

2002- 2007 Life Nature Program :  
**Protection of the habitats  
of the Freshwater Pearl Mussel  
in Belgium.**

Final results of the project.





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## INTRODUCTION

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Life Nature Programs aim at settling nature conserving actions in sites of the Natura 2000 network. The Pearl Mussel (*Margaritifera margaritifera*) is a "Natura 2000" species for which sites were defined. The project which is co-financed by the European Commission and the DGRNE, is written and coordinated by the "Centre de Recherche de la Nature des Forêts et du Bois (CRNFB)" of the Walloon Region. Natagora (RNOB) and the "Parc Naturel Hautes-Fagnes Eifel" (PNHFE) are the partners responsible for the settlement of the action on the sites.

This document is presenting the final results of the actions carried out from 2002 to 2007.

This complex project could not have been achieved without the involvement of numerous persons/members (acteurs): farmers, foresters, local, provincial and regional authorities. The collaboration of our different administrations has been essential, particularly the "Division Nature et Forêt (DNF)", the "Division de l'eau" (DE), the "Direction Générale de l'Agriculture" (DGA), the "Société Publique de Gestion de l'Eau" (SPGE), the "AIDE", the "AIVE" and local structures like the « Contrats de Rivière », « Parc Naturel », « Centre régional d'Initiation à l'Environnement (CRIE of Anlier)", regional partners of the RNOB and of the BNVS.

We are also thankful to all the members of the accompagnement committee, the CRNFB, Natagora, PNHFE staff as well as the European Commission and the external teams (Ecosystems, Astrale) which have followed up the project and have advised us in a sensible way. The various companies which were in charge of the realization of the works, sometimes technically complex have also contributed to the success of this project. The involvement of the trainees, the PhD students and the volunteers has also to be stressed.

Finally, the exchange of experiences with other Life projects dedicated to the Freshwater Pearl Mussel and active experts abroad (i.e. Germany, Czech Republic, France, United Kingdom, Luxembourg, Sweden, Spain, Austria) and in Wallonia as well as with different Interreg projects have contributed to settling the actions so quickly.

The team of the Belgian Pearl Mussel LIFE project

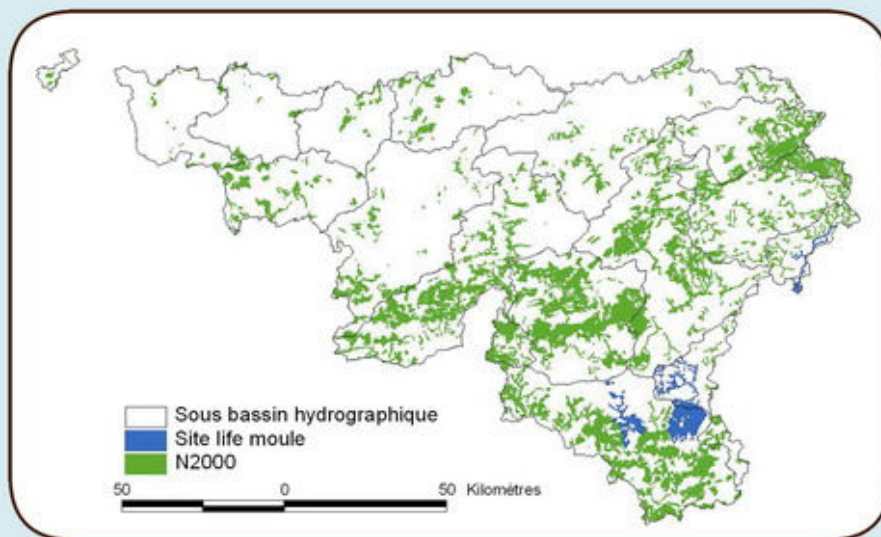




## SITES LOCALIZATION

Semois and Moselle Hydrographic bassins, Liège and Luxembourg province, Walloon region, Belgium

Natura 2000 site of the Anlier forest (BE34052), of the superior and inferior valley of the Vierre (BE34047, BE34049), of the valley of the Sure (BE34039) and of the superior and inferior valley of the Our (BE33062, BE33065).



## PROJECT DURATION

September 1st, 2002 – August , 31, 2007

## **GENERAL OBJECTIVE OF THE PROJECT**

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The project's aim is the long term conservation of the habitats associated to pearl mussels populations. In the past these populations were largely widespread within Europe but 95 to 99% of the numbers of the populations have disappeared during last century. In the past they were common in a large part of the Belgian massif of the Ardennes and of the Eifel. And now these populations have drastically decreased. In a century, the species has seen a change of its statut: it was common and now it has become an endangered species.

