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HealthyForestRegions

D 2.1.3 Regional strategies for prioritisation of forest related ecosystem services

Slovenian pilot site

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The *HealthyForestRegions Project - Supporting Healthy Forest ecosystems for human well-being in forest regions* (CE0100310) operates under Interreg CENTRAL EUROPE's 2021-2027 funding. It is aligned with Priority 2 '*Cooperating for a greener Central Europe'*, and addressing Objective 2.4, '*Safeguarding the environment in Central Europe*'. The project spans form April 2023 to March 2026, with a budget of €2.78 million, of which 80% are funded by ERDF. Involving nine partners across six Central European countries with six project regions, the project fosters commitment among policy- and decision-makers to maintain and create conditions that support the health of the regional forest ecosystems. Thereby, the *HealthyForestRegions Project* supports the long-term well-being of the people living, working and spending time in the targeted regions.

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Acronyms

FMU – forest management unit

FMA – forest management area

ES – ecosystem service

FF – forest function

SSF – Slovenia State Forests (SiDG)

SFS – Slovenia Forest Service (ZGS)

IRSNC – the Institute of the Republic of Slovenia for Nature Conservation

PES – payment for ecosystem services

N2k – Natura 2000

EIA – ecologically important areas

REGIONAL STRATEGIES FOR PRIORITISATION OF FOREST ECOSYSTEM SERVICES - SLOVENIAN PILOT SITE

Introduction

Within the Interreg *HealthyForestRegions Project*, the work package 2 (WP2) explores new funding opportunities and development of reimbursement systems for forest ecosystem services.

This strategy for the prioritization of forest-based ecosystem services (FES) has been developed to support the overarching goal of the project: to identify and promote sustainable, nature-compatible alternatives to timber and fuelwood harvesting for local and regional forest owners. Apart from timber harvesting, the strategy aims to create new income opportunities by recognizing and enhancing the diverse ecosystem services provided by forests—such as recreation, biodiversity conservation and tourism and recreation.

The strategy was developed with cooperation of local forest stakeholders, experts of Slovenia Forest Service, IRSNC and SiDG as a result of several meetings, workshops and following the previous working activities in the frame of the INTERREG *HealthyForestRegion* (HFR) Project (deliverables D.2.1.1 and D.2.1.2):

- Development of methodology for ecosystem services quantification regionally adjusted by each target area
- Producing maps for each ecosystem service (scale 1:10.000)
- Regional workshop for prioritizing the forest related ecosystem services

The project team developed a methodology to quantify and assess the status of forest-related ecosystem services: timber production, biodiversity, carbon sequestration, recreation and tourism for each target area (Austria, Slovenia and Slovakia).

Each FES was presented in the framework of the Common Classification Ecosystem Services (CICES) classification and described in general terms based on published scientific literature. The methodology was presented with a list of criteria and indicators for the quantification of ecosystem services, which were presented to the relevant stakeholders in each pilot region. The list served as a basis for quantification - each pilot region could add or remove some criteria and indicators based on the local context and legal framework.

The strategy is intended to be part of forest management planning for the project area of FMU Ravne as well as provides methodology that can be used in other forest management units as well. Slovenia Forest Service provides forest decade management plans and is central carrier and facilitator of the proposed strategy. In this role, it coordinates implementation by working closely with the regional government, local municipalities, forest owner associations and relevant stakeholders. Its responsibilities include guiding participatory processes, integrating priorities of forest functions (and therefore FES) into the forests of different ownership categories by management planning and ensuring that proposed measures are

ecologically sound and economically viable. The objective of the strategy is to ensure or enhance the provision of the highly rated ecosystem services in each of the regions.

The following chapters are included in the document:

- General vision (what are the most important ecosystem services)
- Mission (how to get to a successful realisation of the vision)
- Goals and milestones (measurable target values and timeframes)
- Situation analysis (SWOT analysis for the target regions of the status quo in relation to the ecosystem services)

The development of and definition of action plans, the implementation and operational planning as well as the performance monitoring will be developed in a later stage of the project and will be included in the deliverable D.2.2.2.

Project area

Pilot area in WP2 FMU Ravne, with a size of 2.646,54 ha, is part of FMA Kočevje. FMU Ravne is located within the borders of larger project pilot region HFR Kočevsko. HFR Kočevsko with a total size of 647.900 ha is too big region for detailed analysis of ES that is the main task of WP2. Due to this, WP2 is concentrating on a smaller region FMU Ravne. FMU Ravne includes many forest reserves and has a significant role for providing many ES, since it also includes a virgin forest and a UNESCO heritage site. FMA is located in SE of Slovenia on a karst area. Water sources on surface are rare. Among the most important forest functions and therefore ES are wood production and forest preservation. In the area forest reserves Goteniški Snežnik, Jezero, Borovec, Krempa, Firštov rep and Krokar virgin forest are located (GGN GGE Ravne, (2015 - 2024), 2015).

FMU Ravne has a long history of forest management, since first planned forestry began at the end of 19th century. Today's forest condition is a product of changes in forest management and other historical events. Kočevska overall has relatively humid climate with relatively large amount of precipitation. The warmest month is July and the coldest January (temperatures between -30 ^{0}C in +35 ^{0}C). important climate factor is presence of fog, which reduces solar radiation and is connected to masses of cold air, which are present in lowlands. Spatial distribution of precipitation is relief-related (GGN GGE Ravne, (2015 - 2024), 2015).

