competence are met if the contractor (licensee) has machines, devices and devices, equipment and means necessary for technologically appropriate execution of works. The condition of technical competence also includes equipment for the protection of workers at work and protection against harmful effects for all persons who are on the job site.

The forest owner can independently perform works in his forest that are performed with simple hand tools, such as habitat preparation works, filling works, care and cleaning of stands, afforestation works and other works for which he is professionally qualified. It is considered that a forest owner performs works independently if he is assisted in them by members of the family household.

HUNTING ACT

This act regulates the management (breeding, hunting, protection and use of game and its parts) of hunting grounds and game on a sustainable way, which means in a way and extent that permanently improves the vitality of game populations, habitat production capacity and biodiversity.

The hunting ground is managed on the basis of hunting management plans:

- Hunting management plan
- Game breeding program (for game breeding site) and
- Game protection program (for the areas outside the hunting ground).

Hunting management plans are prepared by the legal or natural person who holds the licence from Croatian Chamber of Forestry Engineers and Wood Technology. The implementation of plans is the obligation of hunting licenses or users of areas where the hunting ground is prohibited, as well as experts for the implementation of hunting management plans.

Establishment of hunting grounds is forbidden in protected parts of nature if hunting is prohibited by special regulations. Also, game hunting is prohibited in the zone of 200 m from the border of protected parts of nature. Instead, for those areas Game protection program is being established.

NATURE PROTECTION ACT

It is the fundamental legislation governing the conservation of biological and landscape diversity. This law defines the categories of protected areas, the methods for management thereof, in this regard, and the basic relevant documents. The fundamental nature protection document is the Strategy and Action Plan for Nature Protection of the Republic of Croatia. The obligation of the development of the Strategy is proscribed by the Nature Protection Act. The Strategy sets long-term goals and guidelines for biodiversity and geodiversity conservation and it is developed by the Ministry in charge for protected areas and nature protection.

Protected parts of nature under this Act are:

- Protected areas (national park, special reserve, nature park, regional park, natural monument, significant landscape, park-forest and monument of park architecture)
- Protected species (strictly protected wild species) and
- Protected minerals and fossils.

National park is a large, mostly unaltered area of land and/or sea of exceptional and multiple natural values that includes one or more preserved or slightly modified ecosystems, and is primarily intended for the preservation of original natural and landscape values. This type of protection prohibits the economic use of natural resources, but allows interventions and activities that do not endanger the naturalness of the area, as well as performing catering-tourist and recreational activities.

Forest management in national park is carried out according to the Forest ecosystem protection program, which is the constituent part of the management plan of public institutions that manage protected areas.

CROATIAN CHAMBER OF FORESTRY ENGINEERS AND WOOD TECHNOLOGY

Croatian Chamber of Forestry and Wood Technology Engineers was established in 2006, pursuant to the Croatian Chamber of Forestry Engineers and Wood Technology Act. The establishment of the Chamber was jointly initiated and realized by the Ministry of Agriculture, Forestry and Water Management, Croatian Forestry Society, Faculty of Forestry, Forestry Institute, Croatian Forests Ltd. Supervision over the work of the Chamber is performed by the Ministry of agriculture.

The Chamber is an independent professional organization that performs the public powers entrusted to it. It preserves the reputation, honor and rights of its members, ensures that certified engineers perform their duties conscientiously and in accordance with the law, and promotes, represents and harmonizes their interests before state and other bodies in the Country and abroad.

Forestry and wood technology engineers who perform professional tasks in the field of forestry, hunting and wood technology must be associated in the Chamber, in order to represent and harmonize common interests, protect the public interest and protect the interests of third parties.

Professional tasks performed by the forestry and wood technology engineers are: designing, development, evaluation, execution and supervision of works in the field of cultivation, forest inventory, exploitation and opening of forests, hunting, forest protection, horticulture, nursery production, consulting, product quality testing, forensic expertise, development and revision of professional studies and plans, project and professional documentation control, construction of devices, selection of equipment, facilities, processes and systems, professional training and licensing of works in forestry, hunting and wood processing.

Licensing of forestry contractors is a procedure in which a state-authorized institution (Croatian Chamber of Forestry and Wood Technology Engineers) in a special procedure, confirms that the applicant meets the

prescribed professional criteria that make him professionally qualified and legally capable of performing works in forestry, and for which he is issued a professional license.