## **DETAILED OBJECTIVE OF THE PROJECT**

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The suggested actions are developed on two geographic levels.

On the four orohydrographic bassins:

- **Awareness campaign of all the river actors in order to improve the water quality and define action plans for each bassin.**
- **Identification on maps of the major problems.**
- **Increased monitoring of the water quality and elaboration of systematic inventories for the mussel.**

Concrete conserving actions within the six Natura 2000 sites consist in:

- **Establishing a detailed cartography of the populations in the hydrographic bassins (115.000ha).**
- **Creating natural reserves in the sensitive areas, through land purchasing of at least 96 ha.**
- **Establishing management measures:**
  - Restoring the banks of the rivers with the building of at least 72 km of fences and the installation of 64 watering places as compensations.
  - Restoring at least 56 ha of bottoms of valley by the withdrawal of coniferous trees.
  - Restoring at least 16ha of riverine woodlands with deciduous plants.



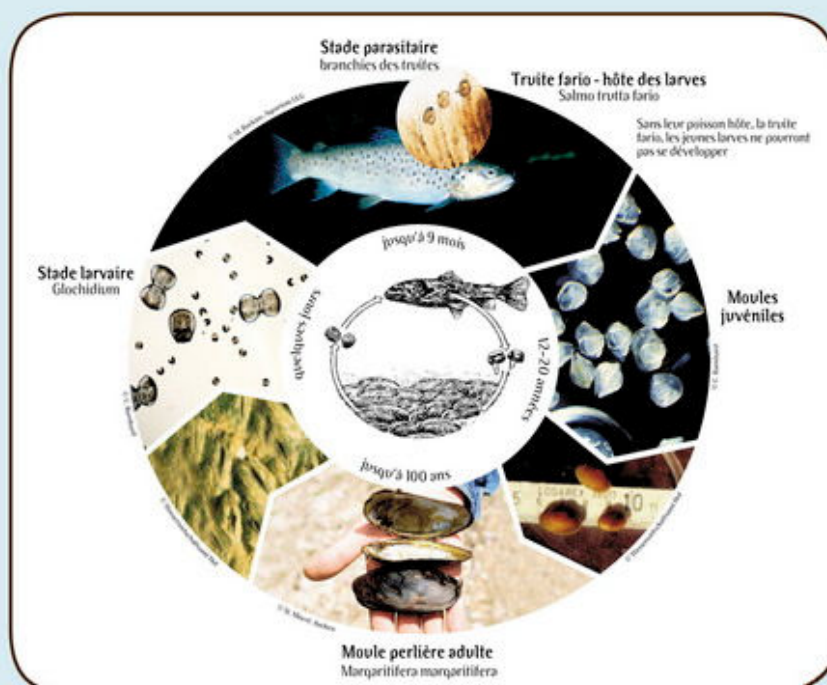
## THE PEARL MUSSEL, A REMARKABLE SPECIES

As its name is indicating it, the pearl mussel can produce a pearl when a sand grain gets into its shell. In order to protect itself, the mussel will coat it with mother-of-pearl in spherical and concentric coats. Out of 1000, only one mussel could produce a pearl with no commercial value any more. In our country, pearl mussel fishing during the 19th and 20th centuries have probably contributed locally to the decline of the species. Elsewhere in Europe, entire populations have been destroyed.

However, the treasure of the pearl mussel resides in its life cycle, which is a marvel of complexity!

The life cycle of the mussel is complex. It includes four stages of development: glochidia, parasitic stage, juvenile and adult.

By the end of the summer, millions of glochidia are released in the water. To survive, the glochidia must hang on to the brown trout gills, the host fish, during 10 months. Without trout, no pearl mussel. At spring, the glochidia frees itself from the fish and falls into the riverbed. It will bury itself in the sediment and continue its growth during five years. At this stage our young mussel, which is now able to filtrate the water to feed itself, go back up to the limit between the free water of the river and the sediment. It will wait for another 10 years before it reaches its sexual maturity which will last more than 70 years! The life expectancy of this species is incredible: nearly 100 years in our regions and more than 150 years in the north of Europe.





## THE PEARL MUSSEL, A DEMANDING SPECIES

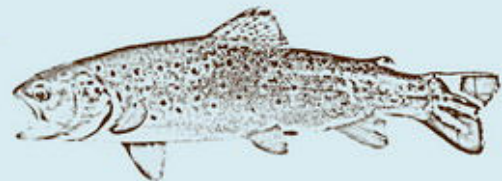
The life environment of the pearl mussel is characterized by rivers close to the natural state, poor in nutrients (e.g. nitrate, phosphate), cool during summer and rich in oxygen. The quality of the water must be excellent.

