

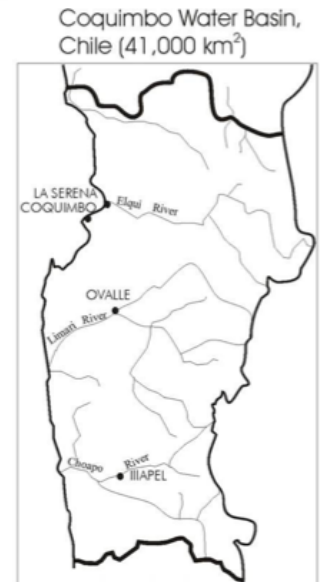
Elqui and Limarí river basins at a glance

Overview

The Elqui and Limari Rivers are an essential source of water for the Coquimbo Region in northern Chile, a main center for the production of table grapes, wine, and pisco. Extended drought in this arid region has resulted in water scarcity and increased conflict and tension among water users. Adaptive measures will be necessary to confront these challenges and ensure water security.



Source of image: wikipedia.com



Source of image: Cepeda et al. 2004

Geographic and physical features

The Elqui and Limari rivers are located in the mountainous and arid Coquimbo Region in north-central Chile, running from east to west through a series of steep valleys from the Andes mountains (approx. 4,800m in elevation) to the Pacific Ocean. Precipitation varies between 25mm and 300mm, with an annual average precipitation of 140mm, mostly occurring in the winter between May and August (1, 2). Five years of drought have had serious impacts in the Coquimbo region, where precipitation in 2013 reached only 50% of the average values (3). The Limarí river basin is located between latitudes 30°15' and 31°25' and is bordered by the Elqui River watershed to the north (4). The Elqui basin covers 9657 square km, while the Limarí covers 12,000 square km just to the south.

Hydrologic features

Both the Elqui and Limari rivers are primarily fed by glacier and snow melt in the Andes, as rainfall and runoff are very low and variable, influenced by the El Niño Southern Oscillation with dry periods related to La Niña episodes (5). The main tributaries of the Elqui River are the Turbio and the Claro, and its average flows range between 2.4 and 33 cubic meters per second (1). The Limarí River's tributaries include the Hurtado, Rapel, Mostazal, Grande, and Cogotí rivers, and its average annual flow is 14.5 cubic meters per second (6). Rural areas depend on groundwater pumping for potable water.

Socio-economic features

The main cities that depend on the Elqui and Limari rivers are La Serena, Coquimbo, Vicuña, and Ovalle. Approximately 75% of the regional population (which was 605,000 in 2002) is classified as urban (1). Approximately 20% of rural families in the region live in poverty, almost twice the rate of urban poverty in the Coquimbo region (1). The regional economy is based on mining, agriculture, tourism, and ocean fisheries. Despite water scarcity, the region's economy is largely based on irrigation-agriculture, producing grapes, avocado and citrus. 43% of the region's surface dry land is dedicated to agricultural development (1). In the Limarí basin, agriculture largely depends upon the Paloma System for distribution, a system of interconnected dams and reservoirs with a storage capacity of one billion cubic meters (2). Perennial crops account for 50% of total land in the Limarí basin (6). The Elqui Valley is renowned for its production of *pisco* (Chilean brandy), depending on the Elqui river to irrigate grapes. Small-scale farming has decreased in recent years with an increase in commercial agricultural production and more residents shifting from subsistence farming to wage-labor (5).

Institutional features

Chile's 1981 Water Code established a market-based system of tradable water rights, with distinction between surface and groundwater and between consumptive and non-consumptive water uses (8,9). The Direccion General de Aguas (DGA) is responsible for granting water rights when available, while water use is monitored by water users associations, such as canal user associations and "vigilance committees" that oversee allocation according to legal water use rights (7). Water is supplied to urban areas by Aguas del Valle and the Water Supply and Sanitation Company of Coquimbo (ESSCO), and in rural areas by Comites de Agua Potable Rural (Rural potable water committees). The Comision Nacional de Riego (the National Irrigation Commission) is also has an important role in the management of water in the Limarí and Elqui basins.



Elqui Valley Agriculture. Source of image: wine-pages.com .

Current challenges

Climatic variability has resulted in intense rain events and flooding (El Niño), reduced annual precipitation (La Niña), reduced vegetation during dry periods, and water shortages (5). Climate projections include an increase in temperature of 2 to 3 degrees Celsius during the remainder of the 21st century (1). Already, the Coquimbo region has seen a 50% deficit in precipitation, with only 60% the average snowpack (3).

Vulnerability of small-scale farmers, goat herders, and rural populations due to climatic variability and increased competition from large-scale agricultural demands for water (5).

Contamination and quality issues: High levels of arsenic in the Elqui River basin have been linked to the El Indio mining operation (10)

Governance: In addition to these infrastructure and production challenges, there have also been challenges related to water governance. The market-based system of water management has resulted in problems stemming from unclear definition of property rights and the inability of the DGA to coordinate multiple water users and resolve conflicts (8).

Barriers to adaptation: In the Limarí basin, overdevelopment of water infrastructure within the Paloma System of dams and reservoirs has led to "basin closure," limiting possibilities for adaptation to climatic variability and resulting water scarcity (6).

An interdisciplinary team of researchers from six countries is working toward strengthening science-policy dialogue over complex water security challenges in the Maipo, as well as the Elqui and Limarí basins in northern Chile, and ten other basin around the Arid Americas.

References - For full references see <http://aquasec.org>

- 1.) Cepeda et al. 2004 2.) Alevy et al. 2010 3.) ANDESS 2013 4.) Zegarra 2010
- 5.) Young et al. 2010 6.) Vicuna et al. 2014 7.) DGA 2004
- 8.) Bauer 1998, 2004, 2009 9.) Hearne and Donoso 2005
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