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LIFE project «Reduction of CO<sub>2</sub> emissions by restoring degraded peatlands in  
Northern European Lowland»

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## LIFE Peat Restore

# Socio-economic impact assessment LITHUANIA

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2018, VILNIUS



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## 1. Methodology

Restoration projects are socio-cultural endeavours, stakeholder driven, socially derived and politically motivated; partially aimed at influencing decision-makers at differing policy hierarchical levels (international, national, regional and local); Thus, socio-economic drivers are already incorporated within restoration research, field trials and working projects, since their results are often intended to be used to address their funding arrangements, influence policy prescriptions for similar landscapes and to create an argument for further (funded) research (Collier, 2011).

Accordingly, this project mitigates some negative and enhance the positive socio-economic effects on the communities in respective countries. Following components with the potential impact to the socio-economic situation in each project site were identified as well as potential key indicators to assess the effects of the project on these valued components identified:

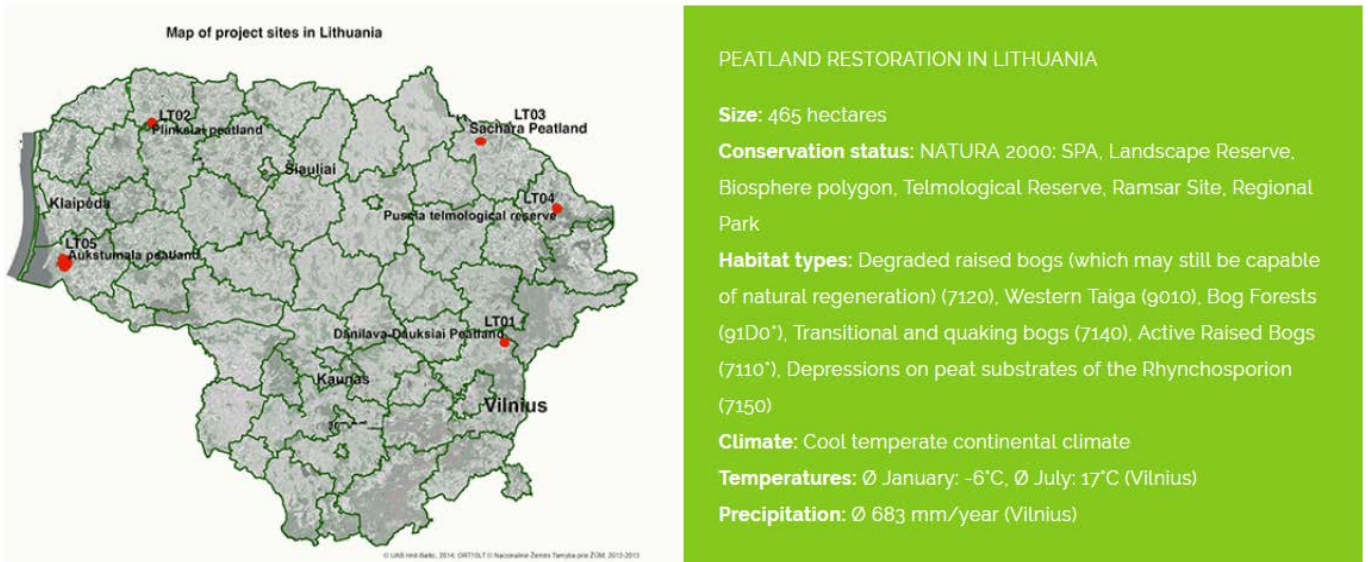
- Impact on the economy (key indicators: business opportunities, employment);
- Impact on the human capital (key indicators: scientific knowledge, awareness raising);
- Impact on the ecosystem:
  - Regulating: erosion control, area vulnerable, erosion rates, percentage bare soil (in vulnerable locations), vegetation cover and density (key indicators: GHG emissions, water quality);
  - Provisioning: food, water, timber, and fiber (key indicators: variation in dominance of native fauna and flora for food and fiber);
  - Supporting: biodiversity (habitats and species), soil formation (peat accumulation) (key indicators: habitat fragmentation, invasive species range /extent /number; number of species, population size/percentage) of (native) species that are endangered, species richness, threatened species, maintenance of migratory species, change in habitat hydrological integrity, change in ecosystem intactness, change in dominance of native plants);
  - Cultural: ecreational, aesthetic, and spiritual benefits (key indicators: presence and abundance of key features for nature based tourism, number and abundance of flagship, rare, attractive species; number of tourists visiting and employment in nature tourism sector. To study the aesthetic enjoyment, the following indicators can be used: scenery landscape features (patchiness etc), “preferred” landscapes, number scenic roads and views. To estimate spiritual experience, the following indicators can be applied: number of people visiting natural areas, number of landscape features with (widely acknowledged) spiritual relevance; number of natural areas. To evaluate educational benefits – opportunities for formal and informal education and training, such indicators as presence of features for education, number of visits (e.g.



schoolchildren), society awareness of nature's contribution, ecosystem and nature awareness can be applied).

