



# Water Rights Arrangements in Australia and Overseas

## Annex J *Chile*

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# Abbreviations

CNR	<i>Comisión Nacional de Riego</i> , National Irrigation Commission
CONADI	<i>Corporación Nacional de Desarrollo Indígena</i> , National Corporation for Indigenous Development
CONAMA	<i>Comisión Nacional del Medio Ambiente</i> , National Commission for the Environment
COREMA	<i>Comisión Regional del Medio Ambiente</i> , Regional Commission for the Environment
CPA	<i>Catastro Publico de Aguas</i> , Public Water Cadastre <sup>1</sup>
DGA	<i>Dirección General de Aguas</i> , Directorate General of Water
DOH	<i>Dirección de Obras Hidráulica</i> , Directorate of Water Works
EFL 1994	<i>Ley de Bases del Medio Ambiente</i> , Environmental Framework Law 1994
ENDESA	National Electricity Company
MOP	<i>Ministerio de Obras Publicas</i> , Ministry of Public Works
NCE	<i>Comisión Nacional de Energía</i> , National Energy Commission
SISS	<i>Superintendencia de Servicios Sanitarios</i> , Superintendency of Sanitary Services
WC 1981	<i>Codigo de Aguas 1981</i> , Water Code 1981
WUA	Water user association

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<sup>1</sup> Cadastre – a registry of property, with details of boundaries and ownership.

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# Preface

*Water Rights Arrangements in Australia and Overseas* is a study that forms part of the Commission's program of benchmarking the performance of economic infrastructure industries. It continues previous work undertaken into the arrangements for setting drinking water quality standards. The study compares the legal, organisational and regulatory arrangements for managing water rights, against accepted best practice principles.

This annex is one of twelve case studies prepared to assist readers understand the complex legal, organisational and management arrangements of the jurisdictions studied. Case studies were prepared for the Murray–Darling Basin, NSW, Victoria, Queensland, South Australia, the ACT, the Colorado River Basin, California, Colorado, Chile, Mexico and South Africa. These case studies should be read in conjunction with the main report.

Research for the study and each of the annexes was undertaken by the Economic Infrastructure Branch, with Dr Neil Byron as mentoring Commissioner.

The Productivity Commission would like to thank the staff at the Directorate General of Water (DGA, Chile) for providing information on the activities of the organisation, and to staff at the Economic Commission for Latin America and the Caribbean (ECLAC, Santiago) for comments on an earlier draft. Further feedback from readers would also be welcome.

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# 1 The water sector

The Republic of Chile is a narrow mountainous country bordered by Peru, Bolivia and Argentina. Its geography varies from arid regions in the north to temperate forests in the south. Water is mostly sourced from rivers that run from the Andes to the sea, some of which cross national boundaries. Of Chile's hundreds of river basins, its principal rivers are the Aconcagua, Baker, Bío-Bío, Palena, Imperial, Loa Maipo, Maule, Toltén, and Valdivia. Its principal lakes are the Ranco, Del Toro, General Carrera, Llanquihue, Puyehue, Rupanco, Sarmiento and Villarrica.

Chile is organised into thirteen government administrative regions. Region I is the northernmost region and XII the southernmost. The metropolitan region (RM) comprises Santiago and its surrounding area (see figure 1.1). Government agencies, such as the Directorate General of Water, staff field offices in each of the regions.

Current use of water in Chile is equivalent to 2000 cubic metres per second (DGA 1999a).<sup>2</sup> The major users are hydroelectricity companies, irrigators and customers of water utilities. Hydroelectric companies are non-consumptive users of water and use two thirds (67.8 per cent) of the volumetric flow — generally in the upper portion of a basin. The middle part of a basin is used by farmers, towns and cities and recreational users.

Irrigation accounts for most (84.5 per cent or 546 cubic metres per second) of the consumptive use of water (Brehm and Castro 1995). Irrigation water supplies two million hectares, most of which are between the I and IX regions of Chile.

Domestic use of water accounts for 4.4 per cent (35 cubic metres per second) of total consumptive use. Water is reticulated to approximately 98 per cent of the urban population and to about 80 per cent of the concentrated rural population. Mining and industrial uses represent about 11 per cent of total consumptive use (DGA 1999a).

There are differences in the regional distribution of water used. In the northern I to III regions of Chile, water use is evenly distributed between domestic, mining and

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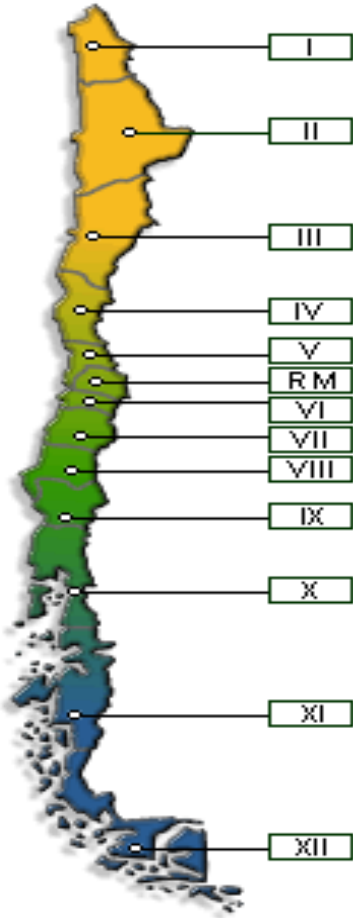
<sup>2</sup> 'Cubic metres per second' is a rate of flow measure and is used to measure low, average and peak flow capacities of pipelines and river channels.

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industrial and irrigation purposes. In the IV, V and RM regions, urban water utilities use most of the volumetric flows. In the VI to IX regions, irrigators use most of the volumetric flows, though hydroelectricity companies are major non-consumptive users of volumetric flows in the VII and VIII regions. Finally, in the southern X and XII regions, consumptive use is small. (DGA 1999a).

Figure 1.1 **Government administrative regions of Chile, 2003**

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Source: CONAMA (undated(a))

Per capita consumption is comparatively high and is on average 650 cubic metres per second, though it ranges from 500 to 1000 cubic metres per second, depending on the region (DGA 1999b).



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The key environmental concerns raised in relation to water include the:

- Contamination of water by domestic water users, largely due to the lack of waste water treatment plants. Untreated domestic sewage remains the most significant source of pollution.<sup>3</sup>
- Discharge of mine tailings and industrial effluents. Industrial effluents tend to be discharged into domestic sewerage systems. Point source discharges are particularly important in the northern I and VI regions, where available dilution flows are limited.
- Non-point agricultural contamination of surface and groundwater. Irrigation salinity (resulting from artificial recharge of groundwater), and the contamination of surface water (through the discharge of fertilisers, particularly nitrates and pesticides) are major concerns. Groundwater has also been increasingly contaminated, where nitrates and pesticides (such as organochlorides) are increasingly being detected (DGA 1999a).

The provision of environmental flows in Chile is important for providing water for environmental demands (such as maintaining volumes in rivers and lakes, to protect ecosystems and associated landscape and tourist values) and to act as dilution flows for certain pollutants (DGA 1999a).

The consumption of water has the potential to dry natural waterways and wetlands in the regions I to VIII. Non-consumptive uses interfere with natural flow regimes. Environmental flows (ecological volumes<sup>4</sup>) have been set aside in those waterways in the VIII and IX regions in the south that have not been fully allocated to consumptive uses or in waterways where non-consumptive use is dominant.

Finally, a number of watercourses cross international boundaries, such as those in the I and II regions. Conflicts over water use have arisen with Bolivia in particular. In one instance, Chile claims that the watercourse is a river and Bolivia claims it is an artificial channel. There is currently no international agreement for the management of international waters (Fernández and Medina 2000).

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<sup>3</sup> This however, is being addressed through a major investment program to construct new waste water treatment facilities (ECLAC, pers. comm., 12 August 2003).

<sup>4</sup> *Caudal ecológico*

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## 2 Legal framework

### 2.1 Evolution of water law

Chile's *Water Code 1981* (WC 1981) operates within a civil or Roman legal system inherited from colonial Spanish Law. According to the Roman legal system, laws are constituted by the legislative and executive branches of government and there is a distinction between public law (between the individual and the state) and private law (between individuals). Judicial decisions do not create binding precedents (Mentor 2001).

Under Roman law, water was regarded as common property (*res communes*<sup>5</sup>), and like English common law, access was available to all with lawful access to the watercourse or lake. The right to access water in colonial Spanish law was reflected in the principle of appurtenance (Bauer 1997; UNESCO 1996). The title to an intangible asset, such as a usufructuary right, must be annexed to a tangible asset such as land (Rutherford and Bone 1993). Water rights could not be transferred separately from land.

The 1855 Civil Code formerly codified water as a 'National Good for Public Use'. The code allowed the state to grant access licences to private parties for the exclusive use of public waters. The licences were governed by public administrative law and could be revoked or modified without compensation (Mentor 2001).

