D.T2.2.9 Summary report

Summary report based on anture conservation management planning (D.T2.2.7)

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Content

1. Introduction

Centralparks Interreg CE1359 project aimed to mitigate the lack of capacity within the managers of nature conservation through the development, field implementation, and evaluation of innovative methods and tools for proper nature conservation management planning. The Activity's A T2.2. „Integrated nature conservation management planning based on the outcomes of A 2.1" main result is the preparation of an integrated, science-based nature conservation management plan for the Börzsöny Mountains, Hungary, based on international cooperation.

The Centralparks project

The Carpathians are one of the most important European ecoregions. They are one of the European wilderness refuges, where the natural values are threatened by biodiversity loss and increasing human pressure. Traditional nature conservation is lacking to succeed in the protection of these natural values. Such issues cannot be solved by individual countries, therefore transnational cooperation was needed. The Centralparks project aims to build management capacities of Carpathian protected areas for the integration and harmonization of biodiversity protection and local socio-economic development.

One of the specific objectives set up for the project is "improving integrated environmental management capacities of protected area administrations and other public sector entities dealing with the protection and sustainable use of natural resources". Within the project, the Danube-Ipoly National Park Directorate aims to build the capacities of Carpathian protected area managers.

Work of WPT2 – Building management capacities for protected area managers

Currently, nature conservation is lacking in human resources and export capacities, which makes long-term planning of nature conservation difficult. Mostly old-fashioned habitat mapping methods are in the everyday use of protected area managers, which need special expertise and use a large proportion of resources. Nature conservation management planning is lacking effective, integrated, science-based information, therefore the preparation of innovative tools and methods is needed.

To face the main challenge, international cooperation and experience exchange will be built to address and share best practices in biodiversity and site management. As a base of the new approach, innovative site evaluation methodologies were developed and tested within the project. The short summary and final results of the methodologies and the field implementation experiences will be introduced within this deliverable.

2. Workshop about the presentation of LiDAR

A workshop about the presentation of LiDAR (laser scan technique), forest state evaluation toolkit D.T2.1.1 (Királyrét, Szokolya, Hungary 2019. 09. 17-19.) was organized by DINPD. Adequate experts on the presented methods were contracted on 3 topics: LiDAR laser scan technique, forest state evaluation protocol, and grassland state evaluation protocol.

In the workshop, the representatives of the PPs, protected area managers, 3 Hungarian National Park Directorates (Balaton-felvidéki NPD, Fertő-Hanság NPD, and Kiskunság NPD), local forestry managers (Ipoly Erdő Zrt.), researchers (Eötvös Loránd University, University of Sopron) and representatives of the Hungarian Agricultural Ministry were presented, altogether 28 participants were presented. 4 professional lectures on the innovative conservation planning methods, 2 group discussions, and 2 field visits were held during the workshop including the field presentation of forest state evaluation protocol.

During the workshop, the method and a case study were presented next to the introduction of forest state evaluation, which was tested in the field as well.

Based on the results of the workshop a joint strategic document on raising good PAs management capacities (toolkit, O.T2.1) was developed. The toolkit showcased the 3 methods that were presented in the workshop including the technical description and a case study on the LiDAR technique, with a focus on the possibilities to use the methods in nature conservation planning.

The technical specification of the public procurement for the LiDAR study implementation was prepared, with the determination of the flying area.

The exact methods of the habitat mapping were determined based on the National Biodiversity Monitoring System (Nemzeti Biodiverzitás monitorozó Rendszer), using the categories set up by the description and determination of Hungarian habitat's vegetation.

3. Forest state evaluation

A huge area of Börzsöny mountain is part of the Danube-Ipoly National Park. The native vegetation is deciduous woodland. The understanding of natural processes is a must for long-term conservation. It is precisely for the reason why it had to revise. Precisely for this reason, it was necessary to revise the forest evaluation method and update the dataset that was gathered in the SH-4/13 project. Furthermore, the evaluation method of forest management effects and the sampling method for Börzsöny mountain itself had to be worked out.

The possible effects were the use of wood, forest management interventions, and natural disturbances (like ice breaks) lacking information provided by the new methodology.

The new methodology followed the structure of the systematic forest state assessment methodology, developed within the SH4/13 project (and was introduced in the workshop (D.T2.1.1) and toolkit (D.T2.1.2). Among the possible impacts, the present work focuses primarily on tree utilization since the surveys, silvicultural interventions, and any significant natural disturbances that may occur.

