4.1 Water pricing

Privatisation of water utilities

The water sector was privatised later than other public utilities. The process was initiated with the 1989 General Law of Sanitation Services and the actual privatisation began in 1998 after necessary reform in pricing policy. By 2000 the first five regional companies had been partly privatised: the former Metropolitan Water Works Company (EMOS), renamed Aguas Andinas (Metropolitan Region), ESVAL (Region V), ESSEL (Region VI), ESSBíO (Region VIII) and ESSAL (Region X). In 2001 the government decided to change its approach, opting for 30-year concessions. By the end of 2003 *private participation in water and sanitation services* covered 76% of the population served, compared to 5% in 1998. Now 49 operators comprise the sector, of which ten are state-owned and seven have state participation (Table 3.2). Three private water companies (Aguas Andinas, ESSBíO and ESVAL) serve almost two-thirds of customers.

Over 1998-2003 the privatisation/concessions programme brought in more than *USD 2 billion in foreign direct investment*. Between 2004 and 2014, USD 1.3 billion would be required to achieve full coverage of drinking water supply (including rural areas) and 99% coverage of urban sewage treatment, with treatment plants accounting for USD 490 million of that sum.

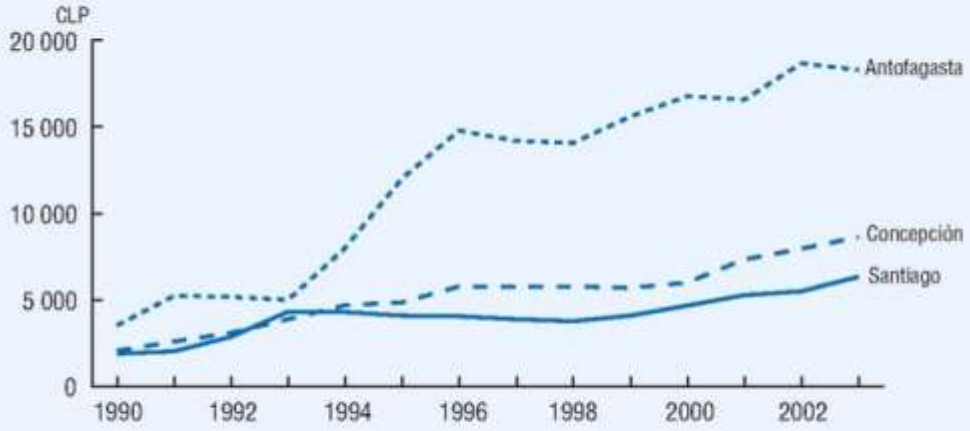
Price setting

Until the late 1980s, *water tariffs covered only part of operating costs*. The few investments were mostly funded through budgetary transfers. High leakage in the distribution and collection networks, poor service quality and delays in provision of services for new urban areas characterised the sector. Prior to privatisation, a new policy had to be adopted to allow water companies to fully recover their costs.

This *new water pricing regulatory framework was set up in 1989*. Modelled on previous developments in the electricity sector, it involved separate supervisory and regulatory functions; the possibility of creating private companies with limited liability; marginal cost pricing; and full cost recovery, including return on investment. SISS, established in 1990, regulates water prices. The shift to tariffs that cover the cost of investments was made gradually over 1990-98. Shortly before privatisation began the rate of return on capital among public water companies averaged more than 6%. The new pricing system allows full cost recovery through relatively homogeneous tariffs within pricing zones (regions). The marginal costs are calculated separately for drinking water supply and sewage treatment, and the calculation formula is to be revised every five years.

Water prices rose considerably between 1990 and 2003, more than doubling in some regions (Figure 3.2). By late 2003, the *average water bill came to USD 0.75/m³* (including drinking water supply, sewerage and sewage treatment). Expansion of sewage treatment accounted for most of the increase. The prices were higher in the extreme north (USD 1.77/m³ in Region II, USD 1.18 USD/m³ in Region I) and extreme south (USD 1.21/m³ in Region XI). Water bills typically include a fixed charge (up to 8% of the bill) and a constant volumetric rate that applies to both water supply (up to 98% of the bill) and sewage treatment (up to 27% of the bill). There is no pollution charge. Some 97% of clients of the 19 main water companies have water meters, half of which are less than five year old. SISS ranks the water companies

Figure 3.2 **Trends in household water prices,**[a] 1990-2003



a) 2003 constant prices, including VAT, covering water supply and sewage treatment services based on average monthly consumption of 15 m³.

Source: Ministry of Economy and Energy.

according to service quality (i.e. drinking water quality, continuity in supplying drinking water and sewerage, accuracy of water pricing and delay in answering client requests).

Subsidies for the poor

To reduce the regressive distributional effects of tariff changes in *urban areas*, it was decided that price increases should be accompanied by a subsidy targeted to the poorest urban families. Introduced in 1989, the subsidy now applies to water and sewerage and is funded from the central budget. The *potential beneficiaries* were defined initially as the poorest 20% in each region, who had to apply for water supply subsidies by filling out a Socio-economic Evaluation Form (SEF), unless they had already done so for other social coverage. The available funds were divided among applicants according to their SEF points. Initially eligibility criteria included having no arrears with the water company and consuming less than 20 m^3 per month. In 1991 the latter requirement was abolished, and the subsidy was extended to families sharing a house and to housing compounds sharing a water meter; the potential beneficiaries were redefined as the poorest 20% nationwide. In 1995 the subsidy was extended to rural consumers. With the expansion of sewage treatment since 2001, the targeted subsidy has also been made available for sanitation services.

