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Management of the Alam-Pedja nature conservation area

In the context of the climate, the aim of carrying out conservation works on the Alam-Pedja Nature and Bird Area is to achieve the best possible status and sustainable functioning of all species and communities targeted by increasing their resilience and adaptation ability to climate change. At the same time, restoration of the peatland's natural water regime and the rational use of biomass of semi-natural habitats would also reduce the direct environmental burden and at the same time mitigate the energy crisis.

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A: Preparatory activities

***Title of Action A1*. Development of options for optimal utilization of hay**

- ***Beneficiary responsible for implementation***

Estonian University of Life Sciences

- ***Description (what, how, where and when):***

The main task of the activity is to evaluate the potential of floodplain meadow hay of Alam-Pedja conservation area for utilization for bio-based products and energy purposes and determine the most feasible technological options for its optimal utilization. Specific objectives are:

- ✓ Evaluate the chemical composition of floodplain meadow hay depending on the area and harvesting time
- ✓ Evaluate the influence of the harvesting time on yields and/or properties of bioenergy carriers/bioenergy output
- ✓ Evaluate the best sustainable management practices for floodplain meadow e.g. (bioethanol, biogas, pyrolysis, torrefaction, direct combustion)
- ✓ Evaluate the potential of floodplain meadow for solid, gaseous or liquid biofuels production and find the most promising solution
- ✓ Compare the potential of floodplain meadow hay for biomethane, bioethanol and biodiesel production and investigate which one brings higher revenues to the production chain considering the footprint of whole production chain
- ✓ Evaluate the potential of floodplain meadow hay as a raw material for bioplastics production
- ✓ Evaluate the economics and scale of bioenergy/bio-products production using floodplain meadow hay.
- ✓ Identifying the opportunities to produce biochemicals from floodplain meadows through various conversion technologies, such as biochemical and thermochemical conversion and separation and purification processes.
- ✓ Establishing the strategies for recovery of nutrients such as nitrogen, phosphorous and potassium
- ✓ Comparing centralised with decentralised processing of meadow hay in order to establish best feasible approach considering the socio-economic development of local areas.

The following activities are planned for this purpose:

T1 - Characterization the chemical composition of the flood plain meadow hay.
T2 – Establishing the relation between harvesting time of hay and the yield and/or properties of the bioenergy carriers.
T3- Torrefaction and pyrolysis of meadow hay.
T4 – Studies on the combustion of meadow hay.
T5 – Pelletizing and direct combustion of meadow hay.
T6 – Biodiesel (lipids) production from meadow hay through microbial fermentation.
T7 – PHA production from meadow hay.
T8 – Developing a biorefinery approach by integrating various valorisation methods.
T9 – Studies on nutrient recovery and recirculation.
T10 – Process simulation, techno-economic and environmental analysis of various valorisation methods studied and the developed biorefinery approach.

In the first quarter of the project activities include collecting samples of the biomass and analysing these properties under laboratory conditions to determine the biomass productivity, properties and

energy use. Activities need to start immediately at the beginning of the project to integrate best practices for the use of biomass from semi-natural habitats in the management plan for semi-natural habitats (activity A3) and in the management plan (activity A7) to be updated by 2025.

- ***Reasons why this action is necessary:***

Semi-natural meadows have developed in the long-term interaction of man and nature and require extensive maintenance either by mowing or grazing to maintain their values. As the meadows that are flooded periodically have very few areas suitable for grazing, mowing is the main treatment. Unfortunately, nowadays it is no longer possible to maintain wet meadows by manual mowing, but instead requires the use of special techniques that have a greater impact on meadow biota compared to historical maintenance practices. In order to mitigate the negative effects of mechanized mowing and to save the meadow biota, mowing times have been brought forward as late as possible, which means that the hay mown since July II has no nutritional value for the animals. However, the amount of biomass that is mown is very high and must be collected from semi-natural habitats in order to prevent the transfer of biomass to water bodies or on-site degradation in the event of floods, which changes the appearance of the communities.

Nearly 3835 ha of semi-natural floodplain meadows is mapped in Alam-Pedja Nature Reserve, which, due to machine access restrictions and very difficult maintenance conditions, can now maintain up to 1000 ha, of which grazing is marginal. The quantities of hay stacked at the border of the protected areas and left naturally to decay are therefore increasing. In the long run, the maintenance of ca 2100-2300 ha of floodplain meadows (Alam-Pedja management plan up to 2025) is estimated to be feasible if a solution is found to realize the biomass. Similar problems with the use of hay have been encountered in virtually all Estonian wetlands, which has led to a growing need for an environmentally and sustainable solution to the use of this biomass in recent years. So far, attempts to produce hay pellets or oil or to use hay for heating have not proved economically sustainable. A new generation of biofuels, whose production technology is also being tested by researchers at the Estonian University of Life Sciences, is expected to be a solution.

- ***Constraints and assumptions:***

The greatest risk to the operation is the result that none of the uses under consideration is economically viable for hay. At the same time, research into bioenergy deployment in recent years has advanced and laboratory tests of new technologies have already succeeded in achieving a competitive price with fossil fuel sources. It is expected that economically and environmentally sustainable solutions for the use of biomass of the Alam-Pedja semi-natural habitats will be the so-called. would also be a starter for developers' interest in investing in green energy to finally find a solution to the virtually wasted and environmentally damaging bio-resource.

- ***Expected results (quantitative information when possible):***

✓ Increase of the energetic sustainability of semi-natural habitats in Estonia by using sustainable management practices.
✓ Contribution to the socio-economic development of the local areas by using the energetic services provided by the semi-natural habitats
✓ Increase of the share of solid, liquid and gaseous biofuels in the Estonian transportation sector
✓ Sustainable strategies in order to produce biochemicals and biofuels from meadow hay by integrating various processes together under circular economy approach.

- ***Cost estimation:***

Personal costs:

1st phase: 1688 man-days 150 000 euros (2,5 experts a 225 man-days per year, 2,5 years or 30 months); monthly salary cost 2000 eur with taxes or 24 000 eur per year)

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2nd phase: 1688 man-days 150 000 euros (2,5 experts a 225 man-days per year, 2,5 years or 30 months); monthly salary cost 2000 eur with taxes or 24 000 eur per year)

Travel costs:
1st phase: 1800 euros (site visits (200 km/per month 0,3 eur/km, 30 monts)
2nd phase: 1800 euros

Consumables:
1st phase: 2 500 euros (a 1000 euros/year laboratory materials)
2nd phase: 2 500 euros

- ***Deliverables**:*

1st quarter: D1- The characteristics data on the physio-chemical properties of the flood plain meadow hay.
D3- Comprehensive data on the thermochemical conversion i.e. combustion, torrefaction and pyrolysis of meadow hay.
D4- Comprehensive data on the biogas and bioethanol production from meadow hay
2nd quarter: D5- Data on the lipids and PHA production from meadow hay.
D6- Established data on the relation between various parameters such as harvesting time of meadow hay, yield and properties of bio-products.
D7- Comprehensive data on the nutrients recovery and recycling.
D8- Socio, techno-economic feasibility data on the valorisation of meadow hay into various products.
D9- Detailed understanding on the feasibility of using meadow hay for bioenergy/bio-products production.

- ***Milestones**:*

1st quarter: M1- Collection of meadow hay from different parts of Alam-Pedja region and ready for the experiments.
M2- Completed with the characterization meadow hay and with the predicted data on the availability of biomass quantity in the region.
M3- Completed with thermochemical conversion studies and ready with the data for feasibility analysis.
2nd quarter: M4- Completed with biochemical conversion studies and ready with the data for feasibility analysis.
M5- A strategy for efficient nutrients recovery and recycling.
M6- Optimized biorefinery process to produce high value products from meadow hay towards the better utilization of the resources of the Alam-Pedja region.
M7-Consolidated report.

Title of Action A2: **Development of a maintenance plan for semi-natural habitats**

- ***Beneficiary responsible for implementation**:*

EB – is the main beneficiary responsible for this action. EB will lead the development of the action plans and will be responsible for the adoption of these plans.

- ***Description (what, how, where and when)**:*

The action A2 aims to comply management plan for semi-natural grassland habitat types like 6270*, 6430, 6450, 6510 and 6530* of Alam-Pedja conservation area. The meadow communities

cover about 3940 ha (10,7% of the Alam-Pedja NCA), of that 98% or 3856 ha are flooded meadows with very complex water regime and difficult management conditions.

In the very first year of the project, the compilation of the maintenance plan for the semi-natural habitats will begin in parallel with the activities A1 and A4. The regional land management specialist of the Environmental Board leads the work as the organizer. RMK will be involved in the process as a representative of the landowner, also ornithologists (who provide input based on the demands of bird species nesting and feeding on meadows), botanists as well as land maintenance contractors and members of the conservation cooperation body (hunters, fishermen, locals, etc.).

In addition to valuable and unique communities, meadows are also a habitat for protected plant species, a habitat for bird species, a spawning site for fish during floods, a shelter and feeding area for large game, especially elk. All these aspects need to be taken into account when planning the restoration and maintenance of meadows, in addition to water regime and site accessibility considerations, and include the definition of out-of-service areas (e.g. (eg shrubs in animal movement corridors, forest and transition areas, etc.) or areas that are very extensively maintained (eg grasshopper playgrounds).

The management plan will serve as the basis for the meadow management contracts, management exceptions, for planning the restoration of the meadows and for the investments necessary for their accesses, hay storage and processing areas (locations of composting fields).

For the purposes of the plan, all meadow areas must first be surveyed, using orthophotos, drones and fieldwork, and then analysed for their conservation values, accessibility, etc. Given the complexity of the area, it is not possible to put together a maintenance plan in just one growing season. After the initial plan is completed, the outputs of activities A1 and A4, which specify the maintenance conditions, will also be expected as input.

In essence, the task of the management plan for semi-natural communities is to describe the so-called ideal recommended economic regime to be matched with national support mechanisms that can be derogated from by the discretion of the protected area manager.

- ***Reasons why this action is necessary****:*

Alam-Pedja meadow communities are very diverse in their type, biota, natural conditions and accessibility to maintenance techniques. Due to changes in historical maintenance practices, all former meadow areas cannot be maintained anymore and many machine accessible communities need to vary maintenance practices based on the secondary protected values (species), humidity regimes and site management features. Thus, different maintenance areas, maintenance techniques and maintenance times are suitable for different areas. All meadow areas, their values and characteristics need to be very accurately mapped in order to set purposeful and optimal maintenance conditions. Access roads or establishments (including accesses for water transport) should be mapped and planned, composting or long-term storage areas should be planned outside the protected area and preliminary agreements should be made with the land-owners and potential partners (farmers).

The activity is an important input to the activities A7 (preparation of the management plan for the protected area) and C1 (management of semi-natural communities) and should proceed in close cooperation with activity A1 (exploration of biomass realization potential) and A4 (restoration of water regime).

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- ***Constraints and assumptions**:*

The biggest obstacle to an effective management plan is the lack of overview of the condition, conservation values and local natural conditions (oxbow lakes, overgrown meanders) of all meadows, but this problem is expected to be easily overcome with modern monitoring tools and cooperation between different stakeholders.

- ***Expected results (quantitative information when possible)**:*

Maintenance plan for semi-natural habitats with an appropriate geodatabase, which includes maintenance conditions and conservation values for each meadow area (polygon).

- ***Cost estimation**:*

Personal costs:
1st phase: 200 man-days 20 000 euros (1 expert 200 man-days)
2nd phase: 10 000 euros

Travel costs:
1st phase: 1500 euros (site visits (5000 km 0,3 eur/km)
2nd phase: 1500 euros

External assistance:
1st phase: 20 000 euros
2nd phase: 10 000 euros

- ***Deliverables**:*

1st quarter: draft version of the management plan
2nd quarter: final version of the management plan (input to the general management plan of the area).

***Title of Action A3*: Development of a control plan of abundance of small carnivores and beaver**

- ***Beneficiary responsible for implementation:***

MTÜ Tartu Jahindusklubi

- ***Description (what, how, where and when):***

Council of various interest groups (the hunting bureau of the Environmental Board, the Estonian Ornithological Society, hunting societies in the Alam-Pedja region, ichthyologists, local residents) is formed to prepare the management plan for small carnivores and beavers and the game monitoring plan. The council sets the initial tasks and reviews and comments on the draft management plan and monitoring plan prepared by the NGO Tartu Hunting Club. The plan shall include descriptions of the initial monitoring to identify species abundance and location, areas and volumes to control abundance, methods to regulate abundance and how to evaluate effect of the activities (monitoring of protected species condition and abundance). It is also very important to determine how the data is collected and stored, and the way information is transmitted.

The activity is an important input for activity A7 (preparation of management plan for the conservation area) and a prerequisite for activity C2 (implementation of the control plan) and D1 (monitoring).

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- ***Reasons why this action is necessary:***

Alam-Pedja Nature and Bird Area is the largest relatively untouched massif in Central Estonia and therefore a very important point of reference for many protected and endangered species related to large natural landscapes such as eagles, black storks, woodpeckers (capercallie and black grouse) and prey. Their abundance, especially ground nesting specie, largely depends on the dynamics of small predators. Reducing the number of small carnivores (pine marten and racoon dog) carried out in previous years has been known to have a rapid positive effect on the number of ground-nesting species. The invasive species raccoon dog, what should be removed from Estonian natural habitats, is widespread and numerous in the protected area. However, the marten also has a very negative impact on the bird species targeted. However, there is no overview of the abundance and seasonal distribution of these predators.

Monitoring and, where appropriate, fishing for small predators, in particular mink (which is also an invasive species) and otter, would support the activities of many ongoing aquatic biota projects to restore fish spawning and habitats.

One of the activities of the Alam-Pedja Conservation Management Plan is to regulate the populations of the numerous beaver populations where they jeopardize other objectives of the protected area (such as the status and species of watercourses and floodplain meadows). In addition, beavers with dams on drainage networks, non-natural habitats, have caused long-term flooding and the loss of protected forest communities.

