Restoration of Unio crassus rivers in the Luxemburgish Ardennes
LIFE11 NAT/LU/857

September 1st 2012 – February 28th 2015

Mid-term Report

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère du Développement durable et des Infrastructures
Département de l'environnement

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Agriculture, de la Viticulture et de la Protection des consommateurs

Mid-term Report

1st September 2012 to 28th February 2015

Reporting Date

February 2015

« Restoration of Unio crassus rivers in the Luxemburgish Ardennes »

Resto-unio

Project location:	Vallée de l'Our de Ouren à Dasburg Pont LU0001002 Vallée Supérieure de la Sûre / Lac du barrage LU0001007
Project start date:	01.09.2012
Project end date:	28.02.2018
Total budget	2.057.068 €
EC contribution:	1.028.534 €
(%) of eligible costs	50 %

Data Beneficiary

Name Beneficiary	Fondation Hëllef fir d'Natur
Contact person	Alexandra Arendt
Postal address	2, Kierchestross, L-9753 Heinerscheid Luxembourg
Telephone	+352 - 26908127-31
Fax:	+352 - 26908127-33
E-mail	al.arendt@naturemwelt.lu
Project Website	www.unio.lu

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2 EXECUTIVE SUMMARY

One crucial problem of the Our and Sûre rivers, leading to the decline of the thick shelled river mussel *Unio crassus,* is the heavy load of fine sediments causing the clogging of the interstitial pore system, the key habitat used by juvenile mussels during the first year and the eutrophication of the rivers. The aims of the project are therefore the improvement of the habitat quality by reducing the load of sediment in river systems and the strengthening of the existing populations.

In general we are proceeding by the following steps:

- An initial mapping of the "hot spots" (action A1) has been done on both river catchments to localize the main sediment entrances to the rivers Our and Sûre and to their tributaries.
- Priority lists have been elaborated by evaluating and rating the detected problems. They help to decide which measures have to be done. These priority lists have been summarized in the "restoration measure plan" (action A2). Some of these restoration measures are at the moment in the planning phase or under execution (action C1, C2 and C3).
- Complementary to the "restoration measure plan" we defined parameters (action D4) to be measured to establish the initial status of the habitat quality and to allow the follow up of the restoration effect.
- In both rivers, Our and Sûre, we are investigating the status quo of the mussels: population density, population structure, vitality, gravidity and the substratum quality (action D3).
- To strengthen the mussel populations, a breeding method has been worked out for the thick shelled river mussel and is applied from now on at the rearing facility at the mill of Kalborn. This method is detailed in a written document (action C4)
- As for both Natura 2000 areas, Our and Sûre, no management plan existed before the start of the project, we are supporting the elaboration of such a plan with our knowledge on the aquatic species of both river catchments.
- Special attention is laid on informing the basin's actors, mainly land-users and water managers (national and trans-boundary) to facilitate the collaboration and the data exchange.
- Till the midst of the Project, more than 1.500 people have visited the rearing station where they could be informed about mussels, fishes and many other interesting aquatic organisms.

In detail that means:

Action A1: Localization of zones with erosion risk

- The hotspots have been evaluated, rated and priority lists have been set up for the following types of entrances of fine sediment in the water courses

1. Erosion of and on farmland,
2. Erosion on or beside forestry and rural roads
3. Spruce trees next to the river
4. Cattle trampling.

Action A2: Planning of restoration measures

For each hotspot a measure has been formulated. A "Restoration measure plan" has been worked out.

Action A3: Planning of water quality and interstitial substrate survey

The redox-electrode allowing the survey of the interstitial substrate was delivered. An online monitoring system "Our" was installed at the Mill in Kalborn in September 2013. A mobile online monitoring system was delivered in March 2014 and is used on the Sûre and on the tributaries.

Action A4: Elaboration of a rearing method for *Unio crassus*

By visiting rearing facilities for freshwater mussels in the USA and by many discussions with experts the already existing experience in rearing the Freshwater Pearl Mussel (*Margaritifera margaritifera*) was adapted to the thick shell river mussel (*Unio crassus*) and a rearing protocol was elaborated.

Action A5: Input to the elaboration of Natura 2000 "Our" and “Haute Sûre" management plans

Three official meetings with ANF and 2 internal meetings with the person in charge of the management plans have taken place. Compilation of the data and synthesis of the long term objectives, the conservation status of the aquatic species, the pressure and the threats have been dealt with.

Action B1: Acquisition of land on the Our and Sûre rivers and on their tributaries

800 are have to be bought. With 322,10 are, 40,26 % of the objective have been realized.

Action C1: Interventions to reduce the fine sediment load to the rivers systems

1. The installation of 2km of fences, 5 cattle watering installations, 3 bridges for cattle.
   We have arrangements with land users for 1130 m of fences and 5 watering places. These measures will be done as soon as the weather conditions are allowing the task within the year 2015.
2. Construction of 60 water evacuation systems on agricultural and forestry roads.
   Agreements have been found for 3 sites with a total of 32 water evacuation grids.
3. 40 agro-environmental measures (AEM)
   1 agreement for extensive pasture. 39 to do.
   The national agriculture plan "Plan du développement rural 2014-2020" is under evaluation in Brussels so that no AEM can be concluded. Till the new AEM are official at the end of 2015 we are working in a pilot project on the Feierbech, a small tributary on the river Our (see more details under C1).
4. Restoration of a river bed

A meeting with SIDEN and the technician of the municipality of Clervaux will take place.

Action C2: Transformation of fish migration obstacles on the tributaries

6 meetings took place to decide which obstacles from the priority list "Fish obstacles" should be transformed, how the transformation should be done and when. A first plan has been drawn for the Schwaerzerbaach. Demands for authorizations have been send to the AGE and the ANF.

Action C3: Improvement of the riverbed by gravel input

Dumping of 300 m^3 gravel in the river Our and 100 m^3 in the Sûre. Delay of the deposits on the Sûre after a first refusal from Belgian authorities. Revision and approval.

Action C4: Breeding *Unio crassus* for the "Grande Région"

Two infestation cycles (2013 and 2014) were done. From the infested fish (*Phoxinus phoxinus*) juvenile *Unio crassus* could be collected in both years and are held in different systems to grow them. The cell counter is used to improve the feeding.

Action C5: Capturing of muskrats

104 muskrats were captured at the Our, 43 at the Sûre.

Action D1: Water quality and interstitial substrate survey

Once a week a sample from each river is taken and analysed. Once per season, or if necessary more often for investigative monitoring, the tributaries are sampled. The parameters temperature, pH value, conductivity, turbidity, oxygen concentration, ortho-phosphate, nitrite, ammonium and nitrate were determined.

Action D2: Host fish monitoring

The fish population in both rivers, Our and Sûre was analysed in 2014 and the natural infestation rate with *Unio crassus* glochidia was checked on 3 fish species. On 8 tributaries at the river Our and 3 tributaries at the river Sûre the fish population was investigated by electric fishing. The next electric fishing event for the main stream is foreseen in 2015.

Action D3: *Unio crassus* monitoring

On the river Our 30% of the target has been done, on the river Sûre 30,45 %, a total length of 12,5km. More than 400 mussels have been tagged. Sampling of sediments have been done.

Action D4: Monitoring and evaluation of restoration measures

The success of the restoration measures is evaluated by the following indicators: water quality, turbidity, quality of substrate and the host fish population. These parameters are used as reference for the evaluation of prospective measures.

Action D5: Analysis of the socio-economical impact of the project and of the effect on the ecosystems

Action not scheduled for the moment

Action E1: Information and sensitization of the concerned actors

Since the start of the project the two trans-border water forums were organized and took place. Two information events for farmers (erosion reduction and methods to reduce the use of pesticides) were organized.

Action E2: Sensitization of the general public

Two information events for the larger public took place at the beginning of the project, one in the river Our catchment and one in the river Sûre catchment. We participated at several information events (e.g. Ökofoire, Naturparkfest..) and more than 1500 people could be informed. Information panels and a flyer in three languages were produced. Several press releases in printed and online media were done.

Action E3: Design of web site

Since June 2013 the web site is fully online in three languages. The number of visits is increasing since then and news are added about once per month.

Action E4: Organization of conferences

Due to many scientific conferences dealing with freshwater mussels in 2014 we moved our first seminar about rearing unionoid mussels to November 2015. The venue is organized and already three invited speakers are confirmed. A fist announcement was send to all the experts in the field and the registration is open.

Action F1: Project management

Constitution of a team, piloting committee 3 meetings, signature of Grant agreement with financial partners

Action F2: Knowledge exchange: with LIFE and other projects

Regular exchange with other projects working with freshwater mussels (LIFE and others) exists. We participate regularly at scientific meetings and discuss our results.

Action F3: After-LIFE conservation Plan

Action not scheduled for the moment

MA:	Ministère de l'Agriculture, de la Viticulture et de la Protection des Consommateurs
MDDI:	Ministère du Développement durable et des Infrastructures
MIGR:	Ministère de l'Intérieur et à la Grande Région
FMCS:	Freshwater mollusk conservation society
U.c.:	*Unio crassus*
WFD:	Water framework Directive
ANF:	Administration de la Nature et des Forêts
IBLA:	Institut fir biologesch Landwirtschaft an Agrarkultur Luxemburg
AEM:	agro-environmental measures
PDR:	plan de développement rural

3 INTRODUCTION

3.1 Description of background, problem and objectives

The thick shelled river mussel *Unio crassus,* a formerly abundant species of semi lentic river habitats, shows a dramatic decline within its distribution range. Whereas till the 1970th the species was present in nearly all the watercourses in Luxembourg, only two populations remain in the river Our and the river Sûre, in the northern part of the country today.

Involved sites:

- LU0001007 Vallée supérieure de la Sûre / Lac du Barrage (43,63 km^2)
- LU0001002 Vallée de l'Our de Ouren à Wallendorf Pont (56,75 km^2)

Targeted species:

Unio crassus

Main conservation issues

Threat1: insufficient number of mussels

The last monitoring done in the years 2001-2004 showed that young mussels with an age under 4 years are present in insufficient numbers. With 30.000 mussels on the Sûre and 9.000 mussels on the Our the populations risk to disappear.

As the thick shelled river mussel has a parasitical phase on a host fish. The host fish need to be present in sufficient numbers to enable the mussels to complete their life cycle. But on many tributaries, pipes cut off the watercourses disabling the fish to migrate into these tributaries for spawning.

Additionally, the muskrat, a non-native species, is locally destroying mussel banks by feeding on them. The recent monitoring shows additionally the presence of the signal crayfish *Pacifastacus leniusculus*.

Objectives:

One key action of the project is to develop captive breeding methods for *Unio crassus* and to release propagated animals at both sites to strengthen the old population with young individuals.

The unnatural predator pressure on *Unio crassus* by neozoa will be reduced by regulating the population densities of the muskrat (*Ondatra zibethicus*).

Improving the connectivity of the river system by removing migration obstacles in smaller tributaries will enhance the host fish population (e.g. *Cottus gobio, Salmo trutta fario*)

Threat 2: insufficient water quality

The intense use of agricultural land leads to heavy loads of fine sediments and to eutrophication in the watercourses. Locally the cattle trampling near the brooks contribute to a destabilisation of the banks and cause a further input of excrements into the water. This leads to insufficient conditions in the substratum, where juvenile mussels grow up.

Objectives:

Installing fences along the river will protect the vegetation and stabilize the banks and reduce erosion. The selective installation of water gutters on agricultural and forestry roads will prevent, that the sediment loaded rain runoff, runs directly into the watercourses. The negotiation of agri-environmental measures will reduce the amount of nutrients and help in decreasing the impact of fines.

3.2 Expected longer term results

As the main goal of the measures is reducing the load of fine sediments and nutrients in the river system, the project will have a positive impact on the thick shelled river mussel *Unio crassus* as well as on many other Annex II species of the Habitats Directive sharing the same aquatic habitat, as *Margaritifera margaritifera, Cottus gobio, Salmo salar, Lampetra planeri, Oxygastra curtisii, Lutra lutra*. Creating cleaner and less clogged gravel within the river will improve the self-cleaning capacity of the river and highly improve the ecosystem services provided by the respective rivers.

At the end of the project, 1000-2000 mussels will be released at selected sites in each river system. A strong mussel population offers a strong ecosystem service to a river by its filtering capacity, by biodeposition and thus making food available to other benthic animals.

The removal of 6 migrating obstacles will reconnect approximately 15km of rivers at each site with the main stream. Bullhead and brown trout will surely benefit from the opening of these stretches that will indirectly have a positive effect on the mussel's populations.

The acquisition of 8 ha of land will enforce the existing network of land dedicated to nature conservation on both catchments.

4 ADMINISTRATIVE PART

4.1 Project management.

- Constitution of the project team:
  - Coordinator 60%: Alexandra Arendt biologist
  - Scientific 1 50%: Frankie Thielen Dr. rer. nat and 50% on an other non EU project
  - Scientific 2 50%: Sonja Heumann Dr. tech.
  - Technician 100%: Léo Klein environmental technician, left in December 2014, is replaced by Karin Michels from January 2015
  - Secretary/accountancy 40%: Patricia Heinen secretary (LIFE 11 NAT/LU/857) 20% (LIFE 11 NAT/LU/858) 20%(LIFE 13 NAT/LU/ 782)

- Allocation of the different missions to each team member:
  - Alexandra Arendt is charged with the coordination of the project, the realisation of measures in the agricultural context.
  - Frankie Thielen and Karin Michels are responsible for the rearing station and the tasks related to the mussel breeding.
  - Sonja Heuman's principal mission is the water quality survey, the monitoring of the measures and the realisation of measures.
  - Patricia Heinen deals with accounting, timesheets and correspondence.
  - Each team member contributes in informing the public. Whenever an action needs higher personal input the other members will give the needed support.

- Every Monday 15 minutes team meeting: information about the happenings for the coming week (meetings, field work, help needed for special tasks...)

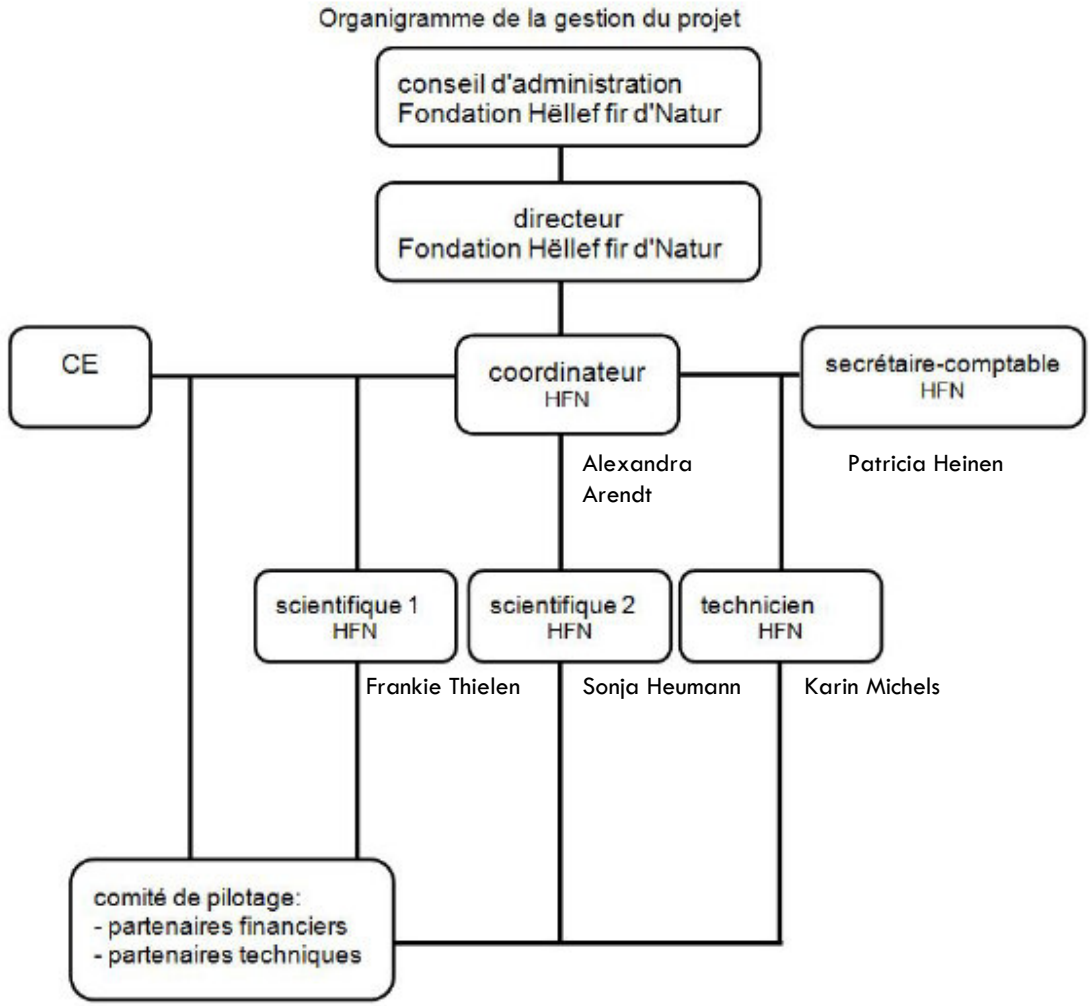
- Monthly team meetings (1 to 2 hours): review of the task's progresses, discussion of problems, working out of solutions. Written reports

- Monthly meeting with the Fondation Hëllef fir d' Naturs' director: validation of work content and proceeding. Written reports

- Monthly meeting between the director and the administrative council of Fondation Hëllef fir d'Natur. If necessary aspects dealing with the Life Unio project are mentioned. Written reports.