The first Chilean Water Code was promulgated in 1951. It distinguished between public and private property of water and allowed the state to grant concessions to private parties. Concessions were temporary but any attempt by the state to reclaim concessions before their expiry date was subject to compensation. Concessions were separable from land title, and could be transferred — provided their use did not change. Access to water was prioritised in favour of drinking, then irrigation and then industrial (Brehm and Castro 1995).

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<sup>5</sup> As expressed in the Institutes of Justinian.

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The 1967 Water Code was part of a wider Agrarian Reform aimed at redistributing land to expand the class of small landholders and to modernise agriculture. In the Constitution, water rights were also declared to be a National Good for Public Use.

Under the 1967 Water Code, the Government had the power to adopt measures to ensure the efficient and beneficial use of water by public and private users. The President of the Republic could:

- establish water use rationalisation in certain areas in order to redistribute the available resources;
- secure reserves of water for specific uses;
- establish permissible rates of use for beneficial and efficient use of water;
- allocate water to various priorities — drinking, agriculture, industry for example; and
- revoke rights when they were not being exercised (Muñoz 1991).

Under the 1967 Water Code, the government was able to plan the use of water to reconcile the national interest with the interests of private users. The government could grant concessions to private parties but could expropriate them without compensation. Concessions for water could not be sold or transferred among private parties (Brehm and Castro 1995).

## 2.1 Current legislative framework

The key legislative instruments guiding water resource policy in Chile are the Constitution, the *Water Code 1981* (WC 1981), the *Environmental Framework Law 1994* (EFL 1994), the National Water Resources Policy, *Law No. 19,243* (creating the National Corporation for Indigenous Development), and the *Irrigation Law for Minor Works 1981* and the *Irrigation Law for Major Works 1985*.

### Constitution

Under the current Constitution, water is defined as a ‘National Good of Public Use’ — considering that it is essential for life, economic development, social objectives and environmental requirements (DGA 1999a). The state has a trustee’s role to regulate water use in a manner that beneficially meets these objectives.

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Water rights<sup>6</sup> may be constituted (granted) to individuals to enjoy the use of the resource. The holder of a water right is legally entitled to use, enjoy and hold the right as if it were a privately appropriated good. A holder enjoys the same legal protection as the owner of a private good (DGA 1999a).

Neither water quality nor environmental uses of water are mentioned in the Constitution. Article 8 provides that every citizen has a right to live in an environment free of contamination, and Article 19.8 provides for the government to regulate activities to control pollution:

The law will be able to establish specific restrictions to the exercise of determined right or liberties to protect the environment.

The Constitution grants ‘...in a wide variety of situations for people to request immediate judicial review of alleged violations of their rights’ (Bauer 1998). Resource protection orders<sup>7</sup> are appeals filed with regional appellate courts and are analogous to ‘injunctive orders’ in the United States. They are intended to remedy an immediate wrong though not as a substitute for a review of civil procedures (Bauer 1998).

Resource protection orders have proved a popular mechanism in Chile for temporarily protecting the environment. They are replacing many of the slower, declarative procedures of the lower courts — although there has yet to emerge a unifying doctrine (Bauer 1998).

### **Water Code 1981**

The *Water Code*<sup>8</sup> 1981 (WC 1981) is the principal legislation governing water resources management. It sets out the categories and characteristics of the different types of rights, and the processes administering those rights. It also defines the institutional arrangements. It gives the Directorate General of Water<sup>9</sup> (DGA) the responsibility for developing water policy and for managing water rights and monitoring the activities of water user associations (WUAs). WUAs are responsible for managing distribution infrastructure, mediating disputes between their members, and for monitoring and enforcing water rights in their areas. Courts are responsible for mediating disputes between water right-holders after mediations within WUAs have failed.

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<sup>6</sup> *Derechos de aprovechamiento*

<sup>7</sup> *Recurso de protección*

<sup>8</sup> *Código de Aguas*

<sup>9</sup> *Dirección General de Aguas*

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## ***Environmental Framework Law 1994***

The *Environmental Framework Law 1994*<sup>10</sup> (EFL 1994) provides a general framework for environmental protection and is intended to serve as the basis for additional laws and regulations to be developed on specific environmental issues.

The law protects the environment by:

- identifying a range of activities that cannot be undertaken without government approval;
- providing for the protection of wildlife and wildlife protection areas that cannot be exploited without government approval;
- requiring the preparation and submission of environmental impact statements (or environmental declarations) for obtaining government approval for the above activities;
- requiring ministries to develop environmental quality standards, such as emission and quality standards;
- providing for the development of management, prevention and contamination plans for the use and development of natural resources;
- establishing the basis for imposing sanctions and penalties for environmental damage; and
- establishing the National Commission for the Environment (EFL 1994, Art. 11).

The EFL 1994 impacts upon water resource management in several ways. The law:

- requires the National Commission for the Environment<sup>11</sup> (CONAMA) and its regional offices to develop environmental quality standards (EFL 1994, Art. 13);
- provides for the creation of system of national parks and wildlife reserves — including marine reserves — whose objective is to protect biological diversity, nature and the national patrimony<sup>12</sup> (EFL 1994, Art. 34);
- requires CONAMA to classify wild species (flora and fauna) into categories of — extinct, at risk of extinction, vulnerable, rare, for which there is little information, or relatively abundant (EFL 1994, Art. 37); and
- requires the DGA to manage water resources and the environment in a manner that maintains the volume of surface and groundwater, maintains landscape

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<sup>10</sup> *Ley de Bases del Medio Ambiente, Ley No. 19,300, publicado en el Diario Oficial del 9 Marzo 1994.*

<sup>11</sup> *Comisión Nacional del Medio Ambiente*

<sup>12</sup> *Patrimony — Property inherited from fathers or ancestors.*

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values, and protects species which are under threat of extinction, vulnerable, rare or insufficiently known (EFL 1994, Arts. 41, 42).

## **National Water Resources Policy**

The National Water Resources Policy 1999 was prepared to address some of the concerns arising from the failure of existing legislation and regulation to efficiently allocate and protect water resources (DGA 1999b). A number of areas of reform were identified.

First, the policy identified a need to allocate water rights more efficiently. It was observed that non-consumptive rights were being hoarded by incumbent hydroelectric companies and were not available to new non-consumptive water users. It was also observed that timing of non-consumptive water flows did not suit the need of either the environment or other consumptive users. The policy recommended that:

- A fee be paid on all water rights possessed but not used. This is to discourage hoarding of non-consumptive rights.
- Applicants for water rights be required to state the use for which water will be used; and
- The state be authorised to deny application for application of new rights when public property exists (DGA 1999b).

Second, the policy identified a need to manage conjunctively surface and ground water, and to better coordinate the activities of government agencies managing water resources, water quality, environment protection, and water infrastructure investments. The policy also identified a lack of coordination between monitoring committees in distributing water along a river — including lack of coordination between consumptive and non-consumptive uses of water.

The policy recommended that river basin-level water resource committees<sup>13</sup> be created to coordinate the development of policies. These committees would comprise government representatives and water users and would be responsible for developing and implementing planning guidelines (DGA 1999b).

Third, the policy identified that the environment was not being adequately protected. The policy recommended, among other things, that the EFL 1994 be fully implemented (especially in setting environmental emission standards) and that the provisions in the WC 1981 be strengthened to guarantee that minimum

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<sup>13</sup> *Comité de Recursos Hídricos.*

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environmental flows (ecological volumes) are respected when constituting new rights (DGA 1999b).

Fourth, the policy observed that, despite efforts to subsidise the construction of modern irrigation infrastructure (under the *Law of Irrigation Promotion*) and the increase in water trading, water use efficiency was still low. The policy recommended that, among other things, the efficiency of water delivery services be improved.

The National Water Resources Policy identified that high transaction costs, resulting from the lack of information regarding the water rights on issue, were impeding the efficacy of water trading (DGA 1999a; Lee and Jouravlev 1998). The policy recommended that traditional water rights continue to be regularised and that the Public Water Cadastre be established (DGA 1999b).

Fifth, the policy identified that many WUAs remained unregistered and consequently unregulated. Many lacked the technical and administrative expertise to fulfil their necessary tasks. The policy recommended that outstanding WUAs be registered and that their capabilities be strengthened through a process of accreditation (DGA 1999b).

Sixth, the policy identified that there was a lack of information available as to the water flows, water quality, levels of extraction and return by users. This lack of understanding of the hydrological resources impaired effective decision making. It has also increased the transaction costs associated with administering water rights. Consequently, the policy recommended that information systems be modernised.

Finally, the policy found that the public and water users did not display adequate understanding of the water culture. This lack of understanding extended to public services, courts of justice, water user organisations, companies, consultants and non-government organisations. It recommended *inter alia* that the education system include in its curriculum, subjects on water to encourage a more active and informed participation by the public (DGA 1999b).

### **Law Number 19,253**

In 1993, the Chilean legislature promulgated a law creating the National Corporation for Indigenous Development (CONADI).<sup>14</sup> The corporation is responsible for promoting, coordinating and implementing development programs

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<sup>14</sup> *Corporación Nacional de Desarrollo Indígena*

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for indigenous communities. This responsibility also includes legally representing indigenous communities in disputes over ownership and access to land and water.

