

Elimination of a pond along the Erve River and conservation of the historical heritage in Sainte-Suzanne-et-Chammes

The operation

Category	Restoration
Type of operation	Elimination or diversion of ponds along rivers
Type of environment	Intermediate river zone
Issues at stake (water, biodiversity, climate)	River continuity, water quality, good status of habitats
Start of operation	May 2010
End of operation	Summer 2010
Length of river affected by the works	400 m

River in the restored sector

Name	Erve River
Distance to source	22 km
Mean bankfull width	40 m before the works 6.5 m post works
Mean gradient	0.51‰
Mean discharge	0.9 cubic metre per second

Aims of the project owner

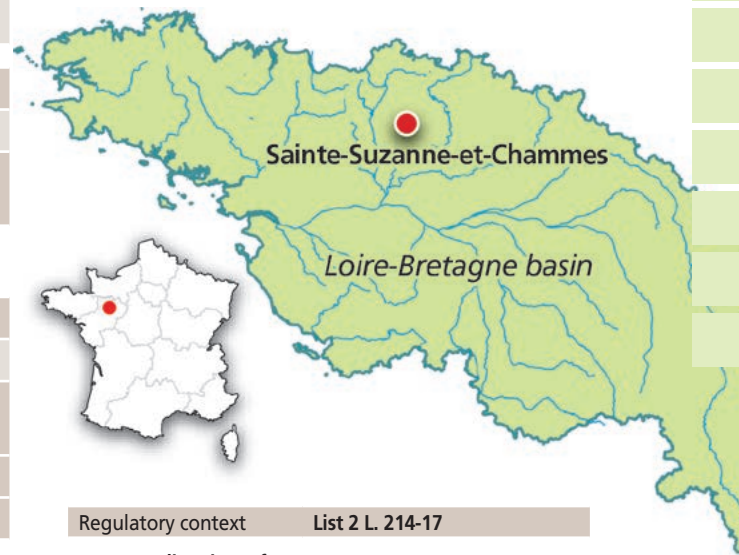
- Restore river continuity.
- Restore the aquatic habitats.
- Improve water quality.
- Conserve and restore the historical heritage.

Environment and pressures

The Erve is a right-bank tributary to the Sarthe River and runs a total of 72 kilometres. Its basin covers a surface area of 380 square kilometres. The Erve is a list-2 river (article L. 214-17 in the Environmental code) and a fish category-1 river from its source to Saint-Jean-sur-Erve, then a category-2 river to its end. Land use consists essentially of agriculture (grazing and crops). The existence of numerous weirs is the main disturbance in that they separate fish populations, modify aquatic habitats and impact sediment transport. The town of Sainte-Suzanne is well known for its historical heritage. For this reason, it has earned numerous awards as one of the "Most beautiful villages of France" or as a "Small town with character". The mills, representing the former industrial wealth of the town, are a notable part of that historical heritage.

The location

Country	France
River basin	Loire - Bretagne
Region(s)	Pays de la Loire
Département(s)	Mayenne
Commune(s)	Ste-Suzanne-et-Chammes



Regulatory context List 2 L. 214-17

European directive references

Water-body ref.:	FRGR0486
Natura 2000 site ref.:	Not applicable
ROE (obstacle) code	5988 and 5990

The reservoir during emptying in May 2010.



Onema



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The Grand-Moulin (Great Mill) prior to removal of the flap gate.

The Pont-Neuf mill around the year 1910.



There is a total of 16 mills in the town, including:

- the Pont-Neuf mill, built in the 1400s to produce paper, flour and as a fulling mill;
- the Grand-Moulin mill, built in the 1000s to grind grain, but not in use and in ruins at that time.

There are also two flap gates on the river:

- one built in the 1970s to create the reservoir (measuring one hectare) for the town of Sainte-Suzanne and supply the Pont-Neuf mill;
- the second built to maintain a constant water level for the pumping station.

The two gates had head drops of 2.3 and 0.8 metres respectively and could not be overcome by aquatic fauna, notably brown trout. The two leats created upstream of the gates (1 km for the Grand-Moulin gate and 325 metres for the Pont-Neuf mill) had an adverse impact on the physical-chemical quality of the water.

Over the years, fishing in the town reservoir had ceased due to excessive silting.