Project area is a part of the karst area in southern Slovenia. Climate conditions of Kočevska are product of many meteorological factors, however, there is a possibility of individual natural hazards damage in the forests, more specifically snow damage, ice breakage and windthrow (GGN GGE Ravne, (2015 - 2024), 2015).

The karst nature of the area has a significant impact on its hydrology as there is no surface running water. The vegetation in the area is mainly dependent on precipitation. The high karst characteristics create a mosaic of changing vegetation types, which corresponds to the different growth capacities of the forest (GGN GGE Ravne, (2015 - 2024), 2015).

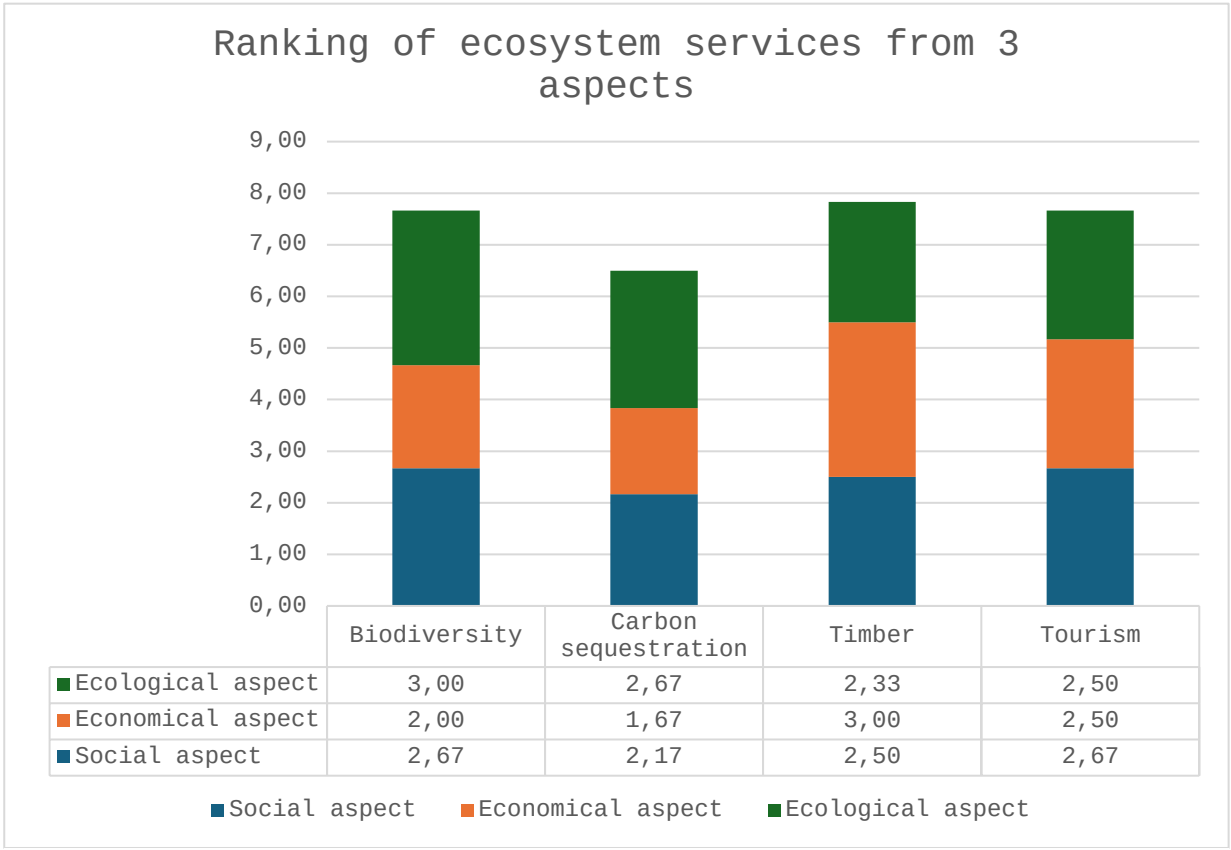
Stakeholders of FMU Ravne are very diverse and can be divided according to ES. Their opinions and visions about project area were discussed as part of D.2.1.2. FMU Ravne is one of the most diverse units due to the emphasis of functions in the Kočevje region, as many forest functions are present in the area (GGN GGE Ravne, (2015 - 2024), 2015). Additional importance of ES biodiversity has been acknowledged by the questionnaire of Healthy Forest Regions. Suggested strategy for ES in FMU Ravne can be included in the management plan for FMU Ravne. Suggestions can be evaluated by author and included in the new Plan for FMU Ravne. The strategy of management can be changed, if necessary, through the Project.

A. Vision

The vision of the project area describes the long-term goal of the proposed strategy, which focuses on prioritising three key ecosystem services (ES) recognized at regional workshop: biodiversity, wood production and tourism together with recreation. Carrier of the strategy for forest management is Slovenia Forest Service, since it provides forest management plans for each FMU and FMA as well as management plans for each forest department regardless of the ownership of the forest.

“The state of the forest provides support for overall very high level of biodiversity and a high percentage of forest cover, and ensures a healthy forest capable of withstanding natural hazards. In order to achieve a balance between the three key ecosystem services, the exploitation of each of them is encouraged in a way that is compatible with the others.”

