



LIFE Integrated Projects 2014

Stage 2 – Full proposal

TECHNICAL APPLICATION FORMS

Part C – detailed technical description of the proposed actions

Important notes:

- All calculations and detailed cost breakdowns necessary to justify the cost of each action should be included in the financial forms F. In order to avoid repeating the financial information (with the risk of introducing incoherencies), Part C should only contain financial information not contained in the financial forms (e.g. details explaining how the cost of an action has been estimated).
- All forms in this section may be duplicated, so as to include all essential information.
- Each action described should have a clear indication of its physical target (e.g., action 1 will take place in area "X" and/or will target species "Y"). Whenever this is relevant, the location of these actions should also be identified on one or several maps which must be provided in annex .
- Any action that is sub-contracted should be just as clearly described as an action that will be directly carried out by the beneficiaries.

DETAILS OF PROPOSED ACTIONS

A. Preparatory actions (elaboration of management/action plans, obtaining licences and permits, trainings, etc.)

ACTION A.1: Development of national integrated model for river basin management

Beneficiary responsible for implementation:

SYKE is in charge of action and others participate: LSPH, LUKE, LUVY, MH, OU, POKELY, SMK

Description (what, how, where and when):

Aquatic ecosystem degradation is highly dominated by eutrophication from diffuse loading from agricultural areas, except for headwater areas, where it is dominated by forestry. Loading originated from forestry actions constitutes of nutrients (N, P) and suspended solids related to drainage of peatland areas. The use of wood as biofuel with total removal of tree branch and stumps is currently increasing, and this has raised additional effects related to rapid flush of nutrients to brooks downstream. Therefore, it is essential to manage loading from areas under active forestry with loading calculation models. In this action, models are used to distinguish most sensitive areas and steer water protection measures in a cost-effective way. The changes in agricultural subsidiary system and increased demand for biomass can be assessed with the models (see also Action A2). Final aim is to find an economically sound set of actions, taking into account also the effect of climate change, to keep the nutrient loading of a watershed within the limits allowing good ecological status in water bodies. In this Action A1, the national integrated model systems for assessing loading will be developed, and their use and outcomes demonstrated using data from selected target areas of the project. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into four subtasks:

Task 1: Development of integrated national modelling tool (FEMMA-VEMALA-LLR)

In this task, models currently developed and tested in SYKE (VEMALA, LLR), LUKE (FEMMA) and Metsäkeskus (KUHA) will be linked into an integrated model chain to estimate loading from agricultural and forestry and further to create a tool to steer agricultural and forestry actions and related water protection measures to reduce loading into watercourses (Fig A1_1).

VEMALA simulates nutrient loading from agriculture and other human sources to the inland waters, nutrient transport and retention in lake-river network and loading to the Baltic Sea. VEMALA includes process based description of nutrients in fields, lakes and rivers, and can therefore been applied for estimation of the effect of changing climate and human activities on nutrient loading until the sea. In FEMMA-VEMALA framework the nutrient input to inland waters from forestry and natural leaching is estimated with FEMMA. The LLR tool is applied for estimating nutrient loading enabling good ecological state in lakes. Since the module in VEMALA simulating loadings from agriculture recently has been updated, the main focus in this Task 1 is on developing the forestry part by integrating the process descriptions of FEMMA and KUHA into the overall VEMALA structure.

The integrated model system will allow:

- assessment of loading of nitrogen, phosphorus and suspended sediments from agricultural and forestry areas with various activities and with the effect of climate change
- identification of suitable sites for water protection measures such as constructed wetlands, sedimentation ponds and buffer zones.
- assessment of impacts of different water protection measures and new agricultural subsidy system on ecological status of water bodies.
- assessment of cost-effectiveness of different water protection measures together with KUTOVA tool in Task 3
- normalization of nutrient load in a context of Life Cycle Assessment (=LCA) of a product (i.e. allows site-specific assessment of potential eutrophication of a product)

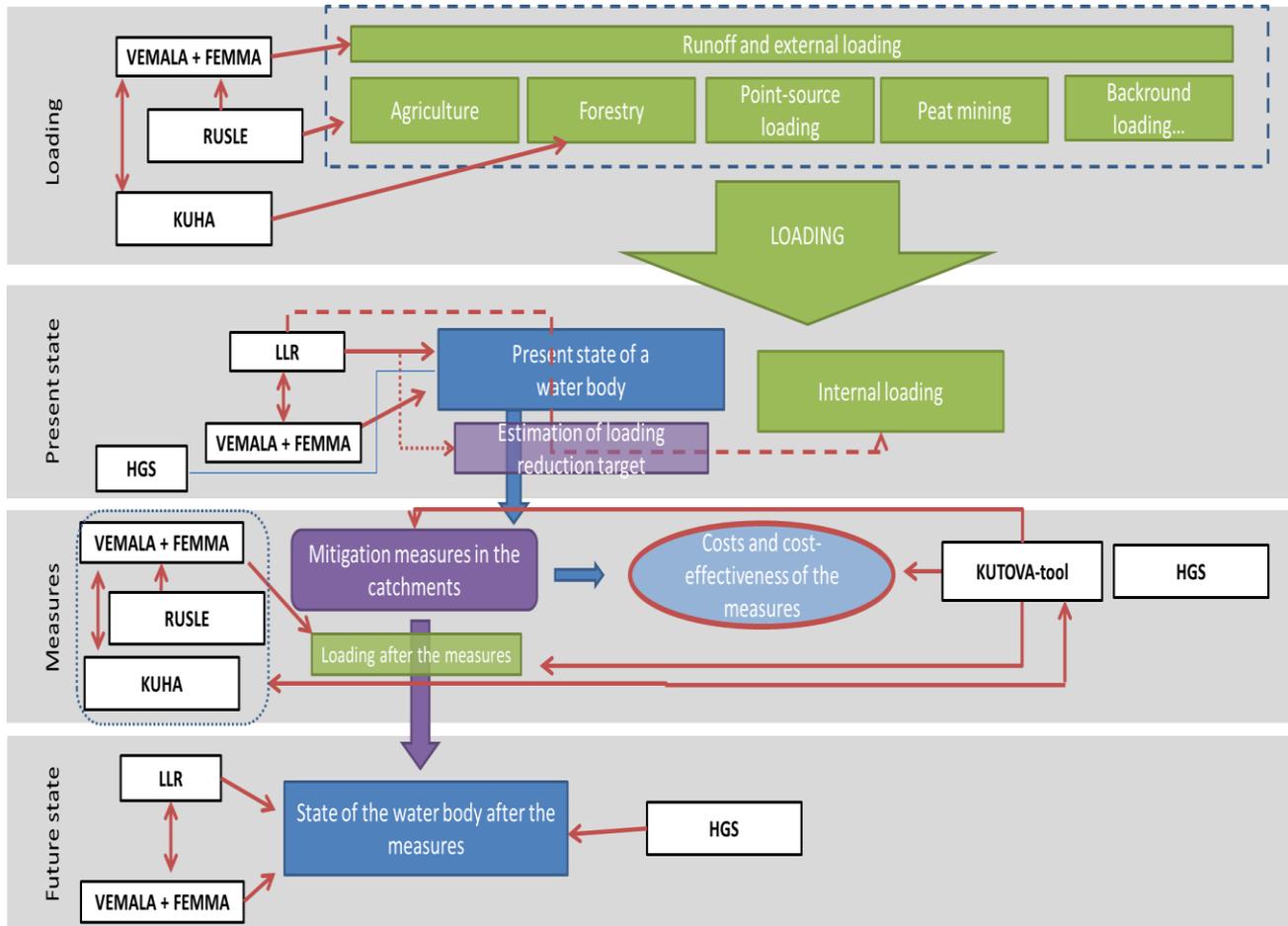


Fig. A1_1. Schematic overview of tools for national integrated model for river basin management.

National integrated model for river basin management will be compiled by combining existing FEMMA, RUSLE, VEMALA and LLR models together (Fig A1_1). FEMMA in this context is a mathematical one dimensional description of water, carbon and nutrient dynamics of forest sites. RUSLE computes erosion of fields at national level on 2m grid. VEMALA simulates water quality and quantity and flux in inland water bodies and to the sea. LLR estimates the nutrient loading limits for good ecological state in a water body. The built national computation system will improve export estimates and increase understanding of environmental effects and the reasons behind them, and enables integrated catchment planning from headwater to the sea. Technically development work consists of two subtasks:

Building hydrological and biogeochemical submodel to FEMMA

Evapotranspiration depends on weather conditions, forest structure and soil water storage. The hydrological submodel will be tested against high-resolution eddy-covariance measurements.

Parameterization and input data processing for FEMMA

Forest structure is parameterized using raster based Multisource National Forest Inventory data, and map based information of soil and site type. Online information about forest management practices is difficult to gain in the required scale. Therefore forest development and management are described as Forest Area Clusters (FAC), which are abstract computational units without explicit location within third order catchments. FACs included the relevant variability of forests age, structure and soil and site types. Forest nutrient loading from FEMMA is connected to VEMALA nutrient transport and retention modelling. VEMALA includes description of the river and lake network, including all 1 ha and larger lakes. Nutrient transport VEMALA includes agriculture, point sources, scattered dwelling and atmospheric deposition. Nutrient loading from agriculture is estimated with integrated ICECREAM model taking into account characteristics of fields, crop, farming actions and fertilization on field plot level (Fig. A1_2).

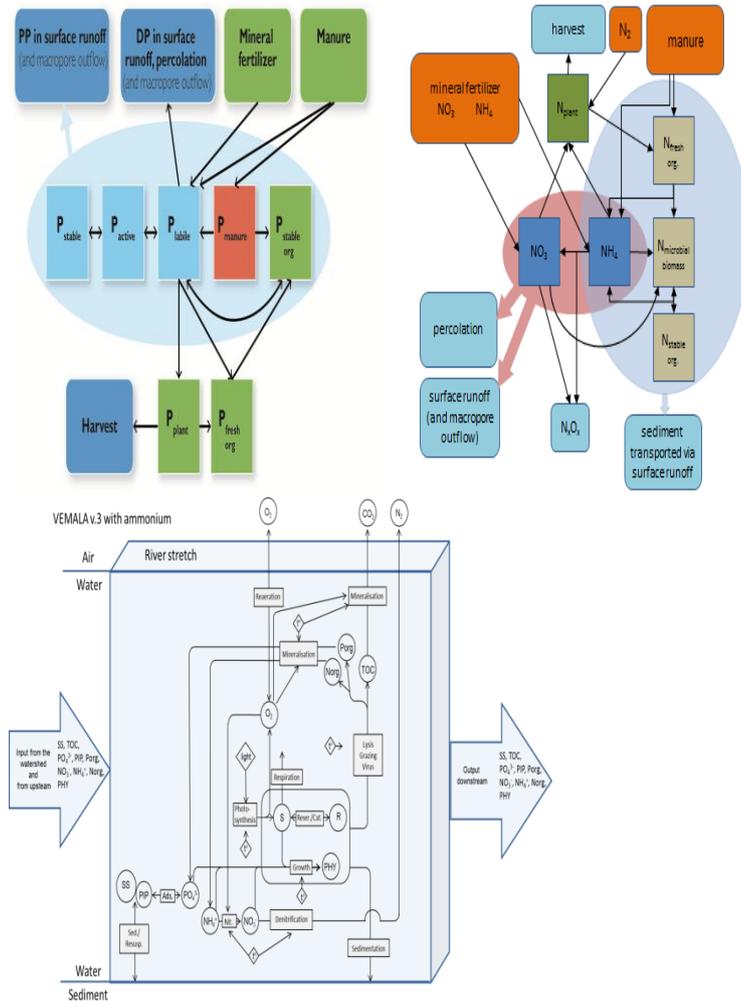


Figure. A1_2v: VEMALA includes description of main nutrient processes on field plot level and in rivers and lakes. Process based simulation of forests and forestry will be included by integrating with FEMMA. RUSLE will provide erosion estimates for fields.

The methodology will be developed and necessary databases compiled in Action A1 during years 2016-2018 (ready by 30.06.2018), and then tested and demonstrated in Action D3 on selected project sites during 2018-2020. The model system will be documented in a report (ready by 30.06.2018) and the system can later be used at other N2000 sites as well in general for river basin management in Finland.

Task 2: Integration of new routines for hydrological modelling

In routinely used hydrological models, water flow processes between groundwater and surface water are commonly treated in simplistic manner. This leaves the potential impact of groundwater in surface water quality and quantity largely unexplored. Nevertheless, forestry operations in particular have been shown to increase both nutrient loading to groundwater and the amount of groundwater recharge. Both processes may be seen in the ecological status of surface water systems in areas where groundwater plays a considerable role in catchment water balance. In current model subsurface water component is based on mass balances and division between different sources (ground water, ditches, soil water) estimated. Similarly, the sequential modeling approach in Task 1 requires heavy simplification of runoff generation processes in 1-D simulations (FEMMA) and subsequent routing of runoff to surface water bodies (VEMALA).

Task 2 introduces physical based, spatially distributed hydrological model software HydroGeoSpere (HGS) to study the runoff generation processes and water retention capacities in detail. HGS uses a fully-integrated modeling approach taking simultaneously into account evapotranspiration, overland

flow, variable saturated subsurface flow, and interaction between the surface and subsurface domains in a single modeling scheme. This enables a detailed and physically more realistic description of water flow processes in the studied catchments.

Fully integrated modeling approach will be used to assist development of model chain in *Task 1* (SubtaskT 2a) and address how water retention measured would impact catchment studied in the project (SubtaskT 2b).

Subtask 2a – Fully integrated hydrological modeling to assist model chain development

Spatially distributed models will be applied to study catchments used in the model chain development in *Task 1*. The models will result in:

- improved conceptual hydrological processes understanding of catchments drained for forestry
- information for importance of groundwater component in stream flow generation
- data that can be used to constrain parameters in the *Task 1* model chain, that are difficult to measure possible identification of anomalous nutrient sources

Subtask 2b – Water retention properties of catchments

Water flow processes need to be considered in an integrated manner when changes in water retention capacity of catchment are evaluated. Water retention capacity is a dynamic and varies especially during stream and catchment restoration. In these actions local groundwater level, runoff and mixing process between surface water and groundwater change which reflect to ecology of area and also to nutrient load and runoff amount to downstream water bodies. The new modeling approach will be developed in one specific area (Isojoki and Karvianjoki tributaries) and further applied in other areas (Puruvesi, Koitajoki) where improved version of VEMALA is applied. During the project, in Isojoki and Karvianjoki tributaries several actions have been planned:

- restore previously drained peatlands
- construct water protection structures (sedimentation basins, wetlands etc.) for forestry
- elevate lake water table
- restore degraded stream stretches

Two of those cases will be chosen for HGS modeling.

Overall the aim is to better understand effects of catchment restoration on dynamic of water retention capacities in the catchment scale, especially on water storage capacity of peatlands (pristine, drained or restored) which is poorly known and processes inadequately taken into account in previous version of VEMALA model. Development of these nationally widely used models is important and offer more efficient and adequate tool to local environmental authorities and consultants in river basin management and in improving ecological status of water bodies under Natura 2000 networks.

Task 3: Assessment of cost-effectiveness of measures

Water protection measures are usually expensive and structures needs continuous maintenance to work properly. Therefore it is essential to plan measures carefully and assess the cost-effectiveness of measures with appropriate approaches. Effect of water protection measures under different management scenarios will be computed using the Integrated national modelling tool for river basin management (Fig. A1_1). In this task existing tools such as the KUTOVA-tool are further developed to calculate more properly the costs and efficiency of water protection measures. KUTOVA will be integrated to other modelling framework.

The cost effectiveness of different water protection strategies will be assessed through scenario analysis. Water protection measures, with the extent and amount, and their costs will be recorded and located to the input data base. The benefits gained with the planned and implemented measures are computed using with successive computations using FEMMA-VEMALA-LLR model (input from Task 1).

Key activities in this task are:

- collecting and processing existing tools for cost efficiency measurement
- integrating calculation models to loading and status assessment tools.

The established model framework is applied in at least two pilot areas and further is applicable in other parts of Finland after calibration. Action D3 will produce proposals for cost-effective sets of measures to keep the nutrient loading within limits of good ecological state under different forestry, agricultural production and climate change scenarios.

Reasons why this action is necessary:

Assessment and further improving ecological status of water bodies under Natura 2000 networks is essential to improve favorable status of protection. Integrated modelling approach with new tools of cost efficiency analysis is therefore the central role to focus restoration measures on correct targets. In Finnish nature it is essential to manage loading from areas under active forestry with loading calculation models and to distinguish most sensitive water bodies. The Finnish Priority Actions Framework (PAF) for Natura 2000 also states that: "In many localities artificial obstructions in rivers and streams and excessive loads of nutrients and solids are the most significant problems facing the habitats of threatened and vulnerable migratory fish populations" Concrete tools are needed to facilitate solutions to environmental loading and steer management by effective way.

Constraints and assumptions:

No significant constraints are predicted. The action is based on already existing models, with common parameters and known developers. The formulation of common interfaces and data exchange platform is a demanding task, but can be dealt in common pilots. Another real challenge is the task to produce internet based tool and platform for models with results fully available also for public. The package has to rely on technical and scientific data but the information must be available in such a format that ordinary users can access and apply it.

Expected results (quantitative information when possible):

Advanced integrated model system for river basin management improves export estimates and increase understanding of environmental effects and the reasons behind them, and enables integrated catchment planning from headwater until sea. It enables systematic comparison of different water protection strategies from cost-effectiveness point of view. The computational river basin management will be demonstrated at selected test sites. The tools will be documented.

- Demonstration of model and tool performance at selected test sites
- Project reports and publications documenting tools and applications
- Demonstration of model application for creating feasible action scenarios for achieving good ecological state in water bodies under Natura 2000 network (D3)

Cost estimation:

This action requires extensive amount of work from experts from different field from the research institutions and universities as various models need to be merged into a new coherent operational model. The cost is divided between 7 beneficiaries (SYKE, SMK, LUKE, MH, OU, POKELY and LSPHä). The personnel cost are divided to several people with substantial efforts from modelling and load experts from SYKE, SMK, LUKE and OU. The personnel costs are divided into all phases with a clear emphasis on phases 1 and 2. For the first phase the permanent staff linked largely to modelling and GIS experts are in total 1 621 days (478 802€) and temporary staff will include modelling experts, analysts and field workers and is estimated at 773 days (223 013€). The personnel costs for the latter two periods is 773 days (223 013€). The total personnel cost is therefore 882 470 €. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff. The personnel cost estimation is based on experience from previous projects with similar kind of actions in which modelling work on real data has been done.

The action also includes travel costs to the test sites as the functioning models needs data and is an iterative exercise. The travel for the first period totals 33 905€ and for the latter 2 periods 58 248€. The total travel cost (91 434€) is based on state travel rules for all beneficiaries.

The external assistance cost totalling (10 600€) include GIS programming to link various GIS data bases (10 000€) and minor sampling costs (600 €). Also field data recorder (4 500€) will be purchases. In addition consumable material costs totals 5 884€. The cost estimations are based on previous informantion on similar cost and internet checking for price level of the required equipment.

The total cost for the action is 994 797€.

Deliverables:

- Report on national integrated model for river basin management (31.12.2017)
- Application of national integrated model for river basin management (31.12.2018)
- Application of improved detailed hydrological model linking groundwater and surface water in brook and wetland restoration (30.09.2022)

Milestones

- Detailed plan for national integrated model for river basin management ready (30.06.2016)
- Database for integrated modelling of national integrated model for river basin management ready (31.12.2016)
- First applications on national integrated model for river basin management pilot areas to be applied ready (30.6.2017)
- First application of improved detailed hydrological model linking groundwater and surface water in brook and wetland restoration (31.12.2021)

ACTION A.2: Development of scenario based model and indicator systems for assessing ecosystem services and sustainability

Beneficiary responsible for implementation:

SYKE is in charge of the action and others participate: LUKE, SMK, UHELL_LBS, POKELY, ProPuru

Description (what, how, where and when):

In terms of causing ecosystem changes, agricultural areas are remarkably dynamic and diverse. The Rural Development Programme for Mainland Finland (RDP) was introduced in 2015. The new programme follows the greening approach of the CAP reform. The objective is to maintain and develop valuable open, cultivated agricultural landscape and natural meadows and pastures, regardless whether they are used for food production, renewable energy, or managed without cultivation. The aim is to reduce the harmful environmental impacts of agricultural activities on the soil, surface and ground water and air by promoting the use of environmentally-friendly practices and taking care of growing conditions. More than 81% of agricultural land is expected to come under management contracts to improve water management.

Ecosystems, under influence of rural and agricultural activities, generate a range of goods and services important for human well-being, collectively called ecosystem services (ES). Over the past decades, progress has been made in understanding how ecosystems provide services and how service provision translates into diverse benefit and economic value. Nonetheless, the losses of ES continue more rapidly than ever due to changes in global change drivers, such as changes in land-use, pollution and climate, as well as their interactions. In this Action A2 model and indicator systems for assessing ES for freshwater ecosystems will be developed and their use and outcomes demonstrated using data from selected target areas of the project, including scenarios based on alternative implementation activities of the RDP. The key challenge in this action is to build up integration between enhancing and utilizing nature based ecosystem services and build up a value addition to final products. In practice this would lead to a specific merit to products which come from nature enhancing production system. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into four tasks:

Task 1: Development of an integrated model system for ecosystem service and sustainability assessment in future agri-environmental context

In this task, detailed process and sustainability performance models developed and tested in other projects of SYKE and LUKE, will be linked into an integrated model chain to allow quantification of main ecosystem freshwater services and assessment of different loading scenarios from agricultural practices including changes in agricultural subsidies and changes in agricultural technology. Thus, this Task 1 of A2 is closely related to Action A1, which gives general modeling platform and feeds ES models, but focus is clearly on the smaller spatial scale (field, smaller catchment), detailed scenario and impact assessment, and quantification of ecosystem services and sustainability performance. Due to central role of agriculture originated loading, detailed development work is focused on assessment of different loading scenarios from agricultural practices including changes in agricultural subsidies. The agricultural subsidiary system is renewed in Finland in 2015, and the evaluation of these measures will be one of the modelling tasks to be conducted. For example, one new subsidy is greening, which requires keeping the permanent grass, polycultural farming and creation of ecological areas.

The different models and their linkages are shown in Figure A2_1. The integrated model system will allow:

- assessment of loading of nitrogen, phosphorus and suspended sediments from agricultural fields assuming different scenarios for agricultural production
- identification of retention areas for nutrients (nitrogen, phosphorus) and suspended solids
- planning of reduction measures for nutrient release
- assessment of impacts on habitats of sensitive/protected freshwater species (trout, river pearl mussel)
- analysis of sustainability performance of different agricultural products
- a quantitative assessment of key ecosystem services (provisioning, regulation/maintenance and cultural services), using an integrated assessment framework developed in the EU/MARS-project

The methodology will be developed and necessary databases compiled in Action A2 during years 2016-2018 (ready by 30.06.2018), and then tested and demonstrated in Action D3 on a selected project site (Karjaanjoki) during 2018-2020. The model system will be documented in a report (ready by 30.06.2018) and the system can later be used at other N2000 sites in Finland and elsewhere in Europe. The approach and results on the ecosystem service and sustainability assessments will also be documented in reports (see Action D3).

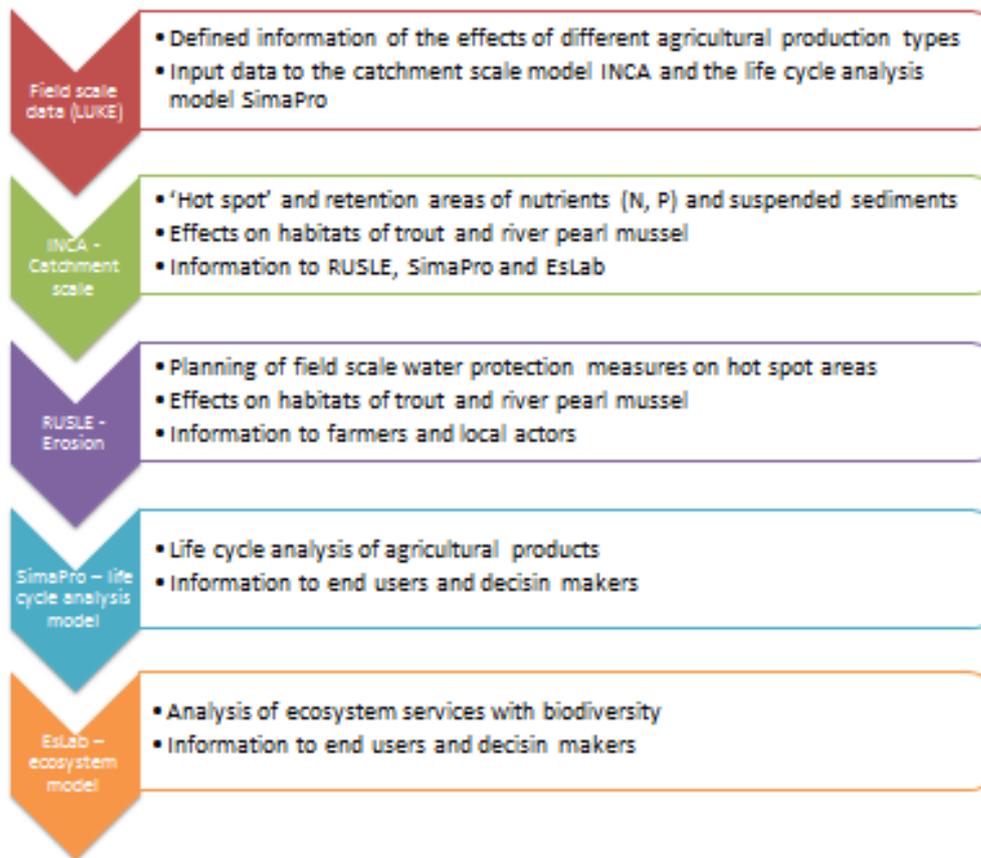


Figure A2_1. Integrated model framework for ecosystem service and sustainability performance assessment, including main information products to different users.

Task 2: Development of freshwater indicators of national biodiversity and ecosystem service indicator system

SYKE is maintaining the www.biodiversity.fi information system where a wealth of research based information on the state and development of nature in Finland is compiled and continuously updated. Biodiversity.fi includes more than 110 indicators reflecting the state and development of various components of biological diversity as well as factors driving changes in Finland's nature, and a framework for 112 indicators describing the social-ecological sustainability of national key ESs. Biodiversity.fi has been developed in close cooperation by Finnish environmental research and non-governmental organisations. The system has been a key information source for the Finnish national reports of the Convention on Biological Diversity (CBD). The focus of biodiversity.fi has so far been on biodiversity indicators but due to the strong emphasis of the PAF on ES, a new subsystem on ES is now under development: www.biodiversity.fi/ecosystemservices/home.

In Task 2, an expert group will:

- assess relevant information available for developing ES for freshwater systems
- develop suitable BD and ES freshwater indicators
- test the indicators using information of the FRESHABIT-project

The approved and tested indicators will then be included in biodiversity.fi by the information management team by the end of year 2018. These indicators can then be used for CBD reporting and in work of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The system also serves as an example for ES reporting for other EU-countries as well. The work will be documented in a project report (ready by 31.12.2017).

Task 3: Assessment of vulnerability and ecosystem impacts at selected N2000 sites using long-term ecosystem data

The impacts of global change drivers (climate change and changes in long-range transported air pollutants) on the vulnerability and ecosystem services of sensitive N2000 sites will be demonstrated in this task. Both climate change and air pollutants are key threats to both ecosystem services and biodiversity which can be assessed using long-term data from intensively monitored and instrumented N2000 sites. Data of the sites Hietajärvi (located in the catchment area of the FRESHABIT area Koitajoki) and Valkea-Kotinen (Vanajavesi catchment) will be collected and used. These sites belong to the Integrated Monitoring network aimed at monitoring and detecting long-term impacts of air pollutants and climate change (www.syke.fi/nature/icpim). The international Programme Centre of this network is at SYKE. Key activities in this task are:

- collecting and processing data from key ecosystem compartments of the sites
- quality control and analysis of the data
- set-up of ecosystem indicator and model systems

The compiled database and prepared indicator and model systems in this preparatory action will then be used in Action D3 to produce two separate assessment reports documenting the methodology and global change impacts at these sites. The work will update the work done and documented in two previous reports from these sites (The Finnish Environment 59/2006 and 34/2011). The work will demonstrate detailed impact assessment that can be conducted at similar N2000 sites elsewhere in Europe. The main products of this Task 3 are the verified catchment data bases which will be ready by 30.06.2020.

Task 4: Assessment of ecosystem services in biosphere reserves and wetlands

Restoration of degraded ecosystems is expected to improve the state of many ecosystem services. However, the examples showing these effects on mires and peatlands, and in connection with adjacent freshwater areas are scarce. In this task we will use Koitajoki catchment in the North Karelia Biosphere reserve as a demonstration area. In the same area some intensive restoration will be done during the FRESHABIT project and the ES impacts of these field works will be projected for the future. Data of ESs of mires and peatlands in this area has been partially collected in previous studies, and in addition to that extensive remote sensing and GIS data sets of ecosystems, biodiversity, land cover and land use are available from SYKE and other partners. Intensity of management and harvest of different natural resources (i.e. for forestry, peat extraction, ditching, mining, recreation etc.) may have varying impacts on co-production of several ESs. We will analyze how different land use scenarios can affect to the bundles of key ES of the area in the future, and how competing land use forms could be fit together.

Key activities in this task are:

- assessing the effects of current restoration and past land use change on ES (mires and adjacent freshwaters);
- analyzing the interactions of natural resource management and extraction from the point of use of ESs in the North Karelia Biosphere reserve;
- recommendations for taking BD and ESs of mires, peatlands and freshwater into account in natural resource management

The main product of this Task 4 is an assessment report which will be ready by 31.12.2019.

Reasons why this action is necessary:

Assessment of ES is a prioritized action in the Finnish Priority Actions Framework (PAF) for Natura 2000, where a key vision is that the favorable status of biodiversity and ecosystem services will be ensured by 2050. This requires ES methodologies to be developed, tested and demonstrated. The PAF also states that: "The Finnish Government will base policy actions promoting the conservation and sustainable use of biodiversity on cross-cutting practices in society, while also ensuring the availability of a knowledge base for such actions and reinforcing the dissemination of information among citizens and decision-makers, for instance, by bringing the concepts of ecosystem services and the ecosystem approach into wider functional use". Concrete actions on this topic are listed in the PAF actions 5-11,12-19 and 24: "Implement measures to achieve the global restoration target of

15% and maintain and improve the production of ecosystem services (develop criteria, restoration methods, and monitoring)". The work is also relevant for the Finnish contribution to the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES).

Constraints and assumptions:

No significant constraints are predicted. The team of the Action is based on already existing cooperation, having close links to the local authorities. The formulation of a coherent data management approach for multi-disciplinary information is a challenge to face and solve in this type of collaborative project. Another real challenge is the task to produce internet based environmental information for local and regional end-users and the general public. The package has to rely on technical and scientific data but the information must be available in such a format that ordinary users can access and apply it.

Expected results (quantitative information when possible):

- Advanced documented integrated model system for ecosystem service and sustainability assessments.
- Updated national ecosystem service and biodiversity indicator system for freshwaters (biodiversity.fi).
- Demonstration of model and tool performance at selected test sites (see also D3).
- Project reports and publications documenting model tools and applications (see also D3).
- Assessment of long-term ecosystem impacts of climate change and air pollutants at selected N2000 sites (indicators, reports, publications, see also D3).

Cost estimation:

This action requires extensive amount of work from ecosystem service and climate change experts mostly from SYKE, LUKE and SMK. Also UHEL LBS along with POKELY, ProPuru are involved in this action with less costs. The personnel costs include mostly modelling and GIS experts and field and laboratory workers. The permanent staff costs for the first phase totals 377 days (120 012€) and for the temporary staff 808 days (229 098 €). For the latter phases the cost are estimated to 229 945 €. The total personnel costs are estimated at 579 055€. Majority of the personnel costs is divided between the experts from SYKE, SMK and LUKE. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff. The personnel cost estimation (time required) is based on experience from previous projects with similar kind of actions in which modelling and assessment work has been done.

The action also includes travel costs to the test sites as the functioning models needs data and is an iterative exercise. The travel costs for the first period are 28 246€ and for the remaining periods 27 816€. The state travel rules for reimbursements are used for calculating the travel costs.

The external assistance costs totalling 27 000€ are linked to water sampling (12 000€) and to aerial photo ja history data analysis and interviews at Puruvesi (15 000€), The water sampling costs are based on list prices of the water sampling laboratory and history data costs for estimation on work effort needed to compile the required information (app. 4 months).

The equipment cost include data loggers (4 600€ á 2 300€). The price estimation is based on internet checking for suitable devices. The consumable materials include sampling consumables totalling 22 600€.

The total cost for the action is 689 317€.

Deliverables:

- Report on integrated model framework for ecosystem service assessment and sustainability assessment (30.06.2018)
- Report on ecosystem service indicators for biodiversity.fi portal (31.12.2017)
- Report on ecosystem services in North Karelia Biosphere reserve (31.12.2019)

Milestones:

- Database for integrated modelling of ecosystem services ready (30.06.2018)
- ES indicators included in biodiversity.fi portal (30.06.2018)
- Database for Hietajärvi site (Koitajoki) for the assessment of long-term impacts of global change ready (30.06.2020)
- Database for Valkea-Kotinen site (Vanajavesi) for the assessment of long-term impacts of global change ready (30.06.2020)

ACTION A.3: Preparation and planning for site management and restoration**Beneficiary responsible for implementation:**

SYKE, GTK, MH, SMK are in charge of action and others participate in their respective project areas: LAPELY, EPOELY, LSPPo, VARELY, LUVY, Raase, VVK, KES-ELY, Saari, POKELY, ESAELY

Description (what, how, where and when):

Action A3 includes all the preparatory work needed before the restoration of freshwater habitats and their catchments in C Actions can be implemented: collection of the necessary background data, surveys of target species, and technical documentation including plans and permits. Furthermore, stakeholder negotiations ensure a true integration of the variable needs and goals and encourage support for the actions from all parties involved. In the planning process the restoration actions will be targeted, prioritized and scheduled in detail based on the available background information, stakeholder negotiations, and visits to the sites. Furthermore, the restoration plans specify in detail the actions (where, when and how) and the required resources (time and costs). Some restoration sites already have up-to-date plans which will be utilized, but for most sites new plans have to be made.

Restoration actions of FRESHABIT are part of an iterative process of the development and testing of the “Integrated multi stakeholder planning for catchment area management of N2000 areas” in Actions A1 and A10. Furthermore, the preparatory actions listed below, and the corresponding concrete actions are scattered over a long period of FRESHABIT. Action A3 is divided into three tasks:

Task 1: Collecting background data for ecological and hydrochemical variables, and cultural heritage

All target areas have been subjects to earlier research and monitoring projects, where data on various ecological indicators (e.g. benthic macroinvertebrates, freshwater mussels, fishes, birds, vegetation, and habitat types), water quality, and cultural heritage has been collected. When necessary, new supplementary field data will be collected. All relevant data will be collected and utilized in all project areas where Actions C1-C9 are executed. The task will be completed by the end of 12/2018.

Task 2: Technical restoration plans and permits

Using the information gathered in Tasks 1 and 2, the regional associate beneficiaries in charge of their region’s actions prepare or buy as external services the general (which areas are optimal for implementing the actions) and detailed (technical plans, timing and costs) plans, and, when necessary, applications for legal permits. Below are details on plans and inventories for C-actions in project areas.

- Karjaanjoki
 - Plans: General plan for in-stream restoration in 2017
- Kiskonjoki
 - Plans: Plans for 2 fishways (Koski, Hålldam)
- Vanajavesi
 - Inventories: Cultural heritage value inventory in 2016 in all restoration areas
 - Plans: Restoration plans for 6 bird lakes between 2016 and 2019, restoration plan for 2 headwater lakes by 2018

- Keski-Suomi
 - Plans: Restoration plan for Haapasuo peat mining area in 2018 and for peatlands in Kivijärvi in 2019, restoration plans for three bird wetlands (Ylin, Peuralampi and Kilpilampi) in Saarijärven reitti between 2016 and 2020
- Pohjanmaa
 - Inventories: Supplementary nature and cultural heritage inventories in Karvianjoki in 2017
 - Plans: Technical plan for dam removal, subsequent restoration actions and flood control of the Villamo in 2016. Restoration plan of bird wetlands in Isojoki and 2 restoration plans for peatland restoration in Isojoki in 2017, Restoration plan of bird wetlands in Ähtävän joki in 2018;
- Puruvesi
 - Plans: Plans for water protection measures for all 5 catchment areas of Puruvesi in 2016
- Koitajoki
 - Plans: 5 plans for water protection and in-stream restoration measures in Lähevaara, Kuikkalammin- and Apsonlamminsärkät areas, River Kelsimä, the areas between Mekrijärvi Village and the peat production area of Riihisuo and Hattuvaara-Tiitanvaara-Marjovaara areas by 9/2019 and 8 mire restoration plans Koivuluhdansuon in 2016, Kesonsuo and Mykränsuo in 2017, Kesonsuo ravines in 2018 and privately owned parts of Kesonsuo ravines and Siltasuo and seven main channels in Kesonsuo in 2019
- Naamijoki
 - Inventories: Cultural heritage value inventory in 2016
 - Plans: Restoration of canals at Teuraoja and Kivijärven oja in 2017+ increasing the water level of Teurajärvi in 2018

Task 3: Survey of HD mussel species in restoration areas

Freshwater pearl mussel *Margaritifera margaritifera*; FPM) and thick shelled river mussel (*Unio crassus*; TRM) are specific target species of Action C9 in Karjaanjoki and Kiskonjoki areas. In addition FPM has been recorded in areas of Isojoki, Ähtävänjoki and Karvianjoki where river restoration Actions C1-C6 will be implemented. In these areas, and within suspected impact area of restoration activities, the HD mussel species will be mapped by diving in larger rivers and streams, or by wading and aquascoping in small streams to prevent disturbance caused by in-stream or catchment restoration. When found, mussels will be transplanted if necessary, as described in Action C9. The task will be completed by the end of 12/2018.

Permits for freshwater mussel conservation in C9 are applied before the start of the project. Planning and construction of visitor facilities are implemented as external services and fully included in Action C11. Concrete conservation Actions C10 and C12 do not require technical planning or permits.

Reasons why this action is necessary:

The collection and analysis of background data is essential for planning, restoration, and assessment of the projects impacts on e.g. biodiversity and the ecological status of water bodies. Detailed restoration plans and technical plans for fishways resulting from Action A3 are required for implementing restoration and management actions and building fishways in Finland, and they guarantee that the restoration actions will be implemented according to the highest standards. Technical plans also provide the means to monitor implementation of the actions. Changing the level of water in a water body, dredging actions when volumes exceed 500 m³, and building fish passages require legal permits by the Finnish Water Act.

Constraints and assumptions:

Collecting, storing and analyzing all the relevant background data and carrying out stakeholder negotiations are demanding and time-consuming tasks. FRESHABIT, however, has involved competent regional partners who are aware of the relevant sources of information and have the

means and resources to handle the data. Acquiring the legal permits sometimes takes long time and this may delay the preparation of actions C3 and C7.

Expected results (quantitative information when possible):

- Sufficient background data for concrete conservation actions
- Cultural value inventories in Karvianjoki, Vanajavesi and Naamijoki
- Occurrence of the HD mussel species is sufficiently known in the impact areas of C actions
- Restoration/technical plans for Karjaanjoki (1), Kiskonjoki (2), Vanajavesi (8), Keski-Suomi (5), Pohjanmaa (5), Koitajoki (13) Puruvesi (5) and Naamijoki (2)
- Legal permits for actions C3 and C7.

Deliverables:

- Technical plan for dam removal, subsequent restoration actions and flood control of the Villamo in 2016 (31.01.2016)
- Fishway plans for Kiskonjoki (Koski, Hålldam) (31.12.2016)
- Restoration plan for peatlands in Koivuluhdansuon (Koitajoki) (31.12.2016)
- A plan of measures to decrease sedimentation loads and the effect of acid sulfate soils, through water protection measures in forestry in Ähtävänjoki (31.03.2017)
- Report of the historical and current distribution of freshwater pearl mussels in the Karjaanjoki area (31.12.2017)
- Restoration plan for canals at Teuraoja and Kivijärven oja (Naamijoki) (31.12.2017)
- Report of the current distribution of freshwater pearl mussels in the Karjaanjoki area (31.12.2017)
- General plan for Karjaanjoki river system in-stream habitat restoration (31.12.2017)
- Restoration plan of bird wetlands in Isojoki (31.12.2017)
- Restoration plans for peatlands in Kesonsuo and Mykränsuo (Koitajokil) (31.12.2017)
- 2 restoration plans for peatland restoration in Isojoki (31.12.2017)
- Plan for increasing the water level of Teurajärvi (Naamijoki) (31.12.2018)
- Restoration plan of bird wetlands in Ähtävänjoki (31.12.2018)
- Restoration plans for headwater lakes (2) in Vanajavesi (31.12.2018)
- Restoration plan for Haapasuo (Keski-Suomi) (31.12.2018)
- Restoration plan for peatlands in Kesonsuo ravines (Koitajoki) (31.12.2018)
- Restoration plan for peatlands in Kivijärvi (Keski-Suomi) (31.12.2019)
- 5 plans for water protection and in-stream restoration measures in Lähevaara, Kuikkalammin- and Apsonlamminsärkät areas, River Kelsimä, the areas between Mekrijärvi Village and the peat production area of Riihisuo and Hattuvaara-Tiitanvaara-Marjovaara areas (Koitajoki) (31.12.2019)
- Restoration plans for six bird lakes in Vanajavesi (31.12.2019)
- Restoration plans for peatlands in privately owned parts of Kesonsuo ravines and Siltasuo and seven main channels in Kesonsuo in 2019 (Koitajoki) (31.12.2019)
- Restoration plans for three bird wetlands (Ylin, Peuralampi and Kilpilampi) in Saarijärven reitti (30.9.2020)

Milestones:

- Cultural heritage value inventory ready in Naamijoki and Vanajavesi (31.12.2017)
- Restoration plans ready in Puruvesi (31.12.2016)
- Cultural heritage value inventory ready in Karvianjoki (31.12.2017)
- All background data gathered, analyzed, and utilized (31.12.2018)
- Occurrences of HD mussel species sufficiently surveyed (31.12.2018)
- Restoration plans ready in Naamijoki and Pohjanmaa (31.12.2018)
- Restoration plans ready in Vanajavesi (31.12.2019)
- Restoration plans ready in Koitajoki (31.12.2019)
- Restoration plans ready in Keski-Suomi (30.9.2020)
- Legal permits acquired for C3 and C7 (31.12.2020)

Cost estimation:

The plans are needed for various concrete conservation measures. Majority of plans will be compiled in the first phase of the project and only small number of plans will be made during second or third period.

The planning cost are divided between 13 beneficiaries (EPOELY, VARELY, ESAELY, POKELY, LAPELY, KESKELY, SYKE, SMK, MH, LUKE, Saari, LUVY, GTK). The plans are partly done by the project personnel and partly outsourced. The personnel cost totals 454 269€. The permanent staff costs of nature conservation, water management experts for the first period totals 471 days (127 791€). Temporary staff (781 days, 177 048€) are needed for mostly for field work related to the plans. The personnel cost for latter periods is estimated at 149 430 €. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff. The total personnel cost are 454 269€. The personnel cost estimation (time required) is based on experience from complining similar kinds of plans by the beneficiaries.