■ Opportunities to act

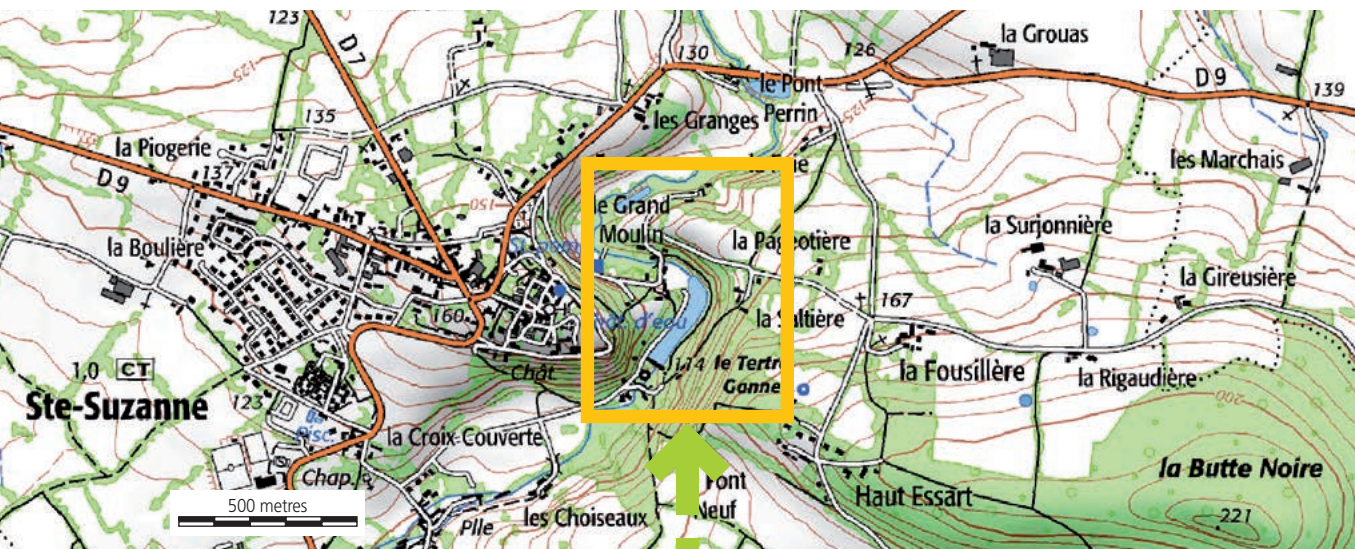
The reservoir in Sainte-Suzanne had become filled with up to two metres of mud and the stagnant water made the site less attractive for anglers and the public.

In 2009, the Contract for the restoration and maintenance of the Erve proposed the elimination of the two gates and the resulting reservoir. However, the proposal did not make it to the actual project stage.

In 2010, the towns of Sainte-Suzanne and Chammes (that became a single town in 2016) and the Coëvrons intermunicipal board decided to restore the Grand-Moulin by creating a leat in order to conserve the town's historical heritage and use the site as a showcase and an educational facility.

The project was accepted by the Departmental territorial agency on two conditions:

- that the water-intake structures be passable by aquatic fauna and comply with regulations concerning the minimum biological flow;



- that the two flap gates and the reservoir be eliminated as compensatory measures, particularly given the fact that the excessively high water level would have hindered operation of the Grand-Moulin (over-running of the wheel).

As a result, the two projects were combined and the Erve River board assumed the role of project owner to ensure optimum coordination of the work.



Downstream view of the reservoir, in 2011 prior to the works.

■ Works and developments

The project started in 2010 with the emptying of the reservoir, very progressively in order to limit the outflow of the fine sediment. The flap gate and the concrete spillway of the reservoir were then removed. Thanks to these two operations, the mud in the former reservoir stabilised and the river reformed its bed very naturally.

In 2012, the second flap gate located upstream and an obsolete, wooden dam located next to the pumping station were removed.

The two flap gates were replaced by two distribution structures, i.e. rock chutes with macro-roughness surfaces evenly distributed. These structures maintain the minimum discharge in the natural riverbed. In parallel, side leats were created to supply the flume of each mill via buried conduits.

In the former reservoir, the river was left to its own devices in order to produce a natural riverbed in the sediment. In 2013, part of the mud was nonetheless spread on a slight slope at the outlet of the Grand-Moulin tailrace in order to improve the stability of the zone. The banks were planted.