In practice, municipalities pay the subsidy directly to the water companies and customers are billed for the difference. The subsidy is granted for three years, after which application must be renewed. Initially the *subsidy rate* was equal to 50% of the bill, up to 10 m^3 per month. In 1993, to provide greater relief in regions with larger price increases (Regions I, II, XI), the subsidy was adjusted at between 40% and 75% of the monthly bill for up to 15 m^3. In 1994 the range was widened to 25-85% for up to 20 m^3 and the rates could differ between regions. In practice, however, the lower end of the range has never been chosen, as it would have been politically unpopular to go under the initial subsidy rate of 50% in low-cost areas. For rural consumers the subsidy covers 50% of the bill for the first 15 m^3 consumed. Beneficiaries of Chile Solidario, a programme aiming to improve the poorest households' access to social protection, are totally exempt from the fixed component and do not pay for the first 15 m^3 consumed. In 2003 the subsidy ranged from 82% in Region I (zone 2) to 50% in the Metropolitan Region.

Despite the dramatic rise in water prices in 1990-98, the subsidy has allowed connections to drinking water supply to continue increasing. By 1998, 99.3% of all urban families were connected, of which *17.4% were subsidised*. In 1998, budgetary transfers for the subsidy amounted to USD 35 million, including USD 1.3 million for rural areas. Since 1998 the *number of beneficiaries has continued to increase* but not the budget, which has stayed at USD 35-40 million a year, thus covering a smaller portion of the water bill. In 2003 there were 615 000 eligible families in urban areas (16.6% of water company clients) and 61 500 eligible families in rural areas. About 73% of the rural beneficiaries were in the poorest group, as measured by their SEF scores. Some USD 40 million, equivalent to 6.2% of water bill receipts, was transferred to urban beneficiaries. The average monthly subsidy was around USD 6 in urban areas and less than USD 1 in rural areas. It ranged between USD 3 in Las Condes (Santiago) and USD 20 in Iquique (Region I).

4.2 *Trading in water rights*

Although water is considered a national asset in Chile, individuals can own perpetual and irreversible *water use rights* (Box 3.2), which are independent of land use and land ownership. Trade in water rights is fairly unrestricted, and there is a real *free market*, where water rights are traded without a government intermediary. Water rights trading in Chile thus differs fundamentally from that in the western United States, for instance, where water rights are defined by prior appropriation and trading is subject to relatively restrictive rules.

Level of transactions

Most short-term transactions take place among irrigators, particularly as regards seasonal rentals. The degree of long-term intersectoral trade is increasing, with water

Box 3.2 **Trading in water rights: legal provisions**

Chile's first constitution (1833) provided for water use rights and the 1980 constitution reiterated this provision, but not until the *1981 Water Code* was there a legal basis for the trading system. The Water Code specifies procedures and proofs of claim for *regularising water rights*, favouring parties that had exercised the rights for at least five years regardless of whether those rights had been registered. DGA grants *new water rights* free of charge (Table 3.3). Parties can register objections if the granting of new water rights impairs their own right. The grandfathering of initial water rights was made proportional to their use in 1975, thus benefiting those who were actively using water (mostly poor farmers). *Transactions in water rights* can include short-term or annual sales, leases and permanent transfers.

Where appropriate, *water rights are allocated for legally defined sections of rivers* (e.g. between two tributaries). Holders of rights in one section have no claims to water in another. The owners of water rights downstream are not legally protected from changes in upstream water use that would significantly reduce flows. In case of drought, they have no assurance that their section of the river will receive any water. Nevertheless, DGA may temporarily suspend water rights and allow water redistribution in declared drought disaster areas, and affected right holders may file for financial compensation. The Water Code defines *groundwater abstraction rights* and allows trading in them.

The Water Code does not identify any *priority uses in the granting of new rights* (e.g. drinking water does not take precedence over irrigation). New rights are granted either for *consumptive uses* (irrigation, industry, municipal) or *non-consumptive uses* (hydropower generation, aquaculture). Within each of these two categories, however, user rights are granted *independently of use*. On a given section, rights for non-consumptive use do not restrict rights for consumptive use unless otherwise agreed between right holders. Both types of rights can be traded. Rights for consumptive uses do not include water quality requirements. Holders of rights for non-consumptive uses must return water with the original quantity, quality and potential for use retained.

"Permanent water rights" are expressed in terms of flow (litres per second). When flows are high, DGA may grant "contingent rights" to any excess after all user rights are satisfied. The Water Code does not explicitly refer to *minimum environmental flows*, but the 1994 General Environmental Framework Law does. Since 1994 DGA has broadly taken minimum river flow into account when allocating water rights. An amendment to the Water Code in 1992 provides for the protection of aquifers that supply wetlands in Regions I and II.

Many low-cost sites were first granted to state-owned *electric utilities*. Following privatisation of these utilities, the rights were transferred to private hydro corporations, which thus own more user rights than they will probably need for the foreseeable future. ENDESA, the largest hydroelectric company, is the main holder of non-consumptive rights.

supply companies buying rights from irrigators. In such cases the principle factors determining price during negotiations are the distance from the company's intake point, the quantity of water and the information available to the seller. The prices of traded water rights signal the opportunity cost of using water. They create incentives to apply the most cost-efficient water conservation options, thereby helping preserve the resource and reducing the need for new water supply investments. In some areas, decreasing the use of irrigation water also has positive environmental effects by reducing salinisation.

The most *active trading* has developed in the *Limarí River valley* (Region IV), where buyers purchase rights to at least 7.2 million cubic metres of water per year. In addition to permanent sales of rights, an active spot market exists in drought years. The conditions for trade in the Limarí valley have been eased by the existence of reservoirs in the valley, adjustable canal gates with flow meters, well-organised water user associations and access by purchasers to the canal system. Some trade has also developed in northern regions, with mining companies buying abstraction rights from farmers.