The travel costs are estimated at 81 603€ of which 56 757€ are used in the first phase and 24 846€ at the remaining phases. The state travel rules for reimbursements are used for calculating the travel costs.

The external assistance cost are related to preparation of the plans and/or various kinds of inventories needed for the plans. The costs range between 3 000 – 20 000€ per plan/inventory. The total external assistance cost for the first period is 333 601€ and for the remaining phases 77 200. The cost estimations are based on previous cost for similar plans/inventories and they are in line other LIFE projects with similar restoration plans.

The equipment cost (7 500€) include field laptop (terrain computer) and level-laser device for measuring altitude. The costs are based on internet checking for suitable devices. The consumables needed for sampling and inventories are estimated at 2 030€.

The other costs include substantial costs for environmental permits (50 000€). The permit cost estimations are based on previous permit prices. Other cost also include mandatory compensations for using own field equipment (3 040€, 76 days á 40€).

The total cost of the actions is 1 009 243€.

ACTION A.4: Elaboration of site and catchment management plans**Beneficiary responsible for implementation:**

SYKE, MH, SMK are in charge and others participate in their respective project areas: EPOELY, LUVY, LSPH, ESAELY, KESELY, JAMK, LSPHä

Description (what, how, where and when):

This Action A4 builds upon the information collected in action A3, and demonstrates the Task “*Integrated multistakeholder planning for catchment area management of N2000 areas*” in action A10. The action comprises both standard Natura 2000 area management plans, and wider catchment area plans around Natura 2000 areas. The action directly supports the implementation of the Priority Action Framework for Natura 2000. Action A4 is divided into two subtasks:

Task 1: Elaborating management plans for N2000 areas

Management plan for a Natura 2000 area is a strategic plan that provides a framework for the long-term adaptive management of the areas. Its objective is to harmonize nature conservation with other land use interests to achieve the objectives of the protected area. The management plan directs concrete conservation and management actions, whilst taking into consideration other uses of the area, such as recreational use. Different forms of land use will be described and their possible impact on the Natura site assessed. Public participation and communication are an essential part of the planning process.

Management plan is drafted by a project group consisting of specialists in land-use planning, species and habitat ecology and conservation, and recreational use. Participants include representatives of MH, the Regional Centre for Economic Development, Transport and the Environment (ELY Centre), and the parties using the area. The plans are drawn up according to the principles of participatory planning. Management plans will be approved before the end of the project according to the prevailing legal procedures. MH is the competent authority in charge of implementing the management plans in the state-owned areas.

Management plans are prepared for two Natura 2000 areas in the Vanajavesi region (Ormajärvi-Untulanharju, FI0325002 and Ansionjärvi, FI0305003) and one in the Päijänne region (Arvajanreitti, FI0900101). The management plans in Vanajavesi will target 100% privately owned areas. The plans will be made in close co-operation with land owners. The planning is done mostly as voluntary work with the guiding from LSPHä. The aim is demonstrate how MPs can be in new light way for privately owned areas.

Task 2: Regional water protection plans (RWPP)

While the standard management plans apply only to the targeted Natura 2000 sites, pressures on those areas often result from human impact around them. This is especially important for freshwater Natura 2000 sites, where environmental loading from their catchments and upstream-downstream effects of processes (e.g. nutrient loading, fish migration) are prone to have an impact on the status of the area. Also the results of the actions A1 and A2 will be used for preparing the plans.

The regional water protection plans (RWPP) in this action A4 implement the multi-stakeholder planning approach that is in the core of FRESHABIT. RWPP are established in the interface of protection of nature and water, and sustainable use of the natural resources in and around freshwater habitats. RWPP are extensions of river basin management plans and part of the programme of measures according to WFD. Regional water protection planning around Natura 2000 areas is demonstrated in the following target areas:

- Isojoki: Multifaceted and broad plan for the use and protection of the whole Isojoki river catchment, enclosing the Natura 2000 site “Lapväärtinjokilaakso” (FI0800111). Completed by the end of 12/2020.
- Karjaanjoki: General catchment area restoration plan for improving the water quality and conservation status of the Natura 2000 site “Karjaanjoki” (FI0100023). Completed by the end of 12/2017.
- Saarijärven reitti: Regional water protection and management plan for river basin enclosing the target Natura 2000 site “Saarijärven reitti” (FI0900025). Completed by the end of 12/2019.
- Naamijoki: Regional water protection and management plan for river basin. Completed by the end of 2016

Reasons why this action is necessary:

This action A4 is directly targeted to implementing the PAF strategic conservation objective for finding solutions at the level of entire catchment areas. While this principle is applied in practice in all of the target areas of FRESHABIT, the demonstrations applied in this action will produce case study reports that serve as examples for other areas. Action A4 is also directly linked to A10 and implementing the concrete C actions in the respective target areas.

Constraints and assumptions:

Collecting, storing and analyzing all the relevant background data and carrying out stakeholder negotiations is a demanding and time-consuming task, and action A4 is dependent on the progress of action A3.

Expected results (quantitative information when possible):

- Management plans for 3 Natura 2000 areas (31.12.2018)
- Regional water protection plans for 4 catchments of Natura 2000 sites (Isojoki, Karjaanjoki, Saarijärven reitti and Naamijoki) (31.12.2020)

Cost estimation:

The cost for 10 beneficiaries (SMK, MH, SYKE, JAMK, EPOELY, KESELY, SMK, LUVY, LSPHä) are linked to the preparation of the catchment area plans. The plans are mostly done by the water protection, forestry and nature conservation experts of the beneficiaries. The permanent personnel work 260 days (75 821 €) and for the first phase. The temporary personnel include mostly planners and other field personnel totalling 653 days (159 301 €). The personnel cost for the latter phases are 235 122€. The total personnel cost are estimated at 425 751€. The management plans for Vanajavesi are mostly done by voluntary work with small expenses from the guiding organisation LSPHä. The estimated costs for the management plan for Arvajanreitti are app. 33 000€. This cost estimation is based on previous management plans made by the KESELY. The majority of the costs for this action are linked to the Regional Water Protection Plans (RWPP). These are made in a novel way using the results of the modeling actions therefore they require substantial amount of personnel work. The daily salaries are based on collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel costs are estimated at 44 694€ of which 29 631€ are used in the first phase and 15 063€ at the remaining phases. The state travel rules for reimbursements are used for calculating the travel costs.

The external assistance costs of the first phase are linked to the outsourced regional plan for Mustionjoki (Karjaa) totalling 18 000€. Translation cost for the plan in Pohjanmaa (4 000€) and level scanning (2 000€). During latter phases 9 100€ is used for external services.

The consumable material cost (7 966€) include meeting costs with local stakeholders in the preparation of the plans.

The total cost of the action is 511 511€.

Deliverables:

- Natura 2000 management plan and RWPP for Arvajanreitti (FI0900101) (31.12.2017)
- RWPP for Karjaanjoki region (31.12.2017)
- Natura 2000 management plans for two sites in Vanajavesi region (31.12.2018)
- RWPP for the Saarijärven reitti (31.12.2019)
- Regional Water Protection Plans (RWPP) for Isojoki river catchment (31.12.2020)

Milestones:

- Natura 2000 management planning for Arvajanreitti (Keski-Suomi) (FI0900101) started (31.01.2016)
- General catchment area restoration planning for Karjaanjoki region started (31.05.2016)
- Natura 2000 management plans for three sites in Vanajavesi region started (31.05.2016)
- Multifaceted and broad planning for sustainable use and protection of Isojoki river catchment started (30.06.2017)
- Regional water protection and management planning for the Saarijärven reitti ready, implementation started (31.12.2017)

ACTION A.5: Development of assessment methods for headwater habitats**Beneficiary responsible for implementation:**

SYKE coordinates the action, and others (MH, SMK, LUKE, UO) participate.

Description (what, how, where and when):

Streams belonging to the habitat type “*Water courses of plain to montane levels with Ranunculus fluitans and Callitriche-Batrachion vegetation*” (3260) of the Annex I of the Habitat Directive (HD) comprise the vast majority of the stream network in Finland. Their conservation status has been assessed as “Unfavourable-Bad” in the latest HD habitat assessment report due to disturbed structure and function. This assessment is, however, largely based on expert judgment due to

scarce monitoring data of their physical disturbance, water quality, or biological integrity, and coupled with insufficient assessment methods. Moreover, conservation management is currently lacking information about useful surrogates for high biodiversity or conservation value, e.g. whether general good hydro-morphological or ecological status corresponds to occurrence of HD species.

A large proportion of the streams are headwaters that have not been properly under implementation of the EU Water Framework Directive (WFD) due to their small size and lack of monitoring resources. These streams are often connected to groundwater, which is an important factor affecting the biodiversity and conservation status in streams. Lately, there have been growing demands among stakeholders and citizens that headwater bodies should be more comprehensively included in the forthcoming WFD planning cycles. Due to their abundance, field inventories of streams are relatively scarce and local, and will remain so in the foreseeable future. Therefore assessment methods of both physical and biological quality that base on diverse GIS data (ditch networks, flow direction charts, laser scanned elevation models) combined with targeted sampling is a necessary step towards cost-effective assessment and monitoring of the conservation status and ecological status of streams.

In this Action A5 status assessment methodology for streams will be developed and demonstrated using existing data for model building (calibration) and data from pilot catchments for model validation and fine-tuning. The methodology will be developed grounding on results of earlier projects and existing protocols (WFD monitoring protocol) modified for small streams. The main aims of this task are to find out:

- How good estimation of the hydro-morphological status of streams can be done by GIS-based assessment in comparison to assessment based on field surveys?
- How well do ecological indicators based on applied WFD monitoring protocols correspond to observed (field) or modelled (GIS-based) hydro-morphological status assessment in the streams?
- Should we develop new set of indicators based on predictive modelling?

The selected pilot catchments for model validation are hydro-morphologically comparable to serve as reference for areas where concrete conservation actions are implemented in FRESHABIT. The methodology for stream assessment developed in this Action can further be applied nation-wide to improve HD and WFD site assessments. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into four subtasks:

Task 1: Collection and analysis of existing data (all participating partners)

In the model building area, Iijoki river basin, more than 1600 km of streams have been inventoried (years 1998-2014) by MH in the field for their hydro-morphological integrity, using 65 indicators measured or estimated in the field. However, these data are currently not available in GIS format. There are also existing data on the land use, groundwater aquifers, bryophyte vegetation, benthic macroinvertebrates, fish, and water quality in the areas used for model building and validation. At the first stage, the previously collected stream inventory data will be manually digitized into an ArcGIS database, and all other available data will be gathered for utilization in Tasks 2-4. This Task will be completed by the end of 12/2016.

Task 2: Harmonizing existing modeling methods for assessment of headwaters (SYKE, SMK)

Results of a complementary project ("SmallWBGIS", 2014-2015, finalized in May 2015) will be analyzed for issues that need further development. The possibilities of joint use and harmonization of these results with the analysis model RiverLifeGIS used in the forestry sector to predict erosion risks into streams will be tested and assessed. The models applied and harmonized in this task are based on a set of physical, geomorphological and geological elements of the streams and their drainage basins that can be extracted from different GIS databases. In addition, some hydraulic and hydrological variables will be applied partly from the outputs of Action A1. The harmonization of models will be based on existing field data from the forest-dominated Iijoki river basin. This Task will feed Task 3 for planning additional sampling (reference and impact sites) and Task 4 for the development of the final model system. This task will be finalized by the end of 12/2017. No costs from the complementary project are included in FRESHABIT budget.

Task 3: Developing assessment methods for ecological status of headwater streams (SYKE, LUKE)

In this task assessment methods for ecological status of headwater streams will be developed based on existing biological data collated in Task 1 and GIS data collated in Task 2, including the “SmallWBGIS” model. Additional monitoring data is achieved from the complementary project “MEBI” realized between 2015- 2016. Small water bodies differ significantly from large ones due to more unpredictable hydrological stress (droughts/floods). Therefore ecological indicators based on WFD monitoring protocols that indicate condition at longer temporal scales may not necessarily correspond to hydro-morphological assessments. In the current task, an ecologically meaningful typology of headwater streams will be developed based on existing data. The typology will serve as a framework both for reporting the status of headwater streams and assessment of the status. Assessment systems for headwater streams will be developed using a predictive modelling approach which combine the GIS data from Task 2 with the existing biological data (Task 1) to predict near-natural ecological conditions for the biological quality elements for their status assessment. Obvious biological quality elements are fish, benthic invertebrates, bryophytes and diatoms, and the indices used in WFD for rivers are modified for headwater streams to assess the ecological status. Supplementary sampling is done where necessary and reference conditions are defined for headwater streams. This task will be finalized by the end of 12/2017.

Task 4: Demonstrating and validating assessment models in selected pilot areas (SYKE, MH)

Based on the data and results from Tasks 1-3, stream modeling will be developed and tested in the Iijoki area based on the earlier inventories, and in Natura 2000 sites (to be selected later) in the catchments of FRESHABIT project areas Isojoki, Karvianjoki, Kiskonjoki, and Koitajoki. Model results will be validated by field surveys conducted by the method used in the Iijoki area. In addition to stream habitat assessment, field workers will be trained to recognize the HD species (e.g. 1029, *Margaritifera margaritifera*; 1037, *Ophiogomphus cecilia*) that indicate high conservation value and are relatively easy to identify, and cultural heritage items visible in the field. The models will be fine-tuned based on the field survey results, and the results will be shared in open databases and available open access GIS platforms. Report of the Action A5 includes description of the methodology, results from model building and validation areas, and the congruence of hydro-morphological and biological classifications. Field surveys for model validation will take place in the field seasons 2017-2018, and all field survey data will be usable by the end of 12/2018.

Reasons why this action is necessary:

The strategic conservation objectives of the PAF draw special attention to the importance and poor conservation status of streams, and the need to develop suitable indicators for monitoring them (p. 26-27). Furthermore, among identified PAF priority measures Action A5 supports the implementation of the national fish passage strategy (p. 40) and restoration of rivers and fish migratory routes (p. 41) by providing a method for assessment of the need for restoration, and the corresponding FRESHABIT Actions (A3, C3, C4). Action A5 also supports the harmonization between HD and WFD (PAF p. 42 and FRESHABIT Action A9) and assessment of freshwater biodiversity (PAF p. 43 and FRESHABIT Action A6).

Constraints and assumptions:

The most significant constraints of Action A5 are that GIS based assessment may respond rather poorly to natural conditions, and that biological responses to variation in hydro-morphological integrity are ambiguous or weak. These constraints are tackled by the wealth of underlying data for model building and testing, and resources for validating the model in other areas by field inventories. Also, the team of the Action is based on already existing cooperation, having close links between the local authorities and national research institutes and universities, and combining the leading researchers in developing monitoring and assessment methodology of freshwaters in Finland. In addition, there might be some challenges related to the usability of the GIS data, as some information related to the forest resources are not public due to national legislation.

Expected results (quantitative information when possible):

- New public access GIS data from the studied areas
- Documented model system for habitat and pressure identification assessment in streams.
- Demonstration of model and tool performance at selected test sites.
- Project reports and publications documenting model tools and applications.
- Ca. 200 km of field-surveyed streams in 8-12 Natura 2000 sites

Cost estimation:

The actions include costs of three beneficiaries MH, SYKE and SMK and majority of the cost are linked to personnel costs of water protection, nature conservation and GIS experts. This action requires data collections and lot of field work at Isojoki, Karvianjoki, Kiskonjoki and Koitajoki. The data is used for making models and estimating how reliable data can be collected e.g. which methods for, which density of sampling etc.). This is an iterative process. The costs per site is app. 115 000€ and is divided between field work and planning/analysis/ reporting 57 500€ each. The costs are in line with the experience from previous stream inventories.

The personnel cost for the first phase include 104 days (31 820€) of permanent staff costs and 444 days (108 930€) for temporary staff, which are mostly hired to carry out the field work, mapping, modelling and GIS analysis. The personnel cost for the remaining phases are 161 610€ and the total personnel cost 302 360€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel cost for the first phase totals 17 500€ and for the latter periods 25 090€. The state travel rules for reimbursements are used for calculating the travel costs.

The consumable materials include minor costs (Camera and GPS) 900€ and field work consumables 250€.

The total cost of the action is 346 100€.

Deliverables:

- Report on the stream habitat assessment methodology (30.06.2019)

Milestones:

- All existing data gathered, analyzed, and utilized (31.12.2016)
- Field data for model validating collected and stored (31.12.2018)
- Initial models developed for testing (30.4.2018)
- Results available as GIS databases (30.6.2019)

ACTION A.6: Development of survey and assessment methods for lake habitats**Beneficiary responsible for implementation:**

SYKE coordinates the action, and others (LUKE, GTK, MH, JYU, POSELY) participate.

Description (what, how, where and when):

Lakes are handled as large entities (habitat types of Annex I) within the Habitat Directive (HD), as well as the Water Framework Directive (WFD; water bodies). Demarcation and assessment of conservation and ecological status are usually based on scattered data (lines, samples, etc.) which are extrapolated to indicate the status of the whole lake, or at the best, large parts of lakes up to hundreds of square kilometres. However, lakes usually encompass a range of habitats that vary in diversity and sensitivity to anthropogenic and global change drivers, and connect to a range of near-shore habitat types. The occurrence of different small-scale habitat types within entire lakes can presumably be largely predicted by geomorphological variation (e.g. height/depth and slope of the littoral zone, soil type, wind exposure). However, attempts to model the varying biological and hydrogeomorphological diversity within lakes are still scarce and the methodology needs to be developed.

In this Action A6 the development of habitat survey and assessment methodology for lake habitats and their biological, hydrological and geological diversity will be developed and demonstrated using selected lakes in our pilot catchments as test sites (Fig. A6_1). Clear-water lakes (Habitat type 3110 *Oligotrophic waters containing very few minerals of sandy plains* (*Littorelletalia uniflorae*)) are used as the test habitat. This lake habitat is defined by and its' conservation/ecological status assessed by habitat-characteristic submerged vegetation (zonation, indicator species, diversity) in the directives.

Furthermore, clear water permits the use of remote sensing methods, and this lake habitat type is the best platform for testing the survey methodology used in the Baltic Sea in earlier projects. Lakes are also rich in cultural heritage items, having been migration routes and sources of wealth for the ancient communities. Therefore, the methodology utilized will also aim at recognizing underwater and shoreline cultural heritage in lakes.

Finally all observations are collected to a common modelling framework, which utilizes modern 3D methodology. Detailed hydrodynamical modelling with combined satellite images will provide unique platform to evaluate biological hotspots and habitat availability. Additionally it will demonstrate possibility to achieve same monitoring results with less time consuming and costly field work.

The main aims of this task are to find out:

- To what extent can hotspot areas for habitat assessment, biodiversity, productivity, and cultural heritage be predicted using remote sensing data and modeling?
- Are there cost efficient methods for mapping?
- Do these hotspot areas overlap?
- What kind of threats do these areas face?

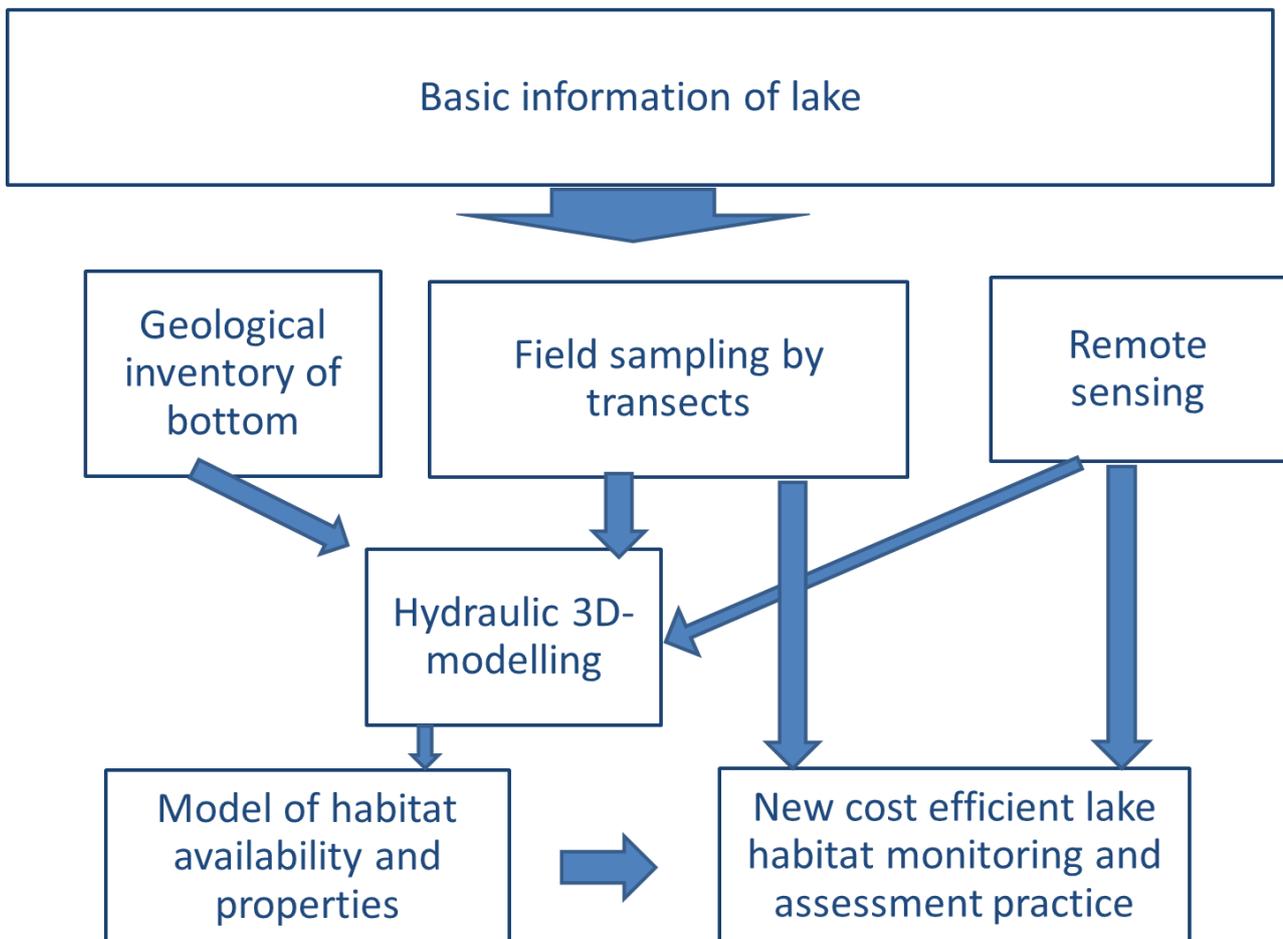


Figure A6_1. General assessment framework for survey and assessment methods of lakes

The selected lakes have high socio-economical value for local communities via fisheries and fishing, and for the wider audience as recreational sites, and there is also a wealth of earlier datasets available to be utilized in FRESHAB. The aim of this Action is to develop methodology for lake assessment that can be later applied to a more variable set of lakes in future projects. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into five subtasks:

Task 1: Collection and analysis of existing data and planning the field work (SYKE, LUKE, JYU, MH)

There are existing data on the macrophyte vegetation, macrozoobenthos, plankton, fish, water quality, and coarse depth contour maps in the target lakes including recent satellite and aerial images. At the first stage, all available data will be gathered and analyzed for planning the field work and selecting target areas within the studied lakes for Tasks 2-4. This Task will be completed by the end of 5/2016.

Task 2: Littoral zone field surveys and biological sampling (MH, SYKE)

Littoral zone field surveys are conducted by observing from a boat using underwater video (drop-down unit), diving, UAV aerial imaging, acoustic surveying, and biological sampling. Ecological status may be good in the pelagial and profundal zone, but in the littoral zone water level regulation and local nutrient loading may still have negative impacts on the ecosystem. A total of 150 transect surveys per lake (from shoreline towards pelagial, 100 m length, or the deep end of the submerged vegetation) will be studied in geomorphologically differing areas of the lakes Konnevesi (rock, boulder and gravel shores) and Puruvesi (gravel and sand, and fine sediment shores). Supplementary samples of e.g. macrozoobenthos will be taken when necessary. Cost-effectiveness of different methods (drop-down video, diving, aerial imaging including satellite images) in the survey of these transects will be specifically assessed. The survey covers the terrestrial shoreline habitat and the littoral zone with vegetation and will be used with additional data from Tasks 1 and 3 to produce the model in Tasks 4-5. Field surveys in Task 2 will be completed in the field season (July-September) 2016 and repeated in the field season 2017 for monitoring the reliability of single snapshot surveys.

Key activities in this task are:

- Mapping the geomorphology and vegetation of the selected study areas in line transects on stony, sandy and vegetation-dominated shoreline habitats
- Identifying the terrestrial habitat type connected to the transect line (e.g. 7140 *Transitional mires and quaking bogs*; 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsa**; 9080 *Fennoscandian deciduous swamp woods*)
- Identifying underwater and shoreline cultural heritage items
- Identifying local threats and pressures
- Using complementary acoustic surveying and aerial imaging of the shoreline in the study areas and determine the proportions of main shore habitat types (stony, sandy and vegetation-dominated)
- Developing interpretation of combined satellite and aerial images to distinguish habitat types and water quality zones

Task 3: Geological lake inventory (GTK)

Geological lake inventories provide information on the characteristics of the lake bottom, e.g. bathymetry and distribution of different bottom sediments. Further it will help to distinguish archeologically valuable sites including remnants of fishing devices etc. Inventories are made using acoustic-seismic methods, which are commonly used in marine environments. Their suitability for lake environments will be tested and evaluated. Acoustic-seismic methods include continuous sub bottom profiling, reflection seismic and side scan sonar investigations. The aim is to achieve full coverage data sets with side scan sonar to be able to produce high resolution side scan mosaics and sediment maps of the surveyed areas. Exact survey sites are decided after reviewing the existing data sets of the study areas. The aim is to cover an area of 40 km² on both targeted lakes, Konnevesi and Puruvesi.

Fieldwork is done using GTK's survey boats. Acoustic-seismic surveys are done in one survey campaign per study area and they are expected to take altogether one month (2-3 weeks per area). Acoustic-seismic data collected during fieldwork will be stored digitally for further processing. After the field survey, sediment maps of the survey areas will be drawn using ArcGIS software. Bottom sediment maps can be used in identifying lake habitats, planning other survey activities in the area and as background material for modeling. Possible underwater cultural heritage sites will be reported if they are found.

Field surveys will be completed as early as possible in the field season 2016 to facilitate other activities (e.g. biological sampling). Maps and ArcGIS layers will be delivered by the end of 2016.

Task 4: Lake habitat modelling (JYU, LUKE, SYKE)

In the first phase data biological data collected in 2016 and older data (from 1990's etc.) are analyzed to find out the areas with biodiversity and productivity. This work is done with different groups (macrophytes, phytoplankton, zooplankton, zoobenthos and fish) and different zones (from littoral to pelagial). The aim is to find out possible hot spot sites where diversity and productivity are high in more than one group.

The flow conditions in selected target lakes will be modelled in order to study the connection between regional flow conditions and habitat diversity. Detailed 3-D flow models will be built using the open source, European Union Public Licence (EUPL) modeling code COHERENS. The models will incorporate bathymetry, sediment, macrophyte and hydrological data as well as atmospheric forcing from existing sources (Task 1) and newly measured datasets (Tasks 2, 3). The expected spatial resolution of the 3-D models is in the region of 100 m in the horizontal with 10-20 depth layers. Both steady-state and dynamic forcing data will be used to identify areas where flow conditions are especially sensitive to outside effects.

For model calibration water flow profiles are measured from target lakes using recording acoustic current meters/profilers in selected sites. Drifters can also be utilized to complement the data. Major inflows and outflows are identified and measured. Surface elevation data is measured in representative sites. In the second phase this data is connected to hydrological modeling and geological data from GTK (Task 3). This work provides a spatial dataset. By GIS-analysis it is possible to add layers of environmental data including satellite images and find out hot spot areas. The remote sensing products will be based on data from the Sentinel 2 (S2) and Sentinel 3 (S3) satellites that will be launched in 2015. S2 offers good spatial resolution (10-20 m pixels) while S3 (300 m pixels) has shorter revisit time and better band characteristics for water quality estimation. Additionally, images from Landsat 8 (LS8) will be used. For S3 the image analysis and processing methods will be based on the algorithms developed for the Envisat-MERIS instrument. S3 is expected to provide Chl-a, turbidity and water transparency data. S2 (and LS8) are expected to provide turbidity and vegetation data. Based on that data, a first version of diversity model will be constructed.

Supplementary field sampling in 2017 will focus on important and endangered fish species nursery areas and macrophytes. Coregonid fish larvae are sampled with bongo nets pushed in front of a boat. For grayling larvae sampling new methods are developed and tested in Puruvesi. Methods for macrophytes monitoring are described in task 2. This sampling is planned to produce more information for model and models verification. Model is developed based on that data. With the final version of model it is possible to predict cost-effectively the hotspots of high biodiversity and productivity.

Task 5: Demonstrating and validating assessment models

Based on the data collected in Tasks 1-4, assessment models will be developed and new hot spot areas for habitat assessment, biodiversity, productivity, and cultural heritage will be predicted in Lake Päijänne (areas with mixed rock, boulder, gravel, and finer sediments) (2018). Model results will be validated by field surveys as described in Tasks 2 and 4. The models will be fine-tuned based on the field survey results, and the results will be shared in open databases and available open access GIS platforms, and a description report of the process.

Reasons why this action is necessary:

There are good experiences from a previous inventory of the underwater biodiversity in marine environment that should be expanded to freshwater habitats (PAF p. 22 and 43). Methods and processes of assessment of the conservation status of lake habitat types need improving, and by this action new methodology will be developed for identifying the most vulnerable areas of lakes, and utilizing the monitoring data collected for WFD in HD conservation status assessment. Thus, this action will also aid in the harmonization of the HD and WFD reporting in action A10. In addition, hot spot sites where diversity and productivity are high in more than one group are identified, which in turn supports the sustainable socio-economical use of these lakes.

Constraints and assumptions:

No significant constraints are predicted. The team responsible for the action is based on already existing cooperation, having close links between national research institutes and universities. The formulation of a coherent data management approach for multi-disciplinary information is a challenge to face and solve in this type of collaborative project. Another real challenge is the task to produce internet based environmental information for local and regional end-users and the general public. The package has to rely on technical and scientific data but the information must be available in such a format that ordinary users can access and apply it.

Expected results (quantitative information when possible):

- New public access GIS data from the studied lakes
- Documented model system for habitat and pressure identification assessment in oligotrophic lakes, serving as a step for method development in other lake types.
- Demonstration of model and tool performance at selected test sites.
- Project reports and publications documenting model tools and applications.
- Tasks 1-4 will produce 4-5 scientific article/manuscript till the end of project. Furthermore, one PhD student will graduate in an complementary project.

Cost estimation:

In total 5 beneficiaries (SYKE, MH, LUKE, GTK, JYU) are working in this action. The action is a method development action, which means big efforts in planning, testing, verifying and reporting. Therefore substantial personnel costs are required. This action is implemented in 3 lakes. The costs are estimated on the basis of VELMU program targeting the mapping of marine areas. SYKE, GTK and MH have been involved in VELMU from nearly 10 years.

Majority of the cost are personnel costs from key beneficiaries SYKE, LUKE, MH and JYU. As the action A5 this action is also an iterative process and therefore time consuming requiring special skills of the experts of the beneficiaries in e.g. modelling, analysing, remote and field mapping, data bases and GIS systems. The permanent staff time allocation for the first period totals 760 days (267 476€) and temporary personnel which are mostly used for field work, 1 394 days (360 906 €). The total personnel cost for the first phase is 628 382€. For the last phases the personnel cost totals 435 100€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff and for NGOs the level are inline with the other personnel working in similar actions.

The benthic survey at two lakes by GTK with the costs of app. 170 000€ (includes personnel and vessel operation costs, travel costs). The total travel cost for the first period is 38 650 € and for the last phases 25 898€. The state travel rules for reimbursements are used for calculating the travel costs.

External assistance costs include costs for services of the equipment used for mapping (vessel and UAV) totalling 3 500€ and lifting of the GTK vessel to the study lakes (1 200€).

Also additional equipment is needed for such as UAV aerial imaging device (cost app. 28 000 €) for collecting and documenting data, inflatable boat (7 000€), video and camera for under water use (6 000€) and water proof field laptop (5 200€). The price estimations for equipment is based on internet search for suitable devices. The consumable material cost include field work consumables (e.g. GPS device, batteries) totalling 10 000€. 500€ in other costs are reserved for harbour fees.

The total cost of the action is 1 189 430€.

Deliverables:

- Bottom sediment maps and GIS-layers of the Konnevesi and Puruvesi study areas (31.12.2016)
- Report of spatial diversity in target lakes (31.12.2017)
- Report of model structure and validation (31.12.2018)
- Report on the lake habitat assessment methodology (30.06.2019)
- Map of the important diversity areas (31.12.2020)

Milestones:

- All existing data gathered, analyzed, and utilized (30.06.2016)
- Geological survey data collected and post processing started (30.09.2016)
- Maps and GIS-layers of geological survey ready (31.12.2016)
- First version of diversity model (31.12.2016)
- All field data for model building collected (30.10.2017)
- Initial models developed for testing (30.4.2018)
- Final version of diversity model (30.12.2018)
- Results available as GIS databases (30.6.2019)

ACTION A.7: Developing new economic goods out of freshwater resources

Beneficiary responsible for implementation:

LUKE coordinates the action and WWF supplements with information on less used fish

Description (what, how, where and when):

In this work new goods and services will be developed based on the freshwater resources in order to strengthen the local livelihoods and rural well-being in a sustainable manner. The project will produce knowledge and practical tools for a long term planning and use of the freshwater areas. The work will be conducted via two tasks (task 1 and 2) as follows:

Task 1: Developing new well-being services out of natural resources of Central Finland

LUKE is responsible of this task. The aim of this project is to promote new well-being, so called Green Care services based on the natural resources in collaboration with the entrepreneurs, clients, experts of social and health care and local entrepreneurs and other services providers (NGOs, municipalities, co-operatives). The work will be conducted during years 2017-2018, starting at the end of first and to be completed at the second period.

In particular, the project aims to increase the awareness of the customers of the added values of nature in well-being services:

- To map the natural resources available for the services as well as demand and supply of the services
- to increase the knowledge and capabilities of the entrepreneurs to exploit natural environment in the services and to provide them with information, support and tools to develop new solutions for producing services in Finland

Task 2: Compiling information and evaluating sustainability of freshwater fisheries and aquaculture production

In this task WWF Finland will collect and compile information on selected freshwater fisheries and aquaculture production. The collected data is used for evaluating the sustainability of freshwater fisheries and aquaculture against international seafood sustainability criteria (such as Marine Stewardship Council and Aquaculture Stewardship Council or similar). The information is compiled by using existing databases, scientific and technical reports as well as via stakeholder meetings and on-site visits. The evaluation outcomes and other collected information are used as background material for communication and outreach work conducted under actions E1 and E5. The overall aim of the task is to increase consumption of sustainable local fish by providing up-to-date information for the public, retail, restaurants, fisheries managers and other related fisheries and seafood stakeholders. The work will be conducted at the second period during years 2017-2018.

Reasons why this action is necessary:

The diverse Finnish nature is a huge resource not only for products but also for various services. Until now tourism is already well-developed in many parts of the country. Yet there is also increasing interest to use nature consciously for targeting clients, who need a special support in their well-being either in the preventive sense or as physical or work rehabilitation, or who are considered as vulnerable. Services that use natural environments are ranging from therapeutic ones (such as riding therapy, therapeutic gardening) to a regular regulation and exercise in natural environment and education. Various environments are already used in these services, forests, wilderness areas, gardens, and recently also farms. Lakes and rivers also provide rich and varied environments for developing Green Care activities, but until now they are not efficiently used for these purposes. Furthermore, the Green Care services also call for new kind of partnerships between the public sector (who is responsible for organizing the health and social care services), private, and the NGOs, which may act both as service providers or customers. The project aims to bring these parties together to create new type of collaboration and networks between the actors.

Seafood consumption in Finland is concentrated on imported seafood whilst the local freshwater resources seem to be poorly recognized and under-utilized. Despite that freshwater fisheries and aquaculture are comparatively well reported and studied in Finland the information on sustainability of freshwater fisheries and aquaculture is either scarce or fragmented. This action will compile the existing knowledge and evaluate the practices against widely accepted international criteria. This action aims at increasing the recognition and value of local freshwater resources as a source of sustainable seafood.

Constraints and assumptions:

No major constraints cannot be predicted at this stage. However, the condition for conducting the activities with LIFE funding is that the planned IP -project will be funded. There are existing models for evaluation criteria and lot of data is already available via official fisheries statistics. Data on some specific indicators such as by-catch and ecosystem effects of the fisheries may be challenging to compile by using only technical and scientific data. In those cases expert judgment and on-site audits will be used to achieve the best and up-to-date information.

Expected results (quantitative information when possible):

Expected results are achieved through following actions. Freshwaters are unique though underutilized resources for well-being services. At the same time high quality freshwater is well achievable and available for the use of rural entrepreneurs in Finland. In the frame of FRESHABIT the potential clients and service providers are invited to the workshop. The workshop provides basic information how to establish a Green Care well-being service based on fresh water for different kind of customer groups in a form of key note lectures followed by group work and discussions. Equal aim of the workshop is to offer a platform for innovations and networking, and generate a new kind of partnerships between public and private actors and clients at the regional level. The results and experiences of the workshop construct a body for resources, demand and supply report.

The project produces a guidebook how to establish Fresh water Green Care service. The guidebook collects the best practices and increases the awareness of Green Care activities. It is published as an e-publication and is free access for the whole Finnish Green Care community and other interested persons. Targeted delivery will be done through the umbrella organization of Finnish GC actors, Green Care Finland, which will provide both regional and national utilization of the guidebook.

Green Care services are well established in many European countries (e.g. Netherlands, Germany, Norway). However utilizing the freshwater environment for well-being services is something very unique in Finland. By taking actions for developing type of Blue Care framework in Freshabit platform, will provide knowledge of best practices for other countries to explore these possibilities as well.

- increase the knowledge, capabilities and actual use of freshwater environments for the well-being services
- increase diversity of the rural livelihoods based on freshwater environments
- increase the accessibility of the freshwater environments for various target groups
- Up-to-date information on sustainability of selected freshwater fisheries and aquaculture production.
- Background information and material for communication and outreach actions (3-5 sustainability evaluation reports) for communication and outreach actions conducted under actions E1 and E5.

Cost estimation:

The costs include personnel costs from LUKE and WWF totalling 40 503€. The workload for the permanent staff (socio-economy experts and fish expert of WWF) for the first period totals only 10 days (4 680€) and for the temporary staff 35 days and 10 363€ respectively. The personnel cost for the remaining phases are estimated at 25 640€. The travel cost totals 4 020€ of which 1 960€ is used during the first phase and 2 060€ during the latter phases. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff and for NGOs the level are inline with the other personnel working in similar actions.

The other cost include 3 000€ for organising related seminar.

Note that we aim at mobilising substantial funding for socio-economic studies and practical development of new services and business from complementary projects.

The total cost of the action is 47 253€.

Deliverables:

The report, guidebook and results are shared with Finnish Green Care community and available for everyone interested on the free access- webpages: webpage of Green Care Finland, the umbrella organization of the GC-actors and webpage of Luontoyrittäjyysverkosto, the Network for Nature based Entrepreneurship in Finland.

- A guidebook for construction of Green Care –fresh water environments for different client groups (31.05.2018)
- Report of the resources, demand and supply for the nature-based services (31.08.2017)
- 3-5 sustainability evaluation reports on selected fisheries / aquaculture practices (31.12.2018)

Milestones:

- Workshop for GC actors (30.4.2017)
- Workshop (1-2 pcs) for invited participants: entrepreneurs, public and private sector, social workers, NGOs and other interested actors. (31.08.2017)
- Mapping of the resources, supply and demand ready (31.08.2017)
- Guidebook for constructing Green Care -fresh water environments for different client groups ready (31.05.2018)
- Relevant fisheries/aquaculture production selected and information collected (30.06.2018)
- Sustainability evaluation reports (3-5 reports on selected fisheries / aquaculture production)ready (31.12.2018)

ACTION A.8: Enhancing the use of climate-friendly electricity**Beneficiary responsible for implementation:**

Fully implemented by FANC (EKOenergy)

Description (what, how, where and when):

EKOenergy is a network of 35 environmental organisations from 27 European countries. The Finnish Association for Nature Conservation (FANC) hosts the international EKOenergy Secretariat. The EKOenergy Network encourages the use of renewable electricity, and helps energy companies reduce the environmental impacts of their power plants. Within the network, information and best practises are exchanged. In 2013, the Network launched a European wide ecolabel for electricity. Electricity sold with the EKOenergy label fulfils strict environmental criteria and raises funds for new renewable energy projects. It gives guidance to consumers hoping to get more out of their electricity contract, and acts as a tool to make energy production more sustainable.

In Europe, there is an active market for renewable energy, driven mainly by consumers concerned about their carbon footprints. Approximately 80% of traded and sold renewable electricity originates from hydropower production. In Finland, about 15 TWh of electricity, which is about 17% of the total electricity consumption, is produced by hydropower (partially from Norwegian and Swedish origin). Public attention of the impacts of renewable electricity production, including hydropower, on biodiversity is increasing. EKOenergy wants to 'use' consumers' interest in the environment, to encourage them to do more for the climate and river ecosystems. EKOenergy has been studying ways to encourage consumers to contribute to river restoration measures. One of the concepts we have in mind is 'Fish Passage Electricity'. The idea is simple: can we find electricity consumers willing to pay more for their hydropower electricity, if the sellers promise to invest the extra money in the construction of fish passes?

Preparatory work has been completed in cooperation with a group of river activists, and we aim to pilot this idea into action. We will start public communication on the environmental benefits of the 'Fish Passage Electricity' product. We aim to certify the first sales of the electricity product in 2016. The promotion area is the whole of Finland. Part of the income will be invested into the construction of fish passages, in the Karjaanjoki in Southern Finland. We will analyse the general interest in this type of electricity product and how the interest will affect investments in environmental projects in hydropower plants. The same model will further be replicated in other FRESHABIT project areas.

EKOenergy will continue to develop the process of granting EKOenergy eligibility to hydropower plants. We consider granting the EKOenergy label not only to electricity produced in very environmentally friendly hydropower plants, but also to electricity produced in power plants where owners commit to considerable improvement measures. Local stakeholders and experts are actively involved in the approval process. EKOenergy will actively consult stakeholders such as authorities, hydropower and aquatic ecosystem specialists and local NGOs during the granting process.

In 2016 we will start contacting electricity producers that may be willing to get EKOenergy labelling for their hydroelectric production. In 2016, we will negotiate with stakeholders about what are the best improvement measures for the specific hydropower plants, in order to grant EKOenergy eligibility for the electricity produced there. In 2016 and 2017, the newly eligibly hydropower plants will start producing EKOenergy. This model will be tested in Finland, more specifically at Karjaanjoki, Kiskonjoki and Saarijärvi river basins. During the last three years of this LIFE IP-project we will also seek opportunities to cooperate at Ähtävänjoki, Karvianjoki, Karjaanjoki, Päijänne, Konnevesi and Koitajoki water basins.