The field implementation was carried out from 2014 to 2016. During the project, almost 60.000 plots were sampled. The results were published in the ROSALIA journal. In this report, only the results from the Börzsöny mountain are represented.

In Börzsöny 35048 sampling points, covering almost 29100 hectares were recorded. The density of sampling points was different. 1, 2, or 4 sampling points per hectare were applied.

4. Grassland state evaluation:

The methodology was based on the idea of the methodology introduced within O.T2.1 „Assuring quality in grassland management with a goal-oriented database" together with the base of the forest state evaluation protocol (SH4/13 project). During the preparation, the Natura 2000 monitoring protocol for dry grasslands was used as background documentation.

There are numerous, very diverse (even within one habitat) grasslands within the administration area of the Danube-Ipoly National Park Directorate. That means a dozen of more than 100 ha areas of grassland in the total administration area of the national park.

These grasslands are mostly affected by turning into shrubs to a greater or lesser extend or are the areas of previous shrub removal.

The results were evaluated according to the ÁNÉR 2011 habitat types during the field season of 2021.

5. Habitat mapping

The methodology for habitat mapping exfoliated in the Hungarian vegetation botanical and nature conservation practice in the 1990s, based on the vegetation mapping. The overgrown numbers of vegetation categories did not enable practical use for nature conservation purposes, and were not able to serve as a base for proper treatment planning. The first General Hungarian Habitat Categorization System (Általános Nemzeti Élőhelyosztályozási Rendszer – Á-NÉR) was published in 1997. There were several updates so far, the actual category system was prepared in 2011, which includes every single habitat type occurring in Hungary. The Danube-Ipoly National Park Directorate prepared 90 habitat maps since its establishment in 1997 in its administration area.

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The goal of the habitat mapping is to picture the vegetation patterns of the determined area (on the average scale of 1:5.000 – 1:10.000 m). The applied category system must be appropriately rough to describe a manageable patch size and be not too fragmented, as well as it needs to be appropriately fine structured to enable the detach of the different management claimed patches. This allows the surveyor to map daily 2-300 ha area. The quality isolation of the patches is only partly achievable based on the habitat categories. The other very important base of the analysis is the adaptation of the naturalness-degradation scale, which allows the description of the different status of the patches under the same habitat categories. E.g., the comparison between a well-structured, more layered, mixed beech forest and a same-aged, unmixed young beech forest is only possible with the survey of the additional data.

Further important supplementary information was surveyed during the implementation:

- the presence of protected and rare plant species;
- the potential habitat type;
- the threats and risks;
- any treatment/management proposal.
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The potential vegetation could determine the end goal of nature conservation management.

The collected data allows the National Park Directorates to fulfill their obligations to display Natura 2000 marker habitats during the forest management planning. These data also simplify the nature conservation management planning itself: we will see how many areas are available from the exact habitat types, the distribution of the high nature conservation value habitats, and pictures the general threat of the area.In the sub-areas of the planning area with special nature protection classification (natural zone, specially

protected area, forest reserve core area), it is possible to carry out educational and demonstration activities only on the marked tourist routes.

The Danube-Ipoly National Park Directorate will carry out the habitat mapping for 30.000 ha within the framework of the Centralparks Interreg CE1359 project. For the 24.880,4ha area, an external expert was contracted. The work has been completed in the summer of 2021.

Based on the data received, we drew the following conclusions (Chart 1 and 2). For the clear visibility of the results, we only name habitat groups within the 1st chart.

Habitat Group	Area (ha)	Ratio (%)
Euhydrophyte vegetation	0,3	0,0
Springs, transition mires and raised bogs	0,1	0,0
Marshes	11,9	0,0
Rich fens, wet grasslands and tall herb vegetation	14,9	0,0
Mesic hay meadows, pastures and dry heaths	138,0	0,5
Dry and semi-dry closed grasslangs	423,6	1,4
Open dry grasslands	7,3	0,0
Scrub	194,3	0,6
Riverine and swamp woodlands	238,5	0,8
Mesic deciduous woodlands	13590,7	44,7
Dry deciduous woodlands	7551,5	24,8
Rocky forests	964,7	3,2
Other treeless vegetation	394,1	1,3
Other tree-dominated habitats	4894,8	16,1
Forests and plantations dominated by non native tree species	1379,3	4,5
Other habitats	259,7	0,9
Agricultural habitats	316,1	1,0
Water bodies	19,3	0,1
Sum	**30399,0**	**100,0**

Chart 1: Distribution of the habitat categories

As we can see, the mesic deciduous woodland group is the most abundant group (mainly: beech, hornbeam and sessile oak). The second most abundant group is made of turkey oak, pubescent oak. The grasslands and moors are only sparsely distributed, covering a little area. Most of these are holding a wide variety of protected species.