The need for a general arrangement of game monitoring (except for predators) is based on the fact that up to now this activity has not been organized in the Alam-Pedja Nature Reserve. However, the protected area is known to be an important wintering and breeding site for large wild elk (elk).

- ***Constraints and assumptions:***

The NGO Tartu Hunting Club is the only organization that has the ability to combine the knowledge of game hunters in Alam-Pedja region, the practical experience and skills of hunting associations of users of hunting areas bordering the nature reserve, the initiative of local residents and national conservation objectives.

Tartu Hunting Club is 70 years old, currently has 950 members and two permanent employees, has a very good knowledge of the area and biota, and has long experience in wildlife monitoring, especially outside the protected area. Therefore, they have a great capacity to carry out collaborative projects.

- ***Expected results (quantitative information when possible):***

The control plan of abundance of small carnivores and beavers and a monitoring program for game have been completed.

- ***Cost estimation:***

  Personal costs:

1st phase: 75 man-days a 100 euros, total 7 500 euros (1 coordinator for consultations, arranging workshops, compilation of methodology)

- ***Deliverables:***

2nd quarter 2022: Control plan of abundance of small carnivores and beaver

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***Title of Action A4*: Evaluation of initial state of habitats and threatened species and estimation of ecosystem services related to hydrological conditions**

- ***Beneficiary responsible for implementation:***

ELF

- ***Description (what, how, where and when):***

Modelling hydrological balance of the whole Alam-Pedja NCA will be implemented in order to assess its potential to reduce risks for flooding and mitigation water shortage in case of droughts. To map and evaluate habitat types, select the most representative areas of nature conservation and then analyze in details the drainage network and the need for its closure according to the need for habitat restoration.

Threatened species covered with the project are the European-wide threatened species, which depend on wet forests and bog landscapes (including the bog-forest transition zone) and could be influenced also by climate change. They represent different taxonomic groups: e.g. *Tetrao urogallus* (bird; Annex I EU Birds Directive), *Rana arvalis* (amphibian; Annex IV of EU Habitats Directive), *Leucorrhinia dragonflies* (semi-aquatic invertebrates; Annex II and IV of EU Habitats Directive) and *Nymphalidae* butterflies. Favourable conservation status of these species is important on its own but, more importantly, it is instrumental for assessing the success of different components of ecosystem restoration.

Before completion of restoration plans and technical projects for restoration the existing information on the distribution and population sizes of target species will be pooled. The main sources are different public and institutional databases (e.g. Estonian Ornithological Society, Estonian Lepidoperologist Society, Environmental Board etc) and monitoring reports. Both the existing data and habitat predictions form the basis for field inventories.

Large-scale field inventories of amphibians and bird species, semi-aquatic invertebrates and butterflies will be implemented in all project sites, to determine their habitat use and estimate the state of populations before the wetland restoration. Trained ornithologists, entomologists and herpetologists will implement this work. Standardized timed surveys (butterflies) and transect counts (birds) will be used to determine the species composition abundance. For aquatic invertebrates and amphibians, mainly dip-netting of larvae and counting of egg-clusters will be used to detect the species composition in different water body types and presence as well as abundance of target species, supplemented by measurements of the quality of aquatic habitats. Additionally, counting of adults and exuvias will also be used for dragonflies.

- ***Reasons why this action is necessary:***

Climate Change Adaptation Plan 2030: 5.3. Habitat Sub-Objective 3. Diverse species, habitats and landscapes and favourable status and integrity of terrestrial and aquatic ecosystems are assured in a changing climate. The diversity of biotopes sought, sufficient protected areas and habitats in good condition ensure greater ecological resilience to both biodiversity-reducing factors caused by climate change and other human activities. A significant part of the actions include research on the effects of climate change and monitoring of ecosystems, which provide the basis for more informed adaptation decisions.

Measure 3.5. Monitoring of the status of surface water bodies due to changes in temperature and hydrological regime, structure of biota, external and internal load of substances and minimization of climate risks. Almost half of the actions on ecosystem services are aimed at maintaining the volume and quality of water-related ecosystem services (eg water management, water

purification). To assess its volume and quality, an assessment of the Alam-Pedja water balance is being carried out, which helps to better understand the importance of this wetland for downstream ecosystems, settlements and the city of Tartu.

The management plan includes action planning for wetlands (especially wet forests): In the course of the inventory of wetland habitats, we will evaluate the effect of the drainage network to the different wetlands (including wet forests) of the Alam-Pedja LLA, the condition of the affected habitats and, if necessary, plan appropriate restoration measures in order to restore or improve the habitats.

Wetland restoration causes large-scale changes in hydrology, forest cover and light conditions in the project sites. Pre-restoration values of the habitats will be inventoried in order to describe baseline conditions of represented habitats and species and help to avoid between restoration activities and existing species. E.g., the degraded wetland can host aquatic species in ditches, butterflies on ditch-verges and T. urogallus in the overgrown parts. By carefully documenting the initial distribution and state of species and habitats the project aims at dynamic spatial planning to balance the restoration benefits and risks and, eventually, to evaluate the overall impact of different restoration options.

Reasons for involvement of ornithologists and field assistants. There are lekking sites of capercallie (Annex I species of EU Birds directive) in the area, thus extra knowledge about the population sizes and locations of breeding sites of those birds are needed, before the large-scale habitat restoration starts. Gathering of such vital information for the project requires several visits of the ornithologists to the sites. Such inventories are not possible to carry out by transect counts only. Also there is a need for several inventories to cover different seasons.

- ***Constraints and assumptions:***

Competence experts are recruited by ELF based on experience from similar previous projects, e.g. LIFE Mires Estonia Project. The access to necessary databases and monitoring reports is free for nature conservationists; it is provided by the Estonian Ornithological Society or Environmental Board. Therefore we do not see any serious constraints on this action. Hydrological model need a lot of different calibration data in order to accurately describe the nature. Flow volume measurements are absolutely crucial for such a model, other equipment described in action D3 adds weather and water level data for calibration.

- ***Expected results (quantitative information when possible):***

Hydrological model that relates geophysical conditions to ecological values and gives quantitative estimation to change of the hydrological regime due to climate change and effects of the wetland restoration to it. Evaluation the initial state of target species and habitats affected by drainage and impact of restoration of these wetlands. A report with the results of this action will be compiled. The established state of populations and habitats of threatened species will be used for evaluating the success of the next steps in project implementation

- ***Cost estimation:***

Personnel: Inventory of species 4 experts 100 person days * 150 EUR = 15 000 EUR; inventory of habitats 100 person days * 150 EUR = 15 000 EUR; hydrological modelling 126 person days *200 EUR = 25 200 EUR. Travel: 5000 km*0,3 EUR = 1500 EUR.

Personal costs:

1st phase: 200 man-days a 150 euros, total 30 000
2nd phase: 126 man-days 200 euros 25 200 EUR

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Travel costs:
1st phase: 1500 euros (project site visit (5000 km 0,3 eur/km)
2nd phase: 1000 euros

Equipment:
1st phase: 15 000 euros (flowmeter for hydrological modelling)

Consumables:
1st phase: 3000 euros (laptop, filed equipment)

- ***Deliverables:***

1st quarter: habitats and species database, input to restoration plan and design
2nd quarter: results for hydrological modelling

***Title of Action A5*: Compilation of strategical restoration plan**

- ***Beneficiary responsible for implementation:***

ELF – Estonian Fund for Nature
RMK – State Forest Management Centre

- **Responsibilities in case several beneficiaries are implicated:**

ELF will lead the compilation of strategical restoration plan for project area based on baseline inventory (A4), drainage networks and protected habitats. Strategic plan will gather all relevant information about nature conservation, and adds social and cultural values to the overall picture. Strategical planning set habitat specific restoration targets and will solve predefined conflicts between different values and develop related strategical solutions.
SFMC experts will be visiting most problematic sites and participate in related discussions.

Strategical restoration plan will be developed in close collaboration with SFMC experts who will curate the formation of the technical designs (A7) and the actual restoration works (C3) at the field. This ensures the best transfer of knowledge from baseline surveys to planning and then to implementation.

Strategical restoration plans act as Terms of Reference (ToR) for Technical restoration plans (A7).

- ***Description (what, how, where and when):***

Strategical restoration plans will decide the location and general nature of restoration activities. These plans will be completed in the early stage of the Project (1st phase). Strategic plan will gather all relevant information about nature conservation, social and cultural values and set habitat specific restoration targets. Its task is also to solve predefined conflicts between different values and develop related strategical solutions. Strategical planning will include fieldworks necessary for defining and mapping different values (species, habitats, cultural values etc.). Planning also includes information gained from the hydrological model (A4) for the whole area. Model is also made to predict hydrological conditions after the implementation of planned activities.

- ***Reasons why this action is necessary:***

Strategical restoration plan acts as Terms of Reference (ToR) for Technical restoration plans (A7). These documents will be based on the best available knowledge and should ensure the usage of

the most appropriate solutions for specific targets with minimal negative effect to the existing ecological values. Plans include site specific information (existing drainage network and its functionality, geology, habitats, species, archaeological sites and cultural heritage) which is necessary to avoid misunderstanding of needed measures to achieve good hydrological conditions and avoid loss of protected species and other values present at the sites. Plans should be approved by appropriate public authorities (e.g. State Forest Management Centre; Environmental Board; Agricultural Board; local municipalities; land owners).

- ***Constraints and assumptions:***

Approval of plans by appropriate public authorities (e.g. State Forest Management Centre and its departments; Environmental Board; Agricultural Board; local municipalities; neighbouring land owners or managers) takes longer and is more time consuming.

Opposition of the restoration work, as it is often feared that closing ditches could affect much larger area and therefore could be a threat to forest owners property. In the case of this project the land owner - State Forest Management Centre - is already involved in planning from the earliest stage possible to ensure identification of problematic sites. Hydrological modelling (A4) will give necessary background to such discussions and finally solutions. Bordering drainage systems on managed lands are generally excluded from restoration activities in order to restrain changes of hydrological regime strictly within the project areas.

- **Indicators of progress**

Strategical restoration plan approved by legal bodies.

- ***Expected results (quantitative information when possible):***

One strategical plan for whole area.

- ***Cost estimation:***

Calculations below are based on ELF's experience with similar works. ELF has compiled around 15 restoration plans for different mires during the period of 2007 – 2014 and 7 restoration plans in the course of LIFE Mires Estonia.

1. Field work (covering assessment of drainage Network and status of affected habitats) 50 expert days.
2. Analysing existing databases and compilation of the restoration plans and public meetings – 10 days.
3. Transportation and subsistence costs from Tartu to Alam-Pedja, total: 2000 km.

RMK:

- field work days – 20 days, 170 euros per day.
- Transport costs for 1000 km (0,3 eur/km)

Personal costs:
1st phase (ELF): 60 man-days 150 euros, total 9000 euros
1st phase (RMK): 20 man-days 170 euros, total 3400 euros

Travel costs:
1st phase (ELF): 600 euros (project site visits (2000 km 0,3 eur/km)
1st phase (RMK): 300 euros (1000 km 0,3 eur/km)

Consumables:
1st phase: 300 euros

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- ***Deliverables:***

1st quarter: restoration plans

***Title of Action A6*: Technical restoration projects**

- ***Beneficiary responsible for implementation:***

ELF – Estonian Fund for Nature
RMK – State Forest Management Centre

- **Responsibilities in case several beneficiaries are implicated:**

SFMC organises public tenders and contracts the companies for the task and controls if restoration projects are done in accordance to strategical plan (A.5), legislative regulations and uses best available knowledge about technical know-how of effective restoration measures.

- ***Description (what, how, where and when):***

Technical restoration projects are required to carry out public procurement of practical works and also for effective monitoring of works. Based on existing assessment there is need for technical projects for closing or redirecting waterways on app 3800 hectares on currently degrading protected habitats in project areas. It is maybe necessary to divide entire area between the separate technical designs due to differences of technical solutions and stakeholders involved. If strategic plan includes forest cuttings, then technical restoration project will include necessary forest manipulation areas and detailed descriptions of planned cuttings.

Technical restoration projects designs are largely based on the experience of the State Forest Management Centre. RMK has restored already more than 6000 ha of mire habitats all over Estonia. Technical restoration project will consist:

- The methods and locations for closing the drainage systems or redirecting waterways (complete infilling, various dams etc) together with economic calculations.
- Locations for different forest manipulations (clear cutting area, thinning of forest with different grades etc), methods to achieve desired results and economic calculations.
- Impact assessment and mitigation measures for minimizing negative effect to infrastructure outside or inside of the project areas.
- Cost calculations of all planned activities.
- Conditions to implement restoration work in accordance with guidelines to ensure favourable conditions also for target species.

At least one working meetings will be carried out for each project site involving engineers, experts from RMK and related stakeholders). Restoration projects will be introduced in public meetings. Final restoration project must be approved by Environmental Board.

- ***Reasons why this action is necessary:***

Provides technical conditions and estimation of definite quantities (the length of ditches for infilling, number and specification of dams, logistical plan, costs etc) for actual restoration activities (project actions C3). This is also basis for further procurement of works (C3) and quality control of these actions.

- ***Constraints and assumptions:***

Approval of technical restoration projects by appropriate public authorities (e.g. Environmental

Board; local municipalities; land owners or managers) takes longer and is more time consuming, but restoration plans include sufficient information to back up the reasoning for restoration work and minimize potential negative impacts for targeted species, landowners property, other values of protected sites, etc.

- ***Expected results (quantitative information when possible):***

Technical restoration projects are elaborated for all project sites and approved by competent authorities and stakeholders.
Technical restoration projects are introduced to local communities and other interest groups in public meetings.