As well as the development of this concept, we also continue to mobilise resources via EKOenergy's Environmental Fund. For each MWh of EKOenergy-certified hydroelectricity sold, €0.10 goes to the EKOenergy Environmental Fund. In the past years more than €700,000 has been collected through the fund. Revenues from 2014 will be spent on river restoration projects in the Murrönjoki, Kiskonjoki and Kokemäenjoki rivers. Under this LIFE IP-project the financed projects will be much more actively communicated, also towards EKOenergy consumers. This communication will be combined with extra fundraising.

Reasons why this action is necessary:

Environmental labelling of electricity is one of the few methods to prove to consumers that their choice makes a difference: buying ecolabeled electricity is a way to make the electricity production more environmentally friendly. The ecolabel is also a tool to tell people, in a positive and constructive way, about the impacts of hydropower and about how to mitigate them. Improved knowledge of the impacts on ecosystems will hopefully encourage consumers to choose electricity with more environmentally friendly production methods. An ecolabel such as EKOenergy is also helpful for the electricity producers that want to make a difference. It is a way to prove that they are committed to reducing their environmental impacts, and is a way to reward these efforts.

Instruments such as EKOenergy can help encourage consumers to consider other aspects of electricity, instead of only focussing on the price of the electricity. We want consumers to be willing to pay a slightly higher price, if they see a clear benefit to the environment. As such, the actions will help generate more means to fund the construction of fish passages and the renovation of freshwater habitats.

Constraints and assumptions:

To find electricity suppliers willing to invest extra money in the construction of fish passages and power plant owners willing to make the constructions and considerable improvement measures might be challenging. Also, we are not certain if the public is interested in a new electricity product and are they willing to fund fish passages. We have selected potential locations and we have preliminary agreements with the owners of the power plants. The owners' unwillingness to commit to considerable improvement measures often stems from the high estimated costs. Measures can often cost too much to be funded solely by the power plant owners. EKOenergy is looking for ways to actively fund measures so that power plants owners do not have to provide all the funding themselves. We noted interest amongst consumers - we made pre-communication with specific consumer groups and collected around 1000 names of people who say they are interested in this kind of product.

Expected results (quantitative information when possible):

We expect the people's awareness of EKOenergy to increase greatly through following substeps:

- At least 500 Fish Passage Electricity consumers exist
- The website will provide communication materials for consumers about the project
- At least 5 new hydropower plants that produce EKOenergy

Cost estimation:

The cost include personnel cost for a coordinator (temporary staff) at FANC working with the EKOenergy. The working effort is highest during the first phase of the project; 233 days (46 560€) and for the latter phases 39 794€. The total personnel cost for the action are 86 354€. The personnel cost estimation is inline with the salary level of similar projects of FANC.

The action requires travelling and meeting energy companies in several parts of Finland; first phase 8 720€ and latter phases 17 440€. The state travel rules for reimbursements are used for calculating the travel costs. The external assistance costs for promoting the EKO energy in social media and other media are based on preliminary offers from potential providers (total cost 15 400€). The cost also includes necessary equipment (laptop, 2000€ the first phase and other equipment 2 400€ for the latter phases) for the coordinator. The cost estimations for services and products are based on previous similar actions and internet checking of the price level.

The total cost of the action is 137 314€

Deliverables:

- Project material to communicate about new electricity products (31.12.2016)
- Website to communicate with consumers (31.12.2016)

Milestones:

- Launching the new pilot electricity product (31.12.2016)
- The contracts between EKOenergy and hydropower plants exist (31.12.2017)
- At least 500 Fish passage electricity consumers exist (31.12.2017)
- At least 5 hydroelectric plants are producing EKOenergy (31.12.2017)
- During period 3, the planning of the construction of fish passages and freshwater habitats will start (30.09.2021)

ACTION A.9: Harmonisation of reporting systems of habitats among HBD and WFD**Beneficiary responsible for implementation:**

SYKE is in charge and MH participates

Description (what, how, where and when):

In the Annexes of the Habitats and Birds Directives (HBD) there are species and habitats listed that directly depend on surface and ground waters. For the maintenance of those species and habitats at a favorable conservation status or bringing them to that status the most important measures often are linked to measures in the catchment area of the given natural feature. Therefore, linking management of the surface and ground water dependent species and habitats of Community Interest to the management of freshwaters and their catchments according to the river basin management plans (RBMP) of the Water Framework Directive (WFD) is a prerequisite of adequate management.

For WFD water bodies designated as Natura 2000 sites, the Environmental Objectives may differ from good status, as objectives may have been set differently for those areas in the relevant Community legislation. According to WFD, Member States shall establish a register or registers of all areas lying within each river basin district (RBD) which have been designated as requiring special protection under specific Community legislation. A register for the areas designated for the conservation of habitats and species directly depending on water, including the protection of Natura 2000 sites, shall be established.

Measures specifically designed for Protected Areas should be an integral part of the RBMPs in order to ensure that the requirements of Protected Areas are included in the overall management of the RBDs and to ensure the coherence of the entire water planning with the objectives already established by other Community and national legislation. WFD also requires that the RBMPs contain "a summary of the measures required implementing Community legislation for the protection of water".

Methods employed in action A9 are:

- Development of workflow for storing relevant data and producing data compilations that serve reporting under HBD and WFD
- Technical development of a database for HBD reporting
- Technical development of a database used for WFD reporting
- Technical means for easy integration of harmonized information to planning processes under WFD and HBD

The action A9 is targeted to HD and WFD freshwater habitats and their species, which serve as indicators in the assessment for both Directives, and some of which are also species protected by HBD. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into two parallel subtasks, streamlining the collection of data for reporting and planning processes:

Task1: Data for Reporting

- Data used for reporting under HBD, Marine Strategy Framework Directive (MSFD) and WFD are identified and documented. Work will be done by experts in SYKE by the end of 2016.
- A workflow is developed to convert up-to-date data from databases of MH so that it can be used for reporting under both directives. The workflow will be developed by experts in Natural Environment Centre and Freshwater Centre in SYKE, and MH by the end of 2016.
- Technical solutions (i.e. interoperability and interfaces) for shared use of data are created in relevant databases — VEMU and POVET for WFD and Natura 2000 database for HBD. Technical solutions will be developed by experts in Natural Environment Centre and Freshwater Centre in SYKE, both responsible for their own databases, by the end of 2017.

Task 2: Data for planning processes; River Basin management (WFD), Programme of measures (MSFD) and Management of Natura 2000 Network (HBD)

- Data used for relevant planning processes under HBD, Marine Strategy Framework Directive and Water Framework Directive are identified and documented. Work will be done by Finnish Environment Institute in close co-operation with relevant stakeholders (e.g. MH, regional ELY-centers) in close co-operation with action A1 (modelling) by the end of 2016.
- A workflow is developed that ensures relevant and up-to-date information is at hand in relevant planning processes together with the modelling data (action A1). The workflow is developed together with stakeholders and in close co-operation with action A1 (modelling) by the end of 2016.
- Technical solutions (i.e. automated summaries, maps and tables) will be created to ensure that planning processes have all information available for their use in the most suitable format. Technical solutions will be developed by Natural Environment Centre and Freshwater Centre in SYKE, both responsible for their own databases, by the end of 2017.

Reasons why this action is necessary:

High quality reporting under different EU directives and proper management of Natura 2000 network and river basins needs to be based on all relevant and up-to-date information. This action A9 ensures the availability of this kind of information. Automated summaries, maps and tables produced in the action will improve the quality of public consultancy and acceptance of planning processes among stakeholders. Action A9 implements the strategic objective of the PAF for enhancing the cooperation between WFD and HBD (p. 27) and relevant priority measures for wetland habitats (pp. 42 and 43).

Constraints and assumptions:

There are no major risks for the implementation of the action related to reporting data. However, delays in action A1 (modelling) may prevent timely delivery of this action.

Expected results (quantitative information when possible):

- Functioning interoperability between the databases VEMU, POVET and a database for Natura 2000 data.
- VEMU, POVET and Natura 2000 database will feed up-to-date and relevant information to the modelling process (action A1) and planning processes.

Cost estimation:

The costs include only personnel costs of experts on directive reporting of SYKE and MH and also from the data base experts of SYKE. The permanent personnel (river basin planning and directive expert) are estimated to work 40 days (14 800€) and temporary staff (database developers) is needed for 75 days (27 750€) during the first phase. For the latter phases the personnel cost are estimated to 47 440€. This action requires substantial expertise in directive reporting and also database knowledge and the time allocation estimations are based on the previous experience in directive reporting. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The total cost of the action is 89 990€.

Deliverables:

- Document recording the common data and links between reporting under HBD, WFD and MSFD (31.12.2016)
- Document describing the method ensuring interoperability of the databases VEMU, POVET and a new database for HBD data (31.12.2016)
- Document recording the relevant data for planning processes and modelling supporting those processes (31.12.2017)
- Document describing the workflow that feeds relevant data into modelling and planning processes (31.12.2017)

Milestones:

- Common data used for reporting under the different directives are identified (31.12.2016)
- Data used in planning processes under the different directives are identified (31.12.2016)
- Technical solutions for shared use of data are ready (31.12.2017)
- Results will be utilized in the HBD and WFD reporting process for 2013-2018 (31.12.2019)

ACTION A.10: Writing up practical recommendations and/or national guidance

Beneficiary responsible for implementation:

SYKE is in charge of the action, and others participate: MH, SYKE, SMK, UO

Description (what, how, where and when):

Recommendations and guidance in action A10 are fed by the networking, planning, management, and monitoring actions implemented in the target areas. These recommendations are based on the multi-stakeholder approach in FRESHABIT, and thus implement the capacity building element of the project. The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into three subtasks:

Task1: Integrated multi-stakeholder planning for catchment area management of N2000 areas (SYKE with the support from all beneficiaries)

The aim of this task is to produce and document the operational model for the integrated planning, that is in the center of FRESHABIT, using the methods developed in action A1, and experiences gained in A3 and A4. The planning procedure documented will include the network of usable catchment area models as a tool, types of stakeholder networks met in the planning of FRESHABIT, and experiences of catchment area planning in A4 as examples. The task is fully dependent on the progress of the actions A1, A3, and A4, and although the model will be developed from the beginning of FRESHABIT, its' completion will happen at the end of the project. Therefore, The task will be completed by the end of 2020. Note that the final publication on is made in actions E8.

The aim of this task is to produce and document the operational model for the integrated planning that is in the center of FRESHABIT, utilizing the results of actions A1, A3 and A4. The planning procedure documented will include the network of usable catchment area models as a tool, types of stakeholder networks met in the planning of FRESHABIT, and experiences of catchment area planning in A4 as examples. The integrated multi-stakeholder planning approach for management of Natura 2000 catchment areas covers recommendations on the following issues, all depending on catchment area characteristics:

- Involvement of relevant stakeholder groups in the planning process
- Types of permits and related resource needs
- Which models are suitable for the given catchment area
- How to take habitats and species in to account for best possible results and avoiding collateral damage
- Depth and resource need for management and action plans for the sites.

The task is fully dependent on the progress of the actions A1, A3, and A4, and although the model will be developed from the beginning of FRESHABIT, its' completion will happen at the end of the project. The task will be tested and developed through the action, but completed by the end of 2020. Note that the final publication is made in actions E8. Uptake of lessons learnt will be done by the national authorities responsible for the implementation of HD and WFD, all included in FRESHABIT (SYKE, LUKE, ELY-centres) using established regional joint working groups for river basin management, and other regional and local networks.

Task 2: National guidance with practical recommendations for monitoring stream and lake restoration measures (SYKE with the support from all beneficiaries)

Guidance for monitoring will be produced based on the principles being developed by SYKE and tested in FRESHABIT D actions. The guidelines include indicator sets for different kind of freshwater habitats, and for different levels of monitoring (technical, basic and advanced effects on hydrology and biodiversity). The guidelines also suggest where, when and what to monitor in different conditions, and for different kind of restoration objectives (e.g. for given species/biodiversity in general/enhancing water retention). A test version of the guidelines will be available in 2016 and refined throughout the project. The task will be completed by the end of 2020. Note that the final publication on is made in actions E8.

As part of tasks 1 and 2 the key beneficiaries (MH, SYKE, LUKE and SMK) will disseminate the results the targeted audiences (e.g. water managers, environmental authorities at national and regional level, forestry and agricultural advisors) at various events. See the detailed list of the stakeholders listed in form B5 that are in particular the target groups for the dissemination and related training of the practices developed in FRESHABIT project.

Task 3: Recommendations for considering restoration as an option for the after-production use of industrial areas (POKELY)

Abandoned post-production industrial areas, e.g. peat and metal mining areas, are often difficult to use and have low values for biodiversity. They may also be harmful for water protection, being sources of nutrients, suspended solids and toxic substances. Using experiences from the Koitajoki project area, possibilities for restoration or nature-like amelioration for such areas, and the benefit such action causes to nature and its' ecosystem services, will be considered and documented in a report. The task will be completed by the end of 12/2019.

Reasons why this action is necessary:

This action will draw and document conclusions from the planning process and related development of methods in FRESHABIT. Reports produced in this action will be among the most important capacity building elements of FRESHABIT.

Constraints and assumptions:

There are no major risks for the implementation of the action related to reporting the methods and processes developed in other actions. However, delays in the other actions that feed A10 may prevent timely delivery of this action.

Expected results (quantitative information when possible):

- 3 reports that summarize the experiences and developed methodology for catchment area planning in FRESHABIT
- Information on catchment are approach actively disseminated and relevant stakeholders (e.g. water managers, authorities, forestry and agricultural advisors trained)

Cost estimation:

This is one of the key actions of the project and reports are the key deliverables in the project. The reports are made in a way that they serve both the experts, practical workers, decision makers and laymen. Therefore substantial personnel work effort (388 197€) is dedicated to preparing of the reports from MH, SYKE, SMK and OU. The reports will be made by large group of experts through an iterative coworking process and therefore substantial workload is estimated to be needed for producing good quality reports. Also disseminating, distributing the info at various events and

training require time. The preparation of the documents starts already during the first phase and continues with more effort in the latter periods, especially during the last phase. The permanent personnel cost during the first phase are 129 days, 49 716€ and for temporary experts 175 days, 56 275€. The personnel cost for the latter phases are estimated to 282 206€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

Note that also the experts from LUKE are participating to the production of the reports but the respective costs are allocated in E-actions. The printing costs of the reports are included in action E5. The consumable materials include minor meeting costs (750€).

-

The total cost of the action is 388 947€.

Deliverables:

- Report of the integrated multi-stakeholder planning for catchment area management of N2000 areas (30.9.2022)
- National guidance with practical recommendations for monitoring stream and lake restoration measures (30.9.2022)
- Report for considering restoration as an option for the after-production use of industrial areas. (31.12.2019)

Milestones:

- Preliminary guidelines for monitoring available (31.12.2018)
- Timely delivery of results from action A1 (31.12.2018)
- Timely delivery of results from action A3 (31.12.2018)
- Timely delivery of results from action A4 (31.12.2020)

ACTION A.11: Composing general communication plan for the project

Beneficiary responsible for implementation:

MH is in charge of action, members of core team (SYKE, LUKE, SMK) and steering committee (defined in Action F2) will participate

Description (what, how, where and when):

Project communication plan is prepared at the beginning of the project by the project manager and communication officers of the core team (MH, SYKE, LUKE and SMK), beneficiaries involved with the communication actions (WWF, SLL, NoM, DocArt) and the leaders of the project areas (LUVY, VARELY, VVK, EPOELY, ESAELY, POKELY). This will secure that the plan will be made jointly and the end product will be of good quality. The communication plan will be completed during the first months of the project. Later on, it will be approved by project management core team and project steering committee. FRESHABIT has already identified the list of major stakeholders to be communicated with and this list will be fulfilled while processing the communication plan. The list includes all relevant stakeholders, media contact persons and potential users of the results. Communication plan will also have preliminary timing of media releases, planned events, and meetings. A working group for the communication and education actions of the project for monitoring, coordinating and execution of the dissemination actions will be established at the project (national) and regional level.

Reasons why this action is necessary:

The plan is crucial for the project as it summarizes all communication and dissemination carried out in the project. Communication plan will make it possible to target the project's communication accurately and gives the parties the structure to determine whom we need to reach and how. It will also make project's communication efforts more efficient, effective and lasting. As a long-term plan, it will also help us to map out how to raise projects profile and refine our image in the community over the time.

Constraints and assumptions:

The composing communication plan is not expected to face significant constraints. If we face delays in subprojects, the sticking with the plan might not be possible. Thus, plan will also need to have sufficient flexibility in timing.

Expected results (quantitative information when possible):

- Accurate, effective and long-lasting communication throughout the project
- Increase in stakeholders and public awareness towards conservation of N2000 sites

Cost estimation:

This actions includes minor personnel costs from MH (app. 4 180€) for the first months of the project. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the temporary staff.

Note that we will also engage communication experts from other core organisations and from local coordinators for the preparation of the communication plan in order to quarantee high quality and good coordination in communication of the project.

Deliverables:

- Communication plan for the FRESHABIT (31.05.2016)

Milestones:

- Communication plan for the FRESHABIT composed (31.05.2016)
- Effective communication carried out throughout the project (30.9.2022)

C. Concrete (conservation/implementation) actions

ACTION C.1: River basin management

Beneficiary responsible for implementation:

This action is carried out the following beneficiaries at the project areas SMK, MH, POKELY, KESELY

Description (what, how, where and when):

River basin management is often a necessity for improving the conservation status and ecological status of freshwater and marine habitats. Activities and land use in the catchment area have effects of waters, e.g. by increased nutrient loading and disturbed hydrology that cannot be overcome by management that affects only the aquatic habitat, such as actions C3-4 and C6-C9 of FRESHABIT. Therefore, catchment area effects on water bodies are controlled by catchment area actions C1, C2, or C5.

In action C1, river basin management is divided into three subtasks, depending on the objectives of the management. In task 1 the focus is mostly in improving the status of the targeted aquatic habitats, whereas in tasks 2-3 enhancing the biodiversity value of the restored or ameliorated catchment areas is an equal goal to improving water quality.

Task 1: Restoration of catchment areas (SMK)

Restoration and management of catchment areas situated mostly near present Nature 2000 areas are considered to be restored in aim to diminish the load of nutrients, suspended soil solids and organic matter in the Koitajoki. The area restoration focuses on Ala-Koitajoki catchment area covering an area of 3 560 hectares. At Naamijoki actions to control the load from forestry will be made on an area affecting app. 500 ha. The actions consist of app. 30 water protection measures. The action will be implemented by blocking ditches and similar water protection measures in privately owned areas that are not protected. The task will be completed by the end of 9/2021.

The catchment area actions in Ähtävänjoki are made in the complementary project. Only the planning is done in the LIFE project (See action A3).

Task 2: Restoration of former peat harvesting area (KESELY)

Former peat harvesting areas usually cannot be restored into natural-like peatlands in short to medium term time scale. However, environmental loading from the peat mining areas can be diminished and their biodiversity values enhanced considerably by revegetation and rewetting. In action C1a former peat mining area right next to a valuable peatland Natura 2000 site (Haapasuo-Syysniemi-Rutajärvi-Kivijärvi, FI0900074), and draining into the Päijänne project area, is restored by rewetting. Rewetting by raising water level requires a legal permit applied within A3, and the permit is assumed to be given by the end of 12/2019. Thus, the task will be completed by the end of 9/2021.

Restoration area is 50 ha.

Task 3: Peatland restoration (MH, POKELY, SMK)

Peatlands, including groundwater dependent habitats in ravine peatlands (especially in Koitajoki), will be restored in protected areas to enhance their biodiversity, in addition to having positive effects on the target water bodies. Restoration is implemented using best practice methodology tested in earlier projects and according to recent national guidance on peatland restoration. These include the blocking of draining ditches and removing excess tree growth using heavy machinery, and smaller-scale and cautious action around delicate groundwater-dependent habitat patches. They aim at restoring the hydrology of the peatland and the associated groundwater and surface water balance, and reducing environmental loads to downstream freshwaters. The task will be completed by the end of 12/2019.

Peatlands are restored in four project areas:

- Naamijoki 140 ha
- Isojoki 120 ha
- Karvianjoki 30ha
- Koitajoki 969 ha

Monitoring of the outcome of this action, both physiological and biological, is done in actions D1-5. Some sites already have up-to-date technical plans which will be utilized. For others, detailed planning is done in action A3.

Reasons why this action is necessary:

Catchment area restoration is in many cases a prerequisite for improving the quality of an aquatic habitat. In addition to improving the status of the freshwater habitats downstream to the managed catchment areas, this action also improves the status of peatlands, as deemed necessary in priority measures for wetland habitats and species (PAF pp. 41-43).

Constraints and assumptions:

Acquiring the legal permits sometimes takes long time and this may delay the completion of the actions.

Expected results (quantitative information when possible):

- App. 4 060 ha of catchment area in Koitajoki (3 560 ha) and Naamijoki (500 ha) rehabilitated to the necessary degree
- App. 1 259ha of peatland habitats in protected areas and areas affecting them restored.
- One former peat harvesting area of 50 ha restored into a bird wetland in Haapasuo

Cost estimation:

This costs include personnel cost for supervising the restoration work from SMK, MH and POKELY. Majority of the costs are carried out by subcontractors and the costs have been estimated on the previous restoration projects. The total costs for the action is 693 118€ and therefore the average cost per hectare affected is app. 150€. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- 50% of the peatlands restored at Koitajoki (31.12.2017)
- 50% of the catchment area restoration at Koitajoki completed (31.12.2018)
- Peatlands and banks restored at Naamijoki (31.12.2019)
- All peatlands (969 ha) restored at Koitajoki (31.12.2020)
- Peatlands (150 ha) restored at Isojoki and Karvianjoki (31.03.2021)
- Former peatland harvesting area (50 ha) restored (30.09.2021)
- Catchment area restoration completed affecting 3 560 ha at Koitajoki (30.09.2021)

ACTION C.2: Controlling environmental loading

Beneficiary responsible for implementation:

This action is carried out the following beneficiaries at the project areas SMK, MH, POKELY, ESAELY, VVK, LUVY

Description (what, how, where and when):

The Action C2 concentrates on establishing several water protection measures in water basins. The main object of these measures is to prevent an increase in leaching of solids and nutrients with runoff from forestry, agriculture and other land use, and to clarify runoff as effectively as possible. Thus, all these measures contribute importantly in achieving more favorable ecological and conservation status as stated in HD and WFD. In Finland, also the national legislation requires practitioners to use best available water protection measures.

Standard water protection measures taken up by practitioners include the basic structures of ditch network maintenance (silt traps, breaks in cleaning and digging, sedimentation basins), buffer zones, and minor overland flows. If necessary and conditions permitting, additional measures such as overland flow fields, flow control and submerged dams as well as wetlands are used.

The target sites to implement several water protection measures within FRESHABIT are Rivers Naamijoki (conversion of canals into wetlands along 5km), Karjaanjoki (marketing of buffer zone establishment along the critical parts of the river), Isojoki (at two catchment area covering 2 500 ha each measures targeting forestry), Koitajoki (measures targeting forestry, 27 ha flood plains), and also the areas of Vanajavesi (targeting both agricultural and forestry loads, drainage basins on 4 sites, chains of submerged weirs on 2 sites, erosion control structures on 3 sites) and Puruvesi (targeting both agricultural and forestry loads, 12 ha new floodplains and 55 action locations with e.g. sedimentation pits, peak runoff control).

At Puruvesi we will also test a new compensation system for landowners. SMK will pay one-off compensation payment to the private landowners on whose land the actions are carried out if the landowner is not voluntarily not willing give his/her land for measures. The compensation covers only the area directly targeted by action. The compensation has three objectives: increasing willingness to make the water protection measures, providing small incentive so that measures can be targeted to the most critical spots and guarantee that the investment is sustained as the one of compensation is made on condition that the structure is secured for the period the investment functions (i.e. for at least 30 years). The estimated area covered by the compensation is 20 ha and the costs 30 000€. The average hectare costs is only 1 500 €, which is most of the cases well below the value of land. The compensation scheme will be operational through out the project period after which an analysis id made and also suggestions for the possible use of such scheme in other parts of Finland.

All technical planning is done as part of Action A3 (if plans are not made prior to the project), and monitoring is done as part of Actions D1, D2, D3, and D5. Further, collected data is used in action A1, which aims in combining the national integrated model for river basin management.

Reasons why this action is necessary:

Sediment and nutrient control in water basin areas is crucial in reducing human-induced environmental loading in waters and that way accomplishing more favourable conservation status of water habitats in N2000 areas. Thus, this action provides a direct link between habitat and species conservation in FRESHABIT. Environmental loading has been recognized to severely deteriorate the habitat of freshwater pearl mussels among other aquatic species listed in annexes of HD and to alter the balances of all levels of the lacustrine ecosystems. Following this, all measures decreasing loading from water basins are needed.

Constraints and assumptions:

Constraints on executing water protection measures at its largest scale may be set by private land owners in Vanajavesi area. However, within the preparatory work in A3 this aspect is taken in consideration.

In Isojoki, the sites for standard and additional water protection measures are not yet defined, but there are many potential areas for measures, which will guarantee the implementation of planned actions. For the measures (includn also the removal of the dam, actions to reduce flooding and habitat restorations) in the Villamo area (Isojoki) the water permit is needed, but due to agreements with land- and water owners there should not be any problems (estimated time for permit granted December 31th, 2016).

Expected results (quantitative information when possible):

The actions will improve the conservation status of water habitats by reducing the environmental loading and metals into waters (Clearwater oligohumic lake Puruvesi, Oligotrophic waters containing very few minerals of sandy plains and Natural eutrophic lakes with Magnopotamion or Hydrocharition -type vegetation in Vanajavesi area, Isojoki; as stated in EU Habitats Directive).

These measures will also improve the status of freshwater pearl mussel populations and other aquatic species in riverine habitats.

- App. 27 hectares of wetlands and vegetation flooding areas built in Koitajoki
- At Isojoki area measures are directed to 2 catchment areas of ca. 2500 ha each
- At Puruvesi, app. 12 hectares of restored floodplains with several water protection measures constructed and 55 units of other water protection structures (sedimentation pits, peak runoff control etc.) constructed, compensation scheme implemented on 20 ha of privately owned areas to guarantee the long term sustainability
- At Naamijoki conversion of canals into wetlands along 5km at Teuraoja, Kivijärvenoja
- At Karjaanjoki marketing of buffer zone establishment along the critical parts of the river

Cost estimation:

This costs include personnel cost for supervising the restoration work from SMK, MH, POKELY, ESAELY, VVK, LUVY. Majority of the costs are carried out by subcontractors and the costs have been estimated on the previous restoration projects. This action also includes 30 000€ for compensation payments for 20 ha targeted by measures at Puruvesi. The hectare cost of 1 500€ is reasonable and well below the average hectare price of tree stands in the area. More information on the cost estimation is in the table annexed after the C-action descriptions.

Deliverables:

- Report on the compensation scheme implemented at Puruvesi (31.08.2021)

Milestones:

- Series of wetlands constructed in Naamijoki (31.12. 2018)
- Two catchment areas where wide range of actions (wetlands (1-5), methods for water protection (1-5), removing of sediments, and in-stream restoration) have been executed in Isojoki (31.03.2019)
- Compensation made to 5-10 landowners (20 ha) at Puruvesi for allowing and securing actions on their land (31.05.2021)
- Drainage basins on 4 sites, chains of submerged weirs on 2 sites, and erosion control structures on 3 sites established in Vanajavesi (30.09.2021)
- 27 hectares of wetlands and vegetation flooding areas built and 55 units of other water protection structures (sedimentation pits, peak runoff control etc.) constructed in Koitajoki (30.09.2021)

ACTION C.3: Improving ecosystem integrity

Beneficiary responsible for implementation:

LUKE is in charge of action and others participate in their respective areas: LUVY, Raase, EPOELY, VARELY, Vatten

Description (what, how, where and when):

Connectivity or more precisely the isolation is considered to be one of the most primary factors influencing the distribution of species. In riverine environments, a single barrier immediately isolates contiguous river segments and causes the loss of successional trajectories in watercourses. Such habitat alteration is hazardous, as the associated modifications of the natural flow alters the essential habitat of several species, and often favor generalist species over specialists and thus triggers the loss of biodiversity. The isolation of habitats is also among central causes in declining populations of migratory fish in Finland. Due to this lack of migrating host fishes and/or poor water quality, almost all freshwater pearl mussel populations in southern Finland are non-viable and non-reproducing, and the populations are in danger of extinction.

Action C3 consists of the restoration of ecosystem integrity. The concrete actions of it are either removing a barrier (Isojoki), or reconnecting the previously isolated riverine segments by constructing natural-like side channels or fishways (Karjaanjoki (2), Kiskonjoki (2), Saarijärven reitti (2)). The Saarijärven reitti already have up-to-date technical plans which will be utilized, but other target areas require further planning or updating the existing plans, and applying the permits (action A3).

The concrete implementation of restoration work is part of Action C3. The restocking of freshwater pearl mussels will take place in suitable habitats of the natural-like fishway in Karjaanjoki as part of Action C9.

As part of Action C3, also the other measures to support the positive effects of ecosystem integrity in different phases of the work will be done. For example, the investigations of the natural migration routes of the migratory fish for better planning of the fishway entrance, and supportive fish stocking to strengthen the natural stocks are essential in accomplishing the overall objects in reconnecting the previously isolated habitat systems. The monitoring of effectiveness of concrete actions on ecosystem functioning (the calculation of migrating adult fish) will be done as part of the Action D2, and on biodiversity as part of Action D1 (the density of juvenile fish). The freshwater pearl mussels are monitored yearly for the first five years for their survival as part of the Action D1.

Conceptual plans for Karjaanjoki fishways will be compiled prior to start of FRESHABIT allowing preparatory A3 and concrete C3 actions to include compiling technical plans, applying legal permits, tendering and constructing three fishways. Depending on technical plans to be executed and related results of tendering for construction, FRESHABIT budget limit for Karjaanjoki region will set constraints allowing potentially the construction of 2 fishways. According to the financial plan compiled and status of current commitments (beyond FRESHABIT), the construction of the third of the planned fishway will be funded by municipalities (City of Lohja, City of Raasepori) and the hydropower plant owner (Koskienergia Ltd.). Funding is available also from other private and public sector actors and funding instruments.

Reasons why this action is necessary:

Improving ecosystem integrity is essential part of improving the status of targeted Natura 2000 areas with connectivity problems. As Atlantic salmon or brown trout are known to be the only species accepted by freshwater pearl mussel to serve as host species for their larvae, enhancing salmonid populations will directly support also the indispensable part of freshwater pearl mussel life cycle.

Constraints and assumptions:

Acquiring the legal permits sometimes takes long time and this may delay the preparation of the actions. Based on preliminary survey from parties however, obtaining these permits should not be a problem. In addition, severe droughts or other deviant hydrological events that lead e.g. to poor water quality after restocking, may result in large mussel mortality. Topography, current infrastructure, Finland's National board of antiquities or local museum actors and landowners (despite negotiated tentative commitments) may set constraints on executable technical plans of fishways.

Expected results (quantitative information when possible):

We expect the major increase in ecosystem integrity and longitudinal connectivity in particular of our target areas, and thus the improvement of ecosystem functioning and biodiversity in N2000 areas. This will be achieved through the following sub-steps:

- One major barrier removal in River Isojoki-Lapväärtinjoki (mean flow at the dam 1,6 m³/s). This will open access to about 22 km of the riverbed and to 18 km of tributaries for migratory fish species and enhance especially the vulnerable sea trout stock in the river. In connection to the elimination of the migration barrier at Villamo, 700-800 m of rapids will be restored, further enhancing possibilities of trout re-establishment. Freshwater pearl mussel populations in the upper courses of River Isojoki-Lapväärtin are probable, but not yet confirmed. Within the project the area will be surveyed and any population above the barrier will benefit from the removal of the barrier.

- Two fishways (with natural-like bypass sections) constructed to Saarijärvi watercourse (mean flow 21-29 m³/s, and in the fishways 0.38-0.43 and 0.36-0.43 m³/s). This will open access to 100 km of watercourse for migratory species. These fishways will allow freshwater brown trout, whitefish, ide and other fish biota to move to the Saarijärvi watercourse and within the Saarijärvi watercourse past migratory barriers that have been there since the 1960's. The total length of the migration area will be 300 km including the major feeding area (Lake Päijänne).
- Two fishways constructed to Karjaanjoki (mean flow 19 m³/s, 0.5-0.65 m³/s flow to fishways). This will open access to 23 km of main stream and to 23 km of small tributaries for migratory species. Several migratory fish species are expected to use the fishways. For the restoration of freshwater pearl mussel the return of juvenile salmonids to the river is an essential factor.
- One natural-like side by-pass channel and one fishway constructed to Kiskonjoki (mean flows 4-6 m³/s, more than 0.5 m³/s flow to both fishways). This will open access to 19 km of main stream, several tributaries, and two lakes. Salmon, sea trout and other migratory species are able migrate back to the river. Seminars presenting the results to stakeholders and the general public: 1-2 per area.

Cost estimation:

This costs include personnel cost for supervising the restoration work from LUVY, Raase, EPOELY, VARELY, Vatten and LUKE. Majority of the costs are carried out by subcontractors and the costs have been estimated on the previous fish way projects. The external assistance costs for the removal the barrier at Isojoki is 80 000€ and the costs for other natural-like side channels are on the average 222 000€. This action also include purchase of equipment needed for the exact site selection of the channels. More information on the cost estimation is in the table annexed after the C-action descriptions.

Deliverables:

- Report of migratory fish behaviour and habitat use below hydropower plant in relation to discharge in River Karjaanjoki (31.12.2017)
- Report demonstrating the efficiency of different constructions passing migratory barriers (30.09.2021)

Milestones:

- Permits granted for the restoration- and flood control measures in the Villamo area in Isojoki (31.12.2016)
- Transfer of the environmental permits and use rights to the state, the last phase completed in Isojoki (31.12.2017)
- Tendering for construction is carried out for two fishways in Karjaanjoki (31.12.2017)
- Specific and technical plans are obtained for third fishway in Karjaanjoki (31.12.2018)
- Legal permits for both fishways in Saarijärven reitti (31.12.2018)
- Environmental permits for third fishway in Karjaanjoki (31.07.2019)
- The dam removed and flood control measures completed in Isojoki (31.12.2019)
- First fishway has been constructed in Karjaanjoki (31.12.2019)
- Tendering for construction is carried out for third fishway in Karjaanjoki (31.12.2019)
- Second fishway has been constructed in Karjaanjoki (31.12.2020)
- Captivity reared Freshwater pearl mussels are ready for release to suitable areas in natural-like fishway in Karjaanjoki (30.06.2020)
- Both fishways constructed and working in Kiskonjoki (31.12.2020)
- First fishway completed in Saarijärven reitti (31.05.2020)
- Construction of third fishway has started in Karjaanjoki (30.09.2021)
- Second fishway completed in Saarijärven reitti (30.09.2020)
- All concrete actions completed in Saarijärven reitti (30.09.2021)

ACTION C.4: In-stream habitat restoration**Beneficiary responsible for implementation:**

LUKE is in charge of the action, and others participate in their respective areas: LUVY, EPOELY, LSPPo, VARELY, VVK, MH, POKELY, POSELY

Description (what, how, where and when):

Dredging for timber floating and channelization due to flood protection has widely affected the physical habitats in river. The ability of rivers to sustain their natural aquatic community has decreased. In addition, some slow flowing streams have overgrown due to sedimentation and macrophyte stands. Old partly demolished, dam structures have a negative effect on stream habitat. Action C4 includes the work needed to restore the in-stream physical habitat. The action is part of the catchment wide restoration measures in FRESHABIT. The aim is to focus on all relevant human pressures in restoration work to improve the status of rivers. Action C4 focuses on in-stream habitats.

Physical habitat restoration is done to restore water velocities, water depths and substrate size to fit the requirements of the species community. Different size/age classes of juvenile salmonids, for example, prefer divergent physical conditions. In the restoration water velocities, substrate size and water depth are modified to support all relevant age classes. This will also benefit the whole aquatic community. Freshwater pearl mussel and juvenile salmonids have rather similar habitat requirements for bottom substrate and water quality. Special attention is paid to restore stream areas suitable for freshwater pearl mussel (at Karjaanjoki, actions on 25 river sections area and Ähtävänjoki on 3 river sections). Spawning areas are restored by adding suitable amounts of natural spawning gravel to laminar water velocities Koitajoki the action aims at improving the spawning habitats in multiple locations on a 24 km stretch for densely-rakered whitefish (*Coregonus lavaterus f. nilssonii*) and on 16 km for *Salmo salar m. Sebago*, totaling an area of ca. 8 ha. For densely-rakered whitefish suitable spawning and larval habitats are created with gravel and for *Salmo salar* by transferring aquatic mosses. Overgrown (Kukkia and Tyköljänjärvi) streams will benefit from dredging and streams with old dams will benefit from reconstruction which takes into account the migration of fish population. In Kiskonjoki (2 km at Anerionjoki, Kurkelanjoki, Varesjoki), Karvianjoki (11 km at Pukanluoma, Aunesluoma, Peuraluoma, Paholuoma, Myllykeitaanoja-Vesinevanoja, Saunaluoma, Lohipuro, Latikanoja, Kirkkoluoma, Ristilänluoma), and Isojoki (several locations to be detailed in A3) restoration work is focused to the headwaters. Spawning gravel and large woody debris (LWD) will be added to headwater streams. At Karvianjoki and Isojoki LSPPo also organises events for volunteers to attend the restoration of the streams.

Some sites already have up-to-date technical plans which will be utilized. Applying legal permits for physical habitat restoration is the work of Action A3. General and technical plans will be compiled and/or updated. In-stream restoration plans will be executed on the condition of available resources, legal permits and landowners consent. Applying landowners consent is work of Actions E1 and C4.

Monitoring of the outcomes is done in Actions D1, D2, D3 and D5.

Reasons why this action is necessary:

In-stream habitat quality is, together with the catchment attributes, basis for the natural and healthy aquatic community. Restoring in-stream flowing habitats improves the status of the Natura 2000 areas with problems in the physical structure of habitats. This will allow the natural reproduction of salmonids and other aquatic species. The conservation of freshwater pearl mussel (Action C9) requires the presence of salmonids juveniles as hosts.

Constraints and assumptions:

Acquiring the legal permits sometimes takes long time and this may delay the preparation of the actions. However, the permit processes will be initiated at early stages of the project giving sufficient buffer time. The key authorities are also participating to the project, which makes the permit process easier. Consent of landowners may hinder and/or prolong start of restoration work at some sites. Most of the land owners have been contacted before the project.

Expected results (quantitative information when possible):

The action will improve habitats and enhance the reproduction potential for FPM, migratory fish populations, and other stream biota as follows:

- Karjaanjoki: Ten in-stream sites at the Upper Karjaanjoki area and 15 in-stream sites at the Lower Karjaanjoki river system restored to benefit the FWPM and host species, totaling ca. 5,4 km of stream length
- Ähtävänjoki: 3 sites of potential Fresh water pearl mussel habitat restored, totaling ca. 6 ha
- Koitajoki: spawning and larval habitat improved, totaling ca. 8 ha
- Vanajavesi: clearing overgrown streams at Kukkia and Tyköljänjärvi, totaling ca. 0,8 km of stream length
- Isojoki: 5,5 km rivers and brooks restored
- Kiskonjoki,: 2 km of the river channel restored
- Karvianjoki: 11 km of the river channel restored

Cost estimation:

This costs include personnel cost for supervising the restoration work from LUVY, EPOELY, LSPPo, VARELY, VVK, MH, POSELY. Majority of the costs are carried out by subcontractors and the costs have been estimated on the previous river and brook restoration projects. The costs are app. 6 200 per restored km. The consumable materials include mainly gravel for some of the restoration sites at Isojoki and Karvianjoki and water binoculars for action targeting at Kiskojoki. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- In Ähtävänjoki, 300 m (3 sites) of potential Fresh water pearl mussel habitat restored (31.12.2019)
- In Isojoki, 5,5 km restored (In Ähtävänjoki, 300 m (3 sites) of potential Fresh water pearl mussel habitat restored (31.12.2019)
- Vanajavesi area: In Lakes Tyköljänjärvi and Kukkiänjärvi one inflowing stream in each restored (31.12.2020)
- Ten in-stream sites at the Upper Karjaanjoki area and 15 in-stream sites at the Lower Karjaanjoki river system restored (30.09.2021)
- In Kiskonjoki, 2 km of the river channel restored (30.09.2021)
- In Karvianjoki, 11 km of the river channel restored (30.09.2021)

ACTION C.5: Improving riparian connectivity**Beneficiary responsible for implementation:**

This action is carried out the following beneficiaries at the project areas EPOELY, VVK

Description (what, how, where and when):

The Action C5 concentrates on improving riparian integrity by restoring floodplains and decreasing human-induced sedimentation into rivers. Thus its objective is twofold: sediment control is important in improving status of riverine ecosystems and protecting the biodiversity of species and habitats, but landscaping is also crucial in terms of reducing flood risk in populated areas. The EU Floods Directive (2007/60/EC) requires all Member States to assess water courses in risk from flooding, and to take adequate and coordinated measures to reduce this flood risk in coordination with the WFD. It also emphasizes the involvement of public in planning progress and decision-making.

Task1: The first object in sediment control takes place in Vanajavesi area, more closely in Lake Ansionjärvi (FI0305003) and its water basins (habitat type of transition mires and quaking bogs). Water basin of Lake Ansionjärvi is mostly used in agricultural purposes and due to its flatness, the basin faces regular snowmelt-induced flooding of River Teuronjoki in springtime. This is seen as increased sediment and nutrient loading from year to year in Lake Ansionjärvi and important waterfowl habitat (FI0303017) downstream. The management plans of sediment control are already composed, and FRESHABIT concentrates on executing them. The survey of critical sedimentation points in River Teuronjoki is already done and further actions focus on composing the technical report on required concrete actions and implementing them.

Task 2: The second object of Action C5 in restoring floodplain takes place in Isojoki area, which experienced extreme flooding in years 2012 and 2013. The flood risks have been assessed and parts of the Isojoki river basin are to be classified as areas where significant risks of flooding exist (according to the Directive on the assessment and management of flood risks;2007/60/EC).

Concrete actions to decrease the risks of flooding include the removal of Villamo dam (as part of Action C3) after which it is still necessary to construct check dams in large pools upstream of it and a floodplain and widening of the river channel by replacing the old bridge by a new one with wider span. These are done in action C5. Monitoring of these Actions C3 and C5 will be done as a part of Actions D1, D2, and D5.

Reasons why this action is necessary:

Sediment control in Lake Vanajavesi area is essential in accomplishing more favourable conservation status of important water fowl habitat and thus provides a direct link between habitat and species conservation in FRESHABIT. Actions to reduce the risks of flooding, like the construction of a flood plain, are, according to the EU Floods Directive, mandatory in Isojoki, but they will also benefit the freshwater pearl mussel, which inhabits the upper courses of the river. By removing the last outstanding migration barrier in the river, Villamo dam, the migration of salmonid populations will be enhanced. This will directly support the indispensable part of freshwater pearl mussel life cycle. By actions that reduce the sediment load (also implemented in e.g. actions C2) fresh water pearl mussel habitats and reproduction areas for trout will be improved in both upstream and downstream of the Villamo dam.

