

ACTION NAME	D1 Geomorphological changes to the river bed (erosion, transport and sedimentation processes) on the restored stretches
	D1 Geomorphological follow-up
Special Conservation Zone (SCZ) being acted upon:	SCZ Leizaran River and SCZ Bidasoa River
LINK WITH NATURA 2000	The proposed geomorphological follow-up is related to the objectives contemplated in the Management Plans for both SCZ: Operational objectives: 1.1.2 Permeate existing obstacles in the river corridor.
Key Elements of the promoted SCZ	These effects and processes relate: - Directly with the key elements “River system”, “River habitats”, “Atlantic salmon, shad, sea lamprey and European bullhead” of that corresponding to the SCZ River Bidasoa.
PLACE OF ACTION AND MUNICIPALS:	Bera, Lesaka
Date	2016 to 2020
Budget	€72,190 (In Navarre)
Related project actions (follow-up)	The related preservation actions are those that imply the removal of dams or irrigation dams of a certain size.
Description of the action -OBJECTIVES	The aim of this follow-up action is to assess the evolution of the processes of erosion, transportation and sedimentation along the stretches affected by the project actions.
Description of the action - BACKGROUND	Some of the proposed preservation actions seek to restore the natural and dynamic process of the river, which is why it is hoped that relevant changes will take place in the formation of the river bed (relief, riverbanks, pools, riverbeds, etc.). In previous experiences, thanks to other projects, the evolution of the process and natural dynamics of the river have been documented. Furthermore conclusions have been drawn regarding the scope and speed of change, which have been extremely useful when designing other restoration interventions such as the foreseen actions.
Description of the action – INITIAL AND CURRENT CONDITION (C actions)	

Description of the action – ENVISAGED ACTIONS/DESCRIPTION OF FOLLOW UP

This follow up action is necessary to:

- Establish the effect of the elimination measures for large obstacles (Endarlatsa, Bera and Ituren in Navarre) on the restoration of the processes and natural dynamics of the river in the SCZ Bidasoa river and on the Ezkurra river in Ituren.
- Assess the need to modify the execution of actions or to adopt corrective measures
- Establish the spatial scope (affected stretch) and duration of the actions, as well as their repercussion on habitats and species in the SCZ.

The action plan is based on a comparative scheme of the initial condition, or prior to interventions, and the final state, or after each intervention or phase.

In short, the aim of the action is to analyse the importance of the changes in the river and in the nearby areas that will occur following the demolition of the dams. When the dams were constructed, the river dynamic was changed, creating dammed areas in which the river gradient and water speed were modified by the dam, creating an area that paralysed the natural river dynamic, and which furthermore constituted a habitat of little natural value. Despite appearing to be a scarce entity, it should be highlighted that the reservoirs of the Endarlatsa and Bera dams cover almost 40,000 m² each, constituting a significant area of sedimentation in which the complexity of different naturally formed habitats that would be found along this stretch of river are simplified. This follow-up action aims to analyse how and when the different changes will take place, following the demolition of the dam, as the river will recover its capacity to shape its own channel along the stretch.

The geomorphological follow-up of the dams to be demolished in Navarre can be summarised by studying the following aspects:

Geomorphological follow-up of the dam demolition, that will take place on the “Endarlatsa”, “Bera Plant”, and “Ituren Fish Factory” dams, all located in the Bidasoa basin. Follow-up firstly requires a prior characterisation of the current hydrological model in each river, and its evolution over the past decades, to establish the flow rates that characterise each river and which are those that will transform the geomorphology of the stretch affected by the dam (the reservoir and the upstream areas, as well as the waters below the demolished dam. The following changes will be studied on each dam after demolition:

- Analysis of the longitudinal profile and the local river slopes.
- Analysis of the transverse sections. The form of a group of transverse sections will be assessed in each area affected by the dams, that will provide a representation of how the river evolves in action areas.
- Analysis of the form and evolution of the main river forms. Changes in the relief dimensions, islands and any other interesting river form present in the river bed will be assessed prior to and after the demolition of each dam.
- Granulometric analysis. An analysis will be carried out of the shape and size of the sedimentary particles present in the river bed, and in the reliefs and river islands. The aim is to establish how the sedimentary response varies, as well as the composition of the sediments faced with the new river dynamic that is going to occur.
- Analysis of solid transport. The solid transport in the stretch will be analysed before and after the demolitions.
- Analysis of erosion and sedimentation. The different erosive and sedimentary mechanisms detected along the river stretch will be analysed before and after each demolition.
- Determining the volumes of erosion and deposition in the reservoirs before demolition, immediately after and in the following years after the occurrence of high flow or growth phenomena.

With all the information obtained from follow-up, an ecological interpretation of it will be performed. Geomorphological changes will be analysed and interpreted in terms of ecological processes, in an easily understandable or applicable way from an environmental and river restoration point of view, and in terms of the influence of the dam demolition on the state and distribution of the river habits. In particular, changes that may have occurred in the habitable nature for fish species along the studied stretch, and for river vegetation.

Follow-up will start with the initial characterisation of the 3 stretches of the dams, and following their demolition, **annual follow-up** will be performed. Finally, the **final condition** will be established once all the actions are completed, and at least 2 years after the demolition.

JUSTIFICATION What are the desired results? - **ENVISAGED RESULTS**

The expected results of the action are:

- Establish the effect of the elimination measures for large obstacles (C6, C7 and C8) on the restoration of the natural hydro-morphological processes in the SCZ “River Bidasoa” and in the river Ezkurra.
- Obtain reports about the initial and final condition

