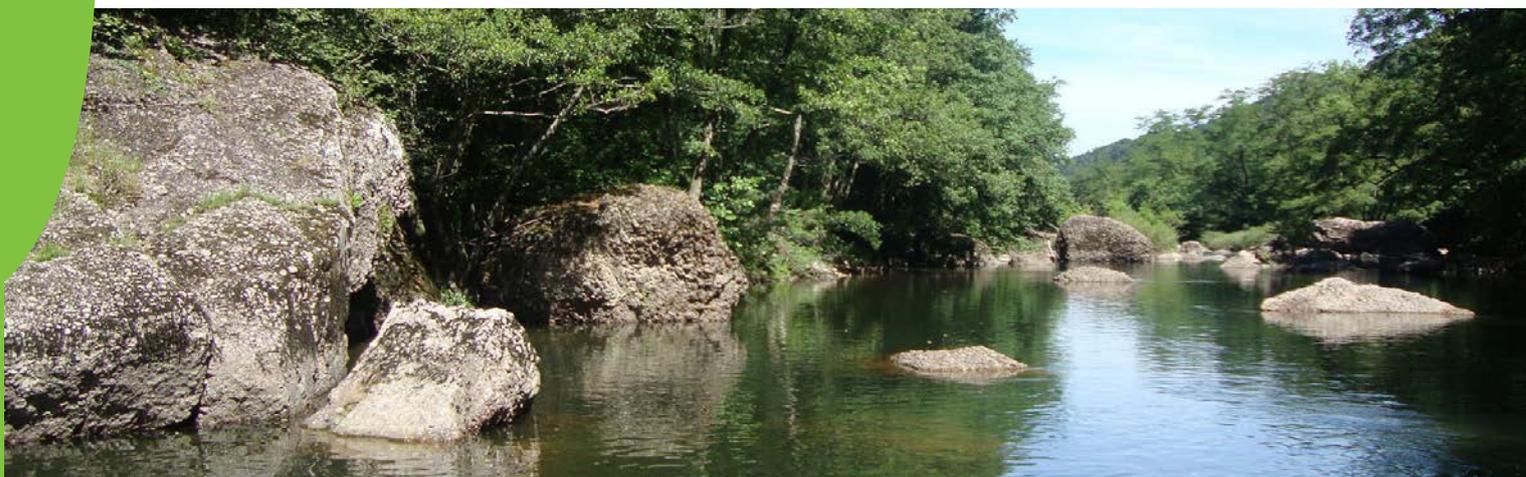




**OPEN RIVERS: IMPROVING
CONNECTIVITY AND HABITATS IN RIVERS
SHARED BY NAVARRE AND GIPUZKOA**

LIFE-IREKIBAI LIFE14 NAT/ES/000186

LAYMAN'S REPORT





The LIFE programme is an instrument of the European Union to co-fund the conservation and protection of the environment.



LIFE Irekibai project partners:



This Layman's Report summarises the objectives, actions and results of the LIFE Irekibai project 'Open Rivers: Improving connectivity and habitats in rivers shared by Navarre and Gipuzkoa' [LIFE14 NAT/ES/000186], co-funded by the European Union's LIFE programme.

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For more detailed information, please see the project website www.irekibai.eu



A NEED: RECOVER WATER FLOW AND FAUNA IN OUR RIVERS AND IMPROVE AQUATIC ECOSYSTEMS

Dams, waterwheels, pipes and different constructions create hurdles in our rivers that prevent their natural function. The consequence are altered ecosystems, which influences the most delicate species, whose area of distribution is cut or fragmented.

The useful habitat for certain species, especially migrating fish like salmon, is reduced, entailing much greater effort for them (the further they are distanced from the sea) in overcoming the increasing number of obstacles. In fact, it is very difficult or directly impossible for them to reach a large number of existing riverbeds.

This situation also affects semi-aquatic mammals, such as European mink and desman, who also suffer genetic isolation, endangering the continuity of their populations.

To tackle this situation, the Public Administrations of the Basque Country and Navarre have spent years taking action on the most heavily affected riverbeds. They have attempted to improve the condition of rivers and recover both the river dynamic and the biodiversity they house, as well as to decrease the risk of flooding for certain areas. Action is also being taken with river restoration techniques, improving natural corridors that prevent erosion of riverbanks.

With the experience gleaned from previous projects, and in continuation with other actions already underway, the Life Irekibai project was born. This is a new step forward toward more living, open and connected rivers. In fact, the project's name plays with the terms Ireki and Ibai, which in Basque means to open and rivers, respectively.



Reparacea upstream | Javier Arbilla



A CONSORTIUM TO JOIN FORCES AND WORK BETTER TOGETHER

A project such as LIFE Irekibai required that the public administrations involved in managing these riverbeds work together. It also required the best teams to carry out all actions planned.

To achieve both these things, we created a specific consortium led by the Provincial Government of Gipuzkoa, with members URA (Basque Water

Agency, HAZI (Basque Government Foundation for rural and marine development), the Government of Navarre and GAN-NIK Gestión Ambiental de Navarra SA, a public company under the Government of Navarre.

OUR GOAL: TO IMPROVE THE STATE OF THE LEITZARAN AND BIDASOA RIVERS

In addition to works to improve the rivers in each one of the communities, in recent years, different cooperation projects were carried out that led to the LIFE IREKIBAI project. It focuses action on the Leizaran and Bidasoa Rivers to improve the river corridor's ecological continuity.

This objective is nothing new: public administrations in the Basque Country and Navarre have been working and collaborating for years to achieve this end.

Specifically, this project works with conservation, monitoring and awareness actions.

The project's scope includes six spaces in the Natura 2000 Network: Leizaran River, Baztán River and Artesiaga channel, Belate, Bidasoa River, Artikutza and Señorío de Bertiz.

