Common Strategy for **Protection and Sustainable** Use of **Ecosystem** Services in **Karst Eco-Regions**

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ECO KARST

Common Strategy for Protection and Sustainable Use of Ecosystem Services in Karst Eco-Regions

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Introduction

The purpose of this strategy is to provide guidance for the protection and upgrading of ecosystem services (ES) in Karst regions inside and outside of protected areas, for starting new local pro-biodiversity business (PBB) models, as well as for fostering networking opportunities.

The strategy strives to balance conservation, protection, and economic development of European karst regions. The main aim is to upgrade the management of protected karst areas and strengthen the cross-cutting, local and transnational, cooperation. It is based on cross-sectoral evaluation and collaboration that was gained between all partners of the DTP ECO KARST project.

This strategy is derived from the pilot area experience and lessons learned with the ES mapping and valuing, the PBB development, as well as further consolidation of key recommendations about the models and methods for protection and sustainable use of ES.

General principles that guide the entire strategy are:

I. The biosphere is a unity and all its diverse constituent parts are interdependent. Every life form is unique and possesses intrinsic values - independent of its worth to humanity.

II. Humanity is part of nature. All life depends for survival and well-being on the functioning of natural systems.

III. The well-being of humanity should be ensured by protecting the health and integrity of the Earth's biosphere and by promoting sustainable development.

IV. All humans, alive and future, have a right to an environment adequate for their well-being (economic, social, political, and cultural) and the responsibility to protect the environment. The purpose of development is to meet the basic needs of humanity, improve the quality of life for all and ensure a secure future.

Specific principles of the strategy are:

I. The Ecosystem Approach[1] with the following particularly relevant principles and implementation guidelines:

1. The objectives of management of land, water, and living resources are a matter of societal choice, so all stakeholders (interested parties including local communities) should be involved in clearly articulating, defining and agreeing upon the goals of management - defining problems - making choices.
2. Conservation of the ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
3. We should seek the appropriate balance between, and integration of, the conservation, and use of biological

1 https://www.cbd.int/doc/publications/ea-text-en.pdf

diversity.

4. We should consider all forms of relevant information, including scientific, indigenous and local knowledge, innovations and practices.
5. We should involve all relevant sectors of society and scientific disciplines, because most problems of maintaining the biological diversity are complex.
6. We should use adaptive management practices, because ecosystem processes and functions are complex and variable.

II. The Precautionary Principle with four central components[2]: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity; exploring a wide range of alternatives to possibly harmful actions; and increasing public participation in decision-making.

III. The Polluter Pays Principle stipulates that the cost of pollution control, prevention, and remediation should be borne by the entity which profits from the process that causes pollution.

For the long-term protection and sustainable s use of ES in Karst eco-regions, a number of practical guidelines were developed for the most important issues, called "strategic focus areas", that are presented here. The strategic focus areas and their related practical guidelines are built on objectives, measures and actions proposed by stakeholders in participative action planning processes, which were ecosystem services-based and conducted in the course of the project. They take also due account of the 31 IUCN Guidelines for cave and karst protection.[3]

Key **strategic focus areas** for the protection and sustainable use of the karst ecosystems in the Danube region that the ECO KARST project partners propose are:

- Provision of drinking water
- Mitigation of natural hazards
- Conservation of biodiversity
- Provision of agricultural products
- Provision of timber and other forest related products
- Programmes for environmental and pro-biodiversity business education and awareness raising
- Development of sustainable tourism
- Optimising management approaches for protected karst areas

In the following chapters, these strategic focus areas are presented and illustrated with results of project work from the seven ECO KARST pilot areas.

2 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240435/

3 https://www.cbd.int/doc/pa/tools/Guidelines%20for%20Cave%20and%20Karst%20Protection.pdf

Provision of drinking water

Statement

Karst landscapes are important for the provision of drinking water and can supply considerable groundwater resources and reserves. Due to their specific characteristics, karst aquifers are extremely vulnerable to various types and sources of pollution. High permeability of karst rocks enables fast infiltration of water from the surface to the underground, and from there on a very rapid flow over long distances and through usually unknown paths. Preserved ecosystems with their vegetation can reduce the infiltration process and mitigate the effect of pollution.

Fig. 2: Waterfall Boka (photo A. Golob).

Explanation

Natural and semi-natural karst ecosystems can provide high quality drinking water that can be easily exploited from a single site, which can be a high flow source or well. However, a good understanding of the characteristics of karst aquifers is essential for their efficient protection and sustainable use. Karst ecosystems have different capacities to retain water, which is important for the provision of drinking water both in terms of continuity of flow also in dry months and for the efficiency of natural purification processes. Karst areas can a reduce the local impacts of floods and balance water flows

It has to be taken into account that in the karst environment together with water also pollution spreads quickly and endangers water resources. Due to a heterogeneous structure of karst aquifers, it is very difficult to anticipate the groundwater flow and its transport of harmful substances. Advantage of the karst aquifers is that they renew much more quickly than porous and fractured aquifers, due to rapid flows and average residence times that are often less than one year. They retain little or no memory of events that have occurred in previous hydrological cycles, such as droughts, temporary overexploitation, as well as accidental or seasonal pollution.[4,5]

Especially mires and forests, but also grasslands, have the capacity to retain water for a longer period and thus slow down the infiltration processes, therefore mitigating the effects of pollution, to a certain degree. Hence, it is important to protect and

4 http://www.gepgis.eu/en/wp-content/uploads/2013/08/Znacilnosti-kraskih-vodon_www_eng.pdf

5 https://www.encyclopedie-environnement.org/en/water/karst-renewable-water-resource-in-limestone-rocks/

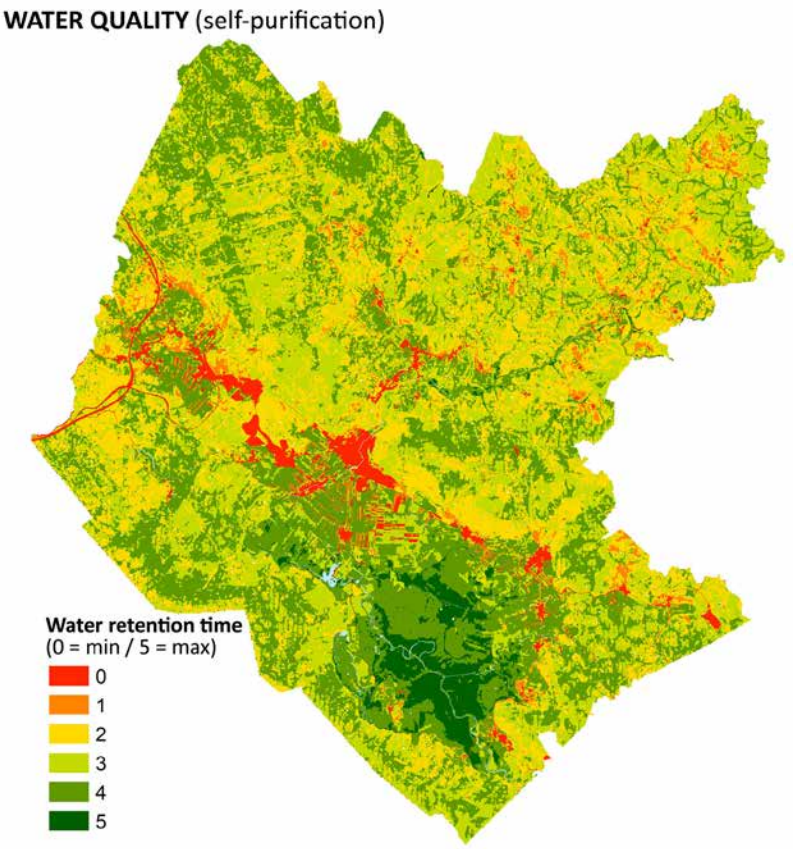
manage them in such a way that their retention and mitigation capacities are maintained for the long run.
Main sources of pollution are:

- Uncontrolled disposal of waste and wastewater from households and industry
- High use of fertilizers and pesticides in agriculture
- Other sources (e.g. soil erosion, military activities)

Fig. 3: One of karst springs that fill the intermittent Cerknica Lake (NRP - photo J. Stergaršek).

Examples

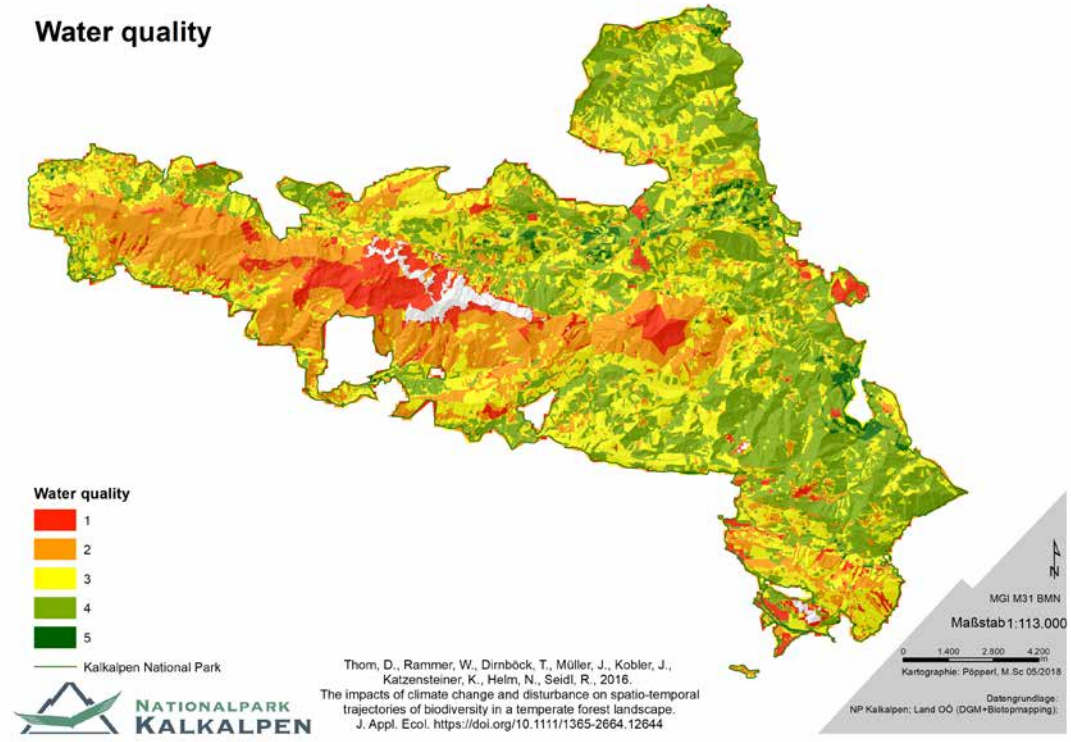
In Slovenia, almost half of the population drinks water from karst water resources, and in dry periods almost two thirds of its water reserves are stored in karst aquifers.
In the pilot area **Notranjska Regional Park**, which comprises the whole local community of Cerknica, sustainable provision of high quality drinking water is of great importance, especially due to the fact that poor quality of drinking water has been reported several times. During several meetings of experts with local stakeholders, habitat types of the area were ranked according to their capacity to prevent quick run off or infiltration of water into the underground, which is important both for continuous supply of drinking water and for the purification efficiency. These are especially wetland habitats like reed-beds, tall sedge and tall herb communities, as well as humid meadows of the intermittent lake and forests of the rocky karst. Results are shown in Map 1.



Map 1: Distribution of habitat types according to their water retention capacity in Notranjska Regional Park (local community Cerknica).

Another expert assessment of water quality was done in **Kalkalpen National Park**, where it is forbidden to use any water from the park for commercial purposes.

Beech and alder forests were assessed to contribute the most to water quality. High rated were also riparian forests, mires, and fens (see Map 2)..



Map 2: Assessment of ecosystem service Provision of quality water in Kalkalpen National Park.

Practical Guidelines for the provision of drinking water

Local level

- Fully implement regulations on the proper disposal of waste and the limitation of fertilisation.
- Maintain extensive management of grasslands on moist soil.
- Abandon the digging and improving of draining canals .
- Manage forests in a close-to-nature way.
- Apply the precautionary principle in local development and spatial planning, and ensure active participation in local planning processes.
- Apply the polluter pays principle to discourage con taminating practices.

National level

- Fully implement the EU Water Framework Directive including its link to Natura 2000 areas.
- Apply the polluter pays principle to discourage contamination and promote pollution-free land use practices.

Regional level

- Exchange knowledge about good practices in integrated implementation of the EU Water Framework and Nature Directives[6].

6 http://ec.europa.eu/environment/nature/natura2000/management/docs/FAQ-WFD%20final.pdf

Mitigation of natural hazards

Statement

Natural and semi-natural karst ecosystems can considerably contribute to the mitigation of natural hazards related to erosion, strong winds, heavy storms, flooding, and other natural disasters, provided that their structure and composition are maintained. Karst ecosystems are very sensitive to degradation, which reduces their resilience and capacity to mitigate natural hazards.

Explanation

The process of soil formation is very slow on limestone and dolomite bedrock, which characterises karst landscapes. Therefore, most karstic habitat types consist of rather shallow and rocky soils. This makes karst landscapes less attractive for intensive agriculture, so forests and grasslands prevail over other land uses. As a result, preserved karst ecosystems can significantly contribute to the mitigation of natural hazards.

Fig. 4: Management of forests adapted to karst conditions is essential for mitigation capacity of forests. Clear-cutting forest in karst conditions may lead to long-lasting desertification. Silviculture system of careful selection of individual trees or groups of trees for cutting has been developed to adapt to such conditions (Snežnik, photo: A. Golob).

Fig. 5: Reafforestation of Kras (Jurhar et al., 1963).

As forests cover large karst areas, they can mitigate natural hazards in many ways if maintained in good condition. They can attract rain and thus reduce the risk of droughts[7] and play an important role in buffering the effects of heavy rainfall and droughts, because of their high water-retention capacity , according to the EEA report[8]. They can also effectively protect soils from erosion.[9] Trees can also significantly reduce wind speed at the local level and mitigate the effect of storms.

Similarly, karstic forests and, to some extent other ecosystems, are important in climate change mitigation. As their biomass increases they sequester carbon from the atmosphere, but they can also become an important source of CO2 emission, if their biomass decreases. Managed forests contribute to climate change mitigation, also because timber can substitute other materials for whose production fossil fuels are required.
All these effects can be provided only from forest ecosystems that have high resilience to natural disasters, such as wind and ice breaks, drought, diseases or calamities caused by insects.

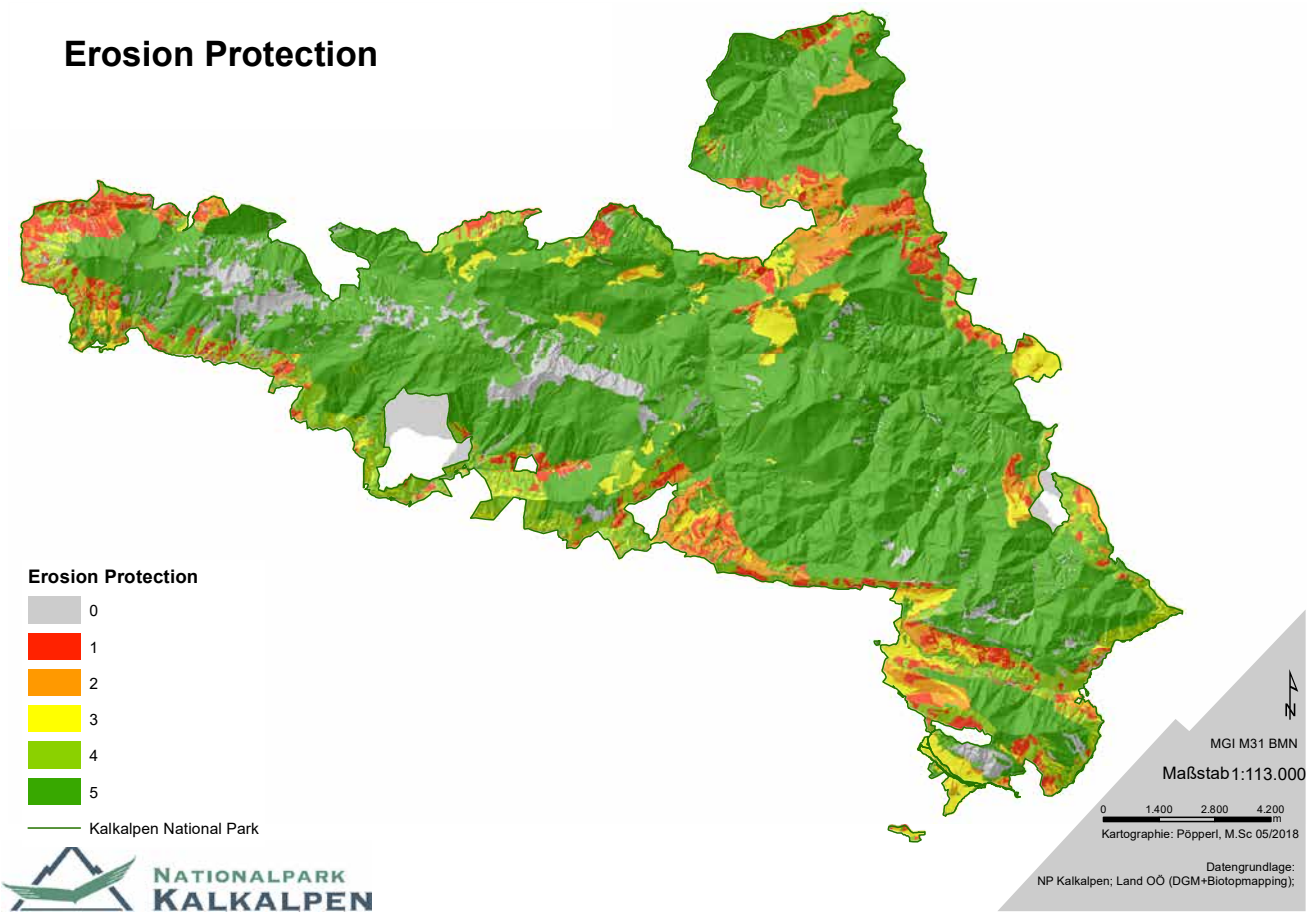
Examples

The effect of grazing, as shown in the case of the **Slovenian Kras**, can be devastating for karst landscapes and their capacity to mitigate natural hazards, such as strong winds, rainfall and droughts. The pressure of sheep and goat grazing began intensively in the 15th and 16th centuries[10] and led to the transformation of forested landscapes into stony deserts. Reafforestation campaigns began in the second half of 19th century (Fig. 5) providing the Kras with its vegetation cover and climate mitigation capacity once again.

