

Adaptive management of hydraulic structures on the Sèvre nantaise and Thouet rivers

The operation

Category	Restoration
Type of operation	Total or partial dam or weir removal
Type of environment	Lowland river
Issues at stake (water, biodiversity, climate)	Water quality, river continuity, good status of habitats

Location

Country	France
River basin	Loire-Bretagne
Région(s)	Pays-de-la-Loire and Poitou-Charentes
Département(s)	Loire-Atlantique, Maine-et-Loire, Vendée and Deux-Sèvres
Commune(s)	Not specified

Start of operation	2004
End of operation	Still underway
Length of watercourse affected by the works	Multi-sites

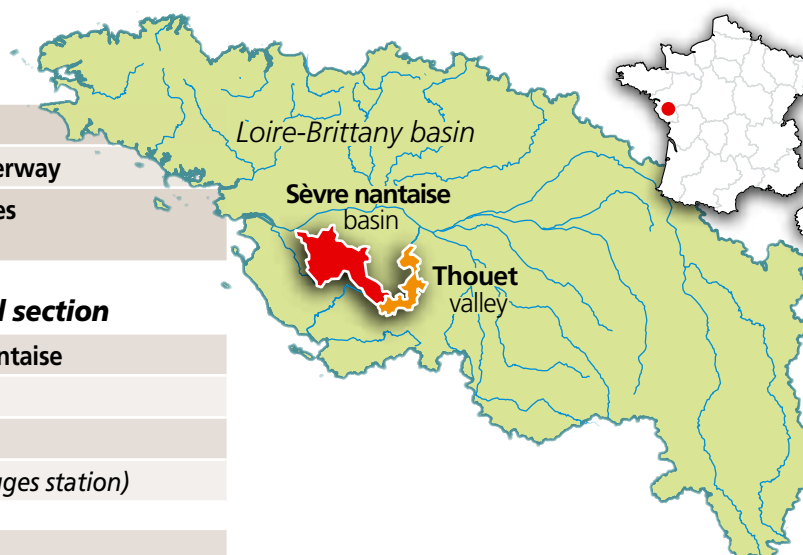
Watercourse in the restored section

Name	The Sèvre nantaise
Mean width	15 to 50 m
Mean gradient	1.54 ‰
Mean flow rate	8 m ³ /s (Tiffauges station)

Name	The Thouet
Largeur moyenne	15 to 50 m
Pente moyenne	1.3 ‰
Débit moyen	19 m ³ /s (Chacé station)

Aims of the project owner

- Improve the decision-making process for the management of the hydraulic structures.
- Contribute to improving the biological quality of watercourses, including by improving the physical processes.
- Restore river continuity.



Environment and pressures

The Sèvre nantaise and the Thouet are tributaries of the River Loire. The Sèvre nantaise flows over 159 kilometres and drains a catchment area of 2,356 km². The Thouet is 159 kilometres long and drains a catchment area of 3,452 km². There are nearly 380 km of main watercourses in the Sèvre basin (Sèvre nantaise, Moine, Maine, Sanguèze and Ouin), to which nearly 1,900 km of small watercourses, which may be permanent or temporary, can be added. In the Thouet basin, there are 2,493 km of watercourses, with the main tributaries being the Argenton, Dive, Thouaret and Cébron.

Regulatory context: *Not applicable*

References in relation to European Directives

Waterbody ref.	FRGR0438a, FRGR0548, FRGR0547b
Natura 2000 site ref.	FR5400442



Oliver Constantin - SMVT



Oliver Constantin - SMVT

The Clapet des Planches reservoir on the Thouet in 2004 prior to lowering (top) and after in 2007 (bottom). The water level dropped by approximately one metre, which allowed for the reappearance of diversified flow patterns (restoration of a riffle).

This entire river network is favourable to colonisation by elvers and young eels. In the past, the downstream Sèvre nantaise was home to a shad population that has since disappeared, and its conditions are also favourable to the sea lamprey.

Throughout both basins, numerous hydraulic structures have been built on the river bed. Their presence was initially due to the use of hydraulic power (mills). More recently, and for the vast majority of sites, the reservoirs have been used for recreational and scenic purposes: hiking, fishing, water sports and landscape beautification, in addition to agriculture (irrigation) and drinking water supplies. Nearly 355 structures have been recorded in these two catchment areas (240 for the Sèvre nantaise basin and 115 for the Thouet). Today, the majority of these structures are rarely operated and many of them have even been abandoned. On the other hand, they are still causing disturbances by modifying flows (stagnation, increase in water temperature, homogenisation of the ecosystems, etc.) and by stopping the movements of fish and sediments.

■ Opportunities to act

The degradation process affecting hydraulic structures, the cost of maintaining them in addition to the negative ecological impacts of the structures and conflicting uses, prompted the Interdepartmental Institution of the Sèvre Nantaise Basin (IIBSN – Institution interdépartementale du bassin de la sèvre nantaise) and the Public-Private Association for the Thouet Valley (SMVT - Syndicat Mixte de la vallée du Thouet) to consider the future of these structures. Since 2004, both of these associations have committed significant resources to improving their understanding of the problems of hydraulic developments and the evolution of the associated landscapes. A site assessment method was initially developed for the Sèvre nantaise basin and then subsequently adapted to the Thouet basin: the collective benefits and negative ecological impacts of the structures in the basin are qualified on a multicriteria assessment grid in which ecological and sociological criteria are used¹.

Since 2008, this approach and the development of an analysis tool have been implemented in the framework of a research-action project proposed in collaboration with the Géolittomer laboratory, LETG UMR 6554 CNRS (Université de Nantes; Régis Barraud, geographer), the SMVT and the IIBSN (RDI Platform of the Plan Loire Grandeur Nature III [Third Loire Management Plan]).