On the riverbanks, damp zones are necessary to ensure food resources to the mussels (organic particles coming from the decomposition of the vegetation) and riverbank trees guarantee cool temperatures in summer.

When post-glochidial juveniles are dug in the bed of the river, siltation is an important problem. The important land streaming in the riverbed silt up the free space between the gravels and the sand grains. The consequence is a lack of oxygen preventing the circulation of the water and leading to the asphyxiation and death of the juveniles.

### IN SHORT :

**Latin name :** *Margaritifera margaritifera*.  
**English name :** Freshwater pearl mussel or mullet.  
**Shell :** black, kidney shape.  
**Length (adult) :** from 6 to 16 cm.  
**Width (adult) :** from 4 to 5 cm.



In Belgium, the brown trout is the host fish.  
 The juveniles stay 4-5 years burried in the riverbed.  
 Sexual maturity is reached when the mussel is 15-20 years old.  
 Longevity may be more than 100 years.  
 A pearl mussel filters 50 liters of water a day.  
 Ideally, the nitrates concentrations cannot go beyond 5mg NO<sub>3</sub>/l.

## THREATS

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### Immediate destruction of the individuals:

- Crushing of individuals by the livestock, the forest machines, the riverbed dedging of the rivers...
- Predation by two species of invasive mammals: musk rat and racoon.

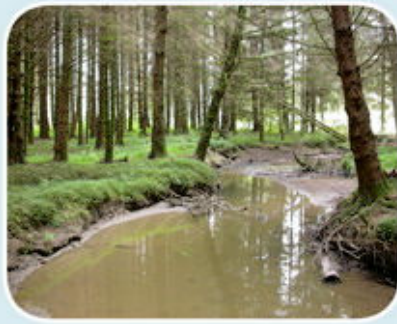
### Alteration of habitats:

- Decline of water quality (nitrates, phosphates, eutrophication, siltation,...) leading to premature death of adults.
- Siltation of riverbeds suppressing the supply of oxygen for the post-glochidial juveniles (stage of sedimentary life).
- Damage to the poor grassland and to the damp zones in the bottom of valley (food source).

Decrease of the number of brown trouts due to the modification of spawning areas and of water quality.







Release of mud during the excavation of a pond



3 km downstream from a crossing river by forest machine



## ACTIONS & RESULTS

### 1. Locating and studying the ecological conditions of the populations of mussels

300km of rivers intensively prospected as well as 35 rivers controlled  
 28 electric-fishings to study the structure of the brown trout populations  
 200 stations to study the water quality  
 2 studies on the quality of the sediment carried out by the University of Liège

### 2. Drawing maps of major problems

600 major problems localized, 180 raised by the project (20% are solved).



Example of black spots raised by the life project

### 3. Establishing management measures

#### 3.1 Building fences and watering places

The standing of livestock on the banks and the free access to the rivers crush the mussels and create mud places contributing to the stiltation of riverbeds and spawning areas of the brown trouts. In total, **76 km of fences** - 105% of the objective - **and 119 watering places** - 188 % of the objective - and 10 runways wood for the crossing of the cattle were installed for the 43 farmers who had accepted to participate in the project.





Old access of the cattle to water, 3 year after installation of fences and water tanks

### 3.2 Withdrawing the coniferous trees from the bottom of valley

The withdrawal of the coniferous trees from the bottom of valley is also a key action of the project. On some parts, the  $\frac{3}{4}$  of the grasslands of the bottom of valley were replaced by spruce woodlands in less than 60 years. The spruces have superficial roots which do not fix correctly the riverbanks. The banks dig anormally, the trees fall, taking with them parts of the riverbank into the rivers. Moreover, the lack of light due to trees present at only 6 meters from the riverbanks impoverishes the aquatic fauna in the river, makes it impossible for the vegetation to grow and limits the ground to be fixed when there are floods. In addition, the drainage of the damp parcels also contributes to the release of silt into the riverbeds. Thanks to the subsidy, our team was able to convince more than 80 land owners to withdraw nearly **100 ha of coniferous trees** - 175% of the objective - in order to open the bottom of valley and to restore a network of humid meadows and of deciduous riverine forests.





1 year after the withdrawal of the spruces (Sure valley)



6 months after the withdrawal of the coniferous trees (Anlier forest)



Reopening of the Braunlauf valley (Our valley)



### 3.3 Restoring riverine forests

In order to shade parts of the rivers, about **16ha of riverbank trees** - 98% of the objective - were planted at the beginning of the bassin or close to the populations of pearl mussels.