This way, we contribute to the recovery and improvement of conservation of these European-protected areas.

A COMPREHENSIVE FOCUS AND THREE INTERCONNECTED OBJECTIVES

IMPROVING THE STATE OF CONSERVATION OF RIVER HABITATS AND SPECIES OF COMMUNITY INTEREST

It is essential to take action on rivers and eliminate the barriers making it difficult for fauna to move through them. However, in the LIFE Irekibai project, we understood that we must also improve our knowledge of river dynamics and their impact on biodiversity. And we must also clearly explain to people using the river and to the population as a whole what we have done, and why.

Thus, the project's actions have been structured around these three broad objectives:

1) TO RESTORE THE RIVERS

- ✓ Removing dams and waterwheels to restore the river dynamic, creating ladders so that fish can move past them.
- ✓ Controlling invasive exotic species that harm native diversity.
- ✓ Recovering degraded habitats and correcting the most severe environmental impacts.

2) TO IMPROVE KNOWLEDGE OF RIVERBED MANAGEMENT AND RESTORATION

- ✓ Analysing erosion, transport and sedimentation processes in the restored sections.
- ✓ Studying progress in the state of conservation for the Iberian desman, allis shad, lamprey and

Atlantic salmon, their populations and their habitat.

- ✓ Monitoring progress of river habitats in restored areas.
- ✓ Evaluating benefits of ecosystemic services to society.
- ✓ Analysing how the project contributes to the local economy.
- ✓ Evaluating operation of devices for the passage of fish in our rivers.

3) TO RAISE SOCIETAL AWARENESS OF THE VALUES AND ENVIRONMENTAL SERVICES OUR RIVERS PROVIDE

- ✓ Conducting our own participation process, with workshops, talks and specific tours of rivers.
- ✓ Promoting and supporting environmental volunteer actions on rivers.
- ✓ Consolidating river custody initiatives with local fishing societies.
- ✓ Promoting the "Sponsor a Bidasoa Salmon" programme.
- ✓ Conducting school field trips on recovery of the Bidasoa salmon.
- ✓ Supporting training for forest rangers.
- ✓ Preparing and sharing an exhibition and informational material on the Irekibai project.





THE HABITATS AND SPECIES WE HAVE HELPED TO CONSERVE THANKS TO LIFE IREKIBAI

Thanks to the LIFE Irekibai project, we have improved the state of conservation of river habitats and species of community interest in Natura 2000 spaces located throughout the zones of action. We have also improved the state of water bodies.

Especially benefiting from the project are certain fish species, such as the Atlantic salmon (*Salmo salar*), the allis shad (*Alosa alosa*) and lamprey (*Petromyzon marinus*) in the Bidasoa and Oria basin.



Atlantic salmon (*Salmo salar*) | José Ardaiz

And we must not forget the burtaina (*Cottus aturi*), a species of fish limited to the Adour, Nivelle and Bidasoa basins. Mammals related to the aquatic environment whose situation has improved thanks to Life Irekibai include the Iberian desman (*Galemys pirenaicus*) and the European mink (*Mustela lutreola*).

riverbank habitat whose situation will be most improved by the actions taken. The alder forests help to regulate the water cycle, halt erosion and keep balance in the river ecosystem, biodiversity and connectivity, since they are front-line ecological corridors offering shelter and protection to animals reluctant to take to the open fields.

Cantabrian alder forests (91E0* "Alluvial forests of *Alnus glutinosa* and *Fraxinus excelsior*") were the

We will discuss this in further detail later on.



Cantabrian alder forests | GAN-NIK

TO RESTORE THE RIVERS

An essential part of our work was focused on eliminating or reducing obstacles in river courses, dams and waterwheels impeding the river's natural function. This helped to improve the state of conservation of habitats and species in the Natura 2000 Network.

The main actions carried out were:

ENDARLATSA DAM

THE ACTION

Located about 10 km from the mouth, and formerly used to produce electric power, the Endarlatsa dam was the first obstacle on the Bidasoa River. The Hydrographic Confederation's license is from



Endarlatsa Dam (before and after) | GAN-NIK



DAM FROM THE FORMER BERA OR SAN MARTÍN PLANT

THE ACTION

This was the third obstacle on the Bidasoa River for fish migrating from the sea, at almost 3 m high and 103 m long. It was also used in yesteryear to produce electric power.

It was licensed in 1910, although it had ceased to fulfil this role decades ago and became an industrial ruin. It was demolished between August and September 2016.

THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ 4,9 km of obstacle-free river were obtained.

1919, but with the passage of time, it ceased to fulfil this role and became an industrial ruin.

Almost 3 m high and 46.18 m long, it was demolished between September and October 2016.

THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ More than 16 km of obstacle-free river were obtained from the Bidasoa's mouth into the Cantabrian Sea, so all fish are able to move freely.
- ✓ The section of water held back by the dam, 2,000 m long, was eliminated, creating a more natural and diversified river habitat and a succession of rapids, pools and tables.

- ✓ The section of water held back by the dam, 1,500 m long, was eliminated, creating a more natural and diversified river habitat and a succession of rapids, pools and tables.

IGERIZARRETA DE ITUREN DAM

THE ACTION

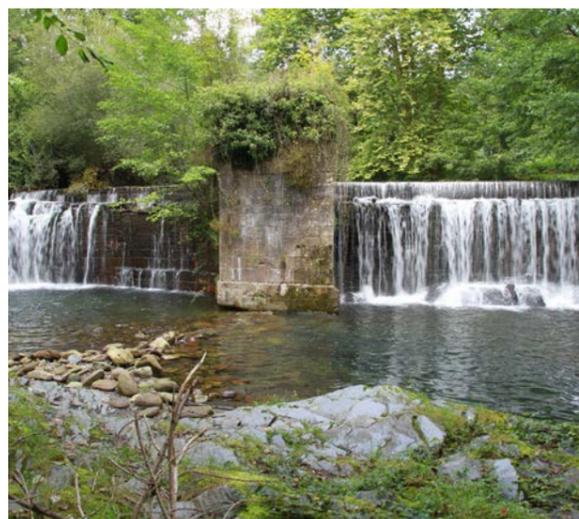
This was located in the Ezkurra River, the Bidasoa's main tributary. Fallen into disuse since 2014, it was 27 metres long and almost five metres high.