Table 3.3 **Granting of new water rights,**[a] 2001

(%)

Regions	Groundwater	Surface waters	
		Consumptive uses	Non-consumptive uses
I	2	3	0
II	0	0	0
III	8	0	0
IV	5	0	0
V	19	51	1
Metropolitan	18	0	70
VI	15	0	0
VII	16	2	0
VIII	6	4	3
IX	1	13	8
X	8	17	14
XI	0	4	3
XII	0	6	2
Total (litres/s)	19 716	101 753	202 492

a) Granted by DGA. Water rights were first allocated after the 1981 Water Code went into effect.
Source: DGA.

Water markets have been inactive in most other parts of the country, however, and thus have had a *limited impact on the efficiency of water use* and the reallocation of resources (Table 3.3). The greatest economic impact of the 1981 Water Code has been the boost to *private investment in the hydro sector* due to the increased legal security of property rights. The code has been much less successful in addressing the issues of co-ordinating multiple water uses, managing river basins, resolving water conflicts (between sectors or between consumptive and non-consumptive uses), protecting river ecosystems and assuring minimum river flows.

A major impediment to the proper functioning of water markets has been the *lack of a central register* of water right holders and transactions, which means administrative delays in establishing new rights and authorising transfers. The Water Code specified that DGA was to designate original rights and keep a national water register, but the task proved overwhelming (water markets can be characterised as thin markets with high transaction costs). There are some 300 000 historical users, and the number of requests handled by DGA has risen steadily. The 5 600 requests in 2003 (up from 1 500 in 1993) broke down as follows: granting new rights (51%), regularising old rights (10%), authorising groundwater abstraction (4%), changing capture areas (3%) and other transactions (32%). The *limited enforcement of water markets* has resulted in many water conflicts going to higher courts, with varying results.

Reforming the Water Code

Starting in 1990, a series of changes to the Water Code were proposed to address *growing public concerns about river basin management, environmental protection, monopoly and speculation*. A debate took place about whether reforms to the Water Code should seek to make water markets work more smoothly and in more circumstances, or instead to limit their scope.

A first proposal was to *foster river basin management*, so as to: i) deal with increasing water management complexity due to rising demand for all uses and the need to manage both surface and groundwater resources; and ii) allow some form of regulation of the water markets and address downstream flows, water quality and environmental flows. In 1992, drawing on the French and Spanish experiences, watershed management corporations were proposed as a complement to the largely agricultural water user associations. The idea was not pursued, however. It has been suggested that *DGA should be given explicit responsibility to enforce minimum flows* when allocating water rights, lending the force of law to the de facto situation.

A second proposal, in the early 1990s, was to withdraw water rights that had not been used for five years. The granting of water rights free of charge and without conditions (including any obligation to use the water) encouraged speculation and

hoarding. Most non-consumptive rights are held by one private hydropower corporation. In 1995 a revised proposal was to *charge holders for non-exerted rights* to both consumptive and non-consumptive uses, at an annual rate that would differ by region according to intensity of water use. In 1997 the Constitutional Court confirmed that the government could attach conditions to water rights, and the Antimonopoly Commission recommended that no further non-consumptive rights be granted until the Water Code was amended to require effective use of water. Hydropower companies claim that the proposal to charge for unused water rights could be *attacked on constitutional grounds*. They argue that since the original rights were not conditional on effective and beneficial use, imposing charges to induce new companies to enter the hydropower market would infringe property rights, which are constitutionally protected.

A third proposal was to *foster sustainable use of aquifers*. The proposed measures were to: i) form groundwater user associations; ii) grant provisional abstraction rights when there is uncertainty over the state of the resource; and iii) activate groundwater markets. Provisional rights would become definitive in five years if empirical evidence showed that they did not affect existing rights. The Supreme Court of Justice ruled that the government could reject requests for groundwater abstraction rights when it is determined that the result would be unsustainable exploitation.

It has also been suggested that the model adopted in air pollution control, in which new entrants must buy pollution emission rights, could be followed in the water sector. Such a programme could also necessitate reforms to the water rights system. In particular, *water rights would have to incorporate ambient water quality standards*. This would increase the cost-effectiveness of meeting emission standards for industrial waste water.

3.4 *Privately protected areas*

Private sector participation in creating protected areas has emerged during the past 15 years. It takes several forms: i) private parks; ii) land donations to SNASPE; iii) land owned by groups of individuals (called conservation communities) for recreational or productive ends but managed for conservation purposes; iv) commercial eco-property and ecotourism projects; and v) private administration of state-owned conservation land (outside SNASPE areas) for ecotourism purposes.

Most privately protected areas consist of native forest vegetation in Araucanía Region IX and Los Lagos Region X. The individuals, groups, NGOs and businesses that own these areas are generally inspired by a sense of stewardship but in addition have a *mix of motivations* such as investment for the future, recreation or sustainable production in logging or ranching. Two-thirds of the owners are individuals or groups of individuals. The 3 000 km^2 Pumalín Park in Los Lagos is owned by a wealthy US citizen. Many owners are not at all well to do, however.

Privately protected areas now cover almost 17 000 km^2, or the equivalent of *about 12% of the SNASPE network* (Table 4.3). The National Committee for the Defence of Flora and Fauna, an environmental umbrella organisation with more than a hundred members (individuals, NGOs, universities, and foundations), in 1997 founded the Network of Privately Protected Areas (RAPP), which now comprises 133 sites totalling 3 866 km^2.

