DAM REMOVALS IN THE BASQUE COUNTRY

Nekane Echandi Almandoz
Civil Engineer (Water Works Technician)

Basque Water Agency: Public Works (sanitation and flooding)
Dam Removals in the Basque Country

- Demolition of Dams in the Basque Country
- Inturria 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)
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
**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 chanelling 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
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

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

- **Access building**: 230 m³
  - H = 3.6 m
  - Dam in poor condition
  - Concrete slab built

- **Demolition of the left half**:
  - Water diverted via the left bank
  - 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
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

**TOTAL DEMOLITION VOLUME**: 740 M³
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

TOTAL DEMOLITION VOLUME: 921 M3
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
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
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.
THANK YOU FOR YOUR ATTENTION