Constraints and assumptions:

For the measures (incl. removal of the dam, actions to reduce flooding and habitat restorations) in the Villamo area (Isojoki) the water permit is needed, but due to agreements with land- and water owners there should not be any problems (estimated time for permit granted December 31th, 2016). Solving the conflicts between measures dealing with the flooding, water protection and nature conservation is demanding in Isojoki area (Action A4 or A10). The action aims to drawing up an integrated multi-stakeholder management plan for Isojoki river basin. The process includes the participating of large range of stakeholders into dialogue aiming to find solutions for management that every party is willing to accept.

Expected results (quantitative information when possible):

The actions will improve the conservation status of water fowl habitats as stated in EU Habitats Directive and status of freshwater pearl mussel population in concern. They will also contribute importantly to implementing the EU Floods Directive in Finland.

As measures in Vanajavesi area are still in planning-phase, the direct results are yet to come. However, the increase in riparian integrity of our target areas can be expected, and thus the improvement of ecosystem functioning and biodiversity in N2000 areas and increase in flood control. This will be achieved through the following sub-steps:

- Constructing check dams, floodplain and widening of the river channel in Isojoki
- Increased habitat for freshwater pearl mussel and other aquatic biota
- Enhancement of migratory fish populations

Cost estimation:

The actions in Vanajavesi are small scale actions with only cost of 10 000€. Majority of the costs are linked to the external assistance costs at Villamo area. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- Permits granted for the restoration- and flood control measures in the Villamo area in Isojoki (31.12.2016)
- Transfer of the environmental permits to the state as one of the complementary projects (31.12.2016)

•

- Isojoki: The dam removed, the flood control measures and habitat restorations completed (31.12.2019)
- Vanajavesi: Water protection measures implemented (31.09.2021)

ACTION C.6: Demonstration methods for stream habitat restoration

Beneficiary responsible for implementation:

OU and LUKE are in charge of coordinating this Action, and EPOELY has responsibility on implementing the concrete restoration actions

Description (what, how, where and when):

The WFD river basin management plans base management decisions on the response of aquatic organisms to environmental stress. In contrast to the effects of degradation, the biotic response to restoration is less well-known and poorly predictable. Thus, future challenges of WFD include intensive monitoring of restoration measures to understand the requirements for ecosystems to recover and prioritization of measures.

Traditionally, stream restorations are based on the premise that if in-stream habitat heterogeneity increases, organisms will recolonize the restored habitat, that is, physical and biological improvements are related. Using this assumption as a guideline, fisheries management has a long tradition of constructing in-stream structures, such as weirs, flow detectors and boulder dams. However, recent evidence in boreal streams suggests that despite the substantial improvement of the physical habitat, biotic responses are weak in most species groups. With limited resources and funding, this contradiction warrants the improvements on traditional restoration methods and turning emphasis more towards restoration of other vital parts of stream ecosystem, such as functioning of communities. Ultimately, positive effects in biodiversity and ecosystem functioning would reflect into more favorable status of biodiversity and human well-being.

In action C6 high amount of large wood (LW) will be added in traditionally-restored (i.e. restored by flow detectors to remove human-induced fine sand from streams) streams along with transplanting of aquatic mosses. The addition of wood has been tested in a laboratory experiment to offer the best long-term solution to improve retention efficiency of organic matter (mainly autumnal leaf-fall in boreal streams). Aquatic mosses have been demonstrated to provide valuable habitat for stream invertebrates and enhance leaf retention capacity. By this action, we aim to restore the functioning of communities from bottom-up, and thereby having far-reaching effects in the whole stream ecosystem. This action will be implemented in Isojoki basin, and partly in Karvianjoki basin.

Preparation of work plans and final selecting of suitable demonstration sites will take place in winter 2016 (action A3). The pool of potentially suitable sites already exists, but it needs focusing, and collecting all available background data. The objective of this preparatory action is to select 8-12 traditionally restored stream sections with length of ca. 300 meters. The quality and land use in basins of these rapids or riffle sections in streams should be as similar as possible. As it has been stated that studies assessing restoration success should have a "double control", being related to both degraded and natural references, we will also select 4-6 near-pristine, physically non-modified reference streams for intensive monitoring of effectiveness of the demonstrative method. All beneficiaries will take part on this selection procedure.

Large trees with root wads will be placed into half of traditionally restored sites (4-6 sites). Large wood is lacking from boreal streams due to their channelization for timber floating, and also the present guidelines for forest management. At the same time, rock-attaching aquatic mosses will be transplanted into same sites from the streams nearby. This action will take place in summertime 2016-2017, and will be implemented by EPO-ELY.

In order to evaluate the effectiveness of demonstrative restoration method, we will carry out an intensive monitoring in all sites (demonstrative restored, traditionally restored, and reference sites). This monitoring will follow our set of indicators defined as “intensive monitoring indicators” (D1-D3). Several biotic groups (e.g. fish, macroinvertebrates, aquatic and riparian vegetation), functional parameters (e.g. primary production, leaf litter decomposition), and hydrochemical parameters (e.g. water table elevation, water chemistry) will be used to study the impact of the demonstrative method. Monitoring of parameters will start 1-2 years before restoration actions and continue in 1-3 consecutive years. Thus, our demonstrative study will follow a space-time-substitute design, where monitoring and each action are replicated in space. Intensive monitoring will be carried out by OU and LUKE.

Reasons why this action is necessary:

Enhancing the habitat heterogeneity by adding large wood and aquatic mosses will increase the suitable habitat for various stream organisms, and also create a more favourable conservation status for aquatic and terrestrial species. The contradictory results from traditional restoration methods warrant the improvements in order to fulfill the objectives of HD and WFD.

Constraints and assumptions:

Although we already have a pool of possible sites, selection process of them must be done with extra care. Stream ecosystems are prone to among-site natural variation, and biological responses might therefore be challenging to detect unless the sites are otherwise similar enough but selected actions.

Another constrain is, that biological responses to restoration may be slow, and therefore concrete actions may not produce detectable biological effects during the project. Also, among-year variation in climatic parameters increases uncertainty of results, and different study years are not always comparable. As a solution to this, indicators for both short and long term responses to restoration actions are monitored and results interpreted with care.

Expected results (quantitative information when possible):

The length of demonstratively restored stream sections through action C6 will be ~1,5km.

We expect to accomplish a more favourable and natural conservation status of the target habitat, “*Water courses of plain to montane levels with Ranunculus fluitantis and Callitriche-Batrachion vegetation*” (3260) of the Annex I of the Habitat Directive (HD). This will be achieved through the following sub-steps:

- increased retention of water and organic matter
- enhancement of suitable habitat for aquatic and riparian species – a benefit for biodiversity
- increased variation in habitats
- increased functioning of stream communities

This action will also provide further knowledge for EU members to use in riverine restorations as stated in WFD.

Cost estimation:

This is a development actions in which novel restoration methods are tested in Pohjanmaa. The tests are planned, carried out and results monitored by the river restoration experts from OU and LUKE. Also the EPOELY takes part in the implementation of the restoration measures. The results are presented in separate report and also in scientific article requiring extensive working effort. Therefore this action includes only personnel and travel costs. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- All necessary stream sites selected and confirmed in field (30.06.2016)
- Pre-monitoring of concrete actions carried out (31.08.2017)
- Concrete restoration actions implemented (31.07.2017)
- Post-monitoring of concrete actions carried out (31.10.2019)

ACTION C.7: Bird wetland habitat restoration**Beneficiary responsible for implementation:**

This action is carried out by the following beneficiaries at the project areas EPOELY, ESAELY, KESELY, MH, VVK

Description (what, how, where and when):

Bird wetlands are coastal or freshwater habitats that are usually rich in nutrients and thus productive, and maintain diverse and abundant waterfowl communities. In addition to waterfowl, bird wetlands harbour a number of vertebrate (e.g. Moorfrog, *Rana arvalis*, 1214) and invertebrate (e.g. darter dragonflies *Leucorrhinia albifrons*, 1038, and *Leucorrhinia pectoralis*, 1042) species of the HD Annexes II and/or IV. Freshwater bird wetlands are usually considered as HD habitat type “*Natural eutrophic lakes with Magnopotamion or Hydrocharition –type vegetation*” (3150) and they are characterized by abundant and often also diverse vegetation. Bird wetlands have often been created by anthropogenic enrichment or lowering of the water table for gaining farming and pasture area. Usually they are also threatened by excessive and ongoing eutrophication and overgrowth, which gradually changes the habitats unsuitable for waterfowl and other typical species. Therefore, bird wetlands usually need human intervention in the form of e.g. grazing, mowing, nutrient control, and active management of the aquatic habitat to keep the designated sites at the desired state of succession.

In this action C7 bird wetlands (including small lakes and eutrophicated bays of larger lakes) are managed actively by means that effect the aquatic habitat (tasks 1-2) or the immediate vicinity of the habitat (task 3). Some sites already have up-to-date technical plans which will be utilized. For other sites plans for the action are done and legal permits applied for in action A3. The action is divided into three subtasks, depending on the methodology used:

Task 1: Raising the water table

Water table will be raised in project areas Naamijoki (3 lakes), Isojoki (1 lake), Saarijärven reitti (3 lakes) and Päijänne (1 lake) by damming the channelized outlets of lakes that have been earlier lowered. All target lakes are within Natura 2000 sites and locally important for catchment area management. The action aims at improving the status of the lake habitats, and also at rewetting the surrounding peatlands and enhancing the water retention capacity of the catchment. The action is done using machinery. The timing varies between the lakes, and the task will be completed by the end of 9/2021.

Task 2: Eradication of aquatic vegetation

Removal of excess macrophyte biomass will be done by dredging and mowing and removing most dense vegetation in bird lakes and bays in 13 separate Natura 2000 areas (8 sites at Vanajavesi, 2 sites at Puruvesi, one site at Saarijärven reitti, one site in Naamijoki and one site in Ähtävänjoki). The action aims at improving the status of the lake habitats for their characteristic species by increasing the area and volume of open water habitats, and by increasing the diversity of the habitat. In some cases task 1 and 2 are implemented for the same lakes. The timing varies between the lakes, but the task will be completed by the end of 12/2020.

Task 3: Habitat improvement by near-shore actions

At Vanajavesi supplementary measures to task 2 are implemented in 7 Natura 2000 sites: building cattle fencing on 1 site, cattle pasturing on 1 site, dredging and digging open water areas on 6 sites, riverbed alteration on 3 sites, nesting islets on 5 sites, other nesting structures on 3 sites, hunting for minor predators (American mink, raccoon dog) on 6 sites, removal of trees on 4 sites, removal of blue-green algae on 1 site, reparation of existing dam structure on 1 site.

Monitoring of the outcome of this action, both physiological and biological, is done in actions D1-5. Detailed planning is done and legal permits applied for in action A3.

Reasons why this action is necessary:

Bird wetlands are among the habitats that need restoration actions most urgently, as stated in the priority measures for marine and coastal habitats and species (PAF p. 39). They are also connected to the surrounding catchment as sinks for nutrient loads causing the eutrophication, and sometimes also as sources of nutrients. In the Vanajavesi project area bird wetlands are the main management target, in other areas bird wetlands will be managed as part of the catchment.

Constraints and assumptions:

Acquiring the legal permits sometimes takes long time and this may delay the completion of the actions.

Expected results (quantitative information when possible):

- A total of 8 bird lakes in 8 separate Natura 2000 sites restored by raising the water table.
- A total of 13 bird lakes or bays in 13 separate Natura 2000 sites managed by eradication of aquatic vegetation.
- Supplementary management implemented in 8 Natura 2000 sites.

Cost estimation:

This action is mostly done by subcontractors. The cost estimates are based on previous bird lake restoration project carried out by the beneficiaries of this project. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- Naamijoki: 3 lakes restored in tasks 1 and 2 (30.9.2019)
- Ähtävänjoki: 1 bird wetland restored in task 2 (31.12.2019)
- Puruvesi: 2-3 wetland in bays managed in task 2 (30.9.2020)
- Vanajavesi: 7 bird lakes managed in tasks 2-3 (31.12.2020)
- Isojoki: 1 bird wetland restored in task 1 (30.9.2021)
- Päijänne: 1 bird wetland restored in task 1 (30.9.2021)
- Saarijärven reitti: 3 bird wetlands restored in tasks 1 and 2 (30.9.2021)

ACTION C.8: Improving trophic web functioning**Beneficiary responsible for implementation:**

This action is coordinated by LUKE and implemented in the area by ESAELY

Description (what, how, where and when):

Eutrophication is a major problem in lakes and other still waters throughout the world. Land use in the catchment, especially from agriculture, is the main source of increased nutrient loads. Within time the nutrients are preserved in the lake sediments. Although the nutrient loadings from the catchment are reduced, the internal loading can determine the eutrophication status of a lake. Eutrophication causes increase in lake fish biomass and the fish community moves to the dominance of Cyprinids, e.g. roach and common bream. Dense fish stocks can increase internal nutrient loading and they also make the lake water more turbid when feeding zoobenthos.

The removal of fish is carried out in Puruvesi by removing of dense fish stocks spatially in 2-3 selected target areas using fyke-nets and/or seine nets. In one site solid ground guided fish trap is used. The action is carried out in 2016-2020 with the aim of removing 40-50 tn of fish.

Reasons why this action is necessary:

Restoring lakes nutrient budget is essential part of improving the status of lakes in the Natura 2000 areas with eutrophication problems. Dense fish stocks can hamper the effects of catchment restoration by inducing internal load and bioturbation. Biomanipulation by removal fishing of Cyprinids is needed to support the effects of the actions taken in the catchment area.

Constraints and assumptions:

Fishing effort needed to reduce internal load and bioturbation must be relatively high to achieve sustaining results. Intensive fishing induces high reproduction of fish and the fish biomass increases to the previous level in few years. To prevent this the removal fishing has to be continued for a couple of years.

Expected results:

- We expect that reduction in nutrient loading and increase of water clarity improve the ecosystem functioning and biodiversity in N2000 areas. This will be achieved through the following sub-steps:
- Removal of 40 – 50tn of fish from Puruvesi
- Organizing management fishing to keep the fish stocks balanced
- Seminars presenting the results to stakeholders and the general public.

Cost estimation:

This action is mostly done by subcontractors. The cost per year is app. 11 500€/year. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- Fish removal at Puruvesi started (31.08.2016)
- Fish removal completed at Puruvesi (30.09.2020)

ACTION C.9: Immediate conservation acts of freshwater pearl mussel

Beneficiary responsible for implementation:

MH are in charge of the action, and others participate in their respective areas: VARELY, EPOELY, LUVY, JYU

Description (what, how, where and when):

Freshwater pearl mussel (*Margaritifera margaritifera*; FPM) is among the most endangered freshwater invertebrates in Finland and listed in the Habitat Directive (HD) Annexes II and V, and nationally strictly protected against killing, capturing, transplanting or disturbing individuals. Conservation status of the species has recently been assessed as “Unfavourable-Bad” and declining in the Finnish Boreal region. Furthermore, almost all FPM populations in southern Finland are non-viable and non-reproducing due to lack of migrating salmonid host fishes and/or poor water quality and bottom sediment. Thus, the populations are in critical danger of extinction. Thick shelled river mussel (*Unio crassus*; TRM) is another HD freshwater mussel species listed in Annexes II and IV, assessed to be in “Favorable” conservation status but being protected against disturbance by HD Annex IV. It should be though noted the Finland is one of the only four EU countries with favorable status for thick shelled river mussel.

Aims of this Action C9 are twofold: primarily to revive two of the most vulnerable populations of FPM in southern Finland, and secondarily to consider the welfare of both FPM and TRM in FRESHABIT concrete restoration actions. Target areas for FPM rearing in action C9 are rivers Karjaanjoki (FI0100023) and Ähtävänjoki (FI0800110), where freshwater pearl mussels have been unable to reproduce and complete their life-cycles for decades because of poor quality of the habitat and water and the lack of salmonid fishes (obligate host in FPM life-cycle). Protection of freshwater pearl

mussel populations requires immediate ex-situ conservation actions such as captive rearing parallel to enhancing the status of habitats and possibilities for natural reproduction.

Captive rearing is a method to overcome the bottleneck phases of FPM. First is the stage when the larvae infect and encyst in their obligate fish hosts for up to 8-9 months to grow and develop into juvenile mussel. Second is the period when juveniles – after excysting from the fish host – start their benthic life burrowed deep within the sediment of stream beds. Captive rearing can be accompanied by captive breeding, as in e.g. at the Freshwater Biological Association breeding station in Windermere, UK. In Europe, mussel breeding and rearing stations have been set up in Norway, Germany, Austria, France, Luxembourg and United Kingdom.

Within the FRESHABIT, given the status of populations and the long time span of the process in relation to FRESHABIT schedule (see Fig. C9.1), ex-situ rearing at an existing station is an applicable and safe short term solution. At the same time, increasing knowledge and practical know-how at national level provides long-term support for conservation of the FPM populations in Finland. With respect to the short-term solution, a direct contract has been agreed with the mussel farm at Austevoll outside Bergen, Norway, which is the closest mussel rearing laboratory to Finland. In relation to increasing knowledge and establishing a breeding station in Finland, research and rearing juveniles through the infection phase at the Konnevesi research station (University of Jyväskylä) is carried out. The aim is to test the suitability of available fish host species and strains as the host of FPM in river Karjaanjoki, since currently this information is lacking for that river. Earlier results from river Iijoki catchment by JYU show that there can be remarkable differences between FPM populations with regard to suitable fish host; in one river or tributary only brown trout is accepted as a host by FPM, while in adjacent tributary the Atlantic salmon can be clearly a better host.



Figure C9.1: A schematic overview of the timing of the FPM rearing process, assuming that glochidia are captured in autumn 2016, and showing both the rearing options in Norway and in Finland.

The work directly supports the implementation of the Priority Action Framework for Natura 2000. The work is divided into four subtasks:

Task 1: Transplanting FPM and TRM in restoration sites (VAR-ELY, EPO-ELY, LUVY)

When detected in preliminary surveys for restoration planning (Action A3), FPM and TRM individuals are transplanted from areas where work may disturb them into suitable and safe locations. Both species are known to inhabit rivers Karjaanjoki (lowest main stem river stretch of Karjaanjoki river system) and Kiskonjoki, where transplanting from restoration areas is likely. In addition, FPM has occurred in Isojoki and Karvianjoki, but the current status of the populations is unknown. Mussels may also be transplanted to enhance the viability of population by e.g. concentrating mussels in a sparse population into suitable areas, or moving mussels into tributaries or stream sections with more suitable conditions than those prevailing in their current location.

Task 2: Capture and transport of FPM larvae (MH, EPO-ELY, LUVY, JYU)

FPM larvae are extracted from captured mature female mussels. In order to maintain the genetic variability of the mussel population, glochidia from as many as possible individuals are retrieved (min. >30). The glochidia will be stored and transported to Norway and taken to the laboratory for infecting the obligate hosts, salmonid fishes. The transport of glochidia must take less than 36 hours in order to keep the mussel larvae in a viable condition. Parallel to collecting and transporting glochidia for rearing in Norway, they are also collected and transported to the Konnevesi research station laboratory (JYU) for feasibility studies for rearing FPM in Finland. In addition to salmonid fishes from hatcheries, local salmonid host fishes from the target rivers are also captured and transported to the JYU laboratory for infection studies.

The capture will take place in August-September 2016.

Task 3: Rearing of FPM (MH, JYU)

The Austevoll mussel rearing farm in Norway will take care of rearing 10 000 – 30 000 young mussels per population from delivered glochidia as an external service by contract between MH and Austevoll. Since host status of the two target populations is unknown, both salmon and brown trout will be infected by glochidia from both populations. Moreover, since different host-populations vary with respect to host suitability, three different populations of salmon and three different populations of brown trout will be used as hosts. Mussels will thereafter be reared in artificial river-like systems. In these artificial rivers mussels normally achieve a size of 3.5 mm after one year. At this stage the mussels have undergone metamorphosis and have functional filter apparatus and byssus threads to fasten themselves to surrounding stones in the river beds or in artificial growth chambers placed in the river, functioning as anchors for the mussels. Mussels will then be delivered back, together with the conditioned gravel in flow-through systems built by Plastinvent AS (NO) for the Austevoll mussel farm. Time span from capture of larvae to return is about 20-22 months (see Fig. C9.1).

In parallel, the national feasibility study in Konnevesi research station (JYU) is carried out with similar aims. Local, wild brown trout from river Karjaanjoki catchment, hatchery-reared brown trout and hatchery-reared Atlantic salmon will be infected with glochidia of river Karjaanjoki (Karjaa) FPM in autumn 2016. Infected fish will be maintained at Konnevesi research station where detached juvenile mussels will be collected the next summer to be transplanted to river Karjaanjoki. However, instead of rearing juveniles in laboratory, the juvenile mussels are transplanted in flow-through containers in their natal rivers shortly after detachment from the host fish. Containers are monitored and maintained in the river for 2-3 years until young mussels are released in the river (see task 4). It is also possible to bring some of the infected fish back to river Karjaanjoki in spring, before detachment of FPM glochidia to be kept in cages the river over the period of natural detachment (until late June), so that juveniles drop off from the host fish on a natural river bed. Locations of cages will be marked to be able to monitor the success of the juveniles. If possible, bottom sediment under the cages will be covered beforehand with fine gravel that provides the best habitat for juvenile mussels that live burrowed into the bottom up to 5 years until they become visible on the surface of the sediment.

Task 4: Restocking juvenile FPM (MH, EPOELY, LUVY, JYU)

After the mussels are transported back to their home rivers, they are kept in marble gravel in a flow-through systems (3 units per population), which is dug down in the riverbank for additional two years. Water to the flow-through system is added through a tube with intake in a local part of the river or a tributary, where water quality is expected to be sufficient for mussel growth and survival. Food is added naturally in the system through the water supply, but initially the marble gravel also contains a biofilm which will support food the first week after release. Mussels will be delivered back, together with the conditioned gravel after about 21 months, together with the flow-through system. This system will be monitored and maintained for two additional years before mussels are released into the river with an expected size, between 7 and 20mm. Suitable locations for restocking are decided upon the knowledge gathered in Action A3, and the progress of restoration Actions C3 and C4. Restocking may take place in restored sections of the mainstream or tributaries, or a natural-like fishway (Karjaanjoki), depending on host availability, water quality and availability, and suitability of the streambed for young mussels. Total time span from capture of larvae to restocking in natural conditions is about 44-46 months (see Fig. C9.1), but extra time for growth of mussels may be necessary in either the laboratory or flow-through unit incubation phase. Depending on survival and growth of juvenile mussels in the laboratory and in the controlled flow-through containers in the river, monitoring after release to the natural habitats in the river is possible for one to three years within the FRESHABIT. While monitoring will be continued beyond FRESHABIT, an increased knowledge and know-how on ex-situ rearing will enable rearing of additional mussel generations for ensuring the protection of the Finnish FPM populations.

Reasons why this action is necessary:

This Action C9 provides a direct link between habitat and species conservation in FRESHABIT. FPM is one of the most threatened freshwater invertebrates in the boreal biogeographical region and new conservation methods such as reintroduction are necessary (PAF priority measures for Natura 2000 wetlands habitats and species, p. 41). Furthermore, among other identified PAF priority measures Action C9 is linked to the implementation of the national fishway strategy (p. 40) and restoration of rivers and fish migratory routes (p. 41), and the corresponding FRESHABIT Actions (A3, C3, C4). Being the first attempt to restock juvenile FPM in Finland, this Action will also pave the way for future attempts to breed FPM in Finland.

Constraints and assumptions:

The largest constraints and risks of Action C9 are related to unexpected natural factors in the rearing process. Location of the adult mussels in both target rivers for Tasks 2-3 is known, but the viability of the glochidia is unknown. Uncertainty is also a factor in laboratory rearing phase, and after restocking severe droughts or events that lead to poor water quality or some other unexpected environmental factors may result in large mussel mortality. Implementing the action needs permits from several authorities for handling, transporting and transplanting the mussels. Based on preliminary survey, obtaining these permits will not be a problem and they will be applied for before the start of the project. Even though natural risks for failure exist, action C9 is of utmost importance as a trial to save these two populations, otherwise prone to go extinct in the near future. This action will also aid in setting up a rearing station in Finland by providing experiences from the rearing and restocking process. Furthermore, the aim of regional FRESHABIT projects is to restore habitats and improve water quality for FPM in Actions C1-C4.

Expected results (quantitative information when possible):

- FPM and TRM populations in restoration sites transplanted where necessary.
- 10 000 – 30 000 juvenile mussels bred in the laboratory from each of the two target populations.
- Enough mussels survive in both target rivers to ensure survival, and, on a longer time-scale, natural reproduction of the population if environmental conditions permit.

Cost estimation:

The mapping of the mussels is done at Kiskonjoki, Karvianjoki and Isojoki requiring personnel and related travel costs. The costs for FPM larvae (50 000€) is based on offer from Norwegian rearing station. Collection of the larvae for the rearing is very labour intensive. Also the monitoring of the transplanted larvae requires regular visits to the area. This action is done at two project areas (Karjaanjoki and Ähtävänjoki). More information on the cost estimation is in the table annexed after the C-action descriptions.

Deliverables:

- Report of field work related to FPM collection (30.12.2016)
- Report on host fish specificity and survival of FPM glochidia reared in captivity, and survival after restocking (30.09.2021)

Milestones:

- Glochidia collected and delivered to Norway from both rivers (30.10.2016)
- Glochidia and local host fishes are collected and transported to JYU laboratory for feasibility studies (Karjaanjoki, 30.10.2016)
- Successful rearing of sufficient number of juvenile mussels from both rivers (31.08.2018)
- Restocked larvae ready for release both rivers (30.6.2020)

ACTION C.10: Purchase of land and compensation payments for use rights**Beneficiary responsible for implementation:**

This action is implemented by EPOELY, KESELY, VARELY, SMK at their areas

Description (what, how, where and when):

Purchase for the state and establishing of permanent nature conservation areas at important sites with respect to the protection of headwaters and improving water retention will be made in three project areas at Kiskonjoki, Keski-Suomi and Pohjanmaa. This action demonstrates how voluntary conservation program METSO can be targeted not only to protect forest habitats but also freshwater habitats by protection important riparian habitats along headwaters and other parts of the catchment area. The METSO program is a national voluntarity based protection program for increasing the amount and area of protected valuable forest and wooded mire areas in southern Finland. METSO was launched in 2008 and has recently been prolonged until 2025 (see more at <http://www.metsonpolku.fi/en/index.php>).

Since 2008 altogether 54 400 ha of forests have been protected in METSO program. The record year for the new protected area was 2014 over 8 000 hectares of new permanently protected forest stands. The METSO program is very well accepted among private forest owners. All areas to be protected in this project are currently privately owned and will be established as nature conservation areas according to the Nature Conservation Act. Therefore the areas will receive the highest possible conservation status in Finland.

Pohjanmaa, Isojoki (EPOELY, SMK)

At the headwaters of Isojoki the aim is to find at least 10 hectares of forest stands along the brooks that will be restored in the project (see action C1, C2 and C4). The suitable forest stands and their owners will be contacted by the planners (SMK) of the restoration actions. The planner will also make the valuation analysis for the compensation payment or purchase values estimation. The METSO experts at EPOELY will then make the agreement with the land owner either for the establishing of the permanent privately owned nature conservation area or on selling the land for the state for nature conservation purposes. The actions will be carried out during the first four years of the project i.e. between 2016 and 2020. The price estimation for the areas is based on previous METSO agreements made in EPOELY area.

Kiskonjoki (VARELY)

At the headwaters and along Kiskojoki and Karvianjoki the aim is to find app. 62 hectares of forest stands that will improve the protection of the Kiskonjoki Natura 2000 area which mostly consists of the freshwater habitats but not of the habitats along the river. The VARELY will outsource the negotiation and planning process to METSO protection consultants which have also previously successfully found new privately owned areas for the METSO program. The actions will be carried out during the first four years of the project i.e. between 2016 and 2020. The price estimation for the areas is based on previous METSO agreements made in VARELY area. Majority of the agreements are expected made for establishing of privately owned conservation area.

Keski-Suomi, Saarijärven reitti (KESELY)

At Keski-Suomi the action will be targeted to the improving of the water retention capacity and increasing water quality of the Saarijärven reitti. This will be done by acquiring at least 50 ha peatlands, mostly pine and spruce mires from the most critical sites along the catchment of Saarijärven reitti. The Natura 2000 conservation experts at KESELY will carry out the negotiations; make the final value assessments and agreements with the landowners during the second phase of the project. The action is finalised by 9/2021. The price estimation for the areas is based on previous METSO agreements made in KESELY area.

Reasons why this action is necessary:

This action aims to demonstrate how –METSO program can be targeted also to protect freshwater habitats. Currently METSO program is marketed to the landowners mostly as a forest protection program. Therefore adding new angle to the objective of the protection will probably increase interest towards voluntary protection along freshwater areas with high nature conservation values. As a result of this action the protecting of freshwater habitats will increase at three project areas as app. 120 ha of new permanent nature conservation areas will be established the headwaters and along the catchment of the sites in which restoration actions will be carried out.

Constraints and assumptions:

METSO program is a voluntary based protection program which relies entirely of the landowner's own will to protect his/her land. This poses a risk that not enough landowners from suitable areas are found. The beneficiaries of this action are however very experienced in implementing the METSO program at their areas, and the METSO program has been running since 2008. The estimates for the new protection areas are therefore based on ample of experience and also the local landowners are aware of both METSO program and the FRESHABIT LIFE IP project. Therefore it is unlikely that the targets would not be reached.

There is also several years of time to implement the action and if it seems that the target is not reached in some of the project areas, we can redirect the action to other project areas since the METSO program is eligible for all other FRESHABIT target areas except Naamijoki, Lapland.

We assume that the interest towards voluntary protection remains at high level since year 2014 was a record in making new METSO agreements.

Expected results (quantitative information when possible):

New permanent nature conservation areas covering app. 120 hectares in 3 project areas.

- App. 10 ha at Isojoki (Pohjanmaa) for improving the protection of riparian forests along the river and brook restoration areas
- 28 ha of new METSO protection areas at Kiskonjoki and Karvianjoki catchment areas
- 62 ha of new METSO protection areas in Kiskonjoki and Karvianjoki catchment areas
- App. 50 ha of peatlands, mostly pine and spruce mires to increase the water retention and filtering along the catchment area of Saarijärvenreitti (Keski-Suomi)

Cost estimation:

The land purchase/compensation payment costs totalling 504 350€ are based on previous METSO agreements made in the areas targeted in the project. The average ha price is 4 503 ha. Furthermore the cost include personnel costs for negotiating and other preparatory work from SMK, VARELY and KESELY totalling 47 388 € (20 606€ during the first phase and 26 782€ for latter phases. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the temporary staff.

At VARELY area (Kiskonjoki) most of the negotiation work is outsourced (77 480 €) and the price estimation is based on previous similar cases at VARELY area.

The documents showing that the price estimations are inline with the market prices are attached as annexes to the application.

Milestones:

- 28 ha of new METSO protection areas at Kiskonjoki (31.12.2017)
- 3 ha of new METSO protection areas at Isojoki (31.12.2017)
- 62 ha of new METSO protection areas at Kiskonjoki (31.12.2019)
- 10 ha of new METSO protection areas at Isojoki(31.12.2019)
- 50 ha new METSO protection areas at Saarijärven reitti (30.09.2021)
- 122 ha of new METSO protection areas (30.09.2021)

ACTION C.11: Improving visitor facilities**Beneficiary responsible for implementation:**

This action is implemented by MH, VARELY, VVK at their areas.

Description (what, how, where and when):

Visitor facilities will be improved at three project areas at Puruvesi (MH), Kiskonjoki (VARELY) and Vanajavesi (VVK). The aim of the action is to improve recreational facilities of at 7 sites in 3 project areas during 2016-2019.

Puruvesi

MH will mark and interpret an existing summer trail in Hytermä island at Lake Puruvesi and re-route and develop a 5,0 km long summer loop trail at Punkaharju. The new trail at Hytermä will be app. 1,5 km long and the theme of the trail is the unique cultural history values of this first private nature conservation area in the area. The trail consists of 1 main information board showing the route, facilities, information on Puruvesi, Hytermä and the FRESHABIT project. Along the route 3-5 smaller information boards and a table with benches will be erected.

The existing winter loop trail at the research forest of Punkaharju will be developed and partially re-routed to enable also summer day use. The interpretive boards will focus on Lake Puruvesi and the role of Punkaharju esker in the cycle of water, information on the FRESHABIT project and the unique features of the natural surroundings. The aim of the improvement is to develop an easy, safe and well marked popular trail for non experienced outdoor visitors – both tourists and locals – and to get them acquainted with this unique area in large numbers, but sustainably. I.e. to steer them to use well maintained and marked trails, not causing multiple paths when freely visiting the area. The trail is app. 5 km long and rerouting requires also building new trail and graveling the path. The trail includes 2 main information boards at the start and at the designated rest place at Karjalan kallio from which a magnificent view opens to the Lake Puruvesi. The trail includes also signing and 5-10 smaller information signs.

Punkaharju trail will be built during 2016 and Hytermä trail during 2017.

Kiskonjoki

At Kiskonjoki the recreational facilities at a popular fishing area of Latokartanonkoski will be improved. The detailed plan for the necessary structures and habitat management actions will be made in 2016. Based on preliminary assessment made in 2014/2015 the following recreational structures will be made: 4 new wooden stairs from the banks to the riverside will be built and 1 spot will be prepared for canoes to go easily ashore. Also the bridge crossing dam of the mill will be restored, railing of another bridge will be replaced and the dangerous holes in the walls of the mill will be closed with metal mesh to increase visitor security. Furthermore the clearing of the path network of app. 2 km and surrounding areas will be carried out on app. 14 ha. The clearing includes also removing alien vascular species mainly Himalayan Balsam (*Impatiens glandulifera*), Red Elderberry (*Sambuca racemosa*) and False Spirea (*Sorbaria sorbifolia*). The clearing and recreational facility building at Latokartanonkoski carried out during 2017 and 2018.

Vanajavesi

At Vanajavesi project area the recreational structures will be improved at 5 sites. The aim is to improve especially easy access, non-disturbing bird watching possibilities at bird lakes.

At Hattelmalanjärvi a hiding hut on shore of this bird lake, path to hut and path connection to existing path network will be built in 2016-2017. The estimated length of the path which is partly made of duck boards in 500m.

At Ormajärvi and Kukkianjärvi a bird watching tower will be built for improving bird watching in 2016-2017.

At Saarioisjärvi a hiding hut with connecting path of 300 – 500m and bird watching tower to Tyköljänjärvi with connecting path of 300 – 500m will be made during the second phase i.e. during 2018-2019.

Information on the new facilities and possibilities will be added to the most famous nature destination web services luontoon.fi and retkipaikka.fi.

Reasons why this action is necessary:

The aim of the action is to improve recreational facilities of at 7 sites in 3 project areas. The recreational facilities increase the attractiveness of the areas among visitors. The bird watching (towers and huts) facilities make it possible to watch birds close enough without disturbing the birds. The trails at Hytermä and Punkaharju will also be used for nature education purposes. Punkaharju region has over 120 000 visitors a year. Therefore it is important to reroute the visitors to use well marked paths when visiting the area. At Kiskonjoki the actions improve the attractiveness of the area among recreational fishermen, especially anglers and among canoeists.

Constraints and assumptions:

There are no expected constraints to this action. The need for the planned recreational facilities have been realised already well before the project. The order of the building of the facilities at Vanajavesi area may change but all facilities will be completed by the end of 2019.

Expected results (quantitative information when possible):

- At Puruvesi area 1,5 km long nature trail to Hytermä. Re-directed and improved app. 5 km nature trail at Punkaharju.
- At Latokartanonkoski in Kiskonjoki area clearing of path network and surrounding habitats covering (includes also removal of Himalayan Balsam) on 16 ha, four new wooden stairs to the riverside and place for canoeist to go shore.
- At Vanajavesi area the improvement of bird watching facilities at 5 sites: hiding hut and trail at Hattelmalanjärvi and Saarioisjärvi, bird watching tower Ormajärvi, Kukkianjärvi and Tyköljänjärvi. Path to the bird watching tower at Tyköljänjärvi.

Cost estimation:

The costs consists mostly on external assistance (81 140€) and material costs (29 500€). The planning is outsourced in Kiskonjoki and made by personnel at Puruvesi. The plans for structures at Vanajanvesi are made prior to the project. The costs for the facilities are based on building similar facilities in previous projects. All beneficiaries are experiences in the building recreational facilities. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- Planning for recreational facilities at Latokartanonkoski (Kiskonjoki) completed (30.09.2016)
- Hytermä and Punkaharju trails completed (30.09.2016)
- Hiding hut at Hattelamalanjärvi and bird watching tower Ormajärvi at Vanajavesi area completed (31.5.2017)
- Wooden stairs, clearing and go ashore site for canoist completed at Latokartanonkoski (Kiskonjoki) (30.10.2017)
- Bird watching tower at Kukkianjärvi at Vanajavesi area completed (30.10.2018)
- Hiding hut at Saarioisjärvi and bird watching tower Tyköljänjärvi at Vanajavesi area completed (31.12.2019)

ACTION C.12: Organising voluntary restoration camps**Beneficiary responsible for implementation:**

WWF with collaboration with MH and other beneficiaries at the camp areas

Description (what, how, where and when):

WWF Finland will arrange five camps for volunteers during the project. The tasks of camps will be either traditional habitat restoration, or data collecting for the needs of the other actions of the project, or both at the same time, depending of the needs of MH and/or some other project beneficiary. For this reason, the timing, location and specific tasks of the camps will be decided later, during the implementation of the project. Potential camp sites are found e.g. t the headwaters of Isojoki, Karvianjoki, Ähtävänjoki and Koitajoki. Data collection camps will be likely be A6 and therefore target either lakes (Päijänne, Konnevesi and/or Puruvesi

WWF Finland is responsible, together with MH and/or other project beneficiaries for organizing the camps. WWF is responsible for the general organization (providing participants, food service, tools etc.) and leading of the camps. MH (or other project beneficiary) is responsible for arranging the necessary material, special tools needed and field work leaders, as well as for organising field transportation, excursion day during the camps, and transportation by boat to the camp sites.

Previously WWF has worked together with MH in tens of similar camps. Many camps have successfully also been as a part of the previous LIFE-Nature projects e.g. "Restoration of boreal forests and forest-covered mires - LIFE", "Restoration and management of meadows in Finland, Sweden and Estonia - LIFE" and in the ongoing Species Rich LIFE project.

The volunteers consist of ordinary people that are interested in nature conservation. Most participants are Finns but also foreigners from abroad have participated in the previous camps. Restoration camps will be organized in project sites.

Altogether 5 camps totalling ca 40 days will be arranged during the project; see the timetable below. Each camp is expected to have ca 20 volunteers and 4-7 persons from the organizing beneficiaries. WWF is responsible for the general organization (providing participants, food service, tools etc.) and leading of the camps. MH (or other project beneficiary) is responsible for arranging the necessary material, special tools needed and field work leaders, as well as for organising field transportation, transportation by boat to the camp sites.

Reasons why this action is necessary:

Restoration and data collecting camps provide excellent opportunity for environmental education and raising awareness for the participants and for media, in addition to the habitat restoration and data collecting work itself. The restoration done manually and carefully by the volunteers is much more elaborate and cautious for the habitat and species than motorized restoration activities. Moreover volunteers are able to carry out actions for which entrepreneurs are currently practically impossible to use.

Constraints and assumptions:

No major constraints expected, WWF Finland has decades long tradition and experience in organizing such camps successfully. Also a data collecting camp has already been successfully piloted in cooperation with WWF and MH.

Expected results (quantitative information when possible):

- 5 camps organised, ca 20 participants per camp. In total 100 participants.

Cost estimation:

The expenses such as travel and material costs were estimated on the grounds of similar projects done in the past. The cost for collaborating beneficiaries of the camps and budgeted under other C or A-actions. More information on the cost estimation is in the table annexed after the C-action descriptions.

Milestones:

- One WWF camp organised (30.09.2017)
- Three WWF camps organised (30.09.2019)
- Five WWF camps organised (30.09.2021)

Annex C.1. Detailed basis for cost estimation for C actions.

Action	Types of actions	Cost estimation (costs per unit)	Basis for the cost estimation
Action C1: River basin management Task: Restoration of catchment areas	Water protection measures targeting mainly ditch lines such as filtering ponds, silt traps, bottom dams to redirect and/or slow water	Average costs per measure is 1 000 – 1 350€ (includes machine work 640€, supervising the work 100€/day, materials 240 – 500€), average cost per hectare 1 000€	Expert assessment of SMK experts based on previous water protection projects in areas close by made and map survey for preliminary planning for the action areas/measures.
Action C1: River basin management Task: Restoration of former peat harvesting area	Planting biomass i.e. replanting and rewetting (raising water level)	190€/ha	Based on former similar kinds of actions.
Action C1: River basin management Task: Peatland restoration	Filling in ditches, blocking ditches, removal of trees	The costs per hectare vary between 600 – 1 300€/hectare depending on the area and actions (includes machine work 640€, supervising the work 100€/day)	Expert assessment based on previous peatland restoration projects as the measures are best practice and map/site checks for action planning.
Action C2: Controlling environmental loading Task: Marketing of buffer zones (Karjaa)	Marketing of buffer zones	Personnel and travel costs totaling 20 300€	Visiting and consulting farmers app. 1 month/year/5 years.
Action C2: Controlling environmental loading Task: Controlling environmental load	Building multiple use wetlands, dredging, specific measures for protecting ground waters, erosion prevention measures i.e. strengthening banks, bottom dam series for slowing waters	The costs depend on actions and vary between 1 000 – 10 000€ per measure. Average costs for measures are multiple use wetland (8 000 €), bottom dam or series of dams (1 000 - 10 000€), erosion prevention 5 000€ and ground water protection 5 000 €. The average hectare cost (area affected by the action) is app. 1 000€.	Estimations are mostly based recent similar kinds of projects in which tendering was done. For Puruvesi the costs are based on detailed plan.
Action C3: Improving ecosystem integrity Task: Construction fish passage	Building of natural like side-channel/fish ways	Cost estimations vary considerable between areas due to different circumstances and needs. Karjaanjoki (2 fish	The costs are based on detailed technical plans for Saarijärven reitti and preliminary plan for Karjaanjoki

		ways): 100 000 – 300 000€/fish way Saarijärvenreitti(2 fish ways): 230 000 € and 550 000€ (note that LIFE covers only 484 000€, Vattenfall committed to cover the rest i.e. 297 000€) Kiskonjoki (2 fish ways): 80 000 – 185 000 €/fish way	and Kiskonjoki
Action C3:Improving ecosystem integrity Task: Demolishing dam (Isojoki)	Demolishing of dam and restoring the river section (rapids) (1 km)	148 000€	Based on detailed technical plan
Action C4: In-stream habitat restoration	Restoration of spawning areas, restoring rapids and habitats for migrating fish. Work is done both by hands and machine	The costs vary between the action areas from 5 000€ - 22 000€ /kilometer. At the higher end more machine work is needed.	The cost estimations are based on recent similar kinds of projects in which tendering was done.
Action C5: Improving riparian connectivity Task: Floodplain restoration (flood prevention)	Building a floodplain with submerged weirs, widening the river channel to protect traffic and building from flooding. Includes also building new bridge and strengthening banks along the road	160 000€	No previous comparable project exists. The cost estimation is based on expert assessment.
Action C5: Improving riparian connectivity Task: Sediment control	Restoring the banks and river channel to reduce sediment load during the flooding	Total costs 10 564€, app. 100€/metre.	The cost estimation is based on expert assessment.
Action C6: Demonstration methods for stream habitat restoration	Novel restoration methods i.e. introducing large wood to selected river sections (6 spots total length app. 1,5 km) manually. Action includes also the monitoring costs (treated and non-treated)	Total costs 118 976€ including personnel and travel costs. Each location visited 2-3 times a year for 4-5 years.	The cost estimation is based on previous projects.
Action C7: Bird wetland habitat restoration Task: Raising the water table	Building of bottom dams (total 8) to raise water level	The cost for bottom dam range between 16 000 – 20 000€. Average cost 17 827€.	The cost estimations are based on recent similar kinds of projects in which tendering was done.
Action C7: Bird	Mowing of aquatic	The cost per hectare	The cost

wetland habitat restoration Task: Eradication of aquatic vegetation	vegetation	range between 500 – 1 300€/ha/year. The cost depends on the location and density of the vegetation. Average cost 944€/ha/year.	estimations are based on recent similar kinds of projects in which tendering was done.
Action C7: Bird wetland habitat restoration Task: Habitat improvement by near-shore actions (Vanajavesi)	New pastures, clearing of bushes and trees, dredging to increase mosaic structure, building of artificial nesting islets, restructuring of river channel, trapping of alien invasive predators, removing blue algae, fixing the dam	New pastures 1 400€/ha (7 ha), clearing by forest worker app. 0,5 ha/day á 350€ (20 ha), dredging 70 000 – 147 000€/ha, the costs vary due to the location and piling possibilities (2-3 ha), restructuring 3 short river sections á 8 000€, artificial islets 1-3 per site, 5 sites á app. 2 000€, trapping American Mink and Raccoon Dogs 5 sites á 4 000€ (1 000€ per year) compensation payment to voluntary hunters, 12 000€ for acquiring pump for vacuuming blue algae at one site, fixing one dam at Tyköljänjärvi 10 000€	Pasture costs are based on national data on pasture establishing costs (Laidunpankki), clearing costs for national average prices for forest worker, dredging, islet, dam fixing and channel restructuring costs are based on plan, trapping for are based on estimation from Finnish Hunter's Association and cost for algae vacuuming on price inquiry of the suitable machine.
Action C8: Improving trophic web functioning	Removal of fish (cyprinids)	40 – 50 000 tonnes, 1 364€/tonne (1,36€/kg)	The cost estimation is based on previous projects.
Action C9: Immediate conservation acts for freshwater mussels General management	Joint overall management of the action by MH, LUVY, and JUY	36 305€ personnel and travel costs	The cost estimation is based on expert assessment.
Action C9: Immediate conservation acts for freshwater mussels Task: Transplanting FPM and TRM in restoration sites	Field inventories, collecting and transplanting + monitoring the mussels	30 690€ personnel costs, 5 182€ for travels, 2000€ for external diving costs, 9 900€ for equipment, and 13500 for consumables and other costs	The cost estimation is based on expert assessment of the time needed for the field work..
Action C9: Immediate conservation acts for freshwater mussels Task: Capture and transport of FPM larvae	Field inventories, collecting and handling the mussel larvae	29 189€ personnel costs, 10 003€ for travel	The cost estimation is based on expert assessment of the time needed for the field work..

