Basin Profile: Guadalquivir River Basin
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Water Scarcity Status

- The Guadalquivir River is experiencing severe water scarcity.
- On average, there is 3,028 hm^3 of water available per year, while average net water allocation is 3,105 hm^3 per year, resulting in a water debt of -77 hm^3 per year.
- Dams along the river and its tributaries are capable of storing almost all of the water the river has available, but reservoirs are rarely filled to capacity and droughts are frequent, making the water supply challenging to manage.
- As a result of damming, industry and agriculture, the watershed is experiencing not only a lack of water quantity, but also a lack of water quality.

Basin Overview
Andalucía, Spain
Area: 57,000 square kilometers
Climate: Dry summer and wet winter
Basin population: 5,000,000

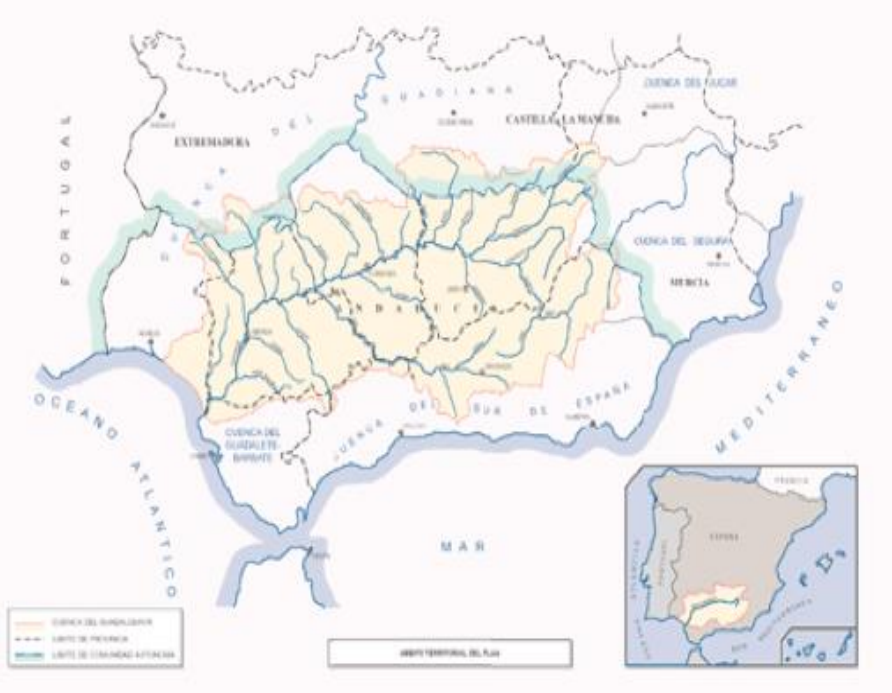

Figure 1. Map of Guadalquivir River Basin (riosycuencas.com)

The Guadalquivir River is located in the region of southern Spain known as Andalucía. At 657 kilometers in length, the river is the fifth largest on the Iberian Peninsula and the second largest to be entirely within Spain's borders. The basin drains over 57,000 km^2, roughly 11% of Spain's landmass.

The basin receives modest amounts of rain, averaging between 250 mm and 600 mm of precipitation per year. Season to season variability is high, with most precipitation occurring between November and March.

The basin is largely rural, with nearly half of the land (49.1%) covered in natural forests, and most of the rest being used for agriculture (47.2%). Only 1.9% of the area is urbanized, and 1.8% of it is wetland. The basin provides domestic water supplies for 5 million people in southern Spain. The population in this region is growing. From 1986-1996, population in the watershed grew by 5.5%, compared to the 3.1% growth rate in the rest of Spain. Already, one tenth of the Spanish population lives in the Guadalquivir Basin

Reservoirs along the Guadalquivir are already able to store more water than is available during the average year. As a result, there is almost no need for new reservoirs to be built. Currently, the Guadalquivir basin has a storage system of over 65 reservoirs capable of storing 9,755 hm^3. Reservoirs are rarely filled to capacity and during drought years in particular, water supply will remain insufficient. When Spain experienced a long drought from 1992-1996, farmers were not allowed to irrigate at all during 1995.