Naturalness value	Area (ha)	Ratio (%)
1	1834,4	6,0
2	5204,9	17,1
3	6834,9	22,5
4	15880,9	52,2
5	644,0	2,1
Summary	**30399,0**	**100,0**

Chart 2: Distribution of the naturalness-state scale (1: very bad; 5: in a very good naturalness state)

The naturalness value is a usable, practical tool for assessing naturalness of patches of habitat maps. We can see, that the majority of the areas are in relatively good condition, but the poor and average condition is also very present.

6. LiDAR laserc scan study

The determined area for the LiDAR record is implemented on 11.000 ha.

The following areas have been determined for implementing the LiDAR laser scanning technology: the area located south of the Kemence-river's valley, which could be determined as the central area of the volcanic area, covering most of the planned 'A zone' (according to the IUCN criteria); the Szent Mihály-mountain's block and the smaller part of the Ipoly-valley (for testing purposes).

The LiDAR survey is included in the 3D scanning procedures, and sensory remote sensing technologies, in our case the survey is a distance measurement through laser rays from a plane, to the direction of the Earth-Centerpoint and surface modeling from the generated point-cloud. With the current instruments (e.g. Leica) we are collecting the part-reflection of the discharged pulse, so we have the information from the absolute route of the given bunch; the different part-reflections from the given bunch can be aggregated separately: the first (canopy level), the lowest (ground level) and the reflections in between. The method's specialty is that the reflection from the different heights can be aggregated, and filtered, that is why we can prepare a surface model (from the closest points – DSM) and a digital relief model (from filtering the furthest reflections – DEM) from just one measurement. Between the two extremities, the reflections coming from the different heights could give a picture, e.g. in the case of a forest from the diversity within the stand (e.g. presence /absence of the middle layer or its patchiness, mapping the closed clearings).

In the case of LiDAR, the resolution is crucial and determining the obtainable information. The resolution is measured in point/m2. The 1-4 point/m2 resolution is very limited, while the >16 points/m2 resolution could be able to hedge in the diameter of the individual trees (in the case of bigger trees). The expansion of the point density is enhancing the expenses exponentially and the calculation input for the analysis. That is why we should be aware of the tasks/questions' resolution purposes.

From the Hungarian national parks directorates, Aggtelek and Fertő-Hanság National Park carried out already a large-scaled LiDAR survey. In the administration area of the Danube-Ipoly National Park Directorate was a small-scaled recording of LiDAR data within the framework of the SH4/13 project in the Királyrét Forestry.

Due to the limited experiences of the method's usage in nature conservation (the Hungarian national parks used only DEM so far, without the possible use of biotic analysis), we aimed to prepare a feasibility study to analyze the possible contribution of the LiDAR method in nature conservation management planning.

Our strategic, long-term goals were detailed in previous documents, but can be summarized as follows:

1, Abiotic patterns and processes

a, getting a detailed digital terrain model (DTM), searching for:

- special habitat types (rock towers)
- archaeological artifacts, e.g.: tells and bronze age fortifications, mining holes
- getting information about historical land use (timber transportation on water and tracks)
- getting information about the impacts of recent forestry infrastructure (most importantly: erosion, and fragmentation caused by forestry activity

b, flood modeling on the Ipoly valley test site

2, Biological information gathering

- signs of and information about historical disturbances from the distribution of eroded pit and mound complexes)
- tree height map derived from the DTM (last returning signal) and the digital surface model (DSM – first returning signal)
- vertical structure of stands
- canopy closure, gap mapping
- laying deadwood mapping
- ecological analysis of biotic information (point data of animals and plants) and LiDAR data, try to build prediction models
- trying to map patches with high structural diversity
- try to map invasive species based on the hyperspectral imagery

7. Forest fauna evaluation

7.1 Birds

Nearly half of the members of the Hungarian bird fauna (440 species) occur more or less regularly in the Börzsöny Mountains. The number of regularly or occasionally nesting species is around 120. However, species richness is severely limited by the fact that, except for a few smaller stagnant waters, typically of artificial origin or maintenance, there is virtually no wetland in the area.