Action C9: Immediate conservation acts for freshwater mussels Task: Rearing of FPM	Rearing of the mussels on Norway, and the trial rearing in Finland, Konnevesi (JYU)	4000€ personnel costs (JYU), 62000€ external service costs, and 4500€ consumable costs	The cost estimation is based on expert assessment for the JYU trial rearing, and tendering for the rearing in Norway
Action C9: Immediate conservation acts for freshwater mussels Task: Restocking juvenile FPM	Restocking the reared larvae in their natal rivers and monitoring	60610€ personnel costs, 11160€ travel costs	The cost estimation is based on expert assessment of the time needed for the field work.
Action C11: Improving visitor facilities	Puruvesi: new nature trail to Hytermä (1,5 km, table&benches, 5-10 info signs and trail logos) and re-routing trail at Punkaharju (5 km, graveling, 10-20 info signs and trail logos) Kiskonjoki: new infra (4x stairs, canoe entry point, repairing of bridge, clearing of path and surroundings) Vanajavesi: New facilities at 5 sites (hiding huts, bird watching towers, new paths, duck boards)	Hytermä 2 000€ for infra Punkaharju 2 500€ for infra and 5 000€ for graveling Kiskojoki: 20 000€ for infra and clearing path, 10 640€ for clearing surrounding area of alien species Vanajavesi: material for huts and towers 20 000€, work 12 500€, new paths and duck boards 5 000€	Costs are based on data from previous infra building projects.
Action C12: Organising voluntary restoration camps	5 camps for volunteers app. 40 days	16 804€ per camp including food, tools, supervision, planning, cook, insurances, excursion.	Cost estimation is based on earlier restoration camps organized with WWF and MH.

Annex C.2. As requested in the revision phase, this table indicates how citizens will be involved in implementation if different C actions.

Action	Area	Description of citizen engagement
C1	Koitaajoki, Naamijoki	Active involvement to the restoration measures at catchment areas (task 1)
C2	Karjaanjoki	Buffer zones will be actively marketed to local farmers.
C2	Koitaajoki, Isojoki, Puruvesi and Vanajavesi	The forestry measures will be demonstrated to local forest owners.
C3	Karjaanjoki, Kiskojoki and Saarijärven reitti	Demonstrating the building and functionality of fish ways for local people. Also active role in the building maybe possible.
C4	Karjaa, Ähtävänjoki, Koitaajoki, Vanajavesi, Isojoki, Kiskonjoki and Karvianjoki	Active involvement to the implementation of small scale in-stream restoration measures.
C5	Vanajavesi	Active involvement to the measures for reducing sediment load
C6	Karvianjoki and Isojoki	Active involvement to the implementation of new restoration methods
C7	Vanajavesi, Puruvesi, Saarijärven reitti, Naamijoki and Ähtäväjoki	Active involvement to the eradication of aquatic plants and near-shore actions
C8	Puruvesi	Active involvement of local fishers to the fish removal and monitoring the effects on fish stocks

D. Monitoring of the impact of the project actions (obligatory)**ACTION D.5: Monitoring technical implementation*****Beneficiary responsible for implementation:***

All beneficiaries with concrete conservation measures.

Description (what, how, where and when):

Monitoring of FRESHABIT C actions is planned in a hierarchical manner, comprising technical monitoring in action D5 and ecological monitoring in actions D1 and D2 for all sites at a basic level, and advanced high-intensity monitoring for selected pilot sites.

In Action D5, the technical implementation of concrete actions C1-C9 with special emphasis on their technical success, functionality and efficiency is monitored. All sites will be visited at least once in 1-2 following years the measures were put into practice, and before the actions are implemented when necessary (e.g. extent of suitable habitat for monitoring action C4). The object of this monitoring is to determine whether the goals that have initially been set are achieved and that measures have succeeded technically. It is also cost-effective to identify potential problems at their early stage and to further develop methods according to the outcomes.

Indicators for technical monitoring for each of the actions C1-C9 are described in table D.1, along with indicators for monitoring effects of biodiversity (D1) and ecosystem functioning (D2).

Reasons why this action is necessary:

It is important to follow up the technical implementation in order to define that measures have technically succeeded as initially set.

Constraints and assumptions:

No significant constraints are predicted.

Expected results (quantitative information when possible):

Monitoring of the technical implementation of actions C1-C9 is done in all sites for concrete conservation actions (at least once before if needed and annually after restoration; to be detailed in a monitoring plan at the first stage of the project). For indicators, see table D.1, and for N2000 sites where D5 is implemented see annex B2a-1. Technical monitoring is implemented in:

- 4 catchment areas (multiple sites to be detailed in further plans for the actions) and 6 peatland restoration sites in action C1
- 10 N2000 sites (multiple sampling sites to be detailed in further plans for the actions) in action C2
- 7 sites for enhancing fish migration in action C3
- Ca. 50 stream sections where habitats are restored in action C4
- 2 sites for improving riparian connectivity in action C5
- 12-18 stream sections for demonstrative habitat restoration in action C6
- 19 bird lakes in action C7
- 1 site for improving trophic web functioning in action C8
- 2 mussel populations in action C9

Cost estimation:

Technical monitoring will be made in all areas where concrete actions are implemented and therefore their technical success and functionality need to be checked and verified. This is done during the implementation and after the action is completed. This action includes costs from 7 beneficiaries (SMK, MH, ESAELY, EPOELY, VVK, LUVY, LSPPo). The personnel needed for the action include co-ordination from monitoring experts (mostly permanent) and data collection from the

sites (mostly temporary staff, regional project manager). The permanent personnel cost during the first phase are estimated to 14 days (3 890€) and temporary staff 26 days and 6 878€ respectively. The personnel cost for the latter phases are 32 240€ and therefore the total personnel cost are estimated to 43 008€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel for acquiring data from the monitoring areas are estimated to 1 520€ for the first phase and 7 734€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

External assistance costs include some water analysis costs (1 900€) for which the estimation is based on list prices of the laboratory service provides. The equipment cost checked from internet sources include GPS, Rangefinder and camera costs totalling 1 150€. The consumable costs include minor field work necessities (300€) and other costs totalling 2 000€ are linked to the publishing of the monitoring reports.

Note that the monitoring of technical efficiency is evident for most beneficiaries. Thus, parts of costs of technical monitoring have been included in concrete actions C1-C12 and not being separated of them into this action.

The total cost of the action is 57 612€.

Milestones:

- List of all relevant parameters in relation to technical monitoring for actions C1-C9 updated and agreed between all beneficiaries (31.05.2016)
- Technical monitoring of implemented concrete actions done (30.09.2022)

Table D.1. Selected indicators to be used in 3-level monitoring for technical success (D5) and impact on biodiversity (D1) and ecosystem functioning (D2) of actions C1-C9. Monitoring of base-level monitoring (a) will be applied to all target areas depending on actions implemented and high intensity (b) in selected target areas.

Action	Task	D5: Technical monitoring All managed sites	D1/D2: Base-level monitoring All managed sites	D1/D2: High intensity monitoring Sites to be selected later
C1 Riverbasin management	<i>Restoration of catchment areas</i>	<ul style="list-style-type: none"> Functioning of structures (dams, filled ditches, other water protection structures; % success) Succession of re-wetting (% of targeted ha) 	<ul style="list-style-type: none"> D2: Water chemistry (basic analyses) 	<ul style="list-style-type: none"> D2: Hydrological parameters required in modelling D2: Water chemistry (several analyses) D2: Redox potential and pH
	<i>Peatland restoration</i>	<ul style="list-style-type: none"> Functioning of structures (dams, filled ditches, other water protection structures; % success) Succession of re-wetting (% of targeted ha) 	<ul style="list-style-type: none"> D2: Watering of outside areas D2: Survey of problematic sites D2: Water chemistry (basic analyses) 	<ul style="list-style-type: none"> D1: Vegetation cover and community D1: Aquatic moss coverage and community composition (groundwater dependent ravine habitats) D1: Macroinvertebrate community composition (groundwater dependent ravine habitats) D1: Diatoms (groundwater dependent ravine habitats) D2: Hydrological parameters required in modelling D2: Water chemistry (several analyses) D2: Level of surface water D2: The quantity and quality of outlet water
	<i>Restoration of former peat harvesting area</i>	<ul style="list-style-type: none"> Functioning of structures (dams, filled ditches, other water protection structures; % success) Succession of re-wetting (% of targeted ha) 	<ul style="list-style-type: none"> D2: Watering of outside areas D2: Survey of problematic sites D2: Water chemistry (basic analyses) 	<ul style="list-style-type: none"> D1: Vegetation cover and community D2: Hydrological parameters required in modelling D2: Water chemistry (several analyses) D2: Level of surface water D2: The quantity and quality of outlet water
C2 Controlling environmental loading	<i>Constructing wetlands, other structures and buffer zones for water protection</i>	<ul style="list-style-type: none"> Functioning of structures (wetlands, silt traps, other water protection structures; % success) 	<ul style="list-style-type: none"> D2: Water chemistry (basic analyses) 	<ul style="list-style-type: none"> D2: Hydrological parameters required in modelling D2: Water chemistry (several analyses)

Action	Task	D5: Technical monitoring All managed sites	D1/D2: Base-level monitoring All managed sites	D1/D2: High intensity monitoring Sites to be selected later
C3 Improving ecosystem integrity	<i>Supporting natural migration</i>	<ul style="list-style-type: none"> • Technical construction of the fish passages as planned (% success) 	<ul style="list-style-type: none"> • D1: No. of target species • D1: No. of other species 	<ul style="list-style-type: none"> • D1: Reproduction of target species • D1: No. of target species upstream • D2: Behaviour and no. of target species in upstream and downstream
	<i>Migration barrier removal or modification</i>	<ul style="list-style-type: none"> • Removal or modification of identified migration barriers (% success) 	<ul style="list-style-type: none"> • D1: No. of target species • D1: No. of other species 	<ul style="list-style-type: none"> • D1: Reproduction of target species • D1: No. of target species upstream • D2: Behaviour and no. of target species in upstream and downstream • D2: Sediment cover(%)
C4 In-stream habitat restoration	<i>Removing extra sediment</i>	<ul style="list-style-type: none"> • Extra sediment removed from targeted reaches (% success) 	<ul style="list-style-type: none"> • D1: Aquatic moss cover (%) • D2: Substrate heterogeneity (Wentworth scale) • D2: Suitable habitat for target species (ha) 	<ul style="list-style-type: none"> • D1: Survival of early life stages of target species (e.g. eggs, larvae, fry)
	<i>Restoration of spawning and larvae habitat</i>	<ul style="list-style-type: none"> • Extent of suitable habitat (area before-after) 	<ul style="list-style-type: none"> • D1: No. of redds • D2: Substrate heterogeneity (Wentworth scale) 	<ul style="list-style-type: none"> • D1: Survival of early life stages of target species (e.g. eggs, larvae, fry)
	<i>Restoration of juvenile and adult habitat</i>	<ul style="list-style-type: none"> • Extent of suitable habitat (area before-after) 	<ul style="list-style-type: none"> • D1: Aquatic moss cover (%) • D1: No. and density of target species OR • D2: retention capacity of organic matter (leaf litter) 	<ul style="list-style-type: none"> • D1: No. and density of other species • D1: Macroinvertebrate community composition • D1: Aquatic moss coverage and composition • D1: Riparian vegetation coverage and composition • D2: Leaf litter decomposition • D2: Primary productivity • D2: Suitable habitat for separate life stages of target species

Action	Task	D5: Technical monitoring All managed sites	D1/D2: Base-level monitoring All managed sites	D1/D2: High intensity monitoring Sites to be selected later
C5 Improving riparian connectivity	<i>Controlling sedimentation</i>	<ul style="list-style-type: none"> • Technical implementation of the sedimentation control measures (% success) 	<ul style="list-style-type: none"> • D2: Concentration of suspended solids in water • D2: Amount of sedimentation 	<ul style="list-style-type: none"> • D1: Riparian vegetation coverage and composition • D2: The slope of bed surface • D2: Volume of sediment travelling downstream
	<i>Constructing and improving floodplains</i>	<ul style="list-style-type: none"> • Technical implementation of the floodplain and channel widening (% success) 	<ul style="list-style-type: none"> • D2: Volume of sediment at floodplain 	<ul style="list-style-type: none"> • D1: Riparian vegetation coverage and composition
C6 Demonstration methods for stream habitat restoration	<i>Adding large wood and/or aquatic mosses</i>	<ul style="list-style-type: none"> • Amount of large wood added (number, volume) • Amount of aquatic mosses added (species, volume) 	<ul style="list-style-type: none"> • D1: Aquatic moss cover (%) • D2: Substrate heterogeneity (Wentworth scale) • D2: Suitable habitat for target species (ha) 	<ul style="list-style-type: none"> • D1: Macroinvertebrate community composition • D1: Aquatic moss coverage and composition • D1: Riparian vegetation coverage and composition • D2: Suitable habitat for separate life stages of target species • D2: The volume of bed load sediment • D2: Redox-potential and pH • D2: Leaf litter decomposition • D2: Primary productivity
C7 Bird wetland habitat restoration	<i>Raising of water level; Eradication of aquatic plants</i>	<ul style="list-style-type: none"> • Mean water level (altitude) • Changes in water depth (m) • Area of open water area (ha at high and mean water level) 	<ul style="list-style-type: none"> • D1: Aquatic vegetation cover and species composition • D2: No. and species diversity of nesting birds • D2: Water chemistry (e.g. nutrients, chlorophyll-a, suspended solids, sediment) 	<ul style="list-style-type: none"> • D1: Predatory fish composition • D1: Total fish community composition • D1: Macroinvertebrate community composition • D2: Wintertime oxygen content (% , mg/l) • D2: Nutrient levels in water and/or sediment
	<i>Habitat improvement by near-shore actions</i>	<ul style="list-style-type: none"> • Length of fence constructed (m) • Area of cattle pasture, near-shore open water habitats and riverbed modification implemented (ha) • Success of nesting structures and dam reparation (number, %) • Catches of alien predators (number) • Volume of trees and blue-green algae removed (m²) 	<ul style="list-style-type: none"> • D1: No. and species diversity of nesting birds • D2: Water chemistry (e.g. nutrients, chlorophyll-a, suspended solids) 	<ul style="list-style-type: none"> • To be defined later

Action	Task	D5: Technical monitoring All managed sites	D1/D2: Base-level monitoring All managed sites	D1/D2: High intensity monitoring Sites to be selected later
C8 Improving trophic web functioning	Improving trophic web functioning by biomanipulation	<ul style="list-style-type: none"> Overall fishing effort Amount of Cyprinid fish removed (tons) 	<ul style="list-style-type: none"> D1: Fish community composition (no. of species, density, biomass) D2: Secchi depth 	<ul style="list-style-type: none"> D1: Predatory fish composition D1: Total fish community composition D1: Species composition of aquatic birds D1: Macroinvertebrate community composition Nutrients (P,N, chlorophyll-a) D2: Wintertime oxygen content (% , mg/l)
	C9 Immediate conservation acts of freshwater pearl mussel	Capture of larvae and transporting	<ul style="list-style-type: none"> Sites surveyed for adult mussels (number) Adult mussels collected for capturing larvae (number) Estimate of larvae captured (number) 	<ul style="list-style-type: none"> D1: Survival of larvae shipped to rearing station (%) D1: Survival of adult mussels after capture and release (%)
Rearing (NO)		<ul style="list-style-type: none"> Infected host fish (number) Larvae on host fish (number) 	<ul style="list-style-type: none"> D1: Survival of larvae through rearing 	<ul style="list-style-type: none"> D2: Host species specificity of mussels
Stocking/transplanting		<ul style="list-style-type: none"> Amount of identified suitable stocking sites (number per population) Transplanted mussels (number) Boxes placed in the rivers (number) Juvenile mussels (number) 	<ul style="list-style-type: none"> D1: Survival of juvenile mussels in boxes D1: Survival of "free-living" mussels after controlled environment (box) stage D2: Redox-potential at restocking site streambeds D2: Substrate heterogeneity (Wentworth scale) D2: Water depth, current, pH 	<ul style="list-style-type: none"> D1: Annual growth increment of young mussels D1: No. of potential juvenile host fish present at mussel sites D2: Oxygen content, temperature, conductivity, turbidity –characteristics of water and sediment of transplantation sites

ACTION D.1: Monitoring impacts on biodiversity**Beneficiary responsible for implementation:**

SYKE, LUKE, MH are responsible ones in coordinating and data analyzing, and other beneficiaries contribute to the implementation of monitoring in their respective areas; EPOELY, KESELY, LAPELY, LUVY, POKELY, VARELY, VVK. UO coordinates the monitoring related to Action C6

Description (what, how, where and when):

In action D1, baseline monitoring is implemented on all relevant indicators of biodiversity in relation to concrete actions C3-4 and C6-9. The WFD indicates that assessment of ecological status is based on Biological Quality Elements (BQEs) depending of water body type. Practically all indicators are intercalibrated against eutrophication pressure and common European indicators sensitive for other pressures such as water level regulation and morphological changes are missing. In HD the structure and function of a habitat is assessed but no indices of metrics have been given. For FRESHABIT, the list of most relevant indicators based on best available knowledge have been collected to monitor the effectiveness of each action, and this list will be updated at the first period of the project.

The list of indicators have two levels: a) base-level monitoring, and b) high intensity monitoring (see Table D.1 below). The base-level forms a basis for all actions to be monitored; they are widely accepted and applied to all target areas. The b-level of monitoring is focused more into demonstrating and piloting partly novel indicators, which are not yet widely used in freshwater management. The object of this two-level monitoring is to define the most suitable indicators in practice to monitor the effectiveness of concrete actions, and ultimately find the most compliant ones with WFD, i.e. reference-based indicators and specific to water types. In most cases, project actions are being compared to the initial situation of habitats and/or species, but also comparison to the reference sites is used. Report on the success of captive breeding and restocking of freshwater pearl mussel will be done as part of Action C9.

Reasons why this action is necessary:

The WFD river basin management plans base management decisions on the response of aquatic organisms to environmental stress. In contrast to the effects of degradation, the biotic response to restoration is less well-known and thus poorly predictable. Thus, future challenges of the WFD include monitoring of restoration measures to understand the requirements for ecosystems to recover and prioritization of measures. FRESHABIT will provide the EU further knowledge on the effects of restoration actions in river basins and peatlands, and transplanting freshwater pearl mussels. Gained knowledge allows the improvement of future restoration actions of habitats and species in other European countries outside FRESHABIT, and thus contributes largely to information gap acknowledged in WFD and HD.

In addition, FRESHABIT is required to report on its outcomes and impact in relation to relevant indicators as stated in LIFE Regulation Annex III (Thematic priorities for Nature, Thematic priorities for Biodiversity). Thus, monitoring is also considered as obligatory according to the LIFE-guidelines for applicants.

Constraints and assumptions:

Ecosystems are prone to among-site natural variation, and biological responses might therefore be challenging to detect unless the sites are otherwise similar enough but selected actions.

Another constrain is, that biological responses to restoration may be slow, and therefore concrete actions may not produce detectable biological effects during the project. Also, among-year variation in climatic parameters increases uncertainty of results, and different study years are not always comparable. As a solution to this, indicators for both short and long term responses to restoration actions are monitored and results interpreted with care.

Expected results (quantitative information when possible):

The results from ongoing surveillance and operational monitoring sites based on WFD approach will be utilized. In addition, monitoring for project impacts on biodiversity is planned to be implemented as follows (at least once before if needed and annually after restoration; to be detailed in a monitoring plan at the first stage of the project). For indicators, see table D.1, and for N2000 sites where D1 is implemented see annex B2a-1. Base-level monitoring for biodiversity is implemented in (high intensity monitoring sites defined later):

- 7 sites for enhancing fish migration in action C3
- Ca. 50 stream sections where habitats are restored in action C4
- 12-18 stream sections for demonstrative habitat restoration in action C6
- 19 bird lakes in action C7
- 1 lake for biomanipulation in C8
- 2 mussel populations in action C9

Cost estimation:

Monitoring impacts on biodiversity is carried out in all regions of the project. The cost are divided between 11 beneficiaries, mostly from the local beneficiaries (VARELY, LAPELY, KESELY, POKELY, ESAELY, EPOELY, LUVY, VVK, OU, SYKE, LUKE). Monitoring requires repeated visits to the field sites, sampling, and analysis of the samples. Identification of biological samples, processing and saving the monitoring data to databases is demanding and time-consuming. The personnel needed for the action include water and nature protection experts (mostly permanent) and field worker and species specialists (mostly temporary staff). The permanent personnel cost during the first phase are estimated to 250 days (53 730€) and temporary staff 207 days and 48 767€ respectively. The personnel cost for the latter phases are 330 992€ and therefore the total personnel cost are estimated to 433 489€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel for acquiring data from the monitoring areas are estimated to 21 158€ for the first phase and 41 784€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

Part of the identification work, laboratory analysis, electrofishing, field work and reporting is outsourced. The external assistance costs are estimated to 143 980€. The cost estimations for services are based on previous experience in monitoring carried out by the beneficiaries.

Electro fishing devices (3 000€) are purchases by LUVY and the cost estimation is based on price check from possible provider. Consumable materials (1 280€) include sampling necessities and mandatory compensation payment for using own diving gear (à 40€/day) are included in the other cost (6 320€, 158 days).

The costs per project region is app. 72 334 € during nearly 7 years.

The total cost of the action is 651 011€.

Deliverables:

- Report on stream restoration effects on biodiversity and functioning (Action D2 included) (30.09.2022)
- Article on peer-reviewed journal on stream restoration effects on biodiversity and functioning (Action D2 included) (30.09.2022)
- Report of restoration effects on e.g. diatoms, macroinvertebrate and aquatic mosses (30.09.2022)
- Report of the restoration effects on spawning area of critically endangered river spawning densely-rakered whitefish (*Coregonus lavaretus f. nilssonii*) (30.09.2022)
- Report of the impacts of transplanted mosses on the juvenile and adult habitats of *Salmo salar. m. sebago* (critically endangered species) (30.09.2022)

Milestones:

- List of all relevant indicators in relation to biodiversity parameters updated (31.08.2016)
- Monitoring of biodiversity effects completed (30.09.2022)

ACTION D.2: Monitoring ecosystem functioning**Beneficiary responsible for implementation:**

SYKE, LUKE, MH are responsible ones in coordinating and data analyzing, and other beneficiaries contribute to the implementation of monitoring in their respective areas
 UO coordinates the monitoring related to Action C6 EPOELY, ESAELY, LUVY, POSELY, Raase,

Description (what, how, where and when):

In Action D2, all indicators of ecosystem functions are being monitored in relation to concrete actions C1-C9 as preliminary indicated in Table D.1. "Ecosystem function" generally includes stocks of materials (e.g., carbon, water, mineral nutrients) and rates of processes involving fluxes of energy and matter between trophic levels and the environment, and monitoring is generally restricted to those properties or processes. Thus in FRESHABIT, the ecosystem functioning is interpreted in wide contexts, and in addition to fluxes of energy and matter monitored more closely in Action D3, this Action D2 includes the movements of biota between habitats and restoration effects on stream ecosystem functioning.

Global declines in biodiversity and shifts in species composition have motivated to link biodiversity and ecosystem functioning. Broader relationships between biodiversity and ecosystem integrity, and fundamental ecosystem processes result in from both structural and functional components. Thus, organic matter processing (e.g. decomposition of organic matter) and primary productivity, as well as season-specific migration of biota form an important component in biomonitoring and assessing the integrity and dynamics of riverine ecosystems.

In FRESHABIT, the decomposition of organic matter (i.e. autumnal leaf litter) and primary productivity (measured as chlorophyll-*a*), will be monitored in Isojoki tributaries. These will be important parameters in monitoring the effectiveness of demonstrative stream habitat restoration (Action C6), and partly also in restoration of catchment areas (Action C1), and controlling environmental loading (Action C2). The season-specific migration between habitats of different life-stages of host species of freshwater pearl mussel (i.e. migratory salmon and/or sea trout) will be monitored following the improving of ecosystem integration (Action C3). Report and article in peer-reviewed journal on stream restoration effects on biodiversity and stream functioning as well as report on the success of restocking of freshwater pearl mussel will be done in Action D1.

Reasons why this action is necessary:

The WFD river basin management plans base management decisions on the response of aquatic organisms to environmental stress. Biodiversity responses to restoration are poorly known, but situation is even weaker in relation to responses of ecosystem functioning, and generally applicable European method of defining ecosystem functioning does not exist yet. Thus, FRESHABIT will provide the EU further knowledge on the effects of restoration actions in river basins and peatlands, improving ecosystem integrity, and transplanting freshwater pearl mussels. Gained knowledge allows the improvement of future restoration actions of habitats and species in other European countries outside FRESHABIT, and thus contributes largely to information gap acknowledged in WFD and HD.

In addition, FRESHABIT is required to report on its outcomes and impact in relation to relevant indicators as stated in LIFE Regulation Annex III (Thematic priorities for Nature, Thematic priorities for Biodiversity). Thus, monitoring is also considered as obligatory according to the LIFE-guidelines for applicants.

Constraints and assumptions:

The natural variation of ecosystems might cause challenges. Ecosystems are prone to among-site and natural variation, and biological responses might therefore be challenging to detect unless the sites are otherwise similar enough but selected actions. In addition, biological responses to any

kind of restoration may be slow, and therefore concrete actions may not produce detectable biological effects during the project. In particular, the recovery of migratory fish populations might take several years, and thus remarkably slow down the detection of noticeable ecological changes.

Expected results (quantitative information when possible):

The results from ongoing surveillance and operational monitoring sites based on WFD approach will be utilized. There are also long-term monitoring projects for assessing the loads from forests and restored peatlands and the results from these projects are used for assessing the impacts of action C1, where applicable. In addition, monitoring for project impacts on ecosystem functioning is planned to be implemented as follows (at least once before if needed and annually after restoration; to be detailed in a monitoring plan at the first stage of the project). For indicators, see table D.1, and for N2000 sites where D1 is implemented see annex B2a-1. Base-level monitoring (high intensity monitoring sites defined later) for ecosystem functioning is implemented in:

- 4 catchment areas (number of sampling sites to be detailed in further plans for the actions) in action C1
- 10 N2000 sites (number of sampling sites to be detailed in further plans for the actions) in action C2
- Ca. 50 stream sections where habitats are restored in action C4
- 2 sites for improving riparian connectivity in action C5
- 12-18 stream sections for demonstrative habitat restoration in action C6
- 19 bird lakes in action C7
- 1 site for improving trophic web functioning in action C8
- 2 mussel populations in action C9

Cost estimation:

Monitoring impacts on aquatic ecosystem functioning is carried out in all regions of the project. The cost are divided between 4 beneficiaries (ESALY, EPOELY, LUKE, POSELY). This monitoring requires repeated visits to the field sites, sampling, and analysis of the samples (decomposition, primary productivity). Mark-release-recapture monitoring and telemetry of fishes and field monitoring of FPM are time-consuming and these actions comprise a majority of the costs in D2. Processing and saving the monitoring data to databases is also a time-consuming step. The personnel needed for the action include geology and fish experts (mostly permanent) and field worker, data analysts and fish specialists (mostly temporary staff). The permanent personnel cost during the first phase are estimated to 26 days (6 764€) and temporary staff 167 days and 29 653€ respectively. The personnel cost for the latter phases are 111 491€ and therefore the total personnel cost are estimated to 147 908€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel for acquiring data from the monitoring areas are estimated to 3 675€ for the first phase and 11 101€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

Part of the monitoring is outsourced in Koitajoki (29 295€). The cost estimations for services are based on previous experience in monitoring carried out by the beneficiaries.

The equipment costs include fish monitoring devices to the fish passes in Karjaa region (60 000€). The consumable materials totalling 31 150€ include three sets of telemetry devices (28 000€) and materials needed for sampling (3 150€).

The average costs per project region is app. 41 000 € during nearly 7 years.

The total cost of the action is 285 585€.

Deliverables:

- Report of survival of descending Atlantic salmon smolts (Karjaanjoki, 31.12.2018)
- Report on the use of concrete actions to restore longitudinal connectivity of riverine habitats in target areas (30.06.2021)
- Monitoring report of the success of natural reproduction (densities of juvenile salmonids) in the nursery areas above the fishways in Kiskonjoki (30.06.2021)
- Brown trout migration (first monitoring period 06/2020-11/2020) report in Saarijärven reitti (30.06.2021)
- Report of salmonid fish migration routes in the bay of Pohjanpitäjänlahti in Karjaanjoki (30.06.2021)

Milestones:

- List of all relevant parameters in relation to ecosystem functioning (Table D1.1) updated (31.08.2016)
- Monitoring of first fishway running in Saarijärven reitti (30.06.2020)
- Monitoring of both fishways running in Kiskonjoki (30.09.2020)
- Monitoring of ecosystem functioning and integrity completed (30.09.2022)

ACTION D.3: Monitoring and modelling of hydrochemical impacts**Beneficiary responsible for implementation:**

SYKE is in charge of action and others participate, LUKE, GTK, OU, JAMK, POKELY, ESAELY, LUVY, LAPELY, UHEL-LBS. VVK

Description (what, how, where and when):

In this Action D3 the site applications following the preparatory work on assessment model and indicator systems of Actions A1 (Development of integrated national model for riverbasins) and A2 (Development of integrated model and indicators systems for assessing ecosystem services and sustainability) are documented. Information and databases of selected sites of the FRESHABIT-project is used. The work is divided into separate subtasks according to the topic of the applications:

Task 1: Applications of river basin models

In this task the site application of the river basin model system (constructed in A1) will be conducted for Koitajoki and Puruvesi catchments using different climate change, management and water protection scenarios. For each scenario, the workflow for the application is as follows: computation of loading, solving of the present state of water courses, assessing the implications and cost effectiveness of water protection measures, and predicting the future state of the water course (see the flow chart Fig. A1_1).

The computed scenarios include 2-6 climate change scenarios, varying forest management and agriculture production scenarios and water impact mitigation scenarios of different intensity. The scenarios will point out what are the most significant contributors and the rank the tested scenarios according to the cost effectiveness.

The work will provide:

- Description of the present state of Koitajoki and Puruvesi catchments including the role of different loading sources in explaining the present state.
- Quantification of the environmental impacts of adjusting forest and agriculture production strategies
- Strategies to mitigate harmful effects of land use in a cost effective way
- Predictions for the effects of climate change on the water courses, and possibilities to compensate the effects by mitigation methods and adjusting the land use

Task 2: Applications of integrated model system for ecosystem service and sustainability assessment

In this task the site application of the developed integrated model system for ecosystem service (ES) and sustainability assessment (deliverable/report of Action A2) is documented. The application is done to site Karjaanjoki, using the collected database (milestone of Action A2). The workflow for the application is as follows (see flow chart Figure A2_1):

- Quantitative information of the effects of different agricultural production types is derived from experimental field sites maintained by LUKE, meta-analysis of relevant scientific literature (regarding e.g. buffer zones) and also from specific scientific papers and statistics.
- Information on catchment soil and watershed properties, hydrology, and water quality are used to calibrate the dynamic INCA catchment-model system.
- The calibrated INCA-model system is run with different scenarios on agricultural production and climate, resulting in different scenarios for N, P and suspended sediment concentrations and fluxes to the waters. INCA produces information also for the subsequent RUSLE, SimaPro and ESlab applications.
- RUSLE model is used for planning of field-scale water protection measures of the target areas.
- Results from both the INCA and RUSLE models are used to predict impacts on the habitats of trout and river pearl mussel populations, under different scenarios and assumptions. This allows both assessment of risks and optimization of agricultural production and protection measures in the areas.
- The SimaPro system is used for Life Cycle Analysis (LCA) of the whole chain of agricultural products of the pilot farms, allowing also assessment of other than water-related impacts.
- The model based information, as well as other information gathered from the catchments is used to quantify provisioning, regulation/maintenance and cultural ecosystem services of the catchment areas. The assessment scheme developed in the EU/MARS project is used.
- The overall information of this task is included in the virtual laboratory for ecosystem services (ESlab) of SYKE. ESlab will be included in the Internet-based information management system of SYKE, providing information to different classes of end-users and the general public.

The work will provide:

- Quantitative information on the impacts of different production schemes and environmental change scenarios on key water quality variables.
- Information for planning of feasible water protection measures under different conditions.
- Assessment of risks of different scenarios on key habitats and species.
- Documented methodologies and results on main ecosystem services.
- A documented model system for further use on N2000 and other sites in Finland and elsewhere in Europe.

The site application will be carried out during 2018-2020. The approach and results on the ES and sustainability assessments will be documented in a site based report (by 31.12.2020). Seminars for local stakeholders, organisations and laymen will also be arranged. Via the ESlab application key methodologies and results will also be provided using Internet-based solutions.

Task 3: Assessment reports on vulnerability and ecosystem impacts at selected N2000 sites using long-term ecosystem data

In this task the compiled monitoring data base of Action 2 (deliverable) will be used to produce two separate assessment reports for the intensively monitored sites Hietajärvi (located in the catchment area of the FRESHABIT catchment Koitajoki) and Valkea-Kotinen (Vanajavesi catchment). These sites are located in protected areas (Patvinsuo national park and Evo nature

reserve, respectively) and represent key habitats of these regions. Intensive data from different ecosystem compartments have been collected since the 1980's, providing unique data sets for assessing the long-term impacts of climate change and air pollutants (www.syke.fi/nature/icpim, ICP IM network). The work will update the work done and documented in two previous reports from these sites (The Finnish Environment 59/2006 and 34/2011). The work will demonstrate methodologies and results for detailed impact assessment that can be conducted at similar N2000 sites elsewhere in Europe as well. The reports will contain results concerning:

- Impacts on element cycling and retention in the catchment areas.
- Long-term changes in hydrology and water quality.
- Impacts on different species.
- Results from ecosystem model applications using the long-term datasets, including predictions on future ecosystem responses.

The work will be conducted during years 2019-2020, and the reports will be ready by 30.6.2020 and 31.12.2020, respectively.

Reasons why this action is necessary:

Assessment and further improving ecological status of water bodies under Natura 2000 networks is essential to improve favorable status of protection. As already detailed in Action A1, the Finnish Priority Actions Framework (PAF) for Natura 2000 states that: "In many localities artificial obstructions in rivers and streams and excessive loads of nutrients and solids are the most significant problems facing the habitats of threatened and vulnerable migratory fish populations" Concrete tools are needed to facilitate solutions to environmental loading and steer management by effective way.

As also already detailed in Action A2, the assessment of ES is a prioritized action in the Finnish PAF for Natura 2000, where a key vision is that the favourable status of biodiversity and ecosystem services will be ensured by 2050. This requires ES methodologies to be developed, tested and demonstrated. Concrete actions on this topic are listed in the PAF actions 5-11,12-19 and 24: "Implement measures to achieve the global restoration target of 15% and maintain and improve the production of ecosystem services (develop criteria, restoration methods, and monitoring)". The work is also relevant for the Finnish contribution to the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES).

Constraints and assumptions:

No significant constraints are predicted. The team of the Action is based on already existing cooperation, having close links to the local authorities. It is assumed that sufficient reliable data can be collected for the detailed model applications at Karjaanjoki.

Expected results (quantitative information when possible):

- Reports on the use of integrated model systems for assessing ecosystem services, environmental impacts and sustainability of measures and agricultural products at the site-scale, 1-2 sites..
- Demonstration of model and tool performance at selected test sites, 3-4 sites.
- Reports demonstrating the assessment of long-term ecosystem impacts of climate change and air pollutants at intensively monitored N2000 sites, 2 sites.
- Seminars presenting the assessment results to stakeholders and the general public, 2-3 seminars.
- Publications on model applications and ecosystem service assessment , 2-3 publications..

Cost estimation:

Monitoring and modelling of hydrochemical impacts is carried out in 5 regions of the project. The monitoring builds largely on field data and model results of other actions. Therefore the costs are mostly comprised of personnel costs related to the analyses of results and reporting. However, also field sampling for validating the model results and providing additional data is required. The personnel needed for the action include water protection, geology and bottom fauna experts (mostly permanent) and field workers for collection the data (temporary staff). The permanent

personnel cost during the first phase are estimated to 236 days (66 437€) and temporary staff 259 days and 41 427€ respectively. The personnel cost for the latter phases are 405 975€ and therefore the total personnel cost are estimated to 513 839€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel for acquiring data from the monitoring areas are estimated to 31 901€ for the first phase and 20 851€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

Costs related to collecting and analyses of samples (e.g. water chemistry, heavy metals, isotopes) are mostly included in external services (90 511€) and at Karjaajoki the monitoring will be outsourced (20 001€). The cost estimations for services are based on previous experience in monitoring carried out by the beneficiaries and analysis price list of the laboratory service providers.

The equipment costs include devices needed for data collection such as precipitation loggers (3x 330€), handheld Field water quality instrument (4 000€) and field multiprobe measurement (10 600€). Consumable material (19 280€) include materials needed for collecting samples. The other costs (3 600€) include printing costs for the monitoring reports.

The costs per project region is app. 57 100 € during nearly 7 years.

The total cost of the action is 715 583€.

Deliverables:

- Report on the long-term impacts of climate change and air pollutants at the Valkea-Kotinen site (Vanajavesi) (30.06.2020)
- Report on the application of the integrated model framework for ecosystem service and sustainability assessment at the Karjaanjoki catchment (31.12.2020)
- Report on the long-term impacts of climate change and air pollutants at the Hietajärvi site (Koitajoki) (31.12.2020)
- Report on the effect of climate change and actions in forestry and agriculture in water quality in Koitajoki and Puruvesi (31.12.2020)

Milestones:

- Report on the long-term impacts of climate change and air pollutants at the Valkea-Kotinen site (Vanajavesi) ready (30.06.2020)
- Seminar for local stakeholders, organisations and laymen at Karjaanjoki (31.10.2020)
- Report on the application of the integrated model framework for ecosystem service and sustainability assessment at the Karjaanjoki catchment ready (31.12.2020)
- Report on the long-term impacts of climate change and air pollutants at the Hietajärvi site (Koitajoki) ready (31.12.2020)
- Scenarios available of the effect of climate change and actions in forestry and agriculture in water quality in Koitajoki and Puruvesi (31.12.2020)

ACTION D.4: Monitoring socio-economical impacts

Beneficiary responsible for implementation:

LUKE, SYKE, MH and all beneficiaries regarding the overall assessment

Description (what, how, where and when):

Socio-economic impacts of nature conservation and management projects can be assessed in a number of ways. Earlier, multi-criteria decision analysis (MCDA) has been used for assessing the costs vs. benefits of restoring migratory fish populations by building fish passages for hydropower dams, e.g. in Karjaanjoki among the FRESHABIT target areas. It has been shown that restoring a migratory fish population could promote huge economical benefits for recreational fishing at a time

scale of a decade. Detailed socio-economic assessment for a project dealing with a single site, e.g. one river, is usually costly and applying such an approach for the whole FRESHABIT project in full detail would be exhaustive. Therefore, we will define the practically applicable level of overall socio-economic impact assessment for FRESHABIT in task 1, using the previous experiences and results for related projects.

Recreation is one of the key ecosystem services that can be enhanced by management and restoration of degraded habitats. MH conducts visitor studies to measure recreational use of national parks and other key recreation areas. Currently visitor surveys collect information of visitors' spending and are used to produce information of local economic impacts, but also to measure visitors experiences their wellbeing effects (psychological, social and physical). There is an attempt to measure these effects also in monetary terms. Measuring the wellbeing effects provided by ecosystems in monetary terms is important for justification of using public funds for providing quality environments and services for recreation. Developing the quality of environment and the services for recreation has also effect on these wellbeing effects. Measuring the changes in wellbeing due to development projects by comparing benefits with costs provide information for justifying the development and for prioritizing various development alternatives. This issue is especially targeted in task 2.

Possibilities for complementary projects for both additional regional assessments utilizing the model produced by task 2, as well as a deeper overall assessment to supplement task 1, are screened throughout the project duration. The aim of especially task 2 is to promote a number of complementary projects.

Task 1: Overall socio-economic impact assessment

The overall socio-economic impact assessment of FRESHABIT will be done at a practical level of detail, considering the large size and complicated structure of the project. With a linkage to the outcomes of other D actions, we will assess the following issues per FRESHABIT area, region, and the whole project:

- Social benefits (e.g. increased attractivity for recreation)
- Economical benefits (e.g. increase in catches, use of byproducts such as cyprinid fish and reed, acquired external services and other effects on employment, increase in the value of recreational business, increase of value of ecosystem services)
- Economical costs (e.g. costs of providing water for the fish passages).