By defining indicators it is being focused on what is going to be measured. Indicators were chosen so that they were measurable, specific, relevant and useful and to keep the balance between quantitative and qualitative indicators based on the availability of data and the relevance to the result. Indicators were divided into direct and indirect indicators. 4 direct indicators are chosen to assess the socio-economic impact of the project in Lithuania. Also, 4 indirect indicators will show additional benefits caused by the project activities in Lithuanian sites. Description of each indicator contains the socio-economic setting, the scope and the baseline. Exact impact of the project in accordance to every indicator will be evaluated at the end of the project after activities are completed.

Secondary data analysis of existing sources and qualitative information method, i. e. comparing the results with the baseline information will be used throughout the Socio-economic impact assessment. Some indicators are suited for quantification. Participatory approach, i. e. direct engagement and data



interpretation method will be used to evaluate the impact on awareness raising on peatland and climate change interactions by releasing questionnaires, also holding discussions as well as organising events. These small group analysis, semi-structured interviews and face to face debates will enable to gather information and provide the conclusions.

## 2. Country profile: descriptive analysis of the sites

In Lithuania there are 5 project sites, which are located in degraded and post mined peatlands: Amalvas peatland, Plinkšiai Peatland, Sachara Peatland, Puscia Peatland and exploited part (10 ha) of Aukstumala peatland, they cover totally 465 ha. They are distributed across almost all regions of the country. Therefore project has different stakeholders, which can be defined by several types:

- state institutions, which are landowners and supervisors. In project sites LT01, LT02, LT03 State Forestry Enterprise own the forests within project sites.
- private companies, who are landusers, also renting the land on the basis of long term agreement. This is the case for peatland where active mining is ongoing, e.g. in Project site LT05 mined by Klasmann-Deilmann Silute Ltd.



c) state institutions, which are supervisors. This type include administrations of protected areas: State Service of Protected Areas and Ministry of Environment and its affiliates: Administrations of Zemaitija National Park, Zuvintas Biosphere Reserve, Grazute and Sartai Regional Park, which supervise project sites. Also variety of state bodies, which will be involed into management plans issue permissions for forest clearing, dam building. Additionally other institutions will be involved too, e.g. Environmental Protection Department, Lithuanian State Forest Service, Local Road Filials of the Lithuanian Road Administration. Also will be directly involved when.

d) local public and landowners: local county administrations, owners of neighbouring land of the project sites: farmers, forest owners who will be involved in hydroengineering project agreements (Action E5) since daming of dithces might have direct influence on their property.

Therefore main target audience also includes huge variety of decision making institutions, local and national authorities; then local public and landowners; privat sector: peat extracting companies; knowledge and best practice will be presented to scientific climate and wetland experts, other NGO's.

### 3. Direct indicators

#### 3.1. Ecosystem regulating services: GHG emissions, water quality

Total peatland area in Lithuania is 646000 ha. About 72 % of the peatlands are drained. It means that approximately 2 million tons of carbon dioxide are emitted every year from degraded peatlands in Lithuania according to the National inventory of green house gas emissions or 7 million tons accrodg to expert assessment based on updated emission coeficinets of IPCC methodology (Nature Heritage Found, 2018). Current EU policy on climate change mitigation as well as National policy in Lithuania is not sufficient enough - only half of the 80 % target for GHG emissions domestic reduction by 2050 (100 % = 1990) will be achieved if nothing changes. Therefore, solutions which can accelerate the climate change mitigation are needed. In order to achieve this, restoration of degraded peatlands would contribute by stopping carbon loss.