Börzsöny is a somewhat neglected or rather misunderstood area in Hungarian ornithological research. In the decades before the turn of the millennium, the mountains were (recognized) solely in terms of birds of prey species (NAGY 1998, VARGA et al. 1999). In addition to the small number of informative publications, the research material processing the entire avifauna (manuscript type) was produced only during the preparation of the Danube-Ipoly National Park, but its emphasis also reflects the previous approach (VOJNITS 1993). Other bird species previously considered valuable from a conservation point of view, such as the Tetrastes bonasia, the Cinclus cinclus, or the Monticola saxatilis, can only be traced back to the establishment of the Börzsönyi Landscape Protection Area almost half a century ago. inborn materials - or not even mentioned in them! Unfortunately, the most recent scientific publication on zoology (VOJNITS - CSÓKA 2014) also provides little support, and the validity of the information contained in it is almost four decades ago.

In recent decades, how professional data is published has also changed: instead of written and classically referenced literature, Hungarian field birds also publish their observation data via a website. Accordingly, the source of the faunistic data of the bird species is the interactive Internet ornithological database operated by the Pest District Ornithological Circle (PKMK): http://www.birding.hu (with data between 2000–2020; 6009 data) and the Danube-Ipoly National Park Directorate biotic database (OBM - status as of June 2, 2020; 26,842 data).

The bird species occurring in the design area come from 13 fauna areas. Nearly half of the species (40%) are pale arctic fauna, but European and European-Turkestan species are also present to a significant extent (32% in total). Holarctic (9%) and Old World (6%) elements are much smaller, and the species of the remaining fauna areas all account for less than 5%.

According to the latest data sheets of the World Conservation Union (IUCN), the bird species in Börzsöny belong to the Least Concern category, except for four species. The red kite (Milvus milvus) and the bald eagle (Circus macrourus), which are very rare in the design area, are classified in the Near Threatened (NT) category. Both the great goda

(Limosa limosa) and the former regular nesting falcon (Falco cherrug), which has been a rare guest in recent decades, both fall into the Vulnerable category.

According to the system of BÁLDI et al. (1995), the endangerment of the Hungarian bird fauna allows for a much more detailed approach. According to its classification, 19 of the 34 bird species among the 74 most endangered terrestrial vertebrates in Hungary have been confirmed in the planning area so far. Among the species that are slightly better than these but still highly endangered (protected and/or of Community importance) are 32 species. A total of 26 species are considered to be moderate and 62 species are considered to be at low risk.

7.2 Bats

A total of 24 protected and/or Community importance bat species are known to occur in the design area (Annex X), including 6 highly protected species - Mediterranean Horseshoe Bat (Rhinolophus euryale), Greater Horseshoe Bat (Rhinolophus ferrumequinum), Western barbastelle (Barbastella barbastell), Bechstein's bat (Myotis bechsteinii), Pond bat (Myotis dasycneme), truncated-eared bat (Myotis emarginatus). (All bat species are protected in Hungary!) 9 species of community importance are present, in addition to the already mentioned highly protected species, they also include the Lesser horseshoe bat (Rhinolophus hipposideros), the Lesser Mouse-eared bat (Myotis blythii), and the Greater mouse-eared bat (Myotis myotis). Based on the evaluation (prioritization) based on the Hungarian occurrences and frequency data, a total of 16 species have a special nature conservation significance.

1.1. Saproxylic insect fauna

Results Species numbers, protected and NAT 2000 marker species During the survey, I recorded 1190 data on a total of 107 saproxylic species, of which 38 are protected, including 6 NATURA 2000 marker species. I also recorded 13 occurrences of 6 protected but not saproxylic beetle species.

Scientific name	Level of protectin	Number of specimen
Acmaeodera degener	protected	2
Aegosoma scabricorne	protected	14
Aesalus scarabaeoides	protected	36
Akimerus schaefferi	protected	1
Ampedus quadrisignatus	protected	2
Camptorhinus simplex	protected	1
Cerambyx cerdo	protected, Natura 2000 species	141
Cerambyx scopolii	protected	5
Cerambyx welensii	protected	1