Data collection for the assessment will be integrated in the overall monitoring scheme of FRESHABIT, and the primary data is provided by the regional projects and analysed together with the regional and national coordinators. Steps to complete the task include:

- Defining the level and expectations for the socio-economic impact assessment (phase 1)
- Defining the indicators that are collected in the regional projects (phase 1)
- Data collection from the regions (started in phase 1)
- Re-evaluation of the expectations and indicators at the end of each phase
- Finishing the socio-economic impact assessment for FRESHABIT (phase 3).

Task 2: Developing a model for assessing the value of recreational use

To develop a model that is applicable in other regions, MH will conduct two visitor studies at Lake Puruvesi / Punkaharju during the project. The first round will be made in 2016 and the second in 2020. Visitor surveys as such do not facilitate valuation of possible changes in the natural environment or recreation services in advance, but a special method of contingent behavior is used for economic valuation of changes in recreation ecosystem services. Visitor surveys before and after the changes in environmental quality and services also allow validation of the measures and the development of the approach. In addition, we develop, test and evaluate the approach to transfer the value information to other regions.

Puruvesi is a lake with exceptionally clear waters and many islands located in Savonlinna, on the border area of South Savo and North Karelia. It is a part of the Vuoksi water system and of the Lake Saimaa. Recreational use of Lake Puruvesi is abundant as it is popular location of summer cottages and also due to Punkaharju's status as a major tourism destination. The lake is actively used for fishing and other outdoor activities by local people although there have been signs of declining water quality. Also many private enterprises in the region are dependent on outdoor activities.

The objectives of task 2 are:

- the development of valuation methods for recreational destinations where environmental quality or services are developed
- monetary measures of recreational benefits and changes in those benefits perceived by visitors at Puruvesi
- creation of an approach that can be applied on new areas,
- developing and testing an approach to transfer obtained value information to selected N2000 sites in all regions.

Steps to achieve the objectives of task 2 are:

- To develop a model to assess the economic value of improving recreational ecosystem services and the status of aquatic ecosystems (contingent behavior method).
- To identify the current recreational use in lake Puruvesi and measure how the planned measures affect the quantity of recreational use and nature-based tourism demand. (Visitor Study 1)
- Analysis of the visitor survey results.
- To identify the effect of measures on the well-being effects of recreational use and their value (Visitor Study 2).
- The existing data sources (e.g. national recreation inventory data LVVI2) are analysed to obtain information of recreation use in other regions. The Puruvesi results are used to develop and evaluate value transfer approach to two most important N2000 sites in other regions.
- Assessment of the approach.
- Reporting the approach.
- Complementary project applications prepared and submitted e.g. on the themes of recreation monitoring and benefit estimation

Reasons why this action is necessary:

Assessment of the overall socio-economic impacts of a project is an important tool for justifying the importance of the project for not only biodiversity and nature conservation, but also for the public. The model developed in task 2 makes it possible to evaluate beforehand the benefits of measures and to prioritize the possible measures in various areas. This action is also necessary to define the value of wellbeing effects to take them into account in allocation of budget funds for recreation development. Task 2 provides an approach that can be used on several sites with recreation development plans, and that will be extrapolated to other project regions in complementary projects, and used for analysis of the data collected from all regions for task 1. This action also benefit private enterprises as it shows the recreation demand and its development on the regions. Knowledge of the monetary value of non-market ecosystem services also facilitates development of payment for ecosystem services (PES) approaches where private companies can act as providers of services on the regions.

Constraints and assumptions:

A clear vision of expectations, methods and indicators in the beginning of the project is essential for the overall assessment. The results rely on survey methods and other data provided by the regional and local actors. Thus it is important to cooperate with local actors to obtain motivated respondents and coherent data.

Expected results (quantitative information when possible):

The results will show the overall socio-economic impact of FRESHABIT, and more specifically, the economic value of the recreational use and wellbeing effects in Puruvesi (clearwater, oligohumic lake) in its current and future state in monetary terms. The results facilitate the comparison of recreation benefits with the cost of development in advance. The expected results also provide an evaluated and applicable approach that can be used on other areas of recreational importance in Finland in complementary projects. The results include:

- An approach and a set of indicators for socio-economic impact assessment that can be used in a similar project
- Overall socio-economic impact assessment report for FRESHABIT as apart of the final report
- A model to be applied elsewhere
- Reports for the modeling approach (3 reports)
- At least one complementary project started during the project (1-3 complementary projects)

Cost estimation:

The costs are divided between two beneficiaries (MH and LUKE). The full scale monitoring of socio-economical impacts is carried out in one project area (Puruvesi) and using methods that do not require as much field work, costly analyses or equipment than D1-D3. The concise assessment method developed at Puruvesi case for socio-economic assessment will be used for the impact assessments at other project areas and for the whole project. The costs are primarily related to permanent personnel used for collecting data, analysing and reporting and temporary personnel for data analyst and interviewer. The permanent personnel cost during the first phase are estimated to 24 days (7 220€) and temporary staff 129 days and 33 960€ respectively. The personnel cost for the latter phases are 42 448€ and therefore the total personnel cost are estimated to 83 628€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The overall assessment is done by MH and other members of the CORE team as part of their other work, and the data from the regions is collected among other data for monitoring purposes.

The travel for acquiring data from the monitoring areas are estimated to 4 068€ for the first phase and 3 108€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

The consumable materials include costs for questionnaires (925€) and other cost include printing costs for the report (800€).

The total cost of the action is 92 529€.

Deliverables:

- Report of the recreation benefits in Puruvesi under various development alternative (31.05.2017)
- Report of visitor survey results (31.12.2017)
- Report of an approach for valuing recreation wellbeing effects (31.12.2017)
- Report for the socio-economic assessment of the project (31.12.2022)

Milestones:

- Approach and indicators for the overall assessment defined (31.12.2016)
- Data collection from regions started (31.12.2016)
- Model development finished and reported (31.12.2017)
- First re-evaluation of the overall assessment approach and indicators (31.12.2017)
- Second re-evaluation of the overall assessment approach and indicators (31.12.2019)
- Socio-economic assessment of the project finished (31.12.2022)

ACTION D.6: Monitoring of the project's contribution to the implementation of the PAF**Beneficiary responsible for implementation:**

MH together with the core group (SYKE, LUKE, SMK) and MoE

Description (what, how, where and when):

The Ministry of Environment will (MoE) establish in spring 2016 a PAF monitoring group in particular related to the contribution of FRESHABIT towards the full implementation of the PAF. The group will be preceded by the MoE. The key ministries in relation to the implementation of the PAF will be engaged (the Ministry of Forestry and Agriculture, Ministry of Employment and the Economy). The experts (2-3) from the FRESHABIT project will be members in the group and other will attend as expert when needed. The Association of Finnish Local and Regional Authorities and NGOs will be given a possibility to express their view as invited experts. In addition the project results and experiences from the project areas of FRESHABIT are presented regularly in the meetings by the beneficiaries from the areas.

The PAF monitoring group will convene 1-2 times a year to discuss:

- the experience gained in the FRESHABIT project
- how the lessons learnt in FRESHABIT can be used in the other types of Natura 2000 sites and particular Annex II habitats
- how to ensure that the lessons learnt and key results are disseminated throughout public administration
- how other EU or national financing instruments could be used for the implementation of the PAF with emphasis on improving of the complementary use of funds for Nature 2000
- how to take Natura 2000 related issues into account in the next financing period

In addition to regular meetings the MoE will organise at least three national/regional PAF implementation seminars. The seminars will deal with the lessons learnt from FRESHABIT and particular efforts will be put for planning new actions and projects for implementing the prioritized actions in the Finnish PAF. They are targeted to environmental agencies and other parties responsible for implementing the PAF, and organizations and companies that could be involved in the implementation, as appropriate regarding the theme of the seminar (see below). The 1-2 day seminars will be held in 2016, 2019 and 2020 with the following themes:

- Seminar I: The possibilities for complementary funding for FRESHABIT and other PAF-targeted projects. How are the current possibilities used and how could they be used in a more efficient way?
- Seminar II: Biodiversity, bioeconomy, and business. Finding new public-private partnership associations for nature conservation.
- Seminar III: Implementation of PAF in Finland. What has FRESHABIT achieved, what has been done elsewhere, what are the next steps towards full implementation of the PAF.

The estimated costs per seminar will app. 3 000€/seminar including venue and catering costs. The MoE will invest app. two weeks (10 weeks in total, total 51 days, daily rate 426€/day) working time per year from the PAF expert to the project i.e. app. 21 750€ as own contribution. The PAF expert is responsible for organizing the monitoring group meetings and PAF seminars in co-operation with the key beneficiaries of the FRESHABIT project (MH, LUKE, SYKE and SMK).

Reasons why this action is necessary:

It is vital that the route to the implementation of the PAF is explored at the ministerial level as the Ministries have a key role in administrating, financing and governing financing instruments related to the Natura 2000 network. Furthermore it is important that the lessons learnt and key results are efficiently disseminated and passed to all levels. This requires a joint monitoring group.

Constraints and assumptions:

It could be possible that Natura 2000 is seen mostly as conservation network and not as a network of possibilities. By establishing a cross-sectored monitoring group the wider possibilities generated by Natura 2000 status can be promoted.

Expected results (quantitative information when possible):

The group involves also experts from FRESHABIT and other key stakeholders for ensuring the lessons learnt and results are efficiently passed inside the public administration. The monitoring group will meet at least 8 times during the project period and also continues working beyond the project period. The seminars will help disseminating the messages to wider audiences.

Cost estimation:

The costs include the personnel costs two beneficiaries (MH and MoE) related to the coordination and implementation of the PAF monitoring group work. The staff include person responsible for PAF work of the MoE (permanent) and freshwater expert (permanent) and overall project manager (temporary) from MH. The permanent personnel cost during the first phase are estimated to 28 days (10 440€) and temporary staff 4 days and 1 240€ respectively. The personnel cost for the latter phases are 23 360€ and therefore the total personnel cost are estimated to 35 040€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff. The costs for other organisations are allocated under F-actions.

External assistance include organising costs for three PAF seminars during the project (à 3 000€).

The total cost of the action is 44 040€.

Deliverables:

- Analysis of the implementation of the PAF within the Final report (31.12.2022)
- Updated PAF (31.12.2022)

Milestones:

- PAF monitoring group established (30.04.2016)
- First meeting of PAF monitoring group (31.05.2016)
- First PAF seminar organized (30.11.2016)
- Second PAF seminar organized (30.11.2018)
- Third PAF seminar organized (30.11.2021)
- At least 9 PAF meetings held (30.09.2022)

ACTION D.7: Overall impact assessment on ecological and conservation status**Beneficiary responsible for implementation:**

Head responsible ones: SYKE, LUKE, MH, UO, ESAELY, POKELY; all other beneficiaries contribute to the implementation of monitoring and background data

Description (what, how, where and when):

In action D7 overall impact assessment based on official WFD compatible ecological quality elements are realized. Assessment is done at water body level in rivers and lakes, but also in smaller units under restoration action. Ecological quality elements are periphytic algae, macrophytes, macroinvertebrates and fishes in rivers. Same elements and also phytoplankton are analyzed in lakes where also new methods developed in A6 are utilized. Additionally physico-chemical water quality parameters and hydromorphological status are analyzed. In streams assessment methodology is developed under action A5 and complementary project MEBI. Obvious new indicators are diatoms analyzed in stone basket and aquatic mosses indicating both diversity and metal accumulation. Also new possible indicators will be investigated as a result of actions D1-2. Latest calculation methodology of restoration effect size will be also applied. Data for assessment is collected in monitoring actions D1-3 and additionally also from national monitoring network regarding reference data. Conservation status is evaluated based on official methodology developed in A9.

Main aims of the action are:

- Assessment of ecological status of water bodies before and after restoration
- Assessment of parameters (structure and function) affecting the conservation status of species and habitats of Community interest before and after restoration

Reasons why this action is necessary:

In principle river basin management is fully steered by official ecological status assessment as part of implementation of WFD. Therefore it is essential to translate all results of project to common status classes and also describe how effective the measures are. Impact of measures on parameters contributing to the assessment of the Conservation status of species and habitats of Community Interest (HBD) is also evaluated and estimated. Action will feed information into PAF on the effectiveness of the used measures. FRESHABIT will provide a first national view of the efficiency of restoration actions translated to European standards and thus supporting common understanding of the recovery speed and processes of the freshwater habitats.

Constraints and assumptions:

Natural variation and relatively coarse scale of status assessments may cause instability for official classification and additionally hinder detectability of improvements.

Expected results (quantitative information when possible):

Results of C actions and D1-5 will provide data that allows:

- WFD status assessment reports with improved data
- HD status assessment with improved data
- The overall impact assessment report of FRESHABIT

Cost estimation:

Monitoring the project impact on the overall conservation and ecological status impacts is largely desk work and it covers all project regions. The costs are primarily related to personnel costs for collecting, analysing, and reporting the data and results. Majority of the personnel costs are for three beneficiaries MH, SYKE and LUKE, which are responsible for the overall assessment. Also costs from ESAELY and POKELY are included. The personnel needed for the action include experts from various fields nature conservation, water protection, climate issues etc. The permanent personnel cost during the first phase are estimated to 246 days (88 477€) and temporary staff 506 days and 151 282€ respectively. The personnel cost for the latter phases are 229 204€ and therefore the total personnel cost are estimated to 468 963€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel for acquiring data from the monitoring areas are estimated to 4 630€ for the first phase and 8 550€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

External assistance costs include water and bedload analysis costs (17 394€) for which the estimation is based on list prices of the laboratory service provides. Also analysis marcoobenthos and diatoms are made (2 460€) is selected sites. The equipment cost checked from internet sources boat (8 000€). The consumable costs include minor field work necessities such as collectors (3 560€) and devices for the boat (cahrt plotter and navigation software totalling 1 670€). Also meeting costs for coordination meeting (300€) are included.

The costs per project region is app.57 382 € during nearly 7 years.

The total cost of the action is 516 437€.

Deliverables:

- Report on ecological status and conservation status of water bodies under restoration (30.09.2022)
- Article on peer-reviewed journal comparing status assessment according to WFD and Natura 2000 reporting (30.09.2022)

Milestones:

- List of all relevant ecological quality elements updated (31.05.2016)

E. Public awareness and dissemination of results (obligatory)**ACTION E.1: Communication*****Beneficiary responsible for implementation:***

Majority of the beneficiaries are involved in the communication. MH is coordinating the national communication and regional coordinating organisations are responsible for communication actions on local and regional level. Following beneficiaries are involved: MH, SMK, LUKE, GTK, WWF (national level) and EPOELY, ESAELY, LAPELY, LSPHä, LUKE, LUVY, MH, POKELY, ProPuru, SMK, VARELY, VVK (on local level). Communication is also done in other E-actions.

Description (what, how, where and when):

Communication is a key to the successful project of high quality. FRESHABIT acknowledges the importance of communication in gaining a better understanding of ourselves and others. It is also seen as a way to solve possible problems, learn new things, and build up trust among stakeholders. Thus, the main object of this action is to communicate and exchange ideas with other stakeholders and public citizens. For practical reasons, the communication has partly been divided in two: national organizations (MH, SYKE, LUKE, MH, WWF, GTK) concentrate on communicating the relevant stakeholders involved at national level, and regional beneficiaries contribute importantly to this in respect to their own regions. Obviously, this division is sometimes as a thin-red-line, and organizations are able to communicate also without boundaries when needed. As a difference to action A10, which concentrates on writing up national guidance and direct capacity building, this action is targeted to other stakeholders, private organisations and to the public in general. In more details, MH will organize at least 2-3 yearly media events (e.g. media trips etc.) during project, and also do social media promotion (Facebook, Twitter and/or Instagram) for FRESHABIT. The topics of the events are e.g. starting of the project, FWPM actions, novel catchment area model, involving volunteers, interim results of the project, role of the project in stream, lake and catchment areas restoration, results of the inventories and findings of the lake and headwater mapping. Also information for the new facilities at Vanajavesi will be produced.

In addition, WWF Finland will communicate and disseminate materials on sustainable seafood choices from local freshwater sources in seminars, exhibitions, stakeholder meetings and other relevant events as well as via social media and other on-line forums. The communication is based on information and sustainability evaluation reports conducted under action A7 and on communication materials produced under action E5. The overall aim of the task is to increase consumption of sustainable local fish by providing up-to-date information for the public, retail, restaurants, fisheries managers and other related fisheries and seafood stakeholders. The work will be conducted during years 2017-2019.

The media work will concentrate on the following topics in the first two years of the project: the start of the project, cross-sectoral co-operation in planning, restoration and monitoring in catchment areas and the meaning of LIFE and PAF. In addition to press releases we will organize at least one media event in the field related to the topics. In addition we will promote the project through social media in campaign during 2016. The theme of the campaign will be decided by the working group for the communication of the project.

WWF will initiate the communication actions on sustainable seafood choices in summer 2017. The campaign will be in full action 2018 and 2019.

Reasons why this action is necessary:

In general, efficient communication is vital to high-quality project. Specifically, seafood consumption in Finland is concentrated on imported seafood whilst the local freshwater resources seem to be poorly recognized and under-utilized. Despite that freshwater fisheries and aquaculture are comparatively well reported and studied in Finland the information on sustainability of freshwater fisheries and aquaculture is either scarce or fragmented. In this action WWF will

produce communication materials which compile the existing knowledge and sustainability aspects of selected freshwater fisheries and aquaculture production. This action aims at increasing the recognition and value of local freshwater resources as a source of sustainable seafood.

Constraints and assumptions:

This Action is not expected to face significant constraints in general. The communication actions of WWF are planned to take place in already existing platforms so that working hours are used for concrete communication action, not for organizing seminars or events. Restaurants and retail are important stakeholders and extra effort is needed to find the best and most effective ways to contact these stakeholder groups. It is also important to have close relations with fishing industry so that possible conflicting information is avoided and communication effort is used to promote accessible and realistic options.

Expected results (quantitative information when possible):

- Increased awareness of private citizens towards conservation of freshwater habitats and species
- At least 15 national media events
- 3-5 short printed policy briefs in English on e.g. catchment area management actions for forest owners, cross-policy co-operation approaches, how to prepare a catchment area plan, information on fish ways and their functionality
- Local media events
- Social media promotion
- Increased awareness on sustainable seafood choices from local freshwater sources
- Increased availability of local sustainable seafood choices
- Awareness rising activities conducted in multiple platforms
- Important stakeholders contacted
- Several newspaper and on-line articles published by WWF

Cost estimation:

MH will employ communication specialist to coordinate the communication. In other organisations (12) the communication is done by the experts of the substance of the project. LUKE has also foreseen some assistance from the communication team. The costs are divided between 13 beneficiaries (MH, LUKE, SMK, VARELY, ESAELY, EPOELY, POKELY, LAPELY, LUVY, GTK, VVK, WWF, LSPHä, ProPuru). The permanent personnel cost during the first phase are estimated to 116 days (34 008€) and temporary staff 230 days and 64 513€ respectively. The personnel cost for the latter phases are 204 474€ and therefore the total personnel cost are estimated to 302 995€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel costs linked dissemination at sites are estimated to 18 163€ for the first phase and 38 728€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs.

External assistance costs totalling 16 500€ are linked to the organising media events and 5 000€ is reserved for social media promotion. Consumable material costs totalling 29 025€ consists mostly of meeting costs (25 225€) and production costs for posters and brochures (3 800€).

Other cost include seminar/public meeting organising costs (15 100€), translations (500€) and public meeting announcements (2 000€).

The average yearly allocation of the beneficiaries for the whole project duration is app. 27 000 €.

The total cost of the action is 428 011€.

Deliverables:

- 3-5 printed policy briefs (31.12.2022)

Milestones:

- First round of media events organised (31.3.2016)
- Social media promotion completed (30.06.2016)
- Second round of media events organized (30.9.2016)
- Third round of media events organized (30.9.2017)
- Communication activities of WWF conducted (30.09.2019)
- 10 media events organised (31.12.2019)
- At least 15 national media events organized (30.09.2022)

ACTION E.2: Networking**Beneficiary responsible for implementation:**

All beneficiaries

Description (what, how, where and when):

The main goal of activity is to exchange experiences with other (LIFE) projects in Finland and other parts of EU working in the same field i.e. managing freshwaters with emphasis on catchment area approach. This will be carried out by contacting the relevant projects picked from LIFE database and arranging meetings as soon as the FRESHABIT LIFE IP project commences. FRESHABIT will share experiences at least with the following international LIFE projects:

Freshwater management

- LIFE13 NAT/SE/000116 LIFE-TripleLakes - Triple Lakes – Catchment restoration and preventive action for aquatic habitats in a climate change perspective
- LIFE13 NAT/PL/000009 LIFEDrawaPL - Active protection of water-crowfoots habitats and restoration of wildlife corridor in the River Drawa basin in Poland
- LIFE12 NAT/EE/000871 LIFE HAPPYRIVER - Restoring the integrity of freshwater habitats in Alam-Pedja Natura 2000 area- bringing the River Laeva back to life
- LIFE10 NAT/AT/000017 LIFE+ Lavant - LIFE+-Lavant: Habitats network for endangered small fish species

Pearl mussels

- LIFE13 NAT/IE/000144 LIFE Kerry - Sustainable land use management for the conservation of the freshwater pearl mussel
- LIFE13 NAT/FR/000506 Life+ Marga Haute-Dronne - Life + Nature Preservation of *Margaritifera margaritifera* and restoration of river continuity of the Upper Dronne River
- LIFE11 NAT/UK/000383 PIP GB - Pearls in Peril - securing the future of the freshwater pearl mussel in Great Britain

In addition we will openly disseminate and distribute our experiences on the preparing of the LIFE IP proposal and also managing of the project to any other ongoing LIFE (IP) project beneficiaries potential, LIFE IP project applicant or national contact point. Actually we have already shared our experiences with e.g. Danish and Swedish LIFE national contact points on the concept note phase. The project results and the processes will also be actively disseminated to the Commission in order to distribute the lessons learnt from managing new LIFE IP project and the key results of the project. The project will also participate to the national and international LIFE meetings such as FIN-SWE-DK LIFE platform meeting and seminars organized during the project period.

Reasons why this action is necessary:

It is important to share experiences and knowledge of LIFE IP project and the key results as widely as possible at local, regional, national and EU level. By networking the project is able to get best practices from other projects working in the same field. The key results such as the novel catchment area approach for freshwater management and protection will also be disseminated as part of action A10.

Constraints and assumptions:

This action is not expected to face significant constraints. We assume that other LIFE beneficiaries are interested in the first ever LIFE IP projects, their preparatory phase and actual implementation.

Expected results (quantitative information when possible):

Active networking with other LIFE (IP) projects especially in the field of freshwater habitat and species protection and catchment area level approach throughout the project period and also beyond. The project results presented in various relevant national and international seminars and events. Lessons learnt passed to the Commission.

Cost estimation:

The networking costs consist mainly of personnel and travel costs totalling 153 753€. The costs are divided between 10 beneficiaries (MH, LUKE, SYKE, SMK, VARELY, ESAELY, VVK, FANC, LUVY, GTK). Some beneficiaries have budgeted personnel and travel costs and others only travel costs. The permanent personnel (mostly substance experts) cost during the first phase are estimated to 56 days (17 095€) and temporary staff (also substance experts and project managers) 60 days and 15 833€ respectively. The personnel cost for the latter phases are 56 720€ and therefore the total personnel cost are estimated to 89 648€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel costs linked dissemination at sites are estimated to 25 885€ for the first phase and 37 220€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs and average prices for flights to European destinations and hotels.

The total cost of the action is 153 753€.

ACTION E.4: Producing the project website**Beneficiary responsible for implementation:**

The main website MH, local website for Puruvesi ProPuru

Description (what, how, where and when):

The purpose of this action is to create a website for the FRESHABIT and hence disseminate the public with information about the project, such as its objectives, actions, progress and results. It is also our intention to enhance public awareness about the N2000 sites in Finland, planned actions and their effects on sites biodiversity and ecological functioning. Project website is very effective and easy way to disseminate the project results and it reaches the target audiences in real-time.

MH will use professional communications officer to develop this website at the beginning of the project, and regular updates will be carried out together with project manager. The content is updated regularly when milestones and deliverables are achieved. The LIFE and Natura 2000 logos will be clear and visible on this website and there will be clear statement the FRESHABIT received the Community support. Information about important events related to the project are announced on the website, and links to the other relevant websites (e.g. other LIFE-projects) are added to the website. Besides information about the projects, website will be linked to other relevant webpages in order to give comprehensive view of N2000 sites and their prioritised species. The beneficiaries of the project will also include basic info of the project at their websites and link to the project website.

In addition, Puruvesi target area will produce their own website for their own region. This website will also have clear LIFE logo on and the statement of Community support. It will be linked to FRESHABIT website.

Reasons why this action is necessary:

It is considered as obligatory according to the LIFE-guidelines for applicants. The reason for a website is to allow the public in target regions, in Finland, and in Europe to follow the project and its objectives. The results of the project will be disseminated to a wider public to pave the way for implementation of conservation also in other parts of the EU.

Constraints and assumptions:

No constraints are expected.

Expected results (quantitative information when possible):

- A website, which presents the project in full detail, regularly updated with the project results
- Increased awareness of public towards conservation and management of N2000 sites

Cost estimation:

The cost include personnel costs from MH (temporary staff, project manager and communications officer) in relation to the setting up and maintaining the project website totalling 21 420 € of which 7 140€ (24 days) is allocated to the first phase. In addition the external assistance costs for design and pictures (4 000€) for the project website and costs for setting up the local website (1 850€) for Puruvesi. The price estimations are at the low end of the costs for new websites.

The total cost of the action is 27 270€.

Deliverables:

- A website, which presents the project in full detail (30.06.2016)

Milestones:

- The project website and Puruvesi website operational (30.06.2016)

ACTION E.5: Producing project materials**Beneficiary responsible for implementation:**

MH coordinates and other participate LUVY, SMK, SYKE, WWF, VVK

Description (what, how, where and when):

In this action, all specific project material such as leaflets, notice boards, newsletters, exhibition stands etc. will be produced. The main purpose of these is to draw public attention into FRESHABIT and conservation of N2000 sites. Leaflets (project and Karjaanjoki) will be handed to public in all relevant exhibitions, meetings, or conferences, and public noticed boards standing at all proposed target sites. Karjaanjoki leaflet is also targeted to the potential funders for the fishways. An exhibition stand is established and used in meetings and conferences. At Vanajavesi keskus a leaflet/newsletter for restored bird lakes will made. On each of these, we will inform about the project, its objectives, planned actions and expected results. The LIFE and Natura 2000 logo shall appear on them at all times.

FRESHABIT will also benefit the social media and produce ca. 10 minutes video on YouTube on project to be easily available to wide audience. Likely, the short videos of applied sampling methods in FRESHABIT might also be produced.

Producing communication materials on sustainable local seafood choices (WWF)

In this task WWF Finland will produce communication materials on sustainable seafood choices from local freshwater sources. The produced materials are based on information and sustainability evaluation reports conducted under action A7. The overall aim of the task is to increase consumption of sustainable local fish by providing up-to-date information for the public, retail, restaurants, fisheries managers and other related fisheries and seafood stakeholders.

The work will be conducted during years 2017-2018. The following actions will be completed during the first two-year period. Project leaflet notice boards for all project areas by 5/2016 and the project roll-ups to be placed in the premises of the beneficiaries and to be used in various seminars and conferences by 8/2016. The project video (max 3 min) presenting the project and it's key objectives will be completed also by 8/2016. In addition the leaflet for Karjaanjoki for promoting catchment area actions and the fish ways will be completed by 12/2016.

Reasons why this action is necessary:

It is considered as obligatory according to the LIFE-guidelines for applicants. We also see it as beneficial for the project that its objectives are supported by the public, especially those living near the sites. It is also vital part of the project to communicate its purposes and expected results to the public. Information and dissemination of the results can help to raise awareness about sustainable development of the N2000 sites and the challenges facing biodiversity in the project area.

Seafood consumption in Finland is concentrated on imported seafood whilst the local freshwater resources seems to be poorly recognized and under-utilized. Despite that freshwater fisheries and aquaculture are comparatively well reported and studied in Finland the information on sustainability of freshwater fisheries and aquaculture are either scarce or fragmented. In this action WWF will produce communication materials which compile the existing knowledge and sustainability aspects of selected freshwater fisheries and aquaculture production. This action aims at increasing the recognition and value of local freshwater resources as a source of sustainable seafood.

Constraints and assumptions:

No constraints are expected.

Expected results (quantitative information when possible):

- Leaflets and other project material to hand out to public (project leaflet/newsletter and local leaflet for Karjaa, Vanajavesi)
- Notice boards at each location of the target sites where actions will be implemented
- Exhibition stands(roll-ups) to be used in meetings/seminars and at the offices of the beneficiaries
- Project video on for MH YouTube -channel
- Increase in public awareness of conservation of N2000 sites
- Communication materials on sustainability of selected freshwater fisheries and aquaculture production.

Cost estimation:

The costs are divided between 5 beneficiaries (MH, SMK, SYKE, WWF, LUVY). The personnel costs consists of the planning of the materials (project presentation video, leaflet, roll-ups, notice boards, info material on sustainable fish choices) totalling 29 860 € linked to the temporary communication staff of MH, SMK and WWF. During the first phase 20 days (5 430€) is used and for the latter phases 24 430€.

The external assistance costs include costs for producing the video (15 000 €), information materials (min 16 info boards 1 600€, project leaflet 2 600€ and min 16 roll ups 4 800€). In Karjaajoki 6 000€ is reserved for project communication materials; project flyer and thematic flyers, signposts for action sites, visual elements for printed media, www and social media communication such as photos, infographics, animations and videos. The costs estimation for the materials including the design and printing are based on earlier projects. Consumable material and other costs are linked to the info products of WWF (2 700€).

The total cost of the action is 83 060€.

Deliverables:

- Notice boards (31.05.2016)
- Project leaflet (31.05.2016)
- Project roll-ups ready (31.08.2016)
- Project video on YouTube (31.08.2016)
- Leaflet for Karjaanjoki completed (31.12.2016)
- Communication materials on sustainable local seafood choices ready 31.12.2018
- Leaflet/newsletter for Vanajavesi (31.12.2019)

Milestones:

- Notice boards ready and distributed (31.05.2016)
- Project roll-ups made and distributed (30.10.2016)

ACTION E.6: Producing high-class transmedia**Beneficiary responsible for implementation:**

DocArt

Description (what, how, where and when):

Ahti's Kingdom is a high-grade documentary series (6 x 30 min.) about freshwater habitats, the vital importance of water, the underwater life and myths and legends related to water, broadcasted by Finland's national public service broadcasting company YLE. It is not only a traditional television series but also an interactive transmedia project, using multiple platforms and formats, such as social media, interactive websites and events, in order to reach wider audience. The documentary includes six themes described shortly below.

1. The most important ecosystem: water

Documentary is a story about water's journey in different seasons: a drop grows into a stream, a flow, a lake and finally it reaches the open sea. During the run of water we meet the most interesting aquatic species in the most important habitats. The documentary shows how all the life is connected to the circulation of water, including us, human-beings.

2. Finland below the surface

Finland below the surface is a story about the unknown underwater life. It's a tale about fish and freshwater pearl mussels, crayfish and the "northern coral": bladderwrack. It's also a filmmaker's personal expedition to petrified forests, shipwrecks, marks of timber rafting under water and many other interesting phenomena below the surface.

3. Myths about water

Finland has an exceptionally rich mythology related to water. However, it's not well known. In Ahti's Kingdom we get to know the greatest underwater god "Ahti" himself and also many other water spirits of the Finnish folklore, such as "Näkki", "Vedenemä" and "Vellamo". We discover how and why the tales were born and we understand their significance on our culture and traditions.

4. Water and health

Water has always been used to prevent diseases and as a source of wellbeing. In Finland - the country of sauna and ice swimming - water has a particular significance for health. We often repeat a phrase "vesi vanhin voitehista" (water is the oldest medicine of all). In recent years ice swimming has become extremely popular and as well as the tour skating and deep water running in lakes.

5. Culture was born on the shores of waterways

People have lived in Finland for 11 000 years after the last ice-age. We often forget that waterways have been the most important "highways" for us. In fact the whole country was inhabited through waterways: for centuries water offered both passageways and nourishment - and still today they have a great importance in Finland. The filmmaker travels along the old waterways by various traditional man-powered water vessels, rowing and canoeing.

6. Water and society

Man doesn't survive without water. We need it for almost every action we take. In everyday life the largest amount of our water consumption goes to personal hygiene. However, the most important matter in water consumption is the so called "hidden water". The water footprint of Finns is far too large. There is plenty of water nearly everywhere, but still water is being transported to Finland and other European countries from the countries where water is scarce. A pair of jeans contains 10 000 litres of hidden water, a cup of coffee 140 litres. These products are often imported from countries where there is scarcity of water. And even though we have plenty of fish in our lakes, rivers and sea, the majority of the fish we eat is imported from other countries.

Ahti's Kingdom is a co-production with DocArt production company and the Finnish Broadcasting Company Yle, with the partnership of FRESHABIT project. DocArt is the leading company in Finland in portraying the relationship between man and nature. The director and principal cinematographer is Petteri Saario. The series will be filmed on high-end HD format.

Ahti's Kingdom documentary series will be broadcasted on Yle TV1 channel 12/2019 TV1 is the most watched TV channel in Finland (share of daily television viewing 41,9% in 2013). Each episode will also be streamed on-demand via Finland's most popular internet TV service Yle Areena.

In order to reach wider audience and raise awareness on the subject, the TV-series will be supported by transmedia actions using multiple platforms (e.g. interactive websites and social media). While a documentary series is broadcasted on TV only during a certain moment, transmedia gives an opportunity for the public to engage in the project during the whole production. The transmedia actions including e.g. dedicated website and social media sites (Twitter, Facebook, Instagram) will be started 1/2019 and will run until 6/2020 i.e. beyond the national broadcasting date. The audience is able to tell their own experiences and give tips to the film crew. Also FRESHABIT partners will produce material for the website and take part in the conversation that takes place in social media.

After the first broadcast in Finland an English translated version of the series is going to be made and Yle Sales will be in charge for the international distribution of the production. DocArt's previous documentary films and series have had over 200 broadcasts in 16 different countries outside Finland. The documentaries are also going to be distributed to national and international film festivals. DocArt's previous documentaries have been shown in numerous film festivals around the world, gaining over 30 awards and merits.

The detailed planning of the documentary begins in 1/2017 and the shooting script will be finalised by 5/2017. Ahti's Kingdom is going to be filmed at different locations in Finland between spring 2015 and autumn 2018. A remarkable part of the filming is going to be done at FRESHABIT project sites and other NATURA areas across Finland. Some of the actions and results of FRESHABIT project will also be presented in the final documentaries and transmedia platforms.

Reasons why this action is necessary:

The goal of Ahti's Kingdom is to raise awareness of the unique and delicate nature of our freshwater ecosystem. The motto behind the TV series is "through the heart to the brain".

Ahti's Kingdom is a character driven documentary production where emotional and personal angle is in the focus. This makes the life-cycle of the production much longer than in the fact orientated current affair programs. It also gives a chance for the viewers to feel they are a part of the journey to the exciting nature of the freshwater ecosystems.

Finland is known as a country of thousands of lakes (187 888 altogether). There is a long coastline and hundreds of rivers. Maybe this is the reason why Finns don't often realise the importance of freshwater to the nature, culture and society - it's too self-evident. An audiovisual production with wide TV-audience and support of the Internet and social media platforms has a great chance to address how crucial resource water is.

Petteri Saario, the director of Ahti's Kingdom has told stories about Finnish nature and the relationship between man and nature on television already for 20 years. He has done documentary series about the rivers, lakes and archipelagos in Finland. All the series have been shown at prime-time on Yle TV1 and TV2 and they have reached high viewer ratings as well as got various awards both in Finland and abroad. The latest series "Enclosed by Water" (2013) produced by DocArt and directed by Petteri Saario reached 5,2 million viewers, which is a very high achievement in Finland. It is very likely that also Ahti's Kingdom will get a large number of viewers.

Ahti's Kingdom is a high quality production both in narration, cinematography and sound design. It gives intense experiences and encourages people to look for information about freshwater habitats, act for the vital freshwater ecosystem and culture - and also enjoy themselves outdoor activities in lakes and rivers. The documentaries as well as the internet content are suitable for the whole family.

The themes of the documentaries are very well in line with the objectives and actions of other actions in FRESHABIT project. The documentaries will be partly shot at the FRESHABIT project areas and the key results of the project such as sustainable use of water, underwater values and role of freshwater as sources of wellbeing are highlighted in the documentaries.

Constraints and assumptions:

Seasons bring along challenges in filming nature. Finland is a quite large country and one cannot be in many places at the same time. The weather can be forecasted only to a certain point. If winter turns out to be nothing like expected, you have to wait another year to have a second chance. For this reason, DocArt's documentaries are always filmed for several years. To avoid these kind challenges the period for the Ahti's Kingdom production will be 3,5 years altogether.

We also assume that the documents will raise interest internationally, especially in the international wildlife festivals. The previous films of the documentary maker have been awarded in over 30 festivals around the world. They have been sold to 16 countries worldwide.

We assume that the transmedia actions will raise interest especially among the younger generation, which is the most difficult target audience on television.

Expected results (quantitative information when possible):

- Ahti's Kingdom documentary series (6 x 30 min.) is completed and handed over to Yle in October 2019.
- Yle shows the documentary series in 11-12/ 2019 on prime time (TV Premiere + one replay broadcast). The expected audience ratings are at least 3-5 million viewers.
- Each episode can be viewed on-demand via Yle's internet TV service Yle Areena during 30 days after the TV premiere.
- An international version of the documentary series is made and Yle Sales starts the international distribution in 2020.

Cost estimation:

This actions includes only costs for Docart oy. Since the production of the high-quality document is expensive, a detailed breakdown of the costs is below. The cost estimations and average working time are based on previous similar documentary series projects.

Personnel costs (in total 309 248€):

- Documentarist is responsible for production planning and script writing (15 days/ episode, total 90 days), producer's work and reporting (total 60 days), directing and filming (20 days/ episode, total 120 days) and post-production (editing 20 days/ episode + online editing and mastering 1 day/ episode, total 126 days). 396 days during the project (116 028 €)
- Production manager-Researcher is responsible for the overall coordination, scheduling, budgeting and financial reporting of the project (average 60 days/ year, total 200 days) and production planning, research work for the script, casting and location scouting (20 days/ episode, total 120 days). 320 days during the project (77 120 €)
- Production secretary-Camera assistant is responsible for sound recording and assisting the cinematographer (working also as diving assistant) (20 days/ episode, total 120 days) and organizing the shootings, assisting in research work and taking care of the media communicating, internet pages and social media (30 days/ episode, total 180 days). 300 days during the project (64 500 €)
- Additional cinematographer-Post production assistant is responsible for aerial cinematography and assisting the director of cinematography (working also as diving assistant) (10 days/ episode, total 60 days) and logging and digitizing the filmed material (20 days/ episode, total 120 days). 180 days during the project (38 700 €).

- Sound designer is responsible for the sound post production process in the project (10 days/ episode, total 60 days) (12 900 €)

Travel costs (in total 44 078 €) consist of mileage allowances (23 640 km x 0,45= 10 638 €), Car-Train tickets to shooting locations in Northern Finland (7 400 €), daily allowances (312 days x 40 = 12 480 €) and accommodation costs (113 nights x 120 =13 560 €).

External assistance costs (in total 25 700 €) include the cost of an additional cinematographer + camera equipment (2 days/ episode, total 12 days x 600 € = 7 200 €), music composing, arrangement and recording (5 000 e), cost of graphic design and printing (webpage, brochures, posters, DVD covers, total 3 000 €), auditorium rental fees for pre-screenings (1 000 €), color grading (1 000 €/ episode, total 6 000 €) and costs for English subtitling (3 500 e).

Consumables (in total 9 050 €) consist of shooting materials (memory cards, data storage etc. 8050 €) and catering costs for pre-screenings (1 000 €).

Other costs (in total 3 000 €) include music copyright compensation costs (500 €/ episode).

The total cost of the action is 391 076€.

Deliverables:

- Ahti's Kingdom production completed, broadcasted and reported (30.06.2020)

Milestones:

- Planning of Ahti's Kingdom completed (01.05.2017)
- Principal photography completed (01.05.2017)
- Post-production completed, TV-series is handed to Yle (30.09.2019)
- Ahti's Kingdom TV-series is broadcasted on Yle TV1 Channel (31.12.2019)
- Final reporting of the project completed (30.06.2020)

Annex1 for Action E6. Detailed schedule for Ahti's Kingdom

01.01.2017	Production planning and research starts
01.05.2017	Shooting script is ready. Filming begins
01.05.2017 – 30.9.2018	Principal photography Digitizing & logging the material
01.01.2018	Facebook, Twitter and Instagram accounts are opened
01.10.2018	Rough cutting starts
01.01.2019	Website of the series is opened, publicity campaign starts
01.01-30.04.2019	Additional shootings, rough cutting continues
30.04.2019	Final script and narration is ready
01.05-30.09.2019	Editing and sound design
01.10. 2019	Ahti's Kingdom documentary series is completed and handed over to Yle
01.12.-31.12. 2019	Yle broadcasts the documentary series on TV and it can be viewed on-demand via Yle's internet TV service Yle Areena
01.01.-30.06.2020	International TV sales, festival distribution
30.06.2020	Project concludes

ACTION E.7: Environmental education**Beneficiary responsible for implementation:**

Coordination of the action MH, others participate in action WWF, FANC, NoM, ESAELY, LAPELY, LSPHä, LSPKe, LSPPPo, LUKE, ProPuru, VVK

Description (what, how, where and when):

Task 1: Organising nature school and training (NoM)

Outdoor education programme

A FRESHABIT outdoor education programme (OEP) suitable for nature schools will be developed.

There are some 30 nature schools in Finland at present, many of which operate in the focus areas of the FRESHABIT project. A nature school provides outdoor education services to schools (primary and secondary level). During one semester a class of pupils (app. 20 persons) usually attends 1-4 nature school days in outdoor “classrooms” (i.e. nature areas). The duration of a nature school day is normally 3-5 hours, including transport from the school. The nature school day is planned and carried out by a nature school teacher with special skills in outdoor education. The OEP can be described as the primary toolbox for the nature school teacher.

The FRESHABIT OEP will combine the strong tradition of Finnish outdoor education with new scientific findings of the FRESHABIT project. By using a wide set of sophisticated pedagogical tools the pupils will get inspired to learn about the freshwater nature. The preliminary scope of the OEP includes streams and rivers, lakes and the shores (interaction with terrestrial habitats). Different groups of species such as birds, fish, insects, mammals, plants and mosses will be highlighted. A special attention will be given to species and habitats protected by the habitats directive. The final outcome will partly depend on the results of other actions of the FRESHABIT project.

The OEP will include two different versions, adopted for different age-groups: version a) for the grades 5-6 and version b) for the grades 7-9. It will be based on the national curriculum that will come into force in the autumn of 2016. There will be optional modules for the different seasons, since the freshwater habitats offer very different possibilities. The OEP includes a written description of the different activities, handouts to pupils, the necessary gadgets and instruments needed during the day and basic information to the adults that are joining the group (teacher/headmaster/ parents).