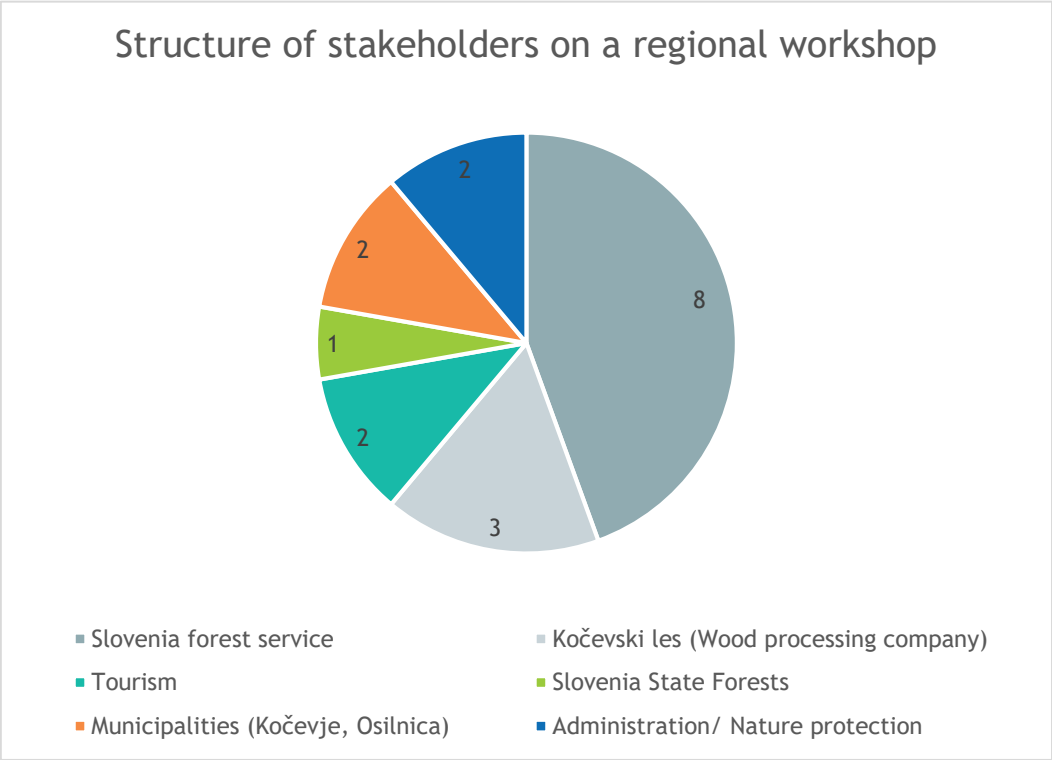
The regional workshop identified three key ES, which were prioritized by stakeholders during Activity 2.1 (see Graph 1). These services were analysed from social, ecological, and economic perspectives. Individual aspects of ES were evaluated by stakeholders, where for each aspect one, two or three points were added according to the importance of the aspect. In data analysis values for all stakeholders were calculated and presented in Table 1. Wood production, biodiversity, and tourism (including recreation) were found to be the three most important ES in the area. For biodiversity and carbon sequestration, the most important is ecological aspect. For timber production, the most important is economic aspect. For tourism, the most important is social aspect.



	Biodiversity	Carbon sequestration	Timber	Tourism
Ecological aspect	3,00	2,67	2,33	2,50
Economical aspect	2,00	1,67	3,00	2,50
Social aspect	2,67	2,17	2,50	2,67

Graph 1: Results of the survey for prioritization of forest related ecosystem services

On the regional workshop many groups of stakeholders were included. The largest percentage of stakeholders were from SFS, followed by wood processing company Kočevski les (Graph 2).



Graph 2: Structure of stakeholders on a regional workshop

B. Mission

In order to achieve all set goals, detailed roadmap will be developed further as a part of activity 2.2. To achieve all of the determined goals, relevant stakeholders will be included in the plan process as well as coordinate policies at regional level.

Key instruments to promote ecosystem services (ES) on regional level include policy frameworks, financial incentives and community-led initiatives. In addition, the development and effective implementation of policy and legal instruments and integrating the traditional knowledge can enhance the capacity of forests to produce timber, enrich biodiversity, provide better opportunities for tourism and recreation and encourage better carbon sequestration and carbon sink.

Slovenian forestry legislation supports nature conservation and the maintenance of species' habitats. The Rules on financing and co-financing investments in forests provide (co-)financing for these measures. In 2016, the Forest Fund was established as a budgetary fund to encourage the conservation and implementation of measures in Natura 2000 areas within private forests, in accordance with the Natura 2000 Management Programme, in exchange for (co-)financing. To implement these measures on a larger scale and with improved quality, the Slovenia Forest Service (SFS) has already proposed changes to the Rules on financing and co-financing investments in forests. The proposal includes higher payments for the implementation of such measures, aiming to further incentivize forest owners to actively preserve the environment for rare and endangered species, as well as for critical habitat types.