Prelaminar surveys show that peatlands in Lithuania might retain up to 531 t of nitrates per year. Thus the role of pristine peatlands to regulate water quality might be estimated 1.7 mln EUR per year. Yet, this role in the whole country is different and depends on many factors, such as geographical location, heaviness of industrial and agricultural contamination. Studies have shown, that using the cheapest methods decreasing of soil contamination by 1 kg of nitrates might cost up to 3 EUR/kg. Improving hydrological regime in the damaged peatlands would help to avoid these expenses.

#### **Restoration of Amalva LT01**

Southern, most disturbed part of Amalvas peatland area (214.75 ha) will be restored. Amalvas peatland (3637.8 ha) is located in the southern part of Lithuania. The territory is also a part of huge wetland complex – Žuvintas, which has a special protectio status of Biosphere Reserve and Ramsar. Draining of the southern part of Amalvas was carried out already in the beginning of 20<sup>th</sup> century and continued during the soviet period. As a result, fen and transitional mire habitats were lost. Currently only degraded raised bogs habitats (30 ha) can be found in the project area.



### **Restoration of Plinkšiai peatland LT02**

In the 69 hectare Plinkšiai peatland, Degraded raised bogs (which may still be capable of natural regeneration) and Bog Forests are characteristic. The landscape and bird protection area, which is located in a biosphere reserve, was partially drained by ditches of a total length of 22 kilometers.

### **Restoration of Sachara peatland LT03**

In Sachara peatland Degraded raised bogs (which may still be capable of natural regeneration), Transitional and quaking bogs, and Bog Forests occur on an area of 92 hectares. Ditches with a total length of 37 kilometers caused a strong drainage. Due to the low water depth, more and more trees and shrubs can establish, which increases the risk of fire in the region.

### **Restoration of Pūsčia telmological reserve LT04**

For the restoration of Pūsčia peatland LT04 altogether 240 dams will be installed in the whole site (80,4 ha). In addition, to ensure stable water level approx. 10 protective embankments from peat and plastic will be constructed. To increase the area of open peatland habitats and to reduce negative impact of tree evapotranspiration altogether 30 ha of trees, mainly pine trees, birch and shrubs offshoots will be cut. Sphagnum diaspores will be spread in the bear peat habitats.

### **Restoration of Aukštumal post mined part LT05**

Aukstumala peatland is the smallest project area with 10.2 hectares. It is part of the Nemunas Delta Regional Park, Ramsar area and NATURA 2000 bird protection area. Due to the intensive peat mining there are no NATURA 2000 habitat types. While the peat layer in the elevated wetlands is on average 6.1 meters, only 0,5 to 1 meter peat deposits are left in the project area. At the end of the 19th century, a peat mining factory was built in the southeast of the area. At the end of the 1960s, roads, water pumping stations and dams were built, which caused the drainage of two thirds of the peatlands area, which was subsequently designated for industrial peat cutting. Although peat mining was abandoned ten years ago, extremely high emission values are still being measured due to unfavorable hydrological conditions and the mineralization of the peat layer. In addition, there is an increased risk of fire in the dry seasons.

### **Impact of restoration**

After the restoration of degraded peatlands in 465 ha, carbon dioxide level will be reduced by ~84 % as further degradation of peatland at the sites and their CO<sub>2</sub> emissions will be stopped and natural processes of peat accumulation in the degraded sites started or increased. Established vital peat-forming vegetation in one water flooded post mining peat deposit areas in Lithuania will interrupt greenhouse gas emissions from such surfaces, or even restore the accumulation of CO<sub>2</sub> in the peat forming process. Moss species (*Sphagnum*) introduced to the sites which are very degraded will help them to colonize faster. These are the sites LT01, LT03, LT04. Abandoned project sites LT 01, LT03, LT04 have rather poor sphagnum cover due to low water level, sphagnum will grow and spread spontaneously. In Project site LT05 which is located in excavated plot of Ausktumala peatland, water level will be optimised by profiling the surface, removing reeds and bushes, installing dams with water



overflow in surrounding ditches. Regular maintenance will be provided while taking the unwanted/atypical vegetation away, at least twice a year. 10 ha of exploited peatland will be converted into the sphagnum covered area. In the context of the CO<sub>2</sub> balance, such measures are needed as deeply flooded areas are significant source of GHG emissions. Re-planting them would increase the chance of CO<sub>2</sub> accumulation.