REGULATION ON THE ECOLOGICAL NETWORK

Ecological network of the Republic of Croatia was proclaimed by the Regulation on the ecological network, and represents the part of ecological network of EU - Natura 2000. Natura 2000 consist of areas of wild plant and animal species, their habitats and habitat types, whose conservation is in the interest of the European Union.

In cases when Natura 2000 sites overlap with forests, forest management plans must integrate Natura conservation guidelines into the Forest management program with ecological network management plan. During the development of such programs, public hearings must be held and the program must be approved by the Ministry responsible for nature protection.

Forest management planning and implementation

We can say that forest management in Croatia is well-organized. Forest management plan for the Republic of Croatia (General FMAP) is a general plan for appointing activities which will be performed in the forests and forest land within the whole Croatian forest management area. The FMAP provides ecological, economic and social support for the biological improvement of forests and the increase of forest production in the forest management area. The adoption of the FMAP is defined in the Forest Act and must be consistent with the provisions of the Nature Protection Act and the Regulation on Proclamation of the Ecological Network. Purpose of determining the FMAP is to ensure the sustainable forest management through conservation of the natural structure and diversity of forests, including the permanent increase of the stability and quality of the economic and general forest ecosystem functions. The FMAP appoints activities which will be performed in the forests for the next 10 years but also describes the management in the previous 10-year period and the status of forests at the beginning of the new 10-year period. Currently is valid the General FMAP for the period from 2016-2025.

The forest management area of Croatia is divided into 684 management units owned by the Republic of Croatia and 407 management units in the private ownership. Out of total number of management units owned by the state, 649 units are managed by the public enterprise “Hrvatske šume d.o.o.” (Croatian Forests Ltd.) and 35 are used or administered by legal administration bodies owned by the state.

For each forest management unit, forest management plan is prepared. Forest management plans are subject to revision in the tenth year of validity and renewal in the twentieth year of validity. According to the General FMAP for the period of 2016-2025, 96 % of the state-owned forests and more than 70% of privately-owned forests have valid management plans. All forest management plans and programs developed for management of each forest management unit should be in line with the General FMAP.

The forest management plans are as follows:

- Forest Management Area Plan for the Republic of Croatia (FMAP)
- Forest management plan for forest management units
- Forest management program with ecological network management plan
- Programmes for management of private forests
- Programmes for management of forests with special purpose for the defence of the Republic of Croatia
- Forest seed facility management program
- Forest protection, care and restoration program
- Special purpose forest management program managed by Legal person

The Ministry of Agriculture supervises the decision-making process of management plans as well as their renewal and revision.

Croatian forest management area is divided in 17 organizational and territorial units – regional forest administrations (subsidiaries), which are further divided into 169 regional forest offices. The forest office is the basic organizational unit for performing all expert and technical activities in forest management and they are directly supervised by the regional forest administration. Forest management in forest units is based on forest management plans for individual management unit approved by the Ministry of Agriculture.

The area of a management unit is usually between 1 000 and 3 000 ha and usually they are not changed. Management unit is divided into compartments which are considered as the permanent and basic unit regarding the management forest division. They are established in order to facilitate the management, inspection and field orientation. The compartment area, except for first age class, shrub, scrubs, maquis, garigue and barren wooded land, in general cannot be larger than 60 ha. Compartments are divided into smaller areas (sub-compartments) which are the smallest variable, basic area regarding the management division of forests which is specially managed as a stand. In general, they are smaller than 1 ha.

Forests and forest land that are not owned by the Republic of Croatia are managed by private owners, supported by Ministry of Agriculture. The implementation of forest management plans in private owned forests is a bit difficult, due to the very small average properties, lack of interest from numerous forest owners and lack of economic incentive (for smaller properties, the costs of management interventions can outweigh the profits).

All national parks and nature parks in the Republic of Croatia are managed by Public Institutions established by the Croatian Government and are under the jurisdiction of the Ministry of Economy and Sustainable Development. The obligation to draft management plans is stipulated by Nature Protection Act. The management plan is adopted by the public institution's Governing Board after securing consent from the Ministry in charge for protected areas and nature protection and technical approval by the Sate Institute for Nature Protection, for a period of 10 years. Public hearings must be held during development of such plans. The management plan is implemented in practice through annual programs of conservation, use and promotion of the protected area. Paklenica National Park Management Plan is adopted for the period of 2007-2016, and the new plan is in the process of development as a part of the national project "Development of the framework for the management of the Natura 2000 ecological network".