As a part of the innovative ways, new mechanisms of the market should be introduced. Among them, payment for ecosystem services (PES) along with promotion of sustainable certification schemes such as FSC and PEFC ensure additional improvement of forest management. Efforts to improve forest management for biodiversity conservation are already underway in Slovenian forests, which can be described as PES. These efforts include the establishment of eco-cells without in multi-purpose forests and the identification of habitat trees to enhance local biodiversity. As mentioned in the previous paragraph, some payments are already being made under the Slovenian forestry legislation. PES for biodiversity ES can be considered as leasing of eco-cells in private forests for a period of 20 years without management, as well as the leasing of habitat trees until their natural death. If the payment is increased in line with the proposed changes, this might lead to increased interest for the use of these PES.

Promoting of new management practices with improvement of ES would require introduction of payment systems, which is planned further in following project activity 2.3 (D.2.3.1 and D.2.3.2).

Capacity of delivering benefits is depending on more key factors, which are related to forest management in project area as well as characteristics of the area itself. Impact of individual influencing variables was presented with graph, designed by ECO, as pictured below. The graph was modified according to FF and ES in Slovenian project area.

The factors influencing forest management are complex, with both positive and negative effects that can shift due to political or other changes, making it difficult to predefine their impact. In our forest management system, all forest functions are considered equal, with priorities depending on the forest. Our pilot region, with its unique balance between factors and ecosystem services, makes defining the impacts of forest functions on these ecosystem services challenging.

- Forest areas with adapted management regime or no management regime

These types of forest areas include forest reserves, eco cells, habitat trees and dead wood biomass, virgin forests, N2k areas, EIA and N2k species reference zones. The presence of listed areas and objects has a significant positive effect on biodiversity in the area. These areas serve as areas for the accumulation of

wood biomass or, in some cases, the absence of active forest management, leading to periods of time restrictions and areas with minimal human intervention.

- Planned tree cut

Intensity of tree cut has a considerable impact on all other ecosystem services and the overall health of the forest ecosystem. If the level of tree cutting is too high, the risk of forest instability increases. On the contrary, an excessively low tree cut can lead to similar negative effects. In order to preserve biodiversity, tree cutting must be optimal to ensure the predicted developmental phases of forest stands. Optimal ratio of development phases is closely connected to the length of the rotation period, which should not be too short or too long. Prediction of exact of tree cutting appears to be nearly impossible due to climate changes and natural disturbances. The quantity of wood logged serves as carbon sink, however, quantity of dead wood biomass and trees left in forest contributes to the carbon storage.

- Natural disturbances

Natural disturbances are increasingly integrated into forest management, and their impact varies significantly accordingly different ES. They cause damage to wood production ES and have a mixed effect on biodiversity by triggering large-scale changes in forest structure. They also affect carbon sequestration and carbon sink as many damaged trees need to be removed. Carbon storage is, however, negatively impacted by natural disturbances. Forest management strives towards forest stability and resilience against natural disturbances.

- Tree species composition and regeneration of trees

Tree species have a crucial role in many ecosystem services and their categorisation. Over the past few decades, shifts in tree composition (less fir and more beech) have resulted both in positive and negative changes to forest ecosystems. Wood production is negatively impacted due to the lack of conifers in tree species composition. Biodiversity is being impacted as fir growing sites are disappearing. Carbon sequestration and carbon sink are depending on fewer tree species than in the past. In order to restore tree species composition, a lot of strategic planning will be required.

- Forest growing sites

Forest growing sites in the project area are very diverse, offering the potential to support all ecosystem services in the area. However, the crucial factor influencing their sustainability is the quantity of wood production on each growing sites. To maintain biodiversity, it is essential to ensure a sustainable quantity of wood biomass which is crucial for its existence including important bird species. Both living and dead wood biomass are therefore necessary.

- Natural conditions of project area (climate, ground, hydrology, animals, trees)

Natural conditions offer opportunities for all ecosystem services and forest functions, connected to them. However, natural limitations must be considered when managing forest. The vision for the project area encompasses a variety of ecosystem services, therefore they must be managed within their sustainability limits. Since conditions are dynamic, forest managers must be aware of potential shifts in both biotic and abiotic conditions.

- Forest roads, roads, skid trails and trails

Forest roads and other linear objects provide direct benefits to some of the ecosystem services in the area, particularly wood production and tourism and recreation. They do represent however a direct disturbance in forest ecosystem which could potentially have negatively impacts on forest ecosystems.

- Other activities and social conditions

Other activities and social conditions negatively impact the ES of wood production by imposing limitations on wood cut. On the other hand, they can promote biodiversity, as activities, such as tourism (when managed moderately and in the limitations) can create better environment for maintaining and fostering biodiversity within the project area. While other activities may have both positive and negative effects on tourism and recreation services, the declining local population, due to migration, suggests that these activities are more likely to negatively impact the project area.

- Yield of trees and forest

Yield of trees and forest are closely connected to the ES of wood production, ES of carbon sequestration and ES of biodiversity. Since yield must be the same as tree cut the balance between these two parameters must be carefully harmonized. Due to natural disturbances and climate change, tree cutting can no longer be carried out systematically. Further, it can be expected that yield of trees and forest will become increasingly unpredictable in this area.

- Ratio of developmental phases in project area

The balance of developmental phases has a positive influence on ES of wood production, ES biodiversity and ES of carbon sequestration. It is crucial, however, that the balance is carefully managed to support all ecosystem services in the area. Maintaining an optimal ratio of developmental phases is challenging due to natural disturbances and climate change. Since the tree species composition is changing, it is likely that the ratio of developmental phases will also shift over time.