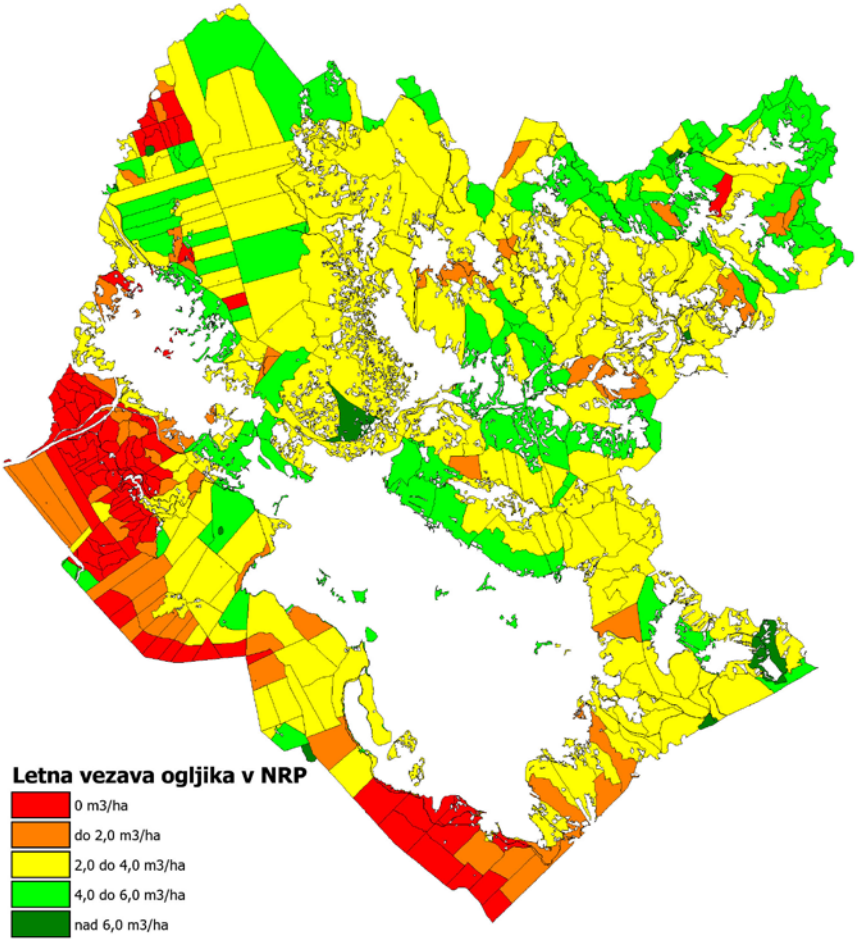
In the pilot area **Kalkalpen National Park**, due to steep slopes and the mountain climate with its intense precipitations, the landscape is prone to erosion processes a well as to avalanches and landslides. It is, therefore, of outmost importance that the vegetation cover is preserved and kept in optimal condition (see explanation under Map 3).
Forest ecosystems have the capacity to rather quickly sequester carbon from the atmosphere and thus contribute to mitigation of climate change worldwide[11]. Other ecosystems, in particular wetlands such as mires, bogs, and fens, also have such capacity, ranging between 20 to 140 grams of carbon per square metre per year[12].

7 https://www.researchgate.net/publication/232695799_How_Forests_Attract_Rain_An_Examination_of_a_New_Hypothesis
8 https://www.eea.europa.eu/publications/water-retention-potential-of-forests
9 https://www.fs.fed.us/foresthealth/fhm/pubs/96seros.htm

10 http://www.razvojkrasa.si/si/narava/98/article.html
11 http://www.fao.org/3/i1960e/i1960e00.pdf
12 https://static.springer.com/sgw/documents/1365471/application/pdf/Wetlands,+carbon,+and+climate+change.pdf



Map 3: Distribution of habitat types according to their erosion prevention capacity. Highest values were attributed to naturally composed mountain forests, riparian forests, and fens (coloured in green), while pastures and other habitat types were ranked low (National Park Kalkalpen).



Map 4: Carbon sequestration of forests in Notranjska Regional Park, indicated as a difference between increment and allowable cut (one m3 sequestered represents roughly one ton of CO2).

As shown in Map 4, carbon sequestration of forests can be assessed as the difference between increment and level of cutting allowed in forest management plans. The difference can be substantial, but has its limits, which in managed forests are on average between 300 to 400 m3 of growing stock per hectare. When this level is reached, timber can replace other energy sources and thus contribute to lowering carbon emissions from fossil fuels both in the industry and energy sector[13]. This effect is not achieved if forests can develop to their climax state. However, it takes centuries until managed forests left to natural development would attain 700 m3 and more of standing volume per hectare and thus accumulate maximum quantities of dead organic matter both above and below ground, which would mean to stop sequestering carbon from the atmosphere. In Kalkalpen National Park, where forests ceased to be managed just several decades ago, carbon sequestration will continue to be a very important ecosystem service for a long time.

Practical guidelines for mitigating natural hazards

Local level

- Ensure good implementation of intergrated land use and forest management plans.
- Take active part in creating local land use and forest management plans in order to preserve and enhance the capacity of ecosystems to mitigate natural hazards in local communities.

National level

- Take active part in creating national climate mitigation and adaptation strategies, national forest programmes, agricultural, and water management policies in order to preserve and enhance capacity of ecosystems to mitigate natural hazards.

Regional level

- Exchange good practices in implementation of EU disaster risk reduction programmes.

13 https://www.efi.int/sites/default/files/files/publication-bank/2018/efi_fstp_6_2018.pdf

Conservation of biodiversity

Statement

Karst landscapes are exceptionally diverse. Prevailing habitat types are forests and dry grasslands consisting of many plant species and hosting a large number of animal species, including large carnivores. Grassy marshes and fens appear on karst fields, where intermittent lakes can develop. Special attention should be paid to the conservation of subterranean fauna, which is under heavy pressure from intensive farming and household and industrial wastewaters, as well as to other endangered plant and animal species.

Fig. 6: Karst landscapes are composed of a variety of habitat types as a result of close to nature forestry and extensive agriculture (Ponikve, Slovenia, photo A. Golob).

Explanation

Karstic soils are not suitable for intensive agriculture, except for dolines, which are rather scarce. Extensive agriculture, predominantly grazing, has been practiced in Europe on rocky karst soils for centuries, resulting in dry grasslands and degraded rocky habitats. Only extreme sites were left to forests, which has changed particularly during the last 60 years, when economic land uses declined and the natural process of succession has been advancing on abandoned pastures and meadows. As a consequence of this (Fig. 6), karst landscapes contain a large number of natural and semi-natural habitat types, which are of European and global ecological importance. Many plant species that can be found both in dry and humid habitat types, primarily grasslands, are endemic or threatened and deserve special attention for their protection and maintenance.

Large complexes of naturally composed forests of several tens thousands of hectares host large carnivores[14], i.e. brown bear, wolf and lynx, which are also of utmost importance for a rich biodiversity. The preservation and enhancing of karst biodiversity is not only important to leave some habitat types to their natural development without human intervention, but also to ensure management practices that maintain a good conservation status in terms of species and their environment.

Biodiversity is especially threatened by agricultural abandonment, pollution, poaching of large carnivores, and some inappropriate forest management practices, as well as the pressure recreation and tourism at certain sites.

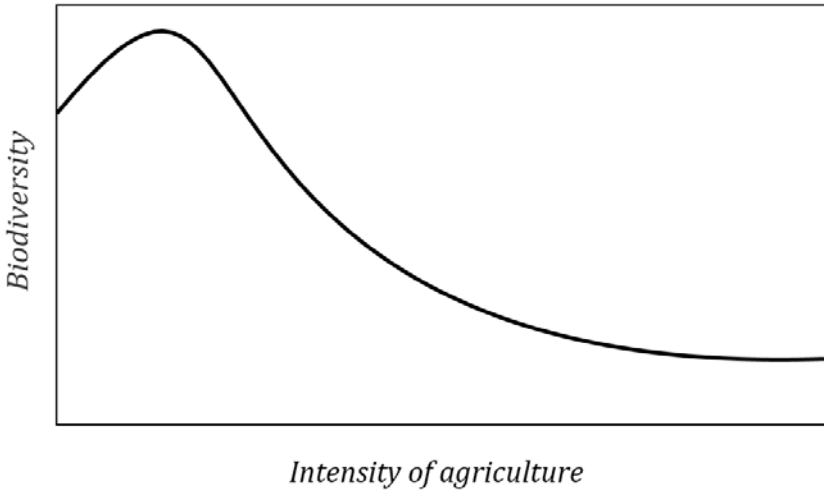


Fig. 7: General relationship between biodiversity and agriculture[15]. The graph does not represent great importance of wilderness areas for biodiversity.

14 http://ec.europa.eu/environment/nature/conservation/species/carnivores/index_en.htm

15 https://www.eea.europa.eu/publications/report_2004_1

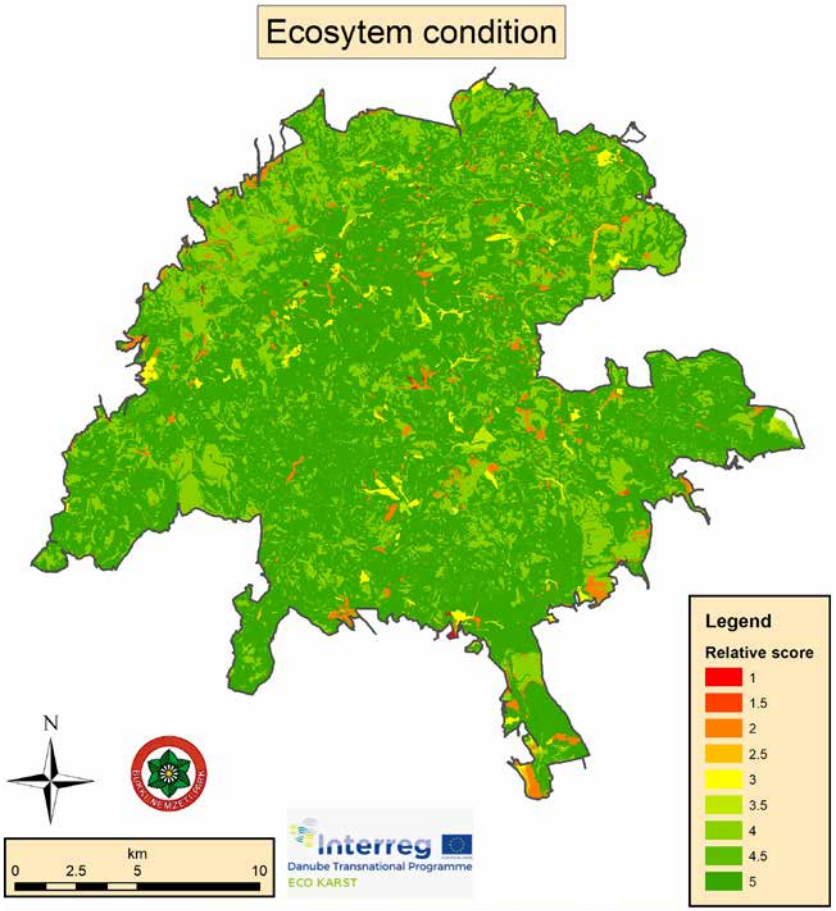
Examples

As regards forest biodiversity, it is important that certain areas of forests are preserved in their primary condition or left to natural development for a longer period of time. Such areas are important refugia for a number of specialised species, in particular birds and beetles, that cannot survive in a strongly managed forest. Many of them depend on very large quantity of deadwood or are sensitive to even minor disturbances, especially in breeding periods. The largest such forest reserves are in the pilot areas of **National Park Kalkalpen** and **Apuseni Nature Park**, while in National Park Tara, Notranjska Regional Park, and Protected Landscape Bijambare some smaller parts of virgin forests were also preserved.

Other karst forests are mainly managed through selection or gradual group management techniques, depending on circumstances and tradition. In **National Park Bükk**, where forests are composed only of broadleaved species, a shelterwood management system is applied, resulting in even-aged forest structures. Independent from a silvicultural system, it is important for many forest-dwelling species, such as woodpeckers, that habitat trees and dead wood are left in the forest in a considerable amount.

Fig. 8: Composition and structure of a primeval beech-fir karst mountain forest in NP Kalkalpen (photo E. Mayrhofer).

Fig. 9: Only a few patches of Picea omorika still exist on their natural sites. National Park Tara plays a decisive role in their protection (photo A. Golob).

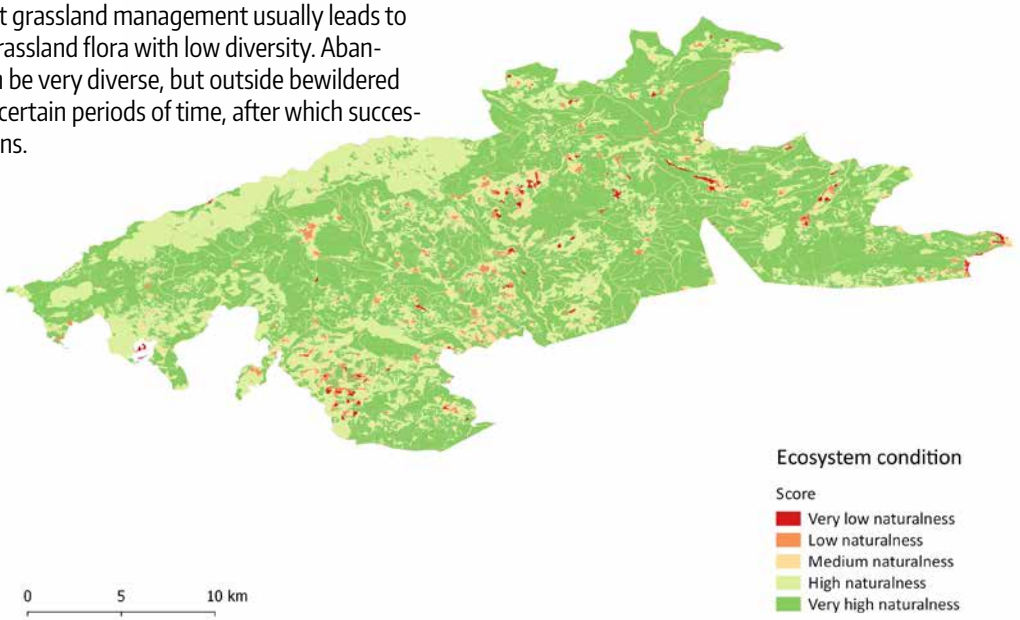


Map 5: Assessment of ecosystem condition in the Bükk National Park, where forest cover is very significant (more than 95%), shows that forests were ranked very high due to preserved species composition and genetic diversity in spite of the fact that they have been managed in a way that favours rather evenly aged structures.

Examples

Contrary to forest biodiversity, karst grasslands - unless found on very special sites, can be maintained only through controlled grazing or mowing or reintroductions of natural grazers (wild horse, European bison, wild water buffalo, etc.). Biodiversity of grasslands is very much influenced by intensity, type and frequency of use. Many plant species only appear on meadows and some even grow specifically on heavily grazed pastures. Economically efficient grassland management usually leads to homogenisation of grassland flora with low diversity. Abandoned grasslands can be very diverse, but outside bewildered landscapes[16] only for certain periods of time, after which succession with shrubs begins.

In the pilot area of **Nature Park Žumberak - Samoborsko gorje** local experts assessed the condition of grasslands on the basis of the number of vascular plants per unit area, invasive plants, management regime defined in the spatial plan, and appropriateness of grasslands to host Natura 2000 species (map 6).