- Meetings with stakeholders or other groups and people relevant for the project management are always mentioned in the respective description of the action (see chapter 5).

- The project Organigramme is the following:



- Till now no amendment to the Grant Agreement has been necessary, as only the name changed from Fondation Hëllef fir d'Natur to natur&ëmwelt-Fondation Hëllef fir d'Natur and there is no change of the statutes.
- The first march 2015 natur&ëmwelt-Fondation Hëllef fir d'Natur got a new president by Patrick Losch.
- The Partnership agreements with MA and MDDI have been submitted with the Inception report while the one with MIGR has been submitted with the Progress report.

4.2 Evaluation of the management system

- There is no partner in the project so the beneficiary is acting by himself.

- The project's staff has to execute the daily project's management. As, with the exception of the technician, all other members have partial tasks, the regular communication between the team members is very important. The weekly short meetings should help in organizing the coming week and in considering eventual problems as soon as they occur. The project management process goes on quite well. The quitting of our technician Léo Klein (December 2012 till December 2014) was a little bit problematic as he knew the project's content quite well and we had to look for another person and a new team member will need some time to adapt. Karin Michels has been employed in January 2015.

  In general, we have very constructive exchanges with the members of the pilot committee. They are supporting the project well. When we ask to give a more political statement to the competent Ministers, we got meetings and were able to discuss the problems encountered.

- In case of questions, we first contact the External Monitoring Team that quickly gives us the requested answers. We also appreciate that the Commission is very close to the project and supports us in approaching problems on the national governmental level.

5 TECHNICAL PART

5.1 Technical progress, per task

5.1.1 Action A1: Localisation des zone à risques d'érosion

The load of fine sediments and nutriments in the river system is one of the main factors responsible for the decline of *Unio crassus*. Therefore, the project focuses on the reduction of the entrance of fine sediments and nutrients into the water courses, especially in the tributaries of the rivers Our and Sûre. The main intent of this action is to localize the hot spots of erosion.

➢ Progress/results

There are different possibilities of entrance of fine sediments into the water courses:

- Erosion of and on farmland
- Erosion on or beside forestry and rural roads
- Spruce trees next to the river
- Cattle trampling

These different aspects in the project area are mapped with the objective to elaborate a detailed map with "hot spots" of erosion.

Mapping started in October 2012 with the tributaries of the river Our, followed by forestry roads around the river Sure and farmland in the river Sure catchment. In May 2014 the mapping was finished.

The hotspots have been evaluated, rated and priority lists have been set up for all types of entrances of fine sediment into the water courses. (see action A2).

➢ Realised

100% of all areas are mapped and rated.

Table 1: Realized mapping in the river Our and Sûre catchments

Mapping subject	Tributary	Realisation
Erosion of and on farmland	River Our catchment	September 2013 to May 2014
Erosion of and on farmland	River Sûre catchment	August 2013 to January 2014
Spruce trees next to the river	11 Tributaries on the Our	October 2012 to April 2013

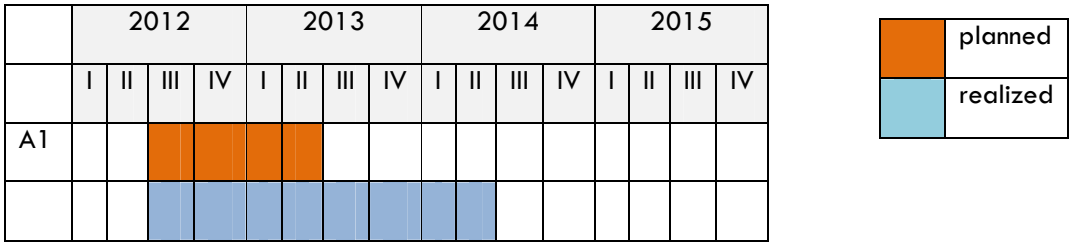
Spruce trees next to the river	5 Tributaries on the Sûre	March 2013 to February 2014
Cattle trampling	11 Tributaries on the Our	October 2012 to April 2013
Cattle trampling	5 Tributaries on the Sûre	March 2013 to February 2014
Erosion on or beside forestry and rural roads	River Our catchment	December 2012 to February 2014
Erosion on or beside forestry and rural roads	River Sûre catchment	February 2012 to April 2014

➢ Problems encountered/delays

Erosion risk maps worked out by the Administration des Services techniques de l'Agriculture, Service pédologique from the Ministery of Agriculture in collaboration with the Université de Liège - Gembloux Agro-bio Tech, Systèmes Sol-Eau were not available until summer 2013. Therefore detailed mapping of farmland in the river Our catchment started only in September 2013. Mapping of erosion on farmland on the river catchment Sûre has to be completed as well as the mapping of erosion on forestry and rural roads on the river Our.

No other problems encountered so far.

There is a slight delay for this action; however the mapping was finished in May 2014 so that we could send our "Erosion report" on 30th June 2014 to the European Commission (see action A2)



➢ Complementary action outside LIFE

none

5.1.2 Action A2: Planification des mesures de restauration

The initial mapping phase of "hot spots" of erosion, as foreseen under the action A1, will allow deciding where negative points have to be resolved and will lead to the concrete planning phase of the following restoration measures:

1. The installation of 2km of fences, 5 cattle watering installations, 3 bridges for cattle.
2. Removal of 6 fish obstacles
3. Construction of 60 water evacuation systems on agricultural and forestry roads.
4. 40 agro-environmental measures
5. Restoration of a river bed

➢ Progress/results

After finishing and already during the mapping we started with the formulation and the planning of restoration measures. The priority lists contain precise information on the detected problems, their localisation, a link to www.geoportail.lu and a description of adapted restoration measures. Furthermore we dispose of the data of the owners or/and land users (we do not include these data in the report as they are personal datas). The following table summarizes the possible measures.

Table 2: possible measures

Type of measure	number of potential measures
evacuation grids	155
installing fences	4 km
fish obstacles	57

The list as well as the measures are compiled in a written document called the" Restoration measure plan" (see Annex 1).

Meeting with forest rangers took place to present the" Restoration measure plan" and to discuss the feasibility of the measures:

- March 2015 Dany Klein (triage Clervaux): Feierbech waterevacuation grids, Roderbaach waterevacuation grids
- 28.5.2015 Jeannot Huijben (triage Harlange): Syrbaach waterevacuation grids, transformation of a ford
- 28.5.2014 Serge Hermes (triage Rambrouch): Schwärzerbaach refection of a forestry road, obstacle transformation,
- June 2014 Fernand Theisen (head ANF north): Schwärzerbaach obstacle transformation
- 29.10.2014 Martin Jacobs (triage Hosingen): no measure for the moment
- 10.11.2014 Rodesch François (triage Vianden): Akeschterplateau waterevacuation grids

➢ Realised

Restoration measure plan submitted to CE on 30.06.2015

➢ Problems encountered/delays

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A2																

planned
realized

➢ Complementary action outside LIFE

none

5.1.3 Action A3: Planification de la surveillance de la qualité de l'eau et du substrat interstitial

The planning of the water measurement stations and other equipment needed for the water quality survey is part of this action.

➢ Progress/results

A redox-electrode (Geist & Auerswald, 2007) was delivered in January 2013. In March (04.03.2013) was a meeting in Munich combined with a workshop to learn the handling. In July 2014 another workshop was hold on the river Our. There were no costs except the travel costs of the expert.

In June 2013 the company Hach-Lange installed 4 probes (nitrate, ammonium, chloride and potassium) at our Lab in Kalborn in order to see if the equipment would fit our needs. In August 2013 the whole equipment (nitrate, ammonium, chloride and potassium; conductivity, turbidity, oxygen and pH-value) was ordered and installed in September 2013.

A second system (OTT) was installed in March 2014. This is a mobile online monitoring system with several parameters (temperature, pH value, oxygen, conductivity, turbidity and nitrate). It is used for the monitoring on the river Sûre and its tributaries and to evaluate the planned measures.

In the Grant Agreement a second station for the river Sure was planned but the Administration of water planned a measure station at Moulin de Bigonville. In the letter of 3rd February 2014 the European Commission approved the bought of the portable system and a delay of three month was accepted. The total cost for the online monitoring system are 32.203,18 €. There is some money left for buying another logger for nitrate or turbidity (see under D1).

As we have several places for measures to reduce the income of fine sediment we plan to buy two turbidity sensors. It is an important task to combine sediment boxes with a turbidity sensor to be able to evaluate the measures. We asked for two offers.

➢ Realised

The redox-electrode was delivered.

Online monitoring system was installed at the Mill in Kalborn in September 2013. Data is available (Action D1, see Annex 2).

The mobile online monitoring system was delivered in March 2014. Data is available (Action D4, see Annex 3).

➢ Problems encountered/delays

At the river Our, the system started operating 3 month later than foreseen under this action. However before March 2013 an online water measuring container was installed at the mill of Kalborn by the water management board and full access to the data was available.

At the river Sûre, the delay is due to the discussions with the water management board about their installation of an online measuring station. However, since April 2013 the online water measuring container from the administration has been installed at the river Sûre in Martelange. All the data are available for us.

No others problems or delays encountered.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A3																

	planned
	Realized
	New plan

➢ Complementary action outside LIFE

none

5.1.4 Action A4: Mise en place de la technique d'élevage pour *Unio crassus*

The intent of this action is to plan and organize all the necessary steps to install a culture procedure for *Unio crassus* at the rearing facility at the mill of Kalborn.

➢ Progress/results

Authorisation

All permissions from the MDDI to handle *Unio crassus* in the river Our and Sûre were organized (see Annex 4).

Exchange with experts from USA

To learn the handling of the cell counter, appointments at the mussel facilities in:

- Marion, Virginia Department of Game and Inland fisheries - Aquatic Wildlife Conservation Center, Virginia (Contact person, Megan Bradley).
- White Sulphur Springs, National Fish Hatchery and aquatic Resource recovery center, West Virginia (Contact person, Rachel Mair).

were organized and took place the week after the FMCS meeting (18-21.03.2013). Cost for traveling were covered by travel costs foreseen under this action. No external assistance costs were necessary to pay for the initial introduction into the use of the cell counter.

Email and phone contact with Rachel Mair and Megan Bradley is still going on. The uptake of algae food by the juvenile mussels in the sand aquaria was analized in September and October 2014. To minimize travel, an expert from the USA (person not yet defined) will visit our rearing facility after our international Seminar, which will take place in November 2015 (24.11 - 27.11) to validate the use of the cell counter.

Developing and writing a rearing protocol

A rearing protocol, including all the necessary steps for the culture of *Unio crassus*, including a discussion of the first results, was written (see Annex 5) and is available online at Unio.lu since August 2014 as planned.

➢ Realised

Permissionletter for the rivers Our and Sûre valid until 28.02.2018 (see Annex 4).

Visit of freshwater rearing facilities in the USA.

Technical document about rearing method (see Annex 5).

➢ Problems encountered/delays

No problems encountered so far.

➢ The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A4																

planned
realized

➢ Complementary action outside LIFE

none

5.1.5 Action A5: Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"

Elaboration of the management plans for the 2 project areas on the river Our and the river Sûre in the Natura 2000 sites LU0001002 Vallée de l'Our à Wallendorf-Pont, LU0002003 Vallée de l'Our à Wallendorf-Pont, LU0001007 Vallée Supérieure de la Sûre/Lac du barrage, LU0002004 Vallée Supérieure de la Sûre/Lac du barrage. The Life team gives scientific assistance to the person in charge of working out management plans. During public hearings the team will contribute with details about the aquatic biotope.

➢ Progress/results

- 13.03.2013 and 18.07.2013 presentation by ANF of the new strategy for working out Natura 2000 management plans for Luxembourg.
- 08.05.2013 meeting with ANF. As up to this date still no consultant office has been charged with the elaboration of the 2 management plans Our and Sûre, n&ë-Fondation Hëllef fir d'Natur insisted on this aspect to avoid a delay of this action. ANF asked n&ë-Fondation Hëllef fir d'Natur to formulate an offer.
- 15.05.2013 Offer and proposal of a timetable by n&ë-Fondation Hëllef fir d'Natur.
- 24.12.2013 n&ë-Fondation Hëllef is officially charged to work out the management plans.
- 29.01.2014 Meeting for discussing a strategy for the realisation of the 2 management plans and designating an employee for this task within n&ë-Fondation Hëllef fir d'Natur.
- 07.01.2015 After having collected the basic data, n&ë-Fondation Hëllef fir d'Natur shows a first draft of its maps to ANF. Life Unio assists the meeting in order to help to define the main conservation objectives of the two areas. The official deadline by ANF is in November 2015.
- 14.01.2015 Meeting with the person in charge of the management plans in order to deal with
  - the identification of the long term objectives
  - the conservation status of the aquatic species
  - the pressure and threats

The employees Richard Dahlem (biologist) supported by Stephan Müllenborn (geographer) for the map drawing of n&ë-Fondation Hëllef fir d'Natur, not involved in the Life Unio or in another Life project, are working out the management plans. The Life staff, as actor of the two areas, gives scientific assistance namely with the focus on the aquatic fauna as foreseen in the Life Grant Agreement.

➢ Realised

Offer and letter sent to ANF for working out the management plans. see Annex 6

Official response from ANF attributing to n&ë -Fondation Hëllef fir d'Natur the permission to work out the management plans. see Annex 7

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A5																

planned
realized

➢ Complementary action outside LIFE

Budget of 50.325,71€ for working out the management plans Our and Sûre.

5.1.6 Action B1: Acquisition de terrains le long de l'Our, de la Sûre et de leurs affluents

It is foreseen to acquire 8 ha of land on the catchment area of the river Our and the river Sûre.

➢ Progress/results

There are agreements for land purchases for 322,10 are. For 63,07 are the notarial acts are under progress. The average prize is about 69,23€/are and is varying from 25 to 147,42 €/are.

Table 3: Land purchase

bassin versant	Commune	section	lieu-dit	n° cadastral	superficie (Are)	usage	mesure prévue
LU0001002 Vallée de l'Our de Ouren a Wallendorf Pont	Clervaux	HA de Lieler	in der Kemich	1022/4853	73,8	grassland	maintien du caractère ouvert de la parcelle,
LU0001002	Clervaux	HA de Lieler	in Kemichsberg	1036/3561	70,9	forest	restauration de la ripisylve
LU0001002	Clervaux	HE de Grindhausen	in Brueckenbrett	283/663	40	forest	restauration de la ripisylve
LU0001002	Clervaux	HE de Grindhausen	in Brueckenbrett	282/660	8,4	forest	restauration de la ripisylve
LU0001002	Clervaux	HC Heinerscheid	Kohlwies	938/2008	4,6	hedge	restauration de la ripisylve
LU0001002	Clervaux	HC Heinerscheid	Kohlwies	940/661	37,6	grassland	restauration de la ripisylve
LU0001002	Clervaux	HA de Lieler	in der Bachseif	710/5031	1,33	grassland	restauration de la ripisylve
LU0001002	Clervaux	HA de Lieler	an der Schelsbich	871	22,4	forest	Plantation d' arbres feuillus restauration de la ripisylve
LU0001002	Clervaux	HA de Lieler	Hehnewies	988/61	19,17	forest	Plantation d' arbres feuillus restauration de la ripisylve
LU0001007	Rambrouch	BA de Bigonville	Im Koilenbrenner	3830/4539	12,1*	forest	
LU0001007	Rambrouch	BA de Bigonville	Im Koilenbrenner	3830/2213	12,1*	forest	
LU0001002	Clervaux	HA de Lieler	Hinter Matheschleid	646	19,7	hedge	Plantation d' arbres feuillus restauration

							de la ripisylve
				Total:	322,10	40,26 %	
				reste à acquérir:	477,9	59,74 %	

* land swaps

➢ Realised

Notarial act, aerial photo with the localisation of the acquisitions, photo with description (see Annex 8).