- Dead wood quantity

Dead wood quantity is crucial for ES of biodiversity, as certain N2k species, such as woodpeckers, dependent on the structure and the amount of dead wood biomass. It is however negatively connected with the ES of wood production. On the other hand, dead wood biomass plays a role in carbon sequestration, as it serves as a carbon storage reservoir.

- Silvicultural work

Silvicultural work is closely linked to ES of wood production, since it forests management outcomes and leads to better wood assortments. It is, however associated with higher expenses in the forest with no immediate benefit. Further, it is indirectly elated to maintaining and creating habitat features that are vital for biodiversity.

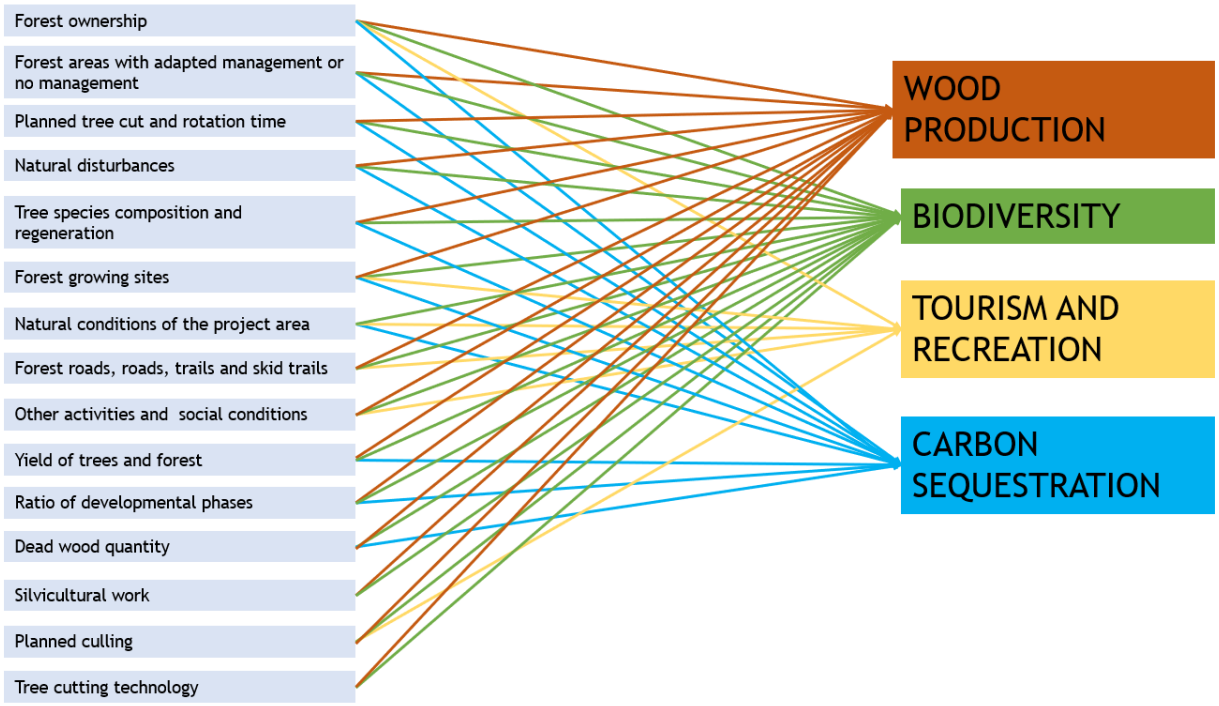
- Planned culling

Planned culling is positively connected to tourism and recreation since it creates better opportunities for hunting within the project area. Due to the reduction of herbivores, we can conclude it has mixed impact on biodiversity (decrease of animal biodiversity while improving of plant biodiversity). Current levels of planned culling quantities have negative impact on ES of wood production since the culling numbers are relatively low.

- Tree cutting technology

Technology for tree cutting is primarily connected to ES of wood production. Current technology for wood production is highly efficient, however, use of combinations of harvesters and forwarders is increasing. Larger and more powerful cutting machines, replacing adapted tractors may lead to deterioration of skidding trails and forest ecosystem overall. Therefore, selection of appropriate tree cutting machinery is crucial for multiple ecosystem services.

Graph 3 below represents the relationship between key management factors and forest properties in FMU Ravne, which influence forest ES. Relationships are not linear, since factors on the left can influence on multiple ES, both negatively and positively. Further, these factors are connected to the selected ES in the area. Arrows indicate relationship between key factor and ES, meaning the factor enhances or represents a negative correlation and adverse effect. It is important to emphasise that the current intensity of individual key factor may have either a negative or positive impact on ES. By adjusting the intensity or scale of the key factor, correlation can change.