Water laws adopted in 1985 shifted away from the "use as much as you can" approach of the past, focusing on water quality and protection. The laws had four main principles: 1) integration of management of surface and groundwater quantity and quality, 2) managing water at the scale of the basin, 3) encouraging user participation, 4) balancing social, economic and ecological factors. The new laws also prioritized water usage within the basin. Priorities were ranked as follows, from most to least importance: domestic supply, irrigation, hydropower, industrial uses, aquaculture, recreation, and finally navigation. Until recently, the Guadalquivir watershed was managed by the Guadalquivir Hydrographic Confederation (operating as part of the Ministry of Environment), but in 2009, water management responsibilities were transferred to the Andalucía Water Agency (AAA).

As is reflected by the region's land use patterns, agriculture plays a large role in the economy of the Guadalquivir basin and an even larger role in its water use. Agriculture generates 6% of the Guadalquivir Basin's Gross Value Added (GVA) and employs 11% of the basin's workforce. Additionally, agro-industry contributes an additional 4% GVA and 2.7% of employment. Irrigated agriculture provides gross added value (GVA) that is 6.5 times higher than non-irrigated agriculture Of the water used for irrigation in the watershed, 80.9% is taken directly from the Guadalquivir River and its tributaries as surface water. The olive industry is a large sector of Spain's agricultural industry and a large consumer of water from the Guadalquivir River. About 974,555 hectares of land within the watershed (over one third of the watershed's agricultural area) are used for growing and harvesting olives, more than any other crop in the region. In fact, Spain is the largest producer of olive oil in the world, producing 1,221,800 metric tons in the 2007/2008 crop year.

Water Scarcity Impacts

Environmental Impacts

Spain has 1,070 large dams and many small ones. Dams are one of the main negative factors affecting native Spanish fish, having a greater impact on riverine fish than any other human activity. Fishways are often absent in large dams, resulting in a loss of habitat for marine species and impeding the migration necessary for reproduction of some species. As a result, all anadromous and catadromous fish are threatened in Spain.

While the biggest water-related concern for the Rio Guadalquivir watershed is water scarcity, water quality is also a concern. The main specific sources of surface water pollution are urban and industrial discharge, fish farming and mining. Additionally, non-point source pollutants include those from transportation and agriculture. Main point source pollutants in groundwater result from urban and industrial discharge and mining, while non-point sources include industrial and urban soils, mining, airports, recreation areas, agriculture and livestock. These pollutants result in increased amounts of nitrates, phosphates, suspended solids, sulfates and chlorides in areas of the watershed Within the Guadalquivir watershed, four of the five fish species in Nicola's study (sea lamprey, shad, European eel, and mullets) experienced sharp declines of 60% or more after 11 major dams were built along the river. The other fish in the study, the European sturgeon, is no longer found in the Guadalquivir

Economic and Social Impacts

As a result of its accessibility along the Rio Guadalquivir, Sevilla is one of the oldest and most historic cities in Spain. The city is over 2,000 years old and was been ruled by the Ancient Roman Empire and the Muslim dynasties of Almoravid and Almohad, before being conquered by Castile in the 1200s. This rich history is still evident throughout the city today. Relics of Roman aqueducts remain and Moorish architecture such as the Alcázar features prominently. The city of Córdoba to the north of Sevilla, shared a similar history, even becoming the capital of the Islamic Caliphate of Córdoba during the Middle Ages. The Rio Guadalquivir did not just help form these historic cities, but it is continuing to shape them today. In order to maintain the natural and historical integrity of the region, the Guadalquivir River system must remain intact.

The public has begun to take note of the problems of water scarcity and water quality in the basin. Research conducted by AquaMoney, a project funded by the sixth European Union Framework, indicates that there is an awareness of water issues in the basin and that many individuals are even willing to pay for improvements (2009). Of residents who were polled, over 90% consider water issues one of the most important problems facing the region. Not only that, but more than 60% of the sample was willing to pay to improve the water quality of the Guadalquivir Basin.

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