The law creates a fund for the purpose of financing the application for water rights, regularising traditional water use, purchasing water rights and financing of works (Dourojeanni and Jouravlev 1999). CONADI is also required to establish an agreement with the DGA for the protection, establishment, and re-establishment of water rights for use on ancestral lands. This would involve:

- Constituting new water rights that would be considered to be the property of the indigenous community. Such rights cannot be constituted by the DGA from existing enrolled water rights.
- Prohibiting the constitution of new water rights to lakes, pools, slopes, rivers and aquifers if water could not be continued to be supplied to indigenous communities (Dourojeanni and Jouravlev 1999).

## **Irrigation laws**

The *Irrigation Law for Major Works* (1981)<sup>15</sup> allows the state to subsidise the construction of major water development projects — such as storages and inter-basin channels (Brehm and Castro 1995). Individual water users may organise and petition the government for the development of the final design and the terms of reference for the project. The beneficiaries of the project must represent at least one-third of the land or water rights in the project's area. A majority vote (in terms of the newly acquired water rights) is necessary and an agreement from the beneficiaries to repay the loan as under agreed terms and conditions is required (Brehm and Castro 1995).

The *Irrigation Law for Minor Works* (1985)<sup>16</sup> provides for the subsidisation of private investments to construct and improve infrastructure (Brehm and Castro 1995). The National Irrigation Commission subsidises the costs, such as design, construction and equipment for constructing minor works and improving existing infrastructure not exceeding an investment of approximately US\$690 000.

Generally, the National Irrigation Commission will subsidise up to 75 per cent of the cost of construction and maintenance of water-related infrastructure for small to medium-sized agricultural enterprises. Its activities are primarily concentrated in the southern regions of Chile (CNR undated(b)). On average, the subsidy amounted

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<sup>15</sup> *Ley de Fomento al Riego, No. 1,123 of 1981*

<sup>16</sup> *Ley de Fomento a Obras Menores de Riego No. 18,450 of 1985*



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between 51 and 61 per cent of the total costs of the irrigation (Brehm and Castro 1995).

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## 3 Organisations

The key government institutions in Chile are:

- Directorate General of Water (DGA) — responsible for regulating the extraction of water from natural waterways and water bodies, through the issue of water rights, approving the construction of water works, wells, transfers of rights, and for maintaining environmental flows. The agency is also responsible for the collection of water-related information through the National Hydrometric Service.<sup>17</sup>
- Directorate of Water Works<sup>18</sup> (DOH) — responsible for promoting and assisting the construction and maintenance of major water supply (including irrigation) and drainage infrastructure, through planning and provision of grants.
- National Commission of the Environment<sup>19</sup> (CONAMA) — responsible for protecting and conserving the environment through the setting of environmental quality standards and the enforcement of environmental impact assessments.
- Superintendency of Sanitary Services<sup>20</sup> (SISS) — responsible for the economic regulation of the delivery of drinking water and waste water treatment sector. It is also responsible for regulating the discharges of polluted water into the sewage network.
- National Irrigation Commission<sup>21</sup> (CNR) — responsible for promoting and assisting the construction of smaller private irrigation infrastructure (DGA 1999a; see figure 3.1).

As mentioned earlier, WUAs are responsible for managing water distribution infrastructure, monitoring and enforcing water rights in their area, and for mediating disputes between their water using members.

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<sup>17</sup> *Servicio Hidrométrico Nacional*

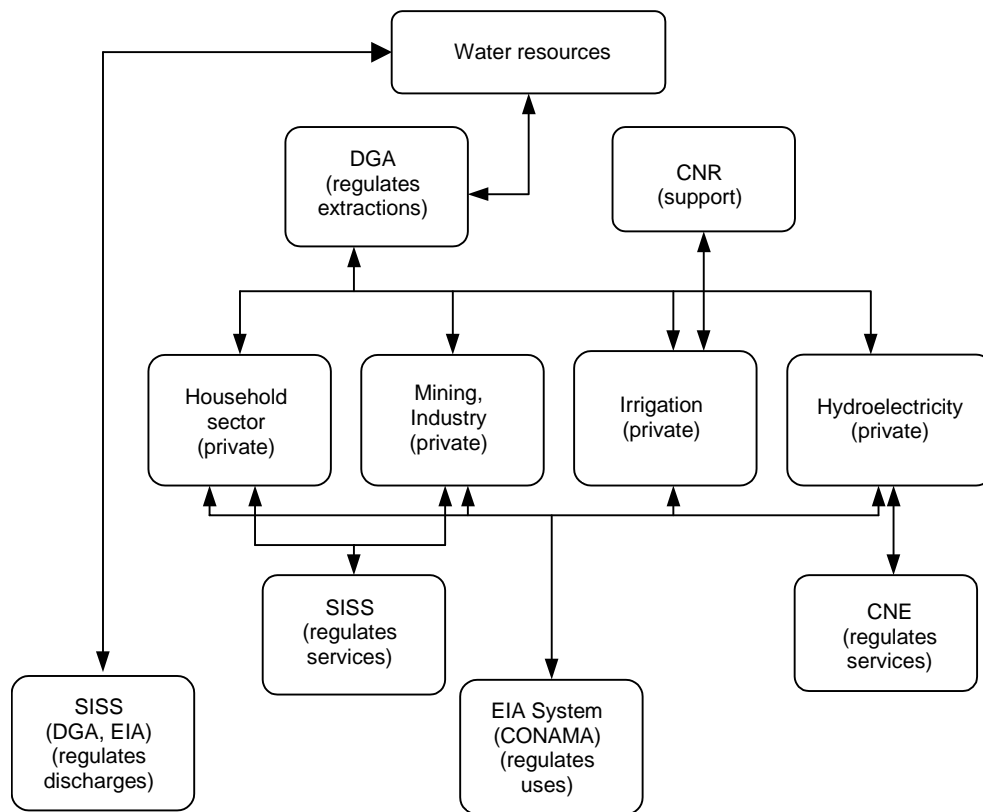
<sup>18</sup> *Dirección de Obras Hidráulicas*

<sup>19</sup> *Comisión Nacional del Medio Ambiente*

<sup>20</sup> *Superintendencia de Servicios Sanitarios*

<sup>21</sup> *Comisión Nacional de Riego*

Figure 3.1 Overview of Chilean institutional arrangements, 1999



Source: DGA (1999a)

### 3.1 Directorate General of Water

The DGA, within the Ministry of Public Works<sup>22</sup> (MOP), is responsible for developing water policy, administering the WC 1981 and providing information for government and private decision-making. In its policy development role, the DGA is responsible for coordinating the development of the National Water Resources Policy<sup>23</sup> and the policy's planning guidelines.<sup>24</sup>

More specifically, the role of the DGA includes:

- constituting, administering, monitoring and enforcing water rights;
- permitting, monitoring and enforcing the operation of water works and modifications to natural waterways;

<sup>22</sup> *Ministerio de Obras Publica*

<sup>23</sup> *Política Nacional de Recursos Hídricos*

<sup>24</sup> *Planes Directores*

- 
- registering and monitoring WUAs, including monitoring committees<sup>25</sup>; and
  - through its National Hydrometric Service, monitoring water resources (WC 1981; DGA undated(a)).

## Public Water Cadastre

The DGA is required to establish a Public Water Cadastre<sup>26</sup> (CPA) that contains ‘all the information relating to water. The cadastre is to constitute archives, registries and inventories that are required by regulation, and to contain all the data, acts and antecedents that relate to the resource, water works, water rights, and the rights of the water rights and of the constructed water works’ (WC 1981, Art. 122).

The DGA is to use the CPA to plan, administer and manage water resources, and for the application to other areas of public policy. The CPA comprises five registries, seven inventories and two archives, which cover:

- applications for water rights, and other applications made to the DGA;
- water rights constituted by the DGA or recognised by the courts;
- authorised water extractions from surface and ground water sources;
- effective (actual) water extractions from surface and ground water sources;
- major and minor water works and standards for their operation;
- administrative decisions and water quality standards;
- water quality in natural waterways;
- sources of domestic and industrial liquid dischargers into natural water sources;
- main legal and administrative features of WUAs;
- provisional roles of water users;
- river basins, glaciers and lakes;
- hydrological and meteorological information;
- state-owned water works and water reserves; and
- other studies and technical information.

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<sup>25</sup> *Juntas de vigilancia*

<sup>26</sup> *Catastro Público de Aguas*

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## 3.2 Directorate of Water Works

The Directorate of Water Works (DOH) is a government agency located within the Ministry of Public Works (MOP). Its functions are set out in a variety of laws, including the Irrigation Law for Major Works 1985.

The mission of DOH is to encourage the development of water infrastructure, which in the context of the integrated management of river basins, supports the efficient use of the resources available, in benefit of the development of the community (MOP undated(a)).

The objectives of the organisation are to

- to improve the quality of life of the urban and rural population, through the development of water infrastructure; and
- to give the population access to water, in a timely manner and in the necessary volume and quality (MOP undated(a)).