This movement emerged spontaneously in the late 1980s without any significant guidance or intervention by the government. Notwithstanding the good intentions of the owners, privately protected areas so far have made a *limited contribution to nature protection*. The selection of sites is largely random (though, like SNASPE sites, strongly concentrated in native forest areas) and takes little account of biodiversity priorities. Most of the areas are small and isolated. With a few exceptions, they lack baseline studies, management plans and trained personnel. Although some legal instruments (e.g. covenant on the title limiting the uses to which the land can be put) exist to safeguard their position, most of the areas are not thus protected.

If private initiatives to create protected areas are to make a real contribution to nature conservation, *they need to be better integrated with government efforts*. The government needs to develop an overall strategic vision in which SNASPE would function as a system of core areas with a high level of protection, surrounded and linked by private areas serving as buffer areas and ecological corridors. The General Environmental Framework Law's Article 35 is aimed at promoting privately protected areas, but a regulation giving effect to this intention still is in the draft stage. Such

areas need some form of legal recognition, and private initiatives should be steered towards identified biodiversity priority areas. The government could contribute technical expertise and training for the management of private areas, as well as financial incentives such as those proposed in the forthcoming native forest law (but not limited to native forests).

5.3 Reviewing expenditure and financing

CONAF *expenditure on management of the SNASPE network* almost doubled between 1994 and 2000 to USD 4.9 million, but has stagnated in recent years; personnel costs account for about 70% of this amount. The bulk of the expenditure is financed through the state budget, which is supplemented by revenue from visitor entrance fees and from concessions granted to commercial ventures. Very little funding is available for investment. Yet, investment is badly needed, not just for infrastructure improvements in existing protected areas but also to extend the network in accordance with the biodiversity strategy objectives. Estimates of the amount needed to even partly meet the 10% target are in the range of USD 100-160 million, or about 20-30 times the current annual operating budget. Even if the private sector finances part of the required extension, it is clear the government will also need to make a large increase in its biodiversity investment.

Other nature-related expenditure is incurred as part of *sectoral agencies' overall enforcement activities*. SAG, which administers the Hunting Law (including CITES), had about USD 0.55 million for this purpose in 2003. CONAF's Standards and Enforcement Division had a budget of USD 3 million that year to promote landholder compliance with forestry and environmental laws. Though much of this activity relates to native forests, the share of the enforcement effort devoted to nature protection per se appears to be the poor cousin of the agency's core development tasks.

Public sector investment is organised through the National Investment System (SNI), administered by the Ministry of Planning and Co-operation and Ministry of Finance. To guide the approval process, the SNI issues standards, techniques and procedures. These include project preparation and assessment methodologies incorporating shadow or "social" prices to measure projects' potential impact on economic growth and development; training in project preparation and assessment for staff of public agencies; and an information system (Integrated Project Bank, or BIP) to facilitate institutional co-ordination. Efforts to incorporate environmental concerns directly into this system should be strengthened. However, public sector projects and private investment projects alike must go through the *Environmental Impact Assessment System* (SEIA).

In the national *annual budgeting process* most environmental expenditure originates with sectoral ministries, where environment competes with other priorities in budget formulation. Environmental units of these ministries regularly track current and capital environmental expenditure, but accounting systems generally are not designed with this purpose in mind. Nor, until recently, has there been uniform methodological guidance available to the environmental units, resulting in a lack of comparability among ministries and over time.

Regarding tax policy, *no explicit use is made of taxes for environmental purposes*, but "environmentally related" taxes exist in the *energy and transport sectors* with differential taxation of diesel fuel and petrol. The current tax structure provides an incentive to use diesel, a fuel that leads to lower CO_2 emissions but is more harmful to human health than petrol because of its higher emissions of particulates.

Provisions in the tax code designed to encourage private investment, while formally neutral, may constitute de facto sectoral subsidies. Examples are accelerated depreciation for new investment and deduction of interest on loans paid by a subsidiary of a multinational enterprise to its parent company (a disguised form of investment). The latter provision is particularly important in large-scale mining, where tax revenue seems disappointingly low despite large production increases in recent years. This situation has given rise to a lively debate about *introducing a royalty tax or increasing licence fees in the mining sector*, as reflected by two draft laws sent to Congress in 2004 (Chapter 6).

Article 19 of the Chilean constitution prohibits *earmarking of tax revenue*, which has limited moves towards environmental taxation. Even revenue from entrance fees to national parks must be deposited with the Treasury as general revenue. A case could be made for partial self-financing of management and small-scale infrastructure improvements at national parks by allowing each unit in the park system to collect and use fees for agreed purposes. Indeed, an exception is already made with national parks or

protected areas within the boundaries of lands managed by indigenous peoples, e.g. a project of the National Corporation for Indigenous Development (CONADI) and National Forest Corporation (CONAF) in Los Flamencos National Reserve (Box 4.2).

The *principal rationale for environmental taxes and charges is their incentive effect* when they are well-targeted at environmental externalities. This objective is more important than the question of how the revenue might be used; discussions on the pros and cons of such measures could usefully be pursued. A positive feature of the individual transferable fishing quota for deep sea cod and orange roughy is that 10% of the annual quotas are issued by *auction*, resulting in a revenue gain for the Treasury. The allocation of bus routes to private operators was also done by auctioning permits. Auctions have not yet been used in connection with the trading of emission permits for stationary sources of suspended particulates in the Metropolitan Region.

