

Removal of the Stalapos weir on the Alagnon 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	June 2008
End of operation	November 2009
Length of river affected by the works	400 m

River in the restored sector

Name	Alagnon River
Distance to source	14.8 km
Mean width	5 m
Mean gradient	0.5‰
Mean discharge	1 cubic metre per second

Aims of the project owner

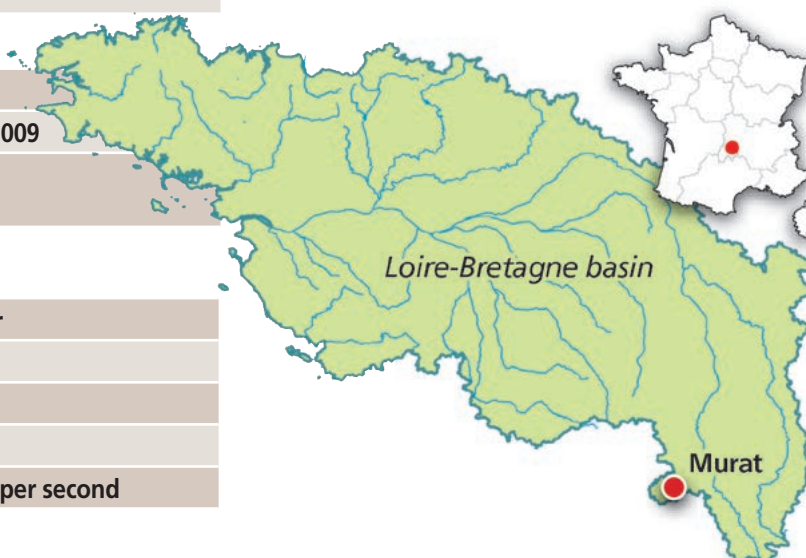
- Restore river continuity.

Environment and pressures

The Alagnon is a tributary to the Allier River and has its source on Mount Cantal, at an altitude of 1 686 metres. The river drains a catchment of 1 044 square kilometres and travels 85 kilometres before joining the Allier. The fish community is made up of grayling and brown trout.

The location

Country	France
River basin	Loire - Bretagne
Region(s)	Auvergne-Rhône-Alpes
Département(s)	Cantal
Commune(s)	Murat



Regulatory context

- The Volcans d'Auvergne regional nature park
- Listed site: the Murat urban area
- Lists 1 and 2 of Article L. 214-17 of the Environmental code

European directive references

Water-body ref.	FRGR0247
Natura 2000 site ref.	FR8302034
ROE (obstacle) code	27190

The Stalapos weir in May 2008, prior to the works.



SIGAL



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Removal of the Stalapos weir during the excavation phase of the project in June 2008. The river was diverted to dewater the weir and the impounded reach.



SIGAL

The work done upstream of the weir in 2008.

In the past, Atlantic salmon could be found in the Alagnon, listed as a river with migratory fish, as per article L. 214-17 of the Environmental code.

