

Integrated water resources management in agriculture

Upper Guadiana Basin, Spain

water scarcity impact



Reduced withdrawal	●
Reduced consumption	●
Improved water quality	
Increased productivity	
Net basin benefit	●

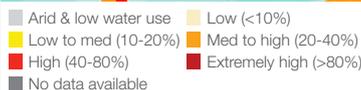
volumetric impact
400 000 000 m³/yr

programme cost
\$ 4 000 000 000

estimated unit cost of water
65 ¢/m³

Water Stress

Upper Guadiana Basin, Spain



Water Stress Map:

F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aqueduct Global Maps 2.1."

Confidence level

● Low ● Medium ● High

Water Scarcity Impact Key

● Main ● Minor

Credits

We would like to acknowledge José Ángel Rodríguez Cabellos of Guadiana River Authority and Manuel Menéndez of Centro de Estudios Hidrográficos del CEDEX for their input in the preparation of this case study.

Project Overview

Groundwater has been used for irrigation in the Upper Guadiana Basin for centuries. The region is semiarid, with an annual rainfall of 415mm, and is characterised by interconnecting aquifers and groundwater dependent ecosystems like the Tablas da Daimiel National Park wetland. Since the 1980s the irrigated area has increased more than four times, resulting in a rapid drop of the water table of up to 20m in places. This has led to the deterioration of several wetland areas of high environmental interest, including the Daimiel National Park.

In 1988, under pressure from environmental and conservation groups, the government initiated a series of legislative changes in an attempt to restore the wetlands and better regulate aquifer withdrawal. Implementation has proved to be challenging with local farmers concerned that restrictions on abstraction would impact on their livelihood.

The 2008 Upper Guadiana Basin Plan identified a range of further measures to manage water resources. Despite the 2010 economic crisis actions were implemented in 2011 and 2012 by the government. In 2012 the aquifer condition was assessed to be in a "nearly good" condition.

Key Elements

- A series of legislation changes aimed at restricting water withdrawal to renewable levels.
- Subsidising crop pattern changes to less water intensive plants.
- Cash compensation for reducing water use on a voluntary basis.
- Improved metering systems and the use of a satellite remote system for monitoring abstraction.

Key Outcomes

- Observed reduction in water withdrawals from 640 000 000 m³ in the 1980s to 240 000 000 m³ in 2012.
- Purchase of 14 000 000 m³ of private water rights by the government and reallocation to support the farming of less water intensive crops and the conservation of the wetlands.



Upper Guadiana Basin, Spain

Intervention Features

- Irrigation metering
- Subsidies to reduce groundwater abstractions
- Enforcement of quotas
- Transformation of water rights
- Education, technical training and capacity building

Project Levers

(1) Legislation

The Upper Guadiana aquifers were declared overexploited in the late 1980s. The government declaration sought to reduce the pumping rates from 4 278m³/ha per year to 2 000m³/ha per year. The operation of new wells and the deepening of existing ones was forbidden under the new legislation. However, it was difficult to observe compliance due to lack of monitoring capacity.

(2) Financial incentives

The €180 million government programme incentivised farmers to restrict their groundwater abstraction by limiting their irrigated surface or switching to less intensive crops. Farmers received compensatory payments calculated on the basis of reduced withdrawal, productivity, irrigation alternatives and profitability. In parallel, an initiative was implemented to restructure the agricultural sector in the region. This included moving away from maize and sugar beet crops into vineyard crops, which were seen as less water intensive.

(3) Basin planning

The 1998 and the 2008 Upper Guadiana Basin Plans have shaped the basin initiatives over the last decade. The 2008 plan identified an initial budget of €5 billion to be jointly funded by the Spanish government and EU. The implemented initiatives were:

- to transform the private groundwater rights into permits in attempt to strike a balance between legal rights and available water resources;
- hydrological monitoring study, satellite installation of water meters and improved use of information systems;
- environmental awareness amongst irrigation communities;
- to strengthen coordination between stakeholders involved in governing the aquifer.

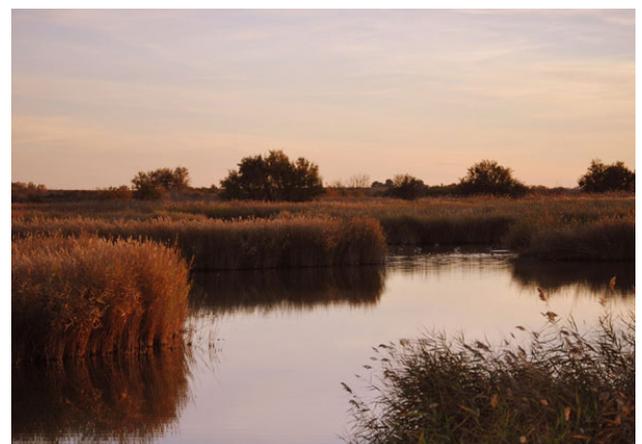
Outcomes and Challenges

In 2012 the condition of the Upper Guadiana aquifers was assessed as “nearly-good”. The sensitive wetlands of the Tablas da Daimiel National Park have also recovered near to their original surface area. Overall, the total abstraction from the aquifers was reduced from 640 million m³/year in the mid 1980s to 240 million m³/year in 2012.

This thirty-year transition, however, was challenging as the government struggled to strike a balance between water demand, economic development and water availability. The changes were met with frequent opposition and often resulted in conflicts between irrigation users and environmental organisations, with slow resolution.

Local farmers were also adamant that the new restrictions affected employment and the region’s economy. The implemented water allocation system was particularly controversial, and in periods of severe drought, smaller landowners were abstracting illegally from the aquifer.

The 2008 Basin Plan had ambitious scope to manage the water crisis in an integrated way and was backed by substantial funds from the government. In 2010, shortly after the plan approval, Spain entered a period of deep economic crisis and the government was forced to scale back many of the planned measures. However, two wet years in 2011 and 2012 provided the government with time to implement a number of the core actions in the plan including the purchase of water rights, the installation of water meters and the development of an environmental awareness campaign.



Above: Tablas da Daimiel National Park (© Victor Solís Parejo)