- **Indicators of progress:**

Technical restoration projects are completed for all sites. By the year 2025 at least 50% of the projects are finalised.

- ***Cost estimation:***

There is a need for technical plans which cover app. 3800 ha of drainage systems. The price is estimated as 65 EUR per ha, in total 247 000 euros.

RMK own permanent staff will work closely with planners and will use up to 140 working days (170 eur/day) for preparation of technical restoration projects.

Transportation will be in total 1200 euros (4000 km, 0,3 eur/km)

It is based on previous experience by State Forest Management Centre on peatland restoration. Also potential increase of the price level is considered due to inflation.

ELF: Field work (additional assessment of drainage network and technical solutions for restoration) 10 expert days. Assistance at development of technical plans 10 workdays. (150 EUR/day), in total 20*150=3000 EUR.

Transportation and subsistence costs from Tartu to Alam-Pedja, total: 500 km (0,3 eur/km, in total 150 EUR).

Personal costs:
1st phase (ELF): 10 man-days 150 euros, total 1 500 euros
1st phase (RMK): Permanent staff 30 days 170 euros, total 5 100 euros
2 nd phase (ELF): 10 man-days 150 euros, total 1500 euros
2 nd phase (RMK): Permanent staff 70 days 170 euros, total 11 900 euros
3 rd phase (RMK): Permanent staff 40 days 170 euros 6800 EUR

Travel costs:
1 st phase (ELF): 100 euros (project site visits (330 km 0,3 eur/km)
1 st phase (RMK): 600 euros (2000 km, 0,3 eur/km)
2 nd phase (ELF): 100 euros (330 km, 0,3 eur/km)
2 nd phase (RMK): 600 euros (2000 km, 0,3 eur/km)
3 rd phase (RMK): 600 eur (2000 km, 0,3 eur/km)

External assistance:
2 nd phase (RMK): 182 000 eur. Tehnical restoration project for 2 800 ha (65 eur/ha)
3 rd phase (RMK): 65 000 eur. Tehnical restoration project for 1 000 ha (65 eur/ha)

- ***Deliverables:***

2nd phase: restoration projects for at least 1 900 ha
3rd phase: restoration projects for at least 3 800 ha

Title of Action ***A7*****. Compilation of new management plan of Alam-Pedja SPA and SCI for 2026-2035**

- ***Beneficiary responsible for implementation:***

EB - is the main beneficiary responsible for this action. EB will lead the preparation of the management plan and will be responsible for the adoption of this plan.

- ***Description (what, how, where and when):***

The current management plan will expire in 2025. During the preparation face since 2024 the effectiveness of the former management plan will be evaluated and new management activities planned to contribute to the achievement of conservation objectives. This would be the third management plan for the Alam-Pedja protected area.

Surveys, inventories and monitoring data, including activities A.2-A.8, form the basis for the preparation of the new management plan. On the basis of the collected data, the management plan of the previous period will be renewed: the factors endangering natural values and their impact will be highlighted, new conservation objectives will be set, necessary work and measures will be planned, priority order, schedule and volume will be determined. The new management plan would build on the previous management plan, providing new information, but essentially creating a coherent strategic management package for all stakeholders to have a clear picture of the area and what is happening there.

According to a regulation of the Minister of the Environment, the management plan has to include:
1) general description of the protected area (protection regime, conservation objective, international status, land use, interest groups, description of the national monitoring carried out in the area, including the objects to be monitored and monitoring intervals);
2) description of natural values presented in the area (assessment of the status of each protected species and habitat type), value-based measurable conservation objectives, expected results by the end of the management period and 30-year term with a goal to achieving the favourable status of protected species and habitat types and value-based indicators for their assessment;
3) factors influencing the key values (both facilitating and threatening), protective measures required and expected outcome of each measure;
4) list of protection activities aimed at preservation, restoration and presentation of core values, together with the volume of the activities, the location of the works and the estimated cost.

Preparation of the management plan is planned to start at the beginning of 2024 and should be completed and approved by the EB General Director by the end of 2025. The plan will be prepared by the EB in cooperation with different stakeholders (public authorities, scientists, Alam-Pedja Cooperation Platform, local people, tourism companies, etc.).

The management plan will be approved by the EB General Director for a period of ten years and the approval information will be published on the EB's website.

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- ***Reasons why this action is necessary:***

The purpose of the action A.9 is to prepare a new operational plan for the Alam-Pedja SPA and SCI, which will form the basis of conservation management for a period of ten years. The management plan is an indispensable document for such large areas like the Alam-Pedja SPA and SCI because, due to the size of the area and the complexity of the conservation objectives and problems, the management plan allows:
- better linking of research of the status of protected values and activities needed to preserve them, both spatially and temporally;
- communicating the contents of the protection measures to different stakeholders, especially to the local community (at best, synergies can be achieved between the plans already in place and the activities planned by the protection measures, as the activities foreseen in the management plan are not the only ones that can be performed);
- provide a systematic basis for the package of protection management activities, including the costs (as accurate and practical as possible).

New management plan would provide support for project activities A.1, C, D and E, but it would also serve as a basis for other more detailed planning of conservation activities, ie activities that become clear (only) during the preparation process.

- ***Constraints and assumptions:***

The greatest limitation when making a management plan is the lack of a complete overview of the status of the conservation values at the end of the management period. For such extensive areas, it is not possible to inventory and assess the status of all conservation values in each management period, to assess the dynamics of their changes. As a rule, the status of individual conservation values is assessed at different intervals through national monitoring, inventories (eg bird inventory), surveys (eg fish migration patterns survey) or projects (eg wetland restoration, watercourse restoration). This gives a fragmentary overview of the status of a particular conservation value but the whole picture of the protected area at a particular time is lacking. However, for Habitat Directive natural habitat types, it is assumed that, under strict protection, their conservation value and status can´t degrade, although it may change over time. As an exception, the status of semi-natural grasslands may change significantly during the 10-year management period, and this will require a reassessment of areas that have not been maintained.

- ✓ All stakeholders have to be engaged to the planning process. Additional experts and representatives of interested organizations will be engaged by communication of the event and different discussions during the planning process. EB has a procedure in place for stakeholder involvement for the management plans.
- ✓ Stakeholder's willingness to foresee all necessary management. Some activities can arise conflicts (closing drainage, infrastructure to flooded meadows etc). The wide spectre of stakeholders engaged to the activity helps to identify and foresee and mitigate such conflicts from early stage. Our toolbox for solving such conflicts includes providing conservation evidences (monitoring of effects and benefits – D actions) and raising awareness (E actions) and demonstrating best practices (C actions).
- ✓ Planning long term management: the management of semi-natural grasslands is costly and is ongoing only based on subsidies. Involved ministries (MoE, MoRA) and large conservation management authorities (EB, RMK) will have to design realistic plans and guarantee their sustainability in long term.
- ✓ Unavailability of specialized experts, methodological problems. To overcome the constraints the advance arrangements, early search for experts will be undertaken.

- ***Expected results (quantitative information when possible):***

Management plan completed and approved by the EB General Director, published on the EB's website (PDF document), plan supporting the activities A.1, C, D and E in this project.

- ***Cost estimation:***

Personal costs (personal costs are calculated based on total annual employment costs and total annual working days):
2nd phase (July 2023-2025): 500 man-days 45 000 € (EB)

Travel costs:
2nd phase: 720 € (*(0,3 €/km)* site visits (planning, discussions, negotiations); EB)

Other costs:
2nd phase: 3000 € (notification work, room rent, coffee breaks for meetings)

- ***Deliverables:***

4th quarter of 2025 – completed management plan approved by the EB General Director (A.9)

- ***Milestones:***

4th quarter 2023 – initial tasks prepared to assess the inventory of semi-natural grasslands and the previous management plan period and to prepare a draft management plan.
1st quarter 2024 – primary stakeholder involvement has taken place. A work plan with an engagement plan (including a work group engagement plan) is in place.
4th quarter 2024 – at least one workshop has been held for each thematic area, including the results of preparatory studies and inventories (A-Unit activities).
2nd quarter 2025 – a public display of the management plan has taken place and everyone has had the opportunity to comment and make suggestions.
3rd quarter 2025 – the management plan is subject to an approval procedure.

C: Practical activities

Title of Action C1: Management of semi-natural communities

- ***Beneficiary responsible for implementation:***

EB – monitoring and controlling of management methods applied according to the management plan (A2); also issuing permits and statements of the governor of the protected area
RMK – manager of the state owned lands; building and maintaining of infrastructure for the management of semi-natural communities; contracting restoration and maintenance works
Contractors (Ilvesmaa OÜ või Lynxland MTÜ) – maintainers of the area, implementers of required management methods of semi-natural communities; partners of the state institutions

Kommenteeritud [KV1]: Palutakse KeMilt selgitust abikõlbulikkuse kohta, kuna erinevate juriidiliste kehade alt tehtavad tegevused on erineva maksustamiskorraga (käibemaksu tagastamine). MTÜ puhul tuleks summadele lisada ka käibemaks, mida MTÜ tagasi ei saa.

- ***Description (what, how, where and when):***

Based on the activity A2. *Maintenance plan for semi-natural habitats*, the maintenance of the Alam-Pedja meadows will be organized and, if necessary, the maintenance conditions set by the protected area manager will be specified.

In order to ensure sustainable maintenance and to avoid environmental problems related to it, efforts are being made to find the best possible use of the harvested biomass (activity A1), one of

which might be also the establishment of a biogas plant in collaboration with Valio Eesti Laeva Meierei. Biogas plant on the border of the protected area, along the Tallinn-Tartu road and logistically at the northern side of the protected area, is not realised in frames of this project, even this possibility has been analysed and budgeted in the preparatory process. Still, possibilities for further financial support from Horizon 2020 etc. programmes are explored.

To reduce the cost of transporting biomass, mowing technology with a big pack press is also purchased, which can be put into service immediately.

The transport of hay from remote flooded meadows without access also requires a water transport vehicle (barge) and the construction of a mooring area (40 x 10 m shorelines) and loading area (50 x 100 m with gravel cover) along the Emajõgi River along the Kärevere bridge. The mooring area design and construction procurement will be launched with the announcement of the ferry procurement.

Approximately 20 km of new fences for cattle will be built in areas suitable for grazing. Fence poles are from impregnated wood or recycled plastic. The plastic solution is preferred because the lifespan of such poles is many times longer and usage of recycled plastic is positive according to today's knowledge. Thanks to the longer life span (impregnated wooden poles last 5-8 years, plastic poles 30+ years), the transport costs and thus the climate impact of installing recycled plastic poles are significantly reduced. The poles are left in place throughout the year. Approximately 2,500 posts will be installed at a cost of about 13 euros.

Around 100 animals will be provided with 6 (a 9 m x 6,5 m, height 2,5 m) removable shelters on pastures with the most open landscapes, i.e without natural shelter.

Three 5-hectare sample plots with different humidity regimes will be established for vast sedge (*Carex sp.*) areas to test the effects of repeated mowing on biodiversity. Areas are planned as part of the activity A2. *Development of maintenance plan for semi-natural habitats* and up to 4 times of mowing each season for 5 years is done.

Areas with dominant meadowsweet are moved just around blooming for 3 years to prevent the plant from spreading and to weaken its competitiveness. This areas are also determined in frames of the activity A2. *Development of maintenance plan for semi-natural habitats.*

Two long-term storage places or composting fields are established for hey outside the protected area according to the maintenance plan for semi-natural habitats (activity A2).

In addition to previous activities RMK has already allocated ressources for following activities supporting current activity C1:
- a 0,82 km long Palupõhja road will be built in the Alam-Pedja Nature Reserve, which will meet the load requirements of the mowing and hay transport equipment.
- Poorly accessible access sections (total 5 pcs, 0.44 km) will be provided at the Laas building, Nasja and Kirna.
- Crossings to the Karisto Stream and to the front of the Ristsaare will be set up to access the meadow.
- One culvert will be set up in the village of Verevi.

- ***Reasons why this action is necessary:***

Alam-Pedja SCI and SPA has a goal to protect semi-natural grassland habitat types like 6270*, 6430, 6450, 6510 and 6530* and related species inhabiting on these communities. The meadow

communities cover about 3940 ha (10,7% of the Alam-Pedja NCA), of that 98% or 3856 ha are flooded meadows with very complex water regime and difficult management conditions. Historically these communities have developed under extensive management, mostly mowing hay for cattle of Tartu city, and therefore can be only preserved by continuing extensive management. Without management most of these semi-natural grassland will disappear under the bushes or pioneer forest communities. It is already evident, that unmanaged communities lose their biodiversity to sedges and meadowsweet communities.

In 2019, the Alam-Pedja Nature Reserve maintained 640 ha of meadows, of which 87 ha were grazed. In addition, 302 hectares were under restoration but over 2500 hectares sill unmanaged meadows. According to the vision, about 380 ha of previously abandoned meadows in Samblasaare and Aiu region and about 100 ha of accessible meadows should be added to the meadows to be restored. In total, the manageable area would increase to 1422 hectares in the near future, or more than 2 times, which would also mean a sharp increase in the biomass supply.

At present, the hay in the Alam-Pedja meadows is mown, and the hay is dried or immediately packed. Removing biomass from meadows is the most difficult and costly part of the maintenance process, as the export routes are long and difficult to pass. However, because of its low feed value, the realization of hay is of major concern and decaying hay rolls continue to be piled on roads going through or passing the protected area. This is a cumulating environmental problem which is increasing every year and requires quick attention.

For more efficient and proper maintenance of semi-natural habitats, it is necessary to increase the grazed areas and purchase a mower and a big pack hay baler, since due to difficult maintenance conditions and low support rates, such investments cannot be expected from land managers. The big pack mowing technique allows to compact the hay more tightly and to put more square bales on the transport vehicle. This saves on transport fuel costs, which is especially important on wetlands and long and difficult-to-reach routes. It also reduces soil damage remarkable.