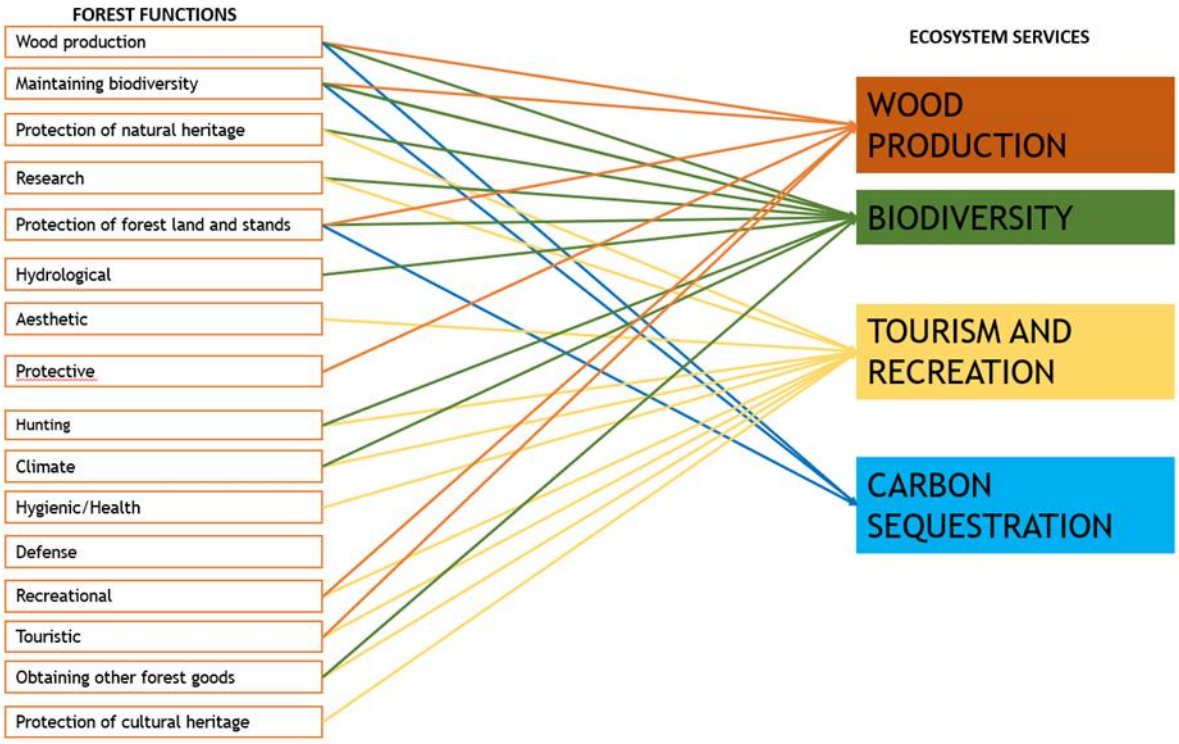


Graph 3: Key management factors influencing forest ecosystem services (colored arrows signalize connections between key management factors and ES) (Source of the graph: ECO; adapted to Slovenian category of forest functions and ecosystem services)

C. Goals and milestones

To achieve a sustainable forest with high biodiversity that also provides income for local communities, it is crucial to establish coherence between all key ES through clear, concrete goals and milestones.

Slovenian legislation provides a more detailed classification of ES as forest functions, which opens up a number of opportunities for developing strategies with clearly defined goals for individual ecosystem services (Graph 4). Presented graph was designed by ECO and adapted to ES and FF on Slovenian project area. Since connections of FF to ES can be both negative and positive (depending on the current intensity and hierarchy of ES) connections were not polarized as positive or negative.



Graph 4: Connection between forest functions and ecosystem services (Source of the graph: ECO; adapted to Slovenian category of forest functions and ecosystem services)

- **Biodiversity conservation:**
  - Short – term goal (10 years): improving key factors determining success of biodiversity, especially areas with no management or limited management as well as a percentage of a dead wood biomass and old trees with larger diameter. In parallel to an increase in the proportion of dead wood biomass, an improvement in stand structure with a higher proportion of live, large trees.
  - Mid – term goal (10-50 years): increasing factors, determining biodiversity on the project area increase to at least 5-10%, depending on factor. Increase the forest biodiversity indicator to at least 5-10%, depending on factor.
  - **Indicator:** based on studied indicators which form the biodiversity index, developed during the project will be used to monitor the progress of individual key factors, written down in plan for

FMU Ravne (2025-2034). The baseline to be monitored is the value of indicators, calculated in 2024. The data to compare the baseline with are obtained via field measurements. Additional indicators provide a possibility for additional description of biodiversity in FMU Ravne.

- **Milestones:**
  - **Baseline data ready in the year of 2025 with forest management plan for FMU Ravne (2025-2034)**
  - **Improvement of individual indicators by the end of forest management plan for FMU Ravne (until 2034)**
  - **Assessment of individual indicators which form the biodiversity index in 2034 and adaptation of measures for next forest management plan**

- **Wood production:**
  - Short – term goal (10 years): present efficiency of wood production
  - Mid – term goal (10-50 years): same value of key factors that determine a success of wood production, same value of key factors that define the efficiency of wood production should focus on producing less quantity but high-quality timber rather than increasing the quantity of wood with a lower economic value.
  - **Indicator:** the main indicator used for this ES is quantity of wood harvested, but the quality of the wood as an ES, represented by the economic profit from the sale of the wood, should be emphasized. To gain a better understanding of wood assortment structure, additional information from forest owner is required.
  - **Milestones:**
    - **Baseline data ready in the year of 2025 with forest management plan for FMU Ravne (2025 - 2034) - already calculated as part of D.2.1.1**
    - **Improvement of individual characters by the end of forest management plan for FMU Ravne (until 2034)**
    - **Assessment of individual indicators with new forest management plan and setting values for individual indicators with establishment of new status quo or additional indicators**

- **Tourism and recreation:**
  - Short – term goal (10 years): bigger success of the tourism and recreation ES offering more guided tours from tourism providers compared to the previous decade. Development of new tourist programs. Developed low-impact tourism that prioritizes nature conservation. Establishment of tourism infrastructure, such as Tourism center for visitors including parking etc. connected to Unesco heritage. Borovec trail should be renovated. It is necessary to regulate the status of management of UNESCO heritage. Manager of the area should be determined by ministry and other stakeholders. Established guided tours are based on quality of services and not quantity. More educated residents on the topic of forest meaning, forest functions and balance of forest reserves and other areas, important for biodiversity. Tourism and recreation are adapted to capabilities of the environment. Tourism goal is subordinate to goal of ES biodiversity.
  - Mid – term goal (10-50 years): same or bigger success of ES tourism and recreation focusing on guided tours and further development of unique tourist programs for different tourist groups.