Its functions are to:

- study, construct, repair and operate irrigation infrastructure, using public funds in accordance with the Irrigation Law for Major Works 1985;
- finance the cleaning and recovery of land, using public funds;
- study, project, construct and maintain the course of irrigation channels located in town suburbs, using the funds or contributions of the respective municipalities; and
- totally or partially minimise the costs incurred in the cleaning and recovery of native lands, in accordance with the founding Supreme Decree (MOP undated(a)).

Under Law No. 19,525 of 1997, DOH is also responsible for:

- Developing plans, which define what constitutes a primary stormwater drainage network. These plans will be approved by Ministers of Public Works; Housing; and Urban Development.
- Planning, studying, constructing, repairing, maintaining and improving the primary stormwater drainage infrastructure;
- As part of these plans, consider the needs of river basins, including the need to avoid the effects of erosion and deforestation (MOP undated(a)).

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### 3.3 National Commission for the Environment

The National Commission for the Environment (CONAMA) is responsible for administering the EFL 1994. CONAMA comprises a Policy Council, executive director, Consultative Council and a regional commission in each of Chile's regions.

The Policy Council<sup>27</sup> comprises the Minister General–Secretary of the Presidency (who occupies the title of President of the National Commission of the Environment), and the Ministers of: the Economy; Promotion and Reconstruction; Public Works; National Goods; Agriculture; Health; Mining; Housing and Urban Development; Transport and Telecommunications; and Planning and Cooperation.

The Policy Council is responsible for approving environmental priorities, policies and regulations, overseeing the coordination of environmental policies between ministries, overseeing the implementation of the CONAMA's policies and approving the financing of environmental protection projects and activities (EFL 1994, Art. 72).

The Executive Director of CONAMA is an appointee of the President of the Republic. The executive director is the legal representative of CONAMA (EFL 1994, Art. 75). The executive director is responsible for developing and proposing policies, work programs, budgets to the Policy Council, and implementing the policies, agreements and the Environmental Protection Fund of the council (EFL 1994, Art. 76).

The Consultative Council<sup>28</sup>, headed by the executive director, is responsible for undertaking public consultations in the setting of environmental standards and regulations on behalf of the Policy Council (EFL 1994, Art. 79). The Consultative Council is comprised of scientists, not-for-profit environmental advocacy representatives, environmental academic experts, union representatives, and a representative of the President of the Republic (EFL 1994, Art. 78)

#### Regional Offices

CONAMA is required to maintain regional offices (commissions) throughout Chile (EFL 1994, Art. 80). Each regional commission, or COREMA<sup>29</sup>, is headed by a regional director and is governed by a policy council. Each policy council

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<sup>27</sup> *Consejo Directivo*

<sup>28</sup> *Consejo Consultivo*

<sup>29</sup> *Comisión Regionale del Medio Ambiente*

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comprises the intendant (‘supervisor’) of the region, the governors of the region, the ministerial regional secretaries, four regional advisors appointed by the policy council, and the director of the COREMA.

Each COREMA also has its own consultative council (EFL 1994, Art. 82). Members are appointed for two-year terms by the intendant of the region. The role of the regional director is similar to that of the executive director, with respect to that region.

### **3.4 Superintendency of Sanitary Services**

The Superintendency of Sanitary Services (SISS) was established by Law No. 18,902 in 1990, and was restructured in 1998 under Law No. 19,821. SISS reports to the President of the Republic through MOP. The Superintendent is appointed by the President, although it is funded by the Ministry of Property (SISS undated(a)).

SISS is principally a regulatory agency. It has responsibility for:

- regulating prices and service quality of the potable water and sewage companies;
- regulating the discharge of liquid wastes into the ocean, water bodies, sewage networks and groundwater aquifers by potable water, mining and industrial companies; and
- setting drinking water and sewage system charges for customers served by the potable water companies (Lee 2000; Hearne and Easter 1995; SISS undated(a)).

The regulation of discharges is subject to the water quality standards set by CONAMA (SISS undated(a)).

### **3.5 National Irrigation Commission**

The National Irrigation Commission (CNR) is an agency within the Ministry of Agriculture. It is responsible for formulating and implementing the National Irrigation Policy for the ‘optimum use of the country’s water resources with an emphasis on irrigation and drainage’ (CNR undated(a)).

The role of the CNR are to:

- contribute to the formulation of the National Irrigation Policy;
- improve the efficiency of the irrigation through of development projects and productive transformation;

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- focus the efforts towards the development in the more distant regions of the country and for groups of vulnerable producers;
  - encourage investment of private irrigation infrastructure through coordinating investment decisions and provision of subsidies, in accordance with the Irrigation Law for Minor Works; and
  - evaluate the technical and economic feasibility of investments in irrigation works in the hydrographic river basins of the country (CNR undated(a)).

The CNR comprises the Minister for Agriculture (President of the Commission) and the Ministers of: Economy, Promotion and Public Reconstruction; Public Works, Planning and Cooperation, and Property (CNR undated(a)).

The CNR is supported by an executive secretariat<sup>30</sup> which is responsible for developing policies and implementing them. The CNR is supported by MOP and other areas of the Ministry of Agriculture. Many of the activities of the CNR are delegated to its thirteen regional offices (CNR undated(a)).

### **3.6 Water user associations**

The distribution of water is managed in Chile by 4000 legally constituted WUAs. WUAs are responsible for the wholesale taking of water from surface and groundwater sources and reticulating it to their members (WC 1981, Art. 186).

Most irrigation and drainage works, including dams and reservoirs, are owned and administered by WUAs (UNESCO 1994). There are three types of WUAs: water communities,<sup>31</sup> canal associations<sup>32</sup> and monitoring committees (Fernández and Medina 2000).<sup>33</sup> Other groups include drainage communities.

#### **Water communities**

Water communities comprise individual water users who share a common source of water. Water communities are responsible for secondary infrastructure such as distribution channels (Brehm and Castro 1995, Hearne and Easter 1995).

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<sup>30</sup> *Secretaría Ejecutiva*

<sup>31</sup> *Comunidades de aguas.*

<sup>32</sup> *Asociaciones de canalistas*

<sup>33</sup> *Juntas de vigilancia*



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Water communities are created through an application to a judge (WC 1981). They are represented by a board of directors whose responsibilities include:

- maintaining an account of water rights of its members;
- operating, constructing and repairing water related infrastructure for the distribution of water to members;
- monitoring and enforcing the taking of water from a channel by its members;
- collecting fees to maintain and construct water related infrastructure, and to prevent supply in case of default;
- providing extension programs to the community; and
- monitoring the taking of water by its members and require action by monitoring committees for the unlawful taking of water (WC 1981).

Water communities are also governed by a general assembly of right-holders. The general assembly is responsible for:

- electing the board;
- deciding on the budget;
- naming the external auditors for financial accounting purposes; and
- fixing sanctions on defaulters (WC 1981).

In general, the access to water by a water community is governed by the water rights held by its members (WC 1981, Art. 193). Voting rights and fees are proportional to the volume of rights held by the community's members.

Water communities are listed in the registry of the DGA and the Real Estate Titles Office (WC 1981).

### **Canal associations**

Water user associations are also responsible for managing major irrigation channels, primary infrastructure such as dams and main irrigation channels. In this role, they are frequently referred to as canal associations (Brehm and Castro 1995, Hearne and Easter 1995).

Canal associations have the same legal standing and are created in the same way as water communities. As with water communities, canal associations can hold water rights. Distribution of water to water communities (and irrigators) are governed by the proportion of water rights held by each water community (and irrigator).

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In addition, the canal associations have the authority to settle disputes between their members and to undertake infrastructure works. These organisations also comprise a general assembly of members, board of directors and president of the board.

## **Monitoring committees**

Monitoring committees comprise all users and user associations on a common stretch of river. The committees are essentially federations of canal associations that take water from the same river. They were formalised in 1951 but have existed since the nineteenth century (Dourojeanni and Jouravlev 1999).

As with other WUAs, monitoring committees are non-profit associations. They comprise a general assembly of members, board of directors and a president of the board (WC 1981). Monitoring committees can levy member associations and users and are self-financing (Puig undated).

The roles of monitoring committees are to:

- maintain water accounts and to distribute water to users, canal associations and water communities;
- reduce the flow in the canals during times of scarcity;
- monitor and enforce the taking of water and the suitability of water works employed by water users, communities and associations;
- resolve disputes between water users;
- keep systematic records of the flows in their channels;
- be accountable to the DGA for the construction of water works (intended to divert water to users) in channels of public use; and
- ask the DGA for declaration of exhaustion of the resource in its jurisdiction (WC 1981; Puig undated).

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## 3.7 Other government bodies

Other government bodies have a role in the management of water resources. These include:

- the Ministry of Health retains responsibility for setting standards for waste water discharge when public health is at risk (SISS undated(a)).
- the National Economic Office is responsible for the prevention of anti-competitive behaviour (Manzetti 1997).
- the Real Estate Titles Office,<sup>34</sup> of each township.
- the National Energy Commission<sup>35</sup> (CNE), which is responsible for prices and service quality of hydroelectric energy providers.