#### 4. Creating a protective status for the most sensitive lands

In the very sensitive areas, protective measures can become incompatible with the farm or forest activities. At the end of the project, **164 ha of purchased land** (more than 200 former owners) - 170% of the objective - (including purchases on own resources) and more than 230ha of lands at the beginning of the catchment and in the bottom of valley, will receive the status of natural reserves.





The Sure at the time of flooding (19/01/07)  
Natural reserves and wetland restoration also have the function of water retention and the fight against the floods.

## 5. Informing, exchanging ideas

In parallel to the restoring measures, the information of the river actors and the different administrations responsible for the management of the rivers and of the water quality is also an important action in order to keep the pearl mussel as the major environmental decision tool (waste water treatment politic, creation of agri-environmental measures, management of the problems,...).

**About 100 work meetings** have been decided with different river actors.  
**95 school discussions** were organized (in collaboration with the RNOB, BNVS, CRIE d'Anlier). We were also part of the organizing committee of the Chlorophylliades, an inter-schools contest. In total, more than **4000 students** have understood the necessity of this project.



## HELPING THE SPECIES

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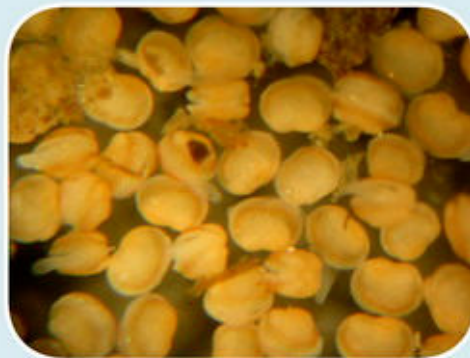
Our pearl mussels populations are getting more and more old and the surviving members are not numerous. The actions of this project are only a first step and its effort will only give results in a medium term.

In order to help the species, it has been decided to release post-glochidial juveniles produced in fish farms in natural environment or in rearing streams. Experts from Czech Republic and Germany working for many years on the pearl mussel as well as the CRNFB have collaborated to this project. Various complementary rearing techniques will be tested in collaboration with the Luxembourg Mussel LIFE project.

Such actions aiming at reinforcing the populations are justified if it becomes more and more obvious that the species will disappear in short term, that the problems are identified, resolved or nearly resolved and if on a medium term, we can expect to cease our intervention. The populations reinforcing measures can never replace the habitat restoring measures.



Trout gills with glochidia (Fish farm of Achouffe)



Juveniles after the dropping from the gills. These juveniles are reintroduced into the river and soon into rearing channel.





## **MUCH MORE THAN PROTECTING THE SPECIES**

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The positive consequences of the actions decided in this project make it possible to protect the pearl mussel and above all to restore our rivers, the habitats in the valleys and their catchments as well as the aquatic and terrest species living in that environment. In the rivers, the fishes and *Unio crassus* (a Natura 2000 species) will benefit from this project. The dipper, the kingfisher, the black stork, the otter or even two species of endangered butterflies like Violet Copper and Bog Fritillary will also take advantage of such actions.

Protecting the pearl mussel is equivalent to stopping the degradation of the ecosystems and the biodiversity, and indirectly improving our life environment.





## MONITORING INDICATORS

- Monitoring of the mussels populations.
- Monitoring of the trout populations.
- Monitoring of the water quality.
- Long term monitoring of silt transportation in rivers.
- Monitoring of the actions aiming at restoring old coniferous trees plants: use of butterflies as bio-indicators and botanic study.
- Continuous consideration of the pearl mussel as an key-element to decide and resolve the problems.



## **WHICH FUTURE FOR THE LIFE PROGRAM ?**

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The protective actions and the actions to restore the habitats of the valleys within the 2000 Natura sites will not be sufficient if the pollution sources are not controlled. This requires continuing the actions in the catchments and not only in the Natura 2000 sites!

Restricting the fertilizers and pesticides, respecting the legislation related to the farming effluents in the surface waters, building fences along riverbanks, respecting the grounds and the rivers during the forest exploitations as well as the treatment of domestic waste waters should become more and more frequent actions.

The Walloon Region, Natagora and the Parc Naturel Hautes-Fagnes Eifel will strive to have additional means to guarantee the monitoring of the persistent problems and of the mussels populations, and the classifications of the purchased fields. These organisms will continue to restore and to monitor the habitats, while favouring the collaboration with the local farmers.





<http://biodiversite.wallonie.be/offh/lifemp>  
Projet B4-3200/02/8590

