

## **The global, sustainable and joint management of the Naives stream's catchment basin: Intereg IV b European project.**

### **A. Description of the global project and studies that were carried out:**

The project carried out in Hotton within the framework of the INTERREG IVb-AMICE European project is oriented towards the global management of the extremes (floods and low waters) of the river Naives and its tributaries, but also towards the rehabilitation of their quality and the whole of the catchment basin.

It is also integrated into a sphere of actions implemented by the Province of Luxembourg and the Municipal Administration of Hotton.

The river Naives, in Melreux upstream from the confluence with the Ourthe, has been the subject of a first improvement work carried out by the Province of Luxembourg. It consisted of creating a floods channel under the village combined with a first buffer zone of 53000 m<sup>3</sup>. The objective was the protection of 70 houses, shops, a regional road and three municipal roads.

At the same time, the Hotton Municipality created a water purification plant to treat the grey waters (creation of a divisive network) in Hotton and Ny, village located in the catchment basin of the Naive stream upstream from Melreux (works currently in progress).

The village of Ny was also strongly flooded by the canalized small river in its centre. The only possible solution was to create a new engineering work proportionate to the rainfall we have been suffering for a decade, combined with a water retention work. The latter was indispensable to fight any overflowing downstream and any additional water supply towards the Ourthe's basin.

The AMICE project enabled the creation of a 83000 m<sup>3</sup> buffer zone and guaranteed a better dimensioning of the works of engineering in order to fight against the floods at Ny.

Still within the framework of the AMICE project, the studies of floods and low waters led to a better understanding of the catchment basin working with the aim of creating the buffer zone. It transpires from this that there is a very important difference between the two extremes, estimated to be a 349 factor (the floods flow is about 14145 l/s and the low water flow is about 40,5 l/s at the engineering work that has been built). The explanation can be found in the geology and the form of the catchment basin. The low waters study also showed that Ny's plain plays an essential role in supporting low water. Indeed, the plain allows to increase fourfold the low water flow (from 10,5 m<sup>3</sup>/s to 40n5 m/s). We note that on the 2nd of April 1999, the Naive stream's top flow was about 21,2 m<sup>3</sup>/s during a few minutes, that is to say the equivalent of a bicentennial flood.

On the contrary, in August 2011, the low water was very marked, with a more than three months dry period of the Naives stream's main tributary, the Esche Alle.

At the same time, 27 stream quality control stations were implanted in the catchment basin. Measures of chemical quality combined with the IBMR index were made during 3 years. It emerges from it that the waters quality was mediocre before the implementation of works. Furthermore, blooms of cyanobacteria were observed in streams during low-waters, among them the kind Planktothrix which is considered as dangerous by the regional authority and by the WATER framework directive. The studies showed a cause and effect relationship between the presence of cattle and this kind of cyanobacteria. These studies allowed guiding measures of streams rehabilitation by the province of Luxembourg, but also the realization of works to improve the streams quality within the framework of the AMICE project

At present, at the end of the project, and before the connecting of the village of Ny to the water-treatment plant, the water quality is considered as average. We note that a few works, among which adapted watering places, have just been ended.

## **B. Works carried out within the framework of the AMICE project:**

1) The AMICE project in Hotton was split into two parts, one part including all of the engineering works:

- A. building of a dike with cyclo-pedestrian track, in coordination with the land consolidation;
- B. building new infrastructures to control discharges including a gate and a low-water bed in order to facilitate fish migration;
- C. building a wide thunderstorm overflow (23 m) to limit water speed (handling of the gate in case of hydraulic crash), and to protect the people present on the dike in case of overflow;
- D. installation of fences, didactic signs, garbage bins;
- E. incorporation of a system preventing beaver ascent in the plain of Ny as well as allowing fish migration;
- F. building of an entrance adapted to farming needs;
- G. preservation of hedges and of the the riparian forest in coordination with Natura 2000 and Natagora;
- H. building of a of trap for driftwood adapted to brooks and small rivers.

2) The second part consisted of compensation for nature losses (Natura 2000) and of the control of the Naives stream. It included:

- A. locational study of an automated limnimeter with two alarms connected by mobile phone. It will be integrated into the Walloon network AQUALIM in a future project;
- B. digging and plantation of ponds to increase biodiversity in consultation with Natura 2000;
- C. building of pontoons in order to avoid damage of the banks by cattle tramping;
- D. installation of four watering holes engineered to prevent blooming of cyanobacteria in the river bed; this measure is applicable with every type of brook and river.

## **C. To conclude:**

The project's objective is to ensure a better management of the highest and the lowest discharges and to obtain a healthy river basin.

Reproduction of this kind of project in all the tributaries of any river would lead to the alleviation of flooding accidents.

Low-flow management has proven that good maintenance combined with local measures allows to recover healthy rivers.

The proposed measures can be used for numerous brooks and small rivers.

Ir. P. Bouxin.



Pontoon built in order to avoid damage of the banks by cattle tramping



Watering hole engineered to prevent blooming of cyanobacteria



New infrastructure to control discharges including a gate and a low-water bed in order to facilitate fish migration



Dike with cyclo-pedestrian track