In wet, poorly accessible and shallow riverbanks, where the biomass export routes are kilometres long, the transport of biomass should preferably take place on a waterway and would require the purchase of a barge with suitable parameters. In 2012, a project was developed with the support of the Environmental Investment Centre, entitled "Development of a technology for barging the hey from flooded meadows in the Alam-Pedja Conservation Area", which resulted in a solution with economic calculations for a watercraft suitable for hay transport. For example, transporting the same amount of balls on land requires 450 litres of fuel and 120 litres by ferry. At the same time, water transport also allows for the maintenance of areas that are so far inaccessible to machinery, for which it is not possible to build infrastructure for environmental reasons. The barge would be able to transport maintenance equipment to meadows surrounded by water and also to remove mowed biomass. In this way, it would also be possible to maintain a number of historical meadows, which are important spawning grounds for the Alam-Pedja region (eg Rõngaskoolme meadows). Unfortunately plans from 2012 have not yet been realized due to the lack of resources.

A telescopic loader would also be required to load the bales of hay or packs on the barge, and to assemble the bales quickly and efficiently, which would allow for higher piles of storage, which would provide better hay retention and save space.

Grazing area should be increased as much as possible to reduce the excess of biomass. Barge for hay transport will be used for cattle transport as well. Currently, the length of cattle fences in Alam-Pedja Conservation area is approximately 20 km and grazed area is about 87 hectares. In about 5 years it would be possible to increase the existing herd to graze up to 250 ha. Grazing is a

historical land use and the biota of semi-natural habitats has adapted to that, and unlike mowing, grazing does not cause problems with excess biomass. Grazing in Alam-Pedja is possible in relatively limited areas due to the extensive flooding. Therefore all suitable areas should be used for livestock farming. Existing fences are sensitive to flooding and should therefore be replaced with more durable materials.

New fence lines also have a significant cost (of the order of 60 km, as it takes 3 km of cord to build one kilometre of cattle fences). The wires could be partially replaced by a stronger and longer-lasting rope, since the wire has a tensile strength of 50 kg and a rope of 200 kg (price range the same).

Due to the disappearance of shrubs from the grazing areas, it is also necessary to start building shelters for cattle. In total, shelters would be needed for about 100 animals. 2,5 m^2 is required for one animal, e.g. ca 6 shelters (9 m x 6,5 m) are needed.

The biggest problem in pastures is the vast areas of sedge that the cattle do not eat. This is partly due to overgrowth of old shallow ditches and the accumulation of sediment in their catchments. Because the drainage of water is blocked, the water level on the meadow may be even higher than in the river, creating a situation where plant species are replaced by monocultural sedges and grazing does not have a positive effect. Some areas have the same problem with meadowsweet, leaving essentially black soil after mowing. Some historic ditches should therefore be cleaned of sediments (defined in the framework of activity A2. *Development of a maintenance plan for semi-natural habitats*) up to 50 cm to allow surface water to run off.

The sample areas should be mowed relatively early and 3-4 times a season over a five-year period for the restoration of diverse vegetation, as the maintenance of fences has shown that sedges disappear rapidly after intensive mowing and will be replaced by other plant species. Therefore, up to three pilot areas of 5 ha in different humidity conditions should be established to test whether the biodiversity and the quality of grassland for grazing of the sample areas can be increased by mowing. For each test area, 20 plant monitoring plots, a 1 m^2, for statistical evaluation of vegetation changes.

In meadowsweet areas early mowing should be allowed as a pilot project for a period of 2-3 years, just before the flowering. Visual assessment is given at the end of each vegetation period and integrated into the monitoring report.

The extensive sedge and meadowsweet areas and test areas referred to above shall be reflected in the maintenance plan for semi-natural habitats under Action A2.

At least two long-term storage places or composting fields outside the protected area are required for hey according to the maintenance plan for semi-natural habitats (activity A2) because biomass production is not equal every year and therefore hay storage for further and continuous use is necessary.

Due to natural conditions, the maintenance conditions of the Alam-Pedja meadows are very volatile and dependent on the weather. Most Alam-Pedja meadows are used as meadows and proper maintenance requires removal and transport of hay from meadows. Improving accessibility with various construction solutions - roads, soil insurance and overpasses - is required for hay transport. The planned and already allocated investments (150 000 eur) in the protected area create the preconditions for the maintenance and favourable status of 570 ha of semi-natural habitats.

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The establishment of the described infrastructure is a prerequisite for the successful implementation of the activities C1. Management of the semi-natural communities.

- ***Constraints and assumptions:***

Solutions for biomass use identified under Action A1, but which cannot be realized before project phase 3, may provide some relief. From the point of view of this project, these would be project-empowering activities that cannot yet be taken into account in the design of this project. At the same time, there is still a need for water transport and landing place to remove as little as possible of the biomass from meadows on land and not to the destroy surface until the biomass reaches the hard-surfaced road from where it can be transported.

A permanent and previously realized risk for hardly maintainable floodplains is the abandonment of maintenance contracts by contractors. This would be mitigated by finding an economically and environmentally sound solution for the biomass that is supplied, which would free land managers from the problems of hay storage, and would at best make maintenance a little less expensive (especially at the expense of water transport).

There are few suitable pastures in the protected area and landowners may not want to rent their land for grazing. Fortunately, most Alam-Pedja meadows are state-owned, which allows the state to direct land use. Animal husbandry is not a profitable activity on the Alam-Pedja meadows and its interest is relatively low. However, there are some dedicated herd owners in the area who are ready to expand their herds and pastures.

The access to meadows are funded by the EU Cohesion Fund and the infrastructure to be set up for the maintenance of the flooded meadows can be considered as supporting the LIFE-IP project, which contributes to the project's objectives. As a result of the action A2. *Development of a maintenance plan for semi-natural habitats* there might arise a need for more infrastructure what cannot be foreseen at present time.

- ***Expected results (quantitative information when possible):***

By implementing more suitable solutions for meadow management and finding solutions for the use of biomass, the quality of habitats, the status of conservation values, the managed area increases and the footprint of meadow management decreases.

The area grazed has increased up to 250 hectares. The quality of meadows and maintenance is improved through the restoration of historic ditches, and areas that are currently unmanaged can be taken care of. Overall, the species richness of meadows increases and carbon emissions from mechanized maintenance decrease as the grazing area increases.

- ***Cost estimation:***

Personal costs:

1st phase: 100 man-days 100 euros, 10 000 euros (1 expert); 60 man-days 150 euros, total 9 000 euros (1 expert for outdoor monitoring and reporting): total 19 000 euros
1st phase (RMK): 2 man-days 170 euros, 340 euros (1 expert)
2nd phase: 19 000 euros
2nd phase (RMK): 340 euros
3rd phase: 10 000 euros
4th phase: 10 000 euros

Travel costs:

1st phase: 1 050 euros (3 500 km a 0,3 eur/km)

2nd phase: 1 050 euros
3rd phase: 450 euros
4th phase: 450 euros

Consumables:
1st phase: 41 500 euros (2 500 poles for fences a 13 eur, total 32 500 euros; 60 km of fence wires, total 9 000 euros).
2nd phase: 50 000 euros (shelters for 100 cattle)

Equipment:
1st phase: 660 000 euros (mower with big pack press 160 000 euros, barge (400 000 euros), telescope loader 100 000 euros)

External assistance:
1st phase: 14 000 euros (3x5 ha = 15 hectares of mowing of test plots, up to 4 times per season a 33 euros/ha/per mowing time, total 5 000; 60 man-days 150 euros, total 9000 (1 expert for outdoor monitoring and reporting))
2nd phase: 254 000 euros (including 2 long-term storage areas or composting fileds)

- ***Deliverables:***

1st phase: yearly reports of plants monitoring in test areas
2nd phase: yearly reports of plants monitoring in test areas

- ***Milestones****:*

2nd quarter 2021: materials for cattle fences and removable shelters for cattle are purchased
3rd quarter 2025: 20 km of cattle fences are ready and 10 removable shelters are established according to the need

***Title of Action C2*: Management of abundance of small carnivores and beaver**

- ***Beneficiary responsible for implementation:***

MTÜ Tartu Jahindusklubi

- ***Description (what, how, where and when):***

Activity is carried out in sequence and partly parallelly with activity A3. *The development of a control plan of abundance of small carnivores and beaver* to test proposed methodology, to count fauna and test techniques and locations for the control of small carnivores and beavers. For this purpose, a permit is issued by the protected area manager EB and training is carried out by the person responsible for the activity. All census and control data are immediately entered into the hunting information system jahis.ee. If necessary, the management plan shall be adjusted in the light of practice and monitoring data on animal fauna (activity D1).

The work requires the purchase of live traps (30 small and 30 large), trap alarms to announce about the catch, trail cameras to conduct a census, an ATV with winter belts, trailer and a boat with an engine to navigate on water (as many parts of the area no not have access from land). Where appropriate, purchased equipment shall be used also for monitoring the effects of the control activities (Action D1).

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Particular attention is paid to the management of the beaver population in the restored riverbed of the Laeva river (also called Karisto stream) and in the oxbow lakes, where they obstruct with dams the free movement of fish and undermine previous conservation efforts.

In the early spring of each year, before the start of the vegetation season, a flight census is also conducted in the protected area. This gives a good overview of the numbers of large game and beaver and the location of dams in difficult-to-access areas, allows to assess the usage of habitats by large animals and the status of different habitats.

Monitoring and management are planned to be organized in the following sections:

1. Viljandi part of the protected area;
2. The area south of the Emajõgi river;
3. the part along Tallinn-Tartu highway;
4. The central part (between and adjacent to Kirna bog and Palupõhja road).

For each area, trustees who are knowledgeable in their area and who are trained to harmonize the methodology are selected.

Animal catch shall be conducted along protected areas, rivers and winter roads in order to minimize the impact on pristine nature.

- ***Reasons why this action is necessary:***

Reasoning of the activity overlaps with the reasoning of the activity A3. Development of a control plan of abundance of small carnivores and beaver as activity C2 is the follow-up and implementation of the control plan during 10 years of project period.

- ***Constraints and assumptions:***

The NGO Tartu Hunting Club is the only organization that has the ability to combine the knowledge of game hunters in Alam-Pedja region, the practical experience and skills of hunting associations of users of hunting areas bordering the nature reserve, the initiative of local residents and national conservation objectives. Therefore, they have a great capacity to carry out collaborative projects and no constraints are expected.

- ***Expected results (quantitative information when possible):***

Conservation status of protected species improves and reaches favourable level. Racoon-dog population is extinct from the protected are and controlled on the borders. Beavers inhabit only in natural watercources where they do not have negative impact on other protected values. Governor of the nature conservation area has permanent overview of the condition of fauna.

- ***Cost estimation:***

Personal costs:

1st phase: 253 man-days 100 euros, total 25 300 euros (XX expert (SS man-days); XX expert (XX man-days)
2nd phase: 27 800 euros
3rd phase: 27 800 euros
4th phase: 27 800 euros

Travel costs:

1st phase: 6000 euros (20 000 km a 0,3 eur/km)
2nd phase: 6000 euros
3rd phase: 6000 euros

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4th phase: 6000 euros

Equipment:
1st phase: 38 400 euros (30 large traps a 120 euros, 30 small traps a 100 euros, 60 trap alarms a 120 euros, 10 track cameras a 360 euros, a trailer for 1000 euros, boat with engine 2000 euros and ATV with winter-belts 18 000 euros)
2nd phase: 2 000 euros (for replacement of damaged equipment)
3rd phase: 2 000 euros
4th phase: 2 000 euros

Other costs:
1st phase: 2 000 euros
2nd phase: 2 000 euros
3rd phase: 2 000 euros
4th phase: 2 000 euros

- ***Deliverables:***

Continuous on-line data from counting and control activities.

***Title of Action C3*: Restoration of hydrological regime**

- ***Beneficiary responsible for implementation:***

RMK
ELF

- **Responsibilities in case several beneficiaries are implicated:**

RMK is responsible for coordination and carrying out of the restoration work;
ELF - responsible for organising volunteers into restoration work; provision of expertise in the course of implementation of restoration work based on previous experience from Project LIFE MIRES ESTONIA.

- ***Description (what, how, where and when):***

Closing of the drainage network and restoring natural waterways is absolutely paramount for any kind of water related habitat restoration. Drainage network within the project areas will be closed or redirected by various methods, specified during the formulation/updating of the restoration projects (Action A6).

To restore the hydrology of mire habitats, the most used method will be infilling of ditches with soil from adjacent areas. In addition, supporting dams may be used. Dams will be used also in area without reasonable thickness or quality of peat. Manual work will be applied only in the places that are not accessible by the excavator. Specific constructions and locations decisions for dams will be made and described in technical restoration projects (A6).

Manipulations of the tree cover. Removal of tree cover reduces evapotransporation which could considerably drop water level in the ground, making tree cover additional vector of the water loss from wetland. Also, removal of tree cover restores more natural light conditions that favour the establishment of sphagnum moss cover - a key component of the northern boreal mires.

Redirecting the waterways is necessary for the restoration of natural river habitats and its

floodplains. In project area it is planned to study the opportunities to restore the morphology on lower course of Pikknurme river. It is planned to redirect river into its natural riverbed and recreated connectivity between river and floodplain.

Restoration actions will be implemented by different private companies recruited via public tendering. The companies should preferably have previous experience on restoration actions in peatlands, experience of building dams. During and after the LIFE project, the maintaining of dams in the project sites will be the responsibility of RMK. RMK experts will check the condition of the closed drainage systems after each spring flood during the project. Remotely controlled aircraft with high quality camera and on foot visits will be used for such surveys.

- ***Reasons why this action is necessary:***

Current drainage infrastructure has negative impact on conservation values related with wet forests, mires and flooded meadows in Alam-Pedja nature conservation area.