¹ - For further information on the multicriteria analysis grid, see the document: "Des étapes et des outils – Réaliser un diagnostic et définir un projet multi-objectif" (Stages and tools – performing a diagnosis and defining a programme with multiple objectives).

■ Works and developments

More than 300 sites with hydraulic structures have undergone the participative multicriteria analysis whose results are currently being exploited in order to develop intervention programmes which include renaturation, for example. The results of the analysis reveal whether the conservation of the channel course is of collective benefit or whether it may have negative ecological impacts on the river processes. Possible solutions include the conservation of the structure, the improvement of its hydraulic management or equipment and the modification or removal of this structure. Three initial pilot projects concerning the opening of gates and the lowering of structures have already been conducted. These actions have been carried out by local river associations:

- Reduction in water depth over 300 metres upstream of the Les Planches gate (0.75 m tall) on the Thouet at Le Tallud (SMVT, commune [town or village] of Le Tallud).
- Lowering by 1.5 metres of the level of the La Motte impoundment on the Sanguèze at Mouzillon (La Sanguèze association).
- Permanent opening of two gates on the Moine at Cholet (La Moine association).

Other cases are being studied or carried out.

■ Monitoring

The three pilot projects were monitored before and after the works. For the Thouet, biology was the only aspect to be monitored by a research consultancy, using the IBGN (Standardised Global Biological Index), IBD (Diatomic Biological Index), the macrophyte Index and the Fish Index. On the Sanguèze, the fauna, flora, water quality, hydromorphology, habitats and social perceptions were evaluated. Finally, on the Moine, in addition to the indicators monitored on the Sanguèze, physico-chemical monitoring was also carried out.

■ Outcome of the project and outlook

The approach carried out by the IIBSN and the SMVT, in partnership with the associations for the Sanguèze and Moine in the Sèvre basin and certain communes, is intended to motivate and help the local project owners implement measures that are designed to restore continuity. The assessments of pilot projects are encouraging because the monitoring results show that the environment has improved at the physical, biological and chemical levels, as well as in terms of the local perception of the projects. In the three cases, eutrophication has diminished and the habitats have diversified. Alluvial banks have formed and become vegetated. Overall, the number of plant and invertebrate species which are adapted to flowing waters has increased. On the other hand, the results for fish po-



The La Motte water body, prior to lowering.



The basin of the reservoir area in 2004, after the lowering of the dam structure. The watercourse has naturally re-established a sinuous flow channel.



The new bed in the former impoundment in 2006, two years after removal. Vegetation has grown on the sediment of the reservoir.

Costs

In euros excl. VAT

Cost of the SMVT multicriteria study over 15 months (<i>recrutement d'un chargé de mission spécialisé</i>)	€50,000
Cost of acquisitions	<i>Not applicable</i>
Cost of operations and developments	<i>Unknown</i>
Cost of enhancement and monitoring	<i>Unknown</i>
Total cost of the operation	<i>Unknown</i>

Financial partners and funding:

Water Agency, Regional Council of the Pays de la Loire, Département-level Councils of the Vendée, Loire Atlantique, Deux-Sèvres and Maine-et-Loire, and the Leader+ European Structural Fund.

Technical partners of the project:

Géolittomer, Université de Nantes (Régis Barraud).

pulations remain mediocre, which is probably related to the fact that water quality remains mediocre. The water quality problems are partly due to the inflows of substances originating from the catchment area.

In order to improve their efficiency, future actions must be undertaken in homogeneous geographical sectors and a series of structures should be covered.

The success of the La Motte and Plessis-Nombretière experiments has allowed the Sanguèze and Moine associations to initiate ambitious dam removal projects, which follow on logically from the measures originally implemented on these sites but involve bigger stretches of watercourses (15 km and six structures on the downstream Sanguèze, 10 km and six structures on the Moine at Cholet). Weir and sluice-lowering experiments are underway and others will be launched in the coming months in order to assess the feasibility of these ambitious projects.

Other actions will be scheduled in the next territorial contract for the aquatic environments of the Thouet, or are undergoing assessment in the framework of restoration-maintenance contracts (CRE) for the Sèvre nantaise basin 2008-2012.

Further efforts must be undertaken in order to understand the positions and opinions voiced by different users. In the framework of the Recherche-données-information (Research-Data-Information) platform of the Loire grandeur nature III (3rd Loire Management Plan), a research operation concerning the evolution of social representations of the river is helping to clarify these issues by conducting photographic surveys

and targeted interviews with groups of users (owners, fishermen and women, hikers, canoeists, etc.). This component facilitates the sharing of projects and thus helps to anticipate the emergence of conflicts.

Promotion of the project

Promotional actions include the production of educational publications (brochures and guides) and a video documentary by the IIBSN and the SMVT, the organisation of a colloquium in 2010 and the online publication of information on the IIBSN and SMVT websites. A survey of the general public concerning the perception and use of the valleys is in the process of being published.

Further information can be found on the following websites:

<http://www.sevre-nantaise.com>

and <http://www.valleedouthouet.fr>



BARRAUD, R. (2007). *Vers un «tiers-paysage». Géographie paysagère des fonds de vallées sud-armoricaines. Héritage, évolution, adaptation.* Géographie, Université de Nantes: 408

Also see the IIBSN website:

<http://www.sevre-nantaise.com/>

Project holders

Syndicat Mixte de la vallée du Thouet, Institution interdépartementale du bassin de la Sèvre nantaise



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