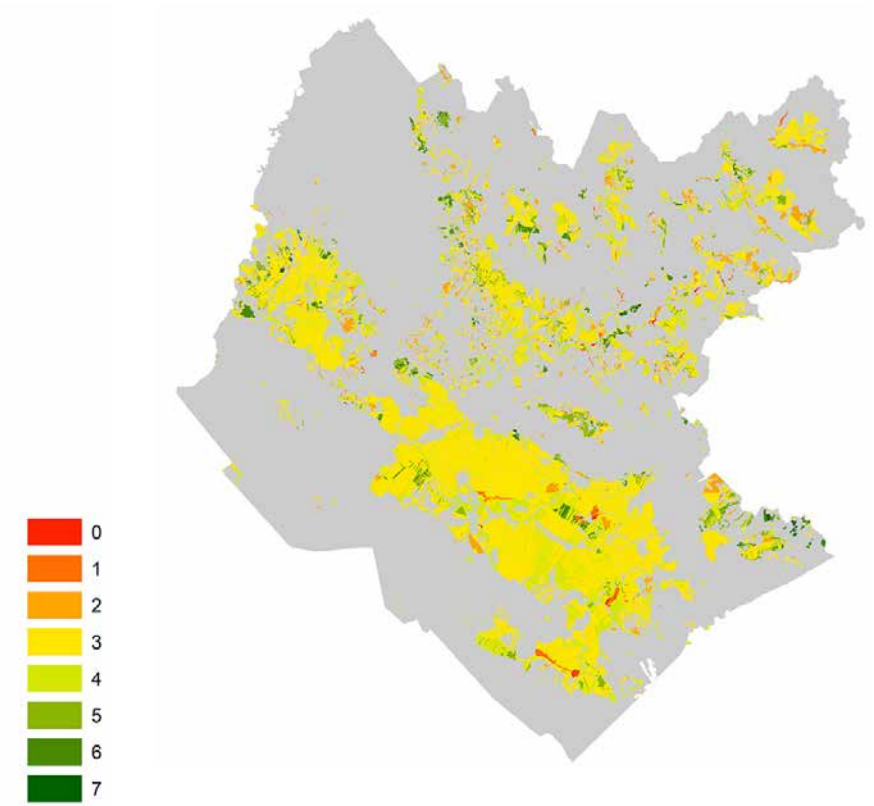
Map 6: Ecosystem condition expressed as naturalness in Nature Park Žumberak-Samoborsko gorje, Croatia. So far naturalness of forests and grasslands is high, but grasslands tend to be overgrown by shrubs due to depopulation processes in the region.

16 https://www.springer.com/gb/book/9783319120386

Local experts of **Notranjska Regional Park** assessed the condition of grasslands on the basis of indicator species, management regime, and level of succession. Results are presented in Map 7.

In the pilot areas of the project, there are a number of other habitat types besides forests and grasslands, but they are represented on quite small areas. Special attention is given to high-stem orchards that are particularly important for birds and are promising also from a production point of view. Their status is generally not good enough and their area could increase as well.

Condition of caves has not been systematically assessed, but some data gathered, such as e.g. investigation of habitats of the olm[17] (Proteus anguinus), show that water pollution represents the most serious threat to cave fauna. In caves opened to the public, light and noise disturbance is also a problem, e.g. for cave hibernating bats.



Map 7: Assessment of condition of grasslands in Notranjska Regional Park shows that grassland management could be improved as the condition is only at medium level.

17 http://www.jknm.si/media/DK/DK6_40_Hudoklin_Zaskrbljujoce_stanje_habitata_cloveske_ribice.pdf

Practical guidelines for conserving biodiversity

Local level

- Liaise with farmers, local agricultural and biodiversity experts to manage grasslands in a biodiversity-friendly way, taking full advantage of environmental components of the EU Common Agricultural Policy. As an alternative, purchase agricultural land and manage it in line with nature conservation objectives.
- Take active part in participative processes of creating local land use plans and oppose decisions that might adversely affect biodiversity. Promote extensive agricultural practices (preference to organic fertilizers, ban of biocides, minimal stocking rates of livestock) and take care that all waste-water is treated and purified.
- Take active part in participative processes of adoption of forest management plans and promote and support silvicultural measures that preserve and enhance forest biodiversity.
- Support and take an active role in NGOs in charge of managing hunting and fishing areas and districts, as well as in birding and speleological associations.
- Regularly conduct systematic monitoring of condition of ecosystems and their charismatic species at local level and publish the results.

National level

- Complete the Natura 2000 network in karst areas where the results of biogeographic seminars have shown that certain natural habitats or species are still not covered enough and complete the Emerald network in EU candidate countries in line with requirements of the Bern Convention and support gathering related scientific data about habitats and species. .
- Take appropriate statutory, management planning and contractual conservation measures to ensure implementation of objectives of the Natura 2000 and Emerald sites in karst landscapes.
- Designate appropriate proportion of representative habitat types that do not require active management as natural reserves.
- Ensure financing of management of protected areas.
- Create favourable conditions for private landowners to manage their land in a biodiversity friendly way.
- Pay particular attention to karst regions in national biodiversity strategies and policies as well as in their implementation.
- Support nature conservation NGOs.
- Set biodiversity and nature conservation standards for NGOs and other organisations that have concessions for the management of caves, wildlife, and fish, and supervise them.

Regional level

- Exchange good practices in implementation of EU nature conservation directives and the Bern Convention in karst areas.
- Continue with cooperation in the Danube region and neighbouring regions and propose similar projects as ECO KARST to improve the management of protected areas, including Natura 2000 and Emerald sites, oriented towards enhancement of biodiversity and related supportive businesses.

Fig. 11: In some karst eco-regions chamois is endangered by poaching and so are large carnivores, such as lynx, bear and wolf - species whose importance has not been accepted by some local population yet (photo Kalkalpen National Park archive).

Fig. 10: Mature and dead trees are very important for woodpeckers and many other bird and beetle species (photo F. Sieghartsleitner)

Fig. 12: Picea omorika (left) is one of few endemic forest species of karst eco-regions, which naturally grows on very restricted areas of Tara (photo Tara National Park archive)

Provision of agricultural products

Statement

Agriculture still represents the cornerstone of economic activities in karst regions. It is also important for the conservation of grasslands and high-stem orchards that should be maintained also for biodiversity reasons. There is a lot of potential to combine agriculture with sustainable tourism and to develop agriculture-based pro-biodiversity business solutions.

Explanation

Small to medium-scale agriculture is performed mostly by family farms, due to unfavourable natural conditions for large scale industrial agriculture, which otherwise adversely impacts the environment. In addition to meat and dairy products, high-stem orchards are present, as well as vineyards in areas with suitable climatic conditions. In dolines, a great variety of crops have been traditionally produced. Honey production is an additional source of income.

Traditionally, rocky and shallow karstic soils have been widely used for grazing, which was seasonally practiced also in mountainous karst areas. Grazing has been abandoned in many areas, as it cannot compete with industrial agriculture without subsidies. Various kinds of cheese produced locally in different ways are the most popular products and have potential also for the future. Production of meat may also be promising, but only if customers can be sure it derives from animals grazing on extensive semi-natural pastures and no agrochemicals were applied.

High-stem orchards are another traditional way of producing fruits mostly for juices and ciders. They usually surround farm houses and are important for many bird species.

Branding is very important for the marketing of high quality local agricultural products, such as the park partner certifications, which assure the consumers that the products are made in a nature-friendly way. Marketing of wine has a long tradition in developing brands also in some karstic regions and is now becoming popular also with other agricultural products.

Farm tourism largely depends on the capacity of farms not only to offer high quality hospitality and products, but also to provide visitors opportunities to explore karstic features in the surroundings.

Examples

Beside forests, grasslands are most extensive land use of karst landscapes and depend on an interest for for grazing or hay production. From an ecological perspective, sustainable grassland management is important to maintain the high biological diversity of grasslands. It is also important for other ecosystem services, such as the provision of herbs.

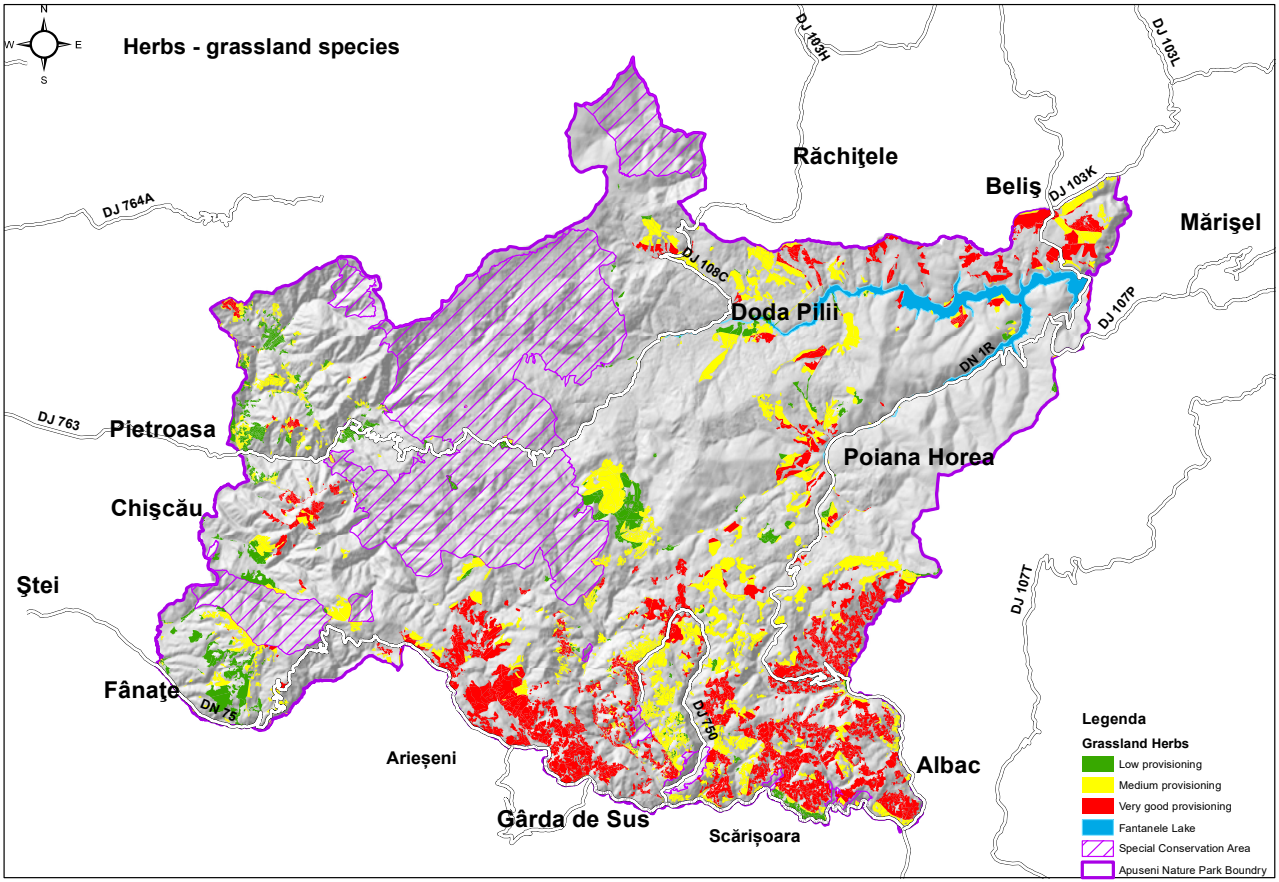
The current level of grassland management is supported through subsidies provided by the European Union, which might be reduced in future financing periods. It is therefore crucial to find new possibilities and perspectives for the local community to sustain an income in this sector.

In the project area **Apuseni Nature Park**, most of the grassland is maintained by farmers who do not sell much of their agricultural products, but use them for their own needs. However, there

are also good examples of starting businesses based on breeding farm animals. Certain farmer associations began to process meat and dairy products locally and to offer them at local markets, restaurants and pensions. The value of the local products has increased in cases where certification schemes were developed and applied.Such bio products are sold to new markets in nearby cities. Apuseni Nature Park administration is playing here an important role, initiating the "Park Partner" label that can generate added value to agricultural products.

Additionally to products deriving from livestock breeding, grasslands provide also an opportunity to collect, process, and sell certain species of herbs. Arnica montana is a protected species in many countries in Europe or considered vulnerable, where picking is often forbidden. In Romania and especially the Apuseni Mountains, the species is still well represented due to traditional pasture and meadow management practices, so harvesting this medicinal plant is restricted but not fully banned. In the last five years, the park administration issued picking licences for 34 tons of Arnica annually, enabling local communities to generate an important, reliable revenue from exporting this to pharmaceutical companies.

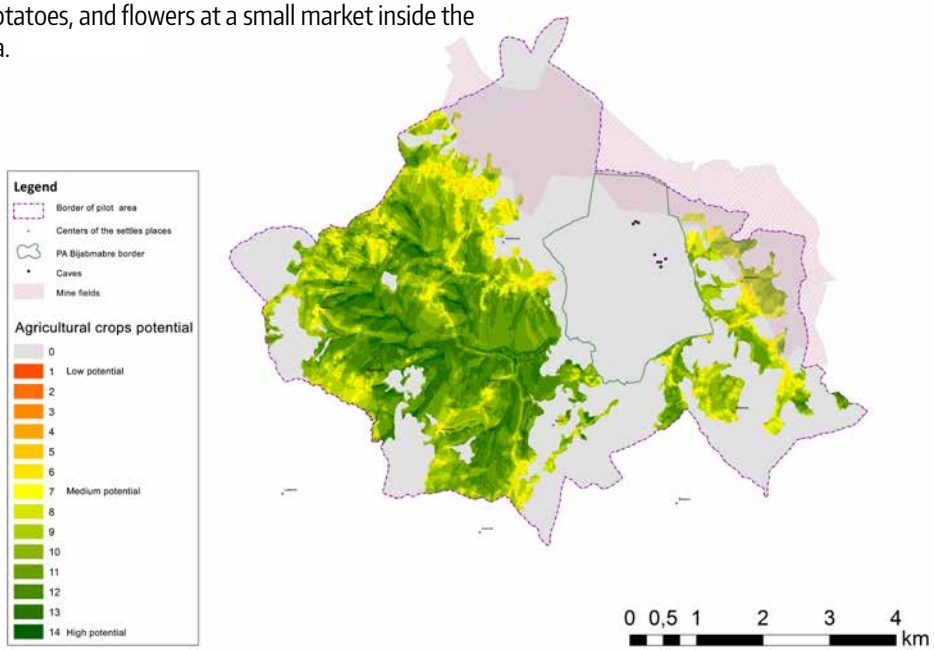
Fig. 13: Combination of grazing and hay production on grasslands of Apuseni Nature Park (photo A. Golob).



Map 8: Grassland habitat types hosting medicinal herbs in Apuseni Nature Park.

In the project pilot area **Bijambare**, 15 farmers are registered and active in the region surrounding the protected area. In addition, there are many farmers who have small patches of land and produce primarily for self-use in a traditional way without pesticides and artificial fertilizers. Some farmers also sell their products, such as cereals, black beans, vegetables, wheat, oats, corn, herbs, potatoes, and flowers at a small market inside the protected area.

BioHalilović Ltd. is a family business that cultivates medicinal and aromatic herbs, cereals, vegetables, and produces essential oils, creams, teas and decorative objects. Its products are sold in local stores and to international pharmaceutical companies and pharmacies. Bijambare pilot area is suitable for thyme, mint, chamomile, calendula, lemon balm, and others.



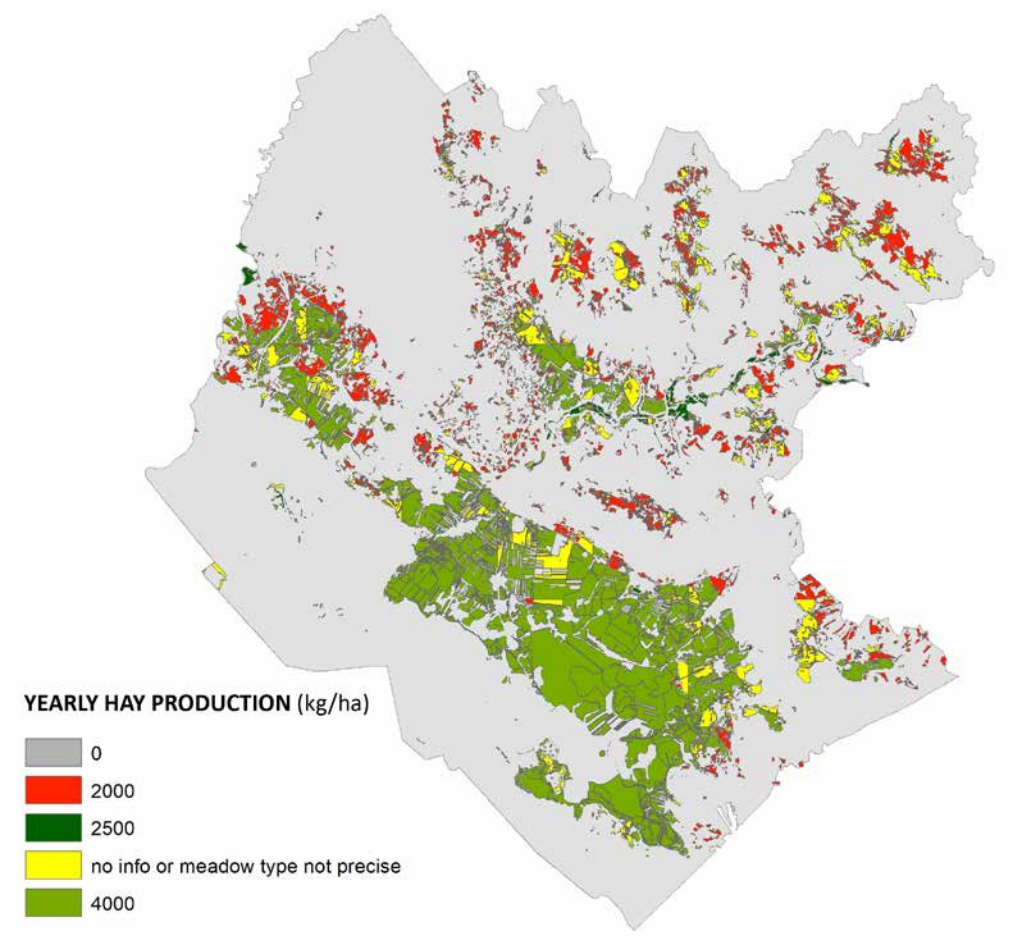
Map 9 (above): Assessment of potential for production of agricultural crops in the area around Protected Landscape Bijambare. Low and medium altitude hay meadows, moist eutrophic and mesotrophic grasslands, alpic swards, and dry heaths were given highest scores, but other factors, such as soil fertility and exposition were taken into account in the assessment procedure.