■ Regulatory approach

Authorisation in accordance with the Water law.

■ Post-restoration management

The natural evolution of the river is monitored by the River board which may decide to intervene in certain areas, if necessary.

■ Monitoring

The pre-works monitoring was carried out in 2010 outside the zone of influence of the former reservoir and dealt with the benthic macrofauna (WFD- IBG biological index). No hydromorphological monitoring was done during the project.

Since the elimination of the flap gates in 2011, annual monitoring of the fish community (IPR index), the benthic macrofauna (WFD- IBG biological index) and diatoms (IBD index) has been carried out. This monitoring work was undertaken inside the zone of influence of the former reservoir.

■ Outcome of the project and outlook

Visually speaking, the project is a success and the river rapidly carved out its bed in the area previously occupied by the reservoir. Vegetation colonised the banks, thus creating alternating zones of light and shade along the river. The flow patterns became more diversified and the previously uniform substrate now varies between sand, stones and large rocks. A general improvement in the fish and invertebrate compartments is due to the diversification of habitats in the former impounded reach (1.3 km).

The results of the macro-invertebrate and diatom indices are positive, including a significant improvement in the WFD- IBG biological index from 2012 to 2014. The level of quality for the index was quite high in 2014, with greater taxonomic richness and the presence of taxa more sensitive to pollutants.



The site of the former reservoir two years after the project, in May 2013.



Downstream view of the reservoir, in 2011 prior to the works.

Costs

In euros ex VAT

Preliminary study	57 590 €
Purchase of land	Not applicable
Works and developments	169 380 €
Monitoring studies	Not applicable
Total cost of project	226 970 €

Financial partners and funding:

Loire-Bretagne Water agency: 50%; Departmental council: 20%; Regional council: 10%; Erve River board: 20%

Technical partners:

Onema, Loire-Bretagne Water agency, Mayenne departmental territorial directorate, Mayenne departmental federation of certified associations for fishing and the protection of aquatic environments, Truite suzannaise association for fishing and protection of aquatic environments, Friends of Sainte-Suzanne, Town of Sainte-Suzanne, Mayenne departmental council, Departmental architecture and heritage service, Coëvrons intermunicipal board, Mayenne nature et environnement association

For the IBD diatom index, the situation has remained stable since 2011, with a varied and balanced diatom community and high physical-chemical quality of the water, notably in terms of nutrients (nitrogen, phosphorous, suspended matter, etc.).

Monitoring of the fish community revealed a reduction in the number of species adapted to lentic environments (roach, bream) or those less sensitive to the quality of the environment (stone loach), and an increase in species adapted to lotic environments (bullheads, minnows). No juvenile trout were noted in the sector, an indication that the necessary reproductive conditions may not be available for the species. In 2014, no eels or brook lampreys had yet been observed on the site. Their absence may be due to the presence, downstream, of transversal structures that block the movement of the species.

This project opened up 2.6 km of river in the upper section of the Erve basin. River continuity nonetheless remains a serious problem because there are still 22 weirs downstream that block the movement of fish and the nearest is only 400 metres away.

Viewpoint

« ...The river has regained its charming aspects, the murmur of a torrent, its natural environment for the aquatic fauna and flora, its original condition. The area occupied by the reservoir has been turned back into public space for strolling along the river, but also for medieval tournaments and battles. The rock chutes for the fish passes on the magnificent site were filmed for the 'Des Racines et des Ailes' television programme. In short, the successful modifications to the river were an integral part of the overall project for the historical and touristic restoration of the village, surnamed the 'Pearl of Maine' ».

Jean-Pierre Morteveille, mayor of Sainte-Suzanne-et-Chammes.

Promotion of the project

Press articles were published in local and regional weekly papers presenting the project and informing the local population. The Loire-Bretagne Water agency awarded the project the Water Trophy 2011.



- *Étude relative à la suppression de l'étang de Sainte-Suzanne et aux ouvrages du Grand-moulin.* Sogreah, juillet 2011.
- *Suivi des indicateurs biologiques dans le cadre du contrat territorial des milieux aquatiques du bassin versant de l'Erve 2014.* Hydroconcept, 2014.
- *The results of the biological monitoring are available on the internet site:*
<http://www.erve.portail-bassins-versants.fr/Rapports-Suivi-des-indicateurs-30.html>

Project owner

Erve River board



Contact

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