1.4 Environmental finance

Only since 1998 has CONAMA systematically compiled time series data on *public sector environmental expenditure* (USD 253 million in 2002). Environmental investment varies more than current expenditure, having decreased from 51% of total environmental expenditure in 2000 to only 19% in 2003. These data are not directly comparable with the environmental expenditure data collected by OECD concerning its member countries. For instance, CONAMA data *exclude* environmental expenditure by municipalities (mostly for solid waste management) and that of private (but concession-holding) companies providing water supply and waste water treatment. Fragmentary data suggest that *municipal* environmental spending for solid waste management comes to at least USD 30 million per year. Regarding *private water companies*, 2003 expenditure on water supply and waste water treatment by publicly traded private enterprises was reported at about USD 345 million.

Regarding companies, their environmental expenditure was estimated at USD 60 million (private companies) and USD 52 million (state-owned mining companies). Finally, *NGOs* are conduits for some environmental expenditure, such as funds provided by the Global Environment Facility and its Small Subsidies Programme, Fondo de las Americas (a debt-swap programme with the United States) and CONAMA's Environmental Protection Fund. Foreign sources provided USD 40.6 million over 1994-2004, or about USD 3.7 million per year, and NGOs themselves may have raised USD 1.8-3.7 million directly per year.

Overall, *total environmental expenditure* (i.e. pollution abatement and control expenditure plus nature protection and water supply expenditure) was close to *1.25% of GDP* in recent years, a figure in the lower middle range of OECD countries.

2.3 *Economic instruments: prices, taxes, subsidies*

Water and waste service pricing

The present water pricing regulatory framework was set up in 1989 with the Superintendency of Sanitation Services (SISS) as the supervisory body. This pricing system, put into effect gradually over 1990-98, allows *full cost recovery* for drinking water supply and sewage collection and treatment. A related *large rise in water prices* preceded the privatisation of water utilities, which began in 1998. In the process the water and sanitation industry went from a centralised public structure to a regionalised private one. The *privatisation/concession* programme for water and sanitation brought in USD 2.4 billion in foreign direct investment over 1998-2003 (Chapter 3). Mechanisms were established to transfer public funds (USD 35-40 million a year) to cover much of the water bill for the *urban poor* (615 000 families) and *rural poor* (61 500 families) (Chapter 3). The restructuring of the water service sector has been quite successful and can be regarded as a model case.

Progress has been made with *municipal waste management* (Box 5.4). Some 80% of municipalities with over 50 000 people have put their waste services under concession. User charges for municipal waste collection and disposal do not recover costs and are largely financed by the municipal budget. Real estate with a tax

valuation of less than USD 14 500 is exempt from property tax and has long had de facto exemption from waste charges (which are paid with the property tax). A 1995 amendment to the Law of Municipal Revenue made it possible for municipalities to collect waste charges on properties that are exempt from property tax but have a tax valuation between USD 1 300 and USD 14 000. The amendment significantly reduced exemptions, as some 60% of properties fall into this category. User charges are linked to weight: a flat fee covers collection and disposal services for up to a set amount of waste. In 2000, in an effort to increase cost recovery, the amount was reduced from 200 to 60 litres per household per day. Some municipalities apply the same fee for all households, other differentiate the fee according to the area and the frequency of service. Some lower the fee for the poorest households. The law provides for adjusting the fee according to the tax valuation of the property or electricity and water consumption, but this is rarely done. Considerable progress is still needed in *industrial waste management* (Box 5.4). Chile should consider introducing product charges to facilitate the handling of selected waste streams, in particular hazardous waste.

Fiscal measures

Taxation of road fuel includes a tax on petrol, which rose from 3.5 UTM/m^3 in 1998 to 6 UTM/m^3 in 2001 and has remained unchanged since, and a tax on diesel (1.5 UTM/m^3), unchanged since 1998. When applied to imported fuel these taxes are based on the CIF price plus import duty and 19% VAT; on domestic production they apply to the producer price including VAT. Since 2000 these taxes have increased the final price by about 20-35% for diesel and 40-60% for gasoline. *Road fuel prices in Chile are low by OECD Europe standards and closer to US and Canadian prices* (Figure 5.2). Taxation on road fuel is not related to environmental concerns. Taxes on diesel fuel, for instance, might be reviewed to better internalise external effects on human health. Suggestions concerning *green taxes* on road fuel and heavy fuel oil have met opposition.

Since 1974 a *registration tax has been imposed on imported new vehicles*, increasing with engine power and price. A surcharge levied on entry of luxury vehicles (price over USD 18 200) is to be phased out by 2007. Most new cars, whether imported or locally assembled, are also subject to the customary 19% VAT. As owners of sport utility vehicles and pickups were registering them as light commercial vehicles to avoid paying VAT, stringent controls were imposed in 2003. Used cars, which cannot be imported, are subject to a *one-off sales tax* equivalent to 0.5% of the selling price. Municipalities levy an *annual motor vehicle tax* starting at USD 30 and increasing with the market value of the vehicle, in a range of 2-4% of the vehicle price. It generates some USD 50 million a year. Vehicles are also subject

to an annual inspection charge of USD 8 for vehicles equipped with catalytic converters and USD 4 for others. Overall, vehicle taxation is not related to environmental concerns. Overall taxation of vehicle ownership (as opposed to vehicle use) is likely to decrease with the implementation of free trade agreements.

To exploit natural resources, *concession holders must hold a patent*. Revenue from the acquisition of *mining patents* (USD 30 million a year) are divided between a regional development fund (70%) and the municipalities concerned (30%). *Fishery patents* increase with ship size and concession area. The 1991 Fishing Law sets the annual patent at between 0.5 UTM per gross weight tonne for ships with fishing capacity below 100 gwt and 1.5 UTM/gwt for ships with capacity over 1 200 gwt. A one-off patent applies to fish farming, based on the concession area. Since 1992 patent payments have been attributed to the Fisheries Research Fund rather than the general budget. They account for more than 60% of total patent payments. The fund's budget rose accordingly to USD 7 million a year. CONAF manages *tourism patents* for hotels and campsites in protected areas, which bring in USD 140 000 a year. In all sectors, patent rates have not been set high enough to capture all resource rents.

