

Drafting of the project for the removal of two locks on the Riera Major, Guillerries-Savassona N. S.

INTRODUCTION

The longitudinal connectivity of the rivers is basic to reach its good ecological state, many old locks out of use complicate the movement of the fauna, completely in the case of the fish. As part of the actions to improve the river space of the Riera Major, carried out by the Guillerries-Savassona Natural Space, the removal of locks that no longer have any function is planned. To do this, we have been commissioned to draw up this project to improve the longitudinal continuity of the Riera Major.

LOCATION

In this case, two of the locks located in the municipality of Sant Sadurní d'Osormort have been studied. The lock located upstream is the so-called Pont de Fàbregues, and the second lock, located a few metres downstream, is called Molí del Soler.



Pont de Fàbregues lock



Molí del Soler lock



Location map

PROJECT GOAL

These locks have been completely clogged after years of sediment accumulation, so that nowadays they no longer have any functionality. On the contrary, they cause certain environmental damage to the stream by impeding its longitudinal connectivity. They mainly act as a barrier, blocking the passage and proper development of aquatic fauna in different sections, for which reason their elimination is proposed. The main objective of this project is the complete removal of these locks.

However, a sudden removal of the locks, without also removing the accumulated sediments, would generate a brusque transport of sediments downstream that could lead to the following negative impacts:

- Fines sedimentation and clogging of the riverbed material.
- Decrease of the oxygen content in the stream.
- Burial of spawning grounds and destruction of present nests.
- Blockage of drainage structures.
- Reduction of depth in the gorges.

Therefore, a second objective is to ensure that the short-term negative impact on the habitats downstream of the locks is minimised. The third objective is to provide the necessary conditions to facilitate the recovery of the riverside forest in the affected area, as well as to promote the riverbank vegetation on the new slopes, generated by taking advantage of the mother plant in the area affected by the work.

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GENERAL CHARACTERISTICS OF THE PROJECT

The removal of the accumulated sediments to avoid downstream effects will force the formation of a new riverbed profile, which will be given a new slope according to the theoretical equilibrium slope and the observations made in the field.

As a result, the level of the riverbed will decrease considerably with respect to the current level, especially at the points closest to the lock and, consequently, new slopes will be generated on the banks. The slope of the banks will be about 30° and in no case more than 45°. These generated new slopes will be managed with landscape bioengineering techniques to allow the development of native vegetation, this time in an optimal way.

AFFECTATIONS AND MEASURES APPLIED

This action will have a long-term strong positive impact on the ecological status of the river. However, despite the obvious benefits in terms of longitudinal connectivity derived from the demolition of the locks, we must also take into account the effects this action has on the river, since it involves important changes on the morphology of the section.