### Real Estate Titles Office

A registry of water rights is maintained by the Real Estate Titles Office in each township. All water rights must be included in the registry and new rights are only perfected (gain the status of property) once they are registered (WC 1981, Art. 112, 113).

The original registration of a water right records:

- the name of the owner of the water right;
- the location of the natural waterway and the associated water works for taking that water, and in the case of groundwater, the location of the well;
- the location of the source from which the water is sourced;
- if the water right is held by a WUA, the title of the association; and
- if the water right is held by a WUA, the form in which these rights are divided between the association's members (WC 1981, Art. 119).

The Real Estate Titles Office must also contain a registry of all the mortgages, burdens, interdictions and prohibitions on water rights. This must contain all the legal interests (such as mortgages and contracts) as well as impediments and prohibitions to the free exercise of water rights (WC 1981, Art. 116).

The Real Estate Titles Office must also register:

- the constituent titles of WUAs;

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<sup>34</sup> *Registro de Propiedad del Conservador de Bienes Raices*

<sup>35</sup> *Comisión Nacional de Energía*

- 
- any agreements and resolutions (such as articles of association) made before ordinary courts of justice creating WUAs;
  - any documents that require distribution of water to submit to articles of association of the relevant WUA (for example, water supply contracts);
  - the formal written notification granting the water right to the association; and
  - any judicial resolutions that recognise the existence of a water right (WC 1981, Art. 114).

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## 4 Defining water rights

### 4.1 Coverage

The WC 1981 covers all terrestrial waters in Chile. Surface and ground waters are administered and distributed separately, with no formal allowance for the impact of one on the other (Brehm and Castro 1995; Mentor 2001; Dourojeanni and Jouravlev 1999; Fernández and Medina 2000).

The WC 1981 (Art. 62) provides for surface water users to object to applications for groundwater. For example, the WUA of the Elqui River opposed the DGA's decision to allocate rights on groundwater resources, because of the potential impact on the surface water flow and particularly on return flows — but without success (Brehm and Castro 1995).

However, this provision has been difficult to apply. The DGA has had difficulty determining the exact surface and groundwater relationships (Brehm and Castro 1995).

The extraction of groundwater by miners is governed by relevant mining legislation. Mining to extract minerals also confers a right to extract water (WC 1981, Art. 56).

Anyone has a right to establish a well to access groundwater for drinking and domestic purposes (WC 1981, Art. 56). Where this adversely affects the enjoyment of other well users, the well may be required to be closed.

Landholders may take any water landing as rain or running over their land without application for a water right, provided that the taking does not injure third parties (WC 1981, Art. 10).

### 4.2 Specification

Water rights are rights to use water and the benefits of that use. Water rights are principally divided into consumptive and non-consumptive categories. Each category can be defined in turn as permanent or eventual, and continuous, non-continuous or alternate (Dourojeanni and Jouravlev 1999). Each allocated right

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is expressed in all three dimensions. For example, a hydroelectric company might hold permanent continuous non-consumptive water rights, and a farmer might hold eventual alternative consumptive water rights. Water rights are not specified in terms of the purpose to which water is to be used. The holder has the right to apply (or not apply) the water to any use.

### **Year-to-year variability**

Consumptive water rights are full diversion rights. Non-consumptive rights require holders to return in full all diverted water at some point to the channel (WC 1981, Art. 13–14).

Permanent rights are a higher priority than eventual rights and must be fulfilled before any water is assigned to eventual water rights (WC 1981, Art. 17 and 18). The DGA will only issue new permanent rights if it is confident that the right can be fulfilled 85 years in any 100 years.

Eventual water rights have less than 85 per cent reliability (DGA 2002; Hearne and Easter 1995). Eventual water rights do not apply to lakes or stored water (WC 1981, Art. 18).

All rights are required under legislation to be specified in volumetric terms (such as litres or cubic metres per second) (WC 1981, Art. 7). However, given traditional practice and the relative uncertainty of water, WUAs have expressed these rights as a share of the available resource (Bauer 1997).

Continuous rights permit water use all day, whereas discontinuous rights permit the use of water for only certain periods of the day (WC 1981, Art. 19). Alternate rights involve two or more rights holders who use the water right in alternate succession (WC 1981 Art. 19).

### **Environmental management and enforceability**

Water rights are permanently vested to individuals under the WC 1981 and the Constitution. They are governed by private (civil) law rather than public (administrative) law. They are protected as private property and cannot be expropriated without compensation (WC 1981, Art. 5–6; Bauer 1997; Bauer 1998). Re-allocation of water rights for the environment is only achieved through market mechanisms.

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### 4.3 Record of title

There are three sources of information about water rights, the:

- Real Estate Titles Office of the local town;
- DGA's Public Water Cadastre; and
- records of the WUAs (Bauer 1997).

The DGA is responsible for issuing new water rights and maintains a record of rights issued. In addition, under the WC 1981, a water right is only legally perfected<sup>36</sup> once it is registered in the Real Estate Titles Office. Consequently, a record of new water rights must be maintained in the Real Estate Titles Office.

The DGA is also responsible for registering and maintaining an inventory of 'traditional' uses of water — water users who had rights constituted under earlier legislation or who had customary use of water. This process is referred to as 'regularisation'. Under the WC 1981 regularisation does not confer a legal title to water — although the DGA frequently recognises these as rights (Hearne and Easter 1995). Under the WC 1981, only a court has the authority for legalising traditional water uses. In addition, the newly established right must be registered with the Real Estate Titles Office for it to be perfected.

In the 1990s, it was estimated that 50 to 65 per cent all water rights were traditional rights, including both surface and groundwater rights. These rights lack a corresponding property title (Brehm and Castro 1995). Consequently, neither the DGA's records nor the Real Estate Titles Office contain up-to-date records of water rights. In addition, the records of the Real Estate Titles Offices are held in respective townships and no national or provincial database has been compiled (Bauer 1997).

Though traditional rights cannot be bought, sold or mortgaged separately from land, in practice, courts have recognised changes in ownership (Bauer 1997). Moreover, the courts have ruled that failure to register a water right with the Real Estate Titles Office does not constitute a loss of ownership.

The internal records of the WUAs provide the most up-to-date records of their members. However, these records do not count as evidence of title (Bauer 1997).

The management of transfers of rights has also limited the reliability of water rights registries. As described in chapter 7, the DGA is not required to approve all

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<sup>36</sup> Gains the legal status of property, without restrictions or conditions.

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transfers — and so changes in ownership will not necessarily be reflected in the records of the DGA.

## 4.4 Duration

All water rights are perpetual. Unlike the water rights of the western United States, specified under the Prior Appropriation Doctrine, there is no beneficial use and no ‘use-it or lose-it’ requirement. Consequently, there is no obligation to exercise the right. Water rights may remain unexercised without the loss of right (Muñoz 1991).

## 4.5 Exclusivity

Water rights in Chile offer protection to third parties in several areas. These include the:

- provision of ecological volumes;
- management of return flows; and
- provision of obligations of water right-holders.

### Ecological volumes

The DGA is required to determine minimum ecological volumes for each river and sustainable recharge rates for each aquifer. However, many rivers have been fully allocated to consumptive users and there is insufficient water for ecological volumes (Dourojeanni and Jouravlev 1999). Minimum volumes and sustainable recharge rates can assist the DGA to protect the environment by:

- requiring applications for new water rights to be tested as to whether they will injure existing ecological volumes;
- approving any changes to river intakes (such as those that result from a transfer of a water right); and
- restricting the right to withdraw groundwater from over-exploited aquifers (Hearne and Easter 1995).

### Return flows

Water draining from private land following its use is presumed to be abandoned (WC 1981, Art. 43). Where it spills into adjoining private land, it can be employed without subsequent application for a water right (WC 1981 1981, Art. 44).



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Return flows are used by all water users, including permanent and eventual water right-holders. It is estimated that nearly 70 per cent of water users depend on return flows. Such water use does not create a burden on upstream water right-holders (WC 1981, Art. 54). Improvements in water use efficiency or transfers of water rights upstream can reduce the volume of water available to downstream users (Dourojeanni and Jouravlev 1999).

Water users can apply for a water right if the waters enter a natural channel (Dourojeanni and Jouravlev 1999). Such a right would be an eventual right, which would require the registration of the title with the relevant Real Estate Titles Office (WC 1981, Art. 55). Eventual rights do not create a burden or servitude on upstream permanent rights (WC 1981, Art. 18).

## **Obligations**

A number of obligations are imposed on water right-holders. The following are some of the more important. First, water users are not allowed to take more water than authorised by their water right and any for any evaporation and seepage (WC 1981, Art. 40).

Second, non-consumptive users must extract and restore their allocated water without diminishing the volume, quality, substance, opportunity of use, and other characteristics (Brehm and Castro 1995). This obligation does not apply to consumptive rights. Instead, point-source discharges are instead subject to the separate regulatory provisions of SISS and CONAMA.