Fig. 14 (above): High quality products based on cultivated and natural herbs from Bijambare area, Bosnia and Herzegovina (https://www.facebook.com/biohalilovicbh/photos/).

Fig. 15: Wet grasslands of Cerknica lake, which are also a habitat of corncrake. Mowing is carried out late to preserve offspring of the endangered bird species (photo NRP – J. Stergaršek).

In **Notranjska Regional Park**, grasslands are mostly used for producing hay and to a lesser extent for grazing. The hay produced in the area is not only used by local livestock breeders, but also sold to the outside local community. When assessing the ecosystem service 'hay production' within a local expert group, four different groups of habitat types were identified:

1. Wet grasslands of the intermittent lake Cerknica lake area, including meadows on wet soils, large sedge communities, reed stands and stands of reed canary grass. Hay yield: 4.000 kg per ha per year.
2. Wet grasslands of other parts of NRP including the same habitats as for the Cerknica lake area but less productive due to lower water and nutrients availability. Hay yield: 2.500 kg per ha per year.
3. Mesophilous grasslands on Cerknica fields outside regular flooding areas and other parts of the pilot area that are more or less flat or with little inclination. Hay yield: 4.000 kg/ha per year.
4. Dry grasslands developed on steeper terrain, often facing south. Hay yield: 2.000 kg per ha per year.

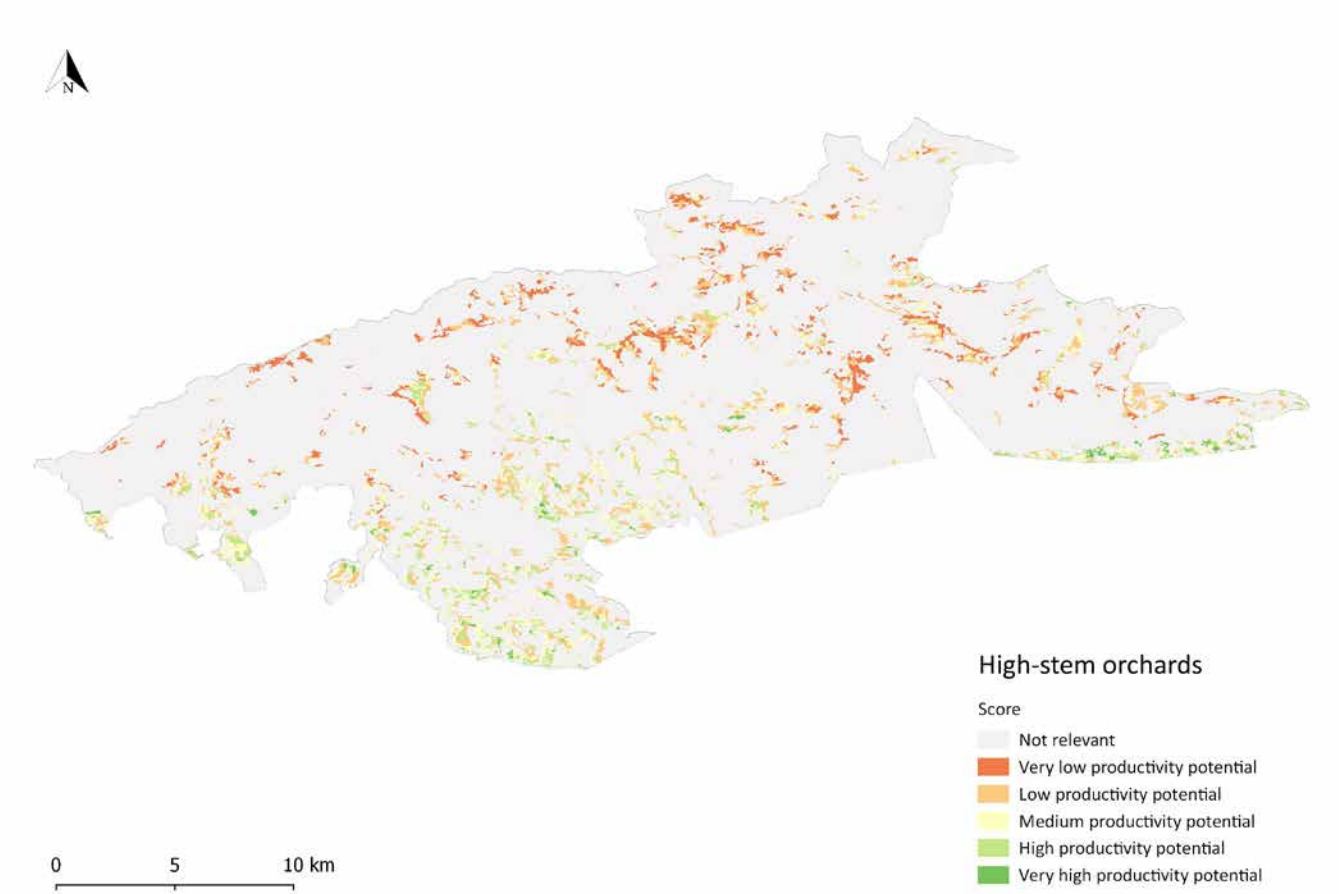


Map 10: Assessment of hay production in Notranjska Regional Park. Wet grasslands are the most productive, but quality of hay may not be the best, as majority of wet meadows are mown after the beginning of August.

In areas surrounding **National Park Kalkalpen**, there is a long tradition of producing juices and cider, which farms usually use for their own consumption. There are some farms that developed the production to an industrial size and successfully sell them using also the logo of the national park for their marketing. They use their own high-stem orchards, but buy fruits also from other farms, thus stimulating the maintenance of such orchards in the whole region and contributing a lot to biodiversity.

A long tradition to cultivate high-stem orchards exists also along the whole karstic Dinaric range where fruits are mostly plums used both for producing brandy and jam. The latter used to be an important source of carbohydrates in the mountainous regions. Close to **National Park Tara**, there is a famous distillery, where the highest quality brandies are produced from orchards and other fruits from the region. Very good conditions for developing businesses based on high-stem orchards exist also in **Nature Park Žumberak-Samoborsko gorje** (Map 9), where the project initiated cooperation with a neighbouring protected area in Slovenia (Kozjanski Park). Good results can be seen after they had started a high-stem orchards campaign 20 years ago.

Fig. 16: High-stem orchards can be highly productive and represent important habitats for birds (vicinity of National Park Kalkalpen - photo: A. Golob).



Map 11: Distribution of high-stem orchards in Nature Park Žumberak-Samoborsko gorje.

Practical guidelines for agricultural products

Local level

- Liaise with farmers and local agricultural experts to manage grasslands in such a way to achieve the right balance between production and biodiversity, taking full advantage of the environmental component of EU Common Agricultural Policy.
- Examine possibilities to use biodiversity-friendly managed grasslands and fields in an economically efficient way that is building on good practices in other areas.
- Examine possibilities for the re-establishment of high-stem orchards and for fruit-based products.
- Set standards for the biodiversity-friendly management of agricultural areas in specific karst conditions, promote them and develop certification schemes for branding.
- Develop innovative ways of marketing agricultural products on local markets in connection with tourism, where appropriate.

National level

- Promote further support of EU common agricultural policies for ecologically friendly management of agricultural areas, especially in regions with more difficult conditions, such as karst landscapes.
- Devote special attention to sustainable agriculture and related local development in national rural development plans.
- Support certification schemes and local markets based on them.

Regional level

- Exchange good practices in implementation of biodiversity-friendly agriculture and innovative agricultural products and marketing approaches.

Provision of timber and other forest related products

Statement

Forests are the prevailing land cover in karst landscapes. If properly managed, forest ecosystems can sustainably provide timber, firewood and other products while maintaining their characteristic species composition as well as their horizontal and vertical structure. They are home to a large number of species of European importance. Firewood is used mostly locally. Industrial timber represents a good opportunity to be processed in local communities where the forests grow and can thus contribute to local employment and economy.

Explanation

In karst areas, forests grow under rather harsh conditions and, besides protecting the soil from erosion and stimulating the local climate, they exhibit a number of other functions, notably the production of timber and firewood. Karst forests have mostly not been converted to monocultures, as the protection function of forests on karst has been recognised and acknowledged long time ago. Their species composition has been preserved, in general, which is very important for the genetic component of biodiversity. The structure of the forest in many karst areas resembles the natural one, if selection or group selection silviculture is practised.

Heavy storms that appear more frequently in recent decades have made a lot of damage to forests and have locally diminished the capacity of forests in providing timber.

Production of timber depends primarily on the productivity of sites, but forest management methods and ownership of the forests also play an important role. Productivity of sites can vary from one cubic metre per hectare to more than ten and depends on the type of soil, climate, relief, as well as the forest structure and composition . The composition of the tree species is influenced by management approaches and natural disturbances over a long period of time, while the forest structure can be changed more quickly.

Remote extensive complexes of karst forests are usually under the ownership of state or bigger forest owners. Forests close to settlements are usually privately owned and forest parcels are small and scattered. In conditions of small ownership, forests provide primarily firewood and timber for small businesses, while forests of large ownership usually provide timber for the market. Economic importance of timber for local communities depends very much on how much and to what level timber is processed within a region. If processed locally to final products, the forest sector can play much greater role in local economy than if it is sold to remote customers.

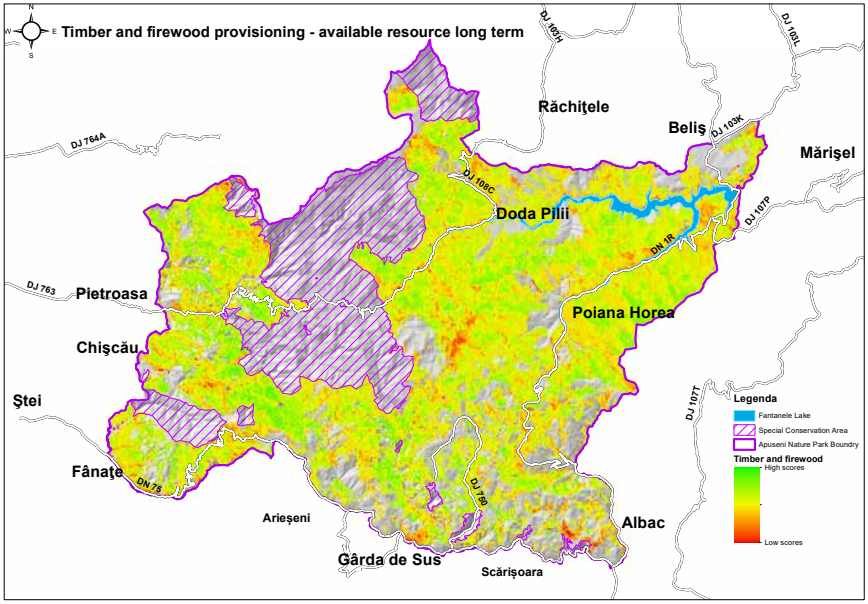
Examples related to provision of timber

In **Apuseni Nature Park**, forests cover 71% of the park surface. More than half of the park surface cover sustainably managed forests, while one fifth represent forested nature reserves. Half of the managed forests are owned by local communities. Income from timber has for a long time been very important for the local

community. Most of timber is sold in form of logs outside of local communities of the park, but some of it is still used for the traditional production of handicrafts.

There is a good opportunity to establish businesses that would focus more on processing of local wood derived from forests of the park managed in accordance with sustainability standards adapted to the multifunctional roles of the park. Possible fields of operation for these businesses are carpentry, furniture production, as well as the production of handicrafts and souvenirs.

Fig. 17: Wooden handicrafts were traditionally important for households of the Apuseni Nature Park. Today they are offered to tourists (photo A. Golob).

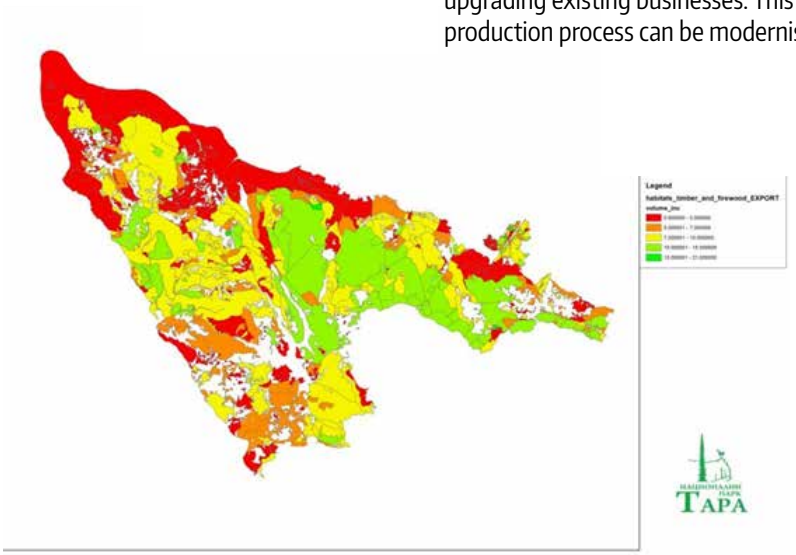


Map 12: Assessment of capacity of the Apuseni Nature Park forests to provide timber.

The **Tara National Park** area is covered by forests composed mainly of fir, beech, and spruce. Tara is also known in the world for its relict and endemic forests of Serbian Spruce, but these forests are strictly protected and not used for forestry. Most of the forest in the area is state owned and managed by PU'' National Park Tara'' on a sustainable basis. Timber is sold to wood processing companies in the region that incorporate both primary processing in sawmills and production of final wood products. Small businesses, such as carpentry workshops, are also present.

All this implies the fact that many people are employed in the forest sector, which is dependent on timber and firewood as an important ecosystem service of the National Park Tara and the surrounding forests.

Taking into account the long history of sustainable forest management based on systematic monitoring of developing forests for 150 years, it can be concluded that forests are used to their full capacity regarding their natural potential. On the other hand, there is a potential for diversification of final products and upgrading existing businesses. This means that even the primary production process can be modernised.

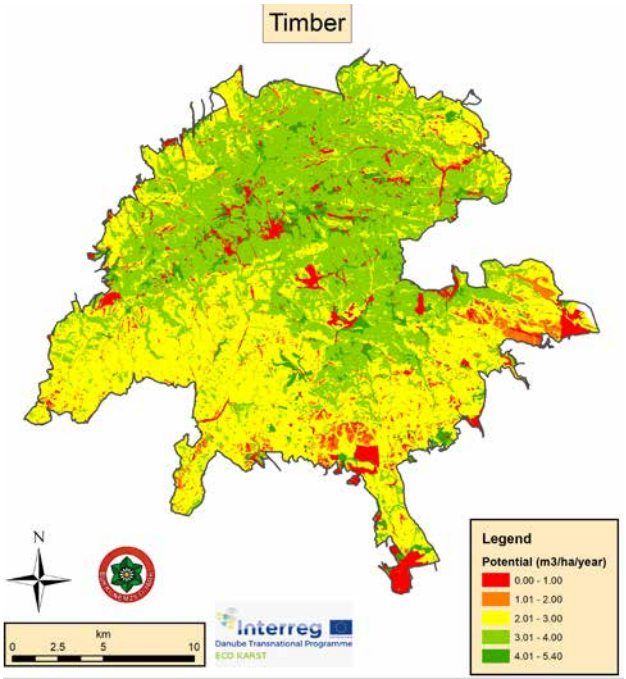


Map 13: Assessment of capacity of forests for provision of timber and firewood in the National Park Tara on the basis of data from forest management plans. Forestry production tables were used with data on year increment per ha. Also the fact that 75 % of the increment is usually harvested was taken into account in the assessment.

Statement

In the **National Park Bükk**, the forest cover is very significant (more than 95%). These habitats serve as a green heart, forming one of the largest forest covered areas in Hungary. The forest cover is also crucial for supporting and ensuring numerous other services. The forests are managed mostly by two state-owned forestry companies, Egererdő and Északerdő Ltd..

Due to the modernisation of forestry technologies, less and less people work directly in the forest. Before that, many more local people were employed in forests in and around the national park. The main product of the forests is firewood. Incomes from processed timber and non-timber products are much lower. The two companies also run other businesses, such as hunting, accommodation and touristic facilities.