For the moment negociations are ongoing for 55,70 Are on the Jansschleederbaach. Till now we did not invest a lot of time in buying land. In future we will pay more attention to this action in order to reach the 8 hectares.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
B1																

planned
realized

➢ Complementary action outside LIFE

none

5.1.7 Action C1: Interventions pour réduire l'apport en sediments fins dans le réseau hydrographique

This action will lead to:

1. The installation of 2km of fences, 5 cattle watering installations, 3 bridges for cattle.
2. Construction of 60 water evacuation systems on agricultural and forestry roads.
3. 40 agro-environmental measures (AEM)
4. Restoration of a river bed

➢ Progress/results

1. Letter send to 7 land owners resp. farmers on the Our catchment, to 4 on the Sûre. Meeting with 4 land user. 1 denial, 3 agreements, 1 on the river catchment Sûre (Syrbaach), 2 on the river catchment Our (Folkesbour and Ruppelsbaach). Viewing of the sites with a company and planning of the work. The measures will be realised as soon as the weather conditions will allow the work. (650 m and 2 watering tanks have been installed in the week of 10 march 2015, but are no more in the timing of the midterm report).

   Table 4: Agreements for fencing

Catchment	River	Fence (m)	watering	cattle passage
Sûre	*Syrbaach*	100	2	0
Our	*Roupelsbaach*	380	1	0
Our	*Folkesbour*	650	2	0
		1.130	5	0

2. Several meetings with the foresters of the triage Rambrouch, Boulaide, Clervaux 09.07.2014, Hosingen 30.11.2014 and Vianden 10.11.2014 took place. The priority list "Erosion on or beside forestry and rural roads" was explained. Agreements were found at 3 sites.

   Table 5: Agreements for water evacuation grids to be installed

Catchment	River	length (m)	nb. of water evacuation grids
Sûre	*Syrbaach*	650	15
Sûre	*Schwaerzerbaach*	50	2
Our	*Roderbaach*	500	15
		1.200	32

3. The proposal of the national agriculture plan "Plan du développement rural 2014-2020" is under evaluation in Brussels and has not yet been approved. Without the definite measures

and the actual rates we are unable to undertake official agreements with the farmers. Before the a.-e.m. freeze took effect we concluded 1 biodiversity contract.

Till the new AEM are official in the end of 2015 we are working on a pilot project on the Feierbech, a small catchment of 0,5 km^2 with agricultural activity on the river Our. The goal is a better understanding of the results of our water survey as the farmers are willing to give us a detailed list of the fertilisers applied on their fields. With the help of the counsellors of the national agriculture chamber and IBLA, a Luxemburgish institute promoting organic farming, it will be tried to reduce the nitrate input into the Feierbech. The challenge is the best possible land management with the current programs.

Table 6: agro-environmental measures

Catchment	River	n° agreement	area (are)	type
Our	Ettebaach	1	360	"biodiversité"* règlement grand-ducale du 10 septembre 2012 instituant un ensemble de régimes d'aides pour la sauvegarde de la diversité biologique en milieu rural, viticole et forestier
		Total:1	360	To do: 39

* for this type of contract the application of pesticides are forbidden and only fertilization with dung is allowed. The goal is the conservation of biodiversity.

4. A meeting with SIDEN and the technician of the municipality of Clervaux will take place in order to discuss the feasibility of the measure.

➢ Realised

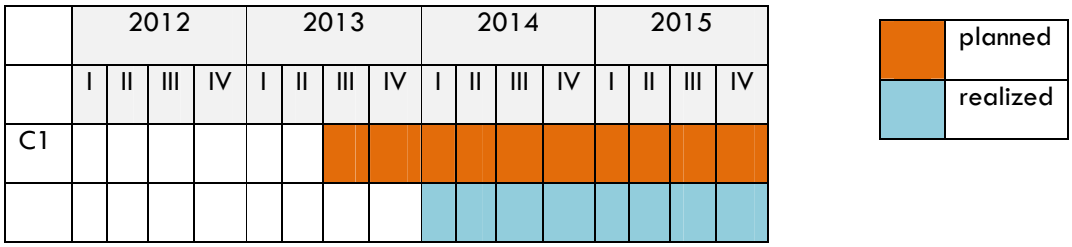
- Letters send to the farmers, see Annex 9.
- Offer for the measures "Folkesbour", see Annex 10.
- Biodiversity contract at Ettebaach, see Annex 11
- Invitation to the piloting Project, see Annex 12.

➢ Problems encountered/delays

We are aware that our restoration measures are delayed as we took more time than planned to initiate our monitoring method on the chosen sites. But we needed this additional time to be able to foreground measurable restoration effects. We are quite sure that from now on the realisation phase is proceeding quickly enough to achieve our objectives.

Table 7: Plan for the residual measures

Measure	Meeting	Permit	Offer	Implementation
fences, cattle watering installations, bridge	with farmers in order to get agreements for the residual 870 m Q2 2015	Q2 2015	Q3 2015	Q1-Q4 2016
water evacuation systems	Meeting with forest rangers to plan the 28 grids, meeting with the municipalities Q2 2015	Q3 2015	Q4 2015	Q4 2016-Q2 2017
agro-environmental measures	with ASTA and agricultural chamber Q4 2015, with farmers Q1-Q4 2016	/	/	Q1 2016-Q4 2017
Restoration of a river bed	with AGE and Ponts et Chaussées Q2 2015	Q3 2015	Q3 2015	Q4 2015



➢ Complementary action outside LIFE

We are supporting that the regulation "Règlement sur la voirie rurale et forestière" applied on the Sûre bassin will also be applied on the Our basin and help to avoid erosion while harvesting wood. See under chapter 5.4 Analysis of long-term benefits.

5.1.8 Action C2: Transformation d'obstacles à la migration des poissons sur les cours d'eau tributaires

The intention of this action is to remove or transform 6 migration obstacles for fish in order to make them passable again.

➢ Progress/results

Set up of a priority list for the fish obstacles that has been sent to the Water administration to plan the measures. Obstacles to be transformed are retained on the tributaries Ettebaach, Gemünder Akeschterbaach, Holzbech, Huuschterbaach and Traesbech for the river Our. Schwärzerbaach, Froumicht, Bëllerbaach, Haemicht and Syrbaach are the selected tributaries for the river Sûre. Together with the water administration we decided which obstacles should finally be removed or transformed.

Several meetings and site viewing with employees of the Water administration (Division de l'Hydrologie - Service Régional Nord): 10.01.2014, 28.06.2014, 08.09.2014, 20.10.2014, 29.01.2015, 12.02.2015

In our proposal we wanted to remove or restore 3 obstacles in each catchment area but there are now 4 obstacles in the catchment area of Sure. 3 of these obstacles are in the tributary "Schwärzerbaach".

The tributary "Schwärzerbaach" (catchment Sûre) is one of the cleanest streams in that area. There is very little income of sewage and no farming next to the stream. Most of the meadows are used in a sustainable manner. Therefore we decided to go on with the restoration of this stream.

The demands for the authorisations for the removal of 4 fish obstacles were sent to the Administration of Water and the Administration of Forest and Environment.

Another project is planned (Huschterbach, catchment Our) and the demand will be sent in June 2015 to the Administration of Water and the Administration of Forest and Environment.

Table 8: Planned obstacle transformations

Catchment area	Tributary	Obstacle	Planned	Demand	Estimated costs
Sure	Syrebaach	Ford - restoration	100%	04.02.2015	10.000
Sure	Schwärzerbaach	Big tube – removal of the tube and building a bridge	100%	12.02.2015	30.000
Sure	Schwärzerbaach	Tube – removal and building a bridge	100%	September 2014	25.000
Sure	Schwärzerbaach	Tube –lifting the river bed	100%	04.02.2015	10.000
Our	Huschterbaach	Big tube – removal and building a bridge	20%	June 2015	25.000
Our	Several options- see table 8 below		0%		

In the catchment areas are several places where we could remove fish obstacles. In these cases we are still in discussion with the Administration of Water (see Table 9).

Table 9: Potential obstacle removing places at the tributaries of the river Our and Sûre

Catchment area	Tributary	Obstacle	Problems
Our	Holzbech	Tube –lifting the river bed	Accessibility (in the wood, steeply sloping)
Our	Ettebach	Tube at the mouth –lifting the river bed	Accessibility (private land, steeply sloping)
Our	Roderbaach	Tubes and Zig-zag-water course	Course of the forest road
Our	Feierbech	Tube – removal and building a bridge	National street
Sûre	Froumicht	Tube – removal and building a bridge	Several tubes, confluence of several small streams

The Administration of Water offered us to do the planning of the removal of the fish obstacles at Schwärzerbaach, Huschterbaach and future projects. So we can save the money provided for the planning (external costs, A2) and use it for additional removal of fish obstacles. As above mentioned some more fish obstacles could be removed in the second period. The planning phase for these obstacles will be finished at the beginning of 2016. The constructions and transformations should be finalized in the middle of 2017.

As soon as we have the authorisation for the removal or restoration we will start with the work.

➢ Realised

- Priority list "Fish obstacles" for the tributaries of Our and Sûre (see action A2, Annex 1).
- Transformation Plan for the Schwaerzerbaach (see Annex 13)
- Demands for the authorisation of (see Annex 14)

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
C2																

planned

realized

➢ Complementary action outside LIFE

none

5.1.9 Action C3: Amélioration du substrat par dépôt de gravier

The intention of this action is to improve the quantity and quality of the river substratum in both rivers by the creation of clean gravel depots at five sites in each river.

➢ Progress/results

- River Our

5 sites for the gravel were chosen at first, but due to organizational means we decided to exclude one, so that the gravel dump is done on the 4 sites named Feischbour, Hiour, Kalbermillen and Groussenauel.

The letters to obtain the permission were sent to the authorities in Luxembourg and Germany in September 2012. Authorisation from Germany was available on the 30.10.2012 and from Luxembourg authorities on the 29.03.2013.

Dump of a total of 3x100 m^3 (the quantity for 2012, 2013 and 2014) of gravel (16-32 mm) from a local quarry at 4 sites (+/-25m^3 /site /year) in the Our has generally been done in the period from mid September to mid October, so that the winter flood can spread the gravel. The dump was always done at the same location.

- River Sûre

5 sites for the gravel were chosen at first.

The letters to obtain the permission were sent to the authorities in Luxembourg and Belgium in January 2013. Authorisation from Luxemburg authorities was available on the 12.06.2013 and a refusal from Belgium on the 07.03.2013.

The refusal was based on an "arrêté royal" from 1970 that interdicts the input of external material into the river in order to avoid flooding. It took us more than a year to get this demand revised and approved on the 23.06.2014.

In our new demand we excluded the inhabited sites near a village and a mill and we proposed 5 alternative sites. Finally we had to drop one more place because of its bad accessibility.

The deposit of 100 m^3 gravel (16-32 mm) from a local quarry has been done in October 2014 at 4 places named: Eilerhaff at 2 different sites, Esperbech and Aale Kessel (+/-25m^3 /site /year).

The gravel has been bought and delivered by Beton Weber Marnach and is declared under other costs for a total amount of 15.767,32€. The subcontractor who drove the gravel to the river was Entreprise Sevrin André for a total amount of 6.587€.

Figure 1: Dump sites at the Sûre and Our rivers

➢ Realised

Dump of 300 m^3 gravel in the river Our and 100 m^3 in the Sûre.

Maps with the final deposit sites see Annex 15.

➢ Problems encountered/delays

Because of the initial discordance with the Belgian "Service des Cours d'eau non navigable" (the details were explained in the progress report) we were not able to put the planned amount of gravel into the Sûre. In the coming years we will increase the amount to get the planned 500 m^3 and respect the schedule (see Annex 16).

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
C2																
							Our				Our	Sûre				

planned

realized

➢ Complementary action outside LIFE

none

5.1.10 Action C4: Elevage de *Unio crassus* pour la Grande Région

The action deals with all the necessary steps to culture juvenile *Unio crassus* at the rearing facility at the mill of Kalborn.

➢ Progress/results

All the necessary material to start the rearing activities was purchased since the beginning of the project. All consumables and durable goods are listed under C4 in the financial report. The most important durable goods purchased so far were:

- Computer and other IT :equipment: 5460,72€

-4 X 4 car (Dacia Duster): 20165,04€

- Cell Counter (Beckman Coulter) 47935,89€

A complete list of all durable goods can be found in Annex 17

In May 2013, the first host fish were artificially infested with larvae from *Unio crassus* originating from the river Sûre and river Our. Since then, this action is going on and so far two rearing seasons took place (2013 and 2014). External assistance was obtained by the company piscatorius on how to handle and keep the infested fish in the hatchery. The rearing activities are managed by the first scientific (Frankie Thielen) and by the technician (from 2012-2014 Leo Klein / since 2015 Karin Michels).

At the moment 1045 *Unio crassus* issued from the culture 2012 and 2013 (387 Sûre and 658 Our) are kept in sand-aquaria to grow them to a larger size.

➢ Realised

Rearing steps

The following steps are used to get juvenile mussels (Figure 2) and to grow the juveniles (Figure3).

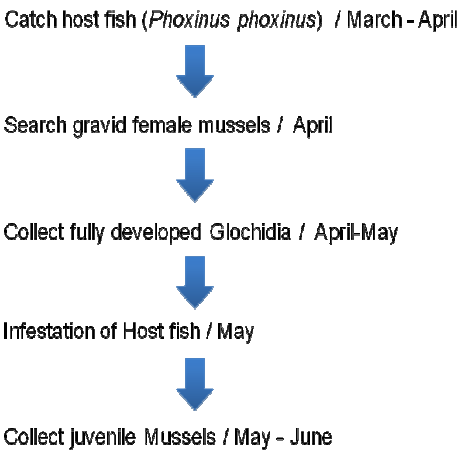


Figure2 : Rearing steps to get juvenile mussels

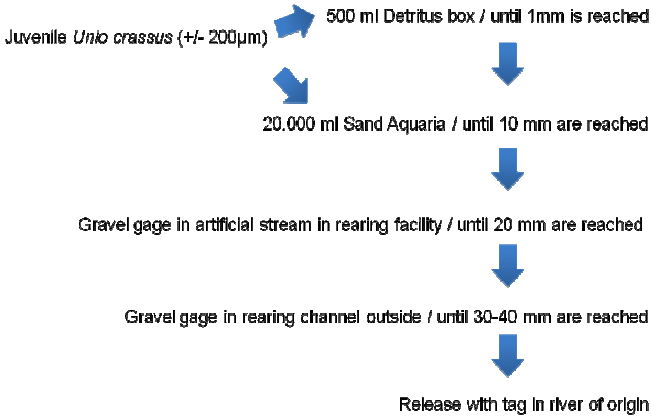


Figure 3: Steps to grow juvenile mussels

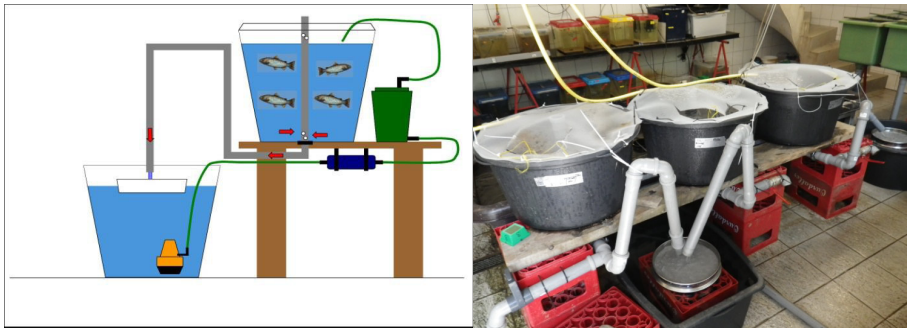


Figure 4: Mussel collecting installation (Schematic view and Photo)

Table 10: Summary of rearing activities in the seasons 2013 and 2014

	Promised / realized 2013	**Promised / realized 2014**
Fish infestation	400 /563 (+320 *S.trutta*)	400 /665
Release in cages	200 /100 +170 released without cage	200/0
Use in collecting installation	200 / 523	200/665
Juvenile mussels collected	5000 /2693	5000/4234

First results about the rearing activities can be found in the rearing protocol (see Annex 5).