Table 1. Summarized table of GHG emission reduction in 5 Lithuanian project sites

|                           | CO <sub>2</sub> (t CO <sub>2</sub> -eq. /year) | CH <sub>4</sub> (t CO <sub>2</sub> -eq. /year) | GWP (t CO <sub>2</sub> -eq. /year) |
|---------------------------|--|--|------------------------------------|
| Baseline, 2018            | 8277,53  | 253,85   | 8510,75                            |
| Post restoration scenario | 1296,15  | 1308,80  | 2616,34                            |
| Savings (%)               | 84   | -415   | 69                                 |

### 3.2. Scientific knowledge

So far, the results of the above mentioned processes are not expressed by the national GHG balances sufficiently and there is a lack of comprehensive approach or strategy for restoration of degraded peatlands in Lithuania. One of the main reasons for that is the shortage of data and knowledge which restricts from one reliable and recognized method.

Scientific knowledge of mires conservationists about the best practices for restoration via rewetting of different types of peatlands will be gained during the project and guidelines for restoration of peatlands will emerge in Lithuania based on gained experience. The guidelines will mostly aim at abandoned peatlands as well as new peatlands if any new permissions will be issued (it is not likely to happen in Lithuania). After the project, new methodology (GEST method) in Lithuania will be established for GHG emission evaluation in peatlands. More precise data from effect to GHG emissions will enable to monitor climate change in national level referring to commitment to Kyoto Protocol and the Paris Agreement.

A Handbook released in Lithuanian language will include recommendations for the sustainable and responsible management of peatlands, highlighting the importance of the climate change mitigation targeted management actions for long term GHG emission reduction. It will target experts and will summarise the project results from Actions A.2 – A.5, C.1-C.3, D.2. The Handbook will include results of GEST analysis and focus on reduction of GHG emissions and enhancement of CO<sub>2</sub> sequestration, as well as integrating priorities of biodiversity and economic aspects. The Handbook will incorporate international scientific advice on management of peatlands as carbon stocks, which will be tested and verified according to climate, ecologic aspects and by application of ecosystem services assessment within the implementation of the project. GEST analysis will be carried out by the mire habitat and wetland experts, as well as GIS/hydrology expert. Data on project site habitats will be collected and summarised. Mire habitat, peatland expert and senior wetland expert supervised by project coordinator (and expert) will collect data of habitats, ground water level data, update actual forest inventory as the old inventory will be old dated, GIS specialist will put analyse data on maps (GIS).



### 3.3. Awareness raising on peatland and climate change interactions

Neither communication events, nor awareness raising campaigns are held to discuss climate change with the society in Lithuania. Furthermore, no publications or seminars are dedicated to promote the importance of peatlands and to enhance responsible use of peat production. Therefore, to raise the level of awareness on peatland and climate change interactions as well as sustainable management of mires among people in Lithuania is necessary.

Digital publication with recommendations promoting wise use of peatland will be developed which will target politicians and peatland users. 10 page document based on the results of the scenarios will be prepared, developed under Action C1. The recommendations will be applicable for different peatland types as the project includes diverse peatland types.

Awareness raising of authorities, decision makers, local people, experts and other relevant stakeholders will be achieved by presenting recommendations in seminars (E-Action).

Recommendations based on the results of the project will be produced (C4), trying to change legislation on restoration of post mined areas. In the case of Lithuania the recommendations of the project will be designed as contribution to the elaboration of the National Strategy for Peatland Use and addressed to the Ministry of Environment which has to adopt it. The strategy might be based on the project results, especially the assumption of GHG emissions. Currently Lithuania does not have strategy on the usage of peatlands, especially abandoned ones. However, there are only data available for such peatlands, including inventories of damaged peatlands (Lithuania Geological Service, 2015), mapped EU Habitat directive habitats (MoE, 2014), which will be supported by GHG emissions, based on the calibrated methodology during the project. Therefore assessment of these data will serve as a background for the national peatland usage strategy, which will provide lists of peatlands, either for restoration, further usage, forestry etc.

What is more, there is no EU-wide agreement on the best methodology for restoration of degraded peatlands as a part of climate policy. To show the international entanglement of peat and peatland use on the one side and peatland devastation and climatic consequences on the other, as well as to prepare to sign an international Memorandum of Understanding on the wise use of peat and on adopting the regulatory framework to protect endangered peatlands in broader EU context to European politicians. There is also no agreement on the best methodology even in the EU countries representing the same climate zone.

Rising awareness among stakeholders the project will achieve more acceptances of sustainable lifestyle and Green Entrepreneurship. That way it will contribute to the shift towards sustainable landuse, especially in regard to peatlands. By demonstrating the results of the active raised bog restoration in the project, including school children and students will expand their knowledge about nature values peatlands, rare plant and animal species, about value of nature in peoples' life; thus awareness of the next economically active generation, will be achieved. Keeping in mind the fact that protecting raised bogs is much more beneficial for economy than their exploitation from sustainable development aspect, introducing youth to re-establishing of Active raised bogs is highly advisable.

### 3.4. Employment





Local accommodation providers and maintaining service sector as well as tourism companies near to planned project sites and project activities sites will be direct beneficiaries as well as people employed and companies hired by the project as indicated in the project proposal.

**The Aukštumala** raised bog (project site LT05) is situated in the western part of Lithuania, in the Kintu Silutes District in the northern part of the Nemunas Delta Regional Park. Population in **Silute District Municipality** is 52 960 (14 % of the county's population). About 14,000 of the municipality residents are children younger than 15 year old and about 10,000 are elderly. Also, there is a peat producing company which employs approximately 240 people.

**Plinkiai peatland (project site LT02) is situated in Mazeikiai District Municipality which** is located in the northern part of Telšiai county and borders Latvia. The district is well-known not only for oil processing but also for wood processing, peat extraction, food industry, agricultural production.

**Sachara peatland (project site LT03) is located in Rokiskis District Municipality. Population is 38 937** (13.7 % of the county's population). Food and light industry is developed.

**Puscia peatland (project site LT04) is located in Zarasai District Municipality which** is located at the north-eastern border of Lithuania, in Utena county; it borders on Latvia and Belarus. **It's population is 20 593** (11.9 % of the county's population).

**Amalva peatland (project site LT01)-** a territory of about 4000 ha – is located in **Marijampole Municipality** which has a population of 68 973 (38.1 % of the county's population). There are favourable conditions for the development of both agriculture and industry (food, wood processing, etc.), as well as the service sector.

## 4. Indirect indicators

### 4.1. Ecosystem provisioning services

Active raised bog has a direct influence on all aspects of ecosystem function that provides some kind of service, like habitat for a variety of plant species growing there. Raised bogs are important for maintenance of ecosystem services, like conservation of the species and habitat biological diversity, recreation, nutrient regulation, soil and sediment regulation, disturbance and hazard regulation, cultural values and aesthetics, food production, water supply. Wetland loss and degradation have substantial and lasting effects, most notably loss of ecosystem services. Services could be restored through careful planning and restoration. Variation in dominance of native fauna and flora for food and fiber will be evaluated.

In all project sites areas in Lithuania gathering wild growing berries and mushrooms, fishing and hunting is typical. Inhabitants do it for leisure as well as for living. Especially, it is very common among unemployed, young and elderly people.

### 4.2. Ecosystem supporting services

Biodiversity (habitats and species), soil formation (peat accumulation), the indicators will include: habitat fragmentation, invasive species range /extent /number; number of species, population size/percentage) of (native) species that are endangered, species richness, threatened species, maintenance of migratory species, change in habitat hydrological integrity, change in ecosystem intactness, change in dominance of native plants.

**Area of Nemunas Delta park where Aukstumala** is situated - 29 013 thousand hectares, forests occupy 10,3%, bodies of water 17,3%, swamps - 13%, settlements - 0,6%, other 7,2%. Nemunas delta regional



park is easily accessible by both land and water routes. Here tourists are welcome in Rusne, Silininkai, Pakalne, Sysa, Vente, Sturmas marinas and Miniija yacht marina. The delta is famous because of rare breeding birds abundance and because it is an important place for travelling birds. In the Aukštumala mire very important habitats of the European importance have been found. They correspond to the NATURA 2000 classification and must be protected and conserved. Quite a few plant associations have been encountered in the habitats. Two of them are from the Red Book of Lithuania. In the bogs of Aukstumala and in the adjacent woods 175 species of higher plants have been numbered of them 5 are brought in the Red Book. Of the fauna there live 78 species of insects, 6 amphibians, 5 reptiles. 88 species of nesting birds have been observed there. Of them 17 are in the Red List. The same number have been entered in the EU bird protection Directive. Of mammals there are 26 species. Of them 4 are in the Red List. But in the Directive appendices 10 species have been included. The Aukstumala mire is poorly visited by people that is why it is such important sanctuary for a whole variety of animals. The main danger threatening to the ecosystem of Aukstumala marsh preserve is its eutrophication which is caused by the intensive drainage as it gives rise to a negatively acting shift of marsh flora. Of the natural marsh of 2500 ha only about 900 ha have remained intact.

**Mazeikiai District where Plinkšiai** is located has low hills, forests, a dense network of rivers and channels. The larger part of the territory is covered by the Venta Lowland, in the western part there is the border of the Vakarų (West) Kuršas Upland, in the south – the border of the Rytų (East) Žemaičiai Plateau. The district is crossed by the Venta River with tributaries the Varduva, Šerkšnė, Kvistė, Ašva, Vaidminas, and others. There are the lakes of Plinkšiai, Meižiai, Medžialenkė and Seda. The landscape is enlivened by ponds – there are as many as 27 of them in the district (the largest ones being those of Renavas, Juodeikiai, Šerkšnėnai and Kulšėnai, which spin hydraulic turbines). There are as many as 133 peat bogs of various size (those of Raudonoji, Plinkšiai and others), Didžlaukis peat bog. Agricultural land makes up 60.3 %, forests – 29.5 %, roads – 2.1 %, built-up area – 3 %, water bodies – 2.6 %, other land – 2.4 % of the municipality. The district has 65 109 residents (37.6 % of the county's population). The largest forests are those of Seda, Balėnai and Mažeikiai.

Rokiškis district municipality (**Sachara peatland**) is located in the north-eastern part of Panevėžys county, at the border with Latvia, on the Aukštaičiai Plateau. There are the Miliūnai, Suvainiškis Moškėnai-Laukupėnai historical landscape reserves and Sartai Regional Park. Valuable natural complexes are preserved in the Notigalė, Suvainiškis, Petriošiškis telmological, Junkūnai geomorphological, Kampuolis hydrographical, Čedasas ornithological reserves. The municipality is adorned with small hills and lakes, the biggest and the most beautiful river in the district – the Nemunėlis. There are the higher riches of the Lėvuvo, Šetekšna, the Kriauna. There are 99 lakes (the largest whereof – Sartai, Obeliai, Apvalasai, Vyžuona, Skaistė), 11 ponds. The largest forests – those of Suvainiškis, Salagiris, Apūniškis. There are the exploited Degesynė, Čelkiai, Varaščina peat bogs. Agricultural land makes up 56 %, forests – 28 %, roads – 2 %, built-up area – 2.3 %, water bodies – 3.8 %, other land – 7.9 % of the municipality.

**Zarasai District Municipality where Puscia peatland is located.** The percentage share of woodland is high, with pinewoods predominating (the largest forests – those of Tumiškės, Gražutė, Salakas). The distribution of forests is optimal – there are almost no areas where the distance between nearby forests would exceed 2–3 km. Sandy pinewoods are rich in mushrooms, berries, rare plants. Zarasai region is often called a land of lakes – there are about 300 lakes in the region. The largest lake in Zarasai district, as well as in Lithuania, is Drūkšiai. Three more district's lakes – Luodis, Avilys, Sartai – are included in the top ten of the largest country's lakes. There are also artificial ponds, an artificial reservoir – that of Antalieptė (area – 4479 ha). The district is crossed by 8 rivers, the longest whereof – the Šventoji.



Agricultural land makes up 37.7 %, forests – 37.2 %, roads – 1.9 %, built-up area – 1.5 %, water bodies – 12.2 %, other land – 9.4 % of the municipality.

**Amalva** wetland is dominated by mire that used to cover 3.414 ha and was formed of raised bog (47%), transition mire (9%) and fen (44%). During the XXth century more than half of the area (2.159 ha) was drained for forestry and agriculture. Three hydrologically different parts could be distinguished nowadays. Bird wildlife is preserved in the Žaltytis ornithological reserve. Agricultural land makes up as much as 71.3 %, forests – 15.3 %, roads – 1.8 %, built-up area – 4.1 %, water bodies – 2.6 %, other land – 4.9 % of the municipality. Bird fauna is represented by species typical of bog woodland and transition mires (in the botanical reserve), as well as meadow and fen. Typical open bog breeding species, such as dunlin (*Calidris alpina*) and curlew (*Numenius arquata*) have disappeared due to increased cover of trees. However, the area remains important breeding site for black grouse (*Tetrao tetrix*). Bushy transition mire areas serve as important breeding sites for bluethroat (*Luscinia svecica*), while certain fen areas - for spotted crake (*Porzana porzana*). Amalva area is also used by wolves, moose. Otters live in Amalvé river. High number of foxes, as well as alien racoon dogs and Canadian minks is an important threat to avian fauna in the area.

### 4.3. Ecosystem cultural services

For the evaluation of cultural services, such as recreation, the following indicators will be applied: presence and abundance of key features for nature based tourism, number and abundance of flagship, rare, attractive species; number of tourists visiting and employment in nature tourism sector. To study the aesthetic enjoyment, the following indicators will be used: scenery landscape features (patchiness etc), “preferred” landscapes, number scenic roads and views. To estimate spiritual experience, the following indicators will be applied: number people visiting natural areas, number of landscape features with (widely acknowledged) spiritual relevance; number of natural areas. To evaluate educational benefits – opportunities for formal and informal education and training, such indicators as presence of features for education, number of visits (e.g. schoolchildren), society awareness of nature's contribution, ecosystem and nature awareness will be applied.

**The Aukstumala** cognitive walkway which length is 1740 m has been set up in Aukstumala thelmological preserve. The reserve was designed to renaturalise and conserve the marshy ecosystem distinguished for lakelets complexes, specific biocenosis, rare and vanishing flora and fauna. The walkway that meanders (over the former bolder pavement) consists of 11 one side stations equipped with information stands. The cognitive path of Aukstumala bog renders a rare and favourable chance to get acquainted with the bog and its flora and fauna, to enjoy a different landscape, to experience a peculiar beauty of the mire. The visitors can witness impassable mires with treacherous soaking pitfalls that are awaiting tourists as well as one of the few remaining shelters for particularly rare marsh plants and animals. During the summer the area becomes particularly popular place. Tourists are coming not only from Lithuania but also from Germany, Denmark. The old tradition of fishermen revives. Here one can visit the restored church, the old post office, ethnographic K. Banyš farmstead, Uostadvaris lighthouse (1876), the first water lifting station (1907)- Uostadvaris water pumping station which is now equipped Rusne polders museum. The other place that attracts tourists is Vente Cape lighthouse - the protected technical monument. In the Vente Cape one can also visit near the lighthouse located the first and oldest Ornithological station in Lithuania, which was founded in 1929. Vente castle is under the water it still remained famous. For now, 13 guides provide their services in the Nemunas Delta Regional Park. In



the region there are 425 available for accommodation as well as several restaurants. In the region there is the Coast Tourism Cluster - an association that connects 20 tourism service providers of developed recreational and water entertainments. It provides services such as romantic rest, values of the coast culture, entertainment sailing, extreme experiences with power kites, sailing and participation in educational programmes and cultural events.

**Mazeikiai District Municipality.** Excursions in the Venta Regional Park, which is famous for impressive rivers, outcrops, castle mounds and water mills, the environs of Mazeikiai or Renavas manor are not that popular yet, neither are they often organised. Excursions around Žemaitija bypass these beautiful places. However, today Mazeikiai district already has 3 tourist routes, while the Renavas manor park belongs to the national cultural tourism route *The Road of Parks and Gardens (Parkų ir sodų kelias)*. Archaeological, ethnographical and folk art values of Zemaitija region are collected, stored and exhibited in the Mazeikiai Museum, which was founded in 1928. Scientific conferences, commemorations, celebrations of anniversaries of famous people, presentations of books, and many other cultural events are organised in the museum. Traditional days of art organised by Vilnius Academy of Art take place annually in May. The Mazeikiai Museum has six branches: the memorial museum of a writer Šatrijos Ragana, Renavas manor, Vieksniai pharmacy, Aleksandras Griškevičius – Lithuania's First Aviator, homeland of Juozas Vaickus, memorial museum of a sculptor Bronius Pundzius. The museum offers additional services – organises excursions around the district.

In **Rokiskis District Municipality** there are recreational sites equipped by the most beautiful water bodies, the most beloved whereof – Sartai Lake (the longest lake in Lithuania). There are four state-protected natural heritage objects: Ozakmenis, Bradesiai oak, Ministras (Minister's) linden and Ziukeliskes oak. There are about 230 historical and cultural monuments: the churches of St Francis Seraphic (18<sup>th</sup> century) in Aleksandravė, St Michael the Archangel in Juzintai and Rokiskis, St Casimir in Kamajai, Panemunis, Salos manors, castle mounds (those of Alksniai, Stasiunai).