Environment-related subsidies

Overall *agricultural support* is limited, though some commodity-specific support measures persist (Chapter 3). Chile has no policy to shift from market price support towards direct payments. No environmental payments are made to farmers. *Irrigation subsidies* involving budgetary transfers averaging USD 15 million a year have been paid since 1985. Concerning *forestry*, tree *planting subsidies* were introduced in 1974 to develop Chile's potential for highly productive tree plantations (Chapter 6). In 1998 the subsidy programme focus was shifted to small landowners and soil conservation objectives. The programme involves budgetary transfers of USD 9 million a year on average. A 1997 draft law on native forest provides for *incentives towards sustainable forest management* (Chapter 6). Concerning *protected areas*, the 1994 General Environmental Framework Law prescribes property *tax exemptions* for public and private protected areas.

Concerning *corporate environmental performance*, the *National Economic Development Agency* (CORFO) makes various financial instruments available to business, including *long-term credits and co-financing*. It offers its resources through private financial entities whose specialisation makes them particularly efficient at channelling and allocating resources. CORFO also co-ordinates support to *small and medium sized enterprises* (SMEs) through instruments including development funds (fondos de fomento). In one CORFO programme, several SMEs can form a Cooperative Development Project (PROFO) to seek joint solutions to common problems, including environmental ones. The programme can provide up to USD 250 000 over three years to finance consultants and equipment. This approach

could foster the development of clusters or bubbles of firms deciding how to meet an overall environmental target, possibly through trading among emission sources. The Technical Assistance Fund (FAT) can grant up to USD 3 500 yearly to enables an SME to hire consultants or advisers in areas such as design, finance, production, marketing, quality assurance and environmental control. The fund has fostered development of *eco-auditing and environmental assessment*. The Provider Development Programme (PDP) seeks to establish mutually beneficial relationships between large companies and their smaller suppliers. In 2003 environmental funding from PROFO, FAT and PDP was, respectively, USD 1.4 million, USD 1.2 million and USD 0.5 million, accounting for 98% of *CORFO environmental support to SMEs*.

Other funds with much higher budgets, which could potentially promote technological innovation and the adoption by SMEs of cleaner production techniques, include: the Programme to Support Management of Exporting Companies (PREMEX), which finances 50% of private initiatives to introduce modern technology into exporter companies; Financing for Technological Innovation Projects (FONTEC), another CORFO financial instrument; and the Fund for Innovation and Development (FDI).

Finally, subsidies have been granted for technological retrofitting to phase out *ozone-depleting substances* through the national programme for Montreal Protocol implementation, and to increase the share of *LPG buses* in the Metropolitan Region (USD 20 000/bus).

Other economic instruments

Road tolls have been charged since 1963. There are 165 tollbooths on main highways. The fee increases with vehicle weight and on weekends when traffic is higher. The revenue of USD 110 million a year goes to maintain and develop road infrastructure. Tolls are regulated for roads under concession (e.g. the Melón tunnel in Santiago), which has sometimes led to conflicts with users. Successive calls for *road pricing* and congestion pricing (i.e. higher tolls and taxes on car use in city centres) led to the introduction in Congress of a proposal in the mid-1990s but it was not approved. The municipality of Santiago charges *parking fees* at a rate across the city of around USD 1 per hour.

CONAF administers *entrance fees* for its SNAPSE network of protected areas (Chapter 4). The revenue of USD 1.8 million a year is significant, accounting for 90% of CONAF's total income (the remaining 10% come from tourism patents and timber harvesting).

A *deposit-refund programme* applies to glass and plastic containers for beer and other beverages. Producers charge distributors USD 0.36 per container, which

distributors pass on to consumers. On average consumers return 80-85% of empty containers; 100% is not achievable, as some small retailers do not give refunds for empty containers (the programme is not compulsory) or accept empty containers only in exchange for beverage purchases.

2.4 *Economic instruments: trading mechanisms*

In Latin America, *Chile has been a leader* in conceiving and implementing trading mechanisms to achieve environmental objectives, acquiring experience in trading of permits for point sources of particulate matter in Santiago, water rights nationwide (with active trading in Region IV) and individual transferable fishing quotas for several species.

A *draft law on decontamination bonds* submitted recently to Congress would permit expansion of tradable emission permit programmes, increasing flexibility and effectiveness in addressing air and water pollution and soil contamination. The bill includes criteria for initial allocations, market regulations, and provisions for reporting and certifying emission reduction. Initially, emission permits would be awarded free of charge. They would be subject to periodic revision to bring them in line with emission reduction goals. The bill also provides for the awarding and banking of pollution control credits. Limitations and restrictions on the use of permits and credits would be used to minimise such undesired effects as development of hot spots. The bill provides for high fines for non-compliance.

The bill proposes *CONAMA as the oversight authority*. To assure transparency, security, liquidity and price continuity CONAMA would need to record transactions, emission control and enforcement, with separate registers for emission permits, clean-up credits and accredited emission certification agencies, along with sources, sinks and non-source participants.

Trading systems would be used only for *pollutants and areas for which clean-up plans exist*. They could involve air, water or soil pollutants. For example a trading system for PM_{10} and NO_x emissions could be established as part of the Metropolitan Region's Air Pollution Prevention and Clean-up Plan (PPDA), covering large stationary sources and public transportation.