So far, no juvenile mussels were released in the **main stream** of the river Our and river Sûre. However first *Unio crassus,* originating from the river Our, were released in the **rearing channel** in gravel boxes (9 boxes with 15-20 mussels). Also 6 hole-gages filled each time with 20 mussels were installed in the **mill race way**. These, under controlled conditions released mussels, can be checked regularly and physical and chemical water parameters are analysed weekly in the mill race way and the rearing channel.

Problems encountered/delays

- **Problem:** *Phoxinus phoxinus* carried fewer larvae after the infestation than expected.
  - **Solution:** The concentration of the infestation solution will be augmented and more good infested host fish will be used to collect the juvenile mussels. This was already done in 2014 and more juvenile mussels could be collected (4234 in 2014 compared to 2693 in 2013).
- **Problem:** Installation of cages in the river Sûre and Our was difficult due to high water levels (thunderstorms).
  - **Solution:** This problem cannot be foreseen. If impossible in the respective year, no infested fish will be released in cages.
- **Problem:** *Salmo trutta fario* seems not to be the optimal host fish.
  - **Solution:** The Brown trout strain from the hatchery will not be used again for infestation. Instead more *Phoxinus phoxinus* from the source rivers Our and/or Sûre will be used as was already done in 2014.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
C4																

planned
realized

➢ Complementary action outside LIFE

Colleagues from the ecological company ecolo-gis working on a Mussel conservation project (NOT Life) contacted us to get advice on rearing *Unio crassus*. Three aquaria with mussels from Germany and Switzerland are looked after at the mill of Kalborn.

5.1.11 Action C5: Régulation de la prédation du rat musqué

The muskrat are captured twice a year to reduce and/or to maintain the populations at a low level in the mussel rivers.

- **Progress/results**

At the beginning of the project, it was foreseen that the trapping would be done twice a year, once in spring and once in autumn. The trapping started therefore on both rivers, Our and Sûre, in autumn 2012. From 2013 the two hunters, who are dedicated to the Life project, got additional missions from the ANF on both catchments. They are present nearly the whole year, so they were able to chose the most adequate moments, for example at low water level, for trapping. As this working method produced quite good results, from 2014 the two hunters were no longer limited just on spring and autumn.

Up to December 2013 the capturing was done with traps set into the dens. In order to avoid injuries of tourists or other people on the riversides floating traps were built and used from 2014 on.

Figure 5: Floating trap for muskrats

Table 11: Caught muskrats at the Sûre and Our rivers from autumn 2012 to December 2014

Capturing period/ Nb. of muskrats	2012	2013	2014	Total:
River Our	8	50	46	**104**
River Sûre	3	19	21	**43**

The construction of the floating trap needed a financial invest of 721,30 €

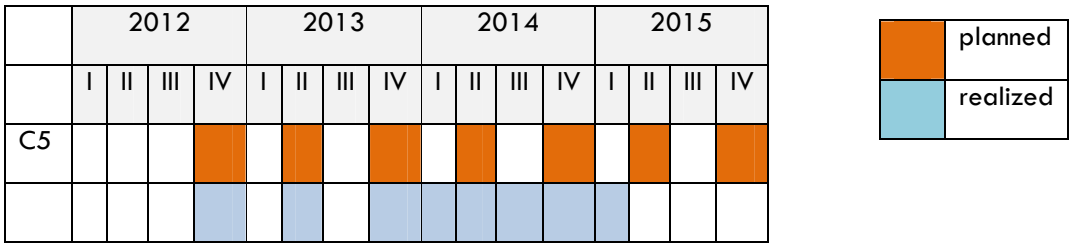
➢ Realised

Detail of capturing period and place, number of trapped muskrats, see Annex 18.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.



➢ Complementary action outside LIFE

The captured muskrats were sent to the Universität Hohenheim Institut für Zoologie (Germany) to analyse the infestation of the muskrats with the Cyclophyllid tapeworm *Echinococcus multilocularis*. These analyses were part of the Bachelor thesis entitled *Echinococcus multilocularis* und andere Cestodenlarven in Bisamen (*Ondatra zibethicus*) aus Luxemburg. Sebastian Nicodemus 2012 (see Annex 19). 147 muskrats were suitable for examination and further analyses. *E. multilocularis* was found in 8.8% (13/147) of the muskrats at different locations around the rivers Sauer and Our. *Taenia taeniaeformis* was found with a prevalence of 57.8% (85/147). For *E. multilocularis*, five different genotypic variants were found. Prevalences for both parasites were in a range that could be expected for Luxembourg, taking into account results from muskrat surveys in surrounding regions. In conclusion, the level of *E. multilocularis* infestation in the muskrats suggests a moderate level of endemicity, in line with the situation in central Belgium. The results confirm the suitability of the muskrats for surveillance of *E. multilocularis*, especially in the absence of any data from definitive hosts (foxes). The results of this study have no relevance for the protection of *Unio crassus* and the Life project.

5.1.12 Action D1: Surveillance de la qualité de l'eau et du substrat interstitial

The water quality is a key issue for the protection of the thick shelled river mussel and is monitored within this action.

➢ Progress/results

The monitoring of the water quality of the river Our started in September 2012, followed by the river Sûre some weeks later in October 2012.

Once a week a sample from each river is taken and analyzed. The parameters temperature, pH value, conductivity, turbidity, oxygen concentration, ortho-phosphate, nitrite, ammonium, chloride (since September 2013) and nitrate were determined.

The online monitoring system on the river Our works since September 2013.

The mobile online monitoring system was tested first in river Our and then brought to the tributary Syrebaach. Since August 2014 the tributary Syrebaach was monitored.

It is important to know the water quality of most of the tributaries from both rivers, Our and Sûre. These results will help to evaluate further restoration measures (C1 and D4). Once per season, or if necessary more often for investigative monitoring, the tributaries are sampled. The tributaries and its springs have been sampled four times in the last period. The sampling points with a map and picture can be found in Annex 20

900 samples of the rivers, streams and springs were measured in the period of September 2012 to February 2015.

In table 12 the average of the samples are listed. An detailed description of the results can be seen in Annex 2.

Table 12: Average of all samples done between September 2012 and February 2015.

Sample area	Number of samples	Ammonium [mg/L]	Nitrite [mg/L]	Nitrate [mg/L]	Comment
Our/ Moulin de Kalborn	106	0,08	0,05	17,1	High nitrate concentration means a high concentration of nutrients and their adverse effects to the river
Sure/ Moulin de Bigonville	97	0,09	0,05	16,6	Higher values of ammonium occurred by pollution with sewage water. High nitrate concentration means a high concentration of nutrients and their adverse effects to the river

Mouths/ tributaries	168	0,15	0,04	26,0	Some tributaries are polluted with sewage water.
Springs/ tributaries	371	0,53	0,06	37,6	Most of the springs are loaded with nitrate. High concentration of ammonium and nitrite is caused by sewage water in the spring area.

The average of nitrate in the springs is below 50 mg/L but 21% of all samples are higher than 49,9 mg/l and 46% higher than 37,5 mg/L.

The nitrate concentration is regarding the needs of *Unio crasssus* to high. The recommend value for nitrate is below 8,0 mg/L (see „Leitfaden Bachmuschelschutz", Bayrisches Landesamt für Umwelt).

For ten sampling points the concentration of several metals and pesticides were determined by the laboratory of Administration of Water. This happened July 2013 and July 2014. The detection of pesticides in surface water depends on the application of pesticides the days before sampling and on the weather situation (rain, wind). Further details can be seen in Annex 2 / part 1.4.

To have an overview over the quality of the interstitial, redox measurements were done (see D4).

In September 2014 was an accident with pesticides next to a tributary of the Sûre in Belgium. A big amount of a ready for use mixture came into the tributary and then into Sûre.

As we have no possibility to measure the pesticide concentration in our laboratory, we have to use the official website of www.sebes.lu to get information about the metazachlor concentration in river Sûre. A summary of this accident is shown in Annex 2.

In the last year we planned measures (see A2) to reduce the income of fine sediment. The efficiency of these measures should be documented. Therefore we installed sediment boxes (see D4). But to have a better conclusion it is important to monitor the turbidity as well. So we asked offers for mobile turbidity loggers.

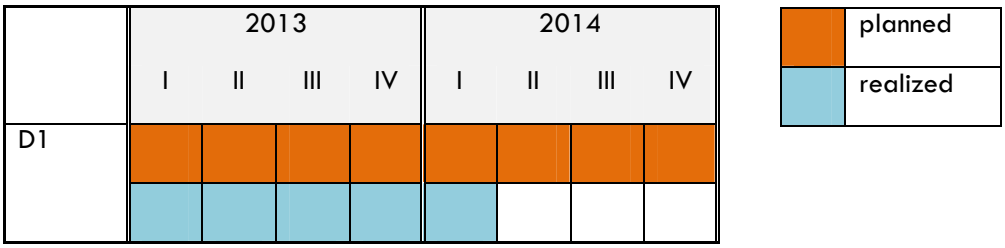
➢ Deliverables

Annex 2 shows graphs of the measurements for both rivers, its tributaries and the summary of the accident with pesticide in Belgium.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.



➢ Complementary action outside LIFE

We followed the development of the pesticide incident on the river Sûre (see above and Annex 2).

5.1.13 Action D2: Monitoring des poissons hôte

This action should give an overview about the host fish population in both rivers (Our and Sûre) and their tributaries.

➢ Progress/results

A permission from the MIGR to perform electric fishing in the river Our and Sûre and the respective tributaries was issued on November25th, 2013 and is valid until 2015 (see Annex 21).

Electric fishing in the river Our 2013

- 06.06.2013: Electric fishing at the river Our (Grossenauel + Dornaulsmühle).

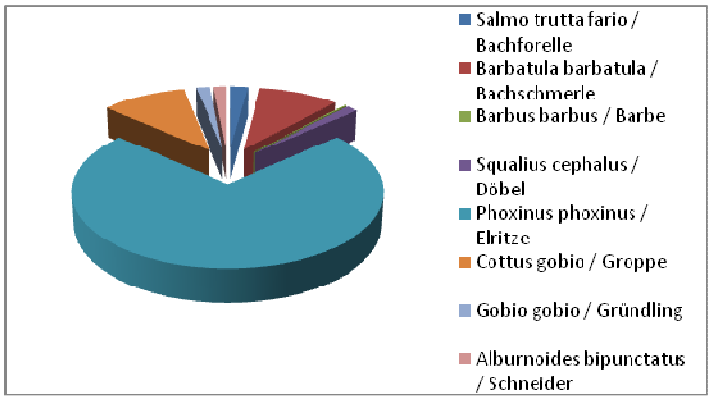


Figure 6. Fish composition in the river Our in summer 2013

Table 13: Infestation parameters of 3 fish species in the river Our at two sites

		Mean abundance	Mean Intensity	Prevalence [%]
Our Grossenauel	***Phoxinus phoxinus***	2,3	3,8	60
	Cottus gobio	0	0	0
	Salmo trutta fario	0	0	0
Our Dornaulsmühle	***Phoxinus phoxinus***	3,3	3,7	90
	Cottus gobio	0,2	1,0	22
	Salmo trutta fario	0	0	0

Mean abundance: This is the mean number of parasites found in all hosts (involves the zero values of uninfected hosts).

Mean Intensity: This is the mean number of parasites (here glochidia in the gills) found in the infected hosts (the zeros of uninfected hosts are excluded).

Prevalence: This is the proportion of infected hosts among all the hosts examined.

In the river Our the expected fish composition was found. Especially the high number of minnow (*Phoxinus phoxinus*) is positive for the reproduction of *Unio crassus* as the parasitological investigation showed that minnow is the most important host fish for *Unio crassus* in the river Our system. 60-90% of the minnows investigated had about 4 glochidia of *Unio crassus* on their gills. But also bullhead (*Cottus gobio*) can act as host fish.

Electric fishing in the river Sûre 2013

- 01.07.2013 and 19.07.2013: Electric fishing at the river Sûre (Moulin de Bigonville, Wolsriech + Moulin d'Oeil, Heckeriech).

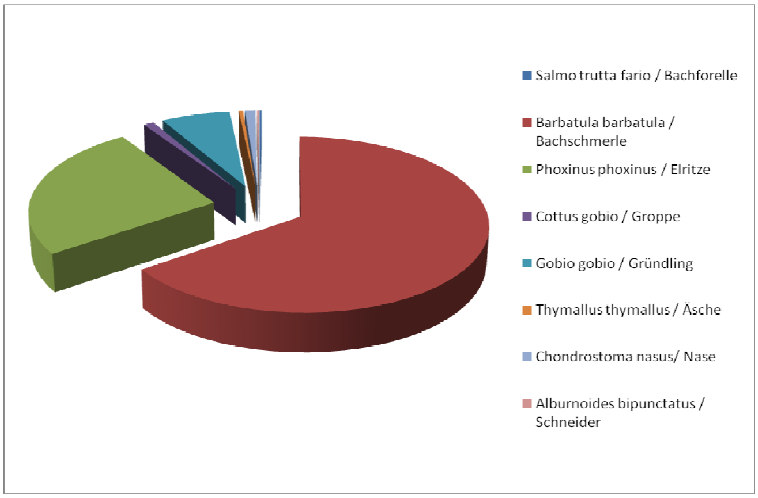


Figure 7. Fish composition in the river Sûre in summer 2013

Table 14: Infestation parameters of 3 fish species in the river Sûre at two sites (na: not available)

		Mean abundance	Mean Intensity	Prevalence [%]
Sûre Oeil	***Phoxinus phoxinus***	9,6	10,7	90
	Cottus gobio	0,1	1,0	11
	Salmo trutta fario	na	na	na
Sûre Bigonville	***Phoxinus phoxinus***	1,86	3,25	57
	Cottus gobio	na	na	na
	Salmo trutta fario	na	na	na

The river Sauer has all the typical fish one would expect in the analyzed river stretches. However compared to the river Our minnow is only the second most abundant fish species. As in the river Our, minnow is also for the river Sauer system the most important host fish. 57-90% of the minnow were infested with 3-10 glochidia of *Unio crassus*. Again, as for the river Our, also bullhead acts as host fish.

Electric fishing at 8 tributaries of the river Our

The following tributaries were analysed by electric fishing in the river Our catchment in December 2013. Between 1 and 3 sites were analysed per tributary, depending on the connectivity and size of the respective stream.

Table 15: Electric fishing at Our tributaries

Date	Tributary	Sites	Species	Individuals
02.12.2013	Träsbech	2	2	29
03.12.2013	Fallbech	1	0	0
03.12.2013	Etterbaach	1	0	0
03.12.2013	Holzbech	2	1	22
06.12.2013	Houschterbaach	3	2	83
06.12.2013	Gemünder Akeschterbaach	1	1	30
03.12.2013	Stolzebuerger Akeschterbaach	2	1	6
05.12.2013	Klangbaach	1	1	23

As expected, bullhead and brown trout could be found in these small tributaries. As bullhead acts as second most important host fish for *Unio crassus* it is important to improve the connectivity of the tributaries with the main stream. The Fallbech and Etterbach have no connectivity with the main stream due to a large pipe-construction under a larger road and no fishes were detected in these tributaries. Both tributaries are rather small and removing these two obstacles makes no sense.

Electric fishing at 3 tributaries of the river Sûre

The following tributaries were analysed by electric fishing in the river Sûre catchment in December 2013. Between 2 and 3 sites were analysed per tributary, depending on the connectivity and size of the respective stream.

Table 16: Electric fishing at Sûre tributaries

Date	Tributary	Sites	Species	Individuals
04.12.2013	Syrbaach	3	8	128
04.12.2013	Froumicht	2	2	12
05.12.2013	Schwärzerbaach	3	2	71

The Syrbaach is already a larger tributary and 8 different fish species could be detected. Froumicht and Schwärzerbaach are two smaller tributaries with its typical fish species, brown trout and bullhead. In the Schwärzerbaach a pipe construction stop's the fish migration about one kilometer upstream from the confluence with the river Sûre. Here the removal of the obstacle makes sense and is already planned under action A2 and C2.