Types and causes of harvesting and intensity

Tree selection for harvesting is performed according to forest management principles, guidelines and the manner of management prescribed by forest management plans. In forests for which a forest management plan has not yet been prepared, it is done in accordance with forest management principles and the principle of sustainable forest management. Selecting trees for harvesting is done by forestry engineers.

There are two kinds of trees selection processes: positive and negative selection. The goal of any kind of selection is to form stable and productive forest stands of optimal structure and maximum growth of quality wood. During the process of positive tree selection, the goal is to help phenotypically best quality trees, while respecting the principles of sustainability. While with the negative tree selection process, focus is on removing the low-quality and undesirable trees.

Types and causes of harvesting are very related to forest management types. The forest management type significantly depends on the ecological characteristics of tree species and the habitat type in which these species grow. The purpose of the forest also has a significant influence on the choice of management methods, so management in economic, protective or special purpose forest differs significantly.

According to the Ordinance on forest management, three methods of forest stand management are prescribed:

- regular system - (in even-aged stands)
- group-selection system (uneven-aged stands).
- selective management (in beech-fir stands)

EVEN-AGED STANDS

Even-aged (regular) forest stand is one in which all the trees are equally old, tall, and thick (trees are of equal age, chest diameter, and height). The difference between the ages of the youngest and the oldest tree is not more than 20 years.

In regular forests, we distinguish the terms of ''main harvesting'' and the ''previous harvesting''. The main harvesting is realized in stands that are ready for natural regeneration process. The term of previous harvesting (intermediate harvesting) is realized in still immature stands through the process of stand thinning.

Even-aged stand regeneration is close-to-nature process of rejuvenation under the canopy of crowning old trees. It is performed with 3 consecutive processes of harvesting (1. Preparatory felling; 2. Felling in the time of good fructification; 3. Final felling), by gradually removing the trees of the parent stand with the simultaneous appearance of natural seedlings and offspring of the new generation of forest stands. During this process, all trees of the old (parent) stand are gradually cut down during the rejuvenation period, which is relatively short, approximately 5 - 20 years. Thus, from an even-aged old stand, young even-aged stand is created.

The preparatory felling is the first phase that is done in the process of rejuvenating the stand. It creates conditions that allow the appearance of seedlings from those types of trees that we want in the future forest stand. During this phase of harvesting, all trees that are morphologically bad or deformed are removed from the stand. Trees of those species whose seeds we do not want on the rejuvenation area of the forest stand are also removed.

The Fructifying felling is performed after the preparatory felling. The period between the preparatory and fertile felling is called the fructifying period because during that time trees fructify the rejuvenation area with their seeds. It is carried out in the year when the trees have produced good seed yield, or 1 to maximum of 2 years after good seed yield of the forest stand. With this felling phase, the goal is to bring the optimum amount of sunlight to the rejuvenation area so that seedlings and offspring are able to grow and further develop. In order to reduce the damage to the seedlings and offspring it is carried during the winter. During this phase, about half of the trees that are left on the rejuvenation area after the preparatory felling, are felled.

With the final felling, the remaining old trees are cut from the rejuvenation area. This ends the change of generations process. During this phase, special attention is paid to the preservation of seedlings and offspring.

UNEVEN-AGED STANDS

In uneven-aged stands, groups of trees of different ages and developmental stages are arranged, where the trees within each group are of same age and developmental stage, and the management is group-based. The area of an individual group of trees of the same age and developmental stages in uneven-aged stands should be from 0.2 ha to 2.0 ha. This type of management is applied in karst forests, special purpose forests, protective forests and privately-owned forests.

In uneven-aged stands, the wood stock has slight oscillations over time and this amount should range from the highest value at the beginning of the rotation (before felling) to the lowest value at the end of the

rotation (after felling). Rotation is the time that elapses between two regular felling interventions in the same stand and is generally equated with the duration of economic half-period of 10 years.

Prescribed harvesting is realized through the thinning and regeneration in groups. This type of management has the characteristics of regular management, but on smaller areas (0,2 – 2,0 ha). This means that in a certain uneven-aged stand, depending of its structural and habitat characteristics, works will be carried out simultaneously in spatially separated groups:

- Nursing and
- Regeneration.