Third, downstream water right-holders have the right to require upstream water users to prevent the deposition of mud, stones, woods or other matter. The cost of cleaning such water must be distributed in equal proportion among those upstream users benefiting from the change in water quality (WC 1981, Art. 125). Similarly, neighbouring land owners can seek compensation from water users whose water discharges spill and damage property (WC 1981, Art. 127).

Finally, there is a general obligation not to injure third parties (WC 1981, Art. 22). However, there is no guidance as to what constitutes an injury and what is necessary to protect third party interests (Dourojeanni and Jouravlev 1999). Moreover, it is not clear that third party interests is limited to other holders of water rights or whether it also extends to other uses, such as the environment (Dourojeanni and Jouravlev 1999).

In the case of groundwater, to prevent injury to their rights, two or more groundwater users can arrange for a temporary reduction of all groundwater rights

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to an aquifer, in equi-proportionate terms, if some users are causing damage to other holders' rights (WC 1981, Art. 62). The measures remain in place until the applicants reconsider their request or the cause of the problem stops (WC 1981, Art. 62)

## **4.6 Detached from land title and use restrictions**

Once granted, a water right (for surface or groundwater) is no longer attached to land title and may be transferred freely between individuals (DGA 1999a).

Water rights may be mortgaged separately from land. To mortgage a water right, they need to be registered with the Real Estate Titles Office, but they cannot be mortgaged jointly with other property (WC 1981, Art. 110–111).

## **4.7 Divisibility and transferability**

Water rights are fully divisible and transferable — apart from the requirement to gain approval for a trade by the DGA, the WUA, and from any trade restrictions applying in a WUA's area. They are freely transferable, like other forms of real estate (Saleth and Dinar 1999; Mentor 2001; Brehm and Castro 1995; Bauer 1998).

## **4.8 Rights-of-way**

Holders of water rights also acquire a number of other rights. The water right-holder can impose all the necessary servitudes to exercise the water right, without damaging the corresponding indemnifications (WC 1981, Art. 25). This implies that:

- a person who holds a water right also possesses a right to enter into negotiations with a private land holder to gain access to that land in order to transport the water (WC 1981, Arts. 8 and 26); and
- holders of water rights also possess the right to construct the necessary water works that are indispensable to take the water (WC 1981, Art. 9).

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## 5 Government involvement in water allocation

For the initial allocation of rights under the WC 1981, a presumption of ownership was declared, based on contemporary patterns of use, even though some water use dated back to the nineteenth century (Bauer 1997; Rosegrant and Gazmuri 1994). The concept of historical consumptive use was not articulated by the Chilean Law (UNESCO 1996).

Most water rights grandfathered under the WC 1981 were to irrigators. Approximately 40 per cent of these were to former landowners and 60 per cent to former workers on the land (Rosegrant and Gazmuri 1994). Water rights were also grandfathered to state companies involved in water supply, electricity generation, waste water treatment, and so on (Manzetti 1997).

### 5.1 Allocation mechanisms

In contrast to the earlier 1967 Water Code, the WC 1981 does not authorise the state to ration the use of water, to secure water reserves, to establish efficient and beneficial use of water, to assign priorities for its use and to revoke unexercised rights. Consequently, water rights can not be modified or expropriated without compensation. The main methods available for re-allocating water are:

- purchasing water rights; and
- investing in water infrastructure to create water savings (DGA 1999a).

The DGA is also required to determine minimum ecological volumes for a river, to protect specific endangered flora and fauna (DGA 2002; Fernández and Medina 2000). However, there does not appear to be any major initiative to purchase water rights in over-allocated rivers to meet the minimum ecological volumes.<sup>37</sup> To the extent that there is a policy of re-allocating water for environmental purposes, it is largely on investing to construct or repair ageing water

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<sup>37</sup> This is possibly due to the high cost of purchasing water rights and popular concerns (ECLAC, pers. comm. 23 August 2003).

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related infrastructure. This is supported by the irrigation laws administered by the CNR and DOH.

## **5.2 Planning guidelines**

A distinctive feature in Chile is the exhaustion or near exhaustion of many water supplies and the expected continued growth in demand for water (DGA 1999a; Fernández and Medina 2000). As mentioned earlier, the National Water Resources Policy recommended that planning guidelines be established for each river basin to, among other things, improve the allocation of water. The purpose of these guidelines are to identify the objectives for managing the river basin and to identify a set of agreed projects to meet those objectives.

As at June 2003, four planning guidelines have been or were being developed — for the San Jose, Aconcagua, Imperial and Maule river basins.

### **Resource assessment**

The resource assessment of the Planning Guidelines for the San Jose River Basin contains estimates of the:

- water resources available for each of the catchments — both in terms of total flows and the timing of the surface flows, and the recharge rates of aquifers;
- level of demand for water from all sectors — domestic, irrigation and industry;
- the number of water rights currently issued and the environmental needs of key protected wilderness areas; and
- net balance of water resources in each catchment (DGA 1998).

### **Objectives**

Several levels of objectives are identified in the planning guidelines. These include overarching objectives of the guidelines themselves, and more specific objectives for each of the projects identified in the guidelines.

The Planning Guidelines for the San Jose River Basin have as their overall objectives to:

- improve the efficiency of the use of the water by the agricultural and domestic sectors;
- obtain the long-term sustainable operation of the Azapa aquifer;

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- develop new sources to satisfy the present and future demands of the domestic use and to improve the security of supplying of the agricultural use;
  - control the contamination of ground water;
  - improve the distribution of water to optimise its use and to control the level of conflicts between users;
  - coordinate public development policies and support the integrated management of river basins; and
  - mitigate the damage produced by flooding to infrastructure, tourism and agriculture (DGA 1998).

The planning guidelines' mid-level objectives include:

- reducing unsustainable extractions from the Azapa aquifer, and not to change the current usage patterns in other aquifers;
- expanding monitoring of water supplies and extraction;
- preventing any new irrigation developments in the Azapa Valley;
- using economic instruments to encourage the efficient and complementary use of ground and surface water in the basin;
- ensuring that any new demand would be provided through importing water from other river basins, and through encouraging the multiple use of existing water resources; and
- improving water quality (DGA 1998).

The planning guidelines provide a list of some 38 projects that comply with the mid-level objectives. These are grouped into short-, medium- and long-term categories and include:

- investing new and repairing existing distribution networks to minimise losses;
- identifying new water sources;
- encouraging conjunctive management of surface and groundwater;
- establishing a Groundwater Community for the Azapa Aquifer;
- establishing education campaigns targetted at water users; and
- legalising and regularising existing water uses (DGA 1998).

Each project had one or more specific objectives.

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## **Impact assessment**

No overall impact assessment was undertaken for the Planning Guidelines for the San Jose River Basin. Pre-feasibility assessments of the relative cost-effectiveness were undertaken for each proposed project. Each project was assessed in terms of the gross financial investment, the total expected water to be obtained and the cost-effectiveness (\$C per cubic second) for the specific project. The planning guidelines also identify the agency responsible for implementing the project.

While the planning guidelines report the financial cost-effectiveness of each proposed project, each agency responsible for administering the project — under direction from its water resources committee — is responsible for undertaking more detailed assessments. The planning guidelines do not offer any guidance on how assessments should be undertaken (DGA 1998).

## **Transparency, consultation, implementation and review**

While it is clear that consultations were undertaken by the DGA in preparation of the Planning Guidelines for the San Jose River Basin, it is not clear how extensive were these consultations.

The San Jose planning guidelines require the establishment of a water resources committee — the Water Resource Management Technical Advisory Committee,<sup>38</sup> (CGRH) whose role is to:

- analyse the recommendations contained in the planning guidelines;
- implement the recommendations of the planning guidelines;
- recommend adjustments to the proposed projects in the planning guidelines (DGA 1998).

The committee is also responsible for consulting between water users and government organisations (DGA 1998b).

The committee for the San Jose basin is to comprise representatives from the:

- Ministry of Public Works (DGA, DOH, SISS);
- Ministry of Agriculture;
- Ministry of Planning;
- Ministry of Housing;

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<sup>38</sup> *Consejo Técnico para la Gestión de los Recursos Hídricos*

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- National Commission of Irrigation;
  - ESSAT, a sanitary services company; and
  - WUAs (DGA 1998).

Though CGRH is responsible for continually monitoring and reviewing the guidelines, it is not clear whether there is an expectation that the guidelines will be subject to an external review.

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## 6 Administering water rights

The DGA has adopted a number of common administrative procedures for applications to:

- issue (constitute) new water rights for surface and ground water;
- explore for groundwater;
- place temporary or permanent embargoes on the taking of water from a surface or groundwater source;
- construct, modify or change water works; and
- modify natural and artificial waterways.

The WC 1981 also describes the procedures to be undertaken by the DGA and local courts in:

- registering with the Real Estate Titles Office any changes to ownership arising from the transfer of water rights; and
- registering WUAs.