Ensuring Eco-friendly ES tourism and recreation through guided tours, thus avoiding negative impacts on forest ecosystems. Infrastructure of other forest reserves should be renovated as well as additionally established. If the number of visitors reaches maximal capacity of environment, suitable protocols are used for visitation restrictions.

- **Indicator:** number of visitors or tourists should not be considered as a suitable or reliable indicator since higher number of tourists is not necessary a better indicator. Instead, more representative indicator of tourism success would be profit per visitor. Indicator will be set differently for ES of tourism and recreation. Since price of the programs can change, we suggest using baseline from analysis in D.2.1.1, which provides a status quo on tourism. Further, the tourism with added value is the goal for project area. For the indicator of recreation, the goal would be to keep number of visitors in moderation due to other important ES on this area. Study of tourist capacity and vulnerability would provide suitable number of visitors for project area. Based on obtained information in participative process with other professional institutions, optimal and maximal values of the indicator are determined. In that way, optimal and maximal values are determined, which also ensures that these activities bring economic benefits and do not cause environmental damage.
- **Milestones:**
  - **Baseline data ready in 2025 with new forest management plan for FMU Ravne (2025-2034) - already calculated as part of analysis D.2.1.1 and development of new experimental tourist programs**
  - **Improvement of eco-friendly and low-pressure ES of tourism and recreation in FMU Ravne until the year of 2034**
  - **Assessment of success of ES of tourism and recreation and determination of new status and development of new tourist programs**

General structure for milestones and progress tracking

Constant forest management plan adaptation is crucial for development of provisioning of all ES in the project area. Therefore, we propose set of activities, which are crucial for development of project area FMU Ravne:

- Short term activities (10 years):
  - Establishing suitable key indicators for individual ES, which will be encouraged in the project area and finalizing status quo in this area
  - Establishment of long-term zones with no management, which would encourage biodiversity on the project area
  - Encouragement of dead wood biomass and alive trees with larger diameter quantity in all managed forest areas (at least 5 %)
  - Ensuring improved management of reference zones of N2k species so feeding and living habitat of species is maintained or improved
  - Reduce the tree cutting with larger diameters (ensuring natural cycle of tree growth and decay for provision of microhabitats)
  - Ensuring adequate wood production from the project area as long as it does not jeopardize other ES. ES of wood production should be concentrated in areas where biodiversity is not a primary

focus. ES of wood production must be planned according to sustainable forest management, so it is limited to potentials of forest capacities.

- Ensuring ES of tourism and recreation by guided tours along marked paths and areas to avoid negative impacts on more sensitive part of forest ecosystems
- Ensuring provision of adequate carbon sink and storage from forest ecosystems as long as other ES are maximized
- Encouraging the use of appropriate tree cutting machinery that is adapted to the local land characteristics

- Medium term activities (10-50 years) should include:
  - Further establishment of no management zones (extended buffer zone around virgin forest, eco-cells, forest reserves etc.)
  - Further encouragement of higher quantity of dead wood biomass
  - Further reduction of tree cut of trees with larger diameter (min 50 cm)
  - Further development of wood assortments with higher value
  - Development of new eco-friendly tourist programs with minimal impact on forest ecosystem
  - Establishing sustainable carbon sink and sequestration in forests with management
  - Adapt forests to climate changes while ensuring all ES
  - Monitoring progress of all ES on the project area
  - provisioning new schemes PES to find alternatives to profit from ES of wood production
  - Establishment of nature – protection park which covers the area of Krokar virgin forest, Borovec, Firšt tail and protective forests in Valley of Kolpa where no cut is determined.

- long term goals (50+ years can be envisioned):
  - achieving target percentage increase for individual ES with biodiversity as priority ES

D. Situation (SWOT) analysis

In order to achieve milestones for developing ecosystem services in project area FMU Ravne we must analyse all aspects of ES and influence factors that represent limitations. In order to analyse these aspects, we conducted SWOT analysis that enables a better strategic approach for strengths, weaknesses, opportunities and threats (Table 1).