The restoration measures proposed by the project will establish the conditions that over time should favour the regeneration/formation of the typical waterlogged ecosystems and related species and habitats - therefore increasing the value and condition of Natura 2000 habitats and their ecosystem services. Manipulation of the forest cover is needed in order to stop water loss via evapotranspiration and improve light conditions for open mire species such as Sphagnum mosses, which are key species in priority Natura 2000 habitats of the project sites.

- ***Constraints and assumptions:***

Costs for the implementation of the restoration actions is highly dependent of local conditions, especially concerning the access of machinery. Temporary infrastructure may be needed for implementation of works. Cost of such measures will be calculated during the action A6. Several sources were used to estimate these costs in the project proposal (within the restoration cost), lowering the risk of under estimation.

- ***Expected results (quantitative information when possible):***

Approximately 3800 ha of drainage affected areas are restored. Degradation of the wetland habitats is stopped and favourable conditions for recovery is created within the restoration areas.

- **Indicators of progress (Maximum Characters: 2000)**

In the 1st phase no works are planned. In 2nd phase we expect that work is finished on 500 ha. In third phase we expect to finish works on 1500 ha. In 4th phase we expect to finish works on last 1800 hectares.

- ***Cost estimation:***

RMK: costs of works by private companies are based on SFMC experience of similar works. Also potential increase of the price level is considered due to inflation. Price estimation is 1000 EUR per ha. Total 3 800 000 euros.
RMK own permanent staff costs are all together 62 900 euros (170 eur/day)
RMK travel costs are 2 250 euros (7500 km, 0,3 eur/km)
ELF. Field work (assessment of actual actions and provision of expert input when amendments or changes are needed in the course of action) - 21 man-days 150 euros 3150 EUR

Personal costs:
2 nd phase (RMK): Permanent staff 40 days 170 euros 6 800 EUR
2 nd phase (ELF): Permanent staff 21 days 150 euros 3 150 EUR
3 rd phase (RMK): Permanent staff 150 days 170 euros 25 500 EUR

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4 th phase: (RMK): Permanent staff 180 days 170 euros 30 600 EUR

Travel costs:
2 nd phase (RMK): 300 eur (1 000 km, 0,3 eur/km)
3 rd phase (RMK): 900 eur (3 000 km, 0,3 eur/km)
4 th phase (RMK): 1 050 eur (3 500 km, 0,3eur/km)

External assistance:
2 nd phase (RMK): 500 000 eur. Restoration works on 500 ha (1000 eur/ha)
3 rd phase (RMK): 1 500 000 eur. Restoration works on 1500 000 ha (1000 eur/ha)
4 th phase (RMK): 1 800 000 eur. Restoration works on 1800 000 ha (1000 eur/ha)

- ***Deliverables:***

2nd quarter: restoration works finished on 500 ha
3rd quarter: restoration works finished on 2000 ha
4th quarter: restoration works finished on 3800 ha

***Title of Action C4*: Conservation work by volunteers**

- ***Beneficiary responsible for implementation:***

ELF

- **Responsibilities in case several beneficiaries are implicated:**

RMK and EB - providing information regarding conservation issues and assistance with special tasks if needed

- ***Description (what, how, where and when):***

Manual work will be applied in the places that are not accessible by machinery. In order to restore hydrological conditions, dams will be built by hand based on technical project. Volunteers are involved into dam building activities in remote areas as well as in the case of closing small ditches. In some cases they take part of „fine tuning" works on those sites where heavy machinery has done the main part of the works before, help in monitoring activities and management of semi-natural habitats.

Within the LIFE project ELF organizes 20 conservation work camps. 10-15 people are expected to work each time 2-3 working days (work time estimated minimum 4 hours a day). Volunteers are coordinated by experienced group leaders (qualification of first aid and group management). Also experts from RMK, Environmental Board or ELF will be included. Nature conservation experts assist and make lectures at project sites. Volunteers are to be recruited through website www.talgud.ee.

ELF has over 20 years of experience (since 2000) of organizing volunteer camps and they serve important educational and informative value besides actual work being done. In our experience it takes 3 work days (WD) to serve one camp. Work of the conservation camp manager includes also different kind of tasks that can't be linked to an individual camp. Conservation camp manager's tasks in this project are following:

- Serving individual camps (meetings and communication with group leaders (usually there are 1 to 2 persons in charge per camp), local partners and experts, food and equipment planning,

buying and packing, leading conservation camps (sometimes this task is done entirely by volunteers but based on our experience it is not always possible).
- Area familiarization (to get to know all the project areas) – 10 WD.
- Risk management and health and safety planning – 5 WD.
- Practical arrangements: scheduling camps, planning of accommodation, catering, logistics and work – 20 WD.
- Preparing and carrying out volunteer group leader's trainings – 10 WD.
- Promoting conservation camps and public communication (press, web, e-mail lists, social media) – 10 WD.
- Recruitment of volunteers – 10 WD.
- Reporting about works and analysing each camp – 10 WD.

Total 75 WD.

- ***Reasons why this action is necessary:***

Mire restoration works causes large-scale changes. To minimize the possible negative effect of the action some of the mire restoration works can be done only by using hand tools. For that many motivated people and qualified group leaders with special skills on working with hand tools are needed.

Also volunteers are needed in remote areas where there is difficult access for heavy machinery or it is not economically viable.

ELF has done similar conservation works with volunteers in different nature conservation areas around Estonia. In our experience it is possible to build 2-3 dams per one conservation camp. During this project we assume to build around 20 to 30 dams using volunteers. The cost of one dam is similar to the cost of building it with heavy machinery. That also justifies the volunteer involvement.

In Alam-Pedja project area it is not reasonable to use heavy machinery everywhere. There are small ditches and using volunteers is effective and also helps to avoid potential damages to soil surface made by heavy machinery. In rest of the areas the exact locations for volunteer involvement will be determined during the compilation or renewal of the restoration plans and technical design. Volunteers will be also involved with management of semi-natural habitats and other works where needed, e.g. assistance in monitoring actions, removal of brushwood from the ditches and adjacent areas, works related to monitoring tasks.
In addition, involvement of volunteers increase public awareness and understanding of the need for climate and conservation actions, importance of Natura 2000 and helps to share the information of the project activities via dissemination activities. Namely, there has been a lot of media coverage on volunteer work and therefore it is also useful tool for public awareness.

- ***Constraints and assumptions:***

Unsuitable weather may complicate the works in areas with complicated access and related activities should be postponed. To avoid that most of the dam building actions and management of semi-natural communities will be done during warmer season (between April and October).

There could be also situation where there are not enough group leaders or volunteers to make the planned camp happen. To avoid it ELF has developed a good human and technical resources base to run successful volunteer projects. ELF has educated ca 40 volunteer group leaders who have certifications on first aid and group management. ELF also has a list of almost 2500 subscribers who get newsletter where all the conservation camps are announced. Camps are also announced through website www.talgud.ee and other ELF social media channels.

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- ***Expected results (quantitative information when possible):***

All together 20 conservation work camps with 10-15 people involved each time have been organized and carried out.
Degradation of the wetland habitats and semi-natural communities is stopped and favourable conditions for recovery created within the restoration areas.
Public awareness on climate, conservation and restoration activities has been raised.

- **Indicators of progress**

All 20 conservation camps will be carried out by the end of 2030.

- ***Cost estimation:***

Personal costs:
1st phase: 30 man-days 120 euros (1 expert (30 man-days) 3600 EUR
2 nd phase: 2250 euros
3 rd phase: 2250 euros
4 th phase: 2250 euros

Travel costs:
1 st phase: 300 euros (project site visit (1000 km 0,3 eur/km) 300 eur
2 nd phase: 300 euros
3 rd phase: 300 euros
4 th phase: 300 euros

Equipment:
1st phase: 500 euros
2 nd phase: 500 euros
3 rd phase: 500 euros
4 th phase: 500 euros

Consumables:
1 st phase: 300 euros
2 nd phase: 300 euros
3 rd phase: 300 euros
4 th phase: 300 euros

Other costs:
1 st phase: 2000 euros
2 nd phase: 2000 euros
3 rd phase: 2000 euros
4 th phase: 2000 euros

- ***Deliverables:***

1st quarter: 4 conservation camps
2nd quarter: 6 conservation camps
3rd quarter: 6 conservation camps
4th quarter: 4 conservation camps

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***Title of Action C5*: Restoration and management of aquatic ecosystems (rivers, oxbow lakes, flooded meadows)**

- ***Beneficiary responsible for implementation:***

Eesti Loodushoiu Keskus NGO (WE)
RMK – State Forest Management Centre; governor of the state lands

- ***Description (what, how, where and when):***

Activity consists of restoration and management of aquatic ecosystems (rivers, oxbow lakes, flooded meadows) under changing climate and hydrological conditions by adapting best practices and testing innovative ideas with a special focus on protected species. This includes planning of the opening, dredging and maintenance of the estuaries, conducting the necessary studies, designing and practical implementation. During the planning phase, 30 major river basins of the Alam-Pedja Conservation Area will be dealt with, during which 20-25 priority sites will be selected for practical dredging and clean-up. Activities shall ensure connections of sufficient depth and breadth between bodies of water and parts thereof to ensure migratory capacity and optimal hydrological regime. Eco-friendly planning and technology will be implemented. The work is carried out at a suitable (low water) time, and the activities take place throughout the project.

- ***Reasons why this action is necessary:***

The uniqueness, diversity and special value of the ecosystems of the Alam-Pedja water bodies has been shaped primarily by the hydrological regime unique to the area. The key factor here is the regularly occurring spring high water, which floods the vast riverside floodplains, providing excellent living conditions for fish and many other biota, especially for breeding but also for feeding.

Unfortunately, according to global warming scenarios, spring high water will be smaller, earlier, shorter, and less frequent. These changes have already begun, and top-level studies (Blöschl et al., Nature 2019) show clear shifts in water regime dynamics across Europe. Climate-driven changes are already happening. In eastern Europe, spring air temperature has increased. This has resulted in much less extensive spring snow cover, a shift of snowfall to rainfall. Decreasing snow cover and snowmelt, resulting from warmer temperatures, have led to decreasing floods in eastern Europe. In north-eastern Europe, warmer air temperatures have led to earlier spring snowmelt floods.

Extreme summer low water periods and droughts may become longer and more frequent in the future. Smaller rivers and pristine rivers may remain water-poor during the summer, sometimes even completely dry.

This presents major challenges for aquatic ecosystems. Early flooding of meadows may occur at a time when fish are not yet ready for spawning, but during the spawning season the water may not rise to meadows. Of the protected species, this is particularly true for squirrels, but is important for the entire local fish fauna (and for other fish-dependent groups of animals - eagles and other birds of prey, otters, etc., and for the entire fishing industry).

Due to declining floods and more frequent droughts, the rivers become even more important as fish breeding grounds and refluxes. Connections between rivers and tributaries need to be further improved to allow free movement of fish within and between water bodies. It is vital for fish. There must be an opportunity to retreat from unfavourable conditions and to migrate back when conditions are favourable. Decrease in high waters will cause changes in sediment drainage dynamics. In this way, sediments deposited in estuary estuaries may remain there for a long time

and begin to accumulate, which may necessitate further cleaning of estuaries currently in good condition. This activity also ensures that the positive effects of existing projects (eg Happyfish, Happyriver, etc.) will continue.

Of the protected animal species, the above is most directly related to European weatherfish or European weather loach (*Misgurnus fossiilis*, Annex 2 to the Habitat Directive). The fish spawns on flooded meadows where possible and, if necessary, by the riversbanks. From the point of view of its protection, the Alam-Pedja Natura area is the most important protected area in Estonia and in the northern part of its distribution area. There are many protected water-dependent species in the area (spined loach, *Cobitis taenia*; European bullhead, *Cottus gobio*; asp, *Aspius aspius*; Eurasian otter, *Lutra lutra*; white-tailed eagle, *Haliaeëtus albicilla*; western osprey, *Pandion haliaetus* etc.). For all of them is vital the organization of protection adapted to changing circumstances.

- ***Constraints and assumptions:***

On of the risks is the ineffective time planning (applying permits). Elaboration of preparatory plans is timely consuming and many concrete actions require legal permits (as temporary water permits, research permits). Acquiring legal permits to carry out concrete actions might sometimes take unexceptionally long time and cause delays to preparation and/or carrying out the actions. Some constraints may also be set by private landowners. But most of the intended action (maintenance of the oxbow lakes connections) do not need legal permits. All competent authorities have been consulted at the beginning of the proposal preparation and permits (legal and also landowners' agreements) will be applied for all relevant actions at the earliest stage possible. Associated beneficiary Estonian Environmental Board is responsible for proceeding of temporary water permits. In addition, based on preliminary surveys and negotiations from parties, obtaining these permits should not be critical. The implementation of actions will proceed from those areas that are ready to go to the ones receiving their permits later. A detailed implementation planning should be done to keep to the timetable contained in the application. To mitigate the problems from time consuming actions it is foreseen enough time (with reserve) to implement them. There are only few private landowners and they are consulted, and they will allow project activities.

Rapid and unexpected changes in weather conditions might also threaten the success of the activities. Unfavourable hydrological conditions (high water levels in rivers) are the main constraints. If the water level is high, then it is not possible to perform qualitative studies and neither is possible to execute the concrete actions. But enough time is planned for surveys and conducting the maintenance and excavation work. To mitigate the risk the activities are planned for longer time period in order to enable to choose most suitable time period for studies and restoration actions.

Also tenderers may challenge public procurement procedures, the administrative approval processes may linger on for longer than normal, the implementation of some measures is more expensive than anticipated and new funding sources must be found or the implementation of some measures and actions may take longer than planned (due to the seasonal peculiarities or to contractors failing to deliver work on time). In most cases, delays can be avoided through detailed planning, involving all of the relevant stakeholders in the processes, and having an open dialogue with all of the parties concerned. The risk of delays occurring in implementing the measures when it comes to unexpected obstacles can be minimised when planning a longer implementation time for actions (allowing extra time as a reserve). Preparatory activities for concrete actions will be implemented in close cooperation with state authorities, municipalities and public information is spread before the fieldworks begin (actions E) and thus the risk is minimized. Good and well

organised communication and planning of time schedules are the key for elimination of the constraints.