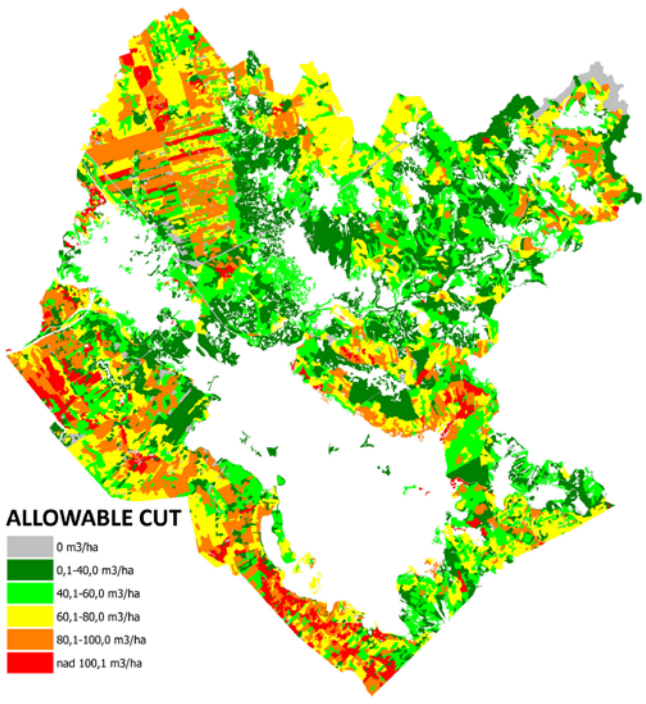


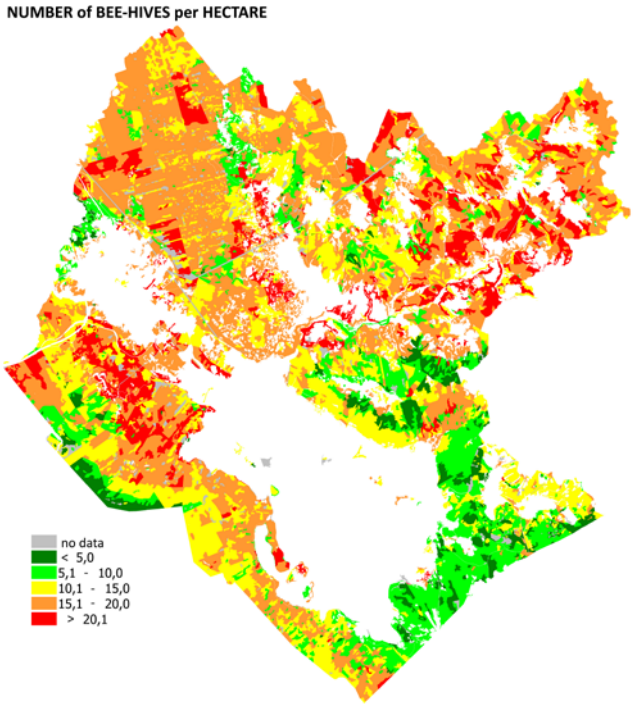
Map 14: Assessment of potential for timber production in the Bükk National Park.

In the **Notranjska Regional Park** and its surroundings, the provision of timber and other forest-related products from extensive karst forests, composed predominantly of fir, beech, and spruce, has traditionally been a very important ecosystem service for local communities. The timber industry has gone through a severe crisis, but is slowly recovering. Traditional wood crafting has been maintained and is gaining importance because of tourism development.

Similarly to Tara National Park, sustainable forest management has been practiced in the Notranjska region for many decades and in some parts for nearly 150 years. There are continuous series of 10-years forest management plans available for management units of this region since 1870s, so it can be seen how the standing volume of trees and tree species composition have developed since then. One can also follow its management guidelines and silvicultural systems. Through all this period, a clear-cutting system has never been applied.

Fig. 18: Traditional crafts, such as hand-made production of wooden boats, can trigger interest of newer generations for the life in the past and raise questions about sustainable development in future (NRP - photo J. Stergaršek).





Map 15 (left): Map showing possible cutting levels as determined in forest management plans of Notranjska Regional Park for 10-years period. The plans are made both for state owned and private forests in consultation with forest owners and other stakeholders, including nature conservation representatives.

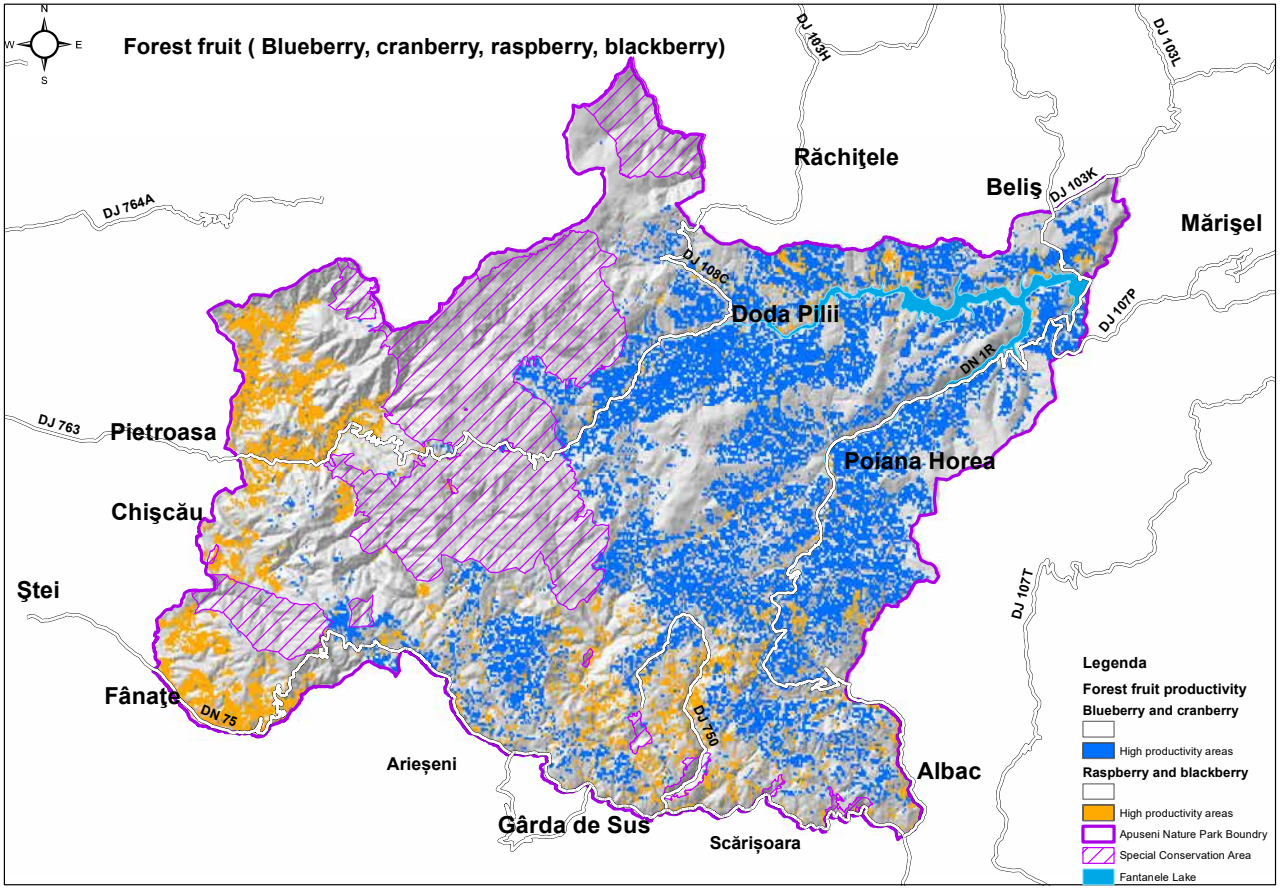
Map 16 (right): Capacity of forests for provision of honey in Notranjska regional park calculated on the basis of tree species composition and data of Slovenian bee-keepers association how many bee-hives a hectare of forests of a certain species can sustain.

Examples related to provision of non-timber forest products

Apart from capacity of forests to enable sustainable production of timber, other forest products are equally important. Honey, for example, is produced in Notranjska Regional Park up to the level of 100 kg per hectare (Map 16), which might in monetary terms be comparable to the value of timber.
Gathering non-timber forest products can be important for local people not only to use them themselves, but also to sell them in quantities that are usually limited. Such is the case in Apuseni Nature Park, where three species of mushrooms are of significant importance for local population in the area: Boletus edulis, Cantharellus cibarius, and Armillaria mellea.

Fig. 19: End products of mushrooms and beries gathered in the eco-region of Apuseni Nature Park (photo A. Golob).

Based on permits issued by the Park, in the past 5 years, 760 tons of Boletus, 413 tons of Cantharellus, and 153 tons of Armillaria were gathered in the Park each year. Similarly, the park administration has issued permits for gathering 1.100 tons of blueberries, 450 tons of cranberries and 150 tons of raspberries, annually (Map 17). Mushrooms and berries are gathered mostly by local people as a seasonal activity and sold to other businesses outside the park area in order to gain an extra income. The prices used by the collectors are very low compared to the reselling market value.
There are good opportunities for small businesses that pick and process these traditional products to sell them on local markets directly or to local restaurants and pension owners. These small businesses can also buy the goods from the local pickers and offer them fair prices. The "Park Partner" label has already been successfully implemented in marketing these products.



Map 17: Distribution of gathering forest fruits in Apuseni Nature Park on the basis of permits issued by the park.

In **Nature Park Žumberak-Samoborsko gorje**, people currently gather mushrooms mainly for personal use and, although no exact data exist on quantities they collect, it is known that this is no very intensive activity within the pilot area and that only a small percentage of the theoretical potential of this ecosystem service is being utilised. Even considering nature protection, a much larger percentage of potential utilisation could be allowed.

Development of mushrooms as fruiting bodies of fungi depend not just on ecosystems and their condition, but also on the precipitation distribution and other abiotic factors, and it varies a lot during and between years.

Map 18: Distribution of ecosystem types according to their productivity for wild mushrooms in Nature Park Žumberak - Samoborsko gorje. Assessment was made on the basis of scientific references and local expertise.

An interesting product of a protected karst forest area can just be a logo of a protected area. Such is the case in **Kalkalpen National Park**, where the forests are now excluded from any usage, but the wood processing industry around the park uses the logo of the park for promotion and marketing purposes (Fig. 20).

Fig 20: One of marketing strategies of a successful modern family wood processing company, which produces wooden houses, is to take advantage of its tradition and the fact that it is situated close to the famous National Park Kalkapen (photo: A. Golob).

Practical guidelines for timber and forest products

Local level

- Cooperate with all relevant stakeholders to achieve sustainable and multifunctional forest management in forested karst regions.
- Take active part in procedures of creation and adoption of management plans for multipurpose management of forests.
- Support programmes for education of local population related to sustainable use of forest products.
- Support local usage of wood products derived from sustainably managed forests and investments in the local wood processing industry and in wood crafting.
- Promote the wise use of non-timber forest products.
- Use wood for building infrastructure and accommodation facilities for tourism, if appropriate.
- Use wood and non-wood products for crafting souvenirs.
- Promote the usage of forest fruits in local tourism offers.

National level

- Ensure through national forest programmes and implementation of adequate forest legislation that all forests regardless of ownership will be sustainably managed.
- Ensure that such silvicultural methods will be implemented that karst forests can effectively and sustainably provide multiple ecosystem services.
- Ensure that local communities and other stakeholders representing interests in various forest ecosystem services will be involved in forest management planning procedures.
- Provide incentives for professional forest management, for restoration of forests damaged by natural disasters, and for implementation of measures required for optimal provision of certain forest ecosystem services.
- Support certification schemes, as an additional instrument for ensuring sustainable forest management.

Regional level

- Exchange good practices in implementation of sustainable, multifunctional and close-to-nature forest management in karst forests.

Fig 21: In forested karst areas wood has traditionally been the major material for construction and is again becoming more popular (Apuseni NP, photo A. Golob).

Programmes for environmental and pro-biodiversity business education and awareness raising

Statement

More and more people live in urban areas and do not have much contact with natural and semi-natural ecosystems. Many people are losing interest in nature and their understanding of natural processes, biodiversity and ecosystem services is diminishing. We believe that if such trends continue society would not be sensitive enough to stop activities and man-induced processes that deteriorate biodiversity and ecosystems and will not be able to adapt properly to changes resulting from such deterioration. Education and awareness raising about the importance of biodiversity and ecosystem services is therefore becoming one of the cornerstones of sustainable development. The complex nature of karst ecosystems is an ideal environment for development of educational programs and awareness raising approaches.

Explanation

Ecosystems of karst landscapes are among the most versatile on earth. In relatively very small geographical regions, whole arrays of ecosystems can be found: rocks and cliffs, caves, fresh water bodies, mires and fens, many types of grasslands, shrubs, and forests that not only depend on natural characteristics, but also on human interference and management approaches both at present and in the past. This versatility is very convenient for designing nature education trails and organising camps in nature enabling visitors to experience a great variety of natural features and learn how people have been managing different habitats. Special opportunities represent primeval forest reserves that have been preserved in Europe mostly in the karst.

Fig. 22: Provoking interest in nature and its features should start early in life (photo: A. Golob).

Fig. 23. Where nature trails and info centres are designed especially in combination with tourism, information boards and multimedia devices should be well thought out and regularly maintained (NPK - photo A. Golob).

Examples

Educational programs and awareness raising approaches should be well prepared with clear objectives and targeted to various-groups of visitors from school children to adults and nature lovers. Educated and well trained guides are of paramount importance to reach these objectives.

Fig. 24: One of the effective presentations requiring active participation of visitors in one of the visitor centres of National Park Kalkalpen (photo: Petra Drašković Pelc).

Of all project pilot areas, the **Kalkalpen National Park** has by far the richest and most versatile programme for environmental education and awareness raising. They have well trained rangers that guide visitors on trips to watch birds, red deer, and chamois, learn to recognise wildlife traces, and to understand ecology of mountain pastures and virgin forests. They also offer day trips guided by scientists to discover plants and other taxonomic groups. They organise wilderness camps, summer camps, and seminars. Their three information centres are exceptionally educative with a lot of innovative interpretations of natural processes. One of the most important target groups, the Park wants to reach, are schoolchildren.

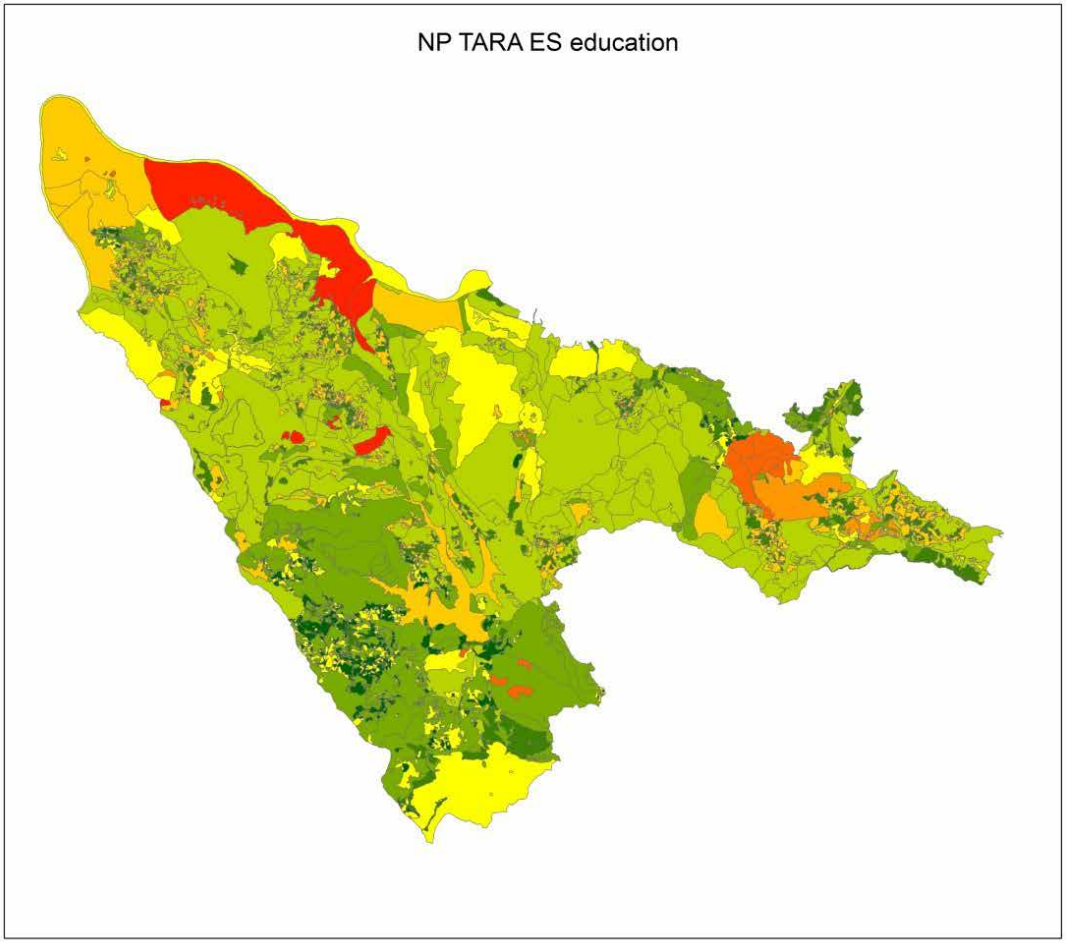
National Park Kalkalpen has established long term cooperation agreements with a number of primary and secondary schools and organises three to five day education programs in nature in cooperation with teachers. The content of the programme of a five-day wilderness camp lead by National Park rangers and wilderness teachers is for example:

- Familiarising events and games
- Tracking lynx
- Make fire with collected igniting materials
- Burning and carving spoons
- Building shelter
- Orientation in nature
- Recognising and using of edible plants
- Wilderness raids with treasure hunts
- Night actions, starry sky
- Preparing meals together, evenings around the campfire.