Coraebus fasciatus	protected	10
Cucujus cinnaberinus	protected, Natura 2000 species	29
Dicerca berolinensis	protected	59
Dorcus parallelipipedus	protected	73
Elater ferrugineus	protected	7
Eurythyrea quercus	protected	77
Gasterocercus depressirostris	protected	3
Gnorimus variabilis	protected	19
Kisanthobia ariasi	protected	1
Lacon querceus	protected	14
Lamprodila rutilans	protected	3
Limoniscus violaceus	protected, Natura 2000 species	36
Lucanus cervus	protected, Natura 2000 species	67
Necydalis ulmi	protected	3
Oryctes nasicornis	protected	1
Platycerus caraboides	protected	3
Protaetia aeruginosa	védett	38
Protaetia affinis	protected	4
Protaetia fieberi	protected	4
Protaetia marmorata	protected	10
Purpuricenus kaehleri	protected	2
Rhysodes sulcatus	protected, Natura 2000 species	2
Rosalia alpina	protected, Natura 2000 species	215
Saperda octopunctata	protected	16
Saperda scalaris	protected	23
Schizotus pectinicornis	protected	7
Sinodendron cylindricum	protected	29
Tenebrio opacus	protected	13
Trichoferus pallidus	protected	2

Chart 3: Protected saproxylic beetle species found during the research

Approximately 50% of the measured data are from selected, data-deficient fauna patches, and some of the data are from one-hectare sample areas generated during or outside fauna patches during access to these areas.

8. Workshop on the tested results

The workshop was held on 22 February 2022, at the Education Center (Hiúz Ház – Lynx's House) of the Danube-Ipoly National Park in Királyrét, Szokolya, and was organized by the Danube-Ipoly National Park Directorate (DINPD, Centralparks PP5). The workshop was held together with the D.T1.4.6 "Pilot action implementation of the D.T1.1.3 inside a protected area in Hungary ", to further enhance the compatibility and synergy of Centralparks work packages WPT1 and WPT2, and provide the relevant stakeholders an inside view of nature conservation management planning focusing a conflicted landscape, and mitigate the conflict on a common interest.

The workshop was attended by the representatives of Hungarian governmental and NGO nature conservation managers, the private forest sector, local forest managers, the relevant research sectors, and the representatives of the regional municipalities, altogether 19 people. During the workshop preparation, the invitations were sent to 45 carefully selected representatives of the main target groups, the absence of some invitees can partly be explained by the COVID-19 pandemic situation, discouraging individuals to travel, and attending any physical meetings. For example, the absent invitees were the representatives of the four local municipalities.

As a result of the discussion on the Csarna-valley, the valley remained strictly protected, as one core area of the A zone according to IUCN protocol. Forest managers emphasized the need for tourist use of strictly protected areas, as well as the sustainable forest management technologies including the „eternal forest concept" and the insufficiency of the current forest management legislation.

There is a constant need for communication between the interested sectors within landscape conservation and the involvement of stakeholders in nature conservation planning. The results of the discussion were taken into account while preparing the nature conservation management plan for the Börzsöny mountains (Centralparks D.T2.2.7).

9. Nature conservation management plan

The Integrated Nature Conservation Management Plan is one of the main results under WPT2, including the results of all developed innovative methodologies, field implementation, and pilot actions.

It refers to the Hungarian situation, especially in the case of the Danube-Ipoly National Park Directorate. The nature conservation management plan showcases the actions necessary for the long-term maintenance and sustainable use of one of the core protected areas of the Danube-Ipoly National Park.

It includes concrete measures and actions that will take care of the sustainable use and preservation of the Börzsöny Mountains, one of the core national park areas.

It summarizes the results of the innovative tools developed and tested under the WPT2. It is an end document of the work carried out under WPT2. Based on the output action nature conservation actions will take place. It is a great tool for the negotiations for the other sectors including forest and wildlife management. Based on the document the revision and replanning of strictly protected areas and the zonation system based on IUCN protocol were developed and mapped. As a final result, the nature conservation management plan for the Börzsöny Mountains could come into a binding force.

10. Task force meeting

During the meeting, the evaluation of the innovative methods developed and tested was carried out. The forest and grassland state evaluation, and LiDAR laser scanning methodology, developed within the framework of the Centralparks project were evaluated, and compared to the pilot actions habitat mapping, with the additional information of the forest fauna evaluation. The result of the methods was summarized and circulated within the project partnership.

The workshop was held on 31st March 2022, at the main office of the Danube-Ipoly National Park Directorate (DINPD), Budapest, Hungary, Költő street 21.

The workshop was attended by the representatives of the Danube-Ipoly National Park Directorate, and the external experts involved in nature conservation management planning for the Börzsöny Mountains and forest state evaluation pilot action.

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