The FRESHABIT OEP will be developed by nature school teachers of NoM, in close co-operation with their colleagues in other nature schools (members of the national umbrella organisation LYKKY) and with partners of the FRESHABIT project. The nature school “Uttern” based in Siuntio in the area of Karjaanjoki and Kiskonjoki will be lead party, but will receive strong support from the nature school “Kvarken” in Ostrobothnia, with Pohjanmaan joet as a focus area.

The work on the new OEP will start as soon as the main project is up and running (expectedly in early 2016). The first project phase includes brainstorming and collecting ideas from similar OEP:s. The first version of the OEP will be ready for testing in the autumn of 2016. Testing and evaluating will continue during the spring 2017, so far only in schools with Swedish pupils and in the three above mentioned areas (Kiskojoki, Karjaanjoki, Pohjanmaan joet).

During the autumn 2017 the next version of the OEP will be finalised, now focusing more on the physical tools that will be needed and finding the optimum outdoor “classrooms” that can be used based on agreements with the landowners.

In the third phase, the final OEP will be translated to Finnish. At this stage we will also reach out to nature schools in the other project areas in order to secure that the OEP can be implemented in all regions. We will offer thorough training to all interested nature school teachers and other environmental education professionals. The final version of the FRESHABIT OEP will be presented at EDUCA 2018, which is the main yearly fair of the Finnish education sector.

During the following years of the project, the nature schools of NoM will systematically offer nature school days based on the FRESHABIT OEP, mainly in the three project areas (Kiskojoki, Karjaanjoki, Pohjanmaan joet). The programme will be marketed using common material with a reference to the Freshabit project. The travel costs will be covered by the FRESHABIT project.

*Task 2: Producing and/or translating material for education in Finnish and Swedish
Developing education on freshwater environments in schools and producing a mobile application in cooperation with schools (WWF and NoM)*

Education on freshwater environments based on experiential learning and observing the surrounding water bodies will be developed in close cooperation with pilot schools from the project area (Karjaanjoki and Vanajavesi). Also a mobile application that will support the learning experience will be produced. The goal is to produce a mobile application focused on the observation of freshwater environments. There will be two levels of the application: one to the grades from 3 to 6, and another to the grades from 7 to 9 in comprehensive school. The application will be compatible with "Järviwiki" run by the Finnish Environment Institute (www.jarviwiki.fi). This online service provides data on lakes and allows citizens to contribute by sharing observations and photos.

The mobile application will be developed in cooperation with the pilot schools. Developing means meeting and planning with the pilot school teachers and pupils several times, several field trips with them, testing of the application and reflecting the project. The WWF environmental educator will spend plenty of time at the pilot schools.

The application will be developed by an entertainment media company in cooperation with the WWF environmental educator and the pilot schools. The application will be mainly educative, but also entertaining, so that also the teenagers will find it interesting. The pilot schools will test the application while it is developed. The contents of the application will be based on the new national curriculum, so it will support the school teaching. There will be an easier content for the lower grades and a more challenging for the upper grades.

When the application is ready to use, the WWF environmental educator will provide 6 teacher training sessions for interested teachers. First training sessions will be arranged on the project areas, and later also in other parts of the country. The applications will be also marketed via internet and the teachers' magazine "Opettaja" and the Educa Education Fair.

Timetable:

Spring 2016 searching for 2-4 pilot schools from the project area of Karjaanjoki and Vanajavesi (1-2 pilot schools from both areas)

Spring and summer 2016 planning the pilot project

School year 2016-2017 running pilot projects with the pilot schools (meetings and field trips with the teachers and the pupils) and development and testing of the mobile application

Summer and autumn 2017 planning, illustration, layout and printing of a marketing flyer

Autumn 2017 mobile application ready to be used and marketed

School year 2017-2018 teacher trainings and marketing of the application in the project areas

2018-2020 teacher trainings and marketing the application to all interested teachers all over the country

Freshwater themed learning material for children and youth camps

Freshwater themed environmental education material will be created for the use of recreational children and youth camps. The material includes experiential activities, studies of the freshwater environment and actions supporting the conservation of the freshwater environment. The material is targeted especially for camps where the instructors are not specialized on environmental education such as the camps of youth departments and parishes as well as scout camps. The nature school program developed by NoM will be utilized when creating the camp program. Also the mobile application and its contents can be used for the same purpose. The material will be widely marketed and distributed in all the project areas, and later in the whole country. The program with its materials will help deepen and illustrate knowledge about freshwater environments. The camp days will offer emotional experiences encouraging commitment to nature and the protection of aquatic environments. The material will be produced in cooperation with

organizations organizing summer camps and it will be translated into Swedish by NoM.

Timetable:

Spring 2018 workshops for representatives from organizations arranging summer camps

Spring 2018 Planning the first version of the camp material.

Summer 2018 First version of the camp material will be tested at few summer camps

Autumn 2018 Editing the material based on user experiences. Illustration and layout of the booklet.

Autumn 2018 Translating the material to Swedish (NoM)

Winter 2018 Printing the booklets in Finnish and in Swedish.

01/2019 Distribution of the booklets at the Educa Education Fair

2019- Marketing and distribution of the booklets to summer camp organizers

Actions in Vanajavesi

VVK will prepare will produced education material on four N2000 sites in Vanajavesi (Hattelmalanjärvi, Saarioisjärvi, Ahtialanjärvi and Ormajärvi) by 30.9.2020, starting in the phase 1. In addition, guided tours with voluntary guides from VVK and NGOs in the region to the sites will be organized, with emphasis on bird observation.

Actions in Puruvesi

MH will produce by the end of 2017 an outdoor education package linked to the Punkaharju nature trail with a theme: Eskers and their role in water cycle; A journey of a water drop. The package will be marketed to the schools in Punkaharju region. The school visitors are offered a free of charge guiding in Punkaharju using the education package in spring and autumn starting in 2018 at the latest.

Task 3: Freshwater ambassadors (FANC, LSPKe, LSPHä)

Freshwater ambassadors will bring together local people to improve their knowledge of freshwater habitats. Ambassadors organize workshops and help local people to find out what the human impacts on local freshwater ecosystem are, how you can study them and what can be done to reduce them. During the workshops field surveys will also be organized.

On field surveys some simple study methods (e.g. measuring pH and conductivity, using of secchi disk) will be demonstrated. Observations will be uploaded to JärviWiki or JokiWiki (web services maintained by authorities and updated by common people).

The guidebook of Freshwater Biology will be produced to be used by the freshwater ambassadors in workshops with local people. In addition to basic information on hydrobiology, the book will contain instructions and guidance on field surveying. The book will have 100–150 pages. Also two leaflets: "Landowner's Guide to the Conservation of Freshwater Habitats" and "Landowner's Guide to Wetland Restoration" will be produced to be delivered in workshops.

Freshwater ambassadors of FANC will bring together two groups (on Saarijärvi and Koitajoki catchment areas) and organize six workshops with each group as a pilot during phase 1 and 2 starting in spring 2017. In addition ambassadors will participate to workshops organized by LSPKe.

The Freshwater ambassadors of FANC's Keski-Suomen piiri ry. (LSPKe) will organize workshops for local people on Saarijärvi project area. The Freshwater ambassadors of LSPKe will also organize peatland restoration events, where slightly ditched peatlands are restored by building dams in ditches. 20 information boards of freshwater biology and conservation will be installed in nature sights. Information of 40 important water or peatland habitats are gathered and published in internet.

LSPPo will organize river restoration events and training courses for volunteers (2-3 events/year during phase 2) on Pohjanmaa project area. LSPPo will also organize a "Taimenpäivä", a seminar in freshwater river ecology, for professionals and locals yearly starting at 2016 until 2021.

Actions in Puruvesi

ProPuruvesi organises yearly starting from 2016 a special outdoor Puruvesi Day for 5th and 6th grades of 3 schools (Kerimäki, Kesälahti and Punkasalmi). The expected number of attendants per

year is 25 – 35 pupils and their teachers. During the day the values and actions at Puruvesi are presented at the lake and at the sites with water quality measures. Also the materials produced by WWF, FANC and NoM are utilised.

In addition a separate GIS-based mobile application presenting at least 20 sites where various water protecting measures have been made will be produced in 2018-2019. This application will be available to all and it gives ample of information on reasons why measures have been made and how they have been made. The application will be also used for school visits. During the last period also assessment of the value of Puruvesi including aspects of employment, nature benefits, recreational values, fishing values will be produced.

The materials produced in this action (tasks 1-3) will also be made available for all other project areas.

Distribution of the results and products of the project at the Educa Education Fair and at the National Environmental Education Days (MH & WWF, NoM)

A lot of materials useful for teachers and schools are produced during the project. These materials will be distributed at the Educa Education Fair in 1/2019 in a joined exhibition space with Metsähallitus and NoM. Content for the fair is provided by all parties but planning and coordinating the exhibition space is mainly MH's responsibility. In 2020 educators will be trained during the National Environmental Education Days. This will be arranged in cooperation with all the parties involved in the project. NoM and WWF Finland will organize freshwater themed workshops and lectures. The coordinating party is WWF Finland.

Reasons why this action is necessary:

Outdoor education is a superior strategy to increase the interest of pupils towards the nature. However, special skills are needed to control the group of pupils in an outdoor classroom. That is why the network of nature schools with skilled teachers has a crucial role.

Most of the present OEP:s focus on terrestrial habitats, while some have developed programmes related to the coastal area and sea shores. There is a clear need for new OEP:s that focus on freshwater habitats.

One nature school teacher can carry out up to 100 nature school days per year reaching out to a total of some 2000 pupils. This will have a significant impact on how the public values the freshwater habitats in the future.

Attitudes and awareness of the future generations play a decisive role in assuring the good condition of the freshwater environments in Finland. Therefore environmental education for children and young people is needed. The education in this project will be implemented in multiple ways suitable for different age groups. Experiential learning for example by exploring nature is emphasized by the national curriculum and this project supports this view. Materials for educators working with children and young people will be produced to encourage teachers to include experiential learning like observing freshwater bodies near the school in their teaching. The benefits of producing high quality teachers' material are high in its effectiveness. A good material will be used for years and so it will reach hundreds of children via one teacher. Materials will be available also in electronic format for easy access and teachers will be encouraged to utilize them also in the future. The same applies to teaching materials targeted for children and youth camps. The mobile application can be used by anyone and this way the impact of this project isn't limited only to teachers, pupils and camp participants.

Local communities have a key role in reducing human impacts on freshwater habitats. Improved knowledge of freshwater biology and human impacts on freshwater ecosystems will increase public awareness of environmental issues and encourage locals to act for their home lakes and rivers. The materials produced can be used for many years and independently by local groups. Materials will also be available in electronic format for easy access. Targeted material from Puruvesi (nature, values and water protection measures) increases the understanding of the uniqueness of the Puruvesi and actions needed to safeguard these values.

Constraints and assumptions:

The concept of outdoor education relies on the willingness of schools (teachers and headmasters) to take the pupils out of the classroom. This cannot be taken for granted and may be decreased by negative experiences such as accidents. However, the present trends of the Finnish educational sector are strongly in support of outdoor education.

Developing a high quality OEP about freshwater habitats is to some extent depending on what will be delivered by actions during the first years of the project. It is crucial that the environmental education actions are strongly linked to other actions.

The broad outreach of this project is depending on whether other nature schools will be inspired by the new OEP or not. We have not carried out a systematic survey to check their interest, but similar projects have been warmly welcomed in the past.

A basic assumption of this project is that the NoM will continue to run nature schools with full-time employed teachers during the whole project period. The nature schools of the NoM are highly dependent on yearly donations, but we have been able to sustain our oldest nature school in 30 years so far.

No major constraints expected. WWF Finland has a long tradition and experience in producing educational materials for diverse target groups and in training teachers and other educators. New materials and competence in environmental education are urgently needed.

Freshwater ambassadors will test the produced materials in workshops with two groups of volunteers. The working with volunteers might sometimes be challenging, but FANC has a long experience in it. It is important to motivate the volunteers and keep them engaged to the project. In addition, the aim is to find volunteers who live by or near the target lake and are highly motivated to work for their local lake. There are no constraints linked to actions in Puruvesi.

Expected results (quantitative information when possible):

- A comprehensive manual explaining the Freshabit OEP. The manual will consist of 20-30 pages per version and there will be two versions (grades 5-6 and grades 7-9). The manual includes text and photos/ illustrations. The manual will be released in two different languages, one version in Swedish and one version in Finnish. The Swedish version will be printed in 20 copies and the Finnish version in 100 copies.
- A marketing brochure (1-2 sheets size A4) for the nature school days based on the Freshabit OEP. The brochure will be produced in two versions, one in Swedish (500 ex) and one in Finnish (2000 ex).
- Nature school days for all the Swedish schools in high quality freshwater nature "classrooms" in the drainage areas of Kiskonjoki, Karjaanjoki and the Pohjanmaan joet. Including all pilot/ test groups we will arrange a total of 150 nature school days during the whole project period, reaching directly some 3100 youngsters and their teachers.
- One big marketing event at the EDUCA fair in Helsinki in early 2018. The environmental education actions of the Freshabit project will have a common exhibition stand.
- Hundreds of summer camps organized by different organizations will be arranged every year in Finland and this project aims to reach as many of them as possible. Each camp has approximately 20-50 participants. These camp participants form the potential group of children and young people that will be reached by this project. Not all camps will use our material but in reality we expect several hundreds if not thousands camp participants to be reached each year. This will continue not only for a limited period but hopefully for many years to come because the materials produced can be used year after year. The material targeted for camps can be used in schools as well which will broaden the group of people that will be reached.
- The mobile application will be designed to support the new national curriculum and therefore can be expected to be used frequently in schools. The application can be used by anyone outside schools as well and this way people of all ages can be reached regardless of location or other such factors. One expected result of this project is an increase in information in Järviwiki service. The mobile application will allow citizens to contribute to this database and this way help collect useful data on freshwater environments in Finland.

- As a result of everything described above we expect this project to contribute to preserving freshwater environments in Finland and helping children and young people to become environmentally aware citizens.
- Vanajavesi: 4 sets of educational material on bird lakes, visitors to the Natura2000 sites are well-informed and inspired, guided tours with voluntary guides to the bird lakes
-
- Puruvesi: outdoor education package in role of eskers in water cycle, a free of charge guiding in Punkaharju for school visitors
- 3000 leaflets will be distributed in workshops and through FANC local member associations
- 200 guidebooks will be distributed in workshops and through FANC local member associations
- Approximately 20 people will participate every workshop organized by the ambassadors (FANC)
- Approximately 200 persons will participate workshops organized by LSPKe ambassadors
- Approximately 70 volunteers will participate in peatland restoration events (LSPKe)
- Approximately 2 km² of slightly ditched peatlands are restored by building dams in ditches (LSPKe)
- 5 permanent and 15 temporary (1 month) information boards will be installed in nature sights (LSPKe)
- Information of 40 important water or peatland habitats are gathered and published in internet (LSPKe)
- Totally 60-90 volunteers will participate in river restoration events (LSPPo)
- Appr. 50-100 persons/year will participate Taimenpäivä –seminar (LSPPo)
- Puruvesi: Yearly Puruvesi days on the lake and shores for 3 local schools, mobile app on water protection measures, assessment of the values on Puruvesi

Cost estimation:

This actions is implemented largely by the NGO beneficiaries. All beneficiaries involved have ample of experience in nature education from previous LIFE or other project. The cost is divided between 10 beneficiaries (WWF, FANC, NoM, LSPHä, LSPKe, LSPPo, ESAELY, LAPELY, ProPuru, MH). All subactions require expertise in nature education, organising voluntary work and communication as this action include nature education actions directed to various target groups. This action is implemented throughout the project period. The permanent personnel (mostly environmental education experts) cost during the first phase are estimated to 424 days (90 679€) and temporary staff (mostly planning staff and project managers of NGOs) 416 days and 82 515€ respectively. The personnel cost for the latter phases are 168 083€ and therefore the total personnel cost are estimated to 341 277€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff and the salary cost for NGOs are inline with the salary level for similar tasks.

The travel costs are largely linked to the visiting schools, planning the education content and sites for voluntary actions. The travel cost for the first phase are estimated to 20 230€ for and 27 769€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs also for NGO beneficiaries.

External assistance costs for the first phase totalling 55 634€ are linked to preparation of the materials for education (11 534€), producing of mobile app (27 000€), information costs for reaching teachers (4 500€), transportation support for schools to reach the study areas (8 400€) and rental cost for events (1 200). For latter phase the costs are of similar nature totalling 115 666€. All costs are inline with previous similar efforts and substantial costs e.g. mobile app has been checked from company with experience in mobile business.

Equipment cost include laptop for FANC (2 000€) which a price for MacProBook. The consumable material for the first phase include material costs for nature education on site such as sampling tools and also 5 tablets for schools (total 18 904€). Also meeting costs totalling 1 160€ is included. The costs for similar kind of issues for latter period are estimated to 14 392€. The price level items has been mostly checked from the internet sites of suitable providers. The other cost include organising cost for the events totalling 3 100€ for the first phase and 6 893€ for the latter periods.

The total cost of the action is 604 725€.

Deliverables:

- Leaflet: Landowner's guide to the conservation of freshwater habitats (FANC) (30.09.2017)
- Manual of Freshabit OEP (NoM) (31.12.2017)
- Marketing brochure Freshabit OEP (NoM) (31.12.2017)
- A mobile application for teaching (WWF) (31.08.2017)
- A marketing flyer of the mobile application (WWF) (31.08.2017)
- Leaflet: Landowner's guide to wetland restoration (FANC) (30.09.2018)
- Camp material (WWF) (31.01.2019)
- 20 information boards (LSPKe) (30.09.2017)
- Guidebook to Freshwater Biology (FANC) (30.09.2019)
- Education material for four bird lakes in Vanajavesi (30.09.2020)
- Valuation assessment of Puruvesi completed (31.01.2021)

Milestones:

- WWF Pilot schools searched and choosed (31.05.2016)
- OEP, first draft version (in Swedish) (NoM) (31.08.2016)
- WWF Mobile application pilot started (31.08.2016)
- OEP, second draft (in Swedish) (NoM) (31.08.2017)
- Draft of Guidebook to Freshwater Biology (FANC) (30.09.2017)
- Information of 40 water or peatland habitats published in internet (LSPKe) (30.09.2017)
- WWF Mobile application ready (30.09.2017)
- WWF Children and youth camp material first draft (31.05.2018)
- WWF Children and youth camp material printed (15.01.2019)
- EDUCE fairs attended (31.01.2019)

ACTION E.8: Technical publications on project

Beneficiary responsible for implementation:

MH is responsible for the key publicatin and local work is done by ESAELY, LUKE, OU, MH, SMK, and VARELY

Description (what, how, where and when):

This action is for beneficiaries to prepare their technical publications for stakeholders, articles for newspapers, and other writings for e.g. social and printed media. As it is highly acknowledged in FRESHABIT, communication is a key to the successful project of high quality, also the writings are highlighted. These writings will assure the long-term effectiveness of results gained from project, as reports and articles survive for long period of time. Several beneficiaries working in the areas will produce various kind of articles, newsletters on the results of the project.

This actions also includes the layout, pictures, drawings, translations and printing cost of the key publications. All materials foreseen will be made during the last two-year period of the project.

National guidance with practical recommendations for monitoring and mapping of stream and lake restoration measures. This publication is targeted to the MoE and freshwater experts and it includes information of methods and costs estimations for national freshwater mapping project similar to VELMU implemented at the Baltic Sea. The publication is made as e-publication by 8/2021.

The practical guide for multi-stakeholder planning, implementation and monitoring of catchment area management with special focus on Natura 2000 values. This publication is targeted to the water managers, environmental authorities, researchers and advisor for land use, forestry and agricultural practices. The comprehensive guide sums up the novel planning models and practices, restoration of various kinds of freshwater habitats and catchment area actions as well as the

monitoring. This guide will be actively disseminated and presented at various events organized by the beneficiaries of the project. The guide will be compiled as e-publication and small number of hard copies (200 copies) by 5/2020. It will be made in Finnish with an extensive English summary.

Reasons why this action is necessary:

Most of the organizations concentrate on concrete actions to be implemented within FRESHABIT. Followed by this, it is also important to reserve working hours to draw general conclusions out of results and prepare them ready for publishing. This action will assure that all results accomplished are also effectively disseminated.

Constraints and assumptions:

No constraints are expected.

Expected results (quantitative information when possible):

- Articles and reports of projects results at project areas
- Key reports: National guidance with practical recommendations for monitoring and mapping of stream and lake restoration measures and the practical guide for multi-stakeholder planning, implementation and monitoring of catchment area management with special focus on Natura 2000 values
- Increase in stakeholders and public awareness towards conservation of N2000 sites

Cost estimation:

This action includes costs of 6 beneficiaries (MH, SMK, LUKE, OU, VARELY, ESAELY) The costs consist of personnel of the workers preparing the local articles and other information materials. The permanent personnel (mostly senior experts, professors and project managers) cost during the first phase are estimated to 66 days (21 116€) and temporary staff (mostly planning substance experts) 61 days and 12 757€ respectively. The personnel cost for the latter phases are 46510€ and therefore the total personnel cost are estimated to 80 383€. The daily salaries are based on collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The external assistance cost include production cost (layout, translations, pictures, drawings) of the key publication totalling 41 000€. The printing costs (9 000€) are in other costs. The cost estimations are based on previous experience of the beneficiaries.

The total cost of the action is 130 383€.

Deliverables:

- The practical guide for multi-stakeholder planning, implementation and monitoring of catchment area management with special focus on Natura 2000 values (31.5.2020)
- National guidance with practical recommendations for monitoring and mapping of stream and lake restoration measures (31.08.2022)
- Report of mussel surveys conducted in Kiskonjoki and Karvianjoki (30.09.2022)
- At least 25 articles prepared for the results of the actions in the project areas (30.09.2022)
- At least 15 articles prepared for media by core beneficiaries (30.09.2022)

ACTION E.9: Layman's report

Beneficiary responsible for implementation:

MH

Description (what, how, where and when):

The Layman's report will present the project, objectives, actions and the key results. The report (10–15 pages) will be produced both in paper and electronic form at the end of the project in 9/2021. It will be printed in Finnish and English. Edition of 500 printed copies (250 copies each language) of the report will be distributed and the electronic version of the report will be made available at the project website. We will use the material produced in the other actions of the project as the main source for Layman's report.

Reasons why this action is necessary:

The Layman's report is essential when clarifying the project's objectives, actions and results to the general public. A clear project description also adds interest to the project and enhances the dissemination of project actions to larger audience.

Constraints and assumptions:

There are no expected constraints or assumptions linked to this action.

Expected results (quantitative information when possible):

500 printed copies of Layman's report will be distributed and an electronic version of the report will be made available on the project's website.

Cost estimation:

The costs include only the printing and layout costs estimated to 4 000€ for MH.

Deliverables:

- Layman's report completed (31.09.2022)

ACTION E.10: Information related to the fish passages

Beneficiary responsible for implementation:

EKOenergia is responsible in coordination of the action, and FANC also contributes to public communication about the impacts of hydroelectricity production

Description (what, how, where and when):

Under this project we will give information to electricity consumers about how they can reduce the negative impacts of hydropower production through the electricity they choose to buy. One of the problems of the electricity market is that it is complex and technical. As a result, communication is often one-way, from suppliers to consumers, with a relatively low involvement of consumers. As well as this, electricity is often called "the most boring product" to sell, as only the price distinguishes one seller from another. EKOenergy is a way to change that. We increase consumer awareness about the impacts of electricity production, and we give suppliers a tool to communicate about environment issues and not only about price.

Under this action, we want to motivate sustainable energy suppliers to communicate about the impacts of hydropower on aquatic ecosystems, and on how they reduce the negative impacts. This goal will be achieved by using the EKOenergy label. We will meet suppliers to communicate about EKOenergy, we will get new suppliers to join EKOenergy and we help suppliers use EKOenergy label as a tool to communicate with consumers. We will organise workshop for stakeholders to talk about EKOenergy and evaluate the success of the communication project. This way we can develop our communication.

We will make a leaflet about the negative environmental impacts of hydropower production and how a consumer can help reduce them. The leaflet will be spread via the Internet and EKOenergy contact groups. We will also print leaflets, which will be shared at seminars and events like the Finnish World Village Festival. Suomen Luonto and Luonnonsuojelija magazines will write about the river restoration projects that are funded by EKOenergy. The Suomen Luonto magazine has a circulation of 25,700 and about 100,000 readers. Luonnonsuojelija has a circulation of 30,000. We also want to get into consumers' magazines of Finnish electricity suppliers and use social media to communicate.

We will create visible and sharable campaign material and advertisement material to engage the public. This will be done through the active use of social media and free media coverage. We want to involve new target groups, such as fishermen clubs. We will use our contacts, like media people, to communicate with these target groups.

Through this communication, we target small households, major companies and state owned companies (which may, for example, put pressure to bring the state's electricity purchasing strategy in line with the Finnish fish pass strategy, in particular by convincing them to purchase environmentally friendly hydropower). The task will continue throughout the whole project, but the main public communication campaign for small households will be done during 2017.

Reasons why this action is necessary:

In this action, consumers have a key role in reducing the impacts of hydropower. Improved knowledge of the environmental impacts will increase public awareness of environmental issues and encourage consumers to choose more environmentally-friendly electricity contracts. Sellers will be encouraged to market more sustainable electricity to their consumers. Growing demand of sustainable hydropower will make more hydropower plant owners willing to implement environmental measures.

Constraints and assumptions:

We want to get ourselves visibility through social media and free media coverage. This means that our campaign material and advertisement material must be visible and sharable and engage the public. We will cooperate with an advertising agency and with the FANC communications department to make our communication more powerful and professional.

Expected results (quantitative information when possible):

- Clear increase in people's awareness towards EKO energy
- We also want to get into Finnish consumers' magazines of electricity suppliers.
- Visibility of campaign in social media and Internet

Cost estimation:

This action includes only costs of FANC. The personnel costs of part-time campaign worker (temporary staff) for 4 years (48 727 €) of this 31 040€ (155 days) is allocated to the first phase and 17 687€ for the latter phases. The campaign worker will use the results of mostly the action A8 for the communication campaign. The personnel cost are inline with the previous similar kinds of actions of FANC and salary level is typical for other project workers of FANC.

The travel cost related for the disseminating the information for the first phase are estimated to 20 3480€ for and 10 240€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs also for NGO beneficiaries.

The total cost of the action is 62 447€.

Deliverables:

- Layout of materials to public communication campaign (30.06.2017)
- Suomen Luonto and Luonnonsuojelija will write about the river restorations that EKOenergy finances, Suomen Luonto at least once (in 2016) and Luonnonsuojelija at least three times (once during the autumn 2016 and once in 2017 and once in 2018) (31.12.2018)

Milestones:

- Launching the public communication campaign (30.06.2017)
- Seminar to develop our communication actions (30.09.2017)
- EKOenergy will speak at 5-10 specialized seminars (in the fish sector, in the hydropower sector and in the renewable electricity sector) (30.09.2021)
- Meetings with private and state owned companies whose electricity consumption is over 5-10 GWh per year (30.09.2021)

F. Project Management and monitoring of project progress (obligatory)

ACTION F.1: Project management

Beneficiary responsible for implementation:

Coordinating beneficiary MH together with SYKE, LUKE and SMK form the core management team. All project areas have one dedicated organisation for the management. Several beneficiaries contribute: EPOELY, ESAELY, FANC, LAPELY, LUVY, POKELY, VARELY, VVK

Description (what, how, where and when):

The description includes the overall description of the project management. Actions F2-6 includes more detailed information of the management structures. Beneficiaries not listed above have well defined and rather small scale actions in the project and it is agreed that they are allowed to include the obligatory LIFE administration costs as part of the costs for the actions they are carrying out. In addition, overheads costs will largely cover their administrative costs. Furthermore, common and local meetings/trainings will be arranged to check on site with personnel of the beneficiaries how LIFE technical and financial obligations should be made. Special attention will be put to the beneficiaries new to LIFE. Permanent staff involved in FRESHABIT will be specifically seconded to the project.

Project management in the coordinating beneficiary

The coordinating beneficiary (MH) will be in charge of the management of the project (administrative, technical and financial aspects) and of fulfilling the LIFE-IP reporting obligations. The project will be coordinated by a full-time project manager to be recruited by MH. The project manager is responsible for documenting the progress of the project and preparing and implementing required reports in time (the finalizing and submitting of the mid-term interims and the final reports with payment requests; see also Action F4). The project manager will therefore be a person with appropriate background knowledge, good interpersonal skills, good leadership and team building capabilities and with good communication skills. The working time of the project manager is also allocated to other project actions.

All reporting (the preparation of the mid-term interims and the final reports with payment requests) will be finalized by project manager together with management core team (see also Action F1). Project manager is in charge of submitting these all to Commission in time.

A part-time financial secretary working for MH will assist the project manager in financial matters; calculating and allocating the staff salaries and internal expenses, processing both incoming and outgoing bills and assisting in the financial reporting. Tools developed as a part of former LIFE projects will be utilized for smooth operation of the project management.

A part-time communications officer working for MH will assist the project manager in external and internal communication to all parties. The communications officer will together with project manager be responsible in planning and executing of media events, communicating in social media, maintaining and updating the project website and preparing the project materials.

Project Management Core Team

The Project Management Core Team will constitute the representatives (1-2 each) of MH, SYKE, LUKE and SMK. Each stakeholder has either full-time (MH) or part-time (SYKE, LUKE, SMK) project manager carrying out the proper implementation of FRESHABIT objectives, monitoring the progress of the project, reporting activities and financial matters to the Project Steering Committee and to the Commission. This Core Team will have monthly meetings to ensure the efficient communication and progress among major stakeholders in project.

Project Steering Committee

The project steering committee will consist of representatives of most relevant ministries such as MoE and MoAF, and representatives (1-2) from each of the organizations in core group and regional stakeholders. This committee will be established in Action F2.

The project steering committee will convene once each year to discuss the experiences gained in the FRESHABIT, the overall strategies, risk management and possible changes needed, how to ensure that the lessons learnt and key results gained are disseminated throughout public administration, and how other EU or national financing instruments could be used to fulfill the funding for future complementary projects.

The project steering group will also instruct and comment on the most relevant technical publications, and after-LIFE-plan. Moreover, the project steering group will approve all technical and financial report and possible requests for amendments prior to their sending to the Commission.

Regional Steering Committees

The Regional Steering Committees (8 pcs) will be established in each project region to ensure the fulfilling of project objects at the regional level. The regional steering committees consists of regional associated beneficiaries, and also other relevant local and regional authorities, universities, major regional co-financers for LIFE-IP itself and complementary projects. These committees will be established in Action F2.

The regional steering committees will convene once each year and discuss otherwise similar topics than the Project Steering Committee, but within their own region. They will also instruct and comment on the regional technical and other publications.

Regional Management Teams

The Regional Management Teams (8 pcs) will be established in each project region to ensure the correct implementation of project objects at the regional level. All the eight areas have one organization responsible for the smooth implementation (see project management chart). In all areas the managing beneficiary has ample of experience in managing projects; in most cases managing a LIFE project. The regional management teams consist of representatives of each regional beneficiary. The regional management teams are responsible ones of effective communication among regional stakeholders, regional steering committees, and project management core team.

Each region has nominated a part-time regional coordinator, who will have main responsibility of running regional management teams. The regional project coordinators will also ascertain that the financial departments of the associated beneficiaries will nominate a financial assistant for the financial monitoring of the project. The regional coordinator reports the results to the coordinating beneficiary and the core management team.

The core teams also take part regularly to the management meeting of project areas. Also joint management meetings are organised particularly in relation to the reporting to the Commission.

Management of Complementary Projects

The Management of Complementary projects will be carried out by Regional Management Teams. They will have responsibility on continuity of complementary projects, and that they will also contribute importantly towards the full implementation of the PAF. They will also inform the Project Steering Committee about progress of complementary projects and their accomplishments.

Thematic Working Groups

Thematic Working Groups will be established around widely distributed topics governing most concrete actions. These topics have been recognised to be: i) communication and education, ii) environmental models and monitoring, iii) mapping, iv) stream restoration (including actions involved with freshwater pearl mussel), v) water basin restoration, and vi) bird wetland habitat restoration. A variety of actions governing these topics are generally implemented in all target areas of project and thus networking and communication among stakeholders have been acknowledged widely. These groups will be carried out regularly as online meetings. This group will be established in Action F3. The role of the thematic working groups is to ensure that information, lessons learnt and experiences are spread throughout the beneficiaries and also other stakeholders.

The project management chart is presented in the next page.

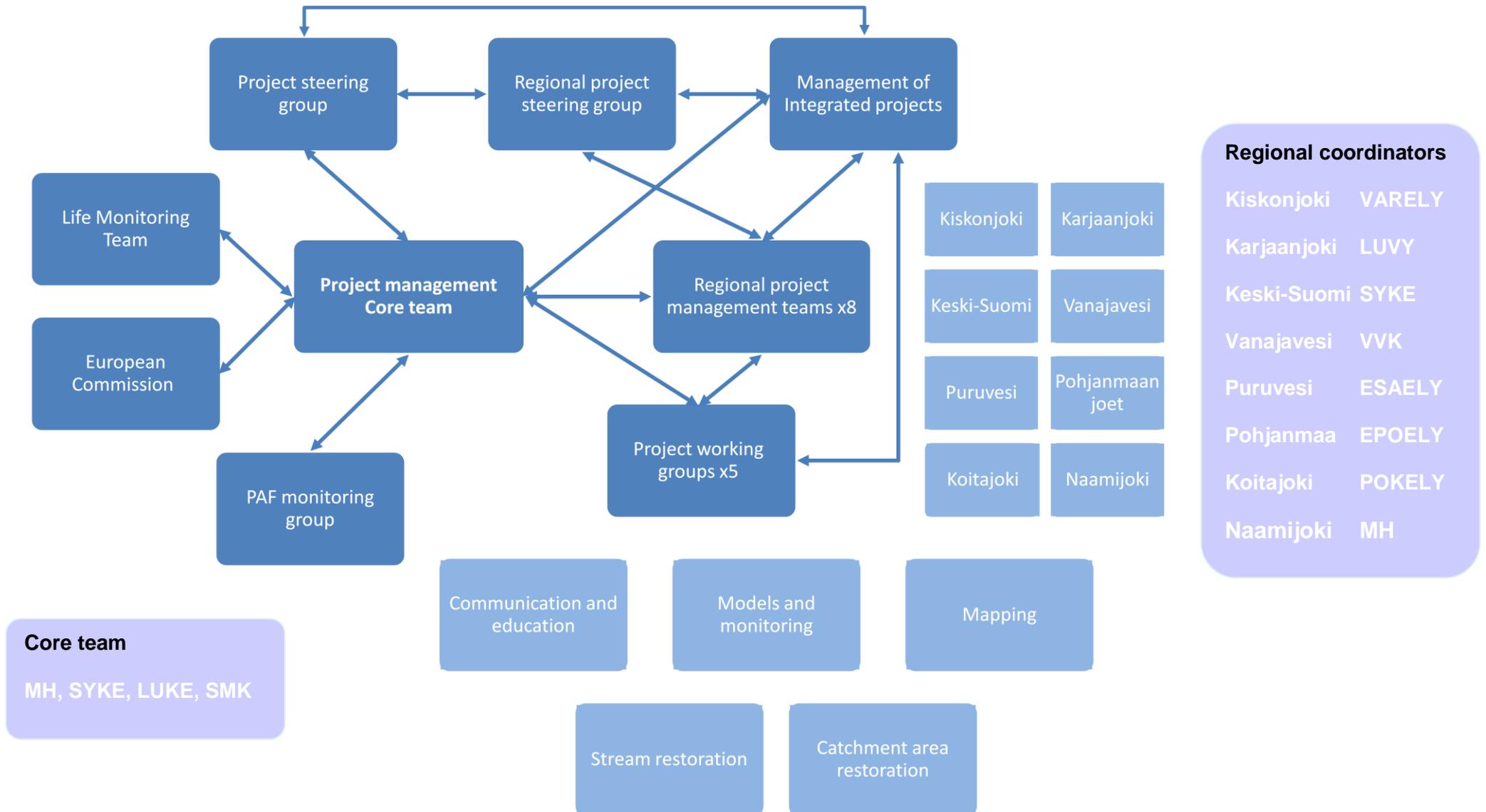


Figure F1.1. The management chart of FRESHABIT-project.

Reasons why this action is necessary:

The managing project with this kind of high geographical and administrative distribution will be first time for everyone, and thus clear management chart will clarify everyone's assignments and that way ensure the high quality management of the project. It is also vital that long project will be routinely checked against its objectives and thus ascertains that project accomplishes its main aim towards implementing the PAF. This will also enable the efficient dissemination of key results and experience gained to all parties.

Constraints and assumptions:

Keeping up the active participation of all stakeholders requires highly motivated members of both project management and regional management teams. It might be sometimes challenging, as organizational changes and employee co-operation negotiations are likely to occur in some organisations. A number of key individuals are responsible for coordination of the project, and any one of them leaving the project prematurely may risk the continuity of some parts of the project. Despite this reality, the staff and management within the institutes involved are highly committed to the project and we thus have high expectations on finding solutions to possible administrative problems and gaps left by any individuals.

Expected results (quantitative information when possible):

The project will progress according to the planned timetable and achieve its assigned accomplishments. All reports will be delivered in time. The project administration is of a high quality, cost-effective and sound. The project will advance the other national and Union funding, and this will give birth to numbers of complementary projects supporting the main aims of FRESHABIT.

Cost estimation:

The coordination costs are divided between 11 beneficiaries. The coordination of the project requires extensive personnel costs from the core team organisations (organisations (MH, SYKE, LUKE and SMK) and regional coordinating organisations) (VVK, VARELY, LUVY, POKELY, EPOELY, ESAELY). Also the FANC being the NGO with the most actions and relatively high budget allocates time for the overall management of the project. The personnel for the coordination include senior staff of the beneficiaries and also project managers to be employed. The total personnel costs for the management are 1 020 459€, which means app. 170 000€ per year from 10 beneficiaries responsible for the overall or regional management. The permanent personnel cost during the first phase are estimated to 498 days (149 257€) and temporary staff 718 days and 208 358€ respectively. The personnel cost for the latter phases are 662 844€ and therefore the total personnel cost are estimated to 1 020 459€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The management includes also 76 596€ (26 590€ the first phase and 50 006€ for the latter periods) for travel costs mostly for the core management team. Regional management is done locally and therefore with small travel costs. Also equipment for some regional coordinators (VARELY and VVK), laptop (800€), and leasing laptop (2 400€) are included. The consumable material include meeting costs (6 100€) and camera (200€).

Beneficiaries have allocated management costs under four actions F1 – 4.

The total cost of the action is 1 106 555€.

Milestones:

- Project manager nominated (15.01.2016)
- Project Management Core Team established (31.3.2016)
- First meeting of Project Management Core Team held (30.04.2016)
- Regional Management Teams established (31.3.2016)
- First meeting of Regional Management Teams held (30.04.2016)
- First get-together meeting of Regional Management Teams and Project Management Core Team held (30.06.2016)
- At least 10-12 meetings of Regional Management Teams held (30.09.2022)
- At least 10-12 meetings of Project Management Core Team held (30.09.2022)
- 4 get-together-meetings of Regional Management Teams and Project Management Core Team held (30.09.2022)

ACTION F.2: Project steering groups at project and regional level**Beneficiary responsible for implementation:**

MH together with the core group (SYKE, LUKE, SMK) are in charge, and regional coordinating (EPOELY, ESAELY, VARELY, VVK, POKELY, LUVY) beneficiaries in the project steering group and regional beneficiaries to the regional level.

Description (what, how, where and when):

MH will establish in spring 2016 a project steering committee for FRESHABIT to ensure the correct implementation of the project according to its objectives. The project steering committee will consist of representatives of most relevant ministries such as MoE, and Ministry of Agriculture and Forestry (MoAF), and representatives (1-2) from each of the organizations in core group and regional coordinating organizations. Also managers of complementary projects are invited to participate to the steering group.

In addition to project steering committee, the regional steering committees (8 pcs) will be established to ensure the correct implementation of project objects at the regional level. Each regional coordinator has leading responsibility on inviting relevant members to these committees in spring 2016. The regional steering committees consists of associated beneficiaries and also other relevant local and regional authorities, universities, major regional co-financers for LIFE-IP itself and complementary projects.

The members of project steering committee and regional steering committees.

<i>Project steering committee</i>	<i>Regional steering committees (8 pcs)</i>
<ul style="list-style-type: none"> • MH (leading responsibility; 1-2 representatives) 	<ul style="list-style-type: none"> • Regional coordinator (leading responsibility)
<ul style="list-style-type: none"> • FEI, LUKE, FFC (1-2 each stakeholder) 	<ul style="list-style-type: none"> • Main regional stakeholders (1 each)
<ul style="list-style-type: none"> • MoE, MoAF (1-2 each ministry) 	<ul style="list-style-type: none"> • Main regional co-financers (1 each)
<ul style="list-style-type: none"> • Regional coordinator and other representative from each region (2 each region) 	<ul style="list-style-type: none"> • Representatives of regional complementary projects (2-3)
<ul style="list-style-type: none"> • Representatives of national complementary projects (2-3) 	

The project steering committee will convene once each year to discuss:

- the yearly experiences gained in the FRESHABIT project,
- the overall strategies,
- risk management and possible changes needed,
- how to ensure that the lessons learnt and key results gained are disseminated throughout public administration
- how other EU or national financing instruments could be used to fulfill the funding for future complementary projects

The project steering group will also instruct and comment on the most relevant technical publications, and after-LIFE-plan. Moreover, the project steering group will approve all technical and financial report and possible requests for amendments prior to their sending to the Commission.

The regional steering committees will convene once each year and discuss otherwise similar topics, but within their own region. They will also instruct and comment on the regional technical and other publications.

Reasons why this action is necessary:

Project steering committee is crucial for correct implementation of general project objectives, and to ensure that key results are effectively available throughout public administration. Steering committee will also contribute to efficient internal networking and communication as well as external dissemination of gained experiences.

Regional steering committees will confirm the efficient project implementation and contribute to dissemination at regional level.

Constraints and assumptions:

It is possible that due to other assignments, not all invited stakeholders will be available for committee work. However, all relevant parties are already informed of FRESHABIT and they have high expectations on this. Thus, it is likely that participating in steering committees is preferred over other assignments.

Expected results (quantitative information when possible):

FRESHABIT will be properly implemented throughout its whole 6-year-period and it will accomplish the main objects set initially both in the whole project and also in regional levels. The experiences and main achievements gained will be effectively passed to future projects aiming to implementation of PAF or otherwise more favorable conservation status and management of ecosystems. Due to high repeatability built up in FRESHABIT, achievements will benefit other similar projects over ecosystems.

Project steering committee and regional steering committees will meet at least 6 times during the project period.

Cost estimation:

The coordination costs are divided between 12 beneficiaries. This action includes personnel and travel costs of the core team organisations and regional coordinating organisations totalling 191 616€. This means on the average app. 3 000€ a year per beneficiary. The personnel include senior experts on the relevant topics. The permanent personnel cost during the first phase are estimated to 106 days (35 929€) and temporary staff 113 days and 36 997€ respectively. The personnel cost for the latter phases are 118 690€ and therefore the total personnel cost are estimated to 191 616€. The daily salaries are based on collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel costs are linked to steering group meetings (1-2 times/year). The travel cost for the first phase are estimated to 17 445€ for and 29 976€ for the latter phases. The state travel rules for reimbursements are used for calculating the travel costs also for NGO beneficiaries.