Another pilot area that has developed programmes for environmental education and awareness raising is **National Park Tara**. The Park has developed educational programs, which can be used for children from the whole Serbia. Special workshops are offered to children from the local community Bajina Bašta. For many years, school children from the whole country are coming to Tara to learn about the specific features especially in nature. Faculties of natural sciences, as well, have in their programs field visits to Tara, enabling their students not only to learn about biodiversity and nature, but also to systematically observe natural processes. Their findings contribute to the park's conservation of biodiversity and have a positive impact on the environment.

Fig 25: NP Tara has installed useful infrastructure along several education trails and dispose of well-educated and trained personnel for guiding school children from the whole country (photo: A. Drasovean)

The area of Tara is a large classroom in nature, but not all parts are equally useful for implementation of environmental education programmes. Local experts assessed and mapped the potential of the NP Tara area for educational purposes (map 19). In addition to ecosystem types, criteria such as land use intensity, availability to centres, rare species distribution, important cultural landmarks, geomorphologic landmarks, and presence of special areas with monitoring were taken into account in the ECO KARST assessment.



Map 19: Distribution of suitability of the NP Tara area for environmental education purposes.

In **Notranjska Regional Park**, organisations that conduct educational programmes are much more dispersed than in the previous two cases. Before the park was designated, the nation-wide Centre of school and out-of-school activities had one of its facilities situated within one of the most attractive parts of the park, and they have carried out programs they design more or less independently of the park employees. Nevertheless, they have to respect the rules of the park and design the programs accordingly. Their programs are designed for school children between 10 and 14 years old.

The programs typically include themes:

- Richness of forests
- Fungi and lichens
- Orientation in nature
- Usefulness of plants
- I see, I hear, I create
- Cultural heritage

An important role in terms of education and awareness raising play NGOs, such as members of Birdlife International, speleological associations, mountaineering associations, members of the World Organization of the Scout Movement, museums, and others. Businesses that conduct eco-tourism programmes usually also raise environmental awareness and convey new information about nature to their customers. NRP started their own ''nature is a classroom'' programme focussing on education of schoolchildren. NRP leads excursions in accordance with Slovenia's official ''nature sciences''/biology curricula of elementary schools. NRP staff transfers their knowledge to other interested parties such as students of biology and agronomy as well.

Fig 26: Educational programs should be conducted in all seasons and weather conditions - NRP (CŠOD Rakov Škocjan). (https://www.csod.si/galerija/rakov-skocjan)

Practical guidelines for pro-biodiversity businesses

Local level

- Cooperate with schools, universities, museums, professional organisations, NGOs, and other relevant stakeholders to create and continuously improve environmental education and awareness raising programmes to be performed in the karst eco-regions.
- Create and maintain infrastructure required to conduct the environmental education and awareness raising programmes.
- Organise training courses for personnel of karst protected areas and include them in the implementation of environmental education and awareness raising programmes.
- Include local experts and other relevant persons in implementation of environmental education and awareness raising programmes.
- Create and support programmes for education of local population and other target groups related to conservation of biodiversity and sustainable use of ecosystem services.
- Initiate and support programmes aimed at the education and training of personnel of small and medium sized pro-biodiversity businesses to enhance their performance.

National level

- Initiate national and EU funded projects supporting implementing education guidelines set out for the local level.

Regional level

- Exchange good practices in the implementation of environmental education and awareness raising programmes and pro-biodiversity business education programmes.
- Initiate EU-funded projects supporting the implementation of environmental and pro-biodiversity education and awareness raising programmes in karst eco-regions.

Development of sustainable tourism

Statement

Tourism has a long tradition in the karst due to its attractive underground world. It is one of the fastest growing sectors of the economy, in which attractiveness of natural features and cultural heritage represent the main motivation for tourist visits. Tourism generates income for the host economy and stimulates investment in the regions' infrastructure. It can thus improve the quality of life for residents. Tourism can have negative impacts on ecosystems and their biodiversity, if adequate protection measures are not identified and implemented.

Tourism should be sustainable characterised by (ETE[18]):

- Supporting the protection of the natural and cultural environment
- Enhancing the well-being of communities
- Recognising the product quality and tourist satisfaction
- Applying adaptive management and monitoring.

Fig. 27: Traditional ways of living are usually attractive for tourists and sustainable (photo: Apuseni Nature Park archive).

18 http://portal.unesco.org/es/files/45338/12417872579Introduction_Sustainable_Tourism.pdf/Introduction_Sustainable_Tourism.pdf

Explanation

According to the World Tourism Organization[19] sustainable tourism should:

- Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity.
- Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
- Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

According to the CBD Guidelines on Biodiversity and Tourism Development[20], sustainable tourism should aim at maximising the positive benefits of tourism to biodiversity, ecosystems, and economic and social development, and of biodiversity to tourism, while minimizing negative social impacts. Development of sustainable tourism supports the economic, social and cultural well being of the local communities in which tourism takes place. Employment may be created directly in the tourism industry through provision of accommodation facilities, restaurants, souvenir sales, specialised guiding, and other tourism-related services, or indirectly through the supply of goods and services needed by tourism-related business. Tourism development often implies infrastructure improvements such as better water and sewage systems, roads, electricity, internet, and public transport networks, thus also improving the quality of life for residents (ETE).

Attractiveness of the karst features, services of ecosystems and cultural heritage is just an initial component for development of good quality products for tourist satisfaction. Other material criteria, like the quality of transport, accommodation, and food, but also non-material criteria like hospitality or the quality of experiences, play an equally important role. Best results can be achieved if a nature-based touristic product is developed and offered through cooperation of several different disciplines and stakeholders.

To ensure that tourism is developed in a way that is ecologically, economically, and socially sustainable, adequate management and monitoring must be established, following the basic principles of sustainable use of resources.

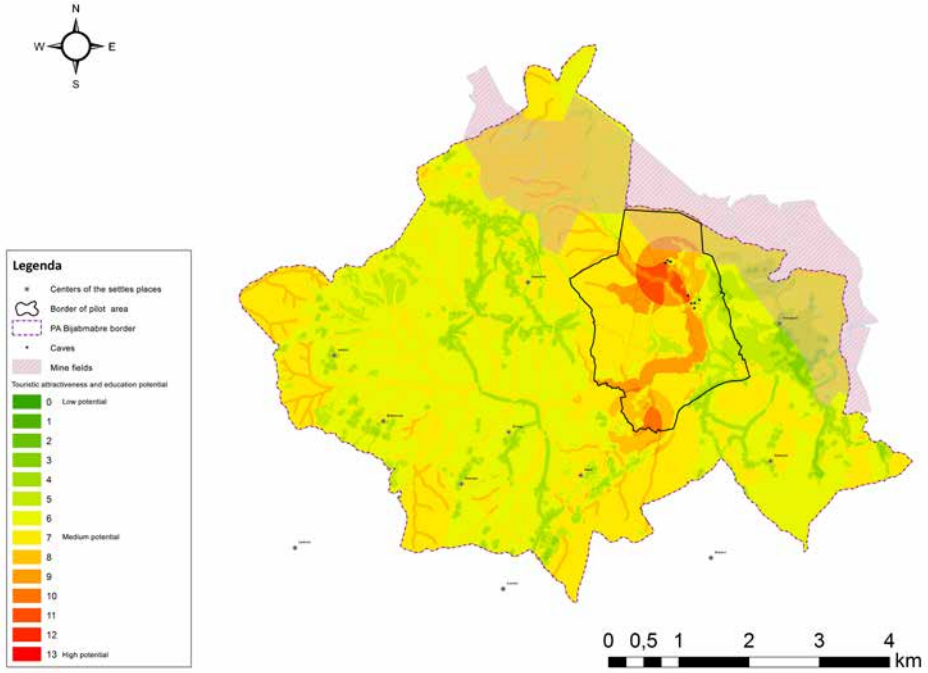
19 https://sdt.unwto.org/content/about-us-5
20 https://www.cbd.int/tourism/guidelines.shtml?page=2

Fig 28: Above: Karst features have been traditionally very attractive to people for visiting (Križna jama - photo: Gašper Modic); Below: Small and not expensive facilities, such as this 'window in the nature ' can contribute a lot to the mood of visitors and attractiveness of the site (photo: A. Golob).

Examples

In the area of **Bijambare Protected Landscape**, the main touristic attraction is the Bijambare cave, followed by medieval tombstones and diverse composition of attractive habitat types (Map 17). The core protected area can only be entered on foot or by a small tourist electric train upon paying an entrance fee. All tourist infrastructures are very well maintained.

Rangers and other employees are from local communities, surrounding the protected area, which is managed by the public institution of the Canton of Sarajevo. The local population benefits from the park also by offering souvenirs and other local products. Local food products are sold directly in the park or through restaurants in the vicinity.



Map 20: In the assessment of touristic attractiveness of Bijambare Protected Landscape highest scores received cave entrances, fir and spruce forests and bogs and mires.




Fig 29: The tourist train, medieval tombstones (stećci), the Bijambare cave, entrance to the park.

National Park Kalkalpen offers visitors pristine nature and tourism activities that are carefully planned. Within the park, motor vehicles are not allowed to be used with the exception of mountain hikers who can leave their cars at the hunting house within the park if they arrive before 9 am. Mountain bikers are directed to several bicycle trails but are not allowed to leave them. There are some walking paths to the mountain tops, but most visitors are directed to the two park info centres, to other attractive facilities situated at the borders of the park, and to the shepherd cottages, which were turned into small restaurants.

The Park administration established a separate tourist business enterprise that manages the info centres and a small hotel Villa Sonnwend in Windischgarsten. Pensions and hotels located around the Park benefit a lot because their guests can use the Park for recreation and nature experience. The park also grants the Park logo to selected nature-oriented businesses around the Park who can use it for marketing purposes.

Fig 30 (left): Kalkalpen National Park is exceptionally attractive due to its pristine nature (photo E. Mayrhofer). Right: A shepherd cottage in the Park (photo F. Sieghartleitner).

Fig 31: The National Park Kalkalpen tourist sightseeing and accommodation facilities are very attractive successfully combining old and modern styles (photo A. Golob).

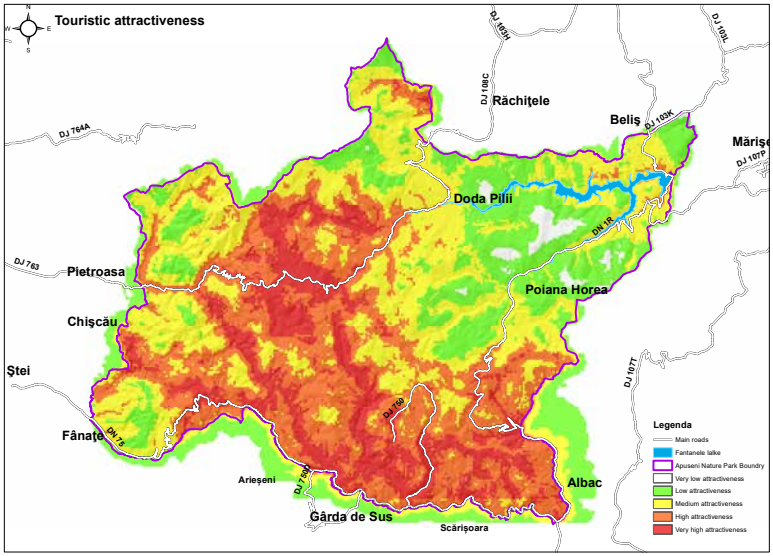
The tourism sector is also very important for **Apuseni Nature Park**, because of the scarcity of other income resources for the local population. Besides timber, non-wood forest products, and herbs, presently most of the local economic activities are related to tourism. Apuseni Nature Park has become a well-known location and a popular destination for Romanian tourists but also for those from other countries.

The growing number of visitors has created pressure on the natural ecosystems, especially on the sensitive karst ecosystems through pollution caused by poor municipal waste and

Fig. 32: Apuseni Nature Park is attractive for tourism because of exceptional natural scenery, world famous caves and other karst features and preserved cultural heritage (photo A. Golob).

wastewater management. So far, many touristic offers have been oriented towards mass tourism, but some good examples of eco-tourism approaches exist already, based on small-scale accommodation facilities with a small impact on nature and high satisfaction of guests.

There are good opportunities to develop adequate eco-camping facilities or to use farm for visitor accommodation. Restaurants could offer more products obtained from local farms and producers. Furthermore, there are opportunities towards developing touristic products that include guided tours with an in-depth interpretation of the local traditions and cuisine, nature and wildlife, speleological tourism or sports with low impact on nature, such as biking, and horse riding. Apuseni Nature Park established a program to offer a "Park Partner" status to some tourism operators and guides that provide this kind of services that can help in marketing and generate added value.



Map 21: Assessment of atractiveness of Apuseni NP for tourism taking into account natural values and existing infrastructure. This map opens new perspective for businesses operating in this sector to introduce specific ecotourism packages that would focus on areas outside mass tourism attractions.

The richness of the natural and cultural heritage is an important advantage of the **Tara National Park** area that shows its potential as a tourist destination. There is a tendency to integrate the offer of Tara into regional offer together with Zlatibor and Western Serbia. Infrastructure and human resources need to be improved in the coming period. The direction and mode of tourism development is necessary to be consistent with the preservation of nature. A special segment is the development of rural tourism, which has good prospects in the Tara National Park and its surroundings.

Tourism gives significant contribution to the local economy. For some local people income from tourism is the main, while for most of them it is an additional earning. Special niches of tourism such as wildlife tourism have a large potential. Wildlife tours with a focus on bears have been initiated. In addition, eco camps could be a good opportunity.
Shortcomings that will need to be resolved in future tourism of NP Tara are in particular the limited access to Tara (road, rail, airport), the underdeveloped basic infrastructure, waste disposal and wastewater management, the lack of basic spatial-urban regulations for some parts, illegal construction, and urbanization. There is pressure also on habitats and biodiversity originating from tourism in the region.

Fig. 33: The famous view from the Tara mountain plateau to the Drina river artificial lake (photo: A. Golob).

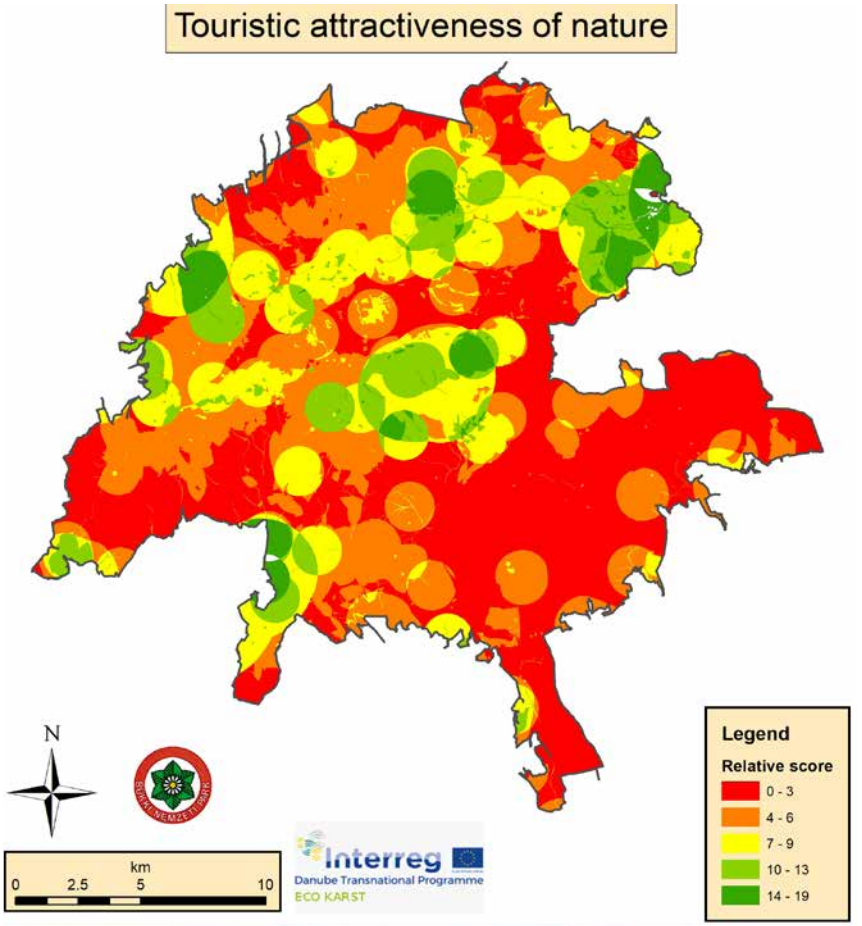
Fig. 34: Enjoying waters of the Drina river and its inflows is one of the most visited tourist attractions of the NP Tara (photo: D. Sharomov)

The **Bükk National Park** with its surroundings has been a favourable target place for tourists for a long time, including outdoor sports. This includes hiking, bicycle riding, horseback riding, rock climbing, caving, and, to a lesser extent, winter sports. Several accommodations and restaurants operate in and around the pilot area. Some of them offer locally produced food and use the Park logo for advertisement. The tourism in the region is increasing. Mostly domestic tourists visit the area. The Bükk National Park has strong protection legislation, so only eco-touristic development is feasible.