SELECTIVE MANAGEMENT

Selectively managed forest is a forest in which, on a relatively small area, trees of all dimensions (with respect to chest diameter and height) exist, mixed individually or in small groups. It is characterized by non-uniform structure in which rejuvenation and care works are carried out by tree or group selection, mostly at the same time and on the same surface.

The goal of selective harvesting is to rejuvenate and nurture the selective stand and maintain its selective structure at the same time by unevenly interrupting the canopy (by removing the appropriate trees). Management in selective forest includes two types of silvicultural procedures: 1. care for the young generation; b) screening trees process (it includes thinning) and the use of mature trees. Selective harvesting in selective forest management is considered to be close-to-nature and almost a perfect way of management of forest ecosystems. Selective felling can be done in any forest, but in Croatia, selectively managed are only beech-fir stands).

SANITARY FELLING

For the purpose of preserving vitality, protection and preservation of forests, the with following features can be selected for felling (so-called sanitary felling):

1. dead trees

2. alive trees with:

    - having a leaf loss of more than 60%
    - if the top of the tree in coniferous trees is affected by dying
    - on which characteristic symptoms of diseases and pests appear on the bark or under it (e.g. characteristic dark spots on the bark of the trunk, mycelium of various fungi, sawdust of bark beetles, etc.).

Functions of forests

Forests provides us a great number of functions and services. At the same time, many roles are either co-dependent or linked together and they change in time and space. Besides the productive function, much more important is the non-productive function of forests, which includes all the positive effects of forest ecosystems on the environment in terms of providing ecological support to the landscape, maintaining and improving biological production, naturalness and environmental diversity, as well as the positive impact on human health, especially on the mental mood.

The non-productive functions of forests are reflected in:

- protection of soil from erosion, torrents and floods
- impacts on the water regime and hydropower system
- impact on soil fertility and essential determination of agricultural production
- climate impact
- protection and improvement of the human environment
- oxygen generation, carbon sink and purification of the atmosphere
- recreational, tourist and health function
- creating favorable conditions for wildlife and other fauna
- increased impact of protective forests and special purpose forests on biodiversity.

Integration of nature conservation, water management, and cultural heritage into the forest management plans

Before obtaining a decision of the Ministry of Agriculture, which approves the forest management plan with the management plan of the ecological network area, it is necessary to obtain the consent of the central state administration body responsible for nature protection issues. This way, nature conservation issues are appropriately regulated for each forest management plan being created / revised / renewed.

The impact of forest ecosystems on the water regime and hydropower system is immensely important. It manifests in the purification of groundwater and surface water, the continuity of water supply and the prevention of its rapid runoff.

According to the Waters Act, forests in a public water resources are protective forests. Water resources consist of land plots that include: 1. aquifers and abandoned surface riverbeds; 2. regulated/unregulated inundation area; 3. area where the water source is needed for its physical protection 4. islands formed in the aquifer riverbed. According to the aforementioned Act, forests in the public good are managed by a legal entity determined by forest regulations, in accordance with the forest management plan, previously approved by Croatian Waters. The forest management plan must be approved by Croatian Waters before it can officially be approved by the Ministry of agriculture. Croatian Waters is a State company responsible for the management of public water resources in accordance with Waters Act. This way, for forests that have the greatest impact on the water regime are appropriately regulated and harmonized relations of forest ecosystems to water management, and vice versa.

Protection and Preservation of Cultural Heritage Act, owners and users of forests and forest lands are responsible for cultural goods located in the areas they manage. They are obliged to take the following measures to protect and preserve them:

- When drafting forest management plans, it is necessary to map the recorded, preventively protected and registered cultural assets located in forests and on forest land in the area of the management unit.

- If the cultural property is located on an area of more than one hectare, the area should be separated into a special section and the necessary forest management restrictions should be prescribed.
- It is necessary to define and describe measures for protection and preservation of cultural assets in the forest management plan of the forest management unit.
- When designing and building roads, planning and implementation of works on felling, transport of cut logs, afforestation, etc., in areas that are recorded and mapped as cultural property, it is necessary to respect protection and preservation measures prescribed in the forest management plan.
- If during the construction or any other works performed on the surface or below the soil surface an archaeological site or finds are encountered, the person performing the works is obliged to stop the works and inform the competent body without delay.

Public participation/consultation procedures in place during the elaboration of the forest management plans

A forest management plan is prepared for each forest management unit in Croatia. If the forest has not been previously managed, a forest management plan is created. Valid forest management plans are subject to revision in the tenth year of validity and to the renewal in the twentieth year of validity.

