



GOBIERNO
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MINISTERIO
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CONFEDERACIÓN
HIDROGRÁFICA
DEL DUERO



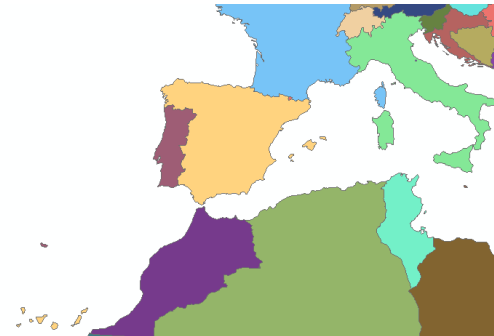
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NATURAL WATER RETENTION MEASURES IN the Spanish part of the Duero Basin



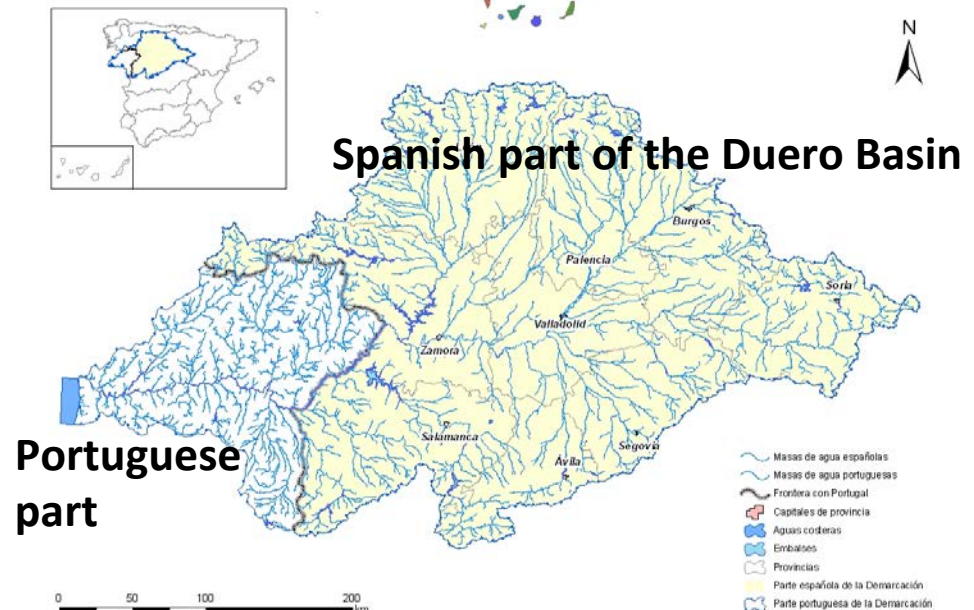
**Ignacio Rodríguez
José Ignacio Santillán
Confederación Hidrográfica del Duero
Ministerio de Agricultura, Alimentación y Medio Ambiente**

Natural Water Retention Measures in the Spanish part of the Duero Basin



International Duero Basin

<u>Total area:</u>	98.000 km ²
<u>Average yearly discharge:</u>	21.800 Hm ³
Spain area:	79.000 km ² (81%)
Spain discharge:	13.600 Hm ³ (62%)
Portugal area:	19.000 km ² (19%)
Portugal discharge:	8.200 Hm ³ (38%)
Boundary:	400 km



Natural Water Retention Measures in the Spanish part of the Duero Basin

Several river restoration measures have been carried out in the last 8 years in the Spanish part of the Duero Basin. There are two categories: recovery of the longitudinal continuity and improvement of the lateral connectivity.

These measures are part of the National Strategy of River Restoration and are integrated in the Program of Measures of the Duero Basin Management Plan.

These kind of actions are in accordance to an array of objectives which are integrated in Green Infrastructures Concept with several effects:

- **Improvement of the hydromorphological and quality conditions in water bodies (Framework Directive)**
- **Control increase of flood risk (Flood Directive)**
- **Making bigger the water infiltration in alluvial areas (Groundwater Directive)**
- **Amelioration of the capacity of natural treatment processes in the receiving environment (Several Directives about Water Quality)**
- **Fluvial ecosystem recovery (Nature Network 2000: Habitats and Birds Directives)**

