Removal of the Brosses weir on the Soanan River

The operation

Category	**Restoration**
Type of operation	**Partial or total weir/dam removal**
Type of environment	**Intermediate river zone**
Issues at stake (water, biodiversity, climate)	**River continuity**

Start of operation	**September 2010**
End of operation	**September 2010**
Length of river affected by the works	**300 m**

River in the restored sector

Name	**Soanan River**
Distance to source	**20 km**
Mean width post works	**8 m**
Mean gradient	**10‰**
Mean discharge	**0.8 cubic metre per second**

Aims of the project owner

- Restore the free movement of species between the Soanan and the Azergues Rivers.
- Restore sediment transport.

Environment and pressures

The Soanan is a coastal river, 20.5 kilometres long, that flows into the Azergues River at the town of Légny. The upper section of the river basin is located in a mountainous region, whereas the lower is essentially situated in an agricultural environment (grasslands and some cereal crops). The Soanan has been subjected to numerous hydraulic projects in order to gain land for urbanisation and contribute to the agricultural development of the valley, including land fills, resizing of certain sections of the riverbed and the creation of approximately fifty structures along the river. The river is also constrained by a departmental road along certain reaches. These various pressures have led to degradation of the aquatic environment, due notably to the loss of river continuity for fish in their upstream migration and to disturbances in sediment transport.

The location

Country	**France**
River basin	**Rhône-Méditerranée-Corse**
Region(s)	**Auvergne-Rhône-Alpes**
Département(s)	**Rhône**
Commune(s)	**Légny**

Regulatory context	**List 1 L. 214-17**

European directive references

Water-body ref.:	**FRDR571**
Natura 2000 site ref.:	*Not applicable*
ROE (obstacle) code	**32445**

The Soanan nonetheless offers valuable habitats as spawning grounds for various fish species, notably brown trout and the species typically found with it, as well as rheophilic cyprinid species.

The Brosses weir, standing at 2.2 metres tall, was an old hydraulic structure previously used to irrigate nearby crops and meadows, via a leat. However, the structure had served no purpose for many years. But the weir still existed and continued to impact the aquatic environment.

Frédéric Fromager - AFB

The Brosses weir prior to its removal. August 2010.

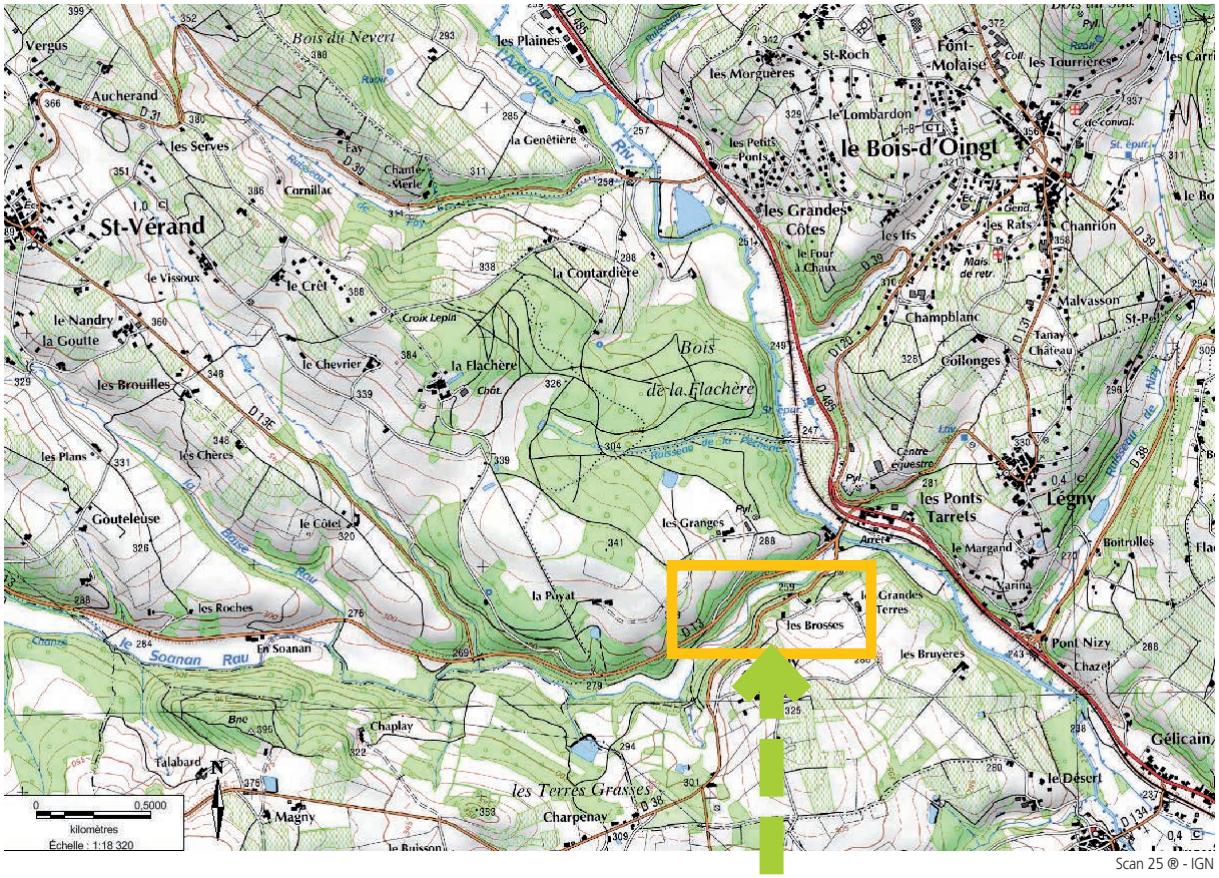
Pierre Gadiolet - SMRPCA

The site after the removal of the weir. September 2010.