There is also a risk, that stakeholders won't engage in implementing the actions or landowners do not agree with project activities. It may not be possible to implement those measures that need legal agreements with landowners, where such agreements are refused. Relevant local actors have been involved from the beginning of the project planning phase (agreements with local landowners are signed). The needs and hopes of local residents are being acknowledged as close as possible and many project stakeholders are involved in implementation of project concrete actions. Thus, citizens are expected to facilitate strong local support and willingness to act. To overcome this risk, there is planned a wide range of involvement activities (consultations, working groups, seminars, information spread through public media to raise stakeholders awareness levels regarding their obligations and the impact of their actions on the environment.

- ***Expected results (quantitative information when possible):***

- An overview of the openness of the connections between river and the oxbow lakes
- Connections restored and migration conditions improved on 20 oxbow lakes

- ***Cost estimation:***

Personal costs for 1 senior expert of WE (daily rate 135 euros during phase 1,143 euros 2nd phase, 152 euros phase 3 and 160 euros phase 4). There will be involved two experts from WE during phase 2 and 3. Senior expert will supervise the work from nature conservation aspects and ensure the use of most environmentally friendly methods and assess the quality. In oxbow lakes where only a small amount of sediment removal is required, work is done with the special amphibious tool carrier Truxor. Following tools for Truxor must be purchased under the category Equipment: special pump (10 000 euros), propeller (1500 euros) and pontoons (3500 euros). Technician of the WE ill conduct the work with the machine.

Travel costs are for visiting the project area during preparation and execution of the concrete actions.

External assistance costs include the cost of the preparation of the technical design for removal of the sediments and habitat restoration. The large-scale excavating work, necessary in some oxbow lakes, will be outsourced. The management of the work with the heavy machinery is responsibility of RMK.

Consumables are foreseen for purchasing the fuel for the boat and Truxor machine.
The Other costs include the maintenance costs of the field work equipment, rental of the garage and vehicles for visiting the project area (ATV).

Personal costs:
1st phase: 140 man-days a 135 euros, total 18 900 euros (1 expert (100 man-days)
1st phase (RMK): 2 man-days a 170 euros, total 340 euros (1 expert)
2nd phase: 25 440 euros
2nd phase (RMK): 340 euros
3rd phase: 27 040 euros
3rd phase (RMK): 340 euros
4th phase: 17 900 euros

Travel costs:
1st phase: 1 800 euros (project site visits (6000 km, a 0,3 eur/km)

2nd phase: 2 500 euros
3rd phase: 2 500 euros
4th phase: 2 000 euros

External assistance:
1st phase: 5 000 euros (technical projects)
2nd phase: 25 000 euros (arranged by RMK)
3rd phase: 25 000 euros (arranged by RMK)

Equipment:
1st phase: 15 000 euros (special pump 10 000 euros; propeller 1 500 euros; pontoons 3 500 euros)

Consumables:
1st phase: 2 000 euros
2nd phase: 8 000 euros
3rd phase: 8 000 euros
4th phase: 2 000 euros

Other costs:
1st phase: 2 000 euros
2nd phase: 3 000 euros
3rd phase: 3 000 euros
4th phase: 2 000 euros

- ***Milestones**:*

4th quarter of 2022 Technical designs produced
2nd quarter 2024 First oxbow lake re-opened
3rd quarter 2028 Restoration work implemented

D: Monitoring

***Title of Action D1*: Monitoring of terrestrial fauna**

- ***Beneficiary responsible for implementation:***

MTÜ Tartu Jahindusklubi

- ***Description (what, how, where and when):***

Each year during the game season of wild and black grouse, the size of the games is estimated and their location is mapped, the number of small predators visiting the games is estimated, and nests that have been looted in the wild are registered in other periods.

The management performance assessment methodology shall be aligned with the national monitoring methodology and the data shall be recorded in a national register.

- ***Reasons why this action is necessary:***

The activities are directly related to activities A3 and C2, providing parallel input to the refinement and improvement of the management plan as well as to the practical activities arising from it. In

addition, monitoring data provides input to the development of a new management plan for Alam-Pedja SPA and SCI, allowing realistic conservation objectives to be set.

- ***Constraints and assumptions:***

No constraints are expected as hunters organisations have great competence in counting and monitoring animals.

- ***Expected results (quantitative information when possible):***

Number of protected forest birds has stabilised and show positive growth. Monitoring has given a valuable input also to the management plan of the semi-natural communities (activity A2) and to the new management plan of the SPA and SCI area (activity A7).

- ***Cost estimation:***

Personal costs:
1st phase: 350 man-days a 100 euros, total 3500 euros
2nd phase: 3 500 euros
3rd phase: 3 500 euros
4th phase: 3 500 euros

Travel costs:
1st phase: 1650 euros (5 500 km a 0,3 eur/km)
2nd phase: 1650 euros
3rd phase: 1650 euros
4th phase: 1650 euros

- ***Deliverables:***

Yearly monitoring reports of the abundance of capercallie and black grouse related to the geographical abundance of small carnivores; monitoring data of large game is entered into the hunting database jahis.ee

***Title of Action D2*: Monitoring of impact of climate change on the status of fish communities**

- ***Beneficiary responsible for implementation:***

Eesti Loodushoiu Keskus NGO (WE)

- ***Description (what, how, where and when):***

Studies of specific aquatic ecosystems of Alam-Pedja and long-term monitoring of changes in the state of conservation values shall be carried out with modern methodology. Proposals for proposals to improve monitoring methodologies will be considered. Where appropriate, the suitability of new methodologies in the area shall be tested.

A hydrological monitoring network shall be established to provide the necessary data (water level, flow rate, temperature, oxygen content, etc.) for the measurement, collection, processing and analysis of at key points of important water bodies.

Emajõgi, Põltsamaa, Pedja, Elva, Ilmatsalu, Umbusi and Laeva rivers, floodplain meadows along the rivers and major oxbow lakes are monitored. Monitoring is mainly based on data collected by automatic hydrological monitoring devices.

Impact assessment of the opening of oxbow lakes will be carried out before and after the implementation of the project's practical activities, in particular the effects on spawning and wintering conditions as well as on the provision of refuge searches. One evaluation period shall last one year.

The status of protected species shall be assessed twice at six-yearly intervals for each target species. Changes in the status of non-native species are also assessed.

Habitat quality assessment shall be carried out in conjunction with an assessment of the conservation status of protected species, including, where appropriate, operational monitoring. The timing of operational surveillance will depend on the occurrence of exceptional weather conditions (exact time unknown).

The impact of lower water levels on protected species will be assessed once for each target species. An overall assessment of the condition of the fauna, telemetry, microchemistry and diseases of the fauna shall be carried out once. Alam-Pedja Conservation Area will be included in the surveys and additional data will be collected from other related areas as needed.

Hydrological monitoring is continuous. A hydrological monitoring network shall be set up and the location of monitoring equipment optimized during the first two years. Monitoring is carried out continuously with some equipment (eg water level and temperature measurement) and periodically with some equipment (eg oxygen measurement of water). Activities take place throughout the project.

In order to assess the importance of the Alam-Pedja for the European weather loach, it is necessary to assess its habitat condition more broadly outside the Alam-Pedja region. Also, as the status of the population of the asp in the River Emajõgi system has improved in recent years, an initiative has emerged to change the protection regime. It is therefore necessary to carry out a study to determine the modalities and scope of any changes to the protection regime and propose further arrangements for protection. After changing the protection regime, it is necessary to monitor the status of the asp population and the impacts of the changes.

- ***Reasons why this action is necessary:***

Impact of climate change on the status of fish communities and ways to minimize negative impacts are becoming more and more important. The contribution of the Alam-Pedja area to the achievement and / or conservation of protected fish species has so far been substantial and has had a far-reaching positive impact. At the same time, projected climate change foresees impacts on the status of vulnerable inland fish species that are vulnerable to climate change, as well as the abundance of other "normal" but important species as part of the ecosystem. To maintain this status, we need to increase our readiness to take action on climate change and improve our understanding of ecosystem functioning mechanisms. The aim is to improve or maintain the conservation status of protected species when the climate change processes put pressure on the protected area. In order to assess trends, it is necessary to conduct large-scale monitoring of fish fauna adapted to the major rivers.

The fish stocks and the status of protected species of the Emajõgi, Peipsi, Võrtsjärv and other connected rivers and lakes are directly dependent on the Alam-Pedja Conservation Area, as this

area is a crucial spawning, feeding and wintering area and migratory route. So far, the River Emajõgi has allowed professional fishermen to catch the largest catches in Estonia by rivers (for example, in 2018, 39% of the total catch of Estonian rivers). This area has been at least as important for recreational fishermen as they account for nearly a third of the Estonian population. Among the protected species of fish, the Alam-Pedja Conservation Area is the vital habitat for the European weather loach, spined loach, European bullhead and asp.

Climate change will affect water-related ecosystems, in particular through shifts in hydrological conditions, such as spring spawning water levels in temporary flooded waterbodies and summer low water flow and duration of water scarcity. Without monitoring of hydrological changes, it is not possible to adequately understand what is happening in ecosystems and to design effective conservation measures. No systematic hydrological monitoring has been organized in Alam-Pedja yet and it must be initiated in frames of the current project.

Analyses indicate that the protection of aquatic habitats and aquatic biota need to be enhanced in order to reduce the impact of climate change. Knowledge-based decision-making requires a competent assessment of the effectiveness of species conservation activities (eg introduction of protected species, opening of migratory routes). It is also necessary to map climate change hot spots, tighten the monitoring step and use more effective analytical methods. Applied research in this area is needed and may lead to the development of new methods.

It has been found that the detailed impact of climate change on fish stocks in the long term is difficult to predict as changes in the frequency and intensity of extreme weather events cannot be predicted and the effects of different climate components on fish may be reversed. In order to improve forecasts, complex studies are needed to clarify which processes regulate the fauna, in particular the status of protected species (including studies of the interaction between weather and anthropogenic changes). Fisheries monitoring results will be integrated with other biota and environmental monitoring as fish depend on the structure and functioning of the entire ecosystem.

- ***Constraints and assumptions:***

Ineffective time planning (applying permits) might delay some activities, which require legal permits (as permits for visiting and acting on site, research permits). Acquiring legal permits to carry out monitoring actions might sometimes take unexceptionally long time and cause delays to preparation and/or carrying out the actions. But the project is secured by careful planning and proper preparatory work. The project partners - Ministry of Environment and Environmental Board are responsible for the successful implementation of the project activities and issuing the needed authorization is negotiated. The previous experience is indicating that the needed approvals will be obtained by the routine work in time.

Rapid and unexpected changes in weather conditions might also threaten some activities. Unfavourable hydrological conditions (high water levels in rivers and oxbow lakes) are the main constraints. If the water level is high, then it is not possible to perform qualitative studies. But enough time is planned for surveys and monitoring. To mitigate the risk the activities are planned for longer time period in order to enable to choose most suitable time period for studies and restoration actions.

- ***Expected results (quantitative information when possible):***

Comprehensive monitoring report with management suggestion for the new management plan of the area in 2025.

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- ***Cost estimation:***

Personal costs for 2 senior experts (daily rate 135 euros during phase 1, 143 euros 2nd phase, 152 euros phase 3 and 160 euros phase 4). Travel costs are for visiting the project area during monitoring work by experts. External assistance costs include the cost of the microchemistry and genetic studies. Consumables are foreseen for fieldwork materials (telemetry transmitters 200 pcs 300 euros /pc, batteries, monitoring nets, waders). The fuel for the boat will be purchased also from the Consumables. Equipment for hydrological and water quality analyses will be purchased under category durable goods: water level data loggers 15 loggers 700 euros/pc and dissolved oxygen loggers 5 pcs 2000 euros/pc. A boat with engine for conducting the fieldwork, monitoring activities, implementing the concrete conservation actions and dissemination activities will be purchased also from category Equipment (35000 euros, can be used). The Other costs include the maintenance costs of the durable goods and fieldwork equipment, rental of the garage and vehicles for visiting the project area (ATV).

Personal costs:
1st phase: 440 man-days a 135 euros, total 59 400 euros (2 experts a 220 man-days)
2nd phase: 62 920 euros
3rd phase: 55 024 euros
4th phase: 62 400 euros

Travel costs:
1st phase: 3 510 euros (project site visits (11 700 km a 0,3 eur/km)
2nd phase: 3 510 euros
3rd phase: 2 010 euros
4th phase: 2 010 euros

External assistance:
2nd phase: 5 000 euros
3rd phase: 5 000 euros

Equipment:
1st phase: 55 000 euros

Consumable:
1st phase: 32 750 euros
2nd phase: 5 000 euros
3rd phase: 31 500 euros
4th phase: 4 000 euros

Other costs:
1st phase: 1 500 euros
2nd phase: 1 500 euros
3rd phase: 1 500 euros
4th phase: 1 500 euros

- ***Deliverables:***

1st quarter 2023: Monitoring report
4th quarter 2025: Monitoring report
1st quarter 2028: Monitoring report
4th quarter 2030: Final monitoring report

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- ***Milestones****:*

4th quarter 2022: Monitoring plan issued; pre-operational monitoring has been carried out
3rd quarter 2030: Monitoring of the project implementation carried out

***Title of Action D3*: Hydrological, habitat and species monitoring, and remote sensing**

- ***Beneficiary responsible for implementation:***

ELF - will organize hydrological, habitat and species monitoring, and remote sensing

- ***Description (what, how, where and when):***

Main project actions are directed towards restoration of the hydrological regime of the affected wetlands and these actions should improve conditions of ecosystem services (incl. carbon accumulation, hydrological balance), as well as Natura 2000 habitats, and conditions for threatened species related to wetlands.