Built over three centuries ago, it took water to move the old Ituren mill. It was then given hydroelectric use, and during the second half of the twentieth century, a fish factory was installed around it that was owned by the Government of Navarre.



It finally ceased to fulfil this role and became an industrial ruin

At the instruction of the Government of Navarre's Heritage Service, this dam was only partially demolished, conserving the central buttress and the body on the right bank of the dam. Works began in September 2017, and restoration actions continued into 2020.



Igerizarreta Dam (before and under construction) | GAN-NIK

THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ 6 km of obstacle-free river were obtained.
- ✓ The section of water held back by the dam, 500 m long, was eliminated, creating a more natural and diversified river habitat, with rapids, pools and tables.

ELIMINATION OF CROSS-CUTTING BARRIERS IN THE TXARUTA CHANNEL

THE ACTION

The Txaruta Channel is a secondary tributary to the Bidasoa River through the Ezpelura Channel. In its lower course is one of the only populations of burtaina (*Cottus aturi*) that currently exist in the Iberian Peninsula. There a transversal obstacle was identified that caused an interruption in the movements of this species.

This was a small stone dam 5 metres wide and 1.70 m high, associated with an old mill that is currently in ruins. In November 2017, its demolition was undertaken.

THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ The available habitat for the burtaina was increased, thereby increasing living conditions for this fish population.

MORPHOLOGICAL RECOVERY IN THE UBARAN STREAM

THE ACTION

The Ubaran Stream joins the Leizaran River near the confluence with the Oria. A series of five obstacles concentrated in a 750-m section prevented fauna movement, with greater or lesser influence depending on the species and the time of the year.

Four of them were eliminated, and the fifth has been adapted to allow for fish movement. 378 m³ of material (concrete and disused pipes) were removed from the bed.

THE RESULTS

- ✓ Connectivity was recovered in the lower section of the Ubaran Stream.
- ✓ The mill dam was adapted for fish passage, and 8600 m of river were cleared of obstacles.

REMOVAL OF FORMER FACILITIES OF THE TRUCHAS ERREKA FISH FACTORY

THE ACTION

The Truchas Erreka waterwheel was an obstacle that fish from the Leizaran could not overcome. In fact, it was the first impassable barrier that the fish encountered on their way from the Cantabrian Sea, with a leap nearly 5 m high, cutting the river from bank to bank at 33 m long.

Next to it was a broad 2-m wide canal, running 100 m to bring water to the fish factory facilities.

The former facilities of the Truchas Erreka fish factory were removed, the ensemble consisting of the dam, concrete ponds, canals and abandoned buildings, occupying one hectare next to the river.

The ladder on the next obstacle was also corrected, the Olaverri Hydroelectric Plant waterwheel, just 200 m upstream. A ladder trough with operational issues was replaced by an uncommon device, a sluice for fish. Given its innovative nature, this sluice requires great efforts in monitoring and operational optimisation. The Provincial Council of Guipuzcoa is conducting this task.

THE RESULTS

- ✓ Truchas Erreka Waterwheel. Connectivity Index: Very good. Obstacle-free.
- ✓ Olaverri Hydroelectric Plant Waterwheel. Connectivity Index: Moderate. Passable with an efficient device.
- ✓ A small, 200-m long section of dammed water was eliminated.
- ✓ The riverbed and the area with the former fish factory (1 ha) were suitably naturalised.
- ✓ The fish sluice is playing a demonstrative role for other managers.



Inturia Dam (before and after) | Hazi

DEMOLITION OF THE INTURIA DAM

THE ACTION

The Inturia dam was a construction almost 13 metres tall and 60 metres long. It entirely altered the river and acted as a barrier for fish living in the Leizaran River. It was constructed in 1913 to provide power to the Streetcar Company of San Sebastian, but over time, it ceased to fulfil this role and became an industrial ruin.

It was demolished in four phases. It began in August 2013 through the European project POCTE-FA EFA221/11 Guratrans. Thanks to the Life Irekibai project, restoration work was completed in January 2016.

THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ The section of water dammed by the construction, over 1,500 m long, was eliminated (in the 4 phases).
- ✓ The river dynamic was reactivated, freeing the deposits in the basin and allowing the river's former bed to flourish.
- ✓ Sediment transport was naturalised, enriching both how the river flows and the river habitats.



REMOVAL OF OLLOKI HYDROELECTRIC PLANT'S FORMER FACILITIES AND DAM

THE ACTION

The Olloki dam was an impassable obstacle for species such as the Atlantic salmon when migrating from the sea to reproduce in the Leizaran River. Partial demolition of this dam took place in two phases. As testimony to the zone's industrial past, two-thirds of the current dam were left, given that the 18 m of riverbed width left are sufficient to

restore the Leizaran River's ecological processes that were interrupted by the dam.

With this partial demolition strategy, the intent was to maintain a balance between ecological restoration and preservation of Cultural Heritage.

Given that the action modifies the course of the river upstream, as well, the Santolaz Stream was stabilised with a stone ramp to prevent possible damage to the hydroelectric plant 250 m from the dam.



THE RESULTS

- ✓ Connectivity Index: Very good. Obstacle-free.
- ✓ The section of water dammed by the construction, over 400 m long, was eliminated (in the 2 phases).
- ✓ With this action and previous actions, Guipuzcoa's entire section of the Leitzaran River was cleared: over 25 km of river habitats.
- ✓ The river dynamic and sediment transport were reactivated, diversifying morphologies and enriching river habitats.

