

# Restoration of the Oka River's upper estuary, part of the Urdaibai Biosphere Reserve <sup>[1]</sup>

Image from Climate Adapt about this case study

[2]

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The estuary of the Oka River is located within the Urdaibai Biosphere Reserve, on the coast of Biscay, Basque Country, north of Spain. It is an area of high ecological value. Its landscape has been transformed over the years by human activities, as it has been inhabited since Prehistoric times. The most important activities affecting the landscape of the estuary have been agriculture, cattle rising and a shipyard. While the first two have practically disappeared, the shipyard activity is still on-going, although with less intensity than in previous decades. Some activities, such as the construction of a canal in the upper estuary, have led the ecosystem to lose part of its original functionality. The restoration of the upper estuary of the Oka River aims to recover some of the lost ecosystems functions.

Climate change will increase pressure on this fragile ecosystem. Temperatures are projected to rise and annual precipitation is expected to decrease, while the intensity and frequency of extreme rainfall events could increase. This will affect water regimes, increasing the river flow and the risk of flooding as well as the erosion of the basin, the flow of suspended sediment in the estuary area and the risk of clogging of tidal fluvial channels. Sea level rise and expected increase in the intensity and frequency of marine storms could lead to the erosion of the intertidal and supra-littoral zone of the beach, as already experienced in some areas, as well as to an increased erosion of the estuary marshes. The Oka River estuary cannot fully adapt naturally to climate change, in particular due to the presence of dams and other artificial barriers along its course. The restoration of the Oka River upper estuary seeks to improve its adaptation capacity by removing dykes and other typologies of barriers and recover previously existing marshland.

## Case Study Description

### Challenges:

According to climate change projections included in the "Basque Country's Climate Change Strategy for 2050" the average annual and seasonal temperature and the occurrence of heat waves are expected to increase. During winter months, it is projected that minimum temperatures will rise between 1 and 3° C by 2100, while during summer months a possible increase of 3° C by the end of the 21st century in maximum temperatures might occur. Due to these changes, longer and more recurrent heat waves are expected by the end of the century. A decrease in precipitation, especially in spring time, is projected, ranging between -10% and -30% by 2100. An increase of events of extreme precipitation up to a 30% by the end of the 21st century is also expected, with consequent increased risk and danger of flooding.

In the same "Basque Country's Climate Change Strategy for 2050" is also mentioned that sea level is expected to rise between 29 and 49 cm by 2100, further increasing the risk of flooding in the estuary of the reserve. Moreover, climate change will increase the intensity and frequency of marine storms, which are responsible of the erosion of the intertidal and supra-littoral zone of the beach. This process is already happening in some areas. For example, the beach of Laida, which semi-confine the estuary, suffered strong erosion due to the storms that occurred in 2014 and as a consequence supra-littoral zone disappeared, with damages to access infrastructures, breakwater walls and channeling as well as limitation to recreational activity.

Considering current climate related pressures and those generated by future climate change, in the next 50

years it will be necessary to continue working on the renaturalisation of the Oka river estuary, including the removal of artificial barriers that currently limit the estuary extension and recovery the previously existing marshland. This would improve autonomous adaptation capacity of the estuary ecosystem.

**Objectives:**

The main objectives of the actions implemented in the upper estuary of the Oka River are: (i) Improve the resilience of the estuarine ecosystems to the impacts of climate change, such as sea level rise and changes in the water regime; (ii) Increase local biodiversity thanks to the recovery of part of the ecosystem's functionality; (iii) Increase the sustainable public use of the natural space of the Urdaibai Biosphere reserve.

**Solutions:**

Restoration activities aiming to recover the previously existing marshland have been implemented in the upper estuary of the Oka River, including the permanent flooding of the Barrutibaso area part of the upper estuary. Moreover, the functionality of part of the original intertidal channel of the Oka River's lower section has been recovered. As part of these restoration activities, some of the dykes and other artificial barriers have been removed to improve the estuary renaturalisation, while embankments have been constructed to create lagoons that will become intertidal zones in the future. The restoration of marshlands formerly drained for sanitary reasons can help the estuary to face climate change. Marshes, in addition to protect against the effects of sea level rise, play an important ecological role providing new habitats to various species of amphibians and birds and improving their adaptation capacity. Moreover, the permanent presence of brackish water favours the elimination of some invasive species (e.g. *Baccharis halimifolia*).

The restoration project also included other interventions and activities:

- The construction of a 14 km pathway network and of a pedestrian and cycling bridge connecting the neighbouring municipalities among each other and to the Oka river estuary, aiming to facilitate sustainable visit of the area;
- The development of tools for environmental education, the most notable being a smartphone application providing information on the habitats, species and culture of the area. Moreover, panels have been installed providing on-site information on local habitats and species.
- Eradication of invasive species (as *Baccharis halimifolia* and *Cortaderia selloana*) in an area of approximately 700 ha of the estuary.

**Importance and relevance of the adaptation:**

PARTFUND\_AS\_CCA;

Additional Details

**Stakeholder engagement:**

The restoration project of the Oka River's upper estuary included the organisation of several meetings with different stakeholders, such as the municipalities located in the area, landowners and environmental associations. Stakeholder engagement aimed at setting common objectives. In addition, informative talks with civil society have been held in town halls and recreational activities have been developed to advertise the project and improve awareness on climate change adaptation.

**Success and limiting factors:**

The newly constructed pathway network has facilitated the connection of different municipalities through sustainable transport (bicycle and walking). Besides improving the sustainable public use of the estuary area it also contributed in raising awareness on the restoration project.

Some of the municipalities included in the area where the restoration measures have been implemented did not take part into the project, thus posing some limitation to its complete development. Therefore, some phases of the project (mainly dealing with removal of some of the dams) are still to be implemented.

Moreover, the ingrained sense of ownership of the people in the area to be restored has made the

implementation of some of the project activities difficult. The 1998 Coastal Law establishes an area 100m wide on both sides of the river, where land owners can make objections to actions planned. For this reason some actions included in the restoration project have not been implemented, yet. Nevertheless, negotiations are continuing in order to make sure that the totality of the project is implemented.

**Budget, funding and additional benefits:**

The project has been completely funded by the Department of Environment, Land planning and Housing of the Government of Basque Country. The overall amount of the project budget is about 2.5 million euro.

**Legal aspects:**

The Spanish Law 42/2007 on natural heritage and biodiversity supports the implementation of the restoration project of the Oka River's upper estuary, as among its purposes it includes conservation, sustainable use, improvement and restoration of natural ecosystems and habitats. The Urdaibai Biosphere reserve is located in the Basque Country, where the local government has set various strategies and plans that promote this type of restoration works, including in particular the "Basque Country's Climate Change Strategy for 2050", the Environment Framework Program 2020 and the Biodiversity Strategy.

**Implementation time:**

Implementation of restoration measures started in 2010 and is still on-going. Most of the measures have been implemented, while few of them are waiting for permission from the Spanish Ministry, as in the case of the dyke removal in the upper estuary.

**Reference Information****Contact:**

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**Websites:**

<http://www.ingurumena.ejgv.euskadi.eus/informacion/proyecto-de-restaurac...> [4]

**Sources:**

Service of the Urdaibai Biosphere Reserve (Servicio de la Reserva de la Biosfera de Urdaibai)

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