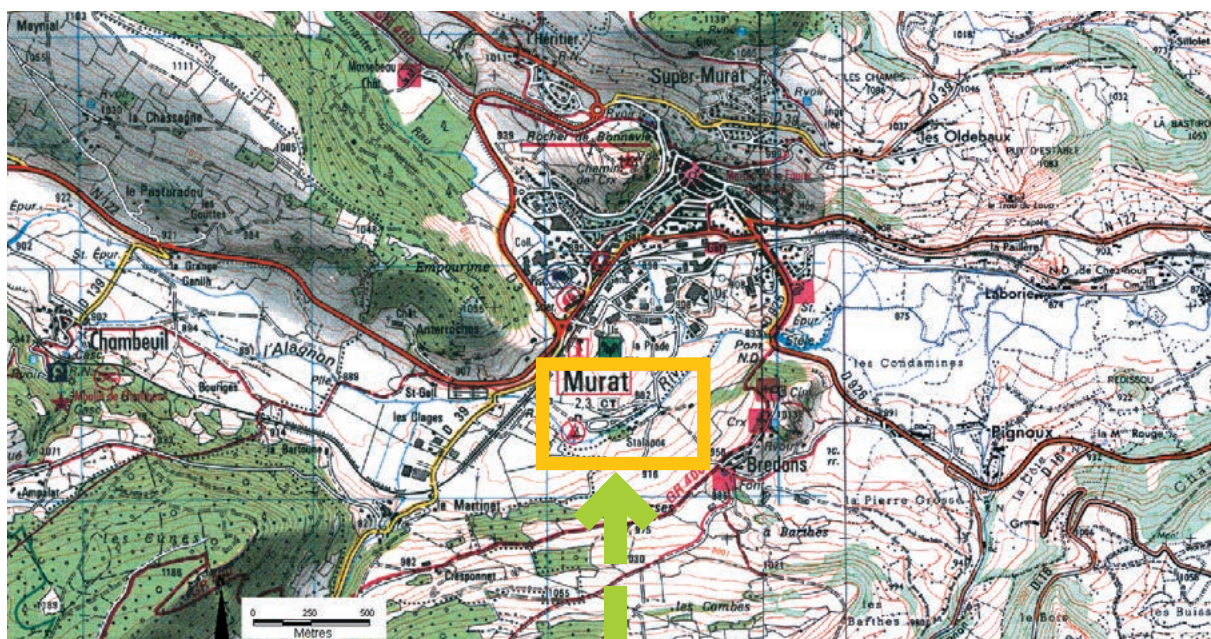
Between the towns of Murat and Albepierre-Bredons, there was a weir built to supply a mill with water. The leat to the mill had already been filled in. The weir measured 2.7 metres high and 26.5 metres long. A municipal camp ground was located nearby on the left bank and pastures on the right. The weir was equipped with a fish pass that functioned very poorly. Upstream migration was impossible for the fish and downstream migration was difficult. The impounded reach created by the weir extended 400 metres upstream and was filled with approximately 6 000 cubic metres of sediment.

■ Opportunities to act

For the period 2001 to 2007, restoration of river continuity for fish in the Alagnon was one of the main objectives of the river contract managed by the Alagnon River board (SIGAL). Starting in 2001, meetings among the stakeholders in the area were organised. The Stalapos weir served no further purpose and the owner relinquished his water rights in 2004. In 2008, the process of removing the weir was initiated.

■ Works and developments

Prior to the actual work, the river was diverted to dewater the weir and the impounded reach. In June and July 2008, the weir was removed by an excavator. The river bed was then graded and stone banking was installed to prevent erosion along the camp ground. The slope of the banks was reworked, trees planted and the site was completely replanted in November 2009.



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■ Regulatory approach

- The project was declared in the public interest.
- The work was authorised in accordance with the Water law: 3.1.2.0 (A): *Modification of the riverbed long profile or cross profile, or creating a bypass.*

■ Post-restoration management

The SIGAL signed a contract with a private company to ensure the provision of two types of service:

- removal of obstructions and alluviation deposits. When sediment has reduced the original cross section of the river bed by at least 20% upstream of the structures, the president of the SIGAL may, following a recommendation by the monitoring committee, order the partial or complete removal of the material;
- emergency interventions. If during a flood the deposits directly threaten existing structures, the company must intervene within 12 hours following the decision by the president of the SIGAL.

In addition, if the mobility space planned for the river is exceeded (approximately ten metres behind the former banks), bio-engineering techniques may be used to protect the banks.

■ Monitoring

The pre-works monitoring of the physical compartment (simplified CarHyCE method) was carried out by a consulting firm. The departmental fishing federation counted the number of trout spawning redds.

Regular monitoring was planned for a period of three years, once or twice per year depending on the hydrological conditions. The post-works monitoring was carried out until 2014. This monitoring programme served to study the physical evolution of the river following removal of the weir, notably through topographical surveys, a study of the substrate sizes and photographic monitoring. Counting of the trout spawning redds continued to be carried out by the Cantal FDAAPPMA until 2014.