Any mass tourism is canalised into the touristic zones (C-zones) of the park or outside the protected areas. The demand for better services in the forested areas is also significant. Several touristic developments were implemented by the park administration, municipalities and forestry companies recently, such as educational trails, renewed forest huts, narrow gauge railway lines, look-out towers, planned visitor centre. An increase in emphasis should not mean increasing the number of visitors, especially not for outdoor sports events, but for developing the nature program offering and for more cooperation among local stakeholders.

Fig. 35: Outskirts of the otherwise mostly forested Bükk National Park are composed of a variety of ecosystems and contribute to the high biodiversity of the entire area. Here conventional sustainable tourism has good prospects for further development (photo: Bükk National Park archive)

Fig 36: High quality guides are required for interpretation of natural and cultural features within the area of Bükk NP (upper line), while phisiologic needs of tourists are saturated in the surrounding area (lower line) by businesses providing high quality products and services (photo U. Gattenloehner).



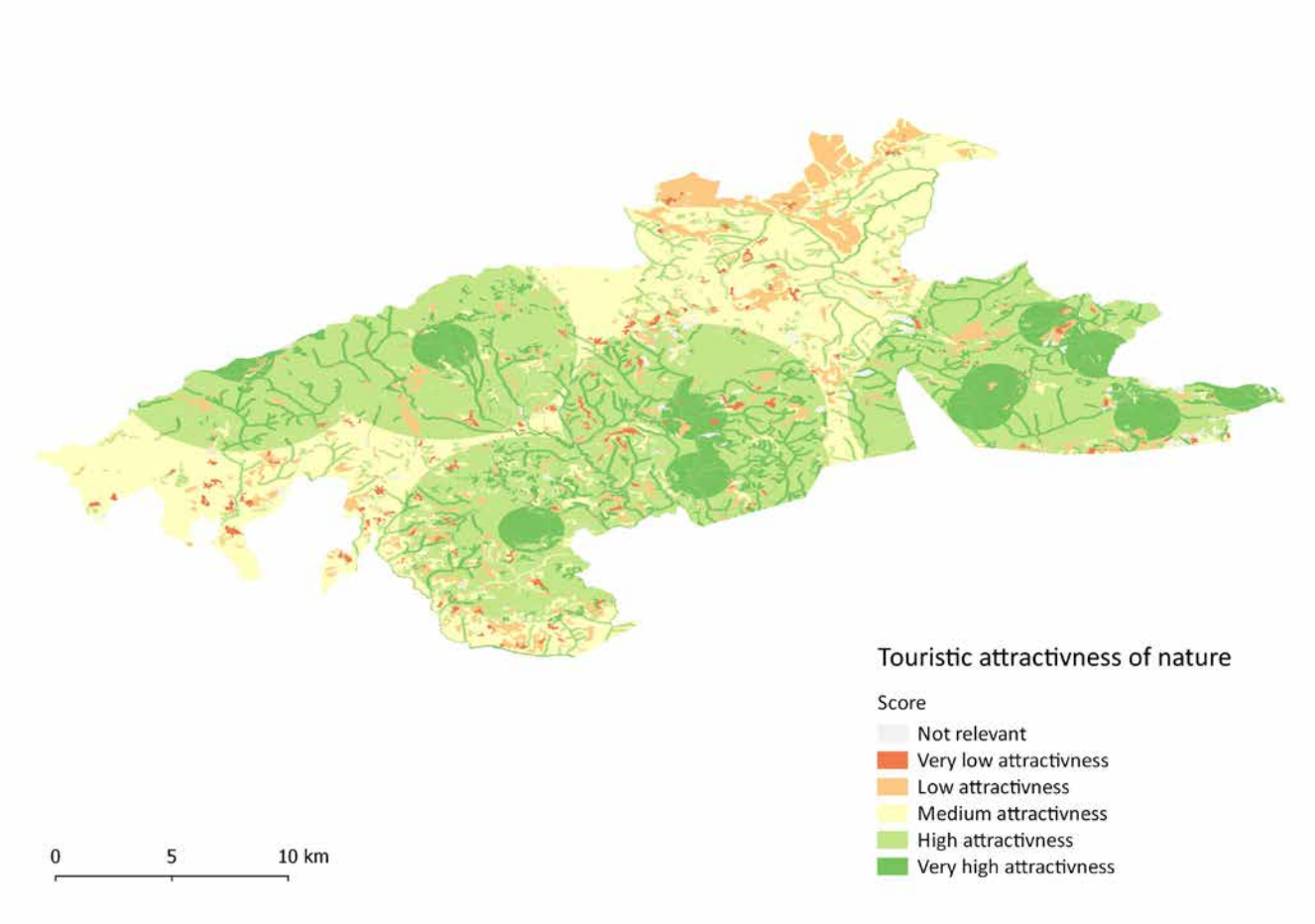
Map 20: Assessment of touristic atractiveness of nature in Bükk National Park. Habitats, which are important from touristic point of view (mountain meadows, alder gallery forests, wooded pastures, permanent streams, lakes) received more scores. So did infrastructure and touristic assets, such as fortifications, beehive rocks, caves, springs and forest resting places, around which buffer zones were formed.

In **Žumberak-Samoborsko gorje Nature Park** development of rural eco-friendly types of tourism could be a way to revive the area and give the locals a reason to stay and live within the Park area. New young families have a chance to start new family farms, accommodation facilities, guided trips, and other tourism products adapted to the values of the Park area. This is necessary because currently tourists are attracted by beautiful nature, cultural heritage, educational trails, but except on the Park border, they can hardly find a place to eat or sleep and it is almost impossible to buy local products, such as food and souvenirs.

In the Park, there is a big gap between actual and potential sustainable tourism development. Therefore, it was important that the map showing touristic attractiveness of nature became one important starting point for further planning of sustainable tourism in the area. Man-made features and habitat type classification that were used in the first trial of mapping this ecosystem service, turned out as no good indicators for assessing this ecosystem service. The main criteria for mapping in the second trial were ecological and landscape features and attributes that attract people for recreational activities. These were mountain peaks, waterfalls, climbing spots (natural occurring steep rocks), paragliding take-offs, streams, and special protected areas within the park, such as canyons, forest reserves, and park forests. Appropriate buffers were made around these features.

Fig 37: One of good examples of sustainable tourism in Žumberak-Samoborsko gorje Nature Park – the Ethno House Slakoper (photo: N. Berbić)

Fig 38: Landscape diversity is the main attractiveness of the Park (photo O. Krstinić)



Map 21: Touristic attractiveness of nature of Žumberak-Samoborsko gorje Nature Park.

It is interesting, though, that the map versions, both with and without man-made features highlight more or less the same areas of the nature park as the most attractive. We can interpret that people living here were already recognizing the most attractive features in the area and were building mountain huts, hiking trails, and other facilities around or in the vicinity of such features. The same applies for the Public Institution managing the Park, which has also created educational trails, cycling trails, the Visitor Center Sošice around and in the vicinity of the most attractive features of the park.

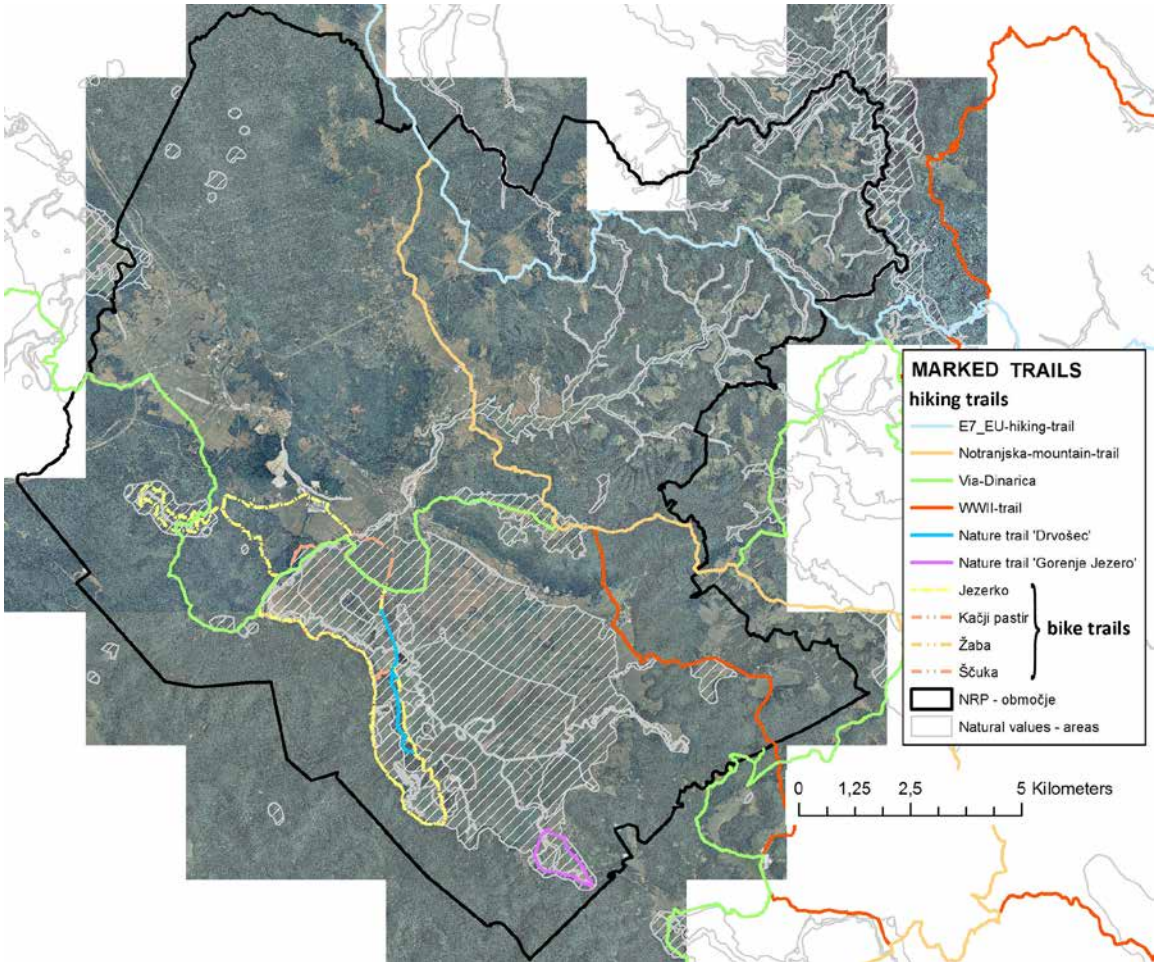
Cerknica Lake became world famous already at the end of 17th century, when Janez Vajkard Valvasor scientifically described its intermittent character in the book The Glory of the Duchy of Carniola and became a member of the Royal Society in London. In spite of the famous lake and the exceptional rock bridges of Rakov Škocjan and Križna jama caves, the area of **Notranjska Regional Park** never developed into a mass tourism destination and there are no such plans also for the future. The area hosts many endangered animal species, especially birds, which are sensitive to disturbance that mass tourism usually brings.

Fig 39: Sopota waterfall (photo: A. Cerovečki).

Fig. 40: Small Natural Bridge and other karstic features in Rakov Škocjan special protected area are easily visited attractions of the Notranjska Regional Park (photo J. Stergaršek).

Notranjska RP is situated in close proximity to Ljubljana and has traditionally mostly been used as a recreational area in all seasons, which has not brought a lot of income possibilities for local population. This situation has changed and there are more and more visitors coming from other countries that would like to spend more days in this attractive region. Local population has adapted to this new situation. Many new tourist farms and tourist guides were registered in the area. The organisation managing the Park is getting more and more involved into the coordination of tourist programmes and acts as a kind of tourist information centre.

Fig. 41: Local population has successfully begun to offer accommodation, guided trips and other services to tourists, but there is still a lot of room for improvement (photo: A. Drasovean).



Map 22: There is a dense network of hiking trails in Notranjska RP area. Along these and also cycling trails many new tourist farms successfully started their businesses not only offering original accommodation, but also local food and other products.

Practical Guidelines for sustainable tourism

Local level

- Take active part in participatory processes of creating action plans for sustainable tourism development in karst eco-regions, taking into account other action plans for protected areas.
- Within the participatory processes, cooperate with all relevant stakeholders to identify, prioritise and locate on maps nature-related tourist activities and products suitable for karst eco-regions and set out conditions for their implementation.
- Support and introduce programmes for the education and training of tourist guides and other local people interested in the implementation of tourism-related businesses in karst eco-regions in order to achieve highest quality tourism products and services and good earnings from tourism.
- Take active part in designing nature-friendly tourism facilities and their endorsement in local spatial plans. Ensure their proper maintenance.
- Take active part in the elimination of all obstacles to development of sustainable tourism in karst eco-regions, including pollution, security issues, professional training, lack of cooperation among relevant stakeholders, lack of information, and others.
- Take active part in promoting projects for financing and realising actions set up in action plans.
- Develop local brands for marketing sustainable nature-based tourism.

National level

- Integrate sustainable tourism and eco-tourism principles in national tourist policies and programmes.
- Set up a multi-sectoral national strategy for developing sustainable tourism that takes into account specific conditions in karst eco-regions.
- Integrate measures in support to sustainable tourism of karst eco-regions in national rural development plans in the context of EU CAP.
- Financially support local development plans aimed at improving conditions for the development of sustainable tourism in karst eco-regions.

Regional level

- Exchange good practices in the implementation of sustainable tourism.
- Develop regional brands for marketing sustainable nature-based tourism and promote them.
- Intensify international cooperation and set up common projects, such as cross-border hiking and bicycling trails.

Fig. 43 (above left): Climbing as a tourist offer should be checked not to endanger rock breeding birds (Apuseni Nature Park archive)

Fig. 42 (above): Traditional way of life is still preserved at Apuseni NP, which makes the area exceptionally attractive for tourism (photo: Apuseni Nature Park archive)

Optimising management approaches for protected karst areas

Statement

Karst eco-regions can sustainably provide many ecosystem services to local communities, if ecosystems are maintained in good condition and if the provision of services is optimally balanced. This can only be achieved through systematic and continuous cooperation of groups and individuals that have interest in provision of particular services and can also contribute to their provision.

Fig. 44: Organisation of cooperating events for stakeholders requires specific expertise (NRP, photo A. Golob).

Organisations and institutions managing protected karst areas have good knowledge of the condition of ecosystems and their species, but also good insights into the services that these ecosystems provide to local communities. They seem to be most appropriate to organise and lead cooperation of stakeholders covering the whole array of ecosystem services and they care that the provision of these services will happen in harmony with nature and in line with regulations. Other organisations, such as regional sustainable development agencies and also some sectoral agencies, can play similar roles outside protected areas covering karst eco-regions.

All stakeholders should get a chance to be involved in management decisions or be early consulted about them. Full participation of stakeholders is the best way that decisions become synchronised with different interests and be well implemented on the ground.

Explanation

Participative management usually starts with a stakeholder analysis, in which stakeholders are identified, classified in terms of the role they are going to play in the process, and, if appropriate, interviewed about their interests and opinions related to the scope of management.

Names of individual persons are needed, as well as the organisation or institution they work for, function within their organisation, contact addresses and indication of the type of interest group they represent. In the action planning processes of the project ECO KARST, the following stakeholder types were identified and registered:

- responsible county and municipal institutions relevant for the site in question;
- organizations holding expert knowledge on biodiversity and ecosystem conditions;
- representatives of organisations responsible for water provision;
- professional and advisory institutions in forestry and agriculture;
- public companies, such as public forest enterprises;
- organisations holding concessions for wildlife, fish and cave management;
- NGOs in the field of environment and biodiversity;
- NGOs in the field of tourism and related businesses;
- land owners and pro-biodiversity business operators;
- schools;
- others, according to their specific interest.

From the point of view of their future role in the process, stakeholders should be classified into the following categories:

- Stakeholders involved in the process and sometimes regarded as true collaborators: this group represents stakeholders that are supposed to be able to contribute the most to the implementation of management decisions. These stakeholders are should be invited to the stakeholder workshops and are expected to play an active role through the whole process.
- Stakeholders to be consulted: this group represents stakeholders that dispose of information or power which might be helpful or can influence implementation of management decisions to a great extent. They are usually invited to the stakeholder workshops, but some might not be willing to actively take part.
- Stakeholders to be informed: this group can only partially influence the implementation of a plan, but has certain interest in the plan and results it can bring. However, sometimes this group can bring forward innovative ideas.

According to our experiences, it should also be emphasised that once stakeholders had been invited to the planning process and have responded with interest, they should always be invited again later in the process. Another important element is controlling the time in the planning process in relation to

stakeholders; otherwise it could turn out to be a lengthy and never ending process. The stakeholders should know in advance what is expected from them and when they have opportunity to contribute to the process.
Participative action planning process usually consists of three rounds of stakeholder workshops:

1) Situation analysis: ecosystem condition, ecosystem services, influencing factors and opportunities;
2) Setting goals and objectives;
3) Measures and activities (Implementation).

The programmes for the stakeholder consultation workshops should be prepared at internal working group meetings, where the following elements should be defined:

- Purpose and programme of the workshop;
- List of invited stakeholders and the method of invitation;
- Who will have introductory presentations and what they will contain;
- Engagement of a moderator and approval of a method for working in groups and discussing workshop results;
- Time and venue of the event;
- Programme of a site visit, if appropriate;
- Logistics and catering;
- Who will deliver an opening speech.