Trading in air pollutant emission permits

A *tradable emission permit programme* was begun in 1992 to control TSP *from stationary sources in the Metropolitan Region*. In practice, coverage is confined to industrial and residential boilers, as it proved too difficult and expensive to include emissions from industrial processes, which accounted for 56% of the total for

industry. The aggregate emission reduction goal was close to 80%. Existing sources already held *daily emission bonds* in perpetuity, based on the source's size and fuel type. New sources and additions to existing sources have to buy emission rights to cover their emission capacity.

In the early stages of implementation the programme was very effective in helping authorities *inventory sources and emissions*, since grandfathering permits instead of auctioning them created incentives for emitters to declare their emissions and claim the corresponding permits. Many firms did take advantage of the market by buying permits instead of making irreversible investments that would have proved uneconomical after the arrival of natural gas.

PM_{10} emissions by industry decreased from 9.1 tonnes per day in 1992 to 4.3 tonnes in 1998 while the share of boilers in total industrial emissions fell from 44% to 30%. The *programme affects only a small proportion of TSP emissions*, however, so its effect on overall performance is limited. The emission reduction objectives were not met until 1997. The sharp decline in TSP emissions from industrial sources that began that year and subsequently accelerated was mainly due to the arrival of low-price *natural gas from Argentina* displacing dirtier coal and oil in

all economic sectors. Emission reduction was also due, to a lesser extent, to investments by industry to avoid having to shut down during emergency and pre-emergency air pollution episodes.

Trading water rights

Although water is considered a national asset, individuals can own perpetual and irreversible water rights. As these rights are independent of land use and land ownership, trade in them is fairly unrestricted. This is a real *free market*, in which water rights are traded without a government intermediary. Water trading in Chile thus differs fundamentally from the system in the western United States, where rights are defined by appropriation and trading is subject to many restrictions.

The 1981 Water Code provides the legal basis for trading of water rights (Box 3.2). In practice, most transactions are between irrigators. The most active market, in the Limarí Valley (Region IV) sees the rights to some 7.2 million m^3 of water change hands each year; in most other parts of the country, water markets are inactive. Rather than efficiency in water use, the greatest economic impact has been to boost private investment by hydropower companies due to increased legal security of property rights. Many water conflicts have gone to court. The debate continues on how to reform the Water Code and address such issues as *co-ordinating* multiple water uses, managing river basins, resolving conflicts between sectors or between consumptive and non-consumptive uses, protecting river ecosystems and assuring environmental flows (Chapter 3).

Individual transferable fishing quotas

Individual transferable quotas are allocated to fishers for squat lobster (since 1992), black hake or deep cod (since 1992), yellow prawn (since 1997) and orange roughy (since 1999). These species account for about *1% of total landings by volume* and 2% by value. For catch control, vessels under quota must accept the presence of scientific observers, and processing plants have to receive information about the catch.

Fishing permits are defined as *shares of total allowable catch* (TAC). Annual TAC is defined on the basis of biological criteria, with updated information. The system does not provide for any type of individual back payments if TAC diminishes.

Quotas are allocated through *open bidding at public auction*. When they are applied for the first time to a given fishery, 100% of the TAC for the coming year is auctioned. Each permit lasts ten years. To promote active trading, a divestment mechanism requires 10% of the TAC to be re-auctioned each year, so the initial permits are reduced accordingly. To maintain their quotas, operators have to keep

re-entering the market. Fishers that do not consume their quota during the calendar year cannot carry the remaining portion forward; i.e. there is no possibility of banking. Though quotas by law are open to foreign investors, a barrier to new entrants is that fish can only be landed by Chilean vessels.

2.2 *Plantation forests*

Tree planting subsidies

Tree planting subsidies have *evolved over the years*. They were introduced in 1974 (Decree Law 701) to develop Chile's potential for highly productive plantation forests. Subsidies (from USD 150/hectare in the early 1980s to USD 400/hectare in recent years) cover 75-90% of plantation and maintenance costs for the first rotation. Initially subsidies mainly benefited big landowners (those owning more than 1 000 hectares). In 1998 the subsidy programme was reformed (Law 19.561) to increase participation of small landowners and strengthen the focus on soil conservation. Land prices have dramatically increased, and large tracts suitable for plantation are scarce. Despite higher per-hectare incentives for afforestation, the industry has shifted its plantation programmes and pulp mill investments to countries such as Argentina where cheap land is still widely available. The *new challenge* is to develop farm forestry in Chile, encouraging farmers to plant trees on land that is marginal for crops. In 2004 small landowners were the main beneficiaries, with 40 000 hectares planted (compared to 5 000 hectares in 1997). Since 2002, smallholders been received technical assistance and been encouraged to form associations to seek economies of scale.

Since the support programme began, *about 50% of afforestation has been subsidised* (Figure 6.2). Over 1974-2002 some USD 225 million in budgetary transfers were made. Even though subsidy rates are higher for native species, most of the payments have been used to plant exotic species, especially Monterey pine (Pinus radiata). More recently, eucalypts have been favoured because of their short maturation (generally no more than 15 years), higher end-product prices and Asian consumer preference.

2. Trade and Environment

The key feature of Chilean trade policy in the 1990s was the search for new export markets. At the beginning of the decade Chile began developing a trade policy based on three main points: first, across-the-board unilateral reduction of *import tariffs* (the rate was 11% from 1991 to 1999, when it began to be reduced, reaching 6% in 2003); second, participation in *multilateral trade negotiations*, including those of the World Trade Organization (WTO) and the Free Trade Area of the Americas; third, bilateral negotiations and related *trade agreements* (Box 8.1).