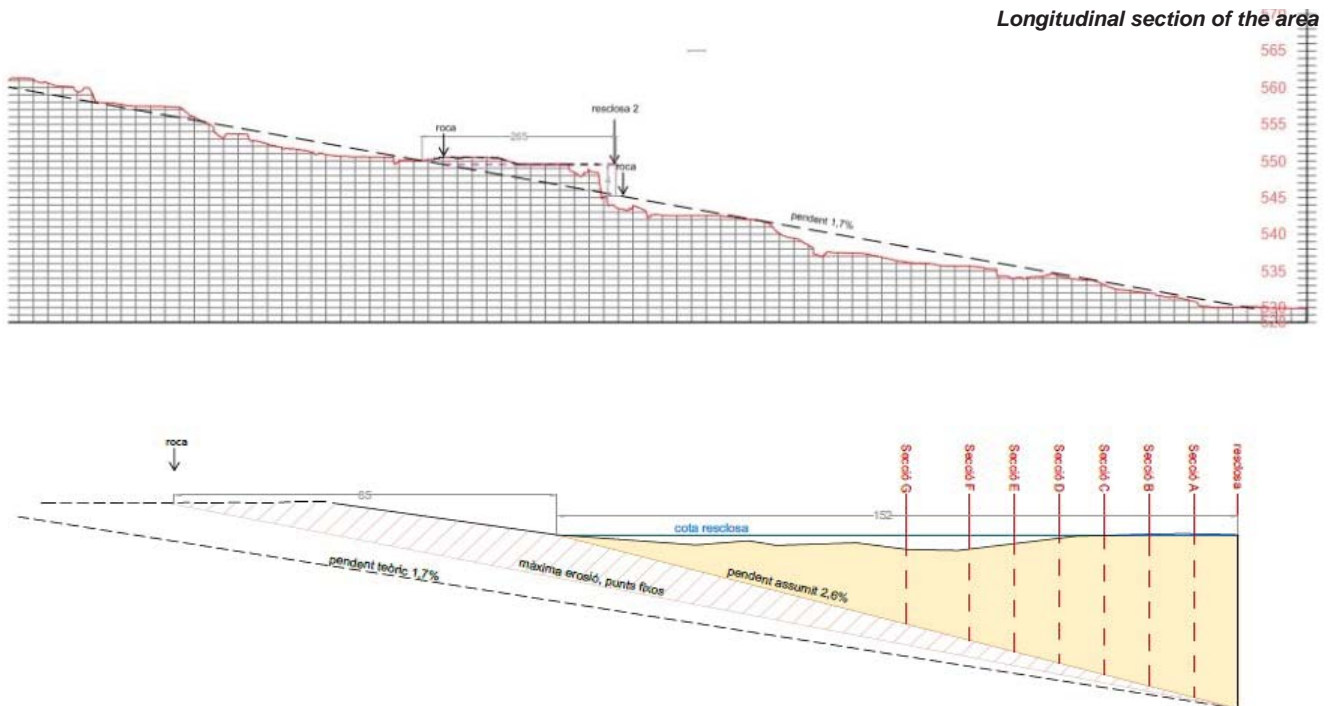
	Affectation	Measure applied to reduce affectation
During the work		
Water quality	Removing the sediments creates turbidity in the water, altering the living conditions and generating possible negative effects on the ecosystem.	A barrier will be created downstream of the lock consisting of an electro-welded mesh and plastics. This barrier and the sediments retained will be removed once the work on the lock is completed. The flow will be redirected to prevent machines working in the middle of the stream.
Long-lasting effects		
Effects on banks and riverside vegetation	The removal of the lock will form a new longitudinal profile of the river in the upstream section, with a greater slope than the current one and a decreasing of the level of the riverbed. This will affect some trees near the current embankment and will have to be removed.	It will be guaranteed that the new slopes generated will not have an excessive gradient. It will also be proposed to replant the area with log branch cuttings obtained from the same affected exemplars.
Regressive erosion	There is some risk that the river will return to the current slope, causing regressive erosion from the lock upstream.	Regressive erosion will be limited by the presence of rock outcrops that act as fixed points in the longitudinal profile and restrain erosion.
Downstream sediment mobilization	Although a large amount of accumulated sediment will be removed, as a section of the river will again be formed, there will be more changes in morphology than usual, and therefore it is expected that solid transport will increase until an equilibrium situation is reached again and the banks consolidate with the new vegetation.	The priority will be to remove the finest fraction sediments and therefore those most susceptible to being mobilized at once. The slopes generated by the decrease in the level of the riverbed will be left with the smoothest possible slopes and will be vegetated so that these will not constitute a new source of sediment in an easy way.

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HYDRAULIC AND GEOMORPHOLOGICAL CONSIDERATIONS

The volume of sediments to be removed from the two locks has been quantified based on aspects of river dynamics. An attempt has been made to foresee how the removal of the locks upstream and downstream may affect them.

Firstly, a study has been made of the longitudinal slope of the river, which in the scope of the project is estimated at 1.7%.



Outline of the longitudinal profile in the area of the Pont de Fàbregues lock. The shading indicates the sediment to be removed, and the striped area, the potential erosion.

PROPOSED ACTIONS

The project is divided into actions for each of the locks, although the structure is very similar:

Disinfection of machinery, material and tools: To prevent the spread of fungi, bacteria, etc., which cause a large decline in amphibian populations.