The impoundment behind the weir had become completely cut down and the bed surface was clogged with fine sediment. Paving had taken place on the downstream bed and the remaining grain sizes were too coarse to be transported, thus leading to a deficit in the distribution of sediment sizes.

Opportunities to act

In defining the projects for the river contract (2004-2010) for the Azergues and its tributaries, the Development board for the Chères and Azergues plain (SMRPCA) launched in the early 2000s several studies to identify the pressures weighing on the river basin. One of the studies in 2001, managed by the Departmental federation for fishing and the protection of aquatic environments for the Rhône department (FDPPMA 69) listed the hydraulic structures on the Soanan and made proposals for the restoration of river continuity concerning ten structures that were observed to serve no purpose. A centennial flood in December 2003 disrupted the plans for the contract projects and funds had to be diverted for repairs after the flood.



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In order to finally start the projects for river continuity initially planned in the river contract, in 2007 the board launched a preliminary study on three structures (including the Brosses weir) that produced different scenarios and cost estimates of the studied solutions (consolidation of the structure and creation of a fish pass, lowering of the structure, diversion or total removal of the structure). In spite of assistance from the Land Register and the nearby land owners, it was not possible to determine with certainty the owner of the Brosses weir.

In December 2008, a second centennial flood again delayed the project.

Finally, in 2009, the procedure in compliance with the Water law could be initiated. It was decided to totally remove the weir, rather than consolidate and equip it (for reasons of cost and the lack of any use) or lower it (given that there were no risks of damage caused by regressive erosion).

Works and developments

The Brosses weir was completely destroyed and the rubble was removed, except for a few large rocks left in the bed, where the weir once stood. During the works, the river was temporarily diverted to avoid the fine sediment being washed away. The dissipation pool of the weir served as a sedimentation pool. A rescue fishing campaign was undertaken prior to the works to limit the impact on the fish population.

Regulatory approach

- The project was declared in the public interest.
- The work was authorised in accordance with the Water law.

Post-restoration management

No particular management measures were planned.

Monitoring

Pre-works monitoring was carried out on several compartments of the hydrosystem. The characteristics of the morphological compartment (long and cross profiles, substrate measurements, flow patterns) were identified prior to the works. The fish and riparian-vegetation compartments were also assessed by the FDPPMA 69 and the SMRPCA respectively. Finally, pre-works monitoring of the spawning redds was done by the Rhône local office of Onema. Post-works monitoring was done on the same compartments in 2011.

Outcome of the project and outlook

The removal of the Brosses weir opened 2.5 km of river and potential spawning redds for brown trout. The free movement of fish species and sediment was restored between this section of the Soanan and the Azergues River.

On the site of the former weir, the Onema local office noted, post works, more diversified flow patterns and a shift from lentic to lotic facies. These changes in facies would seem to have stimulated the populations of bullheads and juvenile brown trout, whose respective densities were multiplied by factors of ten and three one year after the works.

In 2017, following numerous floods including a particularly morphogeneous flood in 2016, it was decided to pursue monitoring on the Soanan. The flood in question reduced some of the irregularities in the long and cross profiles of the river. The slope is now similar to the steady slope observed in the rest of the river. However, regressive erosion upstream of the former weir has been observed.

Analysis of the monitoring data revealed reactivation of sediment over a distance of 120 metres upstream of the former weir and, downstream, sediment progression to the confluence with the Azergues River.

** For more information, see the "Monitoring" section in the fact sheet on the Wetlands portal.*

SMRPCA

The Soanan upstream of the former weir following the ten-year flood of 2016.

SMRPCA

View of the gravel shoal created in the middle section of the river by the 2016 flood, downstream of the former weir.

Costs

	In euros ex VAT
Studies	9 350 €
Purchase of land	0 €
Works and developments	17 600 €
Promotion	0 €
Total cost of project	**26 950 €**

Financial partners and funding:
Rhône-Méditerranée-Corse water agency (60%), Rhône-Alpes region (20%), Development board for the Chères and Azergues plain (SMRPCA) (20%)

Technical partners:
Rhône local office of Onema (National agency for water and aquatic environments), SMRPCA, Departmental federation for fishing and the protection of aquatic environments for the Rhône department (FDPPMA 69)

The fine sediment (sand and silt) disappeared from the upstream zone, revealing gravel beds. In just one year, the natural sediment dynamics were restored in this section of the river.

Prior to the removal of the weir in 2009, no spawning activity by brown trout had been observed over a distance of 200 metres below the weir. Two spawning redds were subsequently observed in 2010, i.e. during the winter immediately following the removal, and twelve spawning redds were observed in December 2011. On the basis of the monitoring results for fish, the species commonly found in calm waters and ponds/lakes had disappeared following the removal of the weir. The number of brook lampreys fell virtually to zero due to the disappearance of the sand and silt substrates. The studied river section had returned to its initial fish-population context comprising essentially salmonids. In 2017, the trout population had returned to a certain equilibrium in that all age classes were represented. However, juveniles were under-represented due to two very hot and dry summers the previous two years.

An action programme for flood prevention (PAPI) and a river-basin contract are currently in effect in the Azergues basin. These two instruments aim to enhance the coordination of management work to control floods and restore aquatic environments by developing contacts and project development in the area.

Promotion of the project

The project to remove the Brosses weir was publicised by several visits by river technicians from neighbouring river boards and by the educational visit of students in the *"Management of aquatic environments"* Master's course at the University of Lyon. The operation was also highlighted on the internet site of the river contract (*http://www.pays-beaujolais.com/france/DT1188994677/page/Contrat-de-Riviere-Azergues.html*) and in articles published in the local newspaper.

Project owner	Development board for the Chères and Azergues plain (SMRPCA)
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