



Agencia Vasca del Agua
Basque Water Agency

DAM REMOVALS IN THE BASQUE COUNTRY

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Dam Removals in the Basque Country

- **DEMOLITION OF DAMS IN THE BASQUE COUNTRY**
- **INTURIA DAM REMOVAL**
 - **DEMOLITION WORK**
- **VIDEO OF THE DAM REMOVAL**
- **RESULTS OBTAINED**



Dam Removals in the Basque Country

➤ IN THE LATE 1990s:

- Large sanitation systems in place
- Rivers had good quality water
- But the ecological recovery of the rivers was very poor

➤ THIS POINTED TO THE IMPORTANCE OF:

- The rivers' good morphological condition and their continuity

➤ 1991: FIRST LOW DAM TO BE DEMOLISHED:

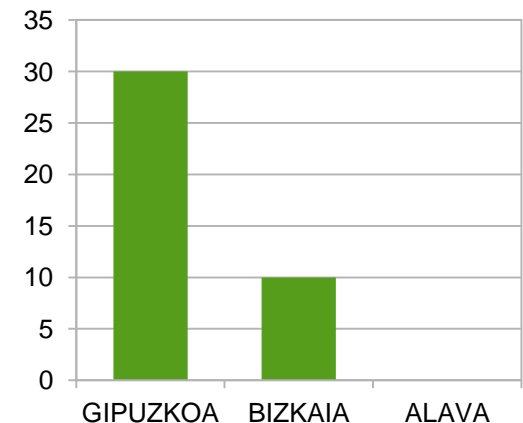
- In Miraballes (Bizkaia) by the Basque Government: H = 4m

Bizkaia: 10 dams (Provincial Council and the Basque Water Agency)

Alava: No removals to date

Gipuzkoa: 30 dams (Cantabrian Hydrographic Confederation,
Provincial Council and Basque Water Agency)

DAM REMOVALS





Dam Removals in the Basque Country

➤ 2001: Gipuzkoa Provincial Council:

- Begins to inventory obstacles basin by basin
- **700 obstacles** identified, 510 of which were not in use

➤ 2002: Gipuzkoa Provincial Council:

- **Carries out the FIRST removal in Gipuzkoa:** H = 2 m (in Urola river)
- The CHC proceeds to terminate any dam concessions in disuse

➤ As of 2012: Europe begins funding dam removal projects (such as Guratrans and Irekibai):

- Gipuzkoa Provincial Council
- Government of Navarre
- Basque Water Agency





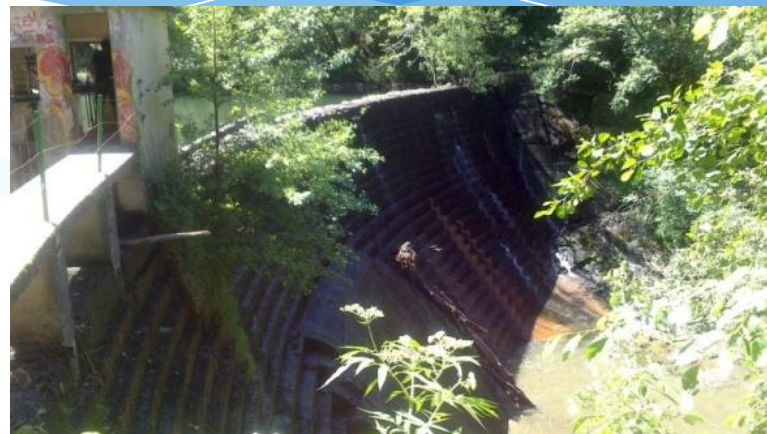
Inturia Dam Removal



- **Location:** Leizaran river
- **Watershed:** 92 km²
- **Inturia dam:** Built in 1913; used as a reservoir regulator for a hydroelectric power station
- **Type:** Concrete gravity dam with staggered typology
- Plant curve of 60 m in length, 12.90 m in height
- Estimated useful volume: 70,500 m³