A short report about the fish composition in the river Our and Sauer is available online at our internet site www.unio.lu.

➢ Realised

As foreseen under this action:

In 2013: Electric fishing at the river Our and river Sûre at 2 sites in each case. Investigation of the natural infestation rate.

In 2013: Electric fishing at 8 tributaries of the river Our and 3 tributaries of the river Sûre.

In 2014 no electric fishing activity was foreseen.

In 2013 and 2014: Electric fishing at the river Our in April 2013 and 2014 to obtain host fish (*Phoxinux phoxinus*) for infestations with glochidia from *Unio crassus*.

➢ Problems encountered/delays

The date of the electric fishing at the tributaries did not take place, as foreseen in the timetable, in the 2nd quarter of the year, but in the 4th quarter (October –November). During this period the water level in the tributaries is higher which allows electric fishing and this period is thus safer for the fish population.

No other problems encountered so far.

The time plan for this action is on schedule for the river Our and Sauer and changed slightly for the tributaries.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
D2																

planned
realized

➢ Complementary action outside LIFE

none

5.1.14 Action D3: Suivi de *Unio crassus* dans son milieu naturel

The status of the *Unio crassus* populations in both rivers (Our and Sûre) was last investigated in 2003. To gain new information about the population size, age structure and habitat use, the intent of this action is to monitor the mussel population in both rivers.

➢ Progress/results

- Estimation of *Unio crassus* population density:

The monitoring began in 2013. We are using the visual method that consists in progressing with a bathyscope over the river bottom. At each riverside one person prospects over a width of about 3 m and over a distance of 500 m per river section. While 2013 the meteorological conditions were quite favourable, the rainy summer in 2014 didn't allow continuous prospections.

On the river Our 30% of the survey have been done (9 km for a total of 30 km).

On the river Sûre 30,45 % of the survey have been done (3,5 km for a total of 11,5 km).

By this method we found very low densities for both rivers that proves the probably unsatisfactory state of the population.

Our: min. 0,005 ind/m^2, max 0,08 ind/m^2

Sûre: min. 0,003 ind/m^2, max 0,13 ind/m^2

- Estimation of *Unio crassus* population structure:

Age determination of *Unio crassus* shells from Sûre and Our rivers were done by Elena Dunca, Bivalvia "Age determination of *Unio crassus* shells from Sauer and Our rivers" by microscopic analysis on 136 shells. The age of the mussels varied between 2 and 29 years in Our population, 4 and 28 in Sûre population. In order to use age-shell length relationship to estimate the age of other mussels in future monitoring work, a growth curve was calculated using the best fit logarithmic curve for each population. The report can be found under Annex 22.

For estimation of population structure, 2 sites have been selected:

1. Our: 114 mussels have been measured and marked with tags near to the old dam of the Kalber mill
2. Sûre: 108 mussels have been measured and marked with tags underneath the mill of Bigonville.

The mussels will be controlled every year for their fitness and survival.

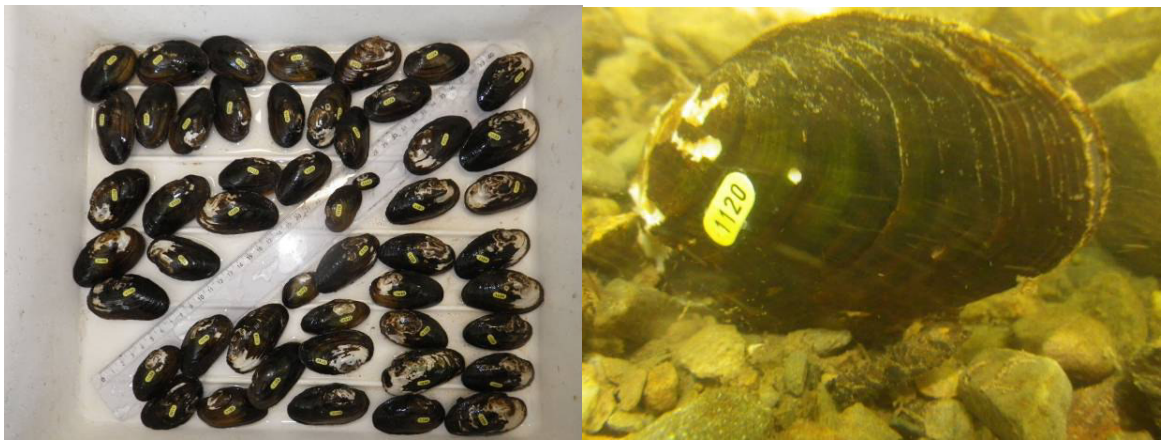


Figure 8. Tagged mussels

- Estimation of *Unio crassus* survival rate:

A first tagging of 92 mussels has been done in 2013 in the mill channel. At the prospections at 2014, 16 empty shells were found.

- Sediment fraction analyses

To get information about the sediment composition, the mussels are living in, samples have been collected in plastic cages (2l boxes 20x14x7cm) at each mussel bank.

1. Our: near to the old dam of the Kalber mill
2. Sûre: underneath the mill of Bigonville.

The method consists in sieving and fractioning the samples with Reetsch. The following fractions have been determined. We can see that for the mussel in the Sûre river the fraction > 2mm is dominant whereas in the bank in the Our river the smaller fractions are dominating. On both sites we have mussels, for the moment we are not able to draw conclusions about how the sediment must be composed. There is a need for analysing further banks that will be done this season.

Table 17: Sediment fractions at 2 mussel sampling sites

Date	site	> 2 mm	> 630 µm	> 63 µm	< 63 µm	Summe	> 2 mm	> 630 µm	> 63 µm	< 63 µm
30/05/14	1	2,45 g	3,06 g	70,08 g	92,84 g	168,43 g	1,45%	1,82%	41,61%	55,12%
02/07/14	2	1628,30 g	89,06 g	14,08 g	12,13 g	1743,57 g	93,39%	5,11%	0,81%	0,70%

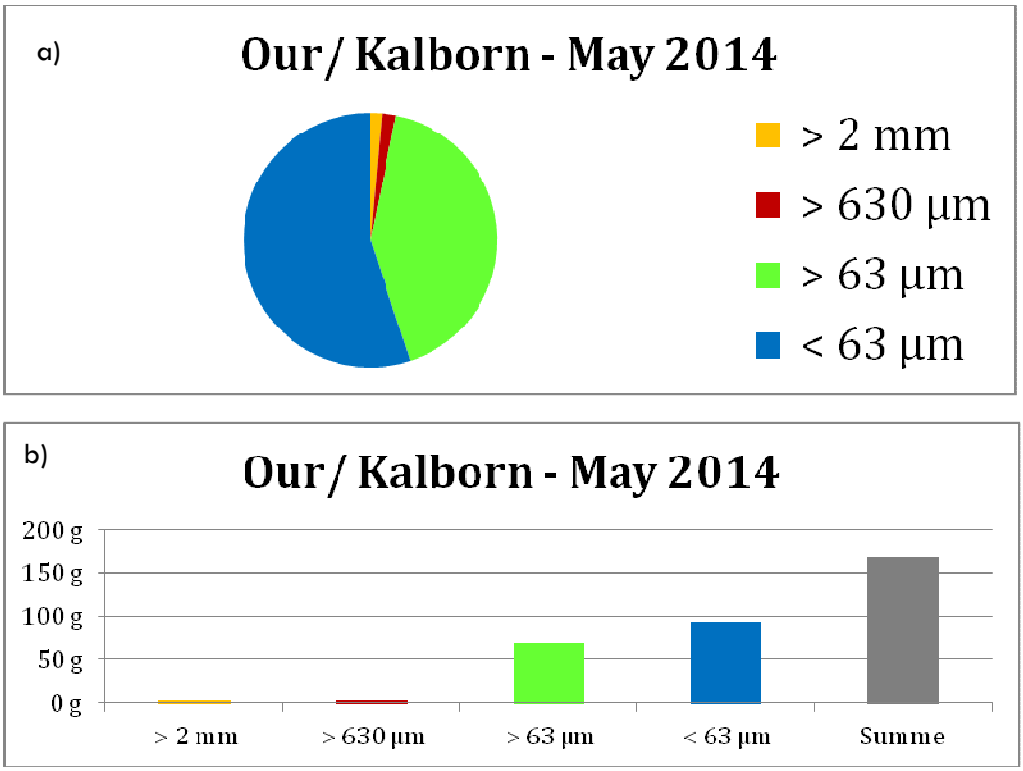


Figure 9. Percentage a) and amount b) of the different sediment fractions at the sampling site Our

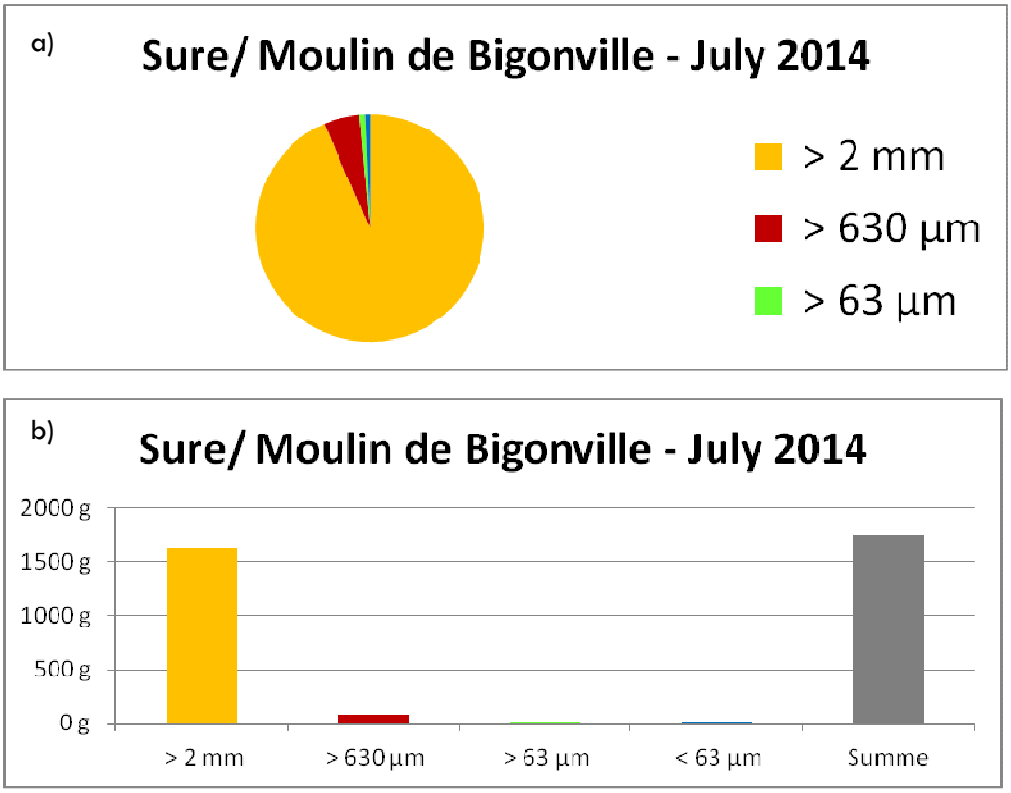


Figure 10. Percentage a) and amount b) of the different sediment fractions at the sampling site Sûre

Table 18: Fertility control

Date	Sûre	Our
22-29.04.2013	50	100
10.04.2014	63	50

At each river catchment some mussels were temporarily transferred to the breeding station in order to collect the larvae (see C4). Mussels were tagged and transferred to the mussel rearing station. After the release of their glochidia, they were placed back into the rivers.

- Mussel release

First mussels will be released after the third year, so in 2016.

➢ Realised

Table 19: Monitoring of *Unio crassus* in the rivers Our and Sûre and Syrbaach (a tributary of the Sûre).

	Our (30 km)	**Sûre (11,5 km)**	**Syrbaach (2,2km)**
Prospected (km)	9	3,5	2,2
mussels alive	1247	686	0
empty shells	694	454	7

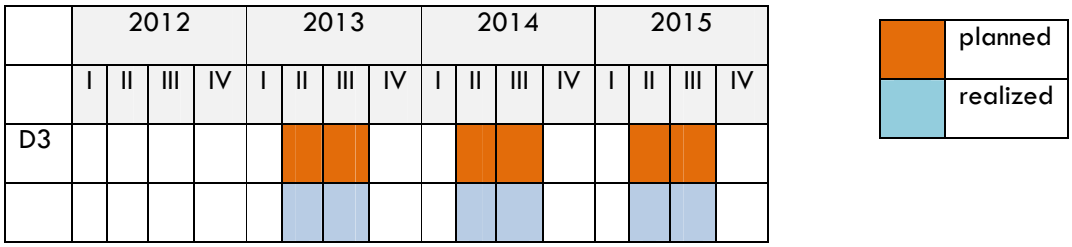
- Offer and report "Age determination of *Unio crassus* shells from Sauer and Our rivers" by Elena Dunca, Bivalvia in collaboration with the Swedish Museum of Natural History, dept. Palaeobiology, Stockholm, Sweden age determination (see Annex 22 for the report).
- Monitoring site Our (see Annex 23).
- Monitoring site Sûre (see Annex 23).
- Monitoring site Syrbaach (see Annex 23)

➢ Problems encountered/delays

On the Sûre, after rainfall the water stays turbid for a long period so that the prospecting conditions are very often insufficient. For 2015 we preview to mobilize more people for the mapping in order to proceed quicker.

No other problems encountered so far.

The time plan for this action is on schedule.



➢ Complementary action outside LIFE

While prospecting for the thick shelled river mussel in the Sûre we frequently noticed the presence of the signal crayfish (*Pacifastacus leniusculus*), a non-native species whose home is in British Columbia in Canada and the Northwest of the USA. As we wanted to know if this species is a supplementary danger for the mussels we initiated on the river Sûre a Master project done by Elisabeth Kirsch, entitled "Predatory impact of the non-native signal crayfish (*Pacifastacus leniusculus*) on the endangered thick shelled river mussel (*Unio crassus*) with the supervision of the Faculty of Biological Sciences, University of Leeds (see Annex 24).

5.1.15 Action D4: Monitoring et évaluation de l'impact des mesures concrètes

The aim of this action is to develop and apply a pre- post-monitoring protocol in order to evaluate the effectiveness of the used restoration methods.

➢ Progress/results

The initial status quo of water quality and population of *Unio crassus* will be used as reference for the evaluation of prospective measures.

The success of the restoration measures will be evaluated by the monitoring of concrete parameters (water quality, turbidity, quality of substrate and the host fish population).

The monitoring of the water quality of the rivers Our, Sûre and their tributaries is in operation. (see D1).

The composition of the host fish population was already monitored at all relevant sites (see D2).

The monitoring of the *Unio crassus* population in its natural environment started in spring 2013 (see D3).

The mussel breeding started in spring 2013 (see C4).

On selected places an intensive monitoring is done. That means that on this sites once a week a water quality sample is taken, sediment traps are installed, intestinal quality will be measured and the host fish population was monitored.

➢ Realised

A good overview about water quality (D1), host fish population (D2) and *Unio crassus* population (D3) is achieved. A good overview about water quality (D1), host fish population (D2) and *Unio crassus* population (D3) is achieved. For water quality see for instance D1 and Annex 2.

Table 20: Pre-restoration analysis of different parameters at different sites

River/ Tributary	Planned measures	Water quality	Sediment traps	Intestinal quality	Host fish population
Sûre - Schwärzerbaach	Remove tube and build a bridge (2 times), lift the river bed	yes	yes	planned	yes
Sûre - Syrebaach	Restore of a ford	yes	yes	planned	yes
Our - Roupelsbaach	Fencing spring and stream	yes	yes	planned	planned
Our - Folkesbur	Fencing spring and stream	yes	yes	planned	planned

Our - Huschterbaach	Remove tube and build a bridge	yes	yes	planned	yes
Our	gravel	yes	no	yes	yes
Sûre	gravel	yes	no	yes	yes

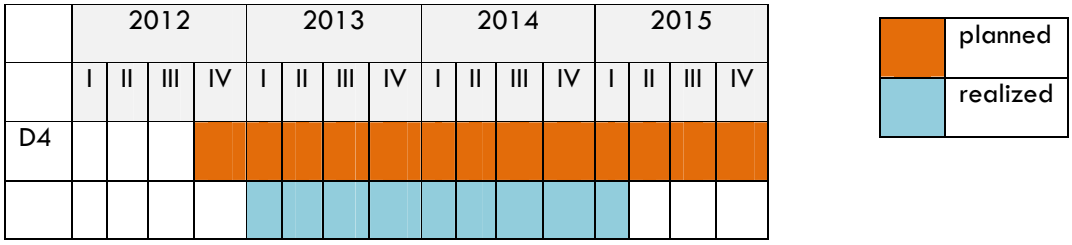
All the equipment necessary for the monitoring has been bought under action D1.

