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EFFECT OF HYDRAULIC INFRASTRUCTURES ON THE CHEMICAL QUALITY OF THE FLOODED AREA OF TABLAS DE DAIMIEL NATIONAL PARK (SPAIN)

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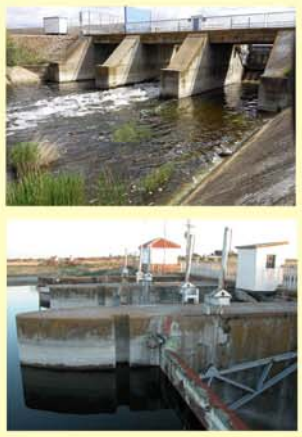
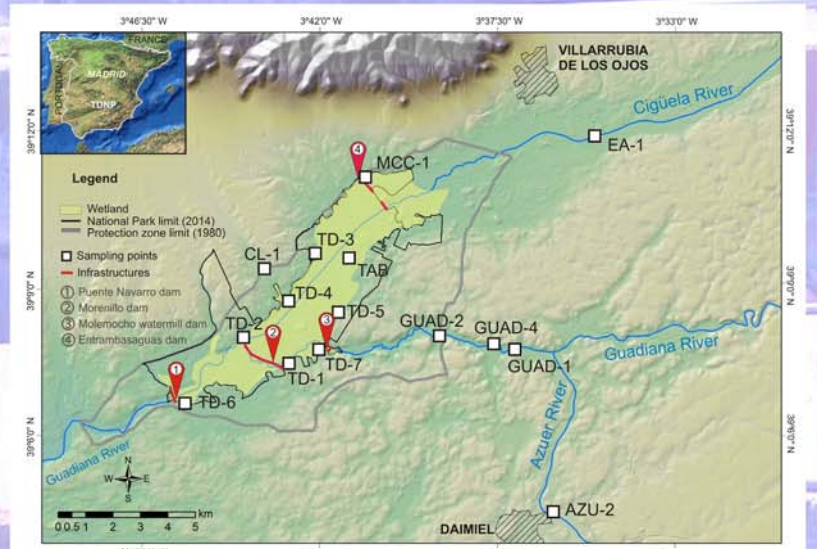
"Las Tablas de Daimiel" National Park (TDNP) is a emblematic wetland located in the centre of the Iberian Peninsula, with a continental and semiarid climate. The peculiar mix of water qualities and sources and its geographical location gived TDNP a special relevance among European wetland areas as a refuge for waterfowl and plant species.

① Puente Navarro dam



② Morenillo dam



③ Molemocho watermill dam

④ Entrambasaguas dam

Before 1970 - Natural conditions

1973 — The area was declared National Park

INTENSIVE GROUNDWATER EXPLOITATION

1985 — Puente Navarro Dam

1985-87 — Morenillo Dam; Molemocho Dam enlargement

1987 — TDPN was dry up for the 1st time

Intensive floods (1997-2004) — Tagus water transfers; Tagus water transfers

2010-2014 Quasi-natural conditions

2012 — Entrambasaguas Dam

2009-13 — Old infastructures consolidation

Las Tablas de Daimiel National Park (TDNP) was a Mediterranean wetland linked to groundwater dynamics. In natural conditions, the water of the wetland was a mixing of surface water and groundwater. Brackish surface water came mainly from Cigüela River, entering the TDNP by the northeastern area. Freshwater inputs came from the Guadiana River (incoming from the east) having both surface (from the tributary Azuer River) and underground sources.

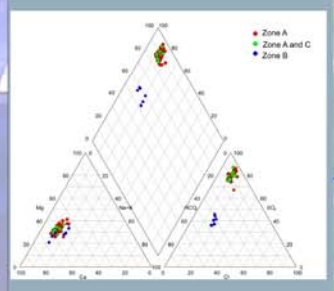
In the mid-1980´s, the disappearance of groundwater inputs and the reduction of surface contributions ocurred. Several actions were taken to maintain the water level in the wetland, being the most important ones the construction of three dams (Molemocho, Morenillo and Puente Navarro), pumping of groundwater from different salinity to the wetland and additional transfers of surface water by the Cigüela River. As a conse_ quence, the hydrological dynamics of the wetland and the physical and chemical characteristics of the water were modified, causing an increase in salinity from Cigüela to the rest of the TDNP.