■ Outcome of the project and outlook

Immediately following the removal of the weir in 2009, morphological adjustments were observed. In the work zone where the weir once stood, the river bed dropped 1.1 metres and would appear to have reached the point of equilibrium. Measurements carried out in 2011 and 2014 confirmed these results. For the river reach as a whole, the long profile stabilised, with local dips and rises in the river bed balancing out.

The sediment trapped initially in the former impounded reach moved downstream. Deposit and erosive zones were observed, indicating regained mobility of the river and sediment transport. This movement was made possible by establishing an erodible corridor for the Alagnon. In addition, management



View of the weir before its removal.



View after removal of the weir in November 2009, the vegetation has partially grown back and the river bed is more diverse.



View of the site in 2017, nine years after the works

Costs

In euros ex. VAT

Studies	10 400 €
Purchase of land	Not applicable
Works and developments	153 000 €
Promotion	Not applicable
Total cost of project	163 400 €

Financial partners and funding:

Water agency (40%), Departmental council (25%), Regional council (15%), Alagnon river board (10%), Departmental fishing federation (10%).

Technical partners:

National agency for water and aquatic environments (Onema), Departmental fishing federation.

works that had been planned for situations where alluviation deposits were too massive or threatened downstream structures during floods were not carried out. It was deemed important to let the river adjust naturally, using its new erodible corridor.

The results of the post-works monitoring of the active spawning redds for brown trout on the site were very positive, on the whole. The immediate impacts of the project on the trout population would appear to have been rapidly compensated by the swift recolonisation of the upstream section and by the quick reversal of the downward trend in the number of spawning redds.

In the studied sector, the reproductive capacity of brown trout increased significantly following the removal of the weir. The number of spawning redds increased by a factor of six upstream of the former weir, from 27 in 2007 to approximately 220 in 2012, and their surface area also increased. Similarly, downstream but to a lesser degree, the number and surface area of spawning redds increased. In 2012, five years after the removal of the weir, the number and surface area of spawning redds would seem to have stabilised.

The stabilisation of the long profile and the increase in the number of spawning redds are indicative of the significant ecological gains produced by the project. The removal of the weir restored ecological continuity.

A major factor in the success of the project was the excellent communication maintained with the owner of the structure. In addition, the steering committee,

consisting of all the local stakeholders (municipality, Regional nature park, Departmental agriculture and forestry directorate, National agency for water and aquatic environments, Departmental fishing federation, Water agency, Departmental council, Regional council, National train company (SNCF), Departmental territorial directorate, manager of the camp ground) succeeded in setting up a project corresponding to the multi-lateral interests.

In the framework of the 2011-2015 Alagnon territorial contract, the action programme targeted 13 structures in view of restoring river continuity, of which two were removed and four were outfitted with a fish pass. It should also be noted that six other structures were also removed, but not in the framework of the territorial contract, thanks to the significant efforts made by the SIGAL.

However, the dam of the Chambezon hydroelectric plant (ROE 10036), with its head drop of approximately four metres, located several kilometres downstream of the study area, represents the limit to colonisation of salmon in the Alagnon River.

Promotion of the project

Articles were published in the press and the regional television station reported on the project. The SIGAL received a Loire-Bretagne "Water trophy" in 2009 for the project. A video has been produced by the Water agency to present the works carried out:

<https://www.youtube.com/watch?v=7znnuRjmiX8>



• See the article on the project published in the bulletin of the Loire-Bretagne Water agency: "L'Eau en Loire-Bretagne", special edition for the "Water trophies in Loire-Bretagne", no. 79, November 2009, p. 24-25, downloadable from: http://www.eau-loire-bretagne.fr/les_rendez-vous_de_leautrophees_de_leautrophees_2009/Tr09_Sigal.pdf

• See also the video prepared for the 2009 Loire-Bretagne Water trophies: <https://www.youtube.com/watch?v=7znnuRjmiX8>

Project owner

Management board for the Alagnon River and its tributaries (SIGAL)



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