An overview of the already achieved results on the selected sites can be seen in Annex 3.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.



➢ Complementary action outside LIFE

none

5.1.16 Action D5: Analyse de l'impact socio-économique du projet et de l'effet sur les écosystèmes

The objective is to assess the impact of the Life Nature project on the welfare of the region and its populations.

➢ Progress/results

This action is not scheduled for the moment.

➢ Realised

No deliverables are foreseen for the moment.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
D5																

	planned
	realized

➢ Complementary action outside LIFE

none

5.1.17 Action E1: Information et sensibilisation des acteurs concernés

The reduction of the input of nutriments and fine sediments in the aquatic ecosystem is of great importance in the present Life project. This action intends to inform all actors responsible for water quality in the river catchment and tries to motivate them to help to enhance the water quality.

➢ Progress/results

We try to keep a good contact and to have regular exchange with the different authorities and with the farmers of the project area.

In the report period, the two water forums for the river Our and the river Sûre catchments took place. For the river Our catchment we were able to invite stakeholders from the three concerned countries (Belgium, Germany, Luxembourg) and for the river Sûre catchment, stakeholders from the two concerned countries Belgium and Luxembourg.

Two information evenings for the farmers were organized and planned (see below). For the small catchment of the Feierbech, additional meetings with farmers were organized (see below and action C1).

The information leaflet for the farmers will be produced, after the last information event for the farmers, because the content of the leaflet will focus on the information given during these information events.

➢ Realised

We had about 57 meetings and contacts with authorities and other actors between 2012 and 2015 (see Annex 25).

In the report period, the following information activities for the stakeholder took place as planned:

- 27.11.2013: Seminar for farmers "Loss of soil through water erosion - protect soil using good practice methods", about 70 participants. (Program and invitation see Annex 26).
- 02.04.2014: 1st water forum for the river Our catchment. Representatives from sewage water treatment, the nature parks and the water management office were invited. 20 participants from 3 countries participated (Program and invitation see Annex 27).
- 23.07.2014 Meeting with the Minister of durable Development and Infrastructure at the Kalber mill. Themes to discuss: insufficient water quality and proposal of solutions. (Letter and report of the meeting see Annex 28)

- 12.11.2014: 1st water forum for the river Sûre catchment. Representatives from sewage water treatment, drinking water treatment, the nature parks and the water management office were invited. 12 participants from 2 countries participated (Program and invitation see Annex 29).
- 14.11.2014 and 10.02.2014 Meeting with farmers from the catchment of the Feierbech for a pilot project on monitoring nutriments (NO_3) in this small catchment. In collaboration with the chamber of agriculture and IBLA. So far 6 out of 10 concerned farmers participated in the meetings (See also action C1) (Meeting invitation Annex 12).

  The next information evening for farmers is planned for the 4th of march.
- 21.01.2015: Meeting with the Minister of Agriculture: Themes to discuss the revision of the national action plan of phytopharmaceutical substances and the national agriculture plan PDR.
- 04.03.2015: 2nd Seminar for farmers "Use of pesticides. How can negative effects be reduced". (Program and invitation see Annex 30). As the information sessions are very close to the daily practice of the farmers the discussions are very stimulating as well for the farmers, for the personal from the administrations as well for the life team. The goal is better to understand the sorrows of each other and may be find solutions together.

Overall the strategy to inform the stakeholders shows a positive development. With the help of the two transborder water forums we were able to meet the responsible persons from the different countries and vice versa. On the long run the protection of the *Unio crassus* populations is in both river systems only possible with the help of the neighbouring countries.

Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule. Contact with different stakeholders is constantly and is not only restricted to the periods highlighted in orange in the table below.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
E1																

planned
realized

Complementary action outside LIFE

none

5.1.18 Action E2: Sensibilisation du grand-public

This action tries to inform people about the sense of the Natura 2000 network and the overall intent of the project by the following means:

1. Information of the population: 1 session/river at the beginning and end of the project.
2. Press release : 100-150 articles
3. Project Flyer: 1
4. Notice board: 2
5. Film: 1
6. Exhibition: 1
7. Natura 2000 visiting room: 1

➢ Progress/results

1. Information of the population of the project area:
   - Starting event: Presentation of the Life Nature project on the river Our catchment the 12.12.2012. Audience of about 100 people. Presentation of the Life Nature project on the river Sûre catchment the 20.02.2013 Audience of about 55 people.
     Groups of people visiting the mill are informed throughout the year (see Annex 31). Beside the personal input of the staff there are no costs for this aspect.
2. Press release: 34 articles since start of the project (Annex 32).
3. Project Flyer
   - Flyer in English, German and French was designed and printed by MUM for a total amount of 1.347,80€ (Annex 33).
4. Notice board
   - Work will start in 2016 with the implementation of the first measures.
5. Film
   - Work will start in 2015 with the implementation of the first measures.
6. Exhibition:

The exhibition was presented on the following occasions:

- Oekofoire, the only yearly trade fair in Luxembourg that deals with environment. Between the 14th and 16th September 2012, 14.300 persons were visiting the fair.
- Starting events 12.12.2012 and 20.02.2013.
- Naturparkfest in Naturpark Our/ Hosingen, 08.08.2013.
- Seminar for farmers, 27. 11.2013 "Loss of soil through water erosion - protect soil using good practice methods ".
- World water Day in Esch-sur-Sûre 22.03.2014
- First water forum for the river Our catchment 02.04.2014 in Heinerscheid.
- First water forum for the river Sûre catchment date ? in Esch-sur-Sûre
- Interlife 09-10.12.2014 at the Kalbermill.

The exhibitions will be expanded with 3 boards and will be adapted to the look and the needs of the Natura 2000 visiting room. Offer for a whole concept is asked to atelier graphique kurth.

7. Natura 2000 visiting room:
   - The restoration of the old house at the mill is achieved and the Natura 2000 visiting room is on the way to finally be installed. (Figure 11)

Figure 11. Future Natura 2000 room

➢ Realised

Flyer, 5 exhibition boards, different press articles in print and online media.

About 1566 people were informed during different visits at the mill and other events (see Annex 31).

Table 21: Visitors and people informed during the project time

	2012	2013	2014	2015	Total
Visitors at the mill	46	261	659	28	
People informed during other events	300	200	100		
Total	346	461	759	28	**1566**

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
E2																

planned
realized

Figure 12: Visit of school class at the mill

Figure 13: Information desk at the "Naturparkfest 2013"

➢ Complementary action outside LIFE

In the last two years the house and the barn of the Kalber mill have been renovated by the funding of the Luxembourgish social charity "Oeuvre Grand-Duchesse Charlotte". The financial investment is about 750.000 €. The Life Unio "Natura 2000 room" is included in the transformed building. In future, this part of the mill will serve educational purposes and will inform about the Natura 2000 network.

5.1.19 Action E3: Création d'un site Web

Creation of a website. The project homepage will give the opportunity to inform all interested people about the progress of the project. Furthermore, technical documents, provided as download, should help other projects working in a similar field.

- **Progress/results**

Since June 2013 the website is fully accessible in all three languages (English, French and German). The download section called "Project-Data" is also online and documents are available.

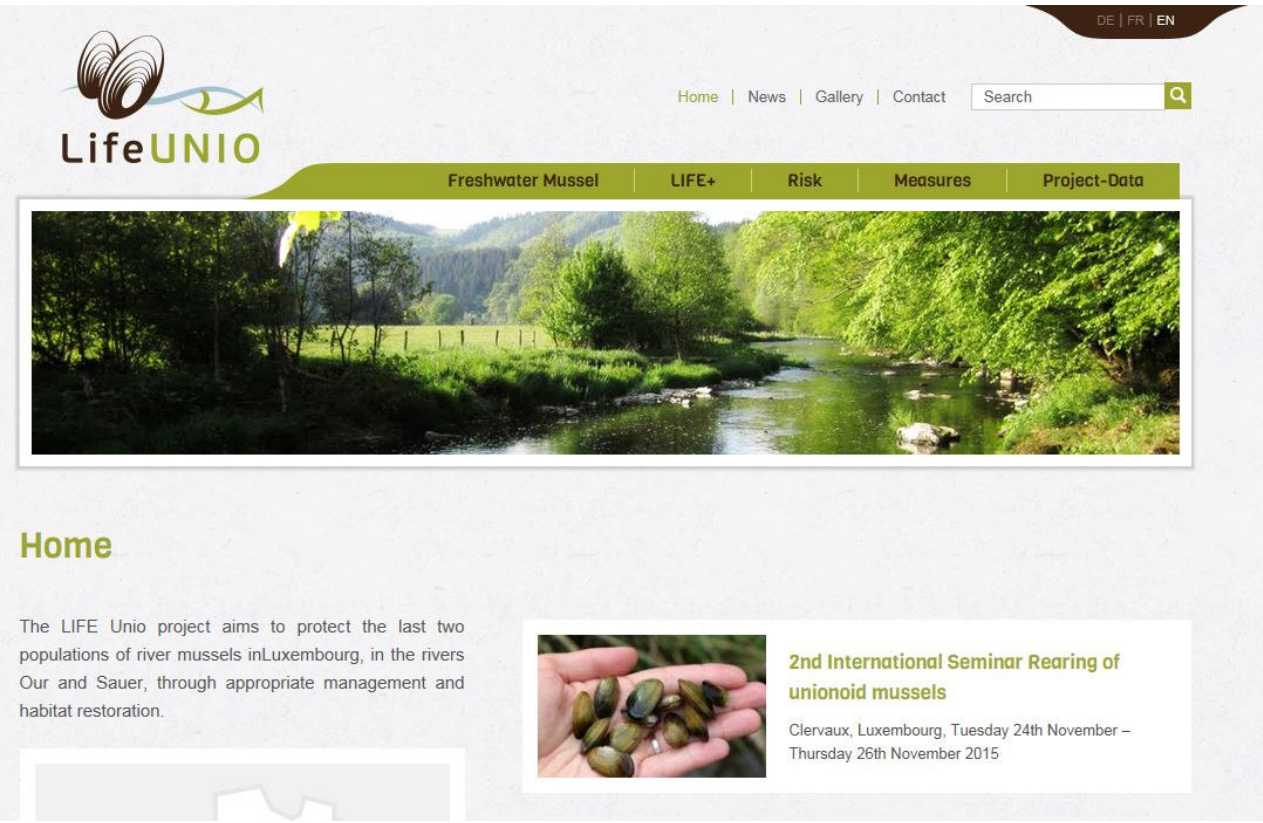


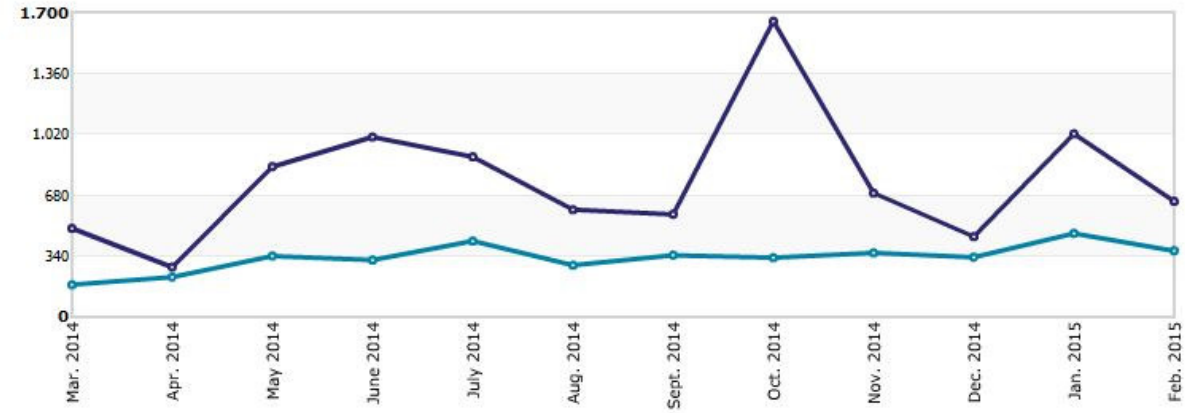
Figure 14: Screenshot of the entrance page

To keep the site attractive we try to add news at least once per month.

Interval Annual From March 2014 until February 2015

Overview | Pages | Entry-Pages | Downloads | Languages | Origin | Referrals | Search

Overview



General overview of the website frequentation total and average values

INFORMATION	TOTALS	Ø AVERAGE
Hits	**71.247** Hits	**5.937** Hits / Month
Visits	**9.125** Visits	**760** Visits / Month
Visitors	**3.957** Visitors	**329** Visitors / Month

Details of website frequentation grouped by date

DATE	VISITS	VISITORS	HITS	TRENDS
February 2015	644	368	1.394	
January 2015	1.021	465	3.137	
December 2014	447	332	1.344	
November 2014	690	356	2.683	
October 2014	1.650	329	41.496	
September 2014	572	344	6.197	
August 2014	597	287	2.456	
July 2014	893	422	2.800	
June 2014	1.003	316	1.941	
May 2014	838	339	1.968	
April 2014	277	221	1.378	
March 2014	493	178	4.453	

Figure 15: Web statistics

The number of visitors and visits is increasing since June 2013. The mentioning of the website "www.unio.lu" at every event and in every publication will help to increase the number of visits.

➢ Realised

Website in three languages realised and news or documents added +/- 12 times a year. The company MUM has designed our website for a total amount of 6.925 €. The regular update is done by the Life team. Yearly hosting costs of 195 € are due from 2014 on. To get a better visibility a Life Unio logo has been designed for 575 € by se same company.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
E3																

planned
realized

➢ Complementary action outside LIFE

none

5.1.20 Action E4: Organisation de séminaires

To promote the scientific exchange with other Life projects or other scientists working in the same field, two scientific seminars are planned within the project.

➢ Progress/results

The first seminar was planned for January or February 2014.

The working group www.flussperlmuschel.at organised an international meeting on freshwater mussels in November 2013. Organizing the next international meeting only 2-3 months later made no sense and it would have been more difficult to attract scientists to visit our meeting.

In November 2014 (November 26-27, 2014) The LIFE+ France « Rivières vivantes de Bretagne et de Normandie : Mobilisation pour le retour de la moule perlière d'eau douce » (http://www.life-moule-perliere.org/accueilmoule.php) organised their scientific meeting. In order not to overlap with this meeting and with the upcoming FMCS (Freshwater mollusk conservation society) in March 2015 we decided to organise our meeting in November 2015. The meeting venue in Clervaux is reserved and a 1st announcement has been send out to all the experts in the field by email. Sa far Prof. Dr. Jürgen Geist from the TU Munich, Germany, Prof. Dr. Chris Barnhart, Missouri State University, USA and Dr. Dave Zanatta, Central Michigan University, USA are confirmed as speakers.

➢ Realised

A 1st announcement has been send by email to all the relevant experts in the field of freshwater mussel propagation (02.02.2015) (see Annex 34).

The seminar is announced on the website www.unio.lu

The seminar will be announced with a poster and by colleagues during the upcoming FMCS-Meeting in March 2015 (http://molluskconservation.org) and the upcoming Mussel meeting in Bavaria in Mrch 2015 (see Annex 35)

The second seminar about the restoration of the habitat is planned for 2017.

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is changed as discussed above.

	planned
	Realized

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
E4																
												start organizing				

➢ Complementary action outside LIFE

none

5.1.21 Action F1: Gestion et encadrement du projet

➢ Progress/results

Project management staff

From 2012 to December 2014 the composition of the project staff was the following:

Coordinator 60%: Alexandra Arendt biologist

Scientific 1 50%: Frankie Thielen Dr.rer.nat and 50% on an other non EU project

Scientific 2 50%: Sonja Heumann Dr. tech.