### 6.1 Applications to the DGA

The WC 1981 specifies the procedures to be followed for a range of water right applications. In general:

- Applications are made in writing to the relevant regional office of the DGA.
- Standard application forms are not employed. However, guidance is provided as to the necessary information that must be provided by the applicant. The type of legal and technical information to be tabled to the DGA will vary with the purpose of the application.
- The DGA does not charge for processing applications, although a fee will be charged if a visual inspection of the site is required.
- All applications are published within 30 days in the Official Newspaper of the Republic.<sup>39</sup> Applicants must also publish their application in a newspaper or

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<sup>39</sup> *Diario Oficial de la Republica*



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periodical in the respective province, or in the region's capital if a newspaper is not published. If the application covers more than one province, both newspapers must be included.

- Statements of opposition may be lodged against the application within 30 days of the date of the publication of the application.
- The statements of opposition are transferred by the regional office of the DGA to the respective applicant, who has 15 days to address the concerns of third parties.
- The DGA will then determine whether there is sufficient resource is available and whether the application will prejudice third parties.
- Successful applications will be lodged with the Real Estate Titles Office.

The DGA's decision may be appealed for reconsideration within 30 days of its decision. Also, appeals to the DGA's resolution may be lodged to the Court of Appeals within 30 days of the notification of its decision (DGA undated(b) to undated(e); Dourojeanni and Jouravlev 1999).

### **Constituting new water rights**

The WC 1981 specifies the DGA procedures for constituting new water rights. The DGA has no discretion to deny applications for water rights if water is available (Bauer 1998).

Applicants must provide the:

- applicant's name and address;
- name of the water source, both surface and groundwater, from which water is to be taken;
- proposed volume of water to be taken and the rate of extraction, specified as litres per second or megalitres per annum;
- locations from which water is to be taken, and in the case of nonconsumptive uses, the point of return;
- type of water — whether it is for continuous or discontinuous use, for alternate use, and for consumptive or non-consumptive use (WC 1981, Art. 140).

The information for this application also forms the basis of the constitution of the water right (WC 1981, Art. 149).

If a water right to groundwater is being sought, the applicant must also present:

- 
- relevant land title from the Real Estate Titles Office;
  - permission of the owners of the land, if the owner is a third party;
  - if the access is on public land, permission from the Ministry of National Goods;
  - if the access is located on a National Good of Public Use (such as a wildlife reserve), permission from the relevant public body, such as the municipality.

Technical data that must accompany applications include:

- a plan to scale of the location of the water and extraction points;
- in the case of groundwater, a confirmation of the existence of a certain yield at a certain depth.

Applicants must make separate applications when constructing water works to extract water. Under the EFL 1994, where approvals are being sought to construct works in certain sensitive areas, such as wetlands and wilderness areas, applicants must also provide an environmental impact statement. However, there is a concern that the application of environmental impact statements only applies to a limited number of water projects — covering only 5 per cent of applications (Dourojeanni and Jouravlev 1999).

The DGA also requires environmental impact assessments to accompany applications for:

- groundwater rights (exploration permits);
- water rights in the fertile valleys and wetlands of the I and II regions, and national parks and wildlife reserves; and
- the construction of aqueducts, dams and pumps for feeding from, draining, dredging, protecting significant natural water courses or bodies (EFL 1994, Art. 10; DGA 2002).

Generally, the DGA will approve the constitution of a new water right if water is available and the constitution of that right does not injure third parties. In most cases, ‘third parties’ is taken to mean the rights of other water users.

It is the intention of the EFL 1994 that water reserved as minimum ecological volumes would not be available for the constitution of private water rights. However, it is not clear whether under the WC 1981, the DGA can legally refuse an applicant seeking to constitute a water right using ecological volumes, because such volumes are not constituted as water rights (Dourojeanni and Jouravlev 1999).

Water rights are not defined in terms of the type of use, such as irrigation, domestic, industrial (Bauer 1997). Consequently, no use restrictions or conditions are placed

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upon water right applications. The DGA does not engage in any approval process for the type of use. Instead, uses are governed by the respective regulatory agencies — such as CONAMA and SISS.

### **Transferring water rights**

Under the WC 1981, holders of water rights are free to transfer the ownership of their right to any party. Except as discussed below, the DGA need not be informed. The parties transferring the water right must register the transfer with the Real Estate Titles Office.

Parties wishing to transfer a water right within a natural channel must apply to the DGA for approval (WC 1981, Art. 163; Brehm and Castro 1995). The procedures for applying for a transfer along a natural channel are similar to the standard procedures described above.

Parties wishing to transfer a water right within an irrigation area, or within a WUA's area, must seek the approval of the board of the WUA. Generally, the board needs only be satisfied that supporting infrastructure be modified to accommodate the transfer (WC 1981, Art. 210; Dourojeanni and Jouravlev 1999). If a party is not satisfied with the decision of the WUA, applications may be filed with the general or special courts (Dourojeanni and Jouravlev 1999; Brehm and Castro 1995).

In cases where a transfer of a water right requires the construction, modification, change or unification of the water works (*bocatoma*), a separate application must be filed with the DGA.

In both types of applications to transfer rights, right-holders can object on the grounds of injury to their right. However, concerns have been expressed over the ability for small right-holders to lodge their objections effectively given the long distance of some rivers and the difficulty in demonstrating injury. In addition, given the large number of small holdings, the potential benefits from any one party lodging an objection will be shared by other parties (Dourojeanni and Jouravlev 1999).

Concerns have been raised over the long time taken by the DGA to process applications to transfer water rights (Brehm and Castro 1995). It has been estimated that delays of 6 to 24 months are not uncommon (Brehm and Castro 1995).

In some river basins, such as in the Aconcagua and Elqui, there are significant return flows. Because of the dependence of downstream water users on these return flows, WUAs have restricted the trades of water rights from their areas (Rosegrant and Gazmuri 1994; Holden and Thobani undated).

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## **6.2 Applications to local courts**

Applications can be made to a court for the recognition of a WUA. The provisions governing the constitution of WUAs are described in the WC 1981.

### **Applying for recognition of water rights**

The WC 1981 provides for traditional water users to regularise their water rights by applying to the DGA. Persons able to demonstrate continued use of water are presumed to be the owners of the right — even if the right is registered to another party (Bauer 1997).

Initially, many small farmers were unaware of the WC 1981. No public information campaign was undertaken in the 1980s or advice offered, and most of the rights had been allocated by the time the farmers became aware of the changes (Bauer 1997).

Small farmers who were part of the Agrarian Reform process were the exception, and were given advice and assistance in regularising their traditional rights (Bauer 1997; Brehm and Castro 1995).

That said, traditional water users have often bypassed the DGA and sought legal recognition of their water rights in courts. This has resulted in the legalisation of water rights through the judicial system, sometimes without the DGA being informed (Brehm and Castro 1995).

## **6.3 Hearing appeals**

Regional appellate courts are responsible for hearing cases on appeal from the administrative decisions of the DGA (Bauer 1998). Supreme courts are responsible for hearing appeals from the regional appellate courts.

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## 7 Distribution management

The WC 1981 authorises WUAs to own and operate water infrastructure, and to distribute water to their members in accordance with their member's water rights (Dourojeanni and Jouravlev 1999).

### 7.1 Water accounting

Water accounting — the record keeping of the volume of water made available and used by water users — is undertaken by WUAs (Dourojeanni and Jouravlev 1999).

In providing water to water right-holders, WUAs fulfill permanent rights first and eventual rights later. All users within a class receive a volume of water in proportion to their water right (DGA 1999a).

#### **Arrangements for water shortages**

During water shortages, WUAs have the authority to restrict the taking of water by their members. During official drought emergencies, the DGA possesses authority over private water use (Mentor 2001), including the power to impound water allocated to rights holders, providing such holders are compensated (Hearne and Easter 1997).

Drought zones are declared by the President of the Republic for a renewable period of up to six months, if so requested by the DGA. To make such a request, the DGA must determine, by resolution, the occurrence of an extraordinary dry period (Rosegrant and Gazmuri 1994).

Water rights may be expropriated but only in order to satisfy domestic consumption (such as in severe droughts), and then only to the extent necessary, to share the burden equally (WC 1981, Art. 27).

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## 7.2 Water distribution

Water distribution is principally undertaken by WUAs. For the purpose of water distribution, most of the larger rivers are divided into administrative sections. Along each section, the WUA is responsible for distributing water to its members (Dourojeanni and Jouravlev 1999; UNESCO 1994; Fernández and Medina 2000).

Monitoring committees are responsible for coordinating the distribution of water between WUAs. Coordination depends on voluntary bargaining and negotiation between private right-holders and their representatives (Bauer 1997 and 1998). Important decisions within the committees ‘...are made by a majority vote of the members, who cast votes in proportion of their water rights’ (Bauer 1998).

However, since the law does not establish any proportionality between consumptive and non-consumptive rights, and since there can be more than one non-consumptive water right for each consumptive water right, non-consumptive users tend to outnumber and out-vote consumptive water users. In response, WUAs have tended not to invite non-consumptive users into their membership (Dourojeanni and Jouravlev 1999).