Therefore monitoring of hydrology, plant cover, species and changes in habitats conditions are essential to quantify effects of the implemented restoration measures. Water levels will be monitored with network of automatic piezometers that is complimented with remote sensing approach (see also http://www.geotech.eu/index.php/products/piezometer)

Piezometers together with plant cover monitoring plots are organized on transects that cross the drainage network. Monitoring transects are organized similarly to the ones that Tartu Un. (the project "Quantifying the drainage impact to the wetlands") and ELF (LIFE Mires Estonia). Results from these projects are available for ELF and form a good basis for quantification of the effect of restoration measures due to available comparative datasets. Same type of piezometers with same installing depths and distances from the ditches will be used in proposed monitoring transects. In total 7 transects will be established.

Ornithologists, entomologists and herpetologists will implement monitoring related to species. Standard transect counts will be used for a population index of *Tetrao urogallos* (based on tracks and birds) and timed surveys to determine the species composition and abundance of butterflies. For semi-aquatic invertebrates and amphibians, mainly dip-netting of larvae and counting of egg-clusters will be used to detect the presence and abundance of target species, supplemented by measurements of the quality of aquatic habitats. Also, counting adults and exuviae of dragonflies will be used.

Locations of the monitoring transects will be chosen during the formulation/updating of the technical plans.

Plant cover will be monitored via classical plot system close to the piezometer sites. All plots will be described and photographed yearly during the project.

Habitat monitoring will be carried out last quarter of the Project in order to allow qualitative analyses of the success of restoration measures.

Radio controlled drones and planes will be used for larger spatial coverage for plant cover and indirect water level monitoring. Currently available consumer-grade cameras and drones allow spatial resolution of ortophotos that is sufficient for rapid, general vegetation monitoring. The

monitoring flights are twice during vegetation season before the restoration activities and twice per year for each transect after restoration actions. Remote sensing is also used for dam monitoring allowing quick check of the field conditions and pinpointing targets for field inspection by foot. This information provides also information regarding the quality of dams and is important to assess whether any improvements are needed or not. If improvements are needed (e.g. during spring with high water movement due to melting snow) there is immediate information regarding problematic dams and relevant works could be planned almost immediately.

Publicly available data supplied by Estonian landboard (ortophotos, lidar data) will also be used for general monitoring purposes besides "in-house" generated remote sensing data.

Remotely controlled aircraft also allows stunning full HD quality aerial videos and photos that will be used extensively in study materials and public materials about the project.

- ***Reasons why this action is necessary:***

Both plant and hydrological "before and after" monitoring is essential to quantification of the restoration success, failures or no-effects. If necessary, suggestions to improve dams or other restoration work, will be done. Scientifically sound monitoring data is the basis to evaluate effectiveness of restoration.

Remote controlled aircraft equipped with high-quality cameras allow much quicker, wider and cheaper observation of ecosystem changes initiated by restoration measures. Also it provided good photo material for information and study materials is usable during public events and publications. To the end that restoration activities create quality habitats for various species, it is essential to assess the impact of habitat restoration on the populations of threatened species. It is possible that, in the case of sensitive species and ecosystems, the loss of existing habitats (in this case: drainage ditches; overgrown bogs) can exceed the provisioning of new ones at least in the short term. Thus, monitoring of impacts of habitat restoration on target species and habitats provides information on the success of the whole project and its learning process.

- ***Constraints and assumptions:***

Piezometers could fail unexpected, causing loss of water level data. Pieozometers used by ELF. have been field tested for over 8 years now, in total 2 out of 156 piezometers have failed. Piezometers will be checked and maintained at least twice a year in order to minimize potential dataless periods due to piezometer failures. Also transect based setup allows somewhat "reconstruction" of the lost data by combining data from working, surrounding measurement points.

Natural variations between different years make interpretation of water level data difficult. The monitoring points (piezometers) must be set up as quickly as possible to ensure the longest time possible series. Two transects will be set up in areas not affected by restoration measures: one with active drainage and second to natural mire. This setup should ensure the capture of natural background fluctuations and therefore allow quantification of the restoration effects.

Bad weather could hinder the usage of drones or even lead to loss of them. The operators must choose calm, clear days for flying and strict flight plans must be set up before hands to minimize possibility to lose drones. Flight areas must be accessible in case of unexpected landing. Also drones will be supplied with GPS receivers in order to find them if not coming back.

- ***Expected results (quantitative information when possible):***

High quality waterlevel time series from the project areas, indicating hydrological situation "before

and after" the implementation of restoration measures.

High quality plant cover records, indicating vegetation situation "before and after" the implementation measures.

Fine resolution ortophotos and aerial videos taken three times a year from monitoring transects.
A database reflecting the conditions and development of the species' populations in restoration sites will be created and used for compiling the reports. These data will be also added into the Estonian Wildlife Info System. The main results of the project will be published in the layman's report and on the project's website. Results will be discussed during the workshops, experts' meetings, and the Steering Committee meetings.

- ***Indicators of progress***

- Piezometers acquired and installed.
- RC aircraft acquired and operator(s) trained.
- Botanical transects established.
- First ortophotos and aerial videos taken.
- Smooth inflow on monitoring data (water levels, remote sensing and botanical info).
- Analyses of acquired data made and effect of the restoration measures quantified.
- Species monitoring reports (2 years and 5 years after the restoration actions)
- Habitats monitoring report.

- ***Cost estimation:***

Personnel:
Setting up the piezometers on the monitoring transects will take 1 work day for two people per transect. Number of transects is 7; 14 workdays + 1 additional day. Total 15 days *150 EUR (daily rate for expert here and afterwards) = 2250 euros.
Downloading data and maintenance of the piezometers will take around 3 day two times a year per transect. 6 days per year; 60 days for a 10 years project.
Flying the project sites – annually 10 days to cover different seasons and conditions. In total 100 workdays.
Plant cover: 5 surveys per transect lasting 2 days - 70 work days.
Analysis and interpretation of the monitoring data - in total 180 days.
Monitoring habitats: 50 work days.
Monitoring species (2 rounds): 300 work days.
Consumables: Piezometers - analogue or better ca 600 euros a piece. In total 35 piezometers + 1 air pressure logger are needed for water level monitoring network, weather station. Total cost of piezometers + air pressure loggers is 25 900 euros.
RC aircraft, and cameras - 30 000 euros
Transport costs: One field day round from Tartu app. 100 km. Total 500 field days – app 50 000 km.

Personal costs:
1st phase: 100 man-days a 150 euros, total 15 000 euros
2nd phase: 20 000 euros
3rd phase: 60 000 euros
4th phase: 50 000 euros

Travel costs:
1st phase: 3 000 euros (project site visits (10 000 km a 0,3 eur/km))
2nd phase: 3 000 euros

3rd phase: 5 000 euros
4th phase: 5 000 euros

Equipment:
1st phase: 15 000 euros (drones and cameras)
3rd phase: 15 000 euros (drones and cameras)

Consumable:
*1st phase: 25 900 euros (*piezometers and related items*)*

Other costs:
1st phase: 2 000 euros
2nd phase: 2 000 euros
3rd phase: 2 000 euros
4th phase: 2 000 euros

- ***Deliverables:***

1st quarter: establishment of monitoring plots, baseline monitoring reports of hydrology and plant coverage
2nd quarter: annual monitoring reports of hydrology
3rd quarter: annual monitoring reports of hydrology, 1 report of plant coverage, species and habitats
4th quarter: annual monitoring reports of hydrology, 1 report of plant coverage, species and habitats

E: Public awareness and dissemination of results

***Title of Action E1*: Introduction of project in media, seminars and conferences**

- ***Beneficiary responsible for implementation:***

EB – Environmetal Board
Eesti Loodushoiu Keskus NGO (WE) and RMK)

- ***Description (what, how, where and when):***

In order to get the public informed and promote interest concerning the project good contacts with media will be established. Major actions and events will be represented in the press. At least one press article per project year will be published. Information will also be published at the web site and social media channels.

To promote cooperation and exchange of experience, as well as to acquire the best practices of others, project partners will organize thematic seminars and workshops for international experts and practitioners in their area of responsibility. The experience and results of the project will also be presented at the respective topic international conferences. It is intended to visit 3 international conferences in Europe and to organise one seminar per phase, held in Estonia, which are related to the topic of the project. RMK plans to arrange international wetland conferences every second year, all together 5 conferences for 4000 euros.

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There is produced and presented on public exhibitions and museums an interactive play on the River Emajõgi and its change "What is the Future of the River Emajõgi?" The game gives the people an opportunity to find answers to the questions of the river and its surrounding habitats and their protection and to play through different scenarios of the River Emajõgi in future.

Kommenteeritud [KV2]: See on Emajõe mäng, mis on Loodusmuuseumis. Kui väga vaja, siis selle edasiarendamise töö vajadust võib kaaluda

Currently, the game consists of a physical game board and an interactive side that controls players' activities and enhances environmental awareness (touch screen). In present time, the game is in one copy and can only be played physically in one place.

It would be necessary to create a gaming platform for smart devices so that the educational game reaches a wider audience (including educational institutions).

The existing Alam-Pedja Nature Conservation Area website https://www.kaitsealad.ee/eng/alam-pedja-looduskaitseala is managed by the environmental education specialist of the EB to inform the public about the activities planned and already carried out within the project. The site contains information on the protected area, it's values and restrictions, a news block as well as reports of past activities, memos, etc. A picture bank archives activities in a protected area and has a special value. The website will also be linked to the entire project website and other partners' websites. Although managing a website represents a small part of the workload of an environmental education specialist during the project, its cumulative cost must still be taken into account.

- ***Reasons why this action is necessary:***

It is important to share the experience and knowledge of the LIFE IP project and to disseminate the results as widely as possible at local, regional, national, and EU levels. International conferences for knowledge and experience dissemination are vitally important to reach the next professional level of conservation management

Today, the web is the most powerful information channel and the project activities must undoubtedly be disseminated to the general public.

- ***Constraints and assumptions:***

No constraints are expected.

- ***Expected results (quantitative information when possible):***

The public, local authorities, experts, politicians, decision makers and all other interested parties can get up to date information about the project. 5 international conferences are held. The website provides the public with up-to-date and interesting information on what is happening in the protected area.

- ***Cost estimation:***

Personal costs for 2 senior experts (daily rate 135 euros during phase 1, 143 euros 2nd phase, 152 euros phase 3 and 160 euros phase 4). Also 1 expert from EB for 30 man-days per phase is foreseen for web-page. Travel costs are for visiting the dissemination events in Estonia and 4 international conferences (2 persons, 4 days, 3 times). The production and updating of the interactive game will be covered under the External assistance category. The *Consumables* and *Other costs* include the costs of the organisation of the seminars in Estonia. International conferences are expected to be held for 4000 euros, all together 5 conferences and 20 000 euros.

- ***Cost estimation:***

  Personal costs:

1st phase: 80 man-days 9 750 euros (1 expert (40 man-days); 1 expert (10 man-days); 1 expert (30 man-days) a 100 euros)
2nd phase: 10 450 euros
3rd phase: 11 200 euros
4th phase: 11 900 euros

Travel costs:
*1st phase: 3 000 euros (*dissemination events visits (5000 km, 0,3 eur/km), conference visit
2nd phase: 3 000 euros
3rd phase: 3 000 euros
4th phase: 3 000 euros

Consumables:
1st phase: 1 000 euros
2nd phase: 1 000 euros
3rd phase: 1 000 euros
4th phase: 1 000 euros

External assistance:
1st phase: 20 000 euros

Other costs:
1st phase: 6 500 euros
2nd phase: 7 500 euros
3rd phase: 8 500 euros
4th phase: 5 500 euros

- ***Deliverables:***

1st quarter 2023: Interactive game finished

***Title of Action E2*: Heritage, articles and visitors monitoring**

- ***Beneficiary responsible for implementation:***

ELF - Estonian Fund for Nature

- ***Description (what, how, where and when):***

1) The chapter about the wetland heritage in the restoration plan (activity A5) of Alam-Pedja habitats - in an earlier project (LIFE Estonian Mires), during nature conservation work, we have taken into account the specificities of heritage of local mires and wetlands. In this way, a chapter on wetlands heritage will be compiled for the Alam-Pedja mire restoration plan, using RMK's data about cultural heritage sites, heritage sites and place names database as a source of information from the Land Board's map applications; as well as a map application for memory landscapes in national parks. In periodicals (dea.digar.ee) we will gather references related with more remarkable events, accidents etc. taken place in Alam-Pedja nature protection area (the main attention will be paid to fires and drainage development); several databases from the Estonian Literary Museum will be used. In-depth interviews with local residents will be conducted.

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2) Articles-posters - Based on previous experience, it is a very good way of disseminating information in different types of articles in Estonian-language newspapers and magazines. The articles reflect the material found in the archives, which has been interpreted in a discipline-specific way. There are plans to write both popular science and scientific articles to explain and / or justify the potential and / or necessity of adapting to climate change in different ways.

- ***Reasons why this action is necessary:***

1) The chapter about the wetland heritage in the wetland restoration plan (activity A5) - in order to avoid vanishing or harming mire heritage during restoration activities, the aim is to review the heritage information before the work commences. In the case of a so-called inheritance conflict, additions will be made to the restoration plan, if necessary. At the same time, such a niche also identifies important areas for the local population that need to be emphasized when coordinating restoration efforts.
2) Articles-posters – among experts, kids, nature lovers, and adults, writing different kind of articles is one of the best ways to share gathered information. As the reports are generally not very widespread and intended rather for inter-institutional use, experience has shown that writing articles at both the popular and the scientific level is an important solution. At the same time, these articles are a good opportunity to introduce the collected historical data as a climate effect and to highlight the interrelationships between different disciplines.