Technician 100%: Léo Klein environmental technician

Secretary/accountancy 40%: (LIFE 11 NAT/LU/857) 20%: (LIFE 11 NAT/LU/858) 20%: (LIFE 13 NAT/LU/ 782) Patricia Heinen secretary

31 December 2014 the first technician left for another job and from January 2015 Karin Michels is assuming the technician task at 100 %.

Project management

- Constitution of the team.
- Allocation of the different missions to each team member.
- Monthly team meetings: review of the task's progresses, discussion of problems, working out of solutions. Written reports
- Monthly meeting with the director (Fondation Hëllef fir d'Natur): validation of work content and proceeding. Written reports
- Monthly meeting between the director and the administrative council of Fondation Hëllef fir d'Natur. Written reports.

Auditor's report

For the final revision of our financial management we charged Grant Thornton LUX Audit S.A. 89A, Pafebruch L-8308 Capellen.

Piloting committee

Each financial partner nominated its members in the piloting committee of the Life Unio project. Additionally representatives from the Parc naturel de l'Our and the Parc naturel de la Haute-Sûre

were invited to participate. In the meetings of the piloting committee the project's status quo is reported, problems are discussed and solutions are worked out.

The first meeting of the piloting committee took place on 14.11.2012.

The second meeting took place on 10.07.2013.

The third meeting took place on 01.10.2014.

The yearly reports (Interception report, Progress report) due to the EC where send to each member of the piloting committee.

Grant agreement

The grant agreement of the MDDI has been signed on 24th of January 2013

The grant agreement of the MIGR has been signed on 11th of March 2013

The grant agreement of the MA has been signed on 13th of February 2013

➢ Realised

- Topics of the third piloting committee meetings and the correspondent reports resp. power point presentations (see Annex36 for invitation of the third piloting committee).
- Grant agreements with the financial partners (see Annex 37).

➢ Problems encountered/delays

No other problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
F1																

planned

realized

➢ Complementary action outside LIFE

none

5.1.22 Action F2: Echange du savoir avec d'autres projets: LIFE et autres

The intent of this action is the regular exchange with all other projects (Life, but also others) working in the field of freshwater mussel conservation. This is achieved by attending scientific meetings and through regular email exchange with other experts.

➢ Progress/results

During the report period we attended the following scientific seminars:

- International Meeting on Biology and Conservation of Freshwater Bivalve. 4-7 September 2012, Braganca Portugal (Poster about new Life project) (Alexandra Arendt + Frankie Thielen).
- Interreg IVa 003705, Practical Implementation of Freshwater Pearl Mussel Measures, Friday 15th February 2013, Letterkenny Ireland (presentation of the planned restoration measures in the LIFE Unio project) (Frankie Thielen).
- Invitation to mussel meeting in Bavaria: 05. März 2013, Fachtagung: Strategien im Muschelschutz – Aktuelle Entwicklung in Bayern und Europa (poster and presentation) (Frankie Thielen).
- FMCS (Freshwater mollusk conservation society) 8th Biennial Symposium 2013. Recovery & Restoration from Concept to Implementation. Guntersville Alabama USA 10-14.03.2013 (Poster & oral presentation) (Frankie Thielen).
- Symposium for European Freshwater Sciences, with special session on Life projects 1-5.07.2013 Münster, Germany (oral presentation) (Sonja Heumann).
- Life + Conservation de la moule perlière d'eau douce dans le massif armoricain 19-22.06.2013. Meeting of the scientific committee (Alexandra Arendt + Frankie Thielen + Leo Klein).
- Interlife Bretagne 23-25.10.2013 (oral presentation) (Alexandra Arendt).
- International Meeting on Improving the Environment for the Freshwater Pearl Mussel, 13.11-14.11.2013, Weinberg, Kefermarkt, Austria (Poster & oral presentation) (Frankie Thielen).
- Meeting of the "Grenzfischereikommission" 41. Meeting at Burg Bollendorf, 04.11.2014 (oral presentation) (Frankie Thielen).
- Life + Conservation de la moule perlière d'eau douce dans le massif armoricain 25-27.11.2014. Meeting of the scientific committee and Colloque international, Conservation and restoration of Freshwater Pearl Mussel Populations and Habitat in Europe (oral presentation) (Frankie Thielen).
- Closing Meeting Interreg "Erhalt der Flussperlmuschel im Grünen Band Bayern-Tschechien", Zucht-temprärer Königsweg im Flussperlmuschelschutz? (oral presentation), 12.12.2014 (Frankie Thielen).
- Interlife for Belgium, Netherlands, Luxembourg, France and Germany, Hosingen and Kalborn Mill, 9th and 10th December 2014 (organisation of the meeting and presentation of the project with visit) (see Annex 38).

Although some of the meetings were more focused on the freshwater pearl mussel (*Margaritifera margaritifera*), the LIFE Unio project was discussed at all scientific seminars with colleagues. For several meeting we were invited as guest speakers with no additional costs for the Life project.

Regular email exchange occurs with the following projects and experts:

- UC for Life Sweden (http://www.ucforlife.se/en/).
- LIFE+ Project Margal-Ulla Galicia Spain (http://margalulla.xunta.es/en).
- LIFE+ France « Rivières vivantes de Bretagne et de Normandie : Mobilisation pour le retour de la moule perlière d'eau douce » (http://www.life-moule-perliere.org/accueilmoule.php).
- Austrien Freshwater Pearl Mussel Project (http://www.flussperlmuschel.at)
- Rachel Mair White Sulphor Springs National Fish hatchery (http://www.fws.gov/northeast/wssnfh/).
- Prof. Dr. Chris Barnhart, Missouri State University (http://courses.missouristate.edu/ChrisBarnhart/home/Default.htm).
- Megan Bradley Aquatic Wildlife Conservation Center, Marion, Virginia, (http://www.dgif.virginia.gov/awcc/)
- Jürgen Geist group TU München (http://fisch.wzw.tum.de).
- Heidi Sehlheim, Charlotte Bontinck and Grégory Motte, Projekt Habitat Euregio + Biologische Station Aachen, Parc naturel hautes fagnes (http://www.euregio-mr.com/de/service/archiv/2010/das-projekt-201ehabitat-euregio201c).
- Arno Schwarzer ECOLOGIS(http://www.ecolo-gis.de)
- Dr. Manuel Seeger, Institut für Physische Geographie, University Trier, Germany (http://www.uni-trier.de/index.php?id=18521)

➢ Realised

See above

➢ Problems encountered/delays

No problems encountered so far.

The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
F2																

planned
realized

➢ Complementary action outside LIFE

none

5.1.23 Action F3: Plan de conservation After-LIFE

Action to install an afterlife program

➢ Progress/results

This action is not scheduled for the moment.

➢ Deliverables

No deliverables are foreseen for the moment.

➢ Problems encountered/delays

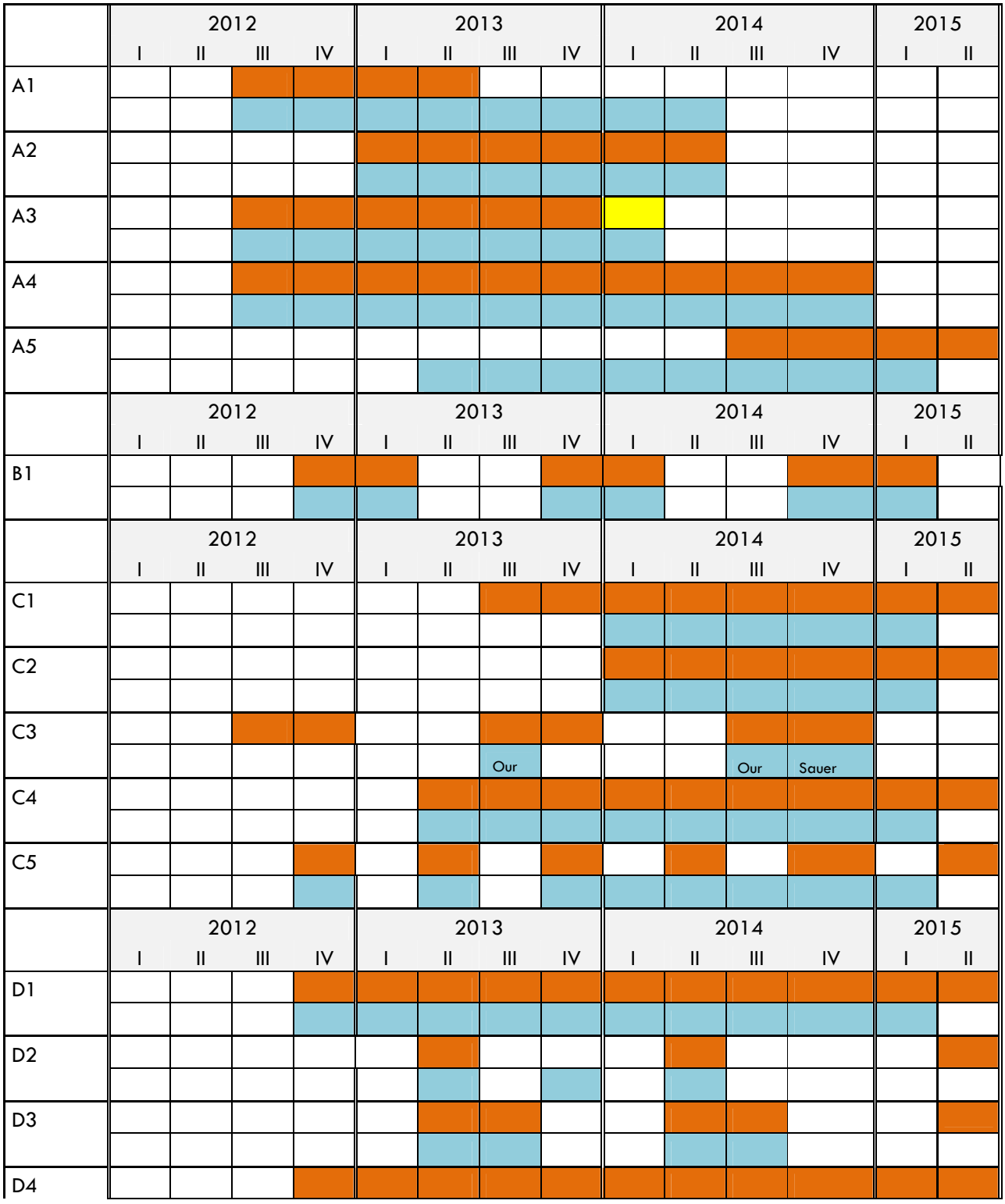
No problems encountered so far.

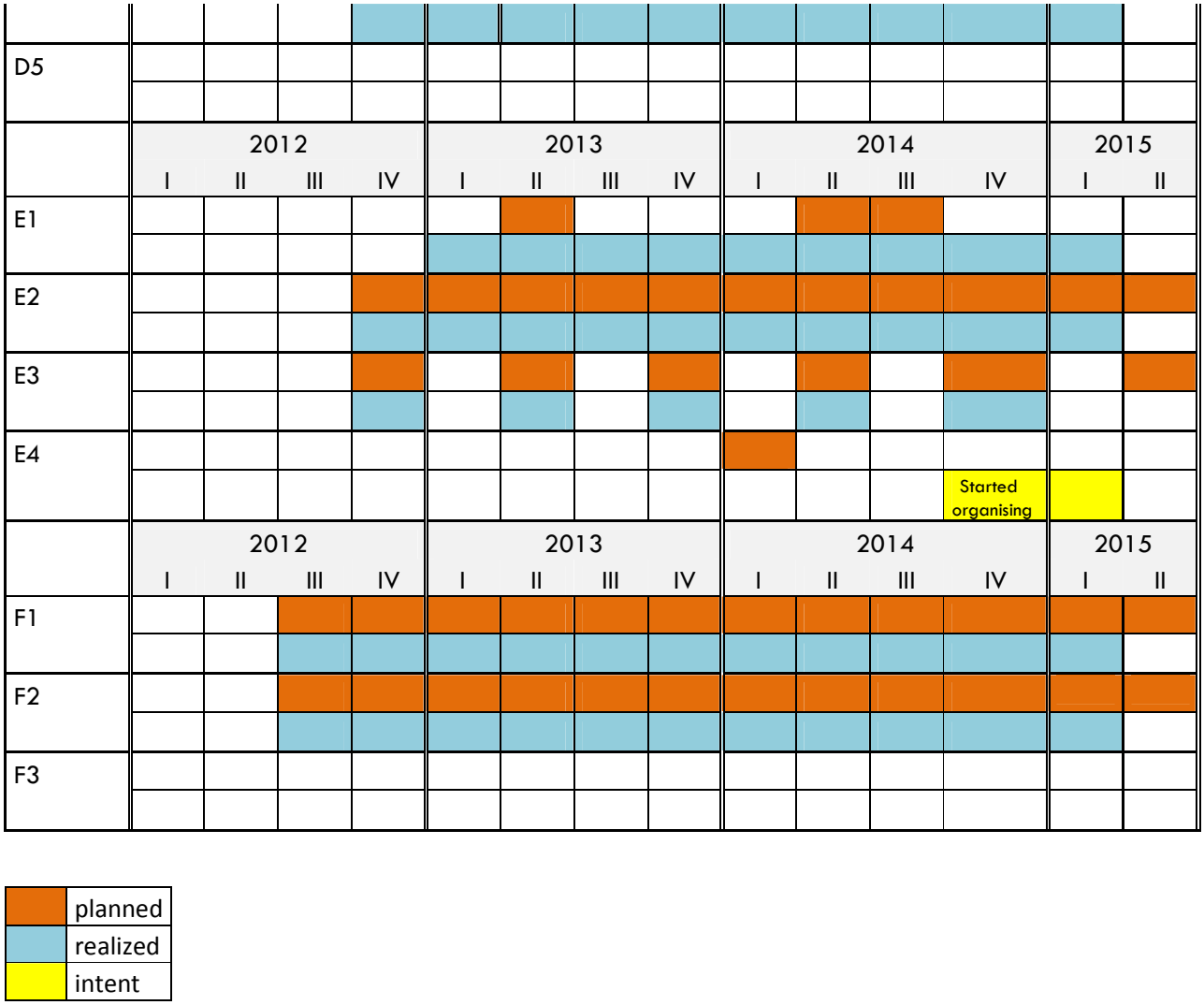
The time plan for this action is on schedule.

	2012				2013				2014				2015			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
D5																

	planned
	realized

5.1.24 Overall Timetable





	planned
	realized
	intent

5.2 Dissemination actions

They can be seen under the respective "E" actions. We are very satisfied with the publicity of the rearing station. Many people are interested to the subject. The number of the visitors is increasing from 46 in 2012 to 649 in 2014. We have more and more demands from schools to learn more about the aquatic ecosystem. Also stakeholders are more and more aware of the Life Project. This level is well done for the moment otherwise we will lack time for the implementation of the other actions of the project. We are aware that Natura 2000 could be promoted more intensively. This will be done by finishing the Natura 2000 room.

5.3 Evaluation of Project Implementation

- As we are at the Projects' first half we are not yet able to give a final statement to the methodologies' success. We think that we will be able to get the wished results for most of the actions and within the financial frame.

- At this state of the project we cannot clearly assess yet which measures will fully meet the objectives and which cannot entirely fulfil the goal. In any case, we tried to build up a monitoring system allowing us to measure effects after having realised the restoration measures. Certainly we will be able to breed the proposed number of young mussels, as we are experienced in breeding the Pearl mussel a more sensitive species than *Unio crassus*. We will also be able to reach an amelioration of the aquatic habitat quality locally, especially on the tributaries. The information and dissemination level will be reached or even overstepped as we are disposing a Natura 2000 room close to the breeding station, many people are visiting.

- The capture of muskrats leads to a directly visible result on both rivers Our and Sûre. We found no more empty shells linked to their predation.

5.4 Analysis of long-term benefits

5.4.1. Environmental benefits

a. Direct / quantitative environmental benefits:

We organized a special meeting on the 23.07.2014 with the Minister of durable Development and Infrastructure at the Kalber mill and we participated at a meeting 03.10.2014 with the Director of AGE and the "premier conseiller de Gouvernement" of the Ministery of durable Development and Infrastructure where we discussed the insufficient water quality (pollution diffuse de l'eau par les nutriments phophates et nitrates et les pesticides principalement d'origine agricole). We explained that Mussel Rivers needed a similar protection area concept like drinking water zones defined by WFD. In these special zones different pesticides will be banned and the fertilisation by liquid manure will be allowed with restrictions. In future the basin Sûre will get a stricter regulation for the drinking water zone. Actually no special restrictions are foreseen in the Natura 2000 areas for both river catchments Our and Sûre. Neither the PDR draft for 2014-2020 sent to Brussels doesn't foresee any special status for the Natura 2000 areas. A similar objection has also been made by the EC at the revision of the document Ref.ARES(2015)258361-22/01/2015 http://fr.slideshare.net/wortlu/document-observations-ccpdr. see p25 under Mesure 12 (Zones Natura 2000 et Directives Cadre-Eau) N°204.