Preparation of the works: Previous actions for the creation of accesses to the areas and for the installation of barriers that work as a trap for sediments dissolved in the water due to the movement of upstream, reducing the impacts of increased water turbidity. Forest cleaning of the vegetation that will be affected by preparing the plant residue for use in revegetation.

Removal of the dam and sediments: main action of the project. It is based on the hydraulic and geomorphological conditions studied by theoretical models and field work.

Revegetation using landscape bioengineering techniques

The newly created slopes will be protected with a combination of different landscape bioengineering techniques. The aim is not to consolidate the slopes so that they remain fixed, but to create a first protection and to enhance the colonization of the vegetation.

It is considered important to avoid, on the one hand, the colonization of the new slopes by opportunistic non-native vegetation, and on the other hand, the sudden mobilization of large amounts of sediment. Therefore, the objectives of slope protection are:

- To promote their replanting with native riverbank species present in the area today.
- To avoid leaving too much sediment, available to be mobilized all at once in case of a small or medium flood.

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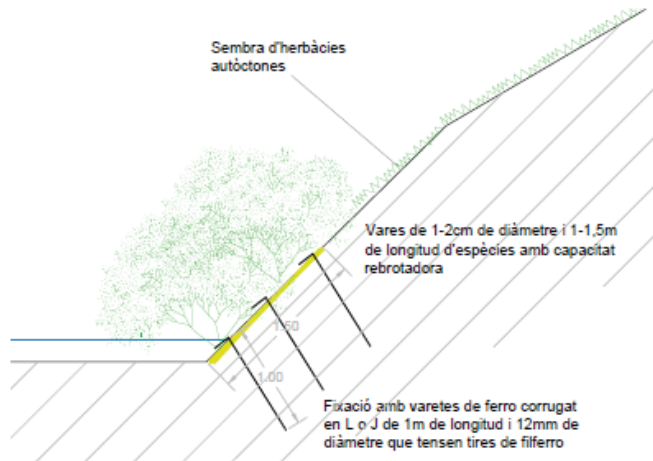
The choice of the type of technique to be used at each point has been made on the basis of the following criteria:

- Achieving maximum plant cover.
- Adapting the actions to the available plant material forecast, achieving the maximum or total use of the extracted plant material without any external contribution.
- Adaptation of the techniques according to the steepness of the slopes (the steeper the slope, the more structural the technique), but in any case, use the least rigid technique possible to allow maximum freedom of the stream flow.

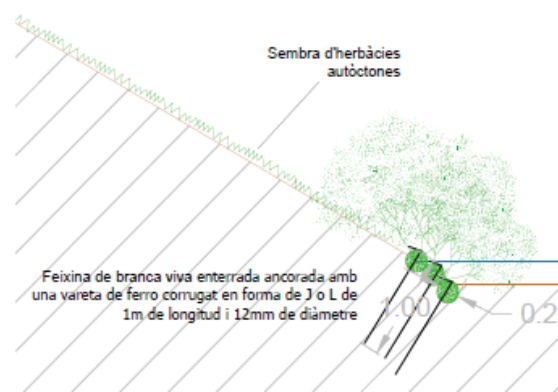
The different techniques proposed are:

- Branch coverage.
- Living fascine (Ribalta type).
- Nailing of timber stakes.
- Sowing.

COBERTURA DE BRANQUES



RIBALTA



ACTUACIONS

- TREBALLS D'EXCAVACIÓ I DEMOLICIÓ**
- TREBALLS PREVIS**
- Accessos
 - Barrera de sediments
- RETIRADA RESCLOSA I SEDIMENTS**
- Retirada de sediments
 - Retirada de la resclosa
 - Millora morfològica
- TREBALLS DE REVEGETACIÓ**
- TREBALLS PREVIS**
- Àmbit de retirada d'arbres i preparació de material vegetal
- PROTECCIÓ DELS MARGES AMB MATERIAL VEGETAL**
- Estaca viva (en agrupacions - patró de plantació)
 - Ribalta
 - Cobertura de branques