

## Water Management in the Huasco River Basin

Huasco, Northern Chile

The Huasco River sustains livelihoods and farming communities, export businesses and ecosystems, maintaining the ecological flow of the river and proper management of the resource is very crucial for the region. There are multiple users competing for resources in a water scarce region and an understanding of the dynamics between the water, energy and agriculture sectors is essential for equitable use.

In 2004, a programme for capacity transfer and improvement of irrigation and resource management in the basin was created by the local government and the irrigation authority with the purpose of sharing benefits of the Reservoir Santa Juana. The programme was implemented by a water association known as 'Junta de Vigilancia del Río Huasco y sus afluentes' (JVRH). Prior to the programme, it was difficult for JVRH to exercise managerial powers effectively due to a limited representation and mandate within the Huasco River Basin. With the programme, JVRH has representation within the basin and was able to improve water distribution. This allowed effective management of available water during dry seasons and incorporation of new water uses in the basin such as energy generation and irrigation.

### The issue

#### Case background/context

The Huasco River flows through the Atacama Region of Chile, one of the driest places on Earth. Fed by Andean glaciers on the Chile-Argentina border, the Huasco River is formed at the confluence of the Del Carmen and Del Transito tributaries. Water sources include glaciers, springs and underground reservoirs beneath salt lakes. The river sustains agriculture (local and export), ecosystems (e.g. the Bofedales) and local flora and fauna (e.g. the Andean flamingo) so maintenance of the ecological flow is crucial.

To increase storage for irrigation, the Santa Juana Reservoir was built on the Huasco River in 1995 to store water for irrigation activities. However its construction has not been without controversy. Residents in the basin were concerned the Huasco River could suffer the same fate as the neighbouring Copiapó River, which has all but dried up as a result of mining and agricultural activities in the region.

Chilean Law considers freshwater resources as a public good, granting individuals use through water rights<sup>1</sup>. The Dirección de General de Aguas (DGA) is the regulatory body which grants users with a property title, designating the flow (as volume per time unit) to be extracted from a particular location (determined by coordinates) and a particular source. Within the same source – basin, canal, dam, or aquifer – water user associations (WUA) can be formed to manage and allocate water.

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<sup>1</sup> Water rights are protected as ownership and regulated as such in the Chilean Constitution.

Oversight Boards (Juntas de Vigilancia) are the biggest type of water users association and have the power to monitor and control extractions, suspend them, declare scarcity and reallocate and manage the resource according to their own statutes.<sup>2</sup> The Chilean law establishes a subsidiary distribution system for water users associations that allows its members to use the resource in proportion to their titles. However, it has usually been difficult for such kind of associations to exercise managerial powers effectively due to a limited representation and mandate within the same basin.

In the Huasco Basin, the 'Junta de Vigilancia del Río Huasco y sus afluentes' (JVRH) was created in 1908 as a canal association, i.e. a type of water user association focused on management of common works – a canal – with a focus on irrigation. JVRH did not have the means or the power to exercise managerial control over the basin, including the Santa Juana Reservoir. Consequently, JVRH saw there was an increasing need of an institutional reform and a changing vision that allowed it to link its water needs with stakeholders across sectors.

### The response

#### Objectives of the case

In 2004, a programme for capacity transfer and improvement of irrigation and resource management in the basin was created by the local government and the irrigation authority with the purpose of sharing benefits of the Reservoir Santa Juana. The programme was implemented by JVRH and lasted 24 months, with a capital of 155 million Chilean Pesos (roughly \$200,000).

The proposed requirements for implementation included:

- Strengthen water management within the basin through creation of one oversight management entity;
- Implement a volumetric distribution system for irrigation;
- Improve allocation and distribution of the irrigation system in place;
- Provide capacity building for management of water resources to the irrigation boards.

Through institutional reform, the former canal association, JVRH was transformed into an oversight board with expanded jurisdiction and representation. Currently, the JVRH has a variety of staff including lawyers, accountants, journalists, engineers and operators. The new JVRH covers the entire hydrographic basin of Huasco River and its tributaries. This includes from the glacial headwaters and mountain lakes to the river mouth at the Pacific Ocean. The basin also includes three reservoirs – Laguna Grande, Laguna Chica (joint capacity of 10.5 Mm<sup>3</sup>) and Santa Juana (166 Mm<sup>3</sup>) – and 315 canals of which 230 are organised as water user groups (who share a specific water body or structure).

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<sup>2</sup> Art 274 Water Code.

As the oversight board, the JVRH adopted a structure in which the executive powers were handed to a Board of Directors with nine members, who were nominated from each section of the basin based on proportional representation of users within the basin. Operational administration has been separated from financial administration.

A volumetric management system was put in place dividing the basin into four operational sections for distribution purposes. Three of these (the fourth does not have connection with the Santa Juana Reservoir) are managed under the volumetric management system, where available water resources in a year period are allocated based on:

- available water volume in a year ( $m^3$ /year);
- total stored volume (i.e. the reservoirs minus the stored volume from the last period) ; and
- generated volume (estimated) which excludes a strategic volume (to be stored for the next period).

Based on these volumes, the oversight board develops four scenarios from surplus to scarcity, enabling the administration to adapt allocation of water resources appropriately.

### The results

#### Outcomes

Through improved governance and capacity, JVRH was able to effectively manage available water, including during dry seasons and incorporation of new water uses in the basin such as energy generation and irrigation.

The design of a volumetric management system has allowed JVRH to measure available volumes that could be withdrawn in a year, as well as the energy potential and associated income from energy generation. The system includes 71 monitoring points distributed along the basin, covering 85% of water titles. These measures have enabled JVRH to manage and allocate available water during dry periods, securing the agricultural production. The irrigable area increased from 3,000 to 12,000 hectares, supporting high value export crops (table grapes) in the upstream portion of the basin.

In 2007 the management of the Santa Juana Reservoir was transferred from private ownership to JVRH, who established user allocation rules for each season based on water availability. A 'Water Fund' was established in cooperation with a mining company to improve agricultural and irrigation infrastructure. In addition, the board has received funds from State subsidies, compensation funds as well as bank loans.

Investments were made to optimise channel, irrigation and hydro-electric power infrastructure. By building a mini power plant at the foot of the dam, the Santa Juana Reservoir was also transformed into multipurpose water infrastructure for energy generation. The efficiency of the system allowed the implementation of a run-of-river hydropower plant (26.1 GW) that, when fully operative, is expected to bank \$7.7 million a year. The hydroelectric power plant was implemented through the creation of a filial company (Hidroelectrica Rio Huasco S.A.) and partially (75%) owned by the board.

### References

Interview with JVRH