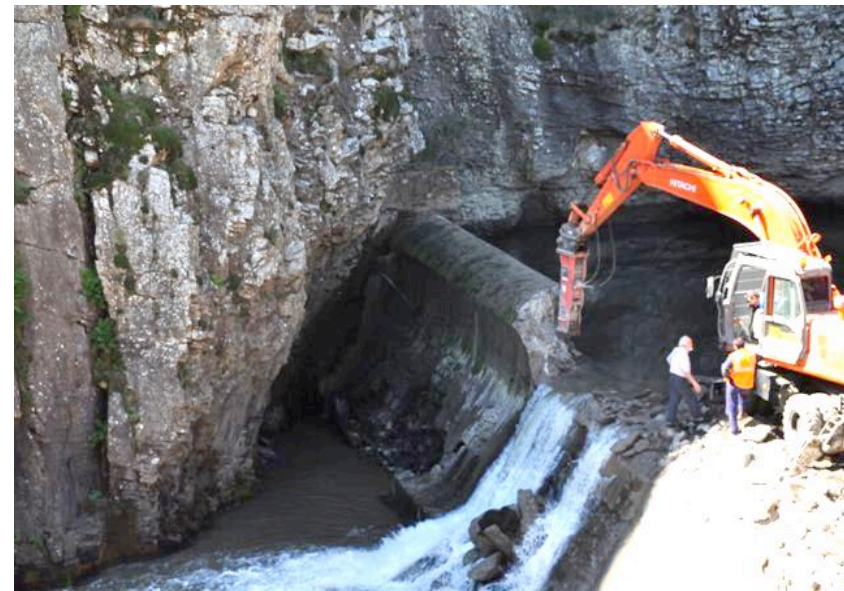


Natural Water Retention Measures in the Spanish part of the Duero Basin

Longitudinal continuity interventions

**Corresponding to Levelling of dams/longitudinal barriers
(code N9 Concept Note)**

**Transversal barriers (weirs and dams) out of use removed: 97,
with more than 600 km of river length reconnected
(flows, sediments, nutrients and biota)**



Natural Water Retention Measures in the Spanish part of the Duero Basin

Lateral connectivity interventions

Corresponding to Codes of the Concept Note:

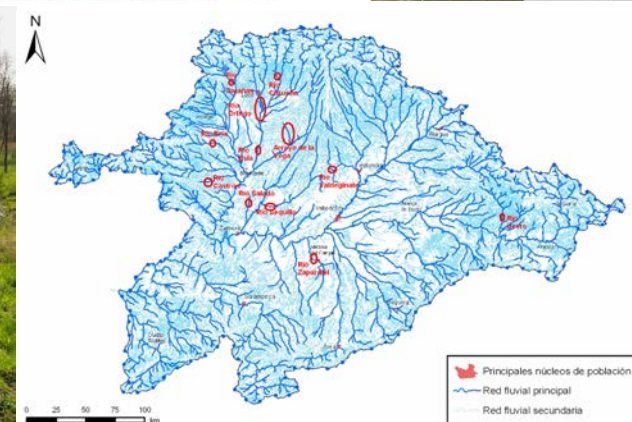
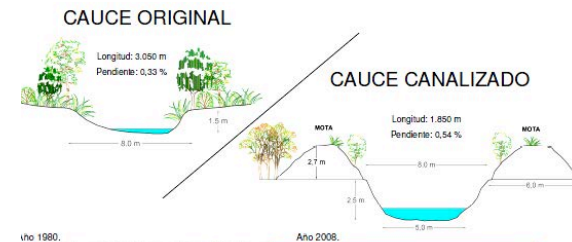
- N3 (Floodplain reconnection and restoration)
- N4 (Re-meandering)
- N5 (Revitalisation of flowing waters)
- N7 (Reconnection of hydraulic annexes)
- N10 (Natural bank stabilisation)
- N11 (Elimination of riverbank protection)
- F1 (Afforestation of riparian areas)
- F15 (Riparian trees in agricultural landscape)

33 interventions, which in summary can be described with the following indicators:

Levees removal: 61.200 m.l.

Levees set back: 8.200 m.l.

De-channelization: 12.300 m.l.



Natural Water Retention Measures in the Spanish part of the Duero Basin

The Órbigo River (León province) Restoration Project (Finalist in the 2013 European River Prize):

http://www.riverfoundation.org.au/articles/2013_IRF_European_Riverprize_Finalists