As a result, export volumes grew strongly from 1990 to 2004, at an annual average of 10.1%. This expansion was mainly due to non-traditional exports, which grew by 13% a year, while shipments of copper grew by 10.7% and non-copper traditional exports (e.g. fresh fruit, fishmeal, cellulose and paper) grew by 5.6%. Exports now account for *36% of GDP*.

Natural resources and their derivatives play an important role: *mining* represents 46% of exports, *agriculture* 17%, *fishing* 9% and *forestry* 13%, for a total of 85%, compared to 15% from industry. The country's top ten export products, representing nearly USD 9.7 billion, are directly derived from natural resources. Dependence on natural resource exports has encouraged Chile to promote mutually supportive trade

and environmental policies and to develop an open and proactive position on trade and environment issues. Chile participates actively in the WTO Trade and Environment Committee and argues that eliminating subsidies on agricultural exports and fishing is beneficial both for environmental protection and for international trade. Chile has proved that it not only places environmental concerns in the context of trade liberalisation but is also willing to take on environmental obligations in the context of bilateral free trade negotiations. To date it has signed three trade agreements that include environmental dimensions.

Chile-Canada Agreement on Environmental Cooperation

The first Chilean trade agreement to incorporate an environmental dimension was the Chile-Canada Free Trade Agreement, which entered into force in July 1997 together with the Chile-Canada Agreement on Environmental Cooperation. The latter was negotiated as an interim agreement pending Chilean accession to the North American Free Trade Agreement (NAFTA), and hence mirrors the North American Agreement on Environmental Cooperation. In the event, Chile did not accede to NAFTA; the agreement remains *actively implemented by Canada and Chile*. It reaffirms each country's right to set its own policies, priorities and levels of environmental protection, and obliges both to maintain high levels of environmental protection and to enforce their own environmental laws effectively, setting fines for non-compliance. This obligation prompted Chile to begin a *review of over 1 200 pieces of legislation* fitting the definition of environmental law, with a view to ensuring that they complement and are consistent with the General Environmental Framework Law (Law 19.300). Additional work is required on this review and to clarify *enforcement responsibilities* of the National Environment Commission (CONAMA) and other environment-related services. Key to implementation of the agreement is its work programme, approved by a council composed of Canada's environment minister and the executive director of CONAMA. The current *fourth work programme* includes several mutually defined co-operative activities related to enforcement, public participation, trade and environment and health and environment issues. Chile and Canada both provide in-kind and financial resources for these activities.

Chile-EU Association Agreement

The Chile-EU Association Agreement (2003) also includes an environmental dimension. *Not merely a trade agreement*, it is a political and economic association based upon trade, political dialogue and co-operation. The agreement includes provisions on trade in goods, antidumping, border measures, rules of origin, sanitary and phytosanitary measures, wines and spirits, trade in services (including telecommunications), maritime transport, financial services, government procurement, competition, dispute settlement

and intellectual property rights. *Environmental co-operation* is one of over 30 co-operation areas identified in the agreement. In addition, the other areas include energy, mining, fishing and agriculture, which are environment-related. No specific resources are identified to support environmental co-operation, but the parties commit themselves to providing, within the limits of their capacities, the resources needed. A sustainability impact assessment study by the European Commission on the trade part of the agreement concluded that it should increase Chile's GDP by 0.5% and help raise the standard of living. Key parts of the agreement, including trade provisions, have been applied since February 2003, but the agreement as a whole will not enter into force until all EU countries' parliaments ratify it.

The section on co-operation emphasises the need to work together on social development, economic growth and environmental protection. Article 28 states that the purpose of the environmental co-operation is to promote conservation and improvement of the environment, to prevent pollution and the degradation of natural resources and ecosystems and to promote rational resource use, in the interest of *sustainable development*. Essential points include the relationship between poverty and environment; the environmental impact of economic activities; development of environmental projects; exchange of information, technology and experience; environmental education and citizen participation; and technical assistance and regional research programmes.

Chile-US Free Trade Agreement and Environmental Cooperation Agreement

The Chile-US Free Trade Agreement (FTA), which entered into force in January 2004, includes an environment chapter. Like the Canada-Chile environmental agreement, this chapter reaffirms each country's right to set its own policies, priorities and levels of environmental protection, and obliges both to maintain *high levels of environmental protection*. The provision on effective enforcement focuses on enforcement failures that result in a trade advantage, and allows for trade sanctions if agreed remedial actions are not carried out. An environmental review by the US administration concluded that the agreement would not have significant environmental impacts in the US, but identifies issues of concern related to the dependence of Chile's economy on natural resources for exports. Although the economic and environmental impact on these resources are considered minimal, the US administration recommended *eight projects* to respond to the concerns: developing a Pollutant Release and Transfer Register (PRTR); reducing mining pollution; improving environmental enforcement and compliance assurance; sharing private sector expertise; improving agricultural practices; reducing methyl bromide emissions; improving wildlife protection and management; and increasing the use of cleaner fuels. The Environmental Cooperation Agreement, negotiated following the FTA and not yet in force, will help guide future co-operative projects between the two countries.

Strategic environmental assessment of trade agreements

While Chile recognises the importance of strengthening environmental management given an export-led development strategy dependent on natural resources, it lacks a policy of conducting *strategic environmental assessments* or *sustainability assessments* of trade agreements or economic policies. Such assessments would help identify environmental pressures that could arise if productive sectors expand, particularly pressures that cannot be identified through project-focused environmental impact assessments (EIAs). As mentioned above, the EU conducted a sustainability assessment of the Chile-EