LIFE Project Number
LIFE13 NAT/LT/000084

FINAL Report
Covering the project activities from 01/07/2014 to 31/10/2018

Reporting Date
<29/01/2019>

LIFE+ PROJECT NAME or Acronym

Restoration of proper hydrological conditions

in Amalva and Kamanos bogs

Data Project

Project location	Žuvintas Biosphere reserve, Marijampolė municipality Kamanos state strict nature reserve, Akmenė region municipality
Project start date:	<01/07/2014>
Project end date:	<31/10/2018> **Extension date:** <dd/mm/yyyy >
Total budget	1,564,386€
EC contribution:	1,173,289€
(%) of eligible costs	75

Data Beneficiary

Name Beneficiary	VšĮ Gamtos paveldo fondas
Contact person	Mr. Argaudas Stoškus
Postal address	<A. Vivulskio g. 41-113, LT-03114, Vilnius>
Telephone	37-05-2723635
Fax:	37-05-2723721
E-mail	a.stoskus@gpf.lt
Project Website	www.wetlife2.gpf.lt

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2. Executive summary.

The key project objectives are restoration of hydrological conditions in Amalva (part of SCI and SPA) and Kamanos (SCI and SPA) wetlands in order to rehabilitate priority bog and swamp wood habitats and secure provision of ecosystem services. Secondary objectives include: development of more sustainable agricultural practices in the areas surrounding core area of Amalva wetland and raising public awareness of peatland ecosystem services and importance of mire conservation.

The key expected project outputs are substantial areas of wetlands (370 ha in Amalva site and 670 ha in Kamanos site) directly affected by hydrological restoration and regeneration of priority active raised bog (7110*), bog woodland (91D0*) and fennoscandian deciduous swamp woods (9080*) habitats in the long run. Rehabilitation of target habitats is expected to ensure return (to Amalva site) and securing favourable conservation status (in Kamanos site) of dependent species, such as golden plover (*Pluvialis apricaria*), wood sandpiper (*Tringa glareola*), curlew (*Numenius arquata*), white-backed woodpecker (*Dendrocopos leucotos*) and middle spotted woodpecker (*Dendrocopos medius*). Additionally, populations of corncrake (*Crex crex*), waders and migratory birds will be benefitted and more sustainable peatland management practices introduced in peripheral parts of Amalva wetland. Finally, better recognition of peatland ecosystem services and their economic and intrinsic value is expected after the end of the project;

Key deliverables of the project include:

- technical material, such as documentation for elimination of draining impact of melioration system on the western part of Amalvas bog and for restoration of lag zone segment in the northern part of Kamanos bog;

- Amalva wetland nature management plan;

- dissemination material, including project newsletter, illustrated booklet presenting peatland ecosystem services, booklet for policy makers, After-LIFE conservation plan, Laymans‘ report;

- monitoring reports.

The project had been completed according to the schedule planned in the Grant agreement, with some minor deviations that had no substantial impact on the overall key results. Reduction in the bog area cleared from trees (150 ha instead of 210-220 ha) took place due to failure of methodology applied for elimination of woody vegetation, but had no impact on the objectives set in the GA. The problem was highlighted already the 1st Progress report.

There were some changes in the project implementation group, as described in the Inception report. Project assistant’s responsibilities were taken over by project supervisor and project manager. Two amendments to partnership contract with KSSNRD were made, as described in the previous reports, due to the need for earlier intermediate payments based on earlier completion of the foreseen actions by AB. One amendment to partnership agreement was also signed with State forests’ enterprise (due to change in legal name) and Marijampolė municipality administration (due to a need for earlier intermediate payment). Communication among beneficiaries, as well as with the Commission and Monitoring team was smooth and effective.

Preparation of the Amalva wetland management plan (action A.1) was completed with some delay and approved by all relevant institutions. Amendment of the forest management plan for Marijampolė district was also initiated and completed to incorporate forest related actions of

the Amalva wetland nature management plan. This secures sustainability and transferability of the project results in the Amalva site.

Preparation of the technical project for elimination of draining impact of melioration systems on the western part of Amalva bog (action A.2) was split in two parts, as described in the Inception report. First one is completed according to the schedule while the second part, was implemented with some delay, which had no impact on timely completion of the related project actions.

Preparation of the blueprint for restoration of lag zone segment in the northern part of Kamanos bog (action A.3) was completed in due time.

Purchase of reclaimed peatland necessary for restoration of hydrological conditions in Amalva bog (action B.1) was completed with some delay. In total almost 29 ha of land were purchased (30-40 ha were planned in the GA). The delay and minor reduction in the area had no impact on achieving project objectives.

Action B.2 (one-off payment for increased water table in reclaimed peatland along the western edge of Amalva bog) was implemented with some delay. Only 1,65 ha of land were affected in a way to be eligible for compensation (23 ha were planned in the GA), therefore reduction in the area had no impact on achieving project objectives.

Blocking drainage ditches in Kamanos bog (Action C.1.) was completed one year earlier than planned in the GA. Implementation of one additional technical measure in the Kamanos site (improvement of accessibility road) was applied for, approved by the EC and implemented.

Elimination of draining impact of melioration systems on the western part of Amalva bog (Action C.2.) was implemented in two steps following preparation of technical documentation under action A.2. Both parts were completed according to the schedule presented the GA despite of delays in preparatory actions and adverse weather conditions in 2017. Additional technical measures were also applied for and implemented. These included: blocking of underground drainage systems in approximately 20 ha of the bog, cleaning of the ditch in the polderized area, installation of automatic water level monitoring system for more balanced regulation of water level in the polder, repairing of the dike section damaged by beavers and repairing of the section of the road damaged during hydrology restoration work. Requests for approval of these technical measures were provided to EC with the Midterm report and during the visit by EC representative to the project site in 2018. Approval of the additional measures by the EC was provided in the official letter dated 22-08-2018.

Elimination of woody vegetation in part of Amalva bog (Action C. 3) was not successful in the starting 55 ha area of the bog due to failure of chosen methodology that didn't prevent from regrowth of birch shoots after intensive repeated cutting. More thorough monitoring was initiated and indicated low impact of repetitive cutting of birch shoots on survivability of the birch root system. Therefore herbicide application (different concentrations) was tested in approximately 3 ha of the bog. This method proved to be very effective in eliminating birches and didn't cause significant damage to bog vegetation. Repetitive cutting of birch shoots was also tested in the other site planned in the GA, where bog habitat was less degraded. The method proved to be quite successful (at least 30 % die-off after 3 repetitions) and also was the only one possible, as status of nature reserve prohibits using herbicides. In total approximately 150 ha were cleared by the end of the project (60 ha less than planned). Additional maintenance will be necessary and is foreseen in the forest management plan in order to achieve complete elimination of birches in the target areas.

Supporting grassland management in part of Amalva bog (Action C.4) was successfully completed. A starting herd of cattle was purchased and a farmer contracted for managing of at

least 30 ha of Amalvas grassland area. 6 ha of arable land plot was transformed into grassland using seed mixture provided by the project and additional area of approximately 40 ha was restored just by providing consultations to farmer regarding grass seed mixture and agro-technology.

Monitoring of the impact in Kamanos and Amalva sites (actions D.1 and D.2) and socio-economic impact assessment was completed and reports produced, as planned in the GA. All aspects that could be recorded according to the planned monitoring setup are presented in the reports. Due to short life span of the project and substantial variations in climatic conditions during the project implementation (from extremely wet summer and autumn floods in 2017 to prolonged dry spells in 2015 and 2018) it's too early to make final conclusions on the intensity of the project impact. However there are clear indications from previous efforts in the project sites indicating positive changes after similar restoration actions and monitoring reports include their overview as well.

Implementation of the action F.2 Networking with other projects is completed as planned in the GA. The most intensive exchange of knowledge and cooperation was with the projects LIFE12NAT/LT/000965 and LIFE15 CCM/DE/000138 focusing on mire restoration.

Dissemination actions were completed as planned in the GA with minor deviations. A number of certain sub-actions (voluntary activities, information meetings) was increased comparing to the initial plan without increase in spent budget.

The total cost of the project actions was approximately 90 % of initially planned budget.

3. Introduction

The following project objectives were listed in the Grant agreement:

- Restoration of proper hydrological conditions in Amalva wetland (part of SCI and SPA) in order to rehabilitate priority bog and swamp wood habitats and secure provision of ecosystem services;
- Restoration of proper hydrological conditions in Kamanos wetland (SCI and SPA) in order to achieve favourable conservation status of priority bog and swamp wood habitats and secure provision of ecosystem services;
- Development of more sustainable agricultural practices in the areas surrounding core area of Amalva wetland;
- Raising public awareness of peatland ecosystem services, their economic value and importance of mire conservation.

Two sites are targeted by the project:
Amalva wetland - part of SCI "Žuvinto ežeras ir Buktos miškas" and SPA "Žuvinto, Žaltyčio ir Amalvo pelkės";
Kamanos state strict nature reserve with bufer zone – SCI and SPA.

The following habitat types are targeted by the project:
91D0* bog woodland 1.208,1 ha in Kamanos wetland. Habitat covers 19 % of the area;
7110* active raised bog 990,5 ha in Kamanos wetland. Habitat covers 15 % of the area;
9080* Fennoscandian decidous swamp woods - 440,3 ha in Kamanos wetland. Habitat covers 7 % of the area;
7120 degraded raised bog (1.158 ha) in Amalva wetland. Habitat covers 32 % of the area. Most of the area would be favoured by the project and should lead to recovery of 7110* active raised bog, 91D0* bog woodland and 7140 transitional mire habitats. Restored hydrological conditions in the lag zone should facilitate development of 9080* Fennoscandian

deciduous swamp woods.

The main conservation issue targeted by the project in both project sites is altered hydrology. Other targeted issues include unsustainable uses of drained peripheral peatlands and general lack of understanding ecosystem services provided by mire habitats.

Socio-economic context

Kamanos state strict nature reserve is state owned and dedicated exclusively for nature conservation. Buffer zone is mainly used for forestry (57 %) and agriculture (43 %). Forests are managed partly by state, partly by private owners, while agricultural land is mostly private.

In contrast to Kamanos site, Amalva project site is located in the intensive farming region, however approximately 41 % of the area is dedicated for nature conservation and 18 % - forestry. The remaining area (41%) - used for agriculture and dominated by pastures and meadows differing in intensity of usage from abandoned to intensively managed land.

Expected long-term benefits

Support to biodiversity would be substantially enhanced due to recovery of EU priority habitats and related species. Planned actions are expected to yield the following main results:

- Approximately 700 ha are expected to benefit in the long run resulting in regeneration of active raised bog (7110*) and bog woodland (91D0*) habitats in Amalva site;
- Fennoscandian deciduous swamp woods (9080*) habitats are expected to re-establish in at least 90 ha of restored lag zone of Amalva bog;
- Rehabilitated 210-220 ha of open bog habitats in Amalva wetland ready to regenerate features typical to active raised bog (7110*);
- The whole 1440 ha Kamanos bog area is expected to benefit in the long run, including total area (990,5 ha) of active raised bog (7110*), 1208,1 ha of bog woodland (91D0*) and approximately 75% of 440,3 ha of fennoscandian deciduous swamp woods (9080*) habitats;
- Populations of species depending on open bog areas (golden plover (Pluvialis apricaria) and wood sandpiper (Tringa glareola) would be stabilized in Kamanos site;
- Populations of species depending on 9080* habitat would benefit in Kamanos site, such as white-backed woodpecker (Dendrocopos leucotos), middle spotted woodpecker (Dendrocopos medius). Minor increase in populations could be observed in short-term perspective;
- Populations of species depending on wet grasslands, such as spotted crake (Porzana porzana) and corncrake (Crex crex) will benefit due to restoration of the lag zone section in Kamanos site;
- Species depending on open bog areas (wood sandpiper (Tringa glareola), golden plower (Pluvialis apricaria), curlew (Numenius arquata) are expected to return in medium-term period in Amalva site;
- Sustained populations of corncrake (Crex crex) – 50-60 singing males, waders and migratory birds (white-fronted goose (>1000 ind.) and been goose (>800 ind.);

4. Administrative part

Description of the management system

The project was carried out employing adaptive management principles what allowed effective response to different challenges. There were no clear phases that could be easily distinguished except for inception phase when the project setup was established: partnership contracts signed, core personnel employed, website created, inception seminars held etc. This phase gave a solid ground for further implementation of the project. Implementation of the very actions usually went through the following phases:

- Preparatory meeting(s) necessary for achieving common understanding of the final result and the best implementation strategy. Such meetings usually involved CB and one or two AB's. Other key stakeholders were involved if needed;
- Implementation of preparatory action and evaluation of produced results by Implementation group and other key stakeholders if necessary;
- Implementation of concrete conservation action;
- Evaluation of achieved results by CB, responsible beneficiary and other key stakeholders;
- Additional improvements if necessary.

There were three key positions in the Implementation group: Project manager, Project financial manager and Project supervisor (see Organigramme below). Minor changes in the Project Implementation group were described in the Inception report. Changes were related to exclusion of Project assistant position. Project supervisor took over some responsibilities in the project to support Project manager and balance the work load. There were no other changes in the Project Implementation group.

Project manager (Mr. Argaudas Stoškus) took care of daily management of the project, kept permanent contacts with AB's contact persons, relevant stakeholders (mostly farmers), organized workshops, meetings and field visits, made presentations about the project, carried our networking activities, assisted hydrologist engineer during field assessments and inspections of sub-contractor work, prepared or assisted in preparation of information material for dissemination (introductory newsletter, website, Layman's report, After-LIFE conservation plan, booklet for policy makers), provided expert input in preparation of Amalva wetland nature management plan, national assessment of peatlands, monitoring reports and carried out other tasks necessary for smooth implementation of the project.

Financial manager (Ms. Raminta Mikalauskienė and later Ms. Milda Dijokienė) took care of daily accounting and consulting of AB's financial managers in relation to project financial management and reporting. Prepared financial report for auditing and supported audit process.

Project supervisor (Mr. Gediminas Raščius) took care of overall supervision and coordination of the project, took part in the coordination meetings with AB's, carried out public procurements and subcontracting, developed staff employment contracts, was responsible for signing/approval of timesheets and invoices and monitoring of the timely project implementation. Additional tasks included communication with SSPA and ME regarding amendment of necessary legal acts (see action B.1), preparatory work for expansion of the area of Žuvintas biosphere reserve.

Hydrologist/Engineer (Mr. Gediminas Lietuvininkas) was responsible for preparation of all technical documentation in relation to restoration of hydrology in Kamanos and Amalva sites

(actions A.2 and A.3) as well as supervision of implementation of hydrological restoration (actions C.1 and C.2).

Planning specialist (Mr. Zenonas Gulbinas) was responsible for planning procedures, including public hearings and coordination of approval of Amalva wetland nature management plan (Action A.1).

Nature management specialist (Mr. Vaidotas Valskys) provided expert input in preparation of the Amalva wetland nature management plan (Action A.1) and compilation of descriptive information.

GIS specialist (Mr. Pavel Korotkich) prepared all necessary cartographic material for Amalva wetland nature management plan (Action A.1).

Grassland specialist (Mr. Jonas Šlepetys) assisted Project manager in discussions with farmers regarding optimization of agricultural activities in peatlands, analysed soil properties and selected grass mixtures for re-sowing of grasslands, made presentation about sustainable uses of grasslands during the workshop with farmers.

CB signed Partnership agreements with all ABs. Copies of the agreements were annexed to the Inception report (Annexes 1-4). Amendments to the Partnership agreements were signed with KSSNRD and MMA and had foreseen earlier advance payments than initially planned. The amendment to Partnership agreement (annex 3) was also signed with SFE due to change in legal name (former MSFE).

KSSNRD was responsible for implementation of the actions related to restoration of hydrology, monitoring and raising public awareness (actions C.1, D.1 and E.2) in Kamanos site. Suitable conditions (dry autumn of 2014 and summer of 2015) made possible faster implementation of hydrological restoration, but additional finances were necessary, therefore amendment to partnership contract was made to ensure sufficient funding for implementation of these activities (amendments to partnership contract: annex 16 of the Progress report and annex 1 of this report).

MMA was mainly responsible for implementation of hydrological restoration in Amalva site, but also assisted in collecting necessary information for assessment of socio-economic impact of the project actions (Action D.3). Beneficiary carried out procurement of work and employed technical supervisor to monitor implementation. Partnership contract with MMA was amended (additional advance payment was foreseen. Annex 2 of this report).

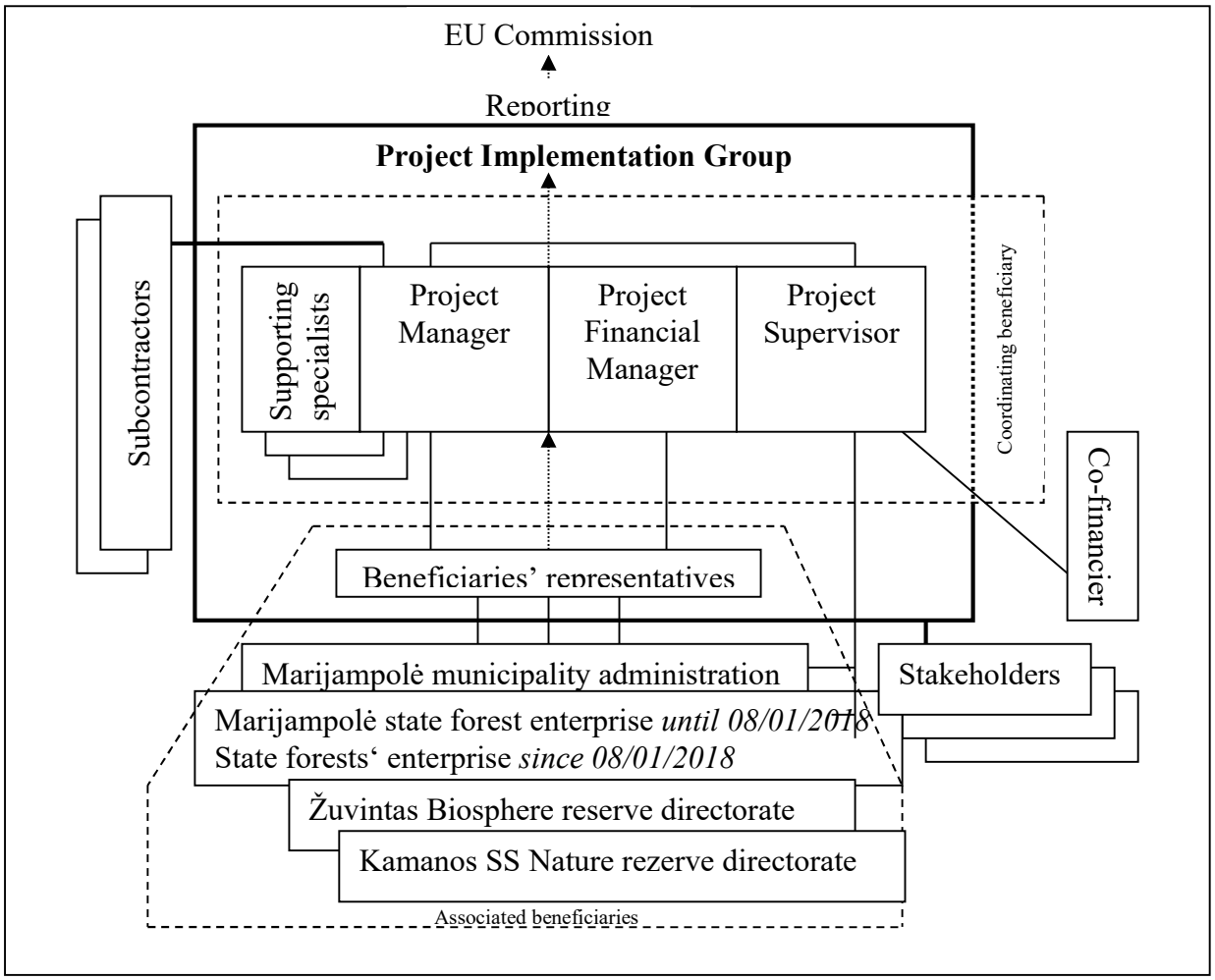
MSFE was responsible for elimination of woody vegetation in part of Amalva site (Action C.3). It employed workers and purchased necessary equipment. It also assisted in preparation of Amalva wetland nature management plan (Action A.1). Legal name of the AB had been changed to SFE during the project and triggered amendment to the GA (signed by EC on 28/09/2018).

ZBRD played an important role in preparation of Amalva wetland nature management plan, was responsible for monitoring of the impact and awareness raising in Amalva site (Actions D.2 and E.3).

A number of meetings/workshops/field visits was organized with ABs and stakeholders including state institutions and local community representatives. AB's representatives took active role in most of these.

Project delivered Inception report on 04/03/2015, first Progress report on 02/09/2016, Mid-term report on 12/01/2017, second Progress report on 05/04/2018 and this Final report.

Organigramme of the project team and the project management structure



Evaluation of the management system

There were no problems related to the project management process. Communication within CB organization and with ABs was smooth and responsive resulting in well-functioning Project Implementation Group actively responding to any issues important for achieving project objectives.

Communication with the Commission and Monitoring team was very effective too. All requests were analysed and responses provided within a short period of time and without excessive bureaucracy.

Response to all comments raised in EC letter dated 22/08/2018 is annexed to this report (annex 5).

5. Technical part

5.1. Technical progress per task

5.1.1. Action A. 1. Preparation of Amalva wetland nature management plan

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 III	2014 III	2016 II	2017 I	Completed

Action related milestones and deliverables:

	Deadline				
	Planned in GA	Revised in Inception report	Revised in Midterm report	Completed on	Where provided deliverable/ milestone status
Deliverable					
Amalva wetland nature management plan	31/12/2015			31/12/2015	1st Progress Report (Annex 18) A copy of ministerial decision - 2nd Progress report (Annex 1).
Milestone					
Prepared Amalva wetland nature management plan and accepted by the State Service for Protected Areas	31/12/2015	No revision		01/02/2016	
Amalva wetland nature management plan approved by the Ministry of Environment	30/06/2016		31/03/2017	30/03/2017	Completed

- Action is completed.
- Delay of approval of the management plan was related to interpretation of current laws regarding transformation of forested mire into treeless mire. However finally the agreement was reached and management plan was approved by the minister of Environment .
- Implementation of the action started as indicated in the project document, i.e. III quarter of 2014 and management plan was completed before the end of 2015. Approval process was substantially delayed due to the reasons and other circumstances already discussed in the Midterm report. Certain sections and formulations of the nature management plan had to be updated several times during the reporting period before the approval.
- Amendment to forest management plan was initiated by the project, as implementation of the actions in the forest land can only be carried out according to forest management plans.

Amendment was completed and approved by the ministry of environment in March, 2018. This enabled cutting of trees in other but initial area of 55 ha.

- Complementary action outside LIFE project – preparation of management plan for Žuvintas biosphere reserve (Amalva site is part of the reserve) was initiated by the State Service for Protected areas and implemented by the CB. The plan is important, as it is a higher rank planning document comparing to Amalva nature management plan. Expansion of the area of the biosphere reserve including the land purchased by the WETLIFE project, as well as other areas proposed in the Amalva nature management plan will be secured in this plan. Public hearing procedures of the planning process are already completed and the management plan is expected to be approved by the government of Lithuania in 2019.
- The delay in approval of Amalva nature management plan and forest management plan had an impact on delay of implementation of the action C.3 *Elimination of woody vegetation in part of Amalva bog* (more details in the section 5.1.8).

5.1.2. Action A.2. Preparation of technical project for elimination of draining impact of melioration systems on the western part of Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 III	2014 III	2015 IV	2015 III (I-st part) 2017 II (II-nd part)	Completed Completed

Action related milestones and deliverables:

	Deadline				
	Planned in GA	Revised in Inception report	Revised in Progress report	Completed on	Where provided deliverable/ milestone status
Deliverable					
Technical project for elimination of draining impact of melioration systems on the western part of Amalva bog	31/12/2015	31/07/2015 (I-st part) 31/12/2015 (II-nd part)	31/05/2017 (II-nd part)	31/07/2015 (I-st part) 25/04/2017 (II-nd part)	1st Progress report (Annex 1) 2nd Progess report (Annex 2)
Milestone					
Prepared technical project for elimination of draining impact of melioration systems on the western part of Amalva bog	31/12/2015	31/07/2015 (I-st part) 31/12/2015 (II-nd part)	31/05/2017 (II-nd part)	31/07/2015 (I-st part) 25/04/2017 (II-nd part)	Completed Completed

- Action is completed. Technical project was subdivided in two parts, as describes in the 1-st Progress report. It was implemented by CB in close cooperation with MMA and ZBRD.
- The delay of the action was due to issues related to land purchase (Action B.1), as described under B actions.
- Implementation of the action has started as indicated in the project document. Geological survey had to be carried out and CB carried out procurement procedures and sub-contracted E. Bukėno personal company for ground assessment. First part of the technical project was prepared, submitted for independent expertise (JSC "National expertise of projects and cost outlays" submitted the best price offer and was sub-contracted) and approved by the relevant authorities in July 2015.
- Preparation of the second part was dependant on success of land purchase. The preparatory work by CB had started before this reporting period and technical project was finalized soon after the preliminary agreement was reached with land owners regarding purchase of necessary land plots. Afterwards it was submitted for independent expertize (JSC "National expertise of projects and cost outlays" again provided the best price offer and was sub-contracted) and was approved on 25th of April, 2017.
- The delay did not prevent from timely implementation of the Action C. 2. *Elimination of draining impact of melioration systems on the western part of Amalva bog.*

5.1.3. Action A.3. Preparation of blueprint for restoration of lag zone segment in the northern part of Kamanos bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 III	2014 III	2015 I	2015 I	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Completed on	Where provided deliverable/ milestone status
Deliverable				
Blueprint for restoration of lag zone segment in the northern part of Kamanos bog	28/02/2015	No revision	28/02/2015	Submitted with the 1st Progress Report (Annex 4)
Milestone				
Prepared blueprint for blocking of Kamanos northern peripheral drainage ditch	28/02/2015	No revision	28/02/2015	Completed

- Implementation of the action started as planned in the GA. Available documentation on hydrological situation, melioration systems and land ownership was collected by CB with support from KSSNR. The aim of the action was presented to the Akmenė municipality council including representative from National land service (institution responsible for state land management and land use planning) during the introductory seminar on October 30, 2014, what helped with approval process.
The action was completed by hydrologist engineer (CB) and the blueprint was approved by the administration of Akmenė municipality according to planned schedule.
- No problems identified.

5.1.4. Action B. 1. Purchase of reclaimed peatland necessary for restoration of hydrological conditions in Amalva bog

Action implementation dates:

Start date		End date			
Planned in GA	Actual	Planned in GA	Revised in Progress report 1	Actual	Status of the action
2014 IV	2014 IV	2016 III	30/02/2017	12/09/2017	Completed

Action related milestones and deliverables:

	Deadline				
	Planned in GA	Revised in Inception report	Revised in Progress report 1	Actual	Where provided deliverable/ milestone status
Milestone					
Purchased necessary land plots	30/09/2016	31/12/2016	30/02/2017	12/09/2017	Completed

- Action is completed.
- 3 out of 4 land purchase contracts were signed on May 18, 2017 and the final one – on September 12, 2017. CB prepared extensive land purchase documentation required by national laws and ZBRD carried out procurement procedures. Purchase agreements were signed by landowner, National land service (representative of the State) and CB. Agreements, as well as entries in the land register include guarantee that the land plots are assigned definitively to nature conservation purposes (Annexes 3, 4 of the 2nd Progress report).
- The land plots purchased for the State were provided to Žuvintas biosphere reserve directorate on 28/11/2018 (Excerpts from Land Register – annex 6).
- Numerous problems were encountered and solved during implementation of this action. Most of them were described in the previous reports and can be shortly listed:

- Amendment to governmental decision had to be initiated in order to use land valuation method best representing actual market value while purchasing land for the state. The amendment was initiated and signed (Governmental decision Nr.1195) on November 18th, 2015 (https://www.e-tar.lt/portal/lt/legalAct/c33d92108f8611e5a6f4e928c954d72b);
- Due to changes in legal acts purchasing organisation had to be changed from MSFE foreseen in the GA to ŽBRD. CB facilitated all the process and remained paying organisation;
- Preliminary estimation of the market price had to be carried out in order to reach preliminary agreements with landowners regarding selling of the target land plots for the state. After procurement procedures JSC "Kovertas" was subcontracted for such an assessment. Such sub-action was not planned in the GA. The total cost was less than 200 EUR;
- Most of the target land plots had to be subdivided, as only parts were aimed to be purchased. CB sent requests for quotations to three companies. JSC "Geometra" provided the best offer and was sub-contracted in December of 2015 for cadastral measurements and subdivision of the land plots. Difficulties arose with one land owner negotiating subdivision line of the land plot. This resulted in delayed implementation of subdivision of the land plots, carried out by the subcontractor JSC "Geometra". Subdivision was completed just in October of 2016;

- CB sent requests for quotation to three companies specializing in independent market price valuation. JSC "Kovertas" provided the best offer and was subcontracted on 15th of November, 2016. Independent land market price assessment revealed market prices higher (around 4500 EUR/ha, table below) than indicated in the GA (3000 EUR/ha) (Copy of land evaluation documentation – annex 7). However, due to slight reduction in the actual area to be purchased (28,51 ha instead of 30-40 ha planned) and significant reduction in the area to be compensated for (1,65 ha instead of planned 23 ha) there was sufficient budget within the project for implementation of the action. Reduction in the area had no impact on achieving project objectives.

Cadaster Nr. of the land plot	Area (ha)	Price (EUR)
5134/0003:185	2,68	12000
5134/0003:292	17,04	79600
5134/0003:184	3,49	15400
5134/0003:294	5,30	23000
Total:	**28,51**	**130000**

- Finally, when all farmers prepared written offers to sell target land plots and official land procurement procedures were completed according to national requirements, one farmer refused to sign the land purchase contract after learning that income tax is applicable on income generated from selling of the land. Such tax became applicable due to recent changes in legislation. CB's consultations with lawyers and negotiations with landowner lasted from May till September and were finally completed by signing the land purchase agreement on 12th of September, 2017.

- Solving of the problems required additional time and resulted in delay of implementation of the action. However, despite of substantial delay, related activity, namely Action C.2. *Elimination of draining impact of melioration systems on the western part of Amalva bog,* was completed within the planned schedule.
- GIS data of purchased land plots were uploaded to the Land Purchase Database.

5.1.5. Action B. 2. One-off payment for increased water table in reclaimed peatland along the western edge of Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 III	2014 III	2016 III	2017 II	Completed

Action related milestones and deliverables:

	Deadline					
	Planned in GA	Revised in Inception report	Revised in Progress report	Revised in Midterm report	Actual	Where provided deliverable/ milestone status
Milestone						
One-time compensation payments completed	30/09/2016	31/12/2016	30/02/2017	31/03/2017	20/06/2017	Completed

- Action is completed.
- Smaller area eligible for compensation than planned in the GA appeared due to more detailed assessment of relief, melioration systems and land use. Assessment revealed that increase in water level will not reduce possibilities to use approximately 20 ha of low laying area as grassland. This part was already wet grassland before the project, therefore no change in land use, as well as economic loss could be attributed to the project. Compensation was agreed for the area that was used for crop production before the project and had to be transformed into wet grassland after raising of water level. Reduction in the area had no impact on achieving project objectives.
- Delay in implementation of the action was due to delay in land purchase and delayed submission of all necessary technical documentation related to the land plot by land owner. Only one land owner agreed with compensatory payment according to the rate indicated in the project proposal (70 % of land price for the area with expected ground water increase to 0-30 cm from the surface and 50 % of the land price - for the area with expected water level increase to 30-60 cm from the surface). The total area for which compensatory payment had been payed – 1,65 ha (23 ha were planned in the GA).

- Implementation of the related Action C.2. *Elimination of draining impact of melioration systems on the western part of Amalva bog* was not affected by the delay in implementation of the Action B.2.

5.1.6. Action C.1. Blocking drainage ditches in Kamanos bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2015 II	2015 II	2018 I	2016 IV	Completed

Action related milestones and deliverables:

	Deadline				
	Planned in GA	Revised in Inception report	Revised in Progress report	Actual	Where provided deliverable/ milestone status
Milestone					
Kamanos bog ditches blocked	31/03/2018	No revision	30/11/2016	30/12/2016	Completed

- Action was completed earlier than planned. Dry 2015 year substantially contributed to earlier completion. All drainage ditches totalling 35 km in Kamanos state strict nature reserve and approximately 3 km of drainage ditches on the edge between the strict nature reserve and the buffer zone were blocked by building more than 300 blocks. The action was implemented by KSSNRD in close cooperation with CB. Procurement procedures for implementation of the action were started as soon as the technical project for blocking drainage ditches was updated by implementing Action A.3 *Preparation of blueprint for restoration of lag zone segment in the northern part of Kamanos bog*. Kraujučio company "Aras" proposed the best price and the contract was signed on 18th of May, 2015. CB provided a special 8-wheel tractor with caterpillar tracks for transportation of necessary material and workers to the bog. A hitch for transportation of 8-wheel tractor and a hitch for transportation of construction material were purchased for implementation of the action (Pictures 2-5 of the Midterm report Annex 3). The first one was not planned in the GA, but a need for a hitch was justified and Commission approved the purchase in the e-mail dated 20-05-2015. Procurement procedures were carried out by CB. JSC "Priekabos jums" and JSC "SPMOTO" provided the best price offers for the above mentioned hitches.
- Implementation of the action revealed a need for additional technical measure not planned in the GA – improvement of a section of accessibility road. Request regarding implementation of such a measure within the actual budget was sent to EC and approval was received by e-mail on 17th of December, 2015. Next step was procurement of preparation of a blueprint for improvement of the road. Architect-engineer Aurimas Vengris proposed the lowest price and was contracted on 22nd of February, 2016 for the task. The blueprint for improvement of the road was finished and procurement procedures started for improvement of the road according to the blueprint. Kraujučio Company "Aras" won the tender, the contract was signed on 7th of July, 2016. Improvement of a section of the road was completed in December of 2016.
- Several dams were damaged by high water levels and had to be repaired by subcontractor. 5 years warranty is foreseen in the contracts for blocking drainage ditches, so dams were repaired at no additional cost for the project. No other problems were identified.
- Continuation of the action will mostly focus on monitoring of the condition of the blocks installed and can be implemented from the KSSNRD annual budget.
- Pictures illustrating the work done under the action are presented in the annex 24.

5.1.7. Action C.2. Elimination of draining impact of melioration systems on the western part of Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2016 III	2015 II	2018 III	Part 1 – 2016 IV Part 2 – 2018 IV	Part 1 - completed Part 2 - ongoing

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Revised in Progress report	Where provided deliverable/ milestone status
Milestone				
Eliminated impact of the western drainage ditch on Amalva bog	15/10/2018	No revision	No revision Part 1 – 15/10/2016 Part 2 – 2018 IV	Part 1 - completed Part 2 - completed

- Action is completed as planned in the GA. Water level was restored in more than 7 km of the northern and the western edge of Amalva bog close to levels known before land melioration took place. The action was implemented by MMA in close cooperation with CB. MMA initiated procurement procedures for implementation of the work planned in the 1st part of the technical project (prepared under Action A.2 *Preparation of technical project for elimination of draining impact of melioration systems on the western part of Amalva bog*). JSC "Kėdainių melioracija" proposed the lowest price and the contract was signed on 18th of March, 2016. MMA appointed Technical supervisor (Ms. Rasutė Chorchordinienė) and CB's hydrologist engineer assisted by project manager carried out author's supervision. The work was expected to be finished at the very beginning of September, 2016, however contract had to be extended due to rainy end of summer. Implementation of the 1st part of the technical project was finished in October 2016.
- MMA initiated procurement procedures for implementation of the 2nd technical project as soon as it was completed and approved. This time JSC "Sumeda" won the tender. The contract was signed in August 4, 2017. Unfortunately, all the work could not be completed as planned in 2017, because of extremely high precipitation and autumn floods in the project area (extreme situation was declared in most of the country). In order to ensure quality of the work and reduce damage to access roads, CB sent an official letter to MMA, dated November 10, asking to stop all field work in the project area until hydrological conditions allow continuation without compromising quality. MMA suspended implementation of the contract due to mentioned force majeure on 5th of December. Approximately 43 % of the work was completed. The remaining part was postponed till the next dry season and completed in 2018.
- A need for additional measures appeared during implementation of the project. First additional measures were already described in the Annex 3 of the 1st Progress report and included: blocking of underground drainage in the southern part (~20 ha) of Amalva bog and installation of equipment for water level monitoring. Later request for inclusion of other additional technical measures was submitted to representative of EC during the monitoring visit to the project site in spring of 2018. The request included: cleaning of the section of the drainage ditch in the Amalvas polder, which prevented effective regulation of water level in the polder and caused substantial drawdown of water closer to the pumping station in order to

affect more distant parts; Repairing and reinforcing of the section of newly built Amalva wetland protective dike after damage done by beavers; Repairing of the section of the road that was damaged during project works due to extremely wet late summer and autumn of year 2017 (the work was stopped by the CB, as it was already mentioned above in this section, however some damage had already been inflicted to the road and local farmers expressed complains to MMA regarding it). Project received approval to proceed with implementation of additional technical measures in the letters dated 19/12/2016 and 22/08/2018. The later also notes that project should explore ways to split the road repair cost among the contractor, the municipality and the project. Such a possibility was thoroughly analysed, however MMA informed that a possibility to get one third of a cost covered by the contractor is impossible without litigation process and the outcome of it is not clear, as extreme situation was declared in 2017 due to high precipitation, while sub-contractor was pressured by the deadline of the contract. The contract was suspended only when some damage had already been inflicted. MMA considers that the total cost of road repair is directly linked to the project and the whole sum is reported.

- The problems encountered were mostly due to extremely wet (state of emergency was declared in most of the country) year 2017. Therefore implementation of part of the work had to be rescheduled.
- Continuation of the action will require monitoring and maintenance of the dikes and dams. The costs will be covered by MMA. More details are in the report of socio-economic impact (output of the Action D.3).
- Pictures illustrating the work done under the action are presented in the annex 24.

5.1.8. Action C. 3. Elimination of woody vegetation in part of Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2015 II	2015 I	2017 III	2018 III	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Revised in Progress report	Where provided deliverable/ milestone status
Milestone				
Eliminated shoots of trees in the foreseen area of Amalva bog	31/08/2017	No revision	30/09/2018	Completed

- The action is completed. Smaller area was cleared (150 ha) than planned in the GA (210-220 ha). Reduction in the area was mainly due to failure in applied methodology. Late approval of the Amalva nature management plan and further amendment of the Marijampolė district forest management plan played some role as well.

The key issue was failure of the applied method (repetitive cutting of birch shoots) that didn't work in targeted degraded part of the bog (55 ha), therefore expansion of the area was suspended and EC informed accordingly already in the 1st Project report. Searching for alternative methods targeted application of herbicide was tested in autumn of 2017 on approximately 3 ha (part of the same 55 ha area). Spring of 2018 revealed good results of targeted herbicide application in terms of elimination of birch shoots and minimal impact on surrounding bog vegetation. Clearing of birch shoots was carried out in approximately 80 ha in the second part of 2018 in order to prepare the area and have lower shoots in 2019, when application of herbicide is planned by SFE (responsible for nature management activities in the forest land including all bog area). In parallel to herbicide application (2017- beginning of 2018) clearing of birch trees and later repetitive cutting of shoots was tested on small scale in less degraded bog area. Nature reserve status prohibits herbicide application in this part of the bog. In this area the method proved to be as efficient, as indicated by the Danish project LIFE05 NAT/DK/150. Due to promising results, clearing of birch trees was implemented on more than 73 ha. Birch trees are planned to be eliminated by SFE in this area by repetitive cutting (2-3 repetitions).

It should be noted that Amalva wetland nature management plan and forest management plan for Marijampolė district foresees elimination of birch trees in 320 ha of the bog.

- The action was implemented by SFE (assign of responsibilities of MSFE since the beginning of 2018, as indicated in the Administrative part) in close cooperation with ZBRD and CB. Five bush cutters and two agricultural sprayers were purchased by MSFE for implementation of the action (Picture 6 of the Midterm report, Annex 3). MSFE hired temporary workers for the work.
- Amendment to the Marijampolė forest management plan had to be initiated for implementation of part of the action C.3. A need for this additional measure (not planned in the GA) was already indicated in the 1st progress report. Forest management plan was amended and approved by the minister of environment in the beginning of March, 2018. It provides legal basis for clearings of trees, as planned in the Amalva wetland nature

management plan. Furthermore, it foresees responsibility of SFE for maintaining open bog areas after completion of the WETLIFE 2 project ensuring sustainability of the project results. It should be noted that there was no project spending related to preparation of the forest management plan. State forest management service, contracted for the task, was incorporated into SFE since the beginning of 2018, i.e. the sub-contractor and the client (MSFE) became subdivisions of the same organisation (SFE) preventing from invoicing for preparation of the forest management plan.

- Despite of smaller area cleared from birch trees and complete elimination expected just after the project, the implementation of the action could be considered as a success, as methodological approach to reaching the goal is clarified, sustainability of the project results and even expansion of the area maintained is embedded in the planning documents, first (most costly) management actions carried out. The project budget spent for this action is adequate to the results achieved, i.e. 56 % lower spending and 29 % smaller area. Furthermore, reduction in the cleared area had no significant impact on the achievement of the key goal - restoration of hydrological conditions in the Amalva bog.
- Pictures illustrating the work done under the action are presented in the annex 24.

5.1.9. Action C.4. Supporting grassland management in part of Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2015 III	2015 I	2017 III	2017 II	Completed

Action related milestones and deliverables:

	Deadline				Where provided deliverable/ milestone status
	Planned in GA	Revised in Incept. rep.	Revised in Progress report	Actual	
Milestones					
Cattle purchased	30/09/2017	31/07/2016	30/11/2016	05/05/2017	Completed

- The action is completed as planned in the GA with minor deviations. As planned, approximately 30 ha of peatland grasslands are managed with a help of starting herd of cattle provided by the project. Approximately 6 ha of grassland were restored using seed material provided by the project (at least 4 ha were planned). Furthermore project assisted with soil analysis and recommendations on seed mixtures in restoration of additional 40 ha. No fencing was done by the project (8 ha planned), as already explained in the 1st Progress report, however, according to signed agreement with farmer, project provided electric impulse generator with batteries for electric fence for the starting herd of cattle.
- The action was implemented by the CB in close cooperation with ZBRD and MMA.
- The project action was closely linked to the action E.3 *Raising public awareness of peatland ecosystem services and promotion of sustainable use of peatlands in Žuvintas biosphere reserve,* which provided the basis for implementation of the action and maximization of results. Action was also based on land use data collected under action D. 3. *Assessment of the socio-economic impact of the project actions.* Target land plots and land owners were selected basing on this land use data indicating abandoned and arable land plots in the peatland. As a result of the above mentioned actions, 7 arable land plots (total area approx. 56 ha) were analysed for transformation to grassland. Finally, 3 grass seed mixtures were proposed for re-sowing of grasslands in 3 land plots. Seed material was purchased by the project CB on 11th of April, 2016 and used for restoration of grasslands in one land plot (approx. 6 ha). Another farmer purchased the proposed seed mixtures himself and re-sowed two formerly arable and later abandoned land plots with a total area of around 40 ha. Together with ~70 ha of peatland that was transformed from arable into grassland without direct project intervention, i.e. selection or purchase of seeds, this makes year of 2016 a year of major land use shift in drained part of Amalva peatland.

Only one farmer applied for cooperation on grassland management by rearing herd of cattle provided by the project. Cattle procurement procedures were initiated by CB in July, 2016 and starting herd of 15 heifers and 1 bull was delivered to farmer by the end of November 2016. A triangular agreement (farmer, CB and ŽBRD) was signed regarding management of Amalva grasslands (copy of the agreement – annex 5 of the Midterm report). There were no farmers interested in fences, so no additional fencing was done.

CB carried out procurement procedures and purchased (in May, 2017) electric impulse generator with two batteries for electric fencing and provided to the farmer, as foreseen in the above mentioned contract. Cattle grazed more than 30 ha of peatland grassland in 2018.

- Picture of the cattle grazing in the Amalva wetland is annexed (annex 24)

5.1.10. Action D.1. Monitoring of the impact in Kamanos bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 IV	2014 IV	2018 III	2018 III	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Actual	Where provided deliverable/ milestone status
Deliverables				
Monitoring report	30/09/2018	No revision	30/09/2018	Annex 8
Milestones				
Monitoring system in place	31/10/2014	No revision	31/10/2014	Completed
Monitoring report produced	30/09/2018	No revision	30/09/2018	Completed

- The action is completed. Monitoring report in Lithuanian language – annex 8.
- The action was implemented by KSSNRD according to the planned extent and schedule.

Necessary materials were purchased for establishment of the monitoring system. Monitoring will be carried out after the end of the project by KSSNRD.

Preliminary data indicate that ground water level responded slowly to blocking of the ditches due to extremely dry years of 2014 and 2015. Precipitation level in 2016 was close to average and all ditches were blocked by the end of the year. Despite of wet summer of 2017 in most of the country, Kamanos received less than average precipitation amount until September, when peatland finally became saturated with water and water level in the Kamanos Lake reached its highest level since measurements started in 2007. This was partly influenced by the new ditch block on the artificial outlet. Data indicate that ground water level in or close to 91D0* habitat on average increased by 13 cm and was on average 15 cm below the surface during the vegetation period of 2016-2017, comparing to 2015 (on the slope of bog cupola increased by 10-19 cm, on the edge of active raised bog – by 7-10 cm). In the lower and more productive spruce-pine forest, which formed after drainage of former peripheral transition mire, water level increased by 33-44 cm and fluctuated at around 30-36 cm below the soil surface. In transition mire water level increased by 9-11 cm and in the neighbouring lag zone – by 24-36 cm. In mineral soils neighbouring the lag zone water level increased by 62-67 cm. The lowest areas surrounding the bog remain flooded for a longer period of time and negatively affect the growth of trees and forest density. Changes in vegetation structure were also recorded close to the blocked ditches. However it should be noted that high variation in yearly climatic conditions and short monitoring period makes it impossible to draw scientifically meaningful conclusions regarding the extent of increase in water level and actual area affected. The impact will also evolve with time, as water level affects vegetation, which in turn affects evapotranspiration, water retention capacities and water level.

- Monitoring results of the impact of similar restoration efforts implemented in the Kamanos site exhibit promising results, which are also reflected in positive changes in population of Wood Sandpiper (*Tringa glareola*) – good indicator of increased water level. However, despite of positive restoration-related changes, recent drier than typical years raise serious concerns regarding the future impact of climate change on bog ecosystems.

5.1.11. Action D.2. Monitoring of the impact in Amalva bog

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2015 II	2015 II	2018 III	2018 III	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Actual	Where provided deliverable/ milestone status
Deliverables				
Monitoring report	30/09/2018	No revision	26/10/2018	Annex 9
Milestones				
Monitoring system in place	31/05/2015	No revision	31/05/2015	Completed
Monitoring report produced	30/09/2018	No revision	30/10/2018	Completed

- The action is completed with insignificant delay. Monitoring report in Lithuanian language is annexed (annex 9).
- It was mostly implemented by ZBRD and assisted by CB except for two vegetation assessments, which were carried out by sub-contracted external expert (Mr. Arūnas Balsevičius). Additional unplanned monitoring sub-action – monitoring of regrowth of shoots was started in the second part of 2016 (more details in the 1st Progress report) and was carried out by ZBRD. All results are presented in the monitoring report and could be summarised:

The key work of hydrology restoration in Amalva site was completed just by the end of the project, therefore the first data on the impact on water level will only be available in 2019. ZBRD will continue monitoring changes.

Monitoring data on the impact of hydrological restoration by the previous LIFE project (WETLIFE) are included in the monitoring report, as impact areas of both projects partly overlap and can hardly be distinguished. Data show significant increase in ground water level (on average by 46 cm) since blocking of drainage ditches in the southern part of Amalva wetland. In the centre of the bog in the southern part average ground water level stays mostly within the limits typical to active raised bog habitats, except for the driest years. Lower water level is on the edges – issue successfully targeted by the WETLIFE 2 project. According to the data from 2017 and part of 2018, ground water level in the monitoring transect at the western edge of the bog increased on average by 33 cm comparing to 2010-2016 period and 70 cm comparing to the situation before both WETLIFE projects.

Changes in hydrological conditions resulted in increased cover of *Sphagnum sp.* moss and other typical bog species, however high availability of nutrients due to mineralised peat resulted in increased cover of scrub and species related to transition or even fen mires. Regrowth of birch shoots was strong in such conditions, as already mentioned in the overview of the action C.3 above.

Assessment of monitoring data on regulation of water level in the Amalvas polder and its impact on abundance of migratory birds, corncrake and indicatory species' populations show significant impact of water level regulation, which was not always adequate. However, WETLIFE 2 project achieved common understanding among stakeholders regarding the

target water levels and installed automatic water level measurement system to allow easy access to monitoring data (on the ZBRD website) by all interested parties.
Analysis of almost 100 years old climatic data show increasing impact of climate change. Increasing temperatures and frequency of dry spells have a long lasting impact on the bog condition and ecosystem services. At the current stage it is impossible to predict whether acceleration of climate change will undermine restoration efforts or not.

5.1.12. Action D.3. Assessment of the socio-economic impact of the project actions

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2016 IV	2015 I	2018 III		Ongoing

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Actual	Where provided deliverable/ milestone status
Deliverables				
Monitoring report	30/09/2018	No revision	30/09/2018	Annex 10
Milestones				
Inquiry of cranberry pickers carried out	30/11/2017	No revision	30/11/2017	Completed
Report on socio-economic impact of the project produced	30/09/2018	No revision	30/09/2018	Completed

- The action is completed as planned in the GA. The report (in English) is annexed (annex 10).
- The action was implemented by CB in close cooperation with MMA and ZBRD. CB employed an expert Mr. Simonas Valatka, who prepared socio-economic impact assessment report together with project manager. Structure of this report follows structure of output indicator's database, so results could be directly used for its filling. ZBRD carried out inquiry of cranberry pickers in Amalva site, while MMA assisted in collecting land use data. Impact assessment of the previous WETLIFE project was also included, as these projects are highly interrelated in the Amalva site. Just a brief assessment was done for Kamanos site, as strict nature reserve status and varying conditions in different parts of the site prevented from qualitative analysis. Results of the impact assessment in Amalva site could be summarised as follows:

The most obvious benefits of restoration of hydrological conditions are related to improved regulation services of mire ecosystems. The key improved services (according to CICES classification) are: regulation of gaseous flows and chemical conditions, which depend directly on peat wetness; maintaining nursery populations and habitats; regulation of temperature and humidity, including ventilation and transpiration; water flow regulation. In economic terms the most obvious saving is related to reduction in emissions of greenhouse gasses (GHG) – 4900 t, 4500 t and 2480 t of CO_2 eqv. for WETLIFE, WETLIFE2 (optimistic climatic scenario) WETLIFE2 (pessimistic climatic scenario) respectively, which at the current price of emission allowances (almost 20 EUR/t in November, 2018) would be equivalent to 98000, 90000 and 49600 EUR respectively.

Increase in regulation and maintenance services is at the expense of certain provisioning services: provision of grass biomass, cereals and timber. Cranberry production is expected to increase in the future, however interest in picking is decreasing year by year. Decrease in production expressed in monetary terms is considered reasonably lower than economic benefit due to reduced GHG emissions under current economic conditions.

It can be concluded, that WETLIFE projects shifted a balance towards less intensive use of peatland areas by raising water table, but not without cost. However, the total sum of ecosystem services is considered to be increased.
Direct economic benefits to local people are not directly linked to ecosystem services. This is also true for provisioning services, as benefits are distorted by subsidies, as well as nature conservation initiatives, including WETLIFE projects. Agri-environmental subsidies are currently more important in Amalva site than provision of grass biomass, which is excessively produced by the ecosystem in the Amalva site. Therefore benefits to local farmers increased due to increased areas eligible for wetland management subsidies. Total eligible area is 660 ha, while until now farmers declared only 80 ha under this measure and 285 ha – under grassland management.

5.2. Dissemination actions

5.2.1. Objectives

Key objective of information and dissemination actions were to raise awareness of peatland ecosystem services, their economic value and importance of mire conservation, as well as to disseminate information about key project achievements and findings to the targeted audiences (policy makers, nature conservation related institutions, general audience) Furthermore, dissemination actions facilitated implementation of the restoration actions by targeting farmers, other local stakeholders and increased visibility of the project.

5.2.2. Action E.1. Creation of the project website

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 III	2014 III	2014 IV	2014 III	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in GA	Revised in Inception report	Actual	Where provided deliverable/ milestone status
Milestones				
Project website developed and operational	31/12/2014	No revision	09/2014	Completed

- The action is completed. Project website www.wetlife2.gpf.lt is operational and updated by CB with relevant information. A link to the information of the previous LIFE project is also provided.
- Project website was linked to the Google Analytics that provides accounting of website visitors. Sub-contractor (SP "Eimalitas") was hired for the task. Data on the project site visitors are available from March 2017. Since that time 495 site visitors have been registered reaching maximum number of 64 users per month at the end of the project.
- Minor technical problems with the website (indicated in the Inception report) due to subcontractor's technical difficulties were solved during previous reporting period.
- The website will be kept for at least 5 years after the end of the project.

5.2.3. Action E.2. Raising public awareness and dissemination of results in Kamanos site

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 IV	2014 IV	2018 I	2018 I	Completed

Action related milestones and deliverables:

	Deadline		Where provided deliverable/ milestone status
	Planned in GA	Actual	
Milestones			
Introductory seminar organized in Kamanos project site	31/12/2014	30/10/2014	Completed
1st educational seminar-voluntary action is organized in Kamanos site	31/07/2016	23/09/2014	Completed
2nd educational seminar-voluntary action is organized in Kamanos site	31/07/2017	25/04/2015	Completed
3rd educational seminar-voluntary action	Not planned	04/10/2015	Completed
4th educational seminar-voluntary action	Not planned	02/05/2016	Completed
5th educational seminar-voluntary action	Not planned	01/10/2017	Completed
Arbour and WC built are built	31/08/2016	31/10/2014	Completed
1st seminar-event marking WWD is organized in Kamanos site	31/12/2016	02/02/2015	Completed
2nd seminar-event marking WWD is organized in Kamanos site	09/02/2018	05/02/2016	Completed
Notice board erected by the visitor centre of Kamanos reserve	Not indicated in the milestones	18/08/2015	Completed
Deliverables			
Article in the local newspaper	31/03/2015	15/11/2014	Inception report (Annex 8)
1st article on the KSSNRD website	31/12/2014	04/11/2014	Inception report (Annex 9)
2nd article on the KSSNRD website	30/09/2016	12/02/2015	1st Progress report (Annex 13)
3rd article on the KSSNRD website	Not planned	12/02/2016	1st Progress report (Annex 14)

- The action is completed. It was carried out by KSSNRD in close cooperation with the CB. Several additional (not planned in the GA) sub-action were implemented, as can be seen from the table above, which strengthened the overall impact of the action. In total 205 participants took part in five educational seminars – voluntary actions and 149 participants in two seminars-events marking World Wetland Day. During these events they learned about the project, importance of bogs for biodiversity and helped to remove birch seedlings and shoots in the active bog habitat areas. Relevant documentation related to the events was submitted with 1st Progress (annexes 7-12) and 2nd Progress report (annex 5). In total four articles were published in the local newspaper and on the KSSNRD website, as indicated in the table above. Notice board was erected by the visitor centre, arbour for visitors was built at the site.

5.2.4. Action E.3. Raising public awareness of peatland ecosystem services and promotion of sustainable use of peatlands in Žuvintas biosphere reserve

Action implementation dates:

Start date		End date		
Planned in GA	Actual	Planned in GA	Actual	Status of the action
2014 IV	2014 IV	2018 III	2018 III	Completed

Action related milestones and deliverables:

	Deadline		
	Planned in GA	Actual	Where provided deliverable/ milestone status
Milestones			
Introductory seminar organized in Amalva site	31/12/2014	13/11/2014	Completed
1st article published in the local newspaper	31/12/2014	25/11/2014	Completed
1st article published on the ZBRD website	31/12/2014	13/11/2014	Completed
1st seminar-event marking WWD is organized in Amalva site	29/02/2016	15/03/2015	Completed
Notice board erected in Amalva site	31/07/2016	05/05/2016	Completed
Workshop with farmers	31/07/2016	03/05/2016	Completed
2nd article published on the ZBRD website	30/09/2016	15/06/2017	Completed
2nd seminar-event marking WWD is organized in Amalva site	09/02/2018	10/03/2018	Completed
3rd article publlished on the ZBRD website	30/09/2018	06/03/2018	Completed
Experience exchange workshop	Not foreseen in GA	31/05/2018	Completed
Illustrated booklet published	31/12/2016	14/03/2018	Completed
Final seminar organized in Amalva site	Not foreseen in GA	26/10/2018	Completed
4th article published on the ZBRD website	Not foreseen in GA	26/10/2018	Completed
Deliverables			
1st article published in the local newspaper	31/12/2014	25/11/2014	Inception report (Annex 11)
1st article published on the ZBRD website	31/12/2014	13/11/2014	Inception report (Annex 12)
2nd article published on the ZBRD website	30/09/2016	15/06/2017	2nd Progress report (Annex 6)
2nd article published in the local newspaper	09/02/2018	29/09/2016	Midterm report (Annex 4)
3rd article publlished on the ZBRD website	30/09/2018	06/03/2018	Annex 16
Illustrated booklet published	31/12/2016	14/03/2018	Annex 17
4th article published on the ZBRD website	Not foreseen in GA	26/10/2018	Annex 18
3rd article published in the local newspaper	Not foreseen in GA	01/12/2018	Annex 19

The action is completed. It was implemented by ZBRD in close cooperation with the CB and included several additional sub-actions not planned in the GA, as can be seen from the table above, which strengthened the overall impact of the action. The unplanned sub-actions strengthened the overall impact of the action, were implemented within planned budget and included two events (workshop - 21€ and final seminar - 167€) and two published articles (no

costs involved). Additional workshop was valuable as allowed exchange of experience in restoration of hydrological conditions implemented at the project sites. Final conference was organised to summarize and discuss achievements of the project with project partners and local representatives. It was not foreseen, as most of representatives were expected to take part in the seminar co-organized with the ministry of environment (Action E.4), however seminar took place in Vilnius and most of representatives didn't take part in it.

In total 6 seminars/workshops were organised in the Amalva site with 162 (26+25+20+49+17+25) participants in total. A number of undocumented field visits and meetings with farmers were held. Documentation material related to the 2nd seminar marking WWD (March 10, 2018; 49 participants), experience exchange workshop (May 31, 2018; 17 participants) and final seminar (October 26, 2018; 25 participants) is annexed to this report (Annexes 11-13).

In total, 7 articles were published in the local newspaper and on the ZBRD website at no cost for the project. 3rd, 4th articles on the ZBRD and 3rd article in the local newspaper are annexed (Annexes 16, 18, 19)

48 pages illustrated booklet was produced (1000 units) with delay that had no impact on actual dissemination result, as it was planned to be distributed at Žuvintas biosphere reserve and Kamanos strict nature reserve visitor centres. JSC "Gamtos pasaulis" was a publisher of the booklet, since it become a winner of the tender organised by ZBRD. Booklet is annexed (Annex 17). The booklet is also available in digital version on the project website.

A notice boar was erected at the site (photo – annex 17 of the 1st Progress report).

5.2.5. Action E.4. Raising public awareness of peatland ecosystem services and dissemination of project results

Action implementation dates:

Start date		End date		
Planned in project application	Actual	Planned in project application	Actual	Status of the action
2014 IV	2014 IV	2018 IV	2018 IV	Completed

Action related milestones and deliverables:

	Deadline			
	Planned in project application	Proposed in 2nd Progress report	Actual	Where provided deliverable/ milestone status
Milestones				
Introductory project newsleter produced	31/12/2014		20/09/2014	Completed
Booklet for policy makers produced	31/12/2017	09/2018	02/10/2018	Completed
Seminar co-organized with the Ministry of Environment	09/02/2018	09/2018	14/06/2018	Completed
Publication presenting peatland ecosystem services on the popular website	16/02/2018	09/2018	22/10/2018	Completed
Layman's report produced	31/10/2018		12/10/2018	Completed
Deliverables				
Introductory project newsleter produced	31/12/2014		20/09/2014	Inception report (Annex 13)
Booklet for policy makers produced	31/12/2017	09/2018	28/09/2018	Annex 20
Publication presenting peatland ecosystem services on the popular website	16/02/2018		22/10/2018	Annex 21
Layman's report	31/10/2018		12/10/2018	Annex 22

The action is completed. It was implemented by the CB. Information material was developed by the project manager and supported by Mr. Simonas Valatka while preparing the booklet for policy makers and publication on the popular website.
Sub-contractors were contracted for design, proofreading of the texts, translation and printing of information material. Several photos had to be purchased as well. However, most photos were provided by the CB and the KSSNRD at no cost for the project. Selection of sub-contractors was according to the procurement procedures. Article presenting key peatland ecosystem services was published at no cost for the project except for personnel costs, as mentioned above.
Introductory project newsletter (300 copies) was produced in the very beginning of the project and distributed during the introductory seminars in the project sites and meetings with stakeholders. Newsletter was submitted with the Inception report, annex 13.
A seminar was organized in Vilnius (June 14, 2018) together with another non-governmental organisation – Lithuanian fund for nature and involved relevant representatives from institutions involved in decision making and research related to peatland management: the Ministry of Environment, Ministry of Agriculture, State service for protected areas, Lithuanian geological survey, Lithuanian research centre for agriculture and forestry, Lithuanian state forest service, Nature research centre, Peat producers' association and environmental non-governmental organisations. 47 participants took part in the seminar

(annex 14 – seminar-related documentation). Mr. Simonas Valatka and project manager Mr. Argaudas Stoškus presented key findings of the national assessment of peatlands and their key ecosystem services, strengthening their importance in carbon storage, regulation of water quality and maintaining biodiversity. As the booklet for policy makers was not available for the seminar, all participant received their copies at the end of the project. 500 copies of booklet were printed and distributed to relevant departments of the ministries of environment and agriculture, directorates of protected areas, environmental NGOs and research institutions. It should also be noted that the booklet contains a chapter presenting key project achievements in the context of key ecosystem services, highlighting high cost-efficiency in peatland restoration due to significantly reduced carbon emissions. The booklet is annexed to this report (annex 20).

An article presenting key ecosystem services with the main focus on carbon storage, sequestration provided by mires and importance of their restoration was published in October 22, 2018 on the most popular in the country DELFI internet portal (annex 21).

Layman's report (in Lithuanian and English languages, 120 and 20 copies respectively) was also produced at the end of the project and distributed during the final seminar, which was held in October 26, 2018 (annex 22).

All deliverables are also uploaded and available for download on the project website.

Action F. 2. Networking with other projects

The action is completed as planned. Implementation of the action had already started in the very beginning of the project by screening of similar LIFE projects in the region. E-mail contacts were established with key 5 projects (LIFE10 NAT/DK/000099, LIFE12 NAT/DK/000803, LIFE12 NAT/DK/000183, LIFE11 NAT/PL/000422 and LIFE13 NAT/LV/000578), as indicated in the 1st Progress report.
The action mainly focused on learning from other projects (in the beginning of the project) and spreading of information on the project achievements (at the end of the project). Furthermore, co-operation with other projects in Lithuania focusing on peatland restoration resulted in substantial benefits for the projects involved, such as improved knowledge in peatland restoration (LIFE12NAT/LT/000965 project) and co-working on joint products – national peatland database and assessment of ecosystem services (Life15 CCM/DE/000138 project), as already described in the Inception and 2nd Progress reports.
Experience exchange trip was organized in July of 2014 to Latvian LIFE project sites (Cena and Stikli mire complexes) where 04NAT/LV/000196 project results were presented by Latvian experts (Program of the meeting and photos from the meeting - annex 14 of the Inception report). The trip was organized one year earlier than planned in the project application, as it was important to discuss technical issues related to blocking of drainage ditches and materials used before starting these activities in the project sites. Representatives from KSSNRD, ZBRD and CB took part in the trip.
Finally, an information letter presenting the key project achievements (annex 15) was sent to the relevant projects in the region (LIFE16 NAT/FI/000583, LIFE15 NAT/UK/000786, LIFE14 NAT/DK/000012, LIFE14 NAT/EE/000126, LIFE14 NAT/IE/000032, LIFE14 NAT/UK/000070, LIFE16 NAT/UK/000646, LIFE15 CCM/DE/000138, LIFE14 CCM/LV/001103). Listed LIFE projects were targeted after additional screening for relevant ongoing projects.