Inturia Dam Removal



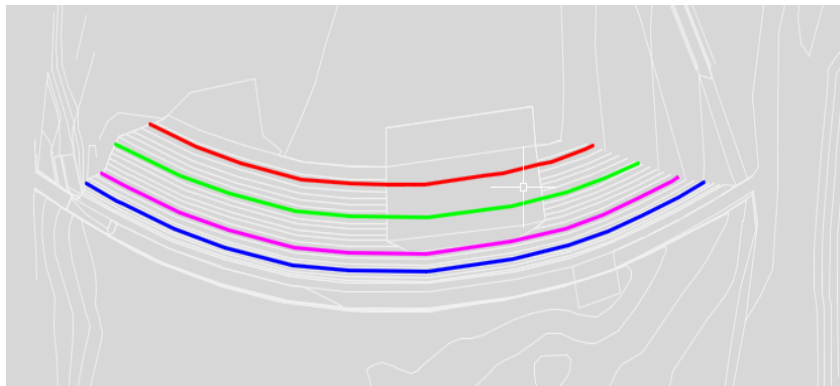
- **Largest dam** demolished in Basque Country: Height and volume of reservoir
- **On top of the dam:** Maneuver gate booth and 4 gates channelling water to a single collector, (outflowing at the foot of the dam).
- **REASONS FOR ACTION:**
 - Insecure infrastructure
 - Not in use
 - High maintenance costs
 - An industrial ruin
 - An obstacle for the river
 - An obstacle for the fish



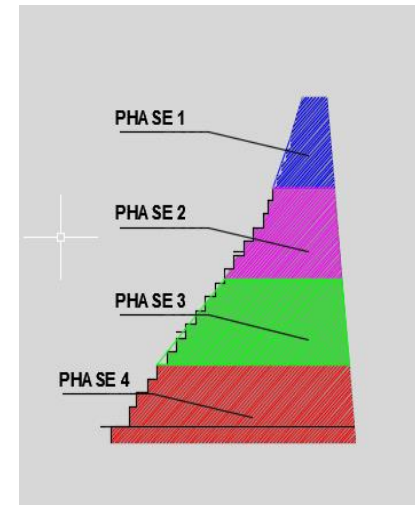
Inturia Dam Removal

➤ COURSE OF ACTION:

- 2009: The Gipuzkoa Provincial Council drafts the demolition project
- Given the great dimensions and the high volume of sediment: **4 phases planned**



Plant



Elevation

- ✓ This would reduce impact
- ✓ Allow for the river to adapt to the changes and move about 60,000 m³ of sediment, after each phase



Inturia Dam Removal

➤ START OF PHASE 1 – August 2013

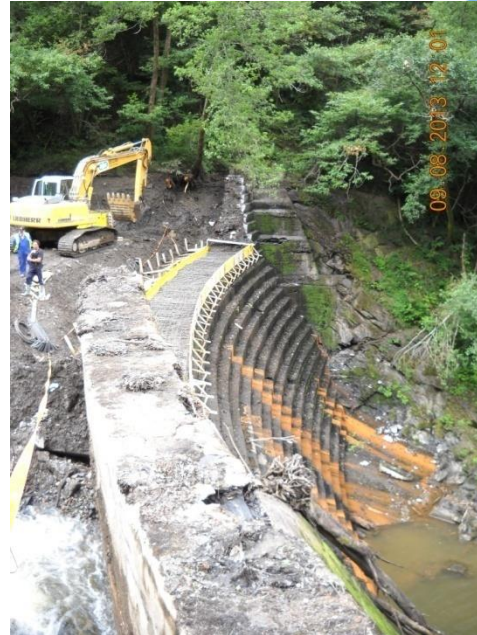


- **Previous work** : protection of fish passage and intake
- **Emptying the reservoir:**
 - Opening of the bottom outlet
 - Piercing of pipe in maneuver booth
 - Request from Iberdrola (the main national electric company): maximum flow possible through its canal



Inturia Dam Removal

➤ PHASE 1



▪ Demolition of the left half:

- $H = 3.6 \text{ m}$
- Dam in poor condition
- Concrete slab built



▪ Demolition of the right half:

- Water diverted via the left bank
- Concrete slab built

▪ Removal of the access and demolition material

➤ TOTAL DEMOLITION VOLUME: 313 M3



Inturia Dam Removal

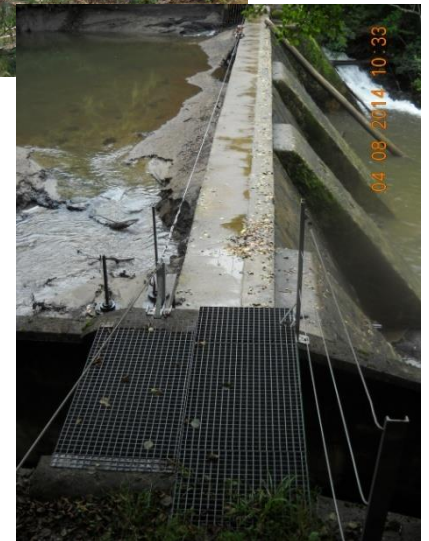
➤ CHANGES AFTER PHASE 1



- Vegetation returns to the shore



- Trees fall down



- Sediment carried downstream



Inturia Dam Removal

➤ START OF PHASE 2 – August 2014

- Same preliminary work: protection of Bertxin dam and Iberdrola
- Access building
- **Clogged pipe:** New pipes put in place



- **Problem:** Early hours of August 13:
a peak flow of 6.6 m³/s was registered
 - It takes with it the working platform
- New access built



- Demolition of the left half
- Concrete slab built
- Demolition of the right half
- **Little iron in the concrete buttress makes for an easy job**
- Concrete slab built



- Removal of access and demolition material



Inturia Dam Removal

➤ START OF PHASE 3 – August 2015

- Same preliminary work
- Access building



- Opening of the channel on left side



- Demolition of right half: H: 3.6 m



- Demolition of left half
- Low height work, so no need to protect the dam with concrete slab
- Removal of access and demolition material



Inturia Dam Removal

➤ The plan was to begin phase 4 in August 2016:

- **November 2015:** the river increases its flow from 3 to 139 m³/s (a five-year flow in one day)



- 250 m upstream the wall supporting a local road slides and collapses



- It was decided to advance the demolition to January, in order for the water level upstream to reach its final level
- Only then could the river bank be stabilized



Inturia Dam Removal

➤ START OF PHASE 4 – January 2016



- Access building
- Demolition of the left half: $H = 2.7$ m
- Demolition of the right half