The program of protection, care and restoration of forests determines interventions on forests and forest lands within protected areas or natural values protected on the basis of nature protection regulations. This applies to categories of strict reserve, national park, special forest vegetation reserve and forest park for a period of ten years. every ten years.

The procedure for approving forest management plans is carried out in accordance with the Forest Act. The forest management plan, its renewal or revision shall be approved by the Ministry by a decision. Forest management plans and their renewal or revision shall be approved on the basis of the opinion of the Commission on their compliance with the FMAP for the Republic of Croatia and the regulations of Forest Act. The Commission is established by the Minister from among forestry experts.

Before the initiation of the approval procedure by the Ministry, forest management plans are subject to public inspection, which must last at least 15 days. After the public inspection, a public hearing must be held. Comments and suggestions from the public, received during the public hearing, are evaluated by the forest management plan contractor. Given the accuracy and relevance of the comments and remarks received, changes are made to the forest management plan prior to its submission to the Ministry for approval.

Game management planning

The game is of good interest to the Republic of Croatia and has its special protection.

The hunting management plan is a planning act which regulates in detail the management, breeding, protection, hunting and use of certain game and hunting ground for a period of ten hunting years. It has to be planned in accordance with habitat possibilities and the number and condition of game population bred in open and fenced hunting grounds. The development of hunting management plans and their revisions must be entrusted to a legal or natural person who holds an appropriate license from the Croatian Chamber of Forestry Engineers and Wood Technology.

The hunting management plan is based on the number of game species permanently or seasonally living in the hunting ground and on the number of game that can be bred in the hunting ground, taking into account the presence of strictly protected animal species affected or affected by hunting management. The hunting management plan must be implemented without disturbing the natural relations between the species.

The right to hunt is executed as a right and duty to implement a hunting management plan. The implementation of hunting rights is not permitted without an approved hunting management plan. The

planning of game shooting must be in accordance with the number, age and sex structure of the game in the hunting ground and the survival needs of strictly protected and other animal species.

Sustainability of forestry practices

Forests and forest land in Croatia are used in a way, and to the extent, that maintains their biodiversity, productivity, regeneration capacity, vitality and potential to meet current ecological, economic and social functions at the local, national and global levels. In a way which does not cause damage to other ecosystems.

The application of the principles of sustainable forest management is achieved through:

- sustainable forest management and the multifunctional role of forests, whereby many goods and services are delivered
- efficient use of resources
- optimizing the contribution of forests, forestry sectors and forest-related sectors to rural development, growth and job creation
- promoting sustainable production and consumption of forest products
- responsibility for forests globally.

Financial resources required for the implementation of sustainable management of forests and forest lands are provided from the following sources of funding:

- by the means of the forest owner
- from the fee for the common welfare forest functions (OKFŠ)
- funds from other public sources
- funds allocated by the Users for increased management costs.

Legal and natural persons who are liable to pay profit tax, and natural persons who are liable to pay income tax, and perform a registered activity in Croatia (with total annual income and income in excess of HRK 3,000,000.00) pay a fee for the common forest functions. The Fee shall be paid in the amount of 0.0265% of the total revenue or total receipts. It is paid into the State budget for the purpose, among other things, to meet the criteria for sustainable forest management in Croatia.

The practice of sustainable forest management is directly implemented through the type, scope and dynamics of works prescribed by forest management plans. Management plans are revised every 10 years, with evaluation of implemented measures and defining of guidelines and goals for the next period.

3. Comparison of results and recommendations

While this analysis produced an overview of the forestry situations in the buffer zones of only the project pilot areas, which are a small subset of all the component parts and clusters of this World Heritage property it is clear that the differences among the countries are quite stark. Several main differences emerge:

1. Land ownership (and use of forests in the buffer zones)
2. Size of the buffer zone (and subsequent subdivision into protective and landscape buffer subzones)
3. Naturalness of the forests
4. Forestry systems in use in the wider areas (outside of buffer zones)

Land ownership opes up the first major point of difference. While the buffer zones in Slovenia, Austria and Croatia are almost entirely state-owned and/or under firm management authority of the protected area management, the German component part's buffer zone is largely privately owned. Slovakia resolved a similarly difficult situation with the boundary modification proposal, with which private properties were excluded. The private ownership is not an issue by itself, however, it is common for forest owners to want to have economic benefit from their forests. In the absence of appropriate compensation schemes and lacking monitoring of harvesting activities, such situations can lead to commercial use of protective buffer zones and thus affect also the WH property, which is what the buffer zones should be protecting. According also to the latest discussions and drafts of the common Guidance document on management of core and buffer zones, most if not all State Parties agree, that protective buffer zones should be free of commercial forestry use, with only minimal measures, if at all, allowed. Among the areas studied in this assessment, only Slovak components have additional landscape conservation zone, all other component parts only feature protective buffer zones.