RIVERBED RESTORATION WITH WOODEN STRUCTURES

THE ACTION

Action was taken on a 7.5-km section of the Leitzaran River, near Olloki and the Ezkurra channel in the municipality of Doneztebe to improve the bed's habitat. Trunks, simulating the structures that



Riverbed restoration with wooden structures | Hazi

naturally form in rivers, were inserted. They are secured with cables to increase their stability.

Wood accumulations were also deposited next to the river to increase shelter areas for the European mink and to decrease risks of riverbank erosion.

Moreover, sections for action with increasing lengths were designed, so that the UPV/EHU (University of the Basque Country) team may apply an additional cost/benefit study for restoration.

THE RESULTS

- ✓ The deadwood density objective in the sections where action was taken was exceeded, reaching a figure of more than 60 m³/ha.
- ✓ The structural complexity of the riverbed was increased, thereby encouraging the richness and diversity of river habitats. This increases hosting capacity for the different species associated with the aquatic environment in general, and fish fauna particularly.

BIDASOA RIVERBED RESTORATION ACTIONS

THE ACTION

Different restoration actions were conducted on the banks of the Baztan and Bidasoa Rivers and the Txaruta Channel.

A solution was provided to each problem with the most suitable technique: riverbank stabilisation, slopes and erosion control with bioengineering techniques, progressive elimination of exotic species, replanting breakwaters and planting native species (alder, ash, hazelnut).

THE RESULTS

- ✓ 11 river bank restoration actions have been carried out in the Bidasoa basin.

AMERICAN MINK CONTROL

THE ACTION

In order to prevent or reduce negative effects on the European mink (*Mustela lutreola*), which is seriously endangered, American mink (*Neovison vison*), an exotic invasive species that acts as its main threat, were controlled.

After the Iberian lynx, the European mink is the most endangered carnivore in Europe today. It is classified as "In Critical State" in the Spanish Catalogue of Endangered Species.

The Iberian population, with only 500 specimens, is one of the species' strongholds. It is already extinct in the centre and east of the continent as a result of the American mink's aggressive behaviour as it competes with the European mink to drive it from its territory while colonising rivers.

It is also growing increasingly scarce in the rivers and channels on Navarre's Atlantic coast. To detect the American mink, a specific methodology was used to control and eradicate this invasive species that was developed and perfected in projects conducted in the United Kingdom (Scotland).

The concept is to place floating platforms on the rivers, at a distance of one kilometre from one another, where the American mink are first detected and then captured.



American mink control | GAN-NIK

THE RESULTS

- ✓ Over the course of the project, four campaigns were conducted. 2124 km of river were monitored, with the installation of 159 platforms to detect the American mink in the following rivers: Bidasoa and its tributaries, Baztán and its tributaries, Ezkurra and Ezpelura and its tributaries, Urumea and its tributaries, Aritzakun, Urrizate, Orabidea-Ugarana, Sorogain, Urrobi,

Upper Arga and Luzaide and its tributaries. 81 positives for mink presence were obtained, and a total of 17 specimens were captured.

- ✓ This contributed to the destabilisation of the American mink population. In 2019, it was estimated that this exotic invasive species was eradicated from the Bidasoa riverbed and its tributaries.



European mink (Mustela lutreola) | GAN-NIK



TO IMPROVE KNOWLEDGE OF RIVERBED MANAGEMENT

GEOMORPHOLOGICAL CHANGES IN THE RIVERBED IN RESTORED SECTIONS

THE ACTION

Geomorphological monitoring of dam demolition is essential to assess recovery of river function after the elimination of an obstacle. Geomorphological changes to the riverbed in the sections where demolitions occurred were evaluated, analysing progress in erosion, transport and sedimentation processes in the affected sections. The objective was to anticipate possible undesired effects, so as to correct them on time.

The rivers adapted with a certain swiftness to the changes to the bank and profile, reactivating processes and seeking a balance. The result was a greater wealth of morphologies and habitats.

THE RESULTS

- ✓ The changes caused by the measures to eliminate large obstacles in the Leitzaran River and Bidasoa River ZECs (Special Conservation Zones) were identified.
- ✓ Changes both upstream and downstream and on the shores were quantified.

- ✓ The volumes of earth moved and transport of bed load were quantified.
- ✓ Upstream effects that actions may have on infrastructures in the bed were monitored.
- ✓ This monitoring was shared at national and international congresses, as well as in scientific and educational magazines.

MONITORING MOVEMENT AND CHARACTERISTICS OF SEDIMENTS IN RESTORED SECTIONS

THE ACTION

The increased concentration of sediments in suspension (CSS) may have huge consequences on ecosystems.

As such, the impact that permeation works on the Leitzaran River may have on sediments in suspension, exported by the river itself, was analysed.

The analysed data show a clear increase in CSS in the Leitzaran's waters during overflows, starting when the works began.



Monitoring the actions undertaken is one of the project's key objectives | GAN-NIK

It is important to consider sediment retention as far as extreme meteorological and hydrological events are concerned, since this could lead to great increased sporadic dragging and undesired impacts on the ecosystem and infrastructures existing along the river.

Studies conducted on the Leitzaran to date do not appear to have influenced the other quality parameters measured (electric conductivity, pH, dissolved oxygen, water temperature) and there are no significant differences between the different phases.

THE RESULTS

- ✓ There is better knowledge of how the measures to eliminate large obstacles affect natural sediment-transport processes in the Leitzaran River ZEC (Special Conservation Zone).

RIVER HABITAT PROGRESS IN RESTORED SECTIONS

THE ACTION

On the Leitzaran River ZEC (Special Conservation Zone), progress of the river habitats was documented.