- Removal of material

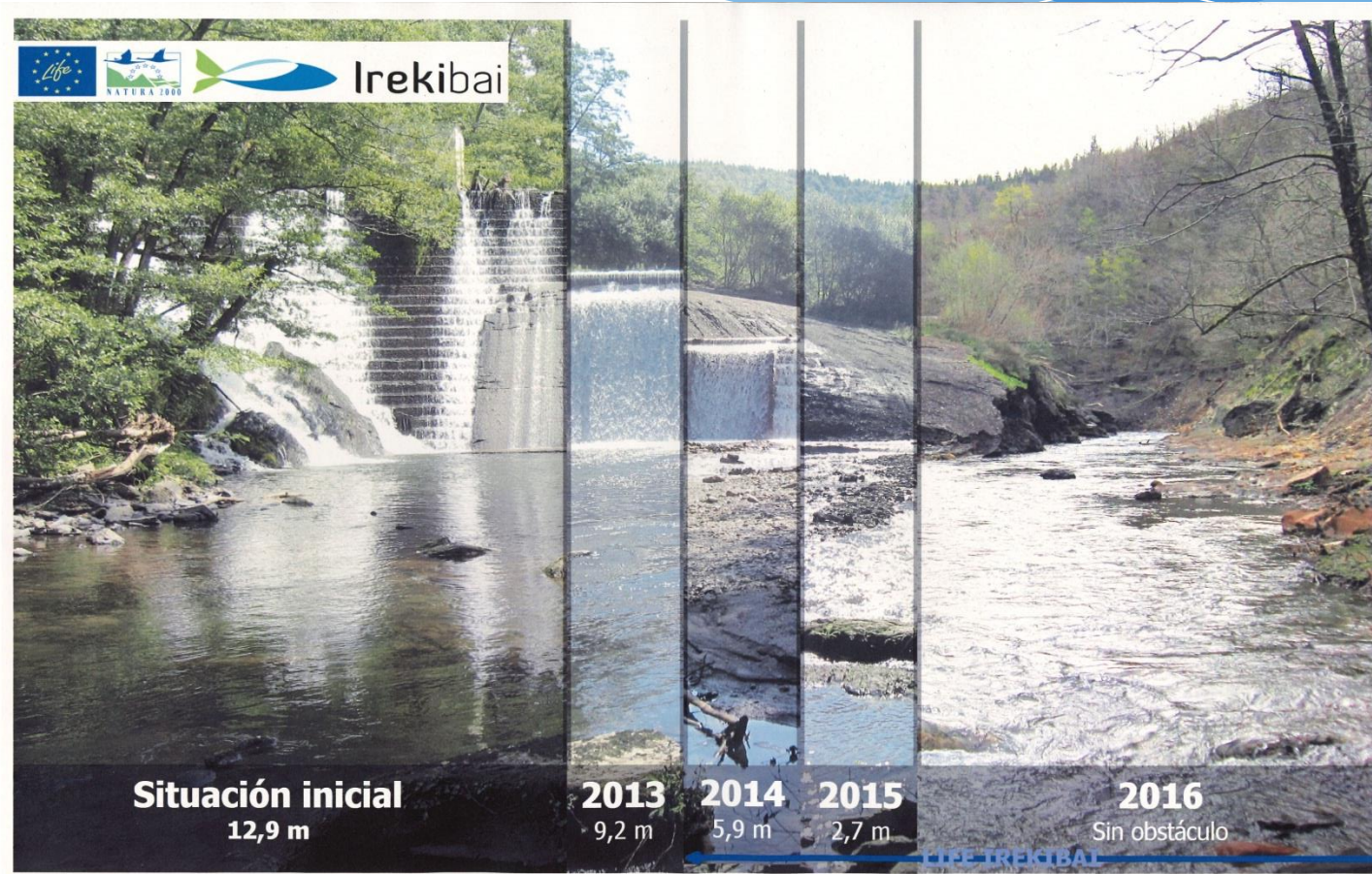


- The maneuver booth access is turned into a lookout
- A plate is installed

➤ **TOTAL DEMOLITION VOLUME: 815 M3**



Inturia Dam Removal



- HEIGHT TAKEN DOWN: 12.9 m
- TOTAL DEMOLITION VOLUME: 2,900 m³





Inturia Dam Removal

➤ RESULTS OBTAINED (After two demolition phases: 2013 and 2014)

- Riparian trees upstream collapse due to erosion
- No significant water flow in those 2 years
- First movement of sediment and increased fine elements observed downriver:
14,000 m³ of evacuated material
- Upstream from dam:
 - The fish community in general recovers, especially trout
 - 271 m² of new spawning areas created

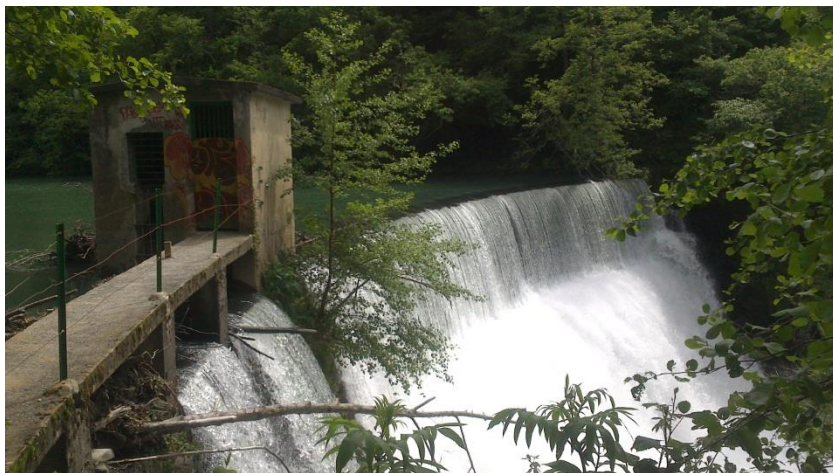
➤ CONCLUSION:

**HAVING REMOVED THE DAM IN PHASES IS THE MAIN REASON FOR
THE POSITIVE RESULTS OBTAINED.**



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THANK YOU FOR YOUR ATTENTION