

## Improving water availability through wastewater treatment

Segura River, Spain

water scarcity impact

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

volumetric impact

### 100 000 000 m<sup>3</sup>/yr

capital cost

### \$917 000 000

estimated unit cost of water

### 65 ¢/m<sup>3</sup>

**Water Stress**  
Segura River, Spain

■ Arid & low water use    ■ Low (<10%)  
■ Low to med (10-20%)    ■ Med to high (20-40%)  
■ High (40-80%)    ■ Extremely high (>80%)  
■ No data available

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**Water Stress Map:**  
Gassert, F., M. Landis, M. Luck, P. Reig, and T. Shiao. 2013. "Aqueduct Global Maps 2.0."

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**Confidence level**  
 Low    Medium    High

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**Water Scarcity Impact Key**  
 Main    Minor

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**Credits**  
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### Project Overview

The Segura River is about 350km long and flows from west to east discharging in to the Mediterranean on Spain's east coast. The river passes through the entire region of Murcia which has the lowest annual rainfall in the European regions yet a population of over two million. The basin experiences an acute supply-demand imbalance as illustrated by the water scarcity index with demand exceeding the natural stream flow by 2.5 times; consequently water that is available in the river is of extremely poor quality thus further reducing resource availability. The basin is supplemented by an inter-catchment transfer from the Tajo river and desalination. Of a total demand of 1 900 million m<sup>3</sup>/yr, 87% is for agricultural use and 10% for municipal use.

This project, implemented over a 10-year period, improves available resource through the capture and treatment of urban and industrial waste water flows and returning them for direct or indirect re-use in irrigation. A key element to the project's success was the enactment of policy and legislation that enforces the "Polluter Pays" principle; this enabled waste water treatment and recovery to be operated on a cost recovery basis.

### Key Elements

- Transfer of the mandate for wastewater collection and treatment from municipalities to a region wide General Directorate of Water.
- Establishment of Esamur, an independent agency for operation and maintenance of treatment facilities and collection of waste water levies.
- Construction of 97 advanced waste water treatment plants.
- Construction of 350km of sewer.
- Introduction of a robust system for the monitoring of industrial discharges to sewers.
- Implementation of industrial wastewater treatment at source.
- 75-80% co-funding from European Funds.

### Key Outcomes

- 100 000 000m<sup>3</sup>/year of wastewater return flows that were previously unusable now treated and made available.
- Ability to meet 6% of irrigation demand.
- Connection of 99% of urban areas to sewers.
- Substantial increase in river water quality; reduction in Biological Oxygen Demand (BOD) by 95%.
- Cost recovery achieved for long term operation of treatment works.
- Negligible discharge of untreated industrial waste to public sewers.
- Compliance with the European Union Urban Wastewater Treatment Directive.
- An improvement in the river and near-river environment for the people of Murcia.



Segura River, Spain

### Intervention Features

- Remote monitoring and sensing
- Wastewater reuse for agriculture
- Improvement in water quality
- Institutional reform

### Project Levers

#### (1) Construction of a region-wide wastewater collection and treatment system:

All 97 advanced wastewater treatment plants were designed to allow nutrient removal and, where necessary, tertiary processing to minimise concentrations of suspended solids and disinfect the reclaimed output. This was done to improve environmental quality and safety for direct and indirect reuse.

By 2010, the wastewater collecting system connected 99% of the urban population of Murcia region to the corresponding treatment plants. Approximately 350km of sewers have been built.

#### (2) Establishment of institutional structures:

A regional authority has been established to implement the project and is responsible for the ongoing operation and maintenance of the works. The authority is funded through a Wastewater Reclamation Levy. This is a change from the previous structure where municipalities were responsible for waste water treatment and collection.

The Segura River Basin Authority is responsible for the monitoring of the Segura River's water quality and enforcement of regulations on parties discharging to the river.

#### (3) Discharge monitoring:

Each waste water treatment plant has been established with continuous monitoring of inputs and outputs. This helps monitor discharge to sewers by industries as well as effluent discharge to the river. The monitoring as well as the operation and maintenance of the plants are funded by the Waste Water Reclamation Levy.

#### (4) Facilitation of industrial wastewater treatment at source:

The application of a 'Waste Water Reclamation Levy' on discharges to the public sewer system has encouraged industries to increasingly treat waste water at source thus reducing load on the public sewers and avoiding discharge of untreated waste to the river system.

### Outcomes and Challenges

#### - Wastewater reuse high recovery rates

In 2010 the actual treated volume was 110 million m<sup>3</sup>, of which 100 million m<sup>3</sup> was reused in irrigation, either directly or after discharge and subsequent downstream abstraction from river.

#### - Reduction in pollution

The water quality in the Segura River has dramatically improved as a result of higher compliance by industry to discharge regulations.

#### - Wetlands recovery

Over the years wetlands which were adversely affected have been restored by the implementation of the project. Some of the wastewater treatment plants are built on sites of old lagoon treatment systems. Some of the renewed lagoons are used for storage of treated water prior to use for irrigation. These have now become resting places for thousands of migrating birds.



Above: Advanced wastewater treatment plant in the Murcia region  
(© Confederación Hidrográfica del Segura Press Office)