The project studies progress of river habitats in restored sections | Hazi

Results from these monitoring actions are especially useful to determine the effects of the measures on the scope of the action and its benefits for habitats and river species.

Results from these monitoring actions are especially useful to determine the effects of the measures on the scope of the action and its benefits for habitats and river species.

THE RESULTS

- ✓ It was made clear that the characteristics and function of the physical and biotic functions of the Leitzaran River were largely conditioned by the waterwheels.

- ✓ Some of the conservation actions have restored natural river processes, such as naturalising the flow system and dynamic, transport of solids and ecological connectivity.

- ✓ This reactivation of processes led to relevant changes in the bed's conformation (succession and relative abundance of rapids, pools, tables, etc.), habitat availability, etc.

- ✓ In general, there is increased presence of productive areas and greater complexity and heterogeneity in the river environment.



ASSESSMENT OF OPERATION OF FISH PASSAGE DEVICES

THE ACTION

When it was not possible to demolish an obstacle, the usual solution was to build passages so that fish could overcome the obstacle and go upstream. Monitoring of fish passage devices is conducted during the salmonids' reproduction season, since this is when the reproducers undertake their longest migrations in search of spawning grounds.

Monitoring was carried out for three years, marking the fish in mid-September and prolonging control until mid-January. The fish were marked with internal PIT-Tags or microchips (using passive antenna placed on the waterwheels and radio transmitters) and they were also monitored with manual antenna. The function of the passage devices equipped on the 15 obstacles in the Bidasoa

River and the 6 obstacles in the Leitzaran River was assessed.

THE RESULTS

- ✓ 507 fish were marked with PIT-Tags (microchips) and with radio transmitters to discover whether the ladders worked.
- ✓ The sampled fish's passage bears a certain functionality, although it does vary amongst them; as such, necessary maintenance measures have been suggested to hydroelectric plant permit holders where the problems were detected. Some of them have been corrected, and others shall be corrected in the post-LIFE period.
- ✓ The cumulative and synergistic effect of passable obstacles was confirmed.
- ✓ Monitoring the sluice for fish at the Olaberri plant is still undergoing an improvement process for this new device.



Sluice for fish on the Leitzaran River | Hazi

ATLANTIC SALMON, ASSESSMENT OF THE EFFICACY OF THE PROJECT'S ACTIONS ON THE POPULATION AND CHARACTERISTICS

THE ACTION

The Atlantic salmon (*Salmo salar*) is a migrating species. It is born in the river, migrates to sea and returns to the river to reproduce after a variable time period spanning one to three years.

In Navarre, programmes have been adopted that include monitoring of the returning population at

the Salmonid Monitoring Station of Bera/Lesaka, monitoring reproduction (counting beds) and estimating juvenile recruitment.

In Gipuzkoa, the returning population is monitored at the Salmonid Monitoring Stations of Orbel-di (Oria) and Elorrabi (Urumea), with the juvenile recruitment and smolt return to sea estimated by capture in the Zikuñaga screw trap in the nearby Urumea basin.

THE RESULTS

- ✓ How effective the actions to eliminate dams were in comparison with the increased surface area of the Bidasoa basin used by salmon was deemed as extremely high. Thanks to the radio-monitoring programme implemented, the presence of salmon 64 km from their point of entry from the sea was verified, as they entered the river before.
- ✓ During 2019's migration, three of the marked salmon were able to overcome the Oharriz fish factory dam (under unusually good flow conditions) and reach the Lamia natural jump. This upper limit is naturally accessible to salmon in the main basin. As such, this year the species occupied 100% of the potentially accessible length of the Bidasoa's main basin. With the secondary beds, the species reached the Amaur channel, so occupation in this sort of bed was estimated at a minimum of 22% of the naturally potentially accessible length.
- ✓ Monitoring shows that there is an increasing presence of salmon in the Leitzaran, and predictions indicate that they will have access in future campaigns to waters higher up the river thanks to implementation of an infrequent device: a fish sluice installed at the Olaberri Hydroelectric Plant.

IBERIAN DESMAN, PROGRESS OF THE STATE OF CONSERVATION OF ITS POPULATIONS AND HABITAT

THE ACTION

The Iberian desman (*Galemys pyrenaicus*) is a semi-aquatic insectivore mammal whose survival is endangered.

It is endemic in the northern third of the Iberian Peninsula and the Pyrenees. Given its reduced population, evasive behaviour and nocturnal nature, knowledge of its ecological requirements is still limited.

The conservation status of known Iberian desman population hubs was assessed in the Leitzaran and Bidasoa riverbeds, and in other beds such as Araxes (Oria) and the Elama River (Añarbe), both in Navarre and in Gipuzkoa, thus broadening the project's scope of intervention.

The species' habitat preferences, how the habitat is preserved and the potential habitat available were also studied, as well as food and the use the desman makes of the territory. An initial assessment and then another final assessment were conducted to contrast the project's effects.



Iberian desman (*Galemys pyrenaicus*) | J. González Esteban



THE RESULTS

- ✓ Substantial progress has been made in knowledge of the desman's habitat. We have better knowledge of its diet, the limitations that available food entail for the species and the river characteristics that define an optimum environment. Today, we know that the menu is just as important as the restaurant. It is just as important to have a wide range of prey (bottom-dwelling macroinvertebrates) as it is to have a river with alternating sections: rapids, slow water and pools. This new knowledge must guide future actions to recover the river habitat to the benefit of this species.
- ✓ It has been confirmed that the Iberian desman occupies the entire area of study (Bidasoa and Leizaran basins). The effective occupation area is estimated at a minimum of 200 km.
- ✓ A new methodology was used to detect the desman, based on collecting its excrement in devices placed along the river to this end. This facilitates monitoring the population throughout the entire area of distribution. This new procedure was published as an article to encourage its dissemination and replicability. Those responsible for monitoring the desman in France have already incorporated it into their work protocols.
- ✓ Lastly, river connectivity and the habitat's characteristics within the scope of the project have significantly improved after eliminating the Inturia and Olloki dams on the Leizaran River and the dams on the Txaruta, Ezkurra and Bidasoa Rivers in the Bidasoa basin.