In the event that disputes are not resolved, coordination issues are resolved by local courts. Similarly, water users (including canal associations and water communities) that feel injured by the activities or decisions of other water users or water user associations can file applications to the ordinary courts of justice (WC 1981, Art. 275). The DGA does not have the authority to intervene in a dispute between parties or over the distribution of water.

### Managing environmental flows

Ecological volumes are determined by the DGA. These consist of volumetric allocations (Dourojeanni and Jouravlev 1999). It is not clear whether ecological volumes are transferable.

There does not appear to be any coordination of ecological volumes and possible downstream consumptive and environmental uses, to ensure that water quality objectives are being met (Fernández and Medina 2000).

### Managing distributions for consumptive use

The management of return flows was described as an important issue in the National Water Resources Policy (DGA 1999b). As mentioned earlier, there are significant return flows and multiple water users make use of the same water.

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WUAs are responsible for coordinating the use of water by their members. Some rivers are served by more than one WUA. For example, the upstream zones of the Maipo are served by five WUAs and the Metropolitan Sanitation Works Company (Hearne and Easter 1995). However, the National Water Resources Policy indicated that WUAs have tended not to coordinate their water use. As a result, upstream WUAs have tended to use water and influence return flows without the regard for the needs of downstream WUAs.

### **Managing distributions for non-consumptive use**

There are a variety of non-consumptive uses of water — generation of hydroelectricity, dilution of polluted water, fishing, navigation, wildlife protection and recreation (Dourojeanni and Jouravlev 1999).

A recurring feature in Chile is the conflict between consumptive and non-consumptive water users. This conflict arises on at least two levels. First, it can occur between non-consumptive users of water, such as tourism operators and environmental groups, do not possess non-consumptive water rights, though they are beneficiaries to the water's flow (Brehm and Castro 1995).

Second, the conflict arises between upstream hydroelectricity companies and downstream irrigators. The Andean snowmelt begins in early spring and continues until late summer and is ideal for irrigators who require water between February and April (Bauer 1997; Dourojeanni and Jouravlev 1999). In contrast, upstream hydroelectric power generators fill their storages from spring and summer flows for subsequent release during the winter — when electricity prices are highest (Bauer 1997; Dourojeanni and Jouravlev 1999).

Conflict over the differing timing requirements for water has not been resolved by the WC 1981 — which is not clear and unambiguous in whether consumptive or non-consumptive rights have prior rights to the timing of the flow (Bauer 1998). The Code states that non-consumptive rights cannot impose any legal obligations on downstream consumptive rights — that is, non-consumptive rights are subordinate to consumptive rights (WC 1981, Art. 97; Bauer 1998; Dourojeanni and Jouravlev 1999).

Power companies, however, have argued that non-consumptive rights include the implicit right to store water in dams temporarily. It also confers a right, to a degree, to regulate the flow of the water — since by definition any release by a hydroelectric power company must change the natural flow of the water (Dourojeanni and Jouravlev 1999). Power companies ‘...have built and paid for

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dams and reservoirs, take for granted their freedom to manage the works as they choose' (Bauer 1998).

Monitoring committees have not been able to resolve a number of these disputes (Hearne and Easter 1997; Brehm and Castro 1995). This is in part because:

- there were few areas of agreement between power companies and irrigators;
- the cost of organising the large number of small irrigators has been large; and
- decisions are adopted by majority vote. As mentioned earlier, the WC 1981 did not describe how consumptive and non-consumptive rights would be reconciled (Dourojeanni and Jouravlev 1999).

A number of significant cases have been heard by the regional and supreme courts of Chile. However, the courts have not always fully resolved disputes (Bauer 1998; Dourojeanni and Jouravlev 1999; Fernández and Medina 2000).



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## 8 Pricing

The WC 1981 does not give the state the authority to charge for water — apart from auctioning new water rights when there are two or more simultaneous applications for the same right. Instead, the scarcity value of water is elicited through water trading.

### 8.1 Price regulation agencies

The price of water rights is not subject to prices oversight by a regulatory agency in Chile.

There is, however, concern that the hoarding and monopolisation of (principally) non-consumptive water rights has limited entry and competition in the hydroelectricity generation industry (Dourojeanni and Jouravlev 1999). For example, the National Electricity Company (ENDESA) currently produces 60 per cent of the total energy output in Chile's national grid. It also possesses approximately 7600 cubic metres per second of consumptive and non-consumptive rights, of which only 13.3 per cent are actually used to generate electricity (Dourojeanni and Jouravlev 1999). These water rights also confer onto ENDESA 77 per cent of the best hydroelectricity development sites (Dourojeanni and Jouravlev 1999).

As mentioned, there is currently a proposal in the National Water Resources Policy to charge users a patent fee for not exercising their water rights, in order to discourage the hoarding of water rights (DGA 1999b). The patent fee would:

- be set to reflect the opportunity cost of not exercising the water right;
- increase progressively with the time that the water right remains unused;
- be refunded once water is placed into productive use;
- require legal presumptions to determine whether water rights are used; and
- be exempted for small volumes of water rights (Lee and Jouravlev 1998; Dourojeanni and Jouravlev 1999).

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There is no price regulation of irrigation infrastructure services, possibly because in the majority of cases, WUAs provide such services to their own members. In contrast, prices are set for drinking (potable) water in urban areas. Urban water prices are set by SISS. Tariffs are reviewed every five years (Fernández and Medina 2000; SISS undated(b)).

## 8.2 Pricing water infrastructure services

Water user associations have the responsibility for charging for the operating, maintenance and capital costs of infrastructure (Brehm and Castro 1995; Fernández and Medina 2000).

As mentioned, the CNR provides subsidies for the construction of minor works under the Irrigation Law for Minor Works (Law No. 18,450, 1985). The law allows the CNR to fund up to 75 per cent of the total construction cost and subsequent repairs. In 1998, some 8774 water users received between them US\$23.4 million. In 1999, it was forecast that US\$35.2 million in support would be provided (Fernández and Medina 2000).

Similarly, the DOH, under the Irrigation Law for Major Works (Law No. 1,123 1981), is responsible for partially financing the construction of larger infrastructure works by monitoring committees. Assistance is provided when the project is socially beneficial, or benefits an economically depressed region, or it is ordered by the President of the Republic (Fernández and Medina 2000).

Tariffs for urban infrastructure services are set to recover the costs of operating and maintenance costs, as well as to provide an incentive for future investment (Fernández and Medina 2000; SISS undated). Tariffs include an annuity to recover the costs of investment and to replace the asset over a 35-year period (SISS undated). Prices also reflect differing regional, demographic and technological differences (Fernández and Medina 2000).

Price levels and structures for urban infrastructure providers vary between regions and localities. Generally, prices can vary between summer and non-summer months. In summer, the consumption-based component is levied on consumption greater than 40 cubic meters. Otherwise, the rate of the consumption-based charge increases as the level of consumption increases (Fernández and Medina 2000).

Capital costs are not fully recovered for irrigation assets. It is not clear whether operating and maintenance costs are being met. Some authors note that the level of maintenance is adequate but not sophisticated (Brehm and Castro 1995).

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Chilean municipal authorities also administer community service obligations, in accordance with Law No. 18,778 of 2 February 1989. Municipalities pay water utilities, from central government funds, to reduce water prices for low-income households. Low-income households may receive a reduction in the price of up to 80 per cent of the invoiced consumption (up to 20 cubic metres) (Fernández and Medina 2000).

### **8.3 Pricing water rights management costs**

As mentioned, water right applicants pay the DGA only when site inspections are required (DGA undated(b) to undated(d)). It is not clear to what extent these filing fees recover the costs of administering water rights.

### **8.4 Pricing environmental third-party effects**

Payments are not required for water extraction or use or for any of the environmental externalities that may be experienced (Dourojeanni and Jouravlev 1995).

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## 9 Monitoring and enforcement

The WC 1981 places most decision-making power in the WUAs and private companies (Dourojeanni and Jouravlev 1999), but the DGA retains overall responsibility for monitoring natural water resources and managing the National Hydrometric Service (Brehm and Castro 1995).

The DGA's monitoring is limited to:

- oversight over the monitoring committees (Brehm and Castro 1995; Bauer 1997); and
- maintaining the National Hydrometric Service, and with it, the monitoring of all riverine and groundwater.

With regard to enforcement, the DGA can take several actions in cases of damages to third parties under Article 62 of the WC 1981 (Brehm and Castro 1995). However, the DGA has expressed concerns over the inadequate information, both with regard to the quality of information maintained in its own registers and the Real Estate Titles Offices, and hydrological surveys. This lack of information has eroded its ability to enforce its activities efficiently (Brehm and Castro 1995).

Enforcement is also the responsibility of water right-holders. WUAs provide the forums for enforcing water rights at a local level. The courts can override WUA and DGA decisions, such as setting limits on traditional rights.

As mentioned earlier, water right-holders often enforce their rights through the courts. Many disputes, including the lengthy disputes between hydroelectricity companies and irrigators, end up before the courts (Brehm and Castro 1995). The courts rely heavily on technical information from the DGA and WUAs, and as mentioned above, this has led to delays (Dourojeanni and Jouravlev 1999).

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