

Removal of the Kernansquillec dam over the River Léguer

The operation

Catégorie	Restoration
Type of operation	Total or partial dam or weir removal
Type of environment	Intermediate zone watercourse
Issues at stake (water, biodiversity, climate)	River continuity

Location

Country	France
River basin	Loire - Bretagne
Region(s)	Brittany (Bretagne)
Département(s)	Côtes-d'Armor
Commune(s)	Plounévez-Moëdec

Start of operation	September 1996
End of operation	2001
Length of river affected by the works	2,000 m

Watercourse in the restored section

Name	The Léguer
Distance to source	26 km
Mean width	10 m
Mean gradient	-
Mean flow rate	6 m ³ /s

Aims of the project owner

- Eliminate the Health and Safety risks relating to the presence of the dam.
- Retain a reminder of the site's former function.

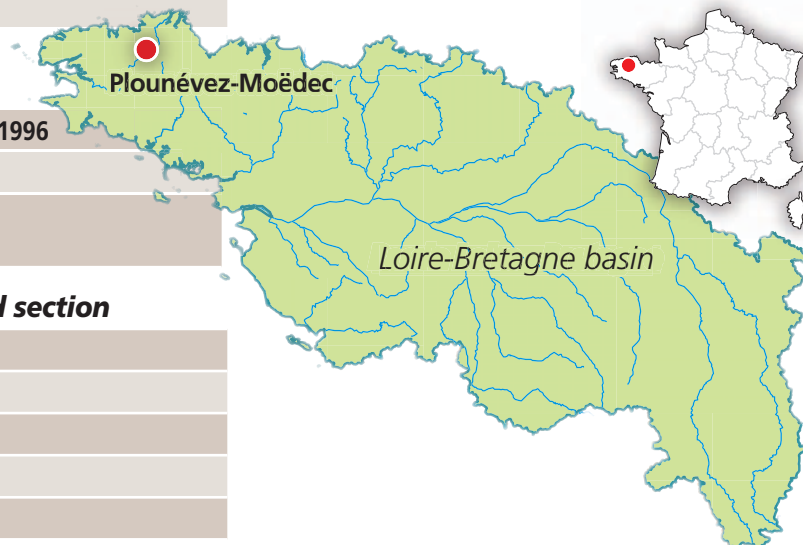


Postcard from the 1960s

Kernansquillec dam and its reservoir in the last century



Old postcard



Environment and pressures

The Léguer is a small river in Brittany which flows over 58 km into the English Channel after crossing the town of Lannion. The 280 km² catchment area consists of a narrow, entrenched granite valley. This first-category watercourse, classified as a "river with migratory fish" (rivière à poissons migrateurs) under the French legislation, is one of the region's most renowned salmon rivers.

The Vallée paper mill - one of the biggest factories in the area - used to be located on the banks of the Léguer at Belle-Isle-en-Terre. Between 1920 and 1922, a dam was built across the Léguer in order to supply the mill with electricity. Providing a livelihood for over a thousand people, the mill and dam symbolised the progress and prosperity of the region.

Regulatory context: Classified watercourse under the French legislation

References in relation to European Directives

Water body ref. FRDR0046
Natura 2000 site ref. FR5300008



The Kernansquillec dam in 1996 during the pumping out of mud from the reservoir prior to drainage.

Maric Bonenfant – DDAF 22



Site of the former dam in October 2009: footbridge and successive weirs.

Corinne Forst – Oneima

The dam, approximately 15 metres tall, created a reservoir with a length of approximately 1.5 kilometres. Despite the presence of a fish pass, it was difficult for salmon to cross and this formed an impassable obstacle for eels.

■ Opportunities to act

In 1965, the paper mill went out of business. The dam then supplied electricity to EDF (French electricity supply company). When it was time to renew the licence, the dam was in poor condition and there was limited economic interest. The former licence-holder decided not to renew its application. The dam went into the public domain in 1994. The French State then became responsible for problems relating to the maintenance of the structure. In addition to the interruption of river continuity, there was significant silting up of the reservoir whose eutrophication was clearly visible due to the proliferation of green algae. The risk of the dam failing became a growing concern and, due to the lack of maintenance, the Kernansquillec dam started cracking and became a direct threat to homes situated downstream. Following significant flooding in the winter of 1995, the government announced plans to dismantle the dam on the grounds of public safety. The demolition permit was granted by the Prefect on 17 September 1996.

■ Works and developments

The dismantling began with the gradual draining of the reservoir. The aim was to prevent river siltation occurring downstream and to minimise the risks of pollution. This drainage process would take five months. 90,000 m³ of sediments were extracted from the original river bed, which was discovered in cadastral archives dating back to the time of Napoleon 1st. The sludge was taken to three lagoons situated 400 m downstream. The river gradually re-



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established its bed and three 50-centimetre weirs were constructed in order to retain any sediments that might have escaped the suction dredging and reduce the risks of regressive erosion. Before the floodgates were opened, the fish were transferred upstream of the dam in order to reduce the risks of mortality due an excessive influx of sediments. The dam was then demolished. Only a single arch was preserved as a heritage symbol of the prosperity of a bygone era.

The river bed rehabilitation works were carried out in 2001, once the river's profile had stabilised. Only consistently unstable banks were revegetated in order to guarantee the safety of future visitors. After the draining and drying of the remaining sediment, the base area of the former reservoir was restored as a natural meadow.

The works schedule respected the rhythms of the ecosystem: heavy operations during periods of minimum flow, seeding before the winter flooding and planting during dormancy, etc.

■ **Regulatory approach**

Creation of an emergency procedure

■ **Post-restoration management**

Since 2002, seven hectares of agricultural land situated within the former reservoir area have been used as summer pasture by two farmers who have converted to organic farming. The plots are managed as extensive grazing land.

■ **Monitoring**

The pre-works monitoring was not carried out. During the works, the water quality was continuously monitored and the results were regularly released to the public.

After the removal of the dam, no specific monitoring was carried out. Only studies of invertebrates using the Standardised Global Biological Index (IBGN – indice biologique global normalisé) method were carried out upstream and downstream of the former dam. Two stations of the Fish Monitoring Network (RHP – Réseau Hydrobiologique et Piscicole) are situated upstream and downstream of the site. They are relatively far away from the dam and one station is situated on a tributary: the Loup. The study of fishery data allows to evaluate the recolonisation of the sector by migratory species. Salmon abundance indices are calculated annually on the watercourse that has been re-established since 1997.

■ **Outcome of the project and outlook**

Overall, the visible but unquantified results of the different elements (water quality, ecological condition, etc.) are very satisfactory. The site has been rehabilitated in the least intrusive manner possible. Five years after the drainage of the reservoir, the banks had stabilised and the river had re-established its meanders, while its flow and gradient had evened out. Alternating



Europa Technologies / Samborn / Google Gray Buildings, 2008-2009

The Léguer valley after the removal of the Kernansquillec dam.

riffles and glides have appeared. The typical bankside vegetation found locally in the area has recolonised the entire site. Successive winter floodwaters have improved the substrate characteristics, creating a heterogeneous particle size distribution that is favourable for fish spawning.

The water quality and IBGN scores recorded at the RHP stations have been excellent since 1994 and have remained that way since the removal of the dam.

As for fish, the salmon, which had been absent from the Loup prior to the removal of the dam,

The Léguer within the former reservoir area in October 2009: variations in the stream flow and particle size distribution.



Corinne Forst – Onema



Corinne Forst – Onema

Costs

In euros excl. VAT

Cost of studies	€15,000
Cost of acquisitions	not applicable
Cost of operations and developments <i>including €985,000 for drainage and dismantling and €400,000 for rehabilitation of the watercourse bed</i>	€1,385,000
Cost of promotion	Unknown
Total cost of the actions	€1,400,000

Financial partners and funding:

- Dam removal: *French Ministry of Industry (70%), Water Agency (20%), French Ministry of the Environment (5%), European Community (5%).*
- Rehabilitation: *European Community (34%), Communities of Communes of Belle-Isle-en-Terre and Beg-Ar-C'hra (34%), French State (18%), Département-level Council (14%), Regional Council (10%) and Water Agency (4%).*

Technical partners of the project:

Léguer Valley Association, Rivers and Water of Brittany, Departmental Directorate for Agriculture and Forestry, Higher Fisheries Council – now ONEMA.

appeared in 1999 – three years after its demolition. It has been present in variable numbers ever since this date. The removal of Kernansquillec dam has allowed for the recolonisation of at least 27 kilometres of the upstream zone. As for eels, the evolution of the population would at first sight seem to be identical to before the removal of the dam, although a lack of accurate data makes this difficult to interpret. The eel abundance indices calculated recently give low results both upstream and downstream of Kernansquillec. Other structures pose problems downstream. The same applies to salmon in dry climatic conditions. Structures interrupt continuity downstream and do not allow the Kernansquillec site to achieve the anticipated results.

In spite of the size of the operation, the drainage of the reservoir had only a limited impact on the watercourse. Only one fish farm situated several kilometres downstream was temporarily disrupted by the silt. All of the drinking water parameters were respected.

At the outset, local residents reacted quite negatively to the dismantling of the dam, which they considered to be destroying a reminder of past industrial activity. The Léguer Valley Association then decided to rehabilitate and enhance the former site of the dam and mill. Public relations announcements about the progress of the project were also increased. These actions ensured that the local residents would accept and take ownership of the project. Large numbers of

visitors now come to see the Kernansquillec site. Since the removal of the dam, the site has become popular with canoeists.

Promotion of the project

Twelve kilometres of pedestrian footpaths with information boards have been created. These enhancement efforts promote the different issues and uses that exist throughout the length of the Léguer valley. In addition, the former paper mill has been developed into a centre that allows visitors to discover the industrial heritage of the area.

A video, made by Eau et Rivières de Bretagne, retraces the dismantling operation and a public relations brochure has also been produced. The brochure entitled "Rebirth of a valley. Dismantling of the Kernansquillec dam and rehabilitation of the site" (MEDD 2002), can be downloaded from the following address: http://www.ecologie.gouv.fr/publications/IMG/pdf/renaissance_valle.pdf

You can also consult <http://www.riviere-du-leguer.com/>



Project holders	French State for dismantling operations, Communities of Communes of Belle-Isle-en-Terre and Beg-Ar-C'hra for the rehabilitation component
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