Table 1: SWOT table

Strengths

- Multipurpose and close-to-nature forest management harmonises wood production ES and biodiversity ES without any significant obstacles for each other maintaining N2k status of the area
- Majority of the forests is in state ownership, which enables easier strategy development
- Dead wood biomass increase does not require additional silvicultural measures, however it encourages biodiversity
- Trees with larger diameter do not have important financial value, therefore their preservation does not endanger ES of wood production
- Guaranteed free access to forests with exception of strictly protected areas
- Participatory process in forest and wildlife management
- High share of N2k areas
- Adaptative forest management

Weaknesses

- Unpredictable interests of forest owner for wood production
- Trees with larger diameter present significant quantity of wood and nonetheless have economic value
- Additional time and space restrictions for biodiversity management could present obstacles for wood production
- Financial income from tourist entrance is hard to achieve in free-access forest, additional infrastructure requires additional expenses
- Not defined manager for UNESCO site, difficulties with development of clear long-term strategy for the UNESCO area
- Not informed visitors and tourists entering protected areas intentionally or unintentionally

Opportunities

- Success of developed measures could make an example of good practice for biodiversity conservation and its improvement
- Designation of manager for UNESCO heritage site
- Possible enlargement of buffer zone around Krokar outside area of FMU Ravne
- Development of tourist packages based on preserved forests, rich biodiversity and areas of special interest (Krokar, Krempa, Lake of Kočevska Reka etc.)
- Improving financial result from existing wood production
- Improving tourist and informational infrastructure
- Awareness building of forest owners on opportunities of ES

Threats

- Increase of natural disturbances
- Increased demand on wood production
- Very economic orientated forest owner
- Prioritization of economic goals over social and ecological goals
- Not expanding reserve Borovec has a negative effect on biodiversity ES
- regional development not aligned with goals of HFR

According to analysis we can conclude that FMU Ravne offers an exceptional opportunity for further development of ecosystem services in this area. Multipurpose and close-to-nature forest management harmonises ES without obstacles for each other. A high percentage of forests is in state ownership, which means easier strategy development. Increase of dead wood biomass does mean not additional silvicultural measures, however it encourages ES of biodiversity, which is very important on this area. Not cutting trees with bigger diameter does not represent an important financial benefit for ES of wood production. For ES tourism and recreation free access to forests (with exception of strictly protected areas) is an important strength. Participatory process in forest and wildlife management presents important strength as well. Forest management is adapting to changes in environment. Project area has a high share of N2k areas, which makes it even more important for ES of biodiversity.

Despite listed strengths we face some weaknesses. Interests of forest owners are unpredictable, especially for ES of wood production. Trees with bigger diameter represent a significant quantity of wood and are nonetheless important for ES of wood production. Additional restrictions, such as non-management time period for ES of biodiversity (for example management zone for western capercaillie), represent obstacle for ES of wood production. Financial income from tourist entrance is more difficult to achieve in free-access forests. Therefore, alternative income generating should be considered by created infrastructure in the project area, which requires additional expenses for area manager. Last weakness is not defined manager for UNESCO site, which means difficulties for long – term strategy for the UNESCO area. Not informed visitors and tourists are entering protected areas intentionally or unintentionally.

FMU Ravne is further presented with some opportunities. Success of developed measures could make an example of good practices for biodiversity conservation and its improvement. Important opportunity is designation of manager for UNESCO heritage site. Another possible opportunity would be developing of bigger buffer zone around Virgin Forest Krokar outside of FMU Ravne. Area could be expanded on the southern side of the forest reserve, connecting nearby nature reserves with protective forests from Loška stena wall to settlement Fara in additional protective zone. New tourist packages based on preserved forests, rich biodiversity and areas of special interest could be developed, which brings more opportunities for ES of tourism and recreation. Further, improving financial results from existing wood production is another opportunity. For ES of tourism and recreation infrastructure improvement is another possible opportunity. For forest owners' awareness building is also important.

Finally, some threats need to be considered. Natural disturbances are increasing. Another possible threat is increased demand of wood production. Further, very economic orientated forest owner could represent a threat. Another possible threat is prioritization of economic goals over social and ecological goals. Not expanding reserve Borovec has a negative effect or threat to biodiversity. Last threat is regional development not aligned with goals of HFR.

E. Conclusion

The development of deliverable D.2.1.3 combined two strategy documents along with previous project activities. More detailed strategic management measures with detailed information will be prescribed with new forest management plan for FMU Ravne in 2025 for the next 10-year. Suggestions will be sent to author for Plan FMU Ravne. They can be evaluated and included in the new Plan for FMU Ravne.

Project activities focused on prioritization of ES in the area. Stakeholder opinion on individual ES was included into project strategies. Four important ecosystem services were identified during the analysis. Biodiversity, wood production and tourism and recreation were among the ecosystem services described in the documents. ES of carbon storage and sequestration was the least written about (only in plan for FMA Kočevje). Each ES was discussed at the regional workshop in March 2024, specifically its ecologic, economic and social components. Stakeholders also proposed strategies for the development of each ES.

Management strategies for all ES in FMU Ravne were developed based on the received information.

For biodiversity, N2K and EIA were included into the strategy, covering the entire project area. Specific measures were outlined for N2K species and growing sites. Important part of ES are reference zones prescribing silvicultural guidelines and measures to improve wildlife conditions and other forest functions.

Wood production strategies were based on forest types within the project area, with silvicultural measures tailored to each type. Special measures were prescribed for protective forests and reserves, including a ban on certain silvicultural measures.

Tourism strategies, developed through a regional workshop with stakeholders and two previous plans, identified significant potential for tourism activities, with opportunities for further development.

Carbon sequestration strategies were discussed on the regional workshop and briefly outlined in the FMA Kočevje. These strategies will be finalized in the new plan.

F. literature

- Gozdnogospodarski načrt GGO Kočevje (2021 - 2030). 2023. Ljubljana.
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