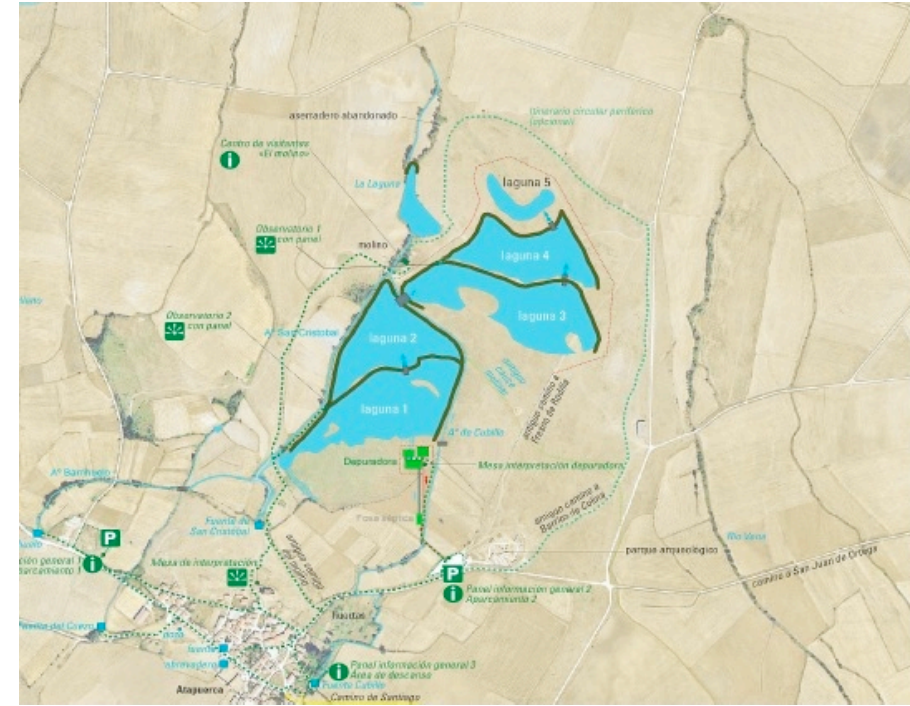
- **Elimination of rip-raps: 4.720 m**
- **Elimination of levees and rip-raps: 8.710 m**
- **Movement of earth embankments away from the channel (levees set-back): 3.130 m**
- **Recovery of secondary channels: 10.063 m**
- **Recovery of flood prone areas: 300 ha**
- **Plus some forestry works aimed at natural bank stabilization**

Pictures showing some works to eliminate levees in stretch I of the ecological improvement project in the Órbigo River

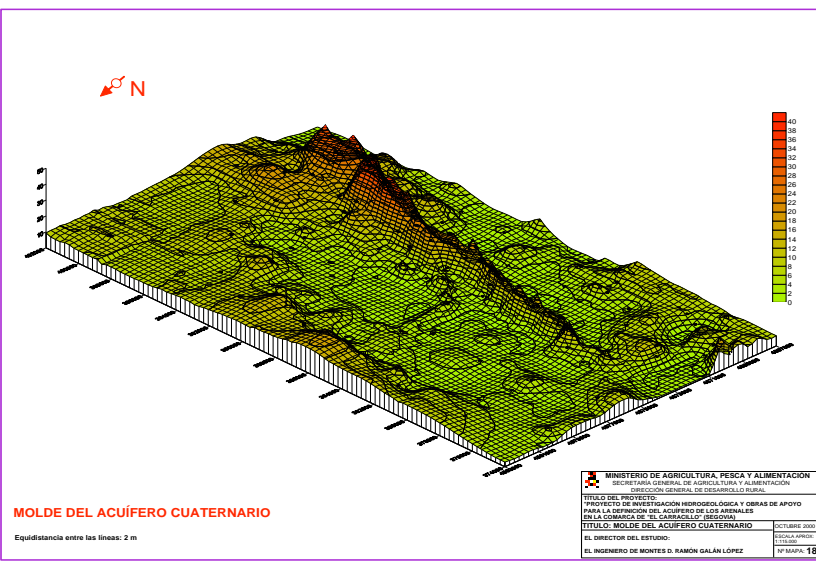


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Other interventions carried out have been the recovery of the Atapuerca wetland in Burgos province (code N12, Restoration of lakes)

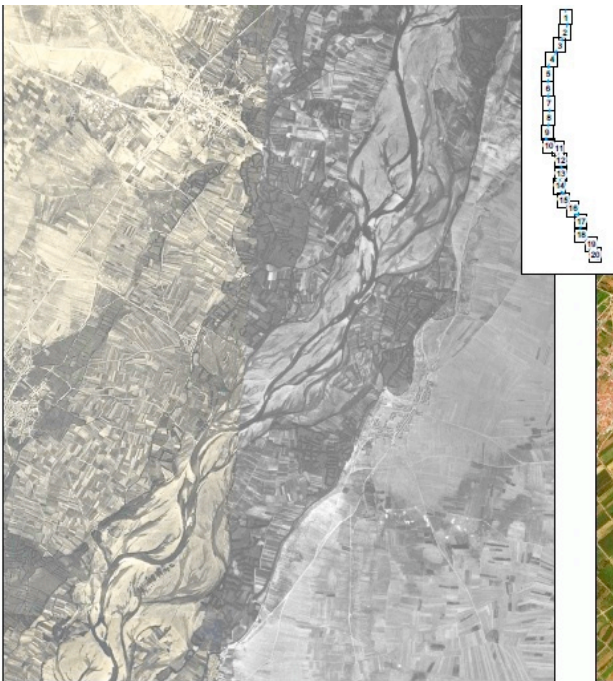


And two Artificial Groundwater Recharge projects (code N13) named as Carracillo and Santiuste de San Juan Bautista, both in Segovia province.



Natural Water Retention Measures in the Spanish part of the Duero Basin

Thank you!



irm@chduero.es
jsi@chduero.es