A further example is that a special budget via PDR will give the possibility to install fences along the watercourses, but again it is on a voluntary base and not specifically reserved for habitat and species conservation of Natura 2000.

b. Relevance for environmentally significant issues or policy areas

Pesticides issue:

Together with Greenpeace Luxembourg, natur&ëmwelt made a demand for significant modifications to the national action plan on phytopharmaceutical substances worked out by the Agricultural Ministry see Annex 39. The action plan should be the national transposition of "article 4 de la directive 2009/128/CE du Parlement européen et du Conseil du 21 octobre 2009 instaurant un cadre d'action communautaire pour parvenir à une utilisation des pesticides compatible avec le développement durable". A weak point is that there will only be pesticide restrictions in the catchment areas used as drinking water source. In all other water dependant zones and Natura 2000 sites, limitations are on a voluntary basis. We are missing a long term reduction of pesticides and a real strategy to avoid water pollution. A press conference has been organised on the 10the of October 2014. We were invited to join the national parliament on the 4th of December 2014 to answer the questions of members of the Commissions of Environment, Agriculture and Petition. A general declaration has been given: "the goal is to save biodiversity and the honeybee, important for the national economy, so that the national action plan of phytopharmaceutical substances will be revised". A meeting with the Minister of Agricultural has taken place on 21th of January 2015. On our question when the plan will finally be revised, the Agricultural Ministry didn't want to give a statement. He said that for the moment a Task Force is working on this subject. Greenpeace Luxembourg and natur&ëmwelt insisted that Luxembourg needs a change of paradigma of the agricultural activities. The output of pesticides must be reduced to a minimum in order to protect our natural resources water, soil and biodiversity.

Erosion issue:

In Belgium wood harvesting is not allowed when weather conditions are bad while in Luxembourg this is not the case. This explains why Belgian enterprises are often working during bad conditions in Luxembourg. Their activity often leads to erosion. We heard about a regulation "Règlement sur la voirie rurale et forestière" installed in the municipalities of the Haute-Sûre basin that could help avoiding damage in the forests as one has to deposit caution money at the municipality before being allowed to harvest the wood. In this case, the forest ranger will be informed when the harvesting starts. We would approve the application of the same system at the Our. After a conversation with the local forest ranger and a technician of the municipality of Clervaux we heard that such a project (see Annex 40) has been introduced to the Ministry of Interior Affairs for a long while. With the help of the MDDI we tried to find out what happened to this document and when it could be operational.

5.4.2. Long term benefits and sustainability

a. Long term / qualitative environmental benefits

After the Life project we want to continue the formation of people, children, pupils, students, adults, etc. to the aquatic environment, and to the European Natura 2000 network. We have introduced a project to HSBC that, if is accepted, could allow us to get some rooms equipped to work with children. Other sponsoring demands have been introduced to SEO (Société de l'Electricité de l'Our) and to the Service Club LIONS. Till now we have got no answer.

As after the project there will still certainly be measures to be done on the river Sûre and Our, we will try to formulate other projects to be able to get on improving the water quality. For the moment there is no concrete project.

Finally we hope that the rearing activities will continue to be financed so that we will be able to breed mussels.

b., c., d. no statement for the moment

5.4.3 Replicability, demonstration, transferability, cooperation

no statement for the moment

5.4.4 Best practice lessons

no statement for the moment

5.4.5 Innovation and demonstration value

no statement for the moment

5.4.6 Long term indicators of the project success

no statement for the moment

6. FINANCIAL REPORT

6.1 Summary of costs incurred

Table 22: Project costs

PROJECT COSTS INCURRED			
COST CATEGORIES	**BUDGET ACCORDING TO THE GRANT AGREEMENT**	**COSTS INCURRED DURING THE PROJECT DURATION**	**%**
Personnel	€ 1.089.312,00	€ 406.799,50	37,34%
Travel	€ 38.049,00	€ 7.267,47	19,10%
External assistance	€ 272.100,00	€ 31.848,87	11,70%
Durable goods - Equipment	€ 222.100,00	€ 107.272,44	48,30%
Land/rightspurchase/lease	€ 81.600,00	€ 21.931,76	26,88%
Consumable material	€ 31.939,00	€ 8.518,16	26,67%
Other direct costs	€ 238.413,00	€ 42.428,27	17,80%
Overheads	€ 83.555,00	€ 29.621,70	35,45%
TOTAL	**€ 2.057.068,00**	**€ 655.688,16**	**31,87%**

Till the midterm the project was indeed relatively low in costs, a total of about 32 % has been spent.

Personnel: This category is slightly underspent, but in future we temporarily will need more manpower for certain actions as f. ex. mussel monitoring.

Travel: This category will decrease when exchanges with other projects will take place.

External assistance: Beside the design of the website, the flyer (action E2) and the gravel dropping (action C3) no expensive external assistance has been done. In 2015 measures will be implemented: fencing, grids (action C1) obstacle transformation (action C3) etc. so that the budget will decrease.

Durable goods/Equipment: Essential acquisitions have been done under action C4 to enable breeding mussels and surveying water quality and travelling of the staff (purchase of a car).

Land purchase: The category is a little bit low for the moment as the expenditures are depending from the land prize of the acquisitions.

Consumable material: This category is low for the moment, but quickly will change when special material is needed.

Other direct costs: The expenditure for the water surveying station is a little bit lower, on the other side the costs for the gravel are slightly higher, so that the budget of this category partly may be compensated.

6.2 Accounting system

- Accounting system: The main accountants department from Fondation Hëllef fir d'Natur is located at our main office in Kockelscheuer, Luxembourg City. They use an analytical accounting system (Software Ciel) and all originals of the invoices are paid and archived here. Each invoice has its own number and is labelled with 8EUUNIO.
- Every invoice concerning the life project gets first to our Life office in Heinerscheid. Here the invoice is checked for correctness by the secretary (is Life code present on invoice, are costs correct). The team member responsible for the expenditure is checking if the invoice is eligible, makes the attribution to the relevant action and signs it. The secretary makes the registration into our accounting table in Excel. The original invoice is send to the main accountants department and a copy is archived at our Life office.
- Use of ready-made timesheet version by Life.
- We have no registration system. Everybody is responsible for its own time management.
- For each offer and each invoice we ask for our Life reference.

6.3 Partnership arrangements

- There are no associated beneficiaries. We have partnership agreements with MA and MDDI financing the national part.
- Fondation Hëllef fir d'Natur has officially changed its name to natur&ëmwelt-Fondation Hëllef fir d'Natur but it is always the same organisation.

6.4 Auditor's report/declaration

The auditor's name is Grant Thornton LUX Audit S.A. 89A, Pafebruch L-8308 Capellen.

6.5 Summary of cost per action

Table 23: Project cost per action

Action	Short name of action	1. Personnel	2. Travel	3. Ext Assistance	4.b. Equipment	5. Purchase of land	6. Consumables	7. Other costs	8. Frais généraux	Total
		406.799,50 €	**7.267,47 €**	**31.848,87 €**	**107.272,44 €**	**21.931,76 €**	**8.518,16 €**	**42.428,27 €**	**29.621,70 €**	**655.688,16 €**
A1:	Localization erosion risk	7.170,17 €	80,50 €	0,00 €	0,00 €	0,00 €	543,56 €	0,00 €		7.794,22 €
A2:	Planning restoration measures	9.034,41 €	107,39 €	0,00 €	0,00 €	0,00 €	102,89 €	0,00 €		9.244,70 €
A3:	Water quality and interstitial substrate planning	3.477,53 €	43,62 €	384,00 €	32.203,18 €	0,00 €	0,00 €	0,00 €		36.108,33 €
A4:	Rearing method for *Unio crassus*	6.524,85 €	3.028,30 €	92,46 €	0,00 €	0,00 €	0,00 €	0,00 €		9.645,62 €

A5:	Natura 2000 "Our" and Haute Sûre" management plans	7.170,17 €	80,50 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		7.250,66 €
B1:	Acquisition of land	6.453,15 €	80,50 €	0,00 €	0,00 €	21.931,76 €	0,00 €	0,00 €		28.465,41 €
C1:	Interventions to reduce the fine sediment load	13.623,32 €	160,99 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		13.784,31 €
C2:	Transformati fish migration obstacles	4.015,29 €	40,30 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		4.055,59 €
C3:	Gravel input	2.724,66 €	26,80 €	13.575,05 €	0,00 €	0,00 €	0,00 €	15.767,32 €		32.093,83 €
C4:	Breeding *Unio crassus*	114.633,06 €	833,26 €	0,00 €	74.884,77 €	0,00 €	4.454,00 €	20.328,29 €		215.133,39 €
C5:	Capturing of muskrats	2.724,66 €	26,80 €	0,00 €	0,00 €	0,00 €	721,30 €	0,00 €		3.472,76 €
D1:	Water quality and interstitial substrate survey	7.044,69 €	87,25 €	0,00 €	184,49 €	0,00 €	1.788,94 €	6.002,50 €		15.107,87 €
D2:	Host fish monitoring	9.769,35 €	114,04 €	0,00 €	0,00 €	0,00 €	374,96 €	0,00 €		10.258,36 €
D3:	*Unio crassus* monitoring	9.787,28 €	124,12 €	0,00 €	0,00 €	0,00 €	95,00 €	0,00 €		10.006,40 €
D4:	Monitoring restoration measures	6.524,85 €	78,98 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		6.603,84 €

D5:	Socio-economical impact s	0,00 €	- €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		0,00 €
E1:	Information and sensitization of the concerned actors	10.898,66 €	134,19 €	- €	0,00 €	0,00 €	32,00 €	0,00 €		11.064,85 €
E2:	Sensitization of the general public	21.851,09 €	255,19 €	10.179,76 €	0,00 €	0,00 €	170,60 €	0,00 €		32.456,64 €
E3:	Design of web site	4.588,91 €	53,70 €	7.617,60 €	0,00 €	0,00 €	0,00 €	0,00 €		12.260,20 €
E4:	Organization of conferences	6.309,75 €	80,50 €	- €	0,00 €	0,00 €	0,00 €	330,16 €		6.720,40 €
F1:	Project management	125.908,15 €	311,60 €	- €	0,00 €	0,00 €	147,54 €	0,00 €		126.367,30 €
F2:	Knowledge exchange: with LIFE and other projects	26.565,47 €	1.518,95 €	- €	0,00 €	0,00 €	87,37 €	0,00 €		28.171,79 €
F3:	After-LIFE conservation Plan	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €		0,00 €

7 ANNEXES

All annexes as listed in the text above can be found in the extra Annex document.

Annex 1: Action A2 Planification des mesures de restauration

- Restoration measure plan

Annex 2: Action A3: Planification de la surveillance de la qualité de l'eau et du substrat interstitial & Action D1: Surveillance de la qualité de l'eau et du substrat interstitial

- Report about water the water quality in the river Our, river Sûre and tributaries

Annex 3: Action A3: Planification de la surveillance de la qualité de l'eau et du substrat interstitial & Action D4: Monitoring et évaluation de l'impact des mesures concrètes

- Report about the evaluation of the measures (pre-restoration measurements)

Annex 4: Action A4: Mise en place de la technique d'élevage pour *Unio crassus*

- Permission Letter to handle *Unio crassus* for the river Our and Sûre

Annex 5: Action A4: Mise en place de la technique d'élevage pour *Unio crassus*

- Technical document about rearing method of *Unio crassus*

Annex 6: Action A5: Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"

- Offer and letter sent to ANF for working out the management plans.

Annex 7: Action A5: Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"

- Official response from ANF attributing to n&ë -Fondation Hëllef fir d'Natur the permission to work out the management plans.

Annex 8: Action B1: Acquisition de terrains le long de l'Our, de la Sûre et de leurs affluents

- Notarial act
- aerial photo with the localisation of the acquisition

Annex 9: Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Letters send to the farmers

Annex 10: Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Offer for the measures "Folkesbour"

Annex 11: Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Biodiversity contract at Ettebaach

Annex 12: Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Invitation to the piloting Project

Annex 13: Action C2: Transformation d'obstacles à la migration sur les cours d'eau tributaires

- Transformation Plan for the Schwaerzerbaach

Annex 14: Action C2: Transformation d'obstacles à la migration sur les cours d'eau tributaires

- Demands for the authorisation of the Schwaerzerbaach

Annex 15: Action C3: Amélioration du substrat par dépôt de gravier

- Maps with the final deposit sites

Annex 16: Action C3: Amélioration du substrat par dépôt de gravier

- Authorisation (correspondence) Sûre Belgium

Annex 17: Action C4: Elevage de *Unio crassus* pour la Grande Région

- List of all durable goods

Annex 18: Action C5: Régulation de la prédation du rat musqué

- Detail of capturing period and place, number of trapped muskrats

Annex 19: Action C5: Régulation de la prédation du rat musqué

- Bachelor thesis entitled *Echinococcus multilocularis* und andere Cestodenlarven in Bisamen (*Ondatra zibethicus*) aus Luxemburg. Sebastian Nicodemus 2012

Annex 20: Action D1: Surveillance de la qualité de l'eau et du substrat interstitiel

- Sampling points with a map and picture

Annex 21: Action D2: Monitoring des poissons hôtes

- authorisation to conduct electric fishing in the river Our, river Sûre and tributaries

Annex 22: Action D3: Suivi de *Unio crassus* dans son milieu naturel

- Report "Age determination of *Unio crassus* shells from Sauer and Our rivers" by Elena Dunca, Bibalvia

Annex 23: Action D3: Suivi de *Unio crassus* dans son milieu naturel

- Monitoring site Our, Sûre and Syrbaach

Annex 24: Action D3: Suivi de *Unio crassus* dans son milieu naturel

- Master project done by Elisabeth Kirsch, entitled "Predatory impact of the non-native signal crayfish (*Pacifastacus leniusculus*) on the endangered thick shelled river mussel (*Unio crassus*)"

Annex 25: Action E1: Information et sensibilisation des acteurs concernés

- List of contacts with authorities and other actors between 2012 and 2015

Annex 26: Action E1: Information et sensibilisation des acteurs concernés

- Invitation: Seminar for farmers "Loss of soil through water erosion - protect soil using good practice methods"

Annex 27: Action E1: Information et sensibilisation des acteurs concernés

- 1st water forum for the river Our catchment

Annex 28: Action E1: Information et sensibilisation des acteurs concernés

- Meeting with the Minister of durable Development and Infrastructure (Letter and report)

Annex 29: Action E1: Information et sensibilisation des acteurs concernés

- 1st water forum for the river Sûre catchment

Annex 30: Action E1: Information et sensibilisation des acteurs concernés

- 2nd Seminar for farmers "Use of pesticides. How can negative effects be reduced", Program and invitation

Annex 31: Action E2: Sensibilisation du grand-public

- Groups of people visiting the mill

Annex 32: Action E2: Sensibilisation du grand-public

- Press release

Annex 33: Action E2: Sensibilisation du grand-public

- Flyer in English, German and French

Annex 34: Action E4: Organisation de séminaires

- 1st announcement of the international Seminar "Rearing of unionoid mussels"

Annex 35: Action E4: Organisation de séminaires

- Poster of the international Seminar "Rearing of unionoid mussels"

Annex 36: Action F1: Gestion et encadrement du projet

- Invitation to the third piloting committee

Annex 37: Action F1: Gestion et encadrement du projet

- Grant agreements with the financial partners.

Annex 38: Action F2: Echange du savoir avec d'autres projets: LIFE et autres

- Interlife for Belgium, Netherlands, Luxembourg, France and Germany, Hosingen and Kalborn Mill, 9th and 10th December 2014

Annex 39: Analysis of long-term benefits

- Together with Greenpeace Luxembourg, natur&ëmwelt made a demand for significant modifications to the national action plan on phytopharmaceutical substances worked out by the Agricultural Ministry

Annex 40: Analysis of long-term benefits

- Règlement sur la voirie rurale et forestière