The period 2009-2014 has been particularly wet, and a "quasi-natural" regime has been reached in the TDNP, in two steps:
a) exclusive contributions of surface water from the Cigüela River and
b) major inputs from the Azuer through the Guadiana and contributions from springs.

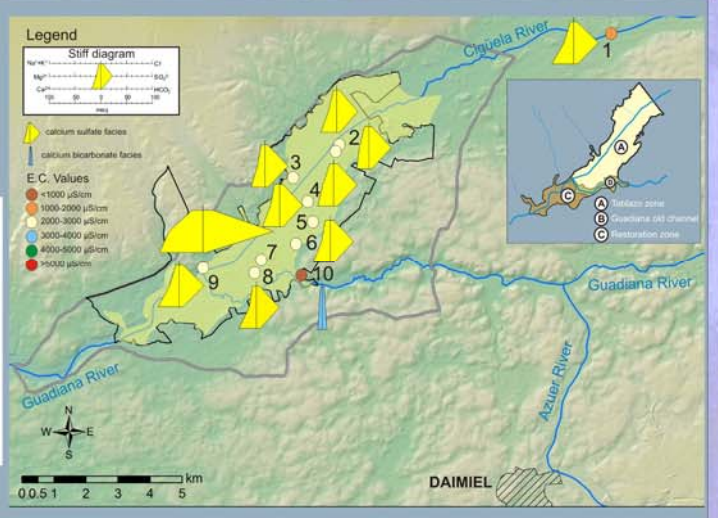
Natural conditions

Brackish surface water ↳ Cigüela River

Freshwater/groundwater ↳ Guadiana and Azuer Rivers



Source: Sáez Royuela, R. (1977) and Mediavilla, R. (2012)

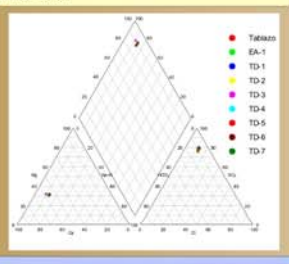


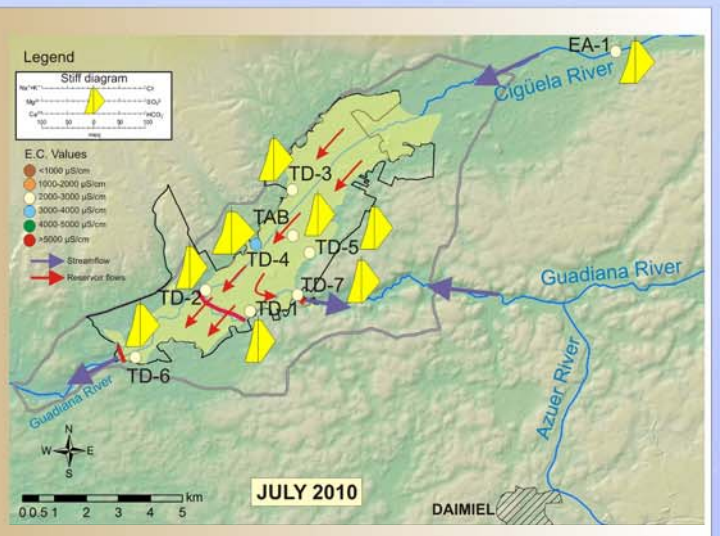
The monitoring of the chemical quality of the waters of TDNP in the last wet periods has shown that the less saline waters entering the TDNP from the Guadiana have migrated upstream to the Cigüela favored by water retention infrastructures.

Quasi-natural conditions

INPUTS
Only surface water: Cigüela + Northern tributaries

OUTPUTS
Guadiana
upstream from Molemocho
downstream from Puente Navarro
Evaporation
Infiltration

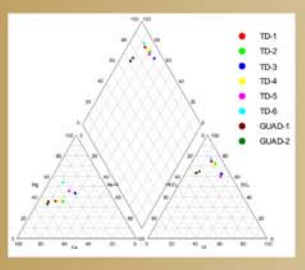


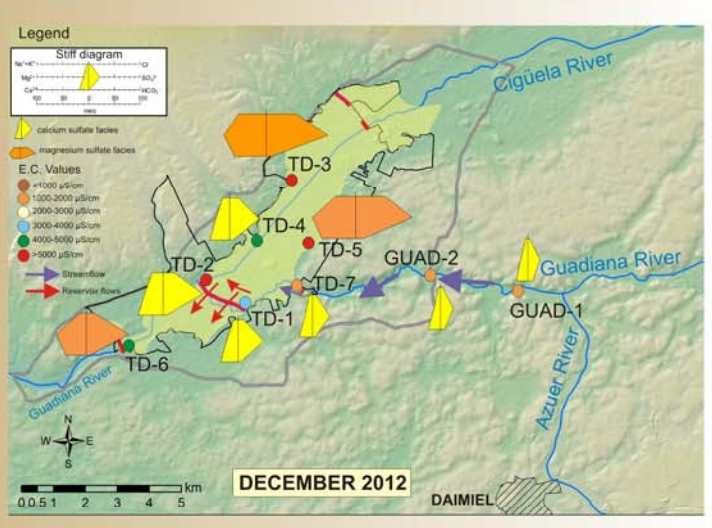


Quasi-natural conditions

INPUTS
Only groundwater (Guadiana) and bank storage

OUTPUTS
Evaporation
Infiltration

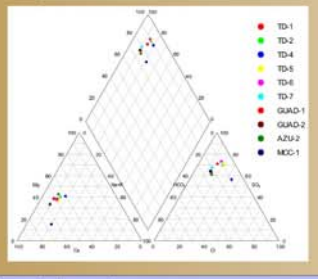


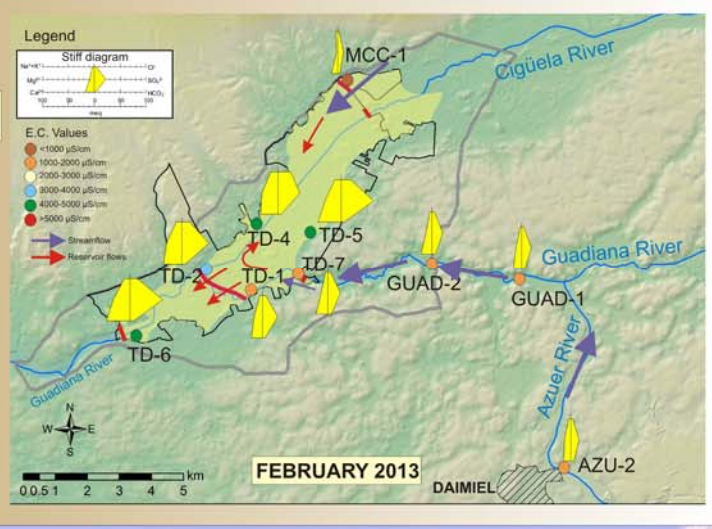


Quasi-natural conditions

INPUTS
Guadiana (surface + groundwater)
Northern tributaries (surface waters)

OUTPUTS
Evaporation
Infiltration

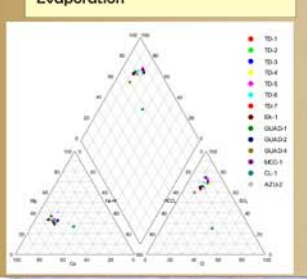


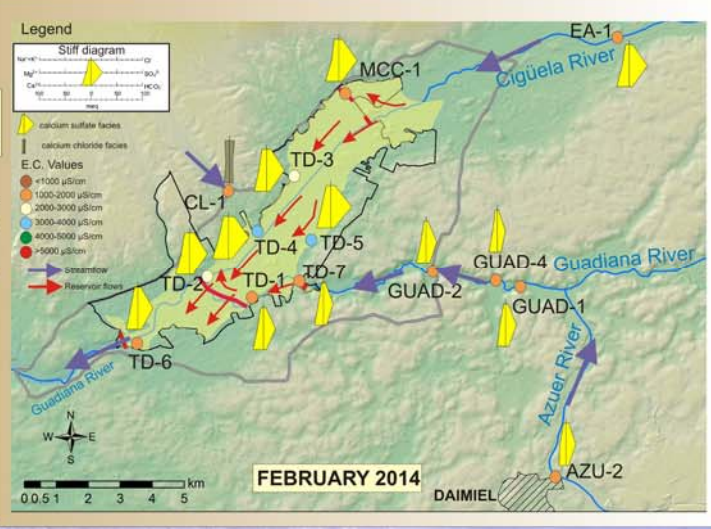


Quasi-natural conditions

INPUTS
Guadiana (surface + groundwater)
Cigüela (surface water)
Northern tributaries (surface water)

OUTPUTS
Guadiana
(downstream from Puente Navarro)
Evaporation





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Puente Navarro Dam