5.3. Evaluation of Project Implementation

Methods for implementation of concrete conservation actions were chosen basing on best practice examples and CB's own more than 15 years' experience in the field of mire conservation.

Raising water level

The project applied different water level restoration measures adapted according to different conditions. Blocks, located every 20-30 cm of the slope, were used for blocking of drainage ditches in the Kamanos site. Plastic sheet piling was used as material for the blocks in remote sites of difficult accessibility. Special low ground pressure machinery provided by CB and ATV hitch purchased by the project were used for transportation of material and workers (Midterm report, annex 3, pictures 2, 3). Most of the terminal ditch blocks in places accessible by excavator were made of ground with overflow tubes for passing of excess water. Such a combination of blocks proved to work well in restoration of other mire sites. All blocks are expected to function several decades without substantial repair. It is important to note, that all restoration work was closely supervised by hydrologist from the KSSNRD, as quality of work has crucial importance for the final result. The total cost of blocking 35 km of ditches with more than 300 blocks was 173000 €, or approximately 5000 €/km of drainage ditch, or

approximately 570 €/block. It is preliminary calculated that affected area could be approximately 670 ha, resulting in less than 260 €/ha. This is considered highly cost-efficient.

Most of the ditches in the Kamanos site were blocked in the periphery of the bog where quite dense tree cover developed after the drainage resulting in increased evapotranspiration. Clearing of trees was not possible due to the status of strict nature reserve. At the moment it is premature to draw conclusions to what extent blocking of the drainage ditches will affect tree cover and hydrological conditions in the bog. Similar restoration actions implemented in other parts of the Kamanos mire approximately 10 years ago show promising results, which are briefly presented in the monitoring report.

Situation was different in the Amalva site, therefore restoration solutions were different too. Raising water level in the drained lag zone was the most challenging task in the Amalva site where bog degradation started after lowering ground water table in the surroundings and diversion of water coming from 16 km^2 basin. Water level and water distribution was restored by building three dams on the drainage ditch along the northern and western edges of the bog (scheme is available in the Layman's report http://wetlife2.gpf.lt/project-publications/). Raising of water level also required purchase of almost 30 ha of private land, reconstruction of 6,6 km of the protective dike. Therefore the total cost of the action was comparatively high – more than 400000 € (530000 € including land price), while directly affected area (according to relief data) will be approximately 370 ha, i.e. approximately 1400 €/ha (including land purchase).

Underground drainage in the Amalva degraded bog was blocked by digging through the sections of drainage tubes with excavator. The central tube lines that collect water from peripheral tubes were dug through and intersected by plastic sheet piling line covered with peat. This way a dam was formed that blocks not only underground, but also surface water movement along subsided valley above the drainage tubes. In total approximately 20 ha were restored this way for 8400 € (420 €/ha)

As restoration of water level in the Amalva site was completed just at the very end of the project, the actual impact is still to be revealed in the coming years.

Hiring experienced hydrologist by CB on a temporary contract base instead of subcontracting proved to be very effective, as preparation of the technical documentation for restoration of hydrological conditions (Action A.2) became a lengthy process due to land purchase procedures. So flexibility in time was extremely important for implementation of the action and quality of the result.

Elimination of trees in the bog

The applied "best practice" methodology for elimination of trees in the bog (repeated cutting of shoots within 2 years) developed by the LIFE05 NAT/DK/150 project proved to be efficient only in less degraded areas, while in more degraded locations with compacted peat and abundant nutrients the method was not successful and had to be replaced with herbicide application. Ground water level was on average just marginally higher and more stable in less degraded area (due to differences in vegetation cover and peat properties). It could be concluded that repetitive cutting (2-3 times a year, 2 years) of shoots could be used as a measure to eliminate birch trees in less degraded bog areas, especially in sites where application of pesticides is prohibited. It is however recommended to test the method on a small scale for efficiency, as detailed thresholds of nutrients were not determined by the project.

Application of glyphosate-based herbicide for elimination of birch shoots proved to be cost-effective and no significant negative impact on bog vegetation was observed when properly applied (low shoots, hood on the sprayer). However, herbicide use in nature conservation projects will always be controversial and is recommended to be thoroughly justified.

Assessment of the actual need of elimination of trees in the bogs is a very important task, which is not so straightforward, as it might look. The aims of clearing, impact of trees on water balance that is dependent on climatic conditions, cost-effectiveness of reaching the aims on a regional perspective, scientific interest and some other aspects might be important. The project focused on two locations within Amalva site. The first was cleared before the project and birch regrowth started impacting water level and regeneration of target vegetation. A mistake was done by pre-project intervention, as it relied on restored water level to hinder regrowth of birch, therefore stumps were not treated with pesticides to kill the roots. Clearing in another location was more of experimental character. This part was mostly affected by lowering of water table in the surrounding area and therefore increased vertical loss of water. In parallel it was affected by increased temperatures and related evapotranspiration. Restoration of lag zone water level and clearing were both considered necessary for regeneration of active raised bog. Additional arguments included readiness of SFE to ensure further maintenance if needed and ensuring conditions for formerly abundant curlew (*Numenius arquata*).

The methodology selected for improving grassland management practices (Action C.4) worked well. Farmer was contracted for management of grasslands with starting herd of cattle and several arable plots were transformed into grasslands by providing or recommending grass seed mixtures. Increase in properly managed grassland area will be immediately visible.

Results achieved:

Task	Foreseen in the revised proposal	Achieved	Evaluation
Reduced draining impact of melioration systems along the 4,9 km western edge and 0,78 km south-western edge of Amalva bog by blocking magistral melioration ditch. Restored provision of key ecosystem services of the Amalva site	N.A.	In total, water level was increased in more than 7 km of northern and western edge of Amalva bog, i.e. slightly bigger part of the bog lag than planned in the GA. Increase was mainly related to improvement in technical solutions. Additional technical measures, such as blocking of the underground drainage, reinforcing of the dike (making it "beaver-proof"), improving of water level management in polderized peatland by introducing automatic monitoring equipment and making data available for all stakeholders added to the result. The total sum of ecosystem services increased, as explained in the socio-economic impact assessment report.	The total area of direct project impact is bigger than planned in the GA due to improved or additional technical solutions. Full scale impact will only reveal itself with time. 30 years period is considered as a threshold for regeneration from degraded to active raised bog habitat in case of successful restoration of hydrological conditions.
Blocked 35 km of drainage ditches in the Kamanos state strict nature reserve	N.A.	Blocked 37,4 km of drainage ditches (slightly bigger length than planned in the GA)	All drainage ditched were blocked according to the rehabilitation project. High density of trees might reduce the impact in certain locations due to evapotranspiration. Longer time period is needed for revelation of the impact on the bog.
Removed woody vegetation in parts of Amalva bog (210-220 ha)	Reduction in the area was already indicated in the 1st Progress report	Woody vegetation was cleared in 150 ha, i.e. smaller area than planned in the GA.	Project could not achieve planned area mainly due to failure of "best practice" methodology in part of the areas. Delay of approval of nature management plan and modification of the areas

			to be cleared also played the role. However, project worked out possible solutions that will be applied after the end of the project. In total more than 300 ha are planned to be cleared/maintained according to the Amalva nature management plan and project laid solid basis for that. Cleared area has been immediately visible, however impacts on vegetation and hydrology are still to be revealed.
Grassland management supported by introducing beef cattle for wet meadow and fen management (20-30 ha managed); Restoration of grasslands facilitated in cultivated peatland areas (4 ha restored;	N.A.	Approximately 30 ha of grasslands are managed with a help of starting herd of cattle, as planned in the GA. 6 ha of grasslands were restored with seed material provided by the project. Additional 40 ha were restored by local farmers consulted by the project.	The action was implemented as planned. It puts on track of achieving a shift to less intensive use of peatlands without ploughing in absolute majority of Amalva peatlands, as it is foreseen in the Amalva nature management plan.
Information material presenting wide spectrum of peatland ecosystem functions developed, published and distributed	N.A.	All information material planned in the GA was developed, published and distributed.	

Dissemination of the target information is considered successful. People actively participated in organized communication events and voluntary actions. Some aspects of peatland ecosystem services and their extent are completely new to public, opening broader understanding of complexity of nature and increasing broader sense of responsibility.
Locally dissemination actions allowed achieving project objectives and secure further road towards fulfilling the aims of the project. Dissemination material focusing on peatland

ecosystem services is expected to have a national scale impact. Interest in this field has increased significantly in the country due to EU driven policies.

5.4. Analysis of long-term benefits

Environmental benefits

The project blocked all drainage ditches in the strictly protected core area of the Kamanos Natura 2000 site containing most of the peatland area, securing conditions for regeneration/conservation of the target mire habitats (7110* active raised bog, 91D0* bog woodland, 9080* fennoscandian deciduous swamp woods) and species (*Pluvialis apricaria, Tringa glareola, Tetrao tetrix, Dendrocopos leucotos, Dendrocopos medius*). Impact on 670 ha of mire habitats is expected in the mid-term perspective.

The project also restored hydrological conditions in the Amalva site containing the biggest area of 7120 degraded bog habitat in the country. This is expected to lead to regeneration of 7110* active raised bog, 91D0* bog woodland and 9080* fennoscandian deciduous swamp woods habitats. At least 370 ha of mire habitats are expected to benefit already in the medium term perspective.

Monitoring results of the project and previous restoration efforts in the project sites are promising. However, short project duration prevents from making scientifically correct conclusions regarding the project impact. It is also important to note that climate change has an increasingly heavier toll on target habitats and degrade impact of restoration actions. Assessment of GIS data on Lithuanian peatlands led to conclusion that restoration of 7120 degraded raised bog habitats and conservation of 7110* active raised bogs should be prioritized in the areas with the most favourable local climatic conditions. Furthermore, assessment indicates inventory data related to 7120 degraded bog habitats should be improved, as there is evidence that a number of sites have no signs of direct hydrological alterations and therefore can't be restored into active raised bogs.

Improvement in provision of ecosystem services was achieved in the Amalva site by finding a better balance between production and regulation services. It was achieved by increased ground water table and supported/promoted less intensive peatland management. Raising awareness on undervalued ecosystem services facilitated the process. It was estimated that project achieved reduction in GHG emission from 2500 t to 4500 t CO2 eqv./year and reduction in total nitrogen elution of approximately 0,6 t/year due to rewetting of Amalva peatland. Such findings are important to communicate, therefore results were included in the booklet for policymakers. Project also elaborated detailed proposals on the sub-basin scale indicating where restoration of peatland hydrology could assist in achieving surface water quality targets set under water framework directive.

Long-term benefits and sustainability

a. Long-term/qualitative environmental benefits

Restoration measures implemented by the project should require no substantial additional input for several upcoming decades, or until re-naturalization of the blocked ditches takes place, as durable materials were used, however periodical inspection of installations is planned and will be carried out by directorates of protected areas. Recurring management of woody vegetation will be based on voluntary work in the Kamanos site or implemented by SFE in the Amalva site, as planned in the Amalva nature management plan and Marijampolė district forest management plan (more details in the After-LIFE conservation plan – annex

22). These documents foresee management responsibilities and funding required for coming decade.

In general, restoration of hydrological conditions should lead to measurable changes in biodiversity in 5-10 years. 30 years are considered a threshold for shifting from degraded bog to active raised bog habitat, if favourable hydrological conditions are restored. It should be noted that dry years of 2015 and 2018 raised concerns regarding increasing negative influence of changing climate on the target habitats. Long-term monitoring will reveal the final outcome of the restoration actions in the context of changing climate. KSSNRD and ŽBRD are committed to continue monitoring activities. Actions remaining after the project, funding needs and continuation by beneficiaries are described in the After-LIFE conservation plan (annex 22), however it should be stressed that all priority measures for both project sites are also included into the planning documents (management plans (not to be confused with nature management plan produced for Amalva site, which is more detailed, but lower rank planning document), that were updated by CB (contracted by State service for protected areas) and are expected to be approved in 2019.

Project provided assessment (booklet for policy makers) of the threats to mire habitats and possible solutions on the national scale, focusing on the objectives of Habitats directive. However, further implementation of the proposals will depend on decisions by national authorities.

b., c.Long-term / qualitative economic and social benefits

Socio-economic impact assessment could not quantify socio-economic impact in Kamanos state strict nature reserve with no economic activities allowed, while insufficiency of detailed data prevented from scientifically correct assessment of impact on emissions of greenhouse gasses, water quality and floods. Impact assessment in Amalva site included previous WETLIFE project and provided contradictory results. Changes in water management resulted in minor economic savings within a range of 2 thousand €/year. Additional economic benefits (within a range of 80 thousand €/year) for local farmers were related to substantial increase in wetland area (totalling 660 ha) eligible for agri-environmental payments. Revenues from cattle, provided by the project, are estimated to be within the range of 15 thousand €/year, however running costs are estimated to marginalize profitability that is expected to increase with number of cattle. Additional economic and environmental value should be noted, as high quality meat (eco-labelled herd was obtained by WETLIFE2 project) is produced without competing for cropland and can further participate in the economic chain (processing, selling). Important social benefit, as already mentioned above, is reduction in emissions of greenhouse gasses, which is estimated to be within the range of 2500-4500 t CO2 eqv./year (plus 4900 t CO2 eqv./year WETLIFE project) and reduction in total nitrogen elution of approximately 0,6 t/year (plus 0,6 t/year WETLIFE project) due to rewetting of Amalva peatland.
However, certain economic losses are also associated with the project. These include estimated decrease in timber production due to increased soil moisture, which is in the range of 135 m^3/year. Big variation in value of different timber species resulted in monetary expression from loss of 3,7 thousand €/year to 3,2 thousand €/year profit. Wetter conditions are also expected to increase timber extraction costs, or at least shorten season of possible extraction. Changes in water table also inflicted land-use change related losses of approximately 1,5 thousand €/year, while approximately 100 ha of rewetted land is expected to be completely set aside from agricultural production. Socio-conomic assessment is complicated by the fact that profitability of agricultural use on such lands depends solely on subsidies, which do not take into consideration other societal needs (carbon, nitrogen storage).

As regards expected capital expenditure, project mostly improved existing infrastructure (dikes, pumping station, spillways). Reduced length of dikes in one place was compensated with increase in the other. Newly installed ditch blocks are made of materials that are expected to serve until renaturalisation of hydrological conditions, if not purposefully damaged. Therefore the overall expected capital expenditure for both projects is considered to be similar to the one without project intervention.
The overall conclusion is that the total sum of ecosystem services provided by the Amalva wetland increased and currently is more balanced despite of decrease in production function. This was mainly achieved due to improved provision of regulation services.

d. Continuation of project actions by the beneficiaries or stakeholders

Project ABs have their responsibilities clearly set in the recently prepared planning documents (for both project sites) regarding further continuation of the actions necessary for achieving restoration/conservation objectives. CB also intends to continue cooperation with AB's in terms of methodological consultations, establishing/renewing contracts with local farmers regarding extensive management of grasslands. On the national scale CB is among most experienced organisations in the field of wetland restoration and intends to continue working in this field after the end of the project.

Replicability, demonstration, transferability, cooperation

Socio-economic assessment of the project impact highlighted cost-effectiveness of mire restoration. Due to increasing importance (and economic value) of carbon storage and sequestration, economic benefits from investment in mire restoration can cover the cost already in the first decade. This is the key message supporting replication of the project actions in other sites.

National assessment of peatlands and their key ecosystem services carried out by the project highlighted restoration priorities, actions and economic sectors involved, providing links of the actions under Habitats, Birds, Water framework directives and Paris agreement. However the overall impact will depend on the actual use of the assessment results by national authorities. CB together with other environmental NGO's will keep on promoting mire hydrology restoration as a tool for achieving the aims of the above mentioned commitments.

Best Practice lessons

Blocking of drainage ditches was based on best practice methods applied by numerous other bog restoration projects (including LIFE-funded). Other measures, focusing on restoration of hydrological conditions of the bog by raising water level in the lag zone fed by substantial basin, were quite innovative and results are still to be revealed by monitoring.

Project also applied best practice method for elimination of birch shoots (repetitive cuttings during several vegetation seasons), proposed by the Danish project LIFE05 NAT/DK/150. However, the method proved to be effective only in less degraded parts of the bog with less compacted peat and lower nutrient levels. It was not effective in the most degraded bog locations, thus application of glyphosate-based herbicide was chosen as alternative.

KSSNRD effectively used voluntary involvement in maintaining open bog areas (removing shoots of trees). However this is not expected be effective on bigger areas and is more considered as awareness raising measure.

Innovation and demonstration value

WETLIFE2 project was best practice project without aiming at innovation/demonstration. Despite of that, assessment of key ecosystem services provided by Amalva mire and highlighting high cost-effectiveness has important demonstration character at least on the national scale. Key findings are presented to policy makers during dedicated seminar and in the booklet.

Long-term indicators of the project success

The key long term indicators are areas and conservation status of the target habitats (7110* active raised bog, 91D0* bog woodland and 9080* fennoscandian deciduous swamp woods) and populations of the target and indicatory species (*Pluvialis apricaria, Tringa glareola, Tetrao tetrix, Dendrocopos leucotos, Dendrocopos medius, Crex crex).*

6. Comments on the financial report

6.1. Summary of costs incurred

Budget breakdown categories	Total cost in €	Costs incurred from the start date in €	% of total costs
1. Personnel	**396 806,00**	**320 638,03**	80,80
2. Travel and subsistence	**19 430,00**	**4 473,24**	23,02
3. External assistance	**690 300,00**	**739 358,04**	107,11
4. Durable goods	**57 800,00**	**57 207,41**	98,97
Infrastructure	9 000,00	8 022,47	89,14
Equipment	48 800,00	49 184,94	100,79
Prototype		-	-
5. Land purchase / long-term lease	**152 250,00**	**136 776,90**	89,84
6. Consumables	**167 300,00**	**68 550,52**	40,97
7. Other Costs	**1 100,00**	**1 206,20**	109,65
8. Overheads	**79 400,00**	**69 689,58**	87,77
TOTAL	**1 564 386,00**	**1 397 899,92**	89,36

No discrepancies compared to flexibility of 30.000 € and 10 % had incurred.
The biggest savings are in the "travel and subsistence" (77 %, 14 960 €) and "consumables" (59 %, 98 750 €) budget categories. Less than planned was spent for travels mainly due to the project efforts to reduce "carbon footprint" and maximize use of electronic communication means. Significant savings under "consumables" category were due to more than 50 % reduction in price of plastic sheet pilling used for the ditch blocks.
The biggest overspendings are in the „external assistance" (7,1 %, 49 060 €) and „other costs" (9,7 %, 106 €) budget categories. Increase in spending under „external assistance" budget category was mainly due to additional technical measure (improvement of section of the accessibility road in Kamanos site) implemented under the action C.1 (more details in the section 5.1.6). The measure was carried out after approval by the EC (e-mail letter dated 17-12-2016). The total cost of this measure – 109.800 € (5.800 € - technical documentation and 104.000 € - work accounted under "External assistance"). The sum needed for this additional measure was covered by the savings in "External assistance" and "Consumables" budget categories.

"Equipment" budget category was exceeded by 0,8 %, 385 €. The cost of the cattle (action C.4 – section 5.1.9) was higher than planned by 4.745 €. It was partly covered by lower spending for brush cutters and electric impulse generator.

6.2. Accounting system

CB put in place an analytical accounting system for registering the project expenditure. According to the partnership contracts, all partners established analytical accounting systems for the sake of traceability of project expenditure and income as well.
All project's expenditure documents are certified by assigned responsible person (for example Mr. Argaudas Stoškus in case of CB).
Manual time recording system is used for completion of timesheets. The project used recommended time sheet forms. The actual hours that each employee spends working on the project are recorded using timesheets and certified regularly by the employee and the employer.
There is a clear indication of the project on every invoice. CB stamped all invoices with a special stamp indicating project number and acronym, while AB's in most cases inscribed project number by hand except cases when project number and title were already included in the very invoices issued by third parties.

6.3. Partnership arrangements

Financial transactions between CB and ABs were done basing on the schedule indicated in the Partnership agreements. Two advance payments and one final payment (after approval of the final report by EC) were foreseen from the beginning. Partnership agreements were amended in cases when additional payments were requested and justified, as important for successful completion of the project actions. Second advance payment was postponed and smaller amount transferred to SFE due to reduction of area cleared from birches (more details in the section 5.1.8) basing on the written request (annex 4).

Financial reporting is organized in a way that ABs are responsible for entering information in the financial tables, however CB checks everything basing on provided copies of financial documents.

6.4. Auditor's report/declaration

Procurement of project audit was carried out by the CB. V. Tamašausko Audit and Consultation Company (official registration number – 335, certificate number - 000288, company code – 126005774, address – Lukiškių str. 5, Vilnius) proposed the best price and was contracted on 23rd of May, 2016. The first audit report was produced in July, 2016. Final auditor's report/declaration prepared using the standard audit report form is annexed (annex 35). It states that "the financial report of the project gives a fair view of the expenses, income and investments incurred/made by project Beneficiaries in connection to the abovementioned project are within the time limit laid down by the Commission and in accordance with LIFE+ Programme Common Proviosions, the national legislation and accounting rules with no exeptions.