Recommendation 1: BEECH POWER would recommend that the State Parties/WH site managers ensure that either appropriate compensation schemes are in place for private owners within buffer zones are provided or the land is purchased and managed as a mostly non-intervention regime. Within landscape buffer zones, sustainable forestry use can be established.

The sizes of the buffer zones also differ quite significantly among countries studied. Buffer zones at the sites studied in Slovenia and Germany currently do not fully meet the minimum size requirements discussed within the framework of Joint Management Committee. While both component parts in Slovenia are surrounded by vast unbroken forests, that are managed in close-to-nature way, the studied German component is more exposed, as agricultural and other non-forest land areas are close-by on three sides, making the component part into a forested peninsula in the landscape. Even so, there are some procedures in place to increase the buffer zones in Slovenia, to comply with international guidances. The buffer zones in Slovakia and Croatia were recently modified along with other boundary modifications and follow the guidances provided. Slovakia and Austria also feature by far the largest buffer zones among the studied areas. While Slovakia had with the boundary modifications already defined both protective and landscape conservation buffer subzones, such a need is also expressed in Austria, however the processes have not started yet in earnest.

Recommendation 2: BEECH POWER urges State Parties to agree on and adopt the Guidance Document on the Management of Core and Buffer Zones. This document would provide much needed basis and target setting for all component parts and clusters to move towards. We fully recognise the vast

variability among the different countries and conditions. Nevertheless, at least the minimum size of the protective buffer zones and the regimes within them should be ensured, even if that would require more boundary modifications in countries.

While the situation regarding the naturalness of the forests vary among countries, especially if we compare the general forest areas outside of buffer zones, most countries exhibit close-to-natural and undisturbed forests within the buffer zones of their component parts. There are some altered forests in the German buffer zone, as well as a significant proportion of forests in the buffer zones (and also some in the core zones) of Slovak components were recognized as modified to different degrees. While a political consensus already emerged about non-intervention regimes within WH property, regardless of the current state of naturalness in those forests, there are still on-going discussions about the degree of interventions to be allowed within protective and landscape conservation buffer subzones.

Recommendation 3: The protective buffer zones are in place to protect the WH property from outside influences. In majority of cases, that would require a close to, if not, non-intervention regimes. However, if a case can be made for stabilisation of conditions, due to consequences of part management interventions, one-off and temporally limited interventions should be considered in considerably altered forest stands. Sustainable and ideally close-to-nature forestry should be implemented in landscape conservation buffer subzone.

One of the great current challenges of the stakeholders involved in this UNESCO World Heritage property is to reach a common understanding among foresters from the involved countries. The present analysis from five of the 12 currently involved countries, demonstrates significant differences in how forestry is practiced across Central Europe. While all involved countries strive towards sustainable forestry, the use of different forestry systems vary considerably (clearcuts, sheltherwood cutting, close-to-nature, etc.). Slovenian and Croatian systems appear closely related and oriented very specifically towards selective cuts and groups selection, while clearcutting is in some cases still practiced in other three countries. There is a need to reach a common understanding of forestry terms that are used. For example, close-to-nature forestry is a term used in Slovenia, Croatia, and Slovakia, yet each country defines and implements it differently. In this case, Slovenia and Croatia have a relatively similar definition, while Slovakia differs. A similar situation appears when one considers the definition of shelterwood cutting, which is similarly defined in Slovakia and Romania (which was not part of this assessment) and say Slovenia.

Recommendation 4: In order to constructively cross this divide, more knowledge exchange among foresters in the involved countries will be needed, to come to at least a common understanding of terms and practices, even if the implementation of forestry measures continues to differ among different states. This can be partly achieved through the future planned project activities on BEECH POWER and partly through the working groups that will be established in the coming months through the Coordination Office.

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D.T2.3.1: Framework Joint Assessment of Current Forest Management Situation in Buffer Zones of Target Areas

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