**Zarasai** was granted a status of a resort area. It is expected that this status will help Zarasai attract investment, will stimulate the development of cultural tourism, active recreation, an increasing number of offered services, as well as an improvement in the quality of the currently offered ones. Tourism development, alongside other small businesses, in Zarasai district municipality is distinguished as a special Zarasai region development area. Tourists and holidaymakers are attracted by picturesque nature, Dusetos, Antalieptė pond landscape and other reserves, Gražutė and Sartai regional parks, 29 castle mounds (Mīneikiškės, Maniuliškės, Šiponiškės, Zabičiūnai, Lūžai and others), the church of Divine Providence in Antazavė and the church of the Holy Trinity in Dusetos, the birthplace of Lithuanian lyric poet P. Širvys in Padustelis, the Antalieptė watermill, the Stelmužė oak and other objects. The district is famed for the folk music festival *Selos muzikantai*, which cherishes old music traditions, a festival of children's popular dance groups and popular choirs *Po drugelio sparnu*, youth folklore festival *Zalvyne*, a common Utena county international folk music and dance festival *Ezeru sietuva*, etc.

**Amalva** mire and lake lies to the north from Zuvintas. The polder of lake amalvas, an area belonging to the Zuvintas biosphere reserve, is notable for unique natural habitats. Visitors are admitted to the polder of lake amalvas and the lake, and are required to comply with natural ethics and to avoid disturbing birds in breeding seasons.

#### 4.4. Mitigation of fire accidents



Currently, due to the low water depth, more and more trees and shrubs can establish, which increases the risk of fire in the Project sites. Thus, the risk of fire has to be mitigated which is going to be achieved by raising water level. Due to the peatland fires 11,2 thous. m<sup>3</sup> of peat are lost in Lithuania annually. Damage to the environment might costs up to 39 thous. EUR per year; 76% of these costs is caused by CO<sub>2</sub> emissions (Valatka & Oskolokaitė, 2010). Estimation of costs and gained value in this case is complicated, because every case of fire accidents is very different and depends not only on the loss of natural resources (timber, peat, protected species etc.), but on the amount of CO<sub>2</sub> that is released.



LITHUANIAN  
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| LITHUANIA   |                       |  |                   |                      |                |                               |                                 |                       |                             |
|---|-----------------------|--|-------------------|----------------------|----------------|-------------------------------|---------------------------------|-----------------------|-----------------------------|
|   | INDICATORS            |  |                   |                      |                |                               |                                 |                       |                             |
|   | DIRECT                |  |                   |                      |                | INDIRECT                      |                                 |                       |                             |
| Units   | Economic contribution | Ecosystem regulating services (GHG emissions, water quality, biodiversity) | Awareness raising | Scientific knowledge | Social capital | Ecosystem supporting services | Ecosystem provisioning services | Fire/flood prevention | Ecosystem cultural services |
| Stakeholder and Duty holder involvement                       |                       |  | 21                |                      | 21             |                               |                                 |                       |                             |
| Information boards/panels                                     |                       |  | 0                 | 0                    | 0              |                               |                                 |                       |                             |
| Employment (Individuals/companies hired by the project)       | 18                    |  |                   |                      |                |                               |                                 |                       |                             |
| Amount spent (€)  | 335,990.41            |  |                   |                      |                |                               |                                 |                       |                             |
| Number of jobs (FTE and PTE)                                  | 9                     |  |                   |                      |                |                               |                                 |                       |                             |
| Number of events and conferences organised / participated     |                       |  | 16                | 16                   | 16             |                               |                                 |                       |                             |
| Number of participants in Events / Conferences                |                       |  | 1.450             | 1.450                | 1.450          |                               |                                 |                       |                             |
| Number of hectares restored                                   |                       | 0 ha   |                   |                      |                | 0 ha                          | 0 ha                            | 0 ha                  | 0 ha                        |
| GWP (tons of GWP equiv CO <sub>2</sub> -eq/yr)                |                       | 8,510.75t  |                   |                      |                |                               |                                 |                       |                             |
| Number of Print media   |                       |  | 6                 | 6                    | 6              |                               |                                 |                       |                             |
| Number of Publications/Reports, promotional material produced |                       |  | 37                | 37                   | 37             |                               |                                 |                       |                             |
| Website – visits (to website in Lithuanian)                   |                       |  | 1.768             | 1.768                | 1.768          |                               |                                 |                       |                             |