Allis shad (*Alosa alosa*) | Ricardo Morán López

ALLIS SHAD, ASSESSMENT OF THE EFFICACY OF THE PROJECT'S ACTIONS ON THE POPULATION AND CHARACTERISTICS

THE ACTION

The allis shad (*Alosa alosa*) is a species that lives in the sea and reproduces in rivers. It is located along Europe's Atlantic coasts. It is currently extinct in certain areas, and in most of its area of distribution is considered a rare species. In Navarre, the only allis shad population is in the Bidasoa River. Its presence has been verified in the lower part of the Bidasoa's main bed since at least 1978.

The allis shad' exclusively nocturnal reproductive habits and their visible copulation make it possible to estimate the reproductive population's abundance based on a count of copulations during the reproductive period. Works were conducted on the Bidasoa River ZEC (Special Conservation Zone), on the lower section.

THE RESULTS

- ✓ Following the established methodology, three spring campaigns were carried out (2018, 2019 and 2020) with 30 nocturnal inventories at two observation points (Endarlatsa and upstream Montoia). However, no reproductive activity was observed in any of the inventories conducted.
- ✓ Environmental DNA (eDNA) analysis indicates the presence of the species in the breeding season, so it is plausible that its population density is currently so low that it does not trigger detectable reproductive activity in nocturnal observation samples.

LAMPREY, ASSESSMENT OF THE EFFICACY OF THE PROJECT'S ACTIONS ON THE POPULATION AND CHARACTERISTICS

THE ACTION

The lamprey (*Petromyzon marinus*) is a migrating species that is born in rivers, where it spends its larval life until growing into adulthood. Adults live in the sea from 20 to 30 months. When they reach sexual maturity, they return to the rivers to complete reproduction. In Navarre, the lamprey can only be found in the Bidasoa.

Reproductive activity was monitored by observing and counting reproducing adults while building their spawning nests. In autumn, the larvae buried in the breeding grounds were also monitored to determine presence and abundance. Works were conducted in the entire lower part of the main bed



Lamprey (*Petromyzon marinus*) | José Ardaiz

THE PROJECT'S CONTRIBUTION TO THE SOCIOECONOMIC SYSTEM

THE ACTION

The project's effects on the local socio-economy are not directly related to Natura 2000, although it is important to consider that many ecosystems are linked to certain socioeconomic uses.

Monitoring was conducted by totalling investments and expenses based on their real application to the municipalities in the socioeconomic

of the Bidasoa River ZEC (Special Conservation Zone). Three spring campaigns were held from April through June on a weekly basis (2017, 2018 and 2019) and another two campaigns in September 2017 and 2019.

THE RESULTS

- ✓ The number of reproducing lamprey entering the Bidasoa River was low, although results from previous years show high inter-annual variability. Spawning nests were detected in 2017 and 2018, but not in 2019.
- ✓ Specific larva sampling confirmed their presence in almost all suitable microhabitats in the lower section of the Bidasoa.
- ✓ Both reproducing lamprey and larvae used the specific micro-habitats that were naturally created after demolition of the Endarlatsa dam.

area of influence of the project (local scope) or beyond them (provincial and regional scope).

THE RESULTS

- ✓ The collection of investments and expenses incurred in the territory, both locally and regionally, was analysed. The conclusion was that 46% of the expense had a direct effect on local companies and services.
- ✓ It is estimated that the project created or helped to conserve employment at an equivalent of 14,6 full-time people/year.



Monitoring project keys | GAN-NIK

ASSESSMENT OF BENEFITS FOR SOCIETY OF ECOSYSTEM SERVICES

THE ACTION

Ecosystems provide different services of interest to society: providing water or food, regulating complex cycles like the water cycle, eliminating waste, etc. Assessment of ecosystem services was framed as a theoretical exercise on the desirable state that the project's habitats must attain.

TESSA methodology was applied, developed by a consortium of universities, NGOs and conservation agencies. With the checklists proposed by TESSA, we analysed which ecosystem services are most relevant within the project's scope of action. To this end, available statistical, documentary and cartographic data were reviewed.

THE RESULTS

- ✓ We have obtained a simple analysis of the benefits and ecosystem services received by society and generated useful information to influence future decision-making. Pursuant to foreseeable changes in the extension and state of conservation of the habitats, the ecosystem services improved by the project were detected.
- ✓ The ecosystem services that have increased to a greater extent have been cultural, linked to education, knowledge and ecotourism activity. Some regulation services have also been favored, such as soil fertility. As is logical, energy supply services have decreased, due to the reduction of hydroelectric infrastructures.



The project also analysed social benefits | GAN-NIK

TO RAISE SOCIETAL AWARENESS OF THE VALUES AND ENVIRONMENTAL SERVICES OUR RIVERS PROVIDE

THE ACTIONS

Irekibai made a great effort to raise local awareness, so throughout the project it implemented actions intended to foment information, awareness, public participation, volunteering, a school programme, sharing results, and more.

Life Irekibai's technical work was accompanied by a public participation process in Navarre. This process provided information that acted as the foundation for deliberation, seeking out effective solutions for the most sensitive issues, all while considering the environmental, economic and social factors of the zone of action.

The participation process agreed upon measures to improve connectivity in the Bidasoa basin and encouraged citizen involvement in conserving and improving rivers. '*Construir juntos el futuro de nuestros ríos* (Building Our Rivers' Future Together)' was the motto we used to summarise the idea of working based on a new relationship with different actors and many different discourses. We sought an environment of trust and dialogue to improve

understanding of the projects and contribute both to better maintenance of the actions carried out and to new possibilities for river restoration.