Consumable materials include the meeting costs totalling 9 300€.

The total cost of the action is 248 337€.

Milestones:

- Project steering committee established (31.3.2016)
- Regional steering committees (8 pcs) established (31.3.2016)
- First meeting of project steering committee (30.4.2016)
- First meeting of regional steering committees held (30.4.2016)
- At least 6 project steering committees held (30.09.2022)
- At least 6 regional steering committees in each region held (30.09.2022)

ACTION F.3: Thematic working groups**Beneficiary responsible for implementation:**

MH is responsible with the core team (SYKE, LUKE and SMK) coordinate, and all other beneficiaries participate.

Description (what, how, where and when):**Thematic Working Groups**

Thematic Working Groups will be established around widely distributed topics governing most concrete actions. These topics have been recognised to be:

- communication and education,
- environmental models and monitoring
- mapping of headwater and lakes
- stream restoration (including actions involved with freshwater pearl mussel)
- river basin (catchment area) restoration
- bird wetland habitat restoration.

A variety of actions governing these topics are generally implemented in all target areas of project and thus networking and communication among stakeholders have been acknowledged widely. These groups meetings will be carried out regularly as online meetings and also as face-to-face facilitated workshop meetings will held at least once a year. In the workshop we will use also innovative participatory methods to make workshop livelier and more motivating to participate to.

The objective of these working groups is to gather together experts, stakeholders and scientist to discuss and exchange ideas on practices and measures implemented, accomplished scientific and practical knowledge and also challenges in both national and international level. The other key aim of the thematic working groups is to ensure that information, lessons learnt and experiences are spread throughout the beneficiaries and also other stakeholders.

Reasons why this action is necessary:

Having dialogue in multiple-way will help all parties to focus their subtargets more closely and to solve possible difficulties they might face. At present, knowledge accomplished in scientific monitoring is not effectively implemented in management, and this gap needs further improvement.

Constraints and assumptions:

This action is not expected to face significant constraints.

Expected results (quantitative information when possible):

The accomplishment of more favourable ecological and conservation status of habitat types and biodiversity is expected through following substeps:

- Increased exchange of knowledge among scientists, management and other stakeholders
- Prevention of billowing difficulties or challenges
- Focusing of methods used on the best available methods
- At least 10 meetings/workshops per working group

Cost estimation:

This action includes personnel and travel costs of the core team organizations (MH, LUKE, SYKE, SMK) and regional coordinating organizations (LUVY, VVK, EPOELY, ESAELY, VARELY, LAPELY, POKELY) and other organizations (FANC, GTK, JYU, OU) totaling 371 224€ This means on the average app. 3 000€ a year per beneficiary. On average two persons from beneficiaries attend the meetings. The average costs allocated to the thematic group work is 4 300€ per year. The personnel cost are linked to the experts in the themes of the working groups. The permanent personnel cost during the first phase are estimated to 145 days (47 886€) and temporary staff 161 days and 44 507€ respectively. The personnel cost for the latter phases are 176 485€ and therefore the total personnel cost are estimated to 268 878€. The daily salaries are based on collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The travel cost are linked to the attending of the meetings (1-3 times/year) totalling 96 346€ of which 33 389€ is used during the first phase and 62 957€ during the latter phases. The state travel rules for reimbursements are used for calculating the travel costs also for NGO beneficiaries.

The consumable material include the meeting costs totalling 6 000€.

The total cost of the action is 371 224€.

Milestones:

- Thematic Working Groups established (31.3.2016)
- First meeting of Thematic Working Groups held (30.04.2016)
- 10-12 meetings/workshops of Thematic Working Groups held (30.09.2022)

ACTION F.4: Technical/financial monitoring and reporting**Beneficiary responsible for implementation:**

MH is the main responsible beneficiary together with the core group (SYKE, LUKE, SMK) and regional coordinating organisations (EPOELY, ESAELY, VARELY, VVK, POKELY, LUVY)

Description (what, how, where and when):

This action is to ensure that all beneficiaries are prepared to fulfil all reporting obligations of LIFE IP projects given by Commission. An interim report together with a request for interim payment and a new detailed planning for next phase must be submitted to committee three months before the end of each phase. In addition, all project materials charged to LIFE must also be annexed to the interim reports or the final report. Also, indicator tables completed in action F5 will be included in these reports. FRESHABIT is planned to have three phases meaning that this process will be repeated three times during the project. All reporting (the preparation of the mid-term interims and the final reports with payment requests) will be finalized by project manager together with management core team (see also Action F1). Project manager is in charge of submitting these all to Commission in time. The regional coordinators will compile the reports for the regional project for the coordinating beneficiary.

At the start of the project the coordinating beneficiary MH will held a separate LIFE administrative meeting with all beneficiaries and their administrative personnel. The aim of the meeting is clarify both the financial and technical reporting and monitoring requirements. Also special attention is paid that all beneficiaries follow the rules for time registration and other important financial rules. Furthermore the Financial and Administrative for the LIFE projects.

Reasons why this action is necessary:

This will allow beneficiaries to adapt the IP to a constantly changing reality and to provide sufficient information to Commission thereby allowing the Contracting Authority to carry out its monitoring and verification functions.

Constraints and assumptions:

No constraints are expected.

Expected results (quantitative information when possible):

The project will progress according to the planned timetable and achieve its assigned accomplishments. All reports will be delivered in time.

Cost estimation:

The actions includes personnel (coordinators, experts and financial/administrative personnel) cost core management team and regional coordinators, in total 13 beneficiaries (MH, SYKE, LUKE, SMK, LUVY, VVK, EPOELY, ESAELY, VARELY, LAPELY, POKELY, FANC, JYU) involved in the reporting of the progress of the project. The average costs is per beneficiary is 6 800€ per year. The personnel costs include senior staff as well as financial secretaries needed for financial reporting and accounting.. The permanent personnel cost during the first phase are estimated to 225 days (66 391€) and temporary staff 251 days and 58 824€ respectively. The personnel cost for the latter phases are 329 900€ and therefore the total personnel cost are estimated to 455 115€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

The external assistance include outsourced accounting costs of ProPuru totalling 4 200€.

The total cost of the action is 459 315€

ACTION F.5: Completing the indicator tables**Beneficiary responsible for implementation:**

MH together with core team (SYKE, LUKE, SMK) are responsible.

Description (what, how, where and when):

The FRESHABIT is built up as NATURE IP aiming to better conservation status of N2000 sites. Thus, our indicators (quantitative and qualitative) are aiming to monitor the ecological effectiveness of concrete actions at the moment. The table of preliminary indicators is seen in technical description of Action D1, and this table will be completed at early stages of FRESHABIT. These indicators will be monitored in Actions D1-D3 (biodiversity, ecological functioning, and hydrochemical indicators), and D5 (technical indicators). These indicators have been prepared using best available knowledge and they are coherent with the PAF and its objectives, with the problems assessed in the FRESHABIT and with the type of activities planned. The direct linkages between the project actions and key ecosystem services provided are combined as integrated national model for riverbasins in Actions A1, A2, and A10 (the outcome).

In most cases, project actions are being compared to the initial situation of habitats and/or species, but also comparison to the reference sites is used in cases where this is better suitable due to natural limitations. Specific attention in monitoring will be paid on FRESHABIT pilot and demonstration elements. In addition to their ecological impact, also their cost-efficient replicability and transferability will be monitored throughout the actions.

The monitoring of the project impact on the implementation of the PAF is specifically addressed in by special monitoring group established in Action D6. The capacity building effects of project proposed will be evaluated in steering committees (Action F2).

Ecosystems generate a range of goods and services important for human well-being, collectively called ecosystem services (ES). Over the past decades, progress has been made in understanding how ecosystems provide services and how service provision translates into economic value. Nonetheless, the losses of ES continue more rapidly than ever due to changes in global change drivers, such as changes in land-use, pollution and climate, as well as their interactions. In Action A2 model and indicator systems for assessing ES for freshwater ecosystems will be developed and

their use and outcomes demonstrated using data from selected target areas of the project, thus directly supporting the implementation of PAF. In addition, the socio-economic impact is measured in action D4 as visitor surveys conducted on national parks and other recreational areas and other types of ecotourism.

Reasons why this action is necessary:

Completing indicator tables is vital in order to produce the equal information from all actions to evaluate their ecological and/or socio-economical effectiveness. FRESHABIT is required to report on its outcomes and impact in relation to relevant indicators as stated in LIFE Regulation Annex III (Thematic priorities for Nature, Thematic priorities for Biodiversity). It is also considered as obligatory according to the LIFE-guidelines for applicants.

Constraints and assumptions:

No constraints are expected in completing indicator tables.

Expected results (quantitative information when possible):

We expect to achieve positive changes in ecological status and further in conservation status as a results of concrete actions and monitoring their effectiveness. Indicators will give support to assess the conservation status of habitats and species defined in Action D7.

Cost estimation:

This action includes some personnel costs (28 124 €) core management team (SMK and LUKE). The personnel cost for the permanent staff (senior experts) are 9 454€ (25 days). For the latter periods the costs are 18 680€. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

MH and SYKE have not separately allocated personnel costs to this action and allocation in action F4 is used.

The total cost of the action is 28 134€.

Deliverables:

- Table of all relevant indicators used in FRESHABIT (30.09.2022)

Milestones:

- Table of all relevant indicators updated (31.08.2016)

ACTION F.6: Combining complementary projects

Beneficiary responsible for implementation:

MH together with core team (LUKE, SMK, SYKE) are in charge, and regional coordinators participate EPOELY, VARELY, LUVY, VVK, ESAELY

Description (what, how, where and when):

we will pay special attention to securing that the FRESHABIT LIFE IP has close and operational link to the complementary (complementary) projects. Most of the complementary projects are managed by the regional beneficiaries but some also by the core management beneficiaries. The core team and regional coordinators make sure that the results and lessons learnt from intergrated projects are used actively in the implementation of the FRESHABIT. The complementary projects are also discussed and invited to the project steering and thematic working groups so that the link is constant.

Moreover it is important to note possible synergies and also be actively involved in planning new complementary projects during FRESHABIT. Majority of the complementary projects in FRESHABIT are implemented during the first two phases of the project. Therefore it is important to

closely follow potential funding sources to include further complementary projects. This follow-up is started in the beginning of the project (see action D6) and carried out throughout the project. We are convinced that once FRESHABIT LIFE IP is running, it will work as a catalyst for several complementary projects during and after the LIFE project.

In general, FRESHABIT itself majors into preparation and implementing concrete actions, whereas complementary projects concentrate more into economic and socio-cultural values of water management projects, ecological monitoring, and pre-development of innovative methods. This general structure allows us to implement the initial strategies in a wider context, and gives more background information for projects beyond FRESHABIT.

FRESHABIT has currently 14 complementary projects for which funding has been granted. Decision on funding is foreseen for further 7 project proposals during 2015. For the rest of the foreseen complementary projects the applications will be done in 2015 or later. FRESHABIT is foreseen to mobilize in total ca. 4.47 M€ (18% of the total complementary project budget) of complementary funds, 2.01 M€ of this being complementary Union funds and 2.46 M€ national funds. Union funds from ERDF and EAFRD are aimed especially on the issues dealing with the well-being provided by nature and utilization of natural resources, and these funds thus provide necessary added value to the IP actions. The national funds mobilized are more directly complementary to the IP actions, providing additional data collecting, monitoring, and planning resources, as well as resources for complementary restoration of catchments and water bodies in and outside FRESHABIT target areas. Beyond those listed in form FP, many opportunities for complementary funding are foreseen from both Union and national sources during the duration of FRESHABIT, and these opportunities will be fully utilized.

All beneficiaries of FRESHABIT are highly motivated in promoting the mobilisation of other relevant funding sources for the implementation of the complementary measures.

Reasons why this action is necessary:

As FRESHABIT already has promoted several funding sources and promoting more of them is highly likely, it is essential to combine their benefits and objects from regularly. Also it is important to find synergies between FRESHABIT and complementary projects. This will ensure the high-quality and relevant content of them and gives a possibility to steer complementary projects towards the full implementation of the PAF in time.

Constraints and assumptions:

This action is not expected to face significant constraints.

Expected results (quantitative information when possible):

The accomplishment of more favourable ecological and conservation status of habitat types and biodiversity is expected through following substeps:

- High number of promoted mobilization of relevant funding sources
- Increased exchange of knowledge among all stakeholders
- Prevention of billowing difficulties or challenges

Cost estimation:

This action includes personnel costs the beneficiaries which currently are involved with the complementary projects, in total 7 beneficiaries (SMK, LUKE, LUVY, VVK, VARELY, EPOELY, ESAELY). The personnel costs are largely linked to the regional managers and substance experts to ensure the link to the project and also planning new complementary projects. The personnel cost for the permanent staff (senior experts) are 25 654€ (79 days) and temporary staff 4 989€ and 19 days respectively. For the latter periods the costs are 45 669€ The average costs per beneficiary is 9 500€ per beneficiary. The daily salaries are based of collaborative labor agreements and/or actual salary costs for the permanent and temporary staff.

Milestones:

- Monitoring complementary projects through core and regional management teams acknowledged (30.4.2016)
- First meeting of regional management teams in relation to complementary projects held (30.4.2016)
- 10-12 meetings of regional management teams in relation to complementary projects held (30.09.2022)

ACTION F.7: Audit of the project

Beneficiary responsible for implementation

MH is responsible in providing general auditing of FRESHABIT; all other beneficiaries are in response of their own accounting

Description (what, how, where and when):

The financial report provided for the Commission with the final report will be verified by an independent auditor. An independent auditor will also be used whenever the Commission finds it necessary to receive intermediate information about the project accounting.

The overall project auditing will be carried out by MH and all other beneficiaries (28 pcs) are responsible of their own auditing (no cost for LIFE project) and providing all supporting documents of their own audits to the MH project auditor.

Reasons why this action is necessary:

Auditing supports the financial management of the project and ensures that general conditions of the grant agreement and national legislation and obligations are fulfilled by the project.

Constraints and assumptions:

No constraints are expected.

Expected results (quantitative information when possible):

Audit of the FRESHABIT project

Cost estimation:

The audit cost all budgeted for MH are estimated to 20 000€.

Deliverables:

- Audit report with the final report (30.09.2022)

Milestones:

- Documents for audit gathered for the auditor (30.09.2022)
- Audit completed and audit report produced (31.12.2022)

ACTION F.8: After LIFE plan

Beneficiary responsible for implementation:

MH together with core team (SYKE, LUKE, SMK)

Description (what, how, where and when):

The coordinating beneficiary will produce the after-LIFE conservation plan as a separate chapter of the final report. The plan will be set out how the future conservation management of the target sites will be developed and how the long-term management of sites, habitats and species will be assured. MH has developed specific routines for this action in previous LIFE-projects.

Reasons why this action is necessary:

This action will ensure that outcomes accomplished in FRESHABIT will carry on beyond the project period. It is also considered as obligatory according to the LIFE-guidelines for applicants.

Constraints and assumptions:

Enough time is needed to complete this plan at the end of the project.

Expected results (quantitative information when possible):

The deliverable will be the after-LIFE plan presented as a separate chapter of the final report.

Cost estimation:

After-LIFE plan will be compiled at no cost for the project.

Deliverables:

- The after-LIFE plan presented as a separate chapter of the final report (31.12.2022)

DELIVERABLE, MILESTONES AND REPORTING SCHEDULE**MAIN DELIVERABLE PRODUCTS OF THE PROJECT**

Name of the Deliverable	Code of the associated action	Deadline
Technical plan for dam removal, subsequent restoration actions and flood control of the Villamo	A3	31.1.2016
Communication plan for the FRESHABIT	A11	31.5.2016
Notice boards	E5	31.5.2016
Project leaflet	E5	31.5.2016
A website, which presents the project in full detail	E4	30.6.2016
Project roll-ups ready	E5	31.8.2016
Fishway plans for Kiskonjoki (Koski, Hålldam)	A3	31.12.2016
Restoration plan for peatlands in Koivuluhdansuon (Koitajoki)	A3	31.12.2016
Bottom sediment maps and GIS-layers of the Konnevesi and Puruvesi study areas	A6	31.12.2016
Project material to communicate about new electricity products	A8	31.12.2016
Website to communicate with consumers	A8	31.12.2016
Document recording the common data and links between reporting under HBD, WFD and MSFD	A9	31.12.2016
Document describing the method ensuring interoperability of the databases VEMU, POVET and a new database for HBD data	A9	31.12.2016
Report of field work related to FPM collection	C9	31.12.2016
Project video on YouTube	E5	31.12.2016
A plan of measures to decrease sedimentation loads and the effect of acid sulfate soils, trough water protection measures in forestry in Ähtävänjoki	A3	31.3.2017
Report of the recreation benefits in Puruvesi under various development alternative	D4	31.5.2017
Layout of materials to public communication campaign	E10	30.6.2017

Name of the Deliverable	Code of the associated action	Deadline
Report of the resources, demand and supply for the nature-based services	A7	31.8.2017
A mobile application for teaching (WWF)	E7	31.8.2017
A marketing flyer of the mobile application (WWF)	E7	31.8.2017
Leaflet: Landowner's guide to the conservation of freshwater habitats (FANC)	E7	30.9.2017
20 information boards (LSPKe)	E7	30.9.2017
Report on national integrated model for river basin management	A1	31.12.2017
Report on ecosystem service indicators for biodiversity.fi portal	A2	31.12.2017
Report of the historical and contemporary distribution of freshwater pearl mussels in the Karjaanjoki area	A3	31.12.2017
Report of the current distribution of freshwater pearl mussels in the Karjaanjoki area	A3	31.12.2017
General plan for Karjaanjoki river system in-stream habitat restoration	A3	31.12.2017
Restoration plan for canals at Teuraoja and Kivijärven oja (Naamijoki)	A3	31.12.2017
Restoration plan of bird wetlands in Isojoki	A3	31.12.2017
Restoration plans for peatlands in Kesonsuo and Mykränsuo (Koitajokil)	A3	31.12.2017
2 restoration plans for peatland restoration in Isojoki	A3	31.12.2017
Natura 2000 management plan and RWPP for Arvajanreitti (FI0900101)	A4	31.12.2017
RWPPfor Karjaanjoki region	A4	31.12.2017
Report of spatial diversity in target lakes	A6	31.12.2017
Document recording the relevant data for planning processes and modelling supporting those processes	A9	31.12.2017
Document describing the workflow that feeds relevant data into modelling and planning processes	A9	31.12.2017
Report of migratory fish behaviour and habitat use below hydropower plant in relation to discharge in River Karjaanjoki	C3	31.12.2017

Name of the Deliverable	Code of the associated action	Deadline
Report of visitor survey results	D4	31.12.2017
Report of an approach for valuing recreation wellbeing effects	D4	31.12.2017
Manual of Freshabit OEP (NoM)	E7	31.12.2017
Marketing brochure Freshabit OEP (NoM)	E7	31.12.2017
A guidebook for construction of Green Care –fresh water environments for different client groups	A7	31.5.2018
Report on integrated model framework for ecosystem service assessment and sustainability	A2	30.6.2018
Leaflet: Landowner's guide to wetland restoration (FANC)	E7	30.9.2018
Application of national integrated model for river basin management	A1	31.12.2018
Plan for increasing the water level of Teurajärvi (Naamijoki)	A3	31.12.2018
Restoration plan of bird wetlands in Ähtävänjoki	A3	31.12.2018
Restoration plans for headwater lakes (2) in Vanajavesi	A3	31.12.2018
Restoration plan for Haapasuo (Keski-Suomi)	A3	31.12.2018
Restoration plan for peatlands in Kesonsuo ravines (Koitajoki)	A3	31.12.2018
Natura 2000 management plans for two sites in Vanajavesi region	A4	31.12.2018
Report of model structure and validation	A6	31.12.2018
3-5 sustainability evaluation reports on selected fisheries/aquaculture practices	A7	31.12.2018
Report of survival of descending Atlantic salmon smolts (River Karjaanjoki)	D2	31.12.2018
Suomen Luonto and Luonnonsuojelija will write about the river restorations that EKOenergy finances, Suomen Luonto at least once (in 2016) and Luonnonsuojelija at least three times (once during the autumn 2016 and once in 2017 and once in 2018).	E10	31.12.2018
Leaflet for Karjaanjoki completed	E5	31.12.2018
Communication materials on sustainable local seafood choices	E5	31.12.2018

Name of the Deliverable	Code of the associated action	Deadline
Camp material (WWF)	E7	31.1.2019
Report on the stream habitat assessment methodology	A5	30.6.2019
Report on the lake habitat assessment methodology	A6	30.6.2019
Guidebook to Freshwater Biology (FANC)	E7	30.9.2019
Report for considering restoration as an option for the after-production use of industrial areas	A10	31.12.2019
Report on ecosystem services in North Karelia Biosphere reserve	A2	31.12.2019
Restoration plan for peatlands in Kivijärvi (Keski-Suomi)	A3	31.12.2019
5 plans for water protection and in-stream restoration measures in Lähevaara, Kuikkalammin- and Apsonlamminsärkät areas, River Kelsimä, the areas between Mekrijärvi Village and the peat production area of Riihisuo and Hattuvaara-Tiitanvaara-Marjovaara areas (Koitajoki)	A3	31.12.2019
Restoration plans for six bird lakes in Vanajavesi	A3	31.12.2019
Restoration plans for peatlands in privately owned parts of Kesonsuo ravines and Siltasuo and seven main channels in Kesonsuo in 2019 (Koitajoki)	A3	31.12.2019
RWPP for the Saarijärven reitti	A4	31.12.2019
Leaflet/newsletter for Vanajavesi	E5	31.12.2019
The practical guide for multi-stakeholder planning, implementation and monitoring of catchment area management with special focus on Natura 2000 values	E8	31.5.2020
Report on the long-term impacts of climate change and air pollutants at the Valkea-Kotinen site (Vanajavesi)	D3	30.6.2020
Ahti's Kingdom production completed, broadcasted and reported	E6	30.6.2020
Restoration plans for three bird wetlands (Ylin, Peuralampi and Kilpilampi) in Saarijärven reitti	A3	30.9.2020
Education material for four bird lakes in Vanajavesi	E7	30.9.2020
RWPP for Isojoki river catchment	A4	31.12.2020
Map of the important diversity areas	A6	31.12.2020
Report on the application of the integrated model framework for ecosystem service and sustainability assessment at the Karjaanjoki catchment	D3	31.12.2020

Name of the Deliverable	Code of the associated action	Deadline
Report on the long-term impacts of climate change and air pollutants at the Hietajärvi site (Koitajoki)	D3	31.12.2020
Report on the effect of climate change and actions in forestry and agriculture in water quality in Koitajoki and Puruvesi	D3	31.12.2020
Valuation assessment of Puruvesi completed	E7	31.1.2021
Report on the use of concrete actions to restore longitudinal connectivity of riverine habitats in target areas	D2	30.6.2021
Monitoring report of the success of natural reproduction (densities of juvenile salmonids) in the nursery areas above the fishways in River Kiskonjoki	D2	30.6.2021
Brown trout migration (first monitoring period 06/2020-11/2020) report in Saarijärven reitti	D2	30.6.2021
Report of salmonid fish migration routes in the bay of Pohjanpitäjänlahti in River Karjaanjoki	D2	30.6.2021
Report on the compensation scheme implemented at Puruvesi	C2	31.8.2021
Report demonstrating the efficiency of different constructions passing migratory barriers	C3	30.9.2021
Report on host fish specificity and survival of FPM glochidia reared in captivity, and survival after restocking	C9	30.9.2021
National guidance with practical recommendations for monitoring and mapping of stream and lake restoration measures	E8	31.8.2022
Application of improved detailed hydrological model linking groundwater and surface water in brook and wetland restoration	A1	30.9.2022
Report of the integrated multi-stakeholder planning for catchment area management of N2000 areas	A10	30.9.2022
National guidance with practical recommendations for monitoring stream and lake restoration measures	A10	30.9.2022
Report on stream restoration effects on biodiversity and functioning (Action D2 included)	D1	30.9.2022
Article on peer-reviewed journal on stream restoration effects on biodiversity and functioning (Action D2 included)	D1	30.9.2022
Report of restoration effects on e.g. diatoms, macroinvertebrate and aquatic mosses	D1	30.9.2022
Report of the restoration effects on spawning area of critically endangered river spawning densely-rakered whitefish (<i>Coregonus lavaretus f. nilssonii</i>)	D1	30.9.2022
Report of the impacts of transferred mosses on the juvenile and adult habitats of <i>Salmo salar</i> m. sebago (critically endangered species)	D1	30.9.2022
Report on ecological status and conservation status of water bodies under restoration	D7	30.9.2022

Name of the Deliverable	Code of the associated action	Deadline
Article on peer-reviewed journal comparing status assessment according to WFD and Natura 2000 reporting	D7	30.9.2022
Report of mussel surveys conducted in Rivers Kiskonjoki and Karvianjoki	E8	30.9.2022
At least 25 articles prepared for the results of the actions in the project areas	E8	30.9.2022
At least 15 articles prepared for media by core beneficiaries	E8	30.9.2022
Layman's report	E9	30.9.2022
Table of all relevant indicators used in FRESHABIT	F5	30.9.2022
Audit report with the final report	F7	30.9.2022
Socio-economic assessment of the project	D4	31.12.2022
Analysis of the implementation of the PAF within the Final report	D6	31.12.2022
Updated PAF	D6	31.12.2022
3-5 printed policy briefs	E1	31.12.2022
The after-LIFE plan presented as a separate chapter of the final report	F8	31.12.2022

MAIN MILESTONES OF THE PROJECT

Name of the Milestone	Code of the associated action	Deadline
First round of media events organised	E1	31.3.2016
Project manager nominated	F1	15.1.2016
Project Management Core Team established	F1	31.3.2016
First meeting of Project Management Core Team held	F1	30.4.2016
Regional Management Teams established	F1	31.3.2016
Thematic Working Groups established	F3	31.3.2016
Monitoring complementary projects through regional management teams acknowledged	F6	30.4.2016
PAF monitoring group established	D6	30.4.2016
First meeting of Regional Management Teams held	F1	30.4.2016
Project steering committee established	F2	31.3.2016
Regional steering committees (8 pcs) established	F2	31.3.2016
First meeting of Thematic Working Groups held	F3	30.4.2016
First meeting of regional management teams in relation to complementary projects held	F6	30.4.2016
First meeting of project steering committee held	F2	30.4.2016
First meetings of regional steering committees held	F2	30.4.2016
Communication plan for the FRESHABIT composed	A11	31.5.2016
First meeting of PAF monitoring group	D6	31.5.2016
The project website and Puruvesi website operational	E4	30.6.2016
First get-together meeting of Regional Management Teams and Project Management Core Team held	F1	30.6.2016

Name of the Milestone	Code of the associated action	Deadline
Natura 2000 management planning for Arvajanreitti (FI0900101) started	A4	31.5.2016
General catchment area restoration planning for Karjaanjoki region started	A4	31.5.2016
Natura 2000 management plans for three sites in Vanajavesi region started (01.06.2016)	A4	31.5.2016
Approach and indicators for the overall assessment defined	D4	31.12.2016
List of all relevant parameters in relation to technical monitoring for actions C1-C9 updated and agreed between all beneficiaries	D5	31.5.2016
List of all relevant ecological quality elements updated	D7	31.5.2016
Notice boards ready and distributed	E5	31.5.2016
WWF Pilot schools searched and choosed	E7	31.5.2016
Detailed plan for national integrated model for river basin management ready	A1	30.6.2016
All existing data gathered, analyzed, and utilized	A6	30.6.2016
All necessary stream sites selected and confirmed in field	C6	30.6.2016
Social media promotion completed	E1	30.6.2016
Fish removal at Puruvesi started	C8	31.8.2016
Mapping of the resources, supply and demand ready	A7	31.8.2017
List of all relevant indicators in relation to biodiversity parameters updated	D1	31.8.2016
List of all relevant parameters in relation to ecosystem functioning (Table D1.1) updated	D2	31.8.2016
Data collection from regions started	D4	31.12.2016
OEP, first draft version (in Swedish) (NoM)	E7	31.8.2016
WWF Mobile application pilot started	E7	31.8.2016
Table of all relevant indicators updated	F5	31.8.2016

LIFE Integrated Projects 2014 - C2

Name of the Milestone	Code of the associated action	Deadline
Geological survey data collected and post processing started	A6	30.9.2016
Planning for recreational facilities at Latokartanonkoski (Kiskonjoki) completed	C11	30.9.2016
Hytermä and Punkaharju trails completed	C11	30.9.2016
Glochidia collected and delivered to Norway from both rivers	C9	31.10.2016
Glochidia and local host fishes are collected and transported to JYU laboratory for feasibility studies (Karjaanjoki)	C9	31.10.2016
Hiding hut at Hattelamalanjärvi and bird watching tower Ormajärvi at Vanajavesi area completed	C11	31.5.2017
Project roll-ups made and distributed	E5	31.10.2016
Database for integrated modelling of national integrated model for river basin management ready	A1	31.12.2016
Cultural heritage value inventory ready in Naamijoki and Vanajavesi	A3	31.12.2016
Restoration plans ready in Puruvesi	A3	31.12.2016
All existing data gathered, analyzed, and utilized	A5	31.12.2016
Maps and GIS-layers of geological survey ready	A6	31.12.2016
First version of diversity model	A6	31.12.2016
Launching the new pilot electricity product	A8	31.12.2016
Common data used for reporting under the different directives are identified	A9	31.12.2016
Data used in planning processes under the different directives are identified	A9	31.12.2016
Permits granted for the restoration- and flood control measures in the Villamo area in Isojoki	C3	31.12.2016
Permits granted for the restoration- and flood control measures in the Villamo area in Isojoki	C5	31.12.2016
Transfer of the environmental permits to the state as one of the complementary projects	C5	31.12.2016
Planning of Ahti's Kingdom completed	E6	30.4.2017

Name of the Milestone	Code of the associated action	Deadline
Principal photography completed	E6	30.4.2017
Workshop for GC actors	A7	30.4.2017
Workshop (1-2 pcs) for invited participants: entrepreneurs, public and private sector, social workers, NGOs and other interested actors	A7	31.8.2017
Mapping of the resources, supply and demand ready	A7	31.8.2017
Guidebook for constructing Green Care -fresh water environments for different client groups ready	A7	31.5.2018
Model development finished and reported	D4	31.12.2017
Launching the public communication campaign	E10	31.5.2017
First applications on national integrated model for river basin management pilot areas to be applied ready	A1	30.6.2017
Multifaceted and broad planning for sustainable use and protection of Isojoki river catchment started	A4	30.6.2017
Concrete restoration actions implemented	C6	31.7.2017
Pre-monitoring of concrete actions carried out	C6	31.8.2017
First re-evaluation of the overall assessment approach and indicators	D4	31.12.2017
OEP, second draft (in Swedish) (NoM)	E7	31.8.2017
One WWF camp organised	C12	30.9.2017
Draft of Guidebook to Freshwater Biology (FANC)	E7	30.9.2017
Information of 40 water or peatland habitats published in internet (LSPKe)	E7	30.9.2017
WWF Mobile application ready	E7	30.9.2017
Seminar to develop our communication actions	E10	30.9.2017
All field data for model building collected	A6	31.10.2017
Wooden stairs, clearing and go ashore site for canoist completed at Latokartanonkoski (Kiskonjoki)	C11	31.10.2017

Name of the Milestone	Code of the associated action	Deadline
28 ha of new METSO protection areas at Kiskonjoki	C10	31.12.2017
3 ha of new METSO protection areas at Isojoki	C10	31.12.2017
Cultural heritage value inventory ready in Karvianjoki	A3	31.12.2017
Regional water protection and management planning for the Saarijärven reitti ready, implementation started	A4	31.12.2017
The contracts between EKOenergy and hydropower plants exist	A8	31.12.2017
At least 500 Fish passage electricity consumers exist	A8	31.12.2017
At least 5 hydroelectric plants are producing EKOenergy	A8	31.12.2017
Technical solutions for shared use of data are ready	A9	31.12.2017
50% of the peatlands restored at Koitajoki	C1	31.12.2017
Transfer of the environmental permits and use rights the to the state, the last phase completed in Isojoki	C3	31.12.2017
Tendering for construction is carried out for two fishways in Karjaanjoki	C3	31.12.2017
Second re-evaluation of the overall assessment approach and indicators	D4	31.12.2019
Socio-economic assessment of the project finished	D4	31.12.2022
Initial models developed for testing	A5	30.4.2018
Initial models developed for testing	A6	30.4.2018
WWF Children and youth camp material first draft	E7	31.5.2018
Database for integrated modelling of ecosystem services ready	A2	30.6.2018
ES indicators included in biodiversity.fi portal	A2	30.6.2018
Relevant fisheries/aquaculture production selected and information collected	A7	30.6.2018
Successful rearing of sufficient number of juvenile mussels from both rivers	C9	31.8.2018

Name of the Milestone	Code of the associated action	Deadline
Bird watching tower at Kukkianjärvi at Vanajavesi area completed	C11	30.10.2018
Final version of diversity model	A6	31.12.2018
All background data gathered, analyzed, and utilized	A3	31.12.2018
Occurrences of HD mussel species sufficiently surveyed	A3	31.12.2018
Restoration plans ready in Naamijoki and Pohjanmaa	A3	31.12.2018
Field data for model validating collected and stored	A5	31.12.2018
Sustainability evaluation reports ready	A7	31.12.2018
Preliminary guidelines for monitoring available	A10	31.12.2018
Timely delivery of results from action A1	A10	31.12.2018
Timely delivery of results from action A3	A10	31.12.2018
50% of the catchment area restoration at Koitajoki completed	C1	31.12.2018
Series of wetlands constructed in Naamijoki	C2	31.12.2018
Specific and technical plans are obtained for third fishway in Karjaanjoki	C3	31.12.2018
Legal permits for both fishways in Saarijärven reitti	C3	31.12.2018
WWF Children and youth camp material printed	E7	31.1.2019
EDUCE fairs attended	E7	31.1.2019
Two catchment areas where wide range of actions (wetlands (1-5), methods for water protection (1-5), removing of sediments, and instream restoration) have been executed in Isojoki	C2	31.3.2019
Results available as GIS databases	A5	30.6.2019
Results available as GIS databases	A6	30.6.2019
Environmental permits for third fishway in Karjaanjoki	C3	31.7.2019

Name of the Milestone	Code of the associated action	Deadline
Naamijoki: 3 bird wetlands restored in tasks 1 and 2	C7	30.9.2019
Three WWF camps organised	C12	30.9.2019
Second round of media events organised	E1	30.9.2016
Third round of media events organised	E1	30.9.2017
Communication activities of WWF conducted	E1	30.9.2019
Post-production completed, TV-series is handed to Yle	E6	30.9.2019
Post-monitoring of concrete actions carried out	C6	31.10.2019
Restoration plans ready in Vanajavesi	A3	31.12.2019
Restoration plans ready in Koitajoki	A3	31.12.2019
Results will be utilized in the HBD and WFD reporting process for 2013-2018	A9	31.12.2019
Peatlands and banks restored at Naamijoki	C1	31.12.2019
The dam removed and flood control measures completed in Isojoki	C3	31.12.2019
First fishway has been constructed in Karjaanjoki	C3	31.12.2019
Tendering for construction is carried out for third fishway in Karjaanjoki	C3	31.12.2019
In Ähtävänjoki, 300 m (3 sites) of potential Fresh water pearl mussel-habitat restored	C4	31.12.2019
Ähtävänjoki: 1 bird wetland restored in task 2	C7	31.12.2019
62 ha of new METSO protection areas at Kiskonjoki	C10	31.12.2019
10 ha of new METSO protection areas at Isojoki	C10	31.12.2019
Hiding hut at Saarioisjärvi and bird watching tower Tykölänjärvi at Vanajavesi area completed	C11	31.12.2019
10 media events organised	E1	31.12.2019

Name of the Milestone	Code of the associated action	Deadline
Ahti's Kingdom TV-series is broadcasted on Yle TV1	E6	31.12.2019
First fishway completed in Saarijärven reitti	C3	31.5.2020
Database for Hietajärvi site (Koitajoki) for the assessment of long-term impacts of global change ready	A2	30.6.2020
Database for Valkea-Kotinen site (Vanajavesi) for the assessment of long-term impacts of global change ready	A2	30.6.2020
Captivity reared Freshwater pearl mussels are ready for release to suitable areas in natural-like fishway in Karjaanjoki	C3	30.6.2020
Restocked larvae ready for release both rivers	C9	30.6.2020
Monitoring of first fishway running in Saarijärven reitti	D2	30.6.2020
Report on the long-term impacts of climate change and air pollutants at the Valkea-Kotinen site (Vanajavesi) ready	D3	30.6.2020
Final reporting of the project completed	E6	30.6.2020
Restoration plans ready in Keski-Suomi (30.9.2020)	A3	30.9.2020
Puruvesi: 2-3 wetland in bays managed in task 2	C7	30.9.2020
Fish removal completed at Puruvesi	C8	30.9.2020
Monitoring of both fishways running in River Kiskonjoki	D2	30.9.2020
Seminar for local stakeholders, organisations and laymen at Karjaanjoki	D3	31.10.2020
All legal permits acquired for C3 and C7 received	A3	31.12.2020
Timely delivery of results from action A4	A10	31.12.2020
All peatlands (969 ha) restored at Koitajoki	C1	31.12.2020
Second fishway has been constructed in Karjaanjoki	C3	31.12.2020
Both fishways constructed and working in Kiskonjoki	C3	31.12.2020
Vanajavesi area: In Lakes Tykölänjärvi and Kukkiänjärvi one inflowing stream in each restored	C4	31.12.2020

Name of the Milestone	Code of the associated action	Deadline
Vanajavesi: 7 bird wetlands managed in tasks 2-3	C7	31.12.2020
Report on the application of the integrated model framework for ecosystem service and sustainability assessment at the Karjaanjoki catchment ready	D3	31.12.2020
Report on the long-term impacts of climate change and air pollutants at the Hietajärvi site (Koitajoki) ready	D3	31.12.2020
Scenarios available of the effect of climate change and actions in forestry and agriculture in water quality in Koitajoki and Puruvesi	D3	31.12.2020
Peatlands (150 ha) restored at Isojoki and Karvianjoki	C1	31.3.2021
Compensation made to 5-10 landowners (20 ha) at Puruvesi for allowing and securing actions on their land	C2	31.5.2021
During the periods 3 and 4, the planning of the construction of fish passages and freshwater habitats will start	A8	30.9.2021
Effective communication carried out throughout the project	A11	30.9.2022
Former peatland harvesting area (50 ha) restored	C1	30.9.2021
Catchment area restoration completed affecting 3 560 ha at Koitajoki	C1	30.9.2021
Drainage basins on 4 sites, chains of submerged weirs on 2 sites, and erosion control structures on 3 sites established in Vanajavesi	C2	30.9.2021
27 hectares of wetlands and vegetation flooding areas built and 55 units of other water protection structures (sedimentation pits, peak runoff control etc.) constructed in Koitajoki	C2	30.9.2021
Construction of third fishway has started in Karjaanjoki	C3	30.9.2021
Second fishway completed in Saarijärven reitti	C3	30.9.2021
All concrete actions completed in Saarijärven reitti	C3	30.9.2021
Vanajavesi: water protection measures implemented	C5	30.9.2021
Isojoki: 1 bird wetland restored in task 1	C7	30.9.2021
Päijänne: 1 bird wetland restored in task 1	C7	30.9.2021
Saarijärven reitti: 3 bird wetlands restored in tasks 1 and 2	C7	30.9.2021
50 ha new METSO protection areas at Saarijärven reitti	C10	30.9.2021

Name of the Milestone	Code of the associated action	Deadline
122 ha of new METSO protection areas	C10	30.9.2021
Five WWF camps organised	C12	30.9.2021
Monitoring of biodiversity effects completed	D1	30.9.2022
Monitoring of ecosystem functioning and integrity completed	D2	30.9.2022
Technical monitoring of implemented concrete actions done	D5	30.9.2022
First PAF seminar organized	D6	30.11.2016
Second PAF seminar organized	D6	30.11.2018
Third PAF seminar organized	D6	30.11.2021
At least 9 PAF meetings held	D6	30.9.2022
At least 15 national media events organized	E1	30.9.2022
EKOenergy will speak at 5-10 specialized seminars (in the fish sector, in the hydropower sector and in the renewable electricity sector)	E10	30.9.2021
Meetings with private and state owned companies whose electricity consumption is over 5-10 GWh per year	E10	30.9.2021
At least 10-12 meetings of Regional Management Teams held	F1	30.9.2022
At least 10-12 meetings of Project Management Core Team held	F1	30.9.2022
4 get-together-meetings of Regional Management Teams and Project Management Core Team held	F1	30.9.2022
At least 5-6 get-together-meetings of Regional Management Teams and Project Management Core Team held	F1	30.9.2022
At least 6 project steering committees held	F2	30.9.2022
At least 6 regional steering committees in each region held	F2	30.9.2022
10-12 meetings/workshops of Thematic Working Groups held	F3	30.9.2022
10-12 meetings of regional management teams in relation to complementary projects held	F6	30.9.2022

Name of the Milestone	Code of the associated action	Deadline
Documents for audit gathered for the auditor	F7	30.9.2022
First application of improved detailed hydrological model linking groundwater and surface water in brook and wetland restoration	A1	30.9.2021
Ten in-stream sites at the Upper Karjaanjoki area and 15 in-stream sites at the Lower Karjaanjoki restored	C4	30.9.2021
In Isojoki, 5,5 km restored	C4	30.9.2021
In Kiskonjoki, 2 km of the river channel restored	C4	30.9.2021
In Karvianjoki, 11 km of the river channel restored	C4	30.9.2021
Audit completed and audit report produced	F7	30.12.2022

ACTIVITY REPORTS FORESEEN

Type of report	Deadline
First interim report	30.09.2017
Second interim report	30.09.2019
Third interim report	30.09.2021
Final report	31.12.2022

LIFE Integrated Projects 2014 - C3

TIMETABLE

List all actions ordered by number and using their numbers or names. Tick as appropriate.

Action Number	2016				2017				2018				2019				2020				2021				2022			
	I	II	III	IV																								
A. Preparatory actions (elaboration of management/action plans, obtaining licences and permits, trainings, etc.)																												
A1	x	x	x	x	x	x	x	x	x	x	x	x									x	x	x	x	x	x	x	x
A2			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x											
A3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
A4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
A5	x	x	x	x	x	x	x	x	x	x	x	x	x	x														
A6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
A7	x	x	x	x	x	x	x	x	x	x	x	x																
A8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
A9			x	x	x	x	x	x	x	x	x	x	x	x	x	x												
A10													x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
A11	x																											
C. Concrete (conservation/implementation) actions																												
C1			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
C2							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C3			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C4				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C5					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C6			x	x	x	x	x	x	x	x	x	x	x	x	x													
C7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C8			x	x			x	x			x	x			x	x			x	x								
C9			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
C10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					

Action Number	2016				2017				2018				2019				2020				2021				2022			
	I	II	III	IV																								
D. Monitoring of the impact of the project actions (obligatory)																												
D5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D7									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
E. Public awareness and dissemination of results (obligatory)																												
E1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E5	X	X							X	X			X	X	X	X												
E6							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
E7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E9																									X	X	X	X
E10			X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X				
F. Project Management and monitoring of project progress (obligatory)																												
F1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F5	X	X	X	X																						X	X	
F6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F7																											X	
F8																									X	X	X	X