It is very important how stakeholders are invited to participate in the planning process. In addition to an invitation letter shortly describing the goal of the process and the desired role of stakeholders in it, it is highly desirable to invite participants personally and chat with them a bit about their indispensable role in the process.

Fig. 45: Stakeholders representing local knowledge and traditions deserve particular respect. Local landowners and land users have often accumulated vast amounts of knowledge and experience about the management of the land and biodiversity. The use of this knowledge will not only make the multipurpose management plan for a karst eco-region effective and pertinent, but will also increase the goodwill of the stakeholders to contribute to the implementation of a plan (NP ŽSg - photo A. Golob).

Situation analysis

The purpose of the first stakeholder workshop is twofold. The first intention is to inform the stakeholders about the purpose and scope of the planning procedure and how decisions of the plan could be implemented. Shortly, stakeholders should get an answer to the question: 'Why we are here?'

The next step is to provide stakeholders with the basic information about the karst area in question and its importance in terms of biodiversity and ecosystem services it can provide. Shortly, stakeholders should get an answer to the question: 'What have we got?'

The second purpose of the first stakeholder workshop is to give an opportunity to stakeholders to say what is important to them and what are the existing influences and potential opportunities. The stakeholders are then asked to map these influences and opportunities (factors). It is desirable that they get a hint about areas of consideration, which is usually done by group leaders that get instructions before the event.

Fig. 46: In the ECO KARST project ecosystem services maps (hanging on the wall), which were prepared in consultation with local experts before the first round of workshops, were of great importance to clarify the question of importance and potential of ecosystem services in the area (NRP - photo: A. Golob).

Fig. 47: In order to achieve that the whole event develops smoothly, in a good atmosphere and effectively, it is highly recommended to engage a professional moderator who would also ensure that the most appropriate participation method will be chosen (photo: A. Golob)

Presentations of results of the working groups by their leaders represent a good opportunity for final exchange of views and their argumentation.

A workshop should always conclude with an evaluation questionnaire whose main aim is to improve in the next workshop round any weaknesses identified by stakeholders.

Site visits for stakeholders may be organised before the first workshop or after it. They should be organised beforehand, if it is expected that a significant number of stakeholders (usually not locals) do not know the area good enough to be able to participate actively in the workshop. A site visit after the workshop could be very useful for the on spot illustration of influencing factors and opportunities that have been identified during the workshop.

Fig 48: Stakeholders should be given an opportunity to take over the initiative at the workshop as much as possible, taking care of course that they stay focused on the topics of the workshop introduced by the moderator and respect the principles presented on the picture left (presentation: Vida Ogorelec Wagner).

Setting vision, goals and objectives

After carefully analysing the results of the first round workshops and improving data on ecosystem condition, ecosystem services, influencing factors and opportunities, preparation should start for the organisation of the second stakeholder workshop whose main aim should be to answer the question: "What do we want (Objectives)?"

The action plan working group should gather again and prepare a programme for the workshop. The first part of the programme should include a quick recapitulation of the results of the previous workshop, especially if some more time has passed. In the next part, some more information from the improved situation analysis should be presented, in particular related to potential actions needed to overcome negative influences and use opportunities that ecosystem services constitute for local sustainable development. No more than 40 minutes to one hour should be spent to present this information and it is important that presenters are persons that have taken part at the first workshop and have been engaged in the analysis of data.

In the second part of the second workshop, stakeholders are invited to formulate the vision, goals and objectives for the future development. Vision means a description of the ideal situation in an undefined future in usually the whole area covered by the plan and is therefore less specific than goals and objectives.

(General) Goals may refer to a description of a desired situation of a homogenous part of the site (a zone) or in our case to short description of particular ecosystem services we want to improve in a certain time frame.

(Specific) Objectives should refer to a description of a desired situation of certain elements related to the general goals. They should be as specific and realistic as possible and time bound (SMART). The location of their implementation should be marked on the map, if appropriate, as was done in the case of ECO KARST project on so called Biodiversity Investment Opportunity maps (BIO maps).

As regards the organisation of the second stakeholder workshop, our experiences have shown that stakeholders can very well set a vision for the site as a whole and some key words for the measures to be taken to achieve such a vision. However, they usually need some pre-prepared framework of goals and objectives and then contribute to its improvement and finalisation. The latter is very important because a joint agreement on the objectives is the crucial point in the participative planning process, where many stakeholders with diverging interests take part.

Fig. 49: In the process of formulating goals and objectives it is desirable that stakeholders are devided into groups according to their specific fields of expertise, experience and interests (NP ŽSg - photo A. Golob).

Fig. 50: The final phase of the workshop, when results of the group work are presented and discussed among all participants, is of utmost importance (NP ŽSg - photo A. Golob).

Measures and activities (Implementation)

The next phase of the management planning process, which should be in the centre of stakeholder interest, is the formulation of a set of activities to achieve the objectives (answer to the question: 'What must we do?'). Activities should be arranged so that it is clear which goal and objective will be reached through their implementation. Description of an activity should contain all elements required to ensure that an action will be implemented. These are:

- Detailed description of an activity linked to a specific factor we want to influence with the activity to reach the objective;
- Location where the activity will take place;
- Time, when an activity should happen;
- Persons or organisations responsible to conduct the activity (leading and their partners);
- Assessment of costs to conduct the activity and possible financial sources;
- Indicators of achievement for a planned activity;
- Prioritisation of implementation.

It is very useful that during the third workshop stakeholders cooperate in specifying the activities, identifying partners and assessing the timeframe. A draft list of activities should be prepared for the workshop by the working group in advance, while after the workshop the working group shall complete all other elements of this implementation chapter of the plan.

All stakeholders participating in the plan should have access to its final version, in which all their names should be mentioned.

Implementation group of the plan should monitor how the activities have been carried out and regularly report the results to all stakeholders.

If it turns out that the plan should be modified due to unexpected changes in social, natural or financial environment, any stakeholder can propose modification, which should be discussed and the result be unanimously agreed.

Fig. 51: Trainings for organisation of participative action planning process were designed according to the learning by doing approach (photo U. Gattenloehner).

Practical guidelines for management approaches

Local level

- Start implementation of action plans in a given area and continue cooperating with stakeholders.
- Spread the stakeholder participation approach over the borders of the park.
- Seek for institutions willing to act as coordinators of participative processes.
- Promote successful stories through media.

National level

- Integrate participative decision approaches in all sectors where inter-sectoral cooperation can bring better results for sustainable development.
- Use LEADER approach in rural development planning as a priority approach.

Regional level

- Keep the stakeholder network alive and involve any missing countries (e.g. for ECO KARST Bulgaria, Slovakia).
- Exchange good practices in implementation of participative decision making processes.
- Create online courses for potential PBBs.
- Organise thematic forums for experience and know-how exchange.
- Establish closer cooperation between neighbouring karst protected areas, such as for ECO KARST pilots Apuseni – Bükk, Bükk – Kalkalpen, Žumberak – Kozjanski Park, Notranjska – Risnjak.

Appendix 1

Recapitulation of implementation guidelines

Local level

1. Fully implement regulations on the proper disposal of waste and the limitation of fertilisation.
2. Maintain extensive management of grasslands on moist soil.
3. Abandon the digging and improving of draining canals.
4. Manage forests in a close-to-nature way.
5. Apply the precautionary principle in local development and spatial planning, and ensure active participation in local planning processes.
6. Apply the polluter pays principle to discourage contaminating practices.
7. Fully implement land use and approved forest management plans.
8. Take active part in creating local land use and forest management plans in order to preserve and enhance the capacity of ecosystems to mitigate natural hazards in local communities.
9. Liaise with farmers, local agricultural and biodiversity experts to manage grasslands in a biodiversity-friendly way, taking full advantage of environmental components of the EU Common Agricultural Policy. As an alternative, purchase agricultural land and manage it in line with nature conservation objectives.
10. Take active part in participative processes of creating local land use plans and oppose decisions that might adversely affect biodiversity. Promote extensive agricultural practices (preference to organic fertilizers, ban of biocides, minimal stocking rates of livestock) and take care that all waste-water is treated and purified.
11. Take active part in participative processes of adoption of forest management plans and promote and support silvicultural measures that preserve and enhance forest biodiversity.
12. Support and take an active role in NGOs in charge of managing hunting and fishing areas and districts, as well as in birding and speleological associations.
13. Regularly conduct systematic monitoring of condition of ecosystems and their charismatic species at local level and publish the results.
14. Liaise with farmers and local agricultural experts to manage grasslands in such a way to achieve the right balance between production and biodiversity, taking full advantage of the environmental component of EU Common Agricultural Policy.
15. Examine possibilities to use biodiversity-friendly managed grasslands and fields in an economically efficient way that is building on good practices in other areas.
16. Examine possibilities for the re-establishment of high-stem orchards and for fruit-based products.
17. Set standards for the biodiversity-friendly management of agricultural areas in specific karst conditions, promote them and develop certification schemes for branding.
18. Develop innovative ways of marketing agricultural

products on local markets in connection with tourism, where appropriate.

19. Cooperate with all relevant stakeholders to achieve sustainable and multifunctional forest management in forested karst regions.
20. Take active part in procedures of creation and adoption of management plans for multipurpose management of forests.
21. Support programmes for education of local population related to sustainable use of forest products.
22. Support local usage of wood products derived from sustainably managed forests and investments in the local wood processing industry and in wood crafting.
23. Promote the wise use of non-timber forest products.
24. Use wood for building infrastructure and accommodation facilities for tourism, if appropriate.
25. Use wood and non-wood products for crafting souvenirs.
26. Promote the usage of forest fruits in local tourism offers.
27. Cooperate with schools, universities, museums, professional organisations, NGOs, and other relevant stakeholders to create and continuously improve environmental education and awareness raising programmes to be performed in the karst eco-regions.
28. Create and maintain infrastructure required to conduct the environmental education and awareness raising programmes.
29. Organise training courses for personnel of karst protected areas and include them in the implementation of environmental education and awareness raising programmes.
30. Include local experts and other relevant persons in implementation of environmental education and awareness raising programmes.
31. Create and support programmes for education of local population and other target groups related to conservation of biodiversity and sustainable use of ecosystem services.
32. Initiate and support programmes aimed at the education and training of personnel of small and medium sized pro-biodiversity businesses to enhance their performance.
33. Take active part in participatory processes of creating action plans for sustainable tourism development in karst eco-regions, taking into account other action plans for protected areas and other outputs of the ECO KARST project.
34. Within the participatory processes, cooperate with all relevant stakeholders to identify, prioritise and locate on maps nature-related tourist activities and products suitable for karst eco-regions and set out conditions for their implementation.
35. Support and introduce programmes for the education and training of tourist guides and other local people interested in the implementation of tourism-related businesses in karst eco-regions in order to achieve highest quality tourism products and services and

good earnings from tourism.

36. Take active part in designing nature-friendly tourism facilities and their endorsement in local spatial plans. Ensure their proper maintenance.
37. Take active part in the elimination of all obstacles to development of sustainable tourism in karst eco-regions, including pollution, security issues, professional training, lack of cooperation among relevant stakeholders, lack of information, and others.
38. Take active part in promoting projects for financing and realising actions set up in action plans.
39. Develop local brands for marketing sustainable nature-based tourism.
40. Start implementation of action plans in a given area and continue cooperating with stakeholders.
41. Spread the stakeholder participation approach over the borders of the park.
42. Seek for institutions willing to act as coordinators of participative processes.
43. Promote successful stories through media.

National level

1. Fully implement the EU Water Framework Directive including its link to Natura 2000 areas.
2. Apply the polluter pays principle to discourage contamination and promote pollution-free practices.
3. Take active part in creating national climate mitigation and adaptation strategies, national forest programmes, agricultural, and water management policies in order to preserve and enhance capacity of ecosystems to mitigate natural hazards and adapt to them.
4. Complete the Natura 2000 network in karst areas where the results of biogeographic seminars have shown that certain natural habitats or species are still not covered enough and complete the Emerald network in EU candidate countries in line with requirements of the Bern Convention and support gathering related scientific data about habitats and species.
5. Take appropriate statutory, management planning and contractual conservation measures to ensure implementation of objectives of the Natura 2000 and Emerald sites in karst landscapes.
6. Designate appropriate proportion of representative habitat types that do not require active management as natural reserves.
7. Ensure financing of management of protected areas.
8. Create favourable conditions for private landowners to manage their land in a biodiversity friendly way.
9. Pay particular attention to karst regions in national biodiversity strategies and policies as well as to their implementation.
10. Support nature conservation NGOs.
11. Set biodiversity and nature conservation standards for NGOs and other organisations that have concessions for the management of caves, wildlife, and fish, and supervise them.

12. Promote further support of EU common agricultural policies for ecologically friendly management of agricultural areas, especially in regions with more difficult conditions, such as karst landscapes.
13. Devote special attention to sustainable agriculture and related local development in national rural development plans.
14. Support certification schemes and local markets based on them.
15. Ensure through national forest programmes and implementation of adequate forest legislation that all forests regardless of ownership will be sustainably managed.
16. Ensure that such silvicultural methods will be implemented that karst forests can effectively and sustainably provide multiple ecosystem services.
17. Ensure that local communities and other stakeholders representing interests in various forest ecosystem services will be involved in forest management planning procedures.
18. Provide incentives for professional forest management, for restoration of forests damaged by natural disasters, and for implementation of measures required for optimal provision of certain forest ecosystem services.
19. Support certification schemes, as an additional instrument for ensuring sustainable forest management.
20. Initiate national and EU funded projects supporting implementing education guidelines set out for the local level.
21. Integrate sustainable tourism and eco-tourism principles in national tourist policies and programmes.
22. Set up a multi-sectoral national strategy for developing sustainable tourism that takes into account specific conditions in karst eco-regions.
23. Integrate measures in support to sustainable tourism of karst eco-regions in national rural development plans in the context of EU CAP.
24. Financially support local development plans aimed at improving conditions for the development of sustainable tourism in karst eco-regions.
25. Integrate participative decision approaches in all sectors where inter-sectoral cooperation can bring better results for sustainable development.
26. Use LEADER approach in rural development planning as a priority approach.

Regional level

1. Exchange knowledge about good practices in integrated implementation of the EU Water Framework and Nature Directives.
2. Exchange good practices in the implementation of EU disaster risk reduction programmes.
3. Exchange good practices in implementation of EU nature conservation directives and the Bern Convention in karst areas.
4. Continue with cooperation in the Danube region and

neighbouring regions and propose similar projects as ECO KARST to improve the management of protected areas, including Natura 2000 and Emerald sites, oriented towards enhancement of biodiversity and related supportive businesses.

5. Exchange good practices in implementation of biodiversity-friendly agriculture and innovative agricultural products and marketing approaches.
6. Exchange good practices in implementation of sustainable, multifunctional and close-to-nature forest management in karst forests.
7. Exchange good practices in the implementation of environmental education and awareness raising programmes and pro-biodiversity business education programmes.
8. Initiate EU-funded projects supporting the implementation of environmental and pro-biodiversity education and awareness raising programmes in karst eco-regions.
9. Exchange good practices in the implementation of sustainable tourism.
10. Develop regional brands for marketing sustainable nature-based tourism and promote them.
11. Intensify international cooperation and set up common projects, such as cross-border hiking and bicycling trails.
12. Keep the stakeholder network alive and involve any missing countries (e.g. for ECO KARST Bulgaria, Slovakia).
13. Exchange good practices in implementation of participative decision making processes.
14. Create online courses for potential PBBs.
15. Organise thematic forums for experience and know-how exchange.
16. Establish closer cooperation between neighbouring karst protected areas, such as for ECO KARST pilots Apuseni – Bükk, Bükk – Kalkalpen, Žumberak – Kozjanski Park, Notranjska – Risnjak.

Appendix 2

Proposed structure of the local action plans

In the ECO KARST project the following structure of the action plan was suggested for the pilot areas:

1. Introduction
- a. Purpose and scope of the action plan
- b. Creation and ownership of the plan

2. Situation analysis of the site
- a. General characteristics
  - i. Maps of the site with description of physical characteristics
  - ii. Brief description of formal designation (legal status) and managing organisation and regime
  - iii. Description of general socio-economic characteristics
- b. Description of features characterising biodiversity
  - i. Map of habitat/ecosystem types with identification of factors influ encing them
  - ii. Description of species acquiring special attention and description of factors influencing them
  - iii. Assessment of condition of ecosystem types with maps and description of influencing factors caused by:
    - Forestry
    - Agriculture
    - Hunting and fishing
    - Tourism
    - Other
- c. Description of ecosystem services
  - i. Map and description of each ecosystem service selected and its importance for sustainable development of the local community and PBBs
  - ii. Assessment of factors influencing ecosystem services
- d. Description of pro-biodiversity businesses
  - i. Gap analysis of each PBB selected
- e. Stakeholder analysis and participation
  - i. List of stakeholders consulted
  - ii. Participation of stakeholders in the plan

4. Goals and Objectives
- a. Goals for improvement of relevant ecosystem services
- b. Goals for development of selected pro-biodiversity businesses
- c. Biodiversity investment opportunity maps (BIO maps)

5. Implementation

a. List of actions required to achieve the goals set

b. Identification of organisations and individuals required to carry out the actions

c. Resources required to carry out activities:
   i. Human
   ii. Time (timeframes should be set for every activity planned)
   iii. Finance

d. Achievement indicators, if appropriate

6. Monitoring and Communication

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http://www.interreg-danube.eu/approved-projects/eco-karst