The project also promoted individual and collective involvement, with environmental volunteer actions in rivers, awareness workshops and training. Regarding volunteer work, Irekibai promoted and supported different *auzolans* organised by town halls, parent-teacher associations and other associations, including rubbish, plastic and other waste collection on the different channels and rivers, elimination of exotic species, etc.

Moreover, progress was made in implementing a new line of work in Navarre, establishing cooperation channels to improve management and conservation of river spaces and species related to the river habitat by signing river custody protocols with local fishing associations. A new programme was also spearheaded: '*Apadrina un salmón del Bidasoa* (Sponsor a Bidasoa Salmon)', which seeks for fishing professionals to contribute to the recovery of this species and improve their knowledge.



23 groups and a total of 649 participants took part in the school programme | GAN-NIK



In order to increase awareness and improve care of the habitat and the flora and fauna in our rivers, several educational publications were shared that describe the main species related to the rivers in our basin, as well as a travelling exhibition, 'Oztoporik, gabe, hobe! / Let the Water Run!'.

With ten large-size panels, it shows the consequences that fragmentation of our rivers poses to wildlife, as well as the lines being put into action by administrations in terms of biodiversity conservation policies to improve our rivers.

THE RESULTS

The project had great visibility. Here, we share some data:

- ✓ The public participation process saw a total of 4 conferences, 5 workshops, 7 meetings and 3 river tours, with 160 participants.
- ✓ 24 volunteer activities were conducted, with over 600 volunteers and 9 awareness activities with 249 attendees.
- ✓ 23 groups and a total of 649 participants took part in the school programme.



Travelling exhibition, Let the Water Run! | GAN

- ✓ River custody protocols were signed with two local fishing associations. 44 activities were conducted, with a total of 143 fishermen-volunteers participating.
- ✓ The [Sponsor a Bidasoa Salmon](#) programme was launched.
- ✓ A folder-brochure was published on the project, two guides: '[Fauna acuática de la cuenca del Bidasoa \(Aquatic Fauna in the Bidasoa Basin\)](#)' and '[Flora acuática de la cuenca del Bidasoa \(Aquatic Fauna in the Bidasoa Basin\)](#)', a brochure on the travelling exhibition and this

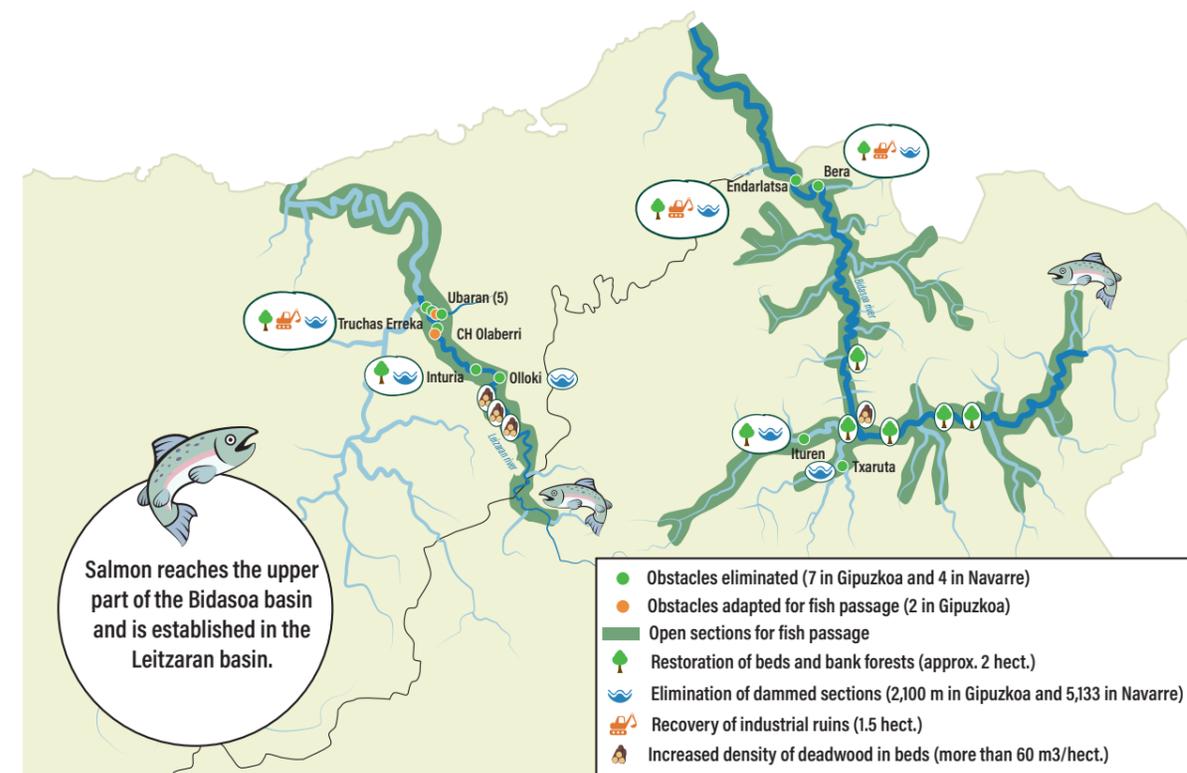
Layman's Report.

- ✓ Descriptive panels were installed about the dam demolition actions.
- ✓ The exhibition [Oztoporik gabe, hobe! / Let the Water Run!](#) received over 3,000 visits while travelling through Bertiz, Pamplona and Sunbilla in Navarre.
- ✓ The website (www.irekibai.es) received over 15.000 users and 57.000 views.
- ✓ We participated in more than 20 national and international conferences and congresses.

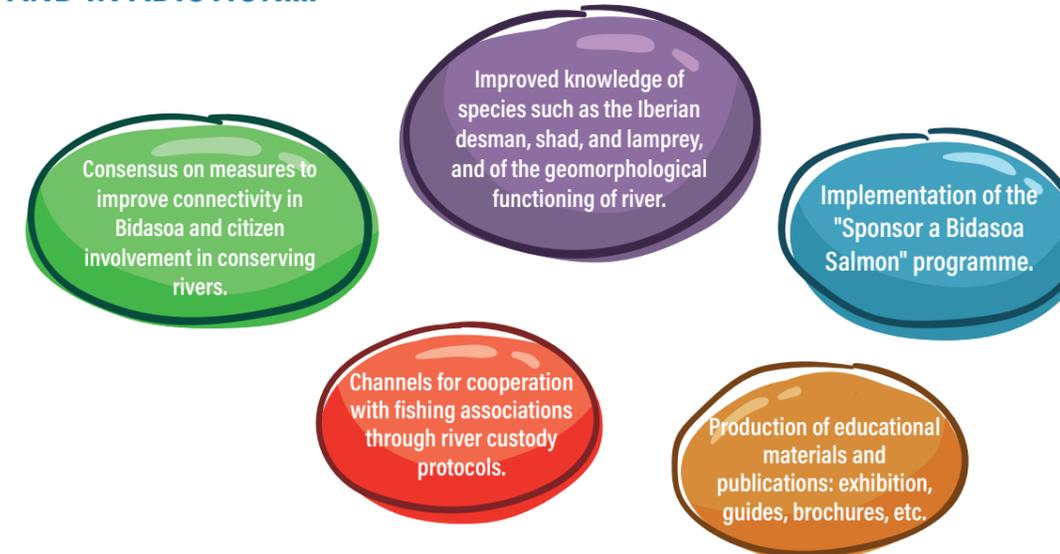


Volunteer fishermen in river custody | GAN-NIK

THE PROJECT'S MAIN RESULTS



AND IN ADICTION...





CONCLUSION

The IREKIBAI project led to a substantial improvement of ecological conditions in the Bidasoa and Leizaran River basins, significantly improving the state of conservation of the species that live in them.

The elimination of obstacles on the main bed in both rivers improved longitudinal connectivity, facilitating upstream fish migration toward spawning and/or feeding zones. A clear example of this is salmon. The Bidasoa River went from using 64% of the main potentially accessible bed in 2015 to 100% colonisation during upstream migration in 2019. The Oria went from needing to be captured and transferred to the Leizaran basin (totally inaccessible) to no impassable obstacles along more than 30 km of this river's main course.

This improved access to high-quality spawning grounds will have an effect on the increased sal-

mon population in upcoming years, thus improving the species' state of conservation. Other fish species such as lamprey and allis shad also increased their potential spawning ground during their journey from the sea or in migration to growth zones, such as occurs with eels.

The elimination of obstacles led to important hydro geomorphological changes, such as the material present in the riverbed or increased rapids and currents, as opposed to dammed water. This especially helped the Iberian desman, an endemic, highly endangered species. IREKIBAI was also able to take an up-to-date snapshot of this species' state of conservation, its requirements and its threats.

Moreover, we worked directly to fight invasive species, including the American mink, which has proven to be the most concerning exotic invasive species in the Bidasoa basin.



The project improved the Leizaran and Bidasoa Rivers' ecological conditions | Gaizka Aranguren

SO, NOW WHAT?

While the IREKIBAI project's objectives were met and then some, there is still a great deal of work to do. Obstacles continue to jam the secondary beds in the two basins.

We need only observe that salmon merely use 22% of these beds in the Bidasoa basin, or that the cumulative effects of the passable obstacles on the Leizaran delay or make migration difficult, to understand that it is important to keep moving in this direction.

We must continue to work on improving and/or eliminating obstacles to reduce the cumulative effect, all while improving passages that the project has identified as bearing certain problems.

Moreover, we must work to decrease the death toll wreaked by hydroelectric plants during juvenile salmon downstream migration and adult eels toward the sea, the former to feed and the latter to reproduce.

We must also continue to control the American mink, since this is the greatest threat to the European mink's conservation.

Hydroelectric plants' diversion of flows is one of the greatest threats to the desman and must be another one of the main pillars in future work.

Lastly, we must not forget that restoring beds and banks in degraded sections can help to conserve and recover the two aforementioned mammals, thus contributing to reaching the Habitat Directive (Directive 92/43/EEC) objectives.

However, it is also useful to improve the state of water bodies and to help reach the Water Framework Directive objectives (Directive 2000/60/EC).

In the same vein, eliminating obstacles can also aid in improving the state of water bodies and decrease the risk of flooding (especially obstacles in urban sections), helping with the implementation of measures related to the Flooding Directive (Directive 2007/60/EC).

In the future, it is important to keep moving forward with new projects that place value on the ecosystemic services provided by the river environment and how environmental restoration helps meet the challenges set forth by community legislation.



We must continue to work to improve the state of our rivers | Javier Arbillia



TITLE OPEN RIVERS: IMPROVING CONNECTIVITY AND THE HABITATS IN RIVERS SHARED BY NAVARRE AND GIPUZKOA.

REFERENCE LIFE IREKIBAI LIFE14 NAT/ES/000186

PROJECT COORDINATOR PROVINCIAL COUNCIL OF GIPUZKOA

PROJECT PARTNERS PROVINCIAL COUNCIL OF GIPUZKOA (COORDINATING PARTNER), BASQUE WATER AGENCY URA, HAZI FOUNDATION AND GOVERNMENT OF NAVARRE, THROUGH GESTIÓN AMBIENTAL DE NAVARRA S.A.

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LIFE FUNDING 1,799,624 € (60%)

PROJECT DURATION 6 MONTHS (16 JULY 2015 THROUGH 31 DECEMBER 2020)