- ***Constraints and assumptions:***

1) The chapter about the mire heritage in the Mire restoration plan – there may be lack of information.
2) Articles-posters – there are not remarkable constraints and assumptions.

- ***Expected results (quantitative information when possible):***

1) The chapter about the mire heritage in the Mire restoration plan – at least 3-pages long report about mire heritage in Alam-Pedja.
2) Articles-posters – 6 articles and 1 poster

- ***Cost estimation:***

Personnel: *46 350 euros*
Expert of environmental awareness 208 man-days, from that 127 days x 150 euros/day for the 1st period and 81 days x 190 euros/day II-IV period = *34 440 euros*
Co-expert 30 days x (150 euros/day for the 1st period) and 39 days x (190 euros/day II-IV period) = *11 910 euros*;
Travel and accommodation: 2 100 euros
Collecting data from archives situating in Tallinn and visiting project area-Tartu total (7000 km x *0,3 km= *2 100 euros)*
External assistance: 3 500 euros
Editing, illustrating and printing materials for raising environmental awareness etc. – 200 euros per year * 10 = *2 000 euros*
Consultation related with archaeology, ethnology and content production 10 days = *1 500 euros*
Consumables: 1 400 euros
Collecting data from archives, there is a need for consumables for everyday work (a la laptop).

Personal costs:
1st phase: 157 man-days a 150 euros, total 23 550 euros
2nd phase: 7 600 euros
3rd phase: 7 600 euros

4th phase: 7 600 euros

Travel costs:
*1st phase: 600 euros (*project site visits (2000 km 0,3 eur/km)
2nd phase: 500 euros
3rd phase: 500 euros
4th phase: 500 euros

External assistance:
1st phase: 2 000 euros
2nd phase: 500 euros
3rd phase: 500 euros
4th phase: 500 euros

Consumables:
1st phase: 700 euros (laptop)
3rd phase: 700 euros

- ***Deliverables:***

1st phase:
2022 - 2nd quarter – heritage-chapter for restoration plan,
2022 - 3rd quarter – 1 article is established
2nd phase:
2024 - 2nd quarter 1 article is established,
2025 - 2nd quarter 1 article is established
2026 - 3rd quarter 2 articles are established
3rd phase:
2027 - 2nd quarter 1 article is established
2028- 2nd quarter 1 article and 1 poster is established
4th phase:
2028 - 2nd quarter 1 article is established
2029 - 2nd quarter 1 article is established

- ***Milestones****:*

1st phase: chapter about cultural heritage is ready for mire restoration plan, 1 article is written
2nd phase: 2 articles area done
3rd phase: 3 articles and 1 poster is done
4th phase: 3 articles are done

***Title of Action E3*: Study camps**

- ***Beneficiary responsible for implementation:***

Eesti Loodushoiu Keskus NGO (WE)

- ***Description (what, how, where and when):***

The purpose of the activity is to inform children and young people about the challenges of climate change, ways to mitigate the effects of climate change and specific project activities.
During the camps the problems of climate change and their connection with the Alam-Pedja Nature Reserve will be introduced. In addition, the principles of the nature conservation and Natura 2000

network, the main ways for preservation of the biodiversity, habitats and species and the importance of different activities for the preservation of protected habitats for endangered species will be addressed. This action will include both theoretical and practical session, visiting sites of concrete conservation actions and participation in practical works, where possible, to enable the participants understand what, for which purpose, and how needs to be done, and to actually see the implications in the nature. Presentations will be given about the protection of aquatic habitats and species, and practical field identification will be carried out so that the participants will be able to participate in related field work and will understand the conservation objectives. One 3-day camp for 20-25 participants will be held in the summer seasons every year in the project area (Palupõhja Nature School). As a result of the camps, press will inform public about the activities carried out and the participants are expected to spread their acquired knowledge to their friends and family members. The experts of WE, who have long experience in organizing similar camps and who are operating in the project area will carry through the study camps. The accommodation and catering will be sub-contracted with Palupõhja Nature School (external assistance). The transportation of the participants will be organised by the relevant service provider (external assistance). Some small consumables (fishing gear, medical supplies, fuel for the boat) will be purchased.

- ***Reasons why this action is necessary:***

Action is needed to raise awareness among young people about the challenges of climate change and to identify ways to address the challenges ahead. The participants of the camps as well as the readers-followers-listeners of the resulting press and social media will have an understanding of the climate change mitigation challenges; this will enable them to take more interest in those natural values and better understand and promote the necessity to preserve these ecosystems.

- ***Constraints and assumptions:***

There are no constraints on implementing the action. According the experience, the interest in such an active educational camps, organised at the Palupõhja Nature School is very high.

- ***Expected results (quantitative information when possible):***

As a result of the nine 3-day camps, the participants and wider public have become more aware of the values of the natural habitats and species and the need for activities and the ways to protect the nature and environment. The knowledge of nature and ecosystems and an ability to recognize the natural values has increased.

- ***Cost estimation:***

Personal costs for 3 senior experts (daily rate 135 euros during phase 1, 143 euros 2nd phase, 152 euros phase 3 and 160 euros phase 4). Travel costs are for visiting the camp by experts. External assistance costs include the cost of accommodation and catering of the camps and the transport costs of the participants. Consumables are foreseen for working and fishing gear for the participants. The fuel for the boat will be purchased also from the Consumables.

Personal costs:
1st phase: 30 man-days 4 050 euros (3 expert (10 man-days)
2nd phase: 6 435 euros
3rd phase: 4 560 euros
4th phase: 4 800 euros

Travel costs:
1st phase: 300 euros (project site visits (1 000 km a 0,3 eur/km)
2nd phase: 390 euros

3rd phase: 300 euros
4th phase: 300 euros

External assistance:
1st phase: 2 000 euros
2nd phase: 3 000 euros
3rd phase: 2 000 euros
4th phase: 2 000 euros

Consumable:
1st phase: 500 euros
2nd phase: 500 euros
3rd phase: 500 euros
4th phase: 500 euros

- ***Milestones**:*

3rd quarter 2021: First study camp organised

***Title of Action E4*: Campaign for return of fish tags**

- ***Beneficiary responsible for implementation:***

Eesti Loodushoiu Keskus NGO (WE)

- ***Description (what, how, where and when):***

Various methods of data collection, including fish tagging, will be used in the course of the project's concrete and monitoring actions. In order to increase the interest of both professional and recreational fishermen in the project, campaigns for the return of the fish tags will be necessary. It is also an effective way of disseminating information and communicating within the numerous communities of fishermen and the general public.

In order to collect information about recaptures of the tagged fish from fishermen and anglers a campaign shall be organised according the monitoring plan and tagging activities. It is estimated that at least 3 campaigns will be organised. The information for the fishermen and public about the tagging of fish and other objectives and outcomes of the project will be distributed on special meetings with fishermen and in media (TV, radio, newspapers, social media). The campaigns contain a lottery what will be held among the fishermen who have returned the tags and provided the information about the catches. The best cooperating fishermen who have communicated valuable information shall be awarded. The lottery will raise attention among the fishermen not only to rewards, but also to the objectives and activities of the whole project.

Personal contacts will be held with active fishermen in order to involve the fishermen to the project activities and to collect other information on riverine habitats not covered by the campaign. The campaign ensures higher rate of return of tags. This action is responsibility of senior expert of WE. The tags will be bought from the fishermen (Other costs, 10 euros/pcs). Costs of the lottery organisation: catering costs 450 euros, prizes 1500 euros, main prize - small boat engine – 5000 euros (other costs).

- ***Reasons why this action is necessary:***

To increase public awareness and get additional high quality monitoring information (related to project activity D2). The fishermen and anglers are the main information source and without them it would be impossible to gather relevant information. The campaign ensures higher rate of return of tags.

- ***Constraints and assumptions:***

There are no constraints on implementation of the action.

- ***Expected results (quantitative information when possible):***

2 campaigns held for return of fish tags. 150 fishermen informed, and contacts created.

- ***Cost estimation:***

Personal costs for 1 senior expert (daily rate 135 euros during phase 1, 143 euros 2nd phase, 152 euros phase 3 and 160 euros phase 4). The Other costs include the cost of organisation of the events, fish tags and lottery prizes.

Personal costs:
1st phase: 15 man-days 2 025 euros (1 expert)
2nd phase: 2 145euros
3rd phase: 2 280 euros
4th phase: 2 400 euros

Other costs:
1st phase: 500 euros
2nd phase: 900 euros
3rd phase: 500 euros
4th phase: 5 900 euros

F. Project management and monitoring of project progress

Title of Action F1: Project administration and coordination

Kommenteeritud [KV3]: Kui koordinaatori kuludest loobutakse, tuleb vastava tegevus laiali jagada teiste tegevuste vahel; ilma koordinaatorita kindlasti ei saa – eksperdid ei saa ise ennast juhtida ja erinevate partnerite tegevusi omavahel sünkroniseerida

- ***Beneficiary responsible for implementation:***

ELF – Estonian Fund for Nature
EB – Estonian Environmental Board
RMK – State Forest Management Centre

- ***Description (what, how, where and when):***

The projects manager at ELF (work load 0,5), EB (work load 1,0) and RMK (1 day per month=120 man-days). The main task for the local managers is controlling of the project in the view of technical and financial aspects at the ELF and communicating with the project manager. Using local manager at the ELF secures the correct implementation of the project actions and smooth run of the project. In addition, ELF project manager will assist experts in elaboration of restoration plans, technical design, restoration work, coordinate and participate in monitoring actions, organise networking with other LIFE projects and participate actively in other information dissemination and nature awareness events.

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Project financial assistant (part-time job, work load 0,15) will provide project financial planning, preparation of the current year financial estimates/plans, prepare expenditure estimates of the project measures to be taken. Assistant will also plan requests of travel expenses, will control the accounting supporting documents, payments and the correctness of other financial operations, as well as the existence of documentation and correctness of payments made by project associated beneficiaries, will ensure correct drawing up of the documentation, compliance with the Republic of Estonia laws and EC Common Provisions. Assistant with project manager will check and adjust the planned accuracy of financial project drafted agreements for projects, will ensure verifying and follow up of the correctness of payments within project, including wages and their compliance with cost estimates/plans approved and contracts award within project, will ensure storage and file systematization if the supportive accounting documents related to project and payments. Finally assistant, will prepare financial reports, statements, as well as follow up the reports of project associated beneficiary's and check correctness of associate beneficiaries financial reports. Assistant will control the project's resources compliance with budgeted project costs, participate in the organisation of public tenders, will prepare financial reports to the EC for Inception Report, Progress Reports and the Final attendance of regional kick-off meeting of LIFE program. Experience in finances and EU funded project management is required.

Public relations coordinator (part-time job, work load 0,15) will inform the public about the EC LIFE Programme and the Project actions.

- ***Reasons why this action is necessary:***

The project activities are extensive and diverse, and coordination and control are essential to the planned implementation of the activities.

- ***Constraints and assumptions:***

No constraints are expected.

- ***Expected results (quantitative information when possible):***

The project has been implemented as planned.

- ***Cost estimation:***

Personal costs:
- Project manager (EB), full time job 1,0
- Project manager (ELF), part-time job, work load 0,4
- Financial assistant (ELF), part-time job, work load 0,15
- Public relations coordinator (ELF), part-time job, work load 0,15
- Projects assistant (RMK), part time job to arrange paperwork, arrange meetings and conference (all together 170 man-days a 170 eur, total 28 900 eur)

Travel costs (ELF): 200 travels estimated, including regional kick-off meeting of LIFE program.
Equipment (ELF): 2 lap top computers with software * 2500 = 5000 EUR.
Consumables (ELF): working clothes for project staff 4 * 500 = 2000 EUR.
External assistance (ELF): Translation of materials to English. 100 pages* 30 EUR page = 3000 EUR.
Over costs (ELF, Eesti Loodushoiu Keskus ca 41 000 eur): 7% overheard (to be determined after all activities and their costs have been accepted). Also auditing costs are required if the project auditing is not central, but done by partners?

Personal costs:

1st phase (ELF): 480 man-days a 150 euros, total 72 000 euros
1st phase (EB): 630 man-days a 100 euros, total 63 000 euros
1st phase (RMK): 43 man-days a 170 euros, total 7 300 euros
2nd phase (ELF): 90 000 euros
2nd phase (EB): 65 000 euros
2nd phase (RMK): 7 300 euros
3rd phase (ELF): 90 000 euros
3rd phase (EB): 67 000 euros
3rd phase (RMK): 7 300 euros
4th phase (ELF): 78 000 euros
4th phase (EB): 69 000 euros
4th phase (RMK): 7 000 euros

Travel costs:
*1st phase (ELF): 1 500 euros (*project site visits (5 000 km 0,3 eur/km))
*1st phase (EB): 1 800 euros (*6 000 km 0,3 eur/km))
2nd phase (ELF): 2 000 euros
2nd phase (EB): 2 000 euros
3rd phase (ELF): 2 000 euros
3rd phase (EB): 2 000 euros
4th phase (ELF): 2 000 euros
4th phase (EB): 2 000 euros

Consumables:
*1st phase (ELF): 5 000 euros (*laptop, field equipment)
2nd phase: 0 euros
3rd phase (ELF): 5 000 euros
4th phase: 0 euros

Other costs:
1st phase (ELF): 5 000 euros
2nd phase (ELF): 5 000 euros
3rd phase (ELF): 5 000 euros
4th phase (ELF): 5 000 euros

- ***Deliverables:***

1st quarter: 2nd quarter: 3rd quarter: 4th quarter:

Kommenteeritud [KV4]: Need projektijuhile kohustuslikud väljundid (aruanded jms.) peab määrama projekti koordinaator

- ***Milestones****:*

1st quarter:
2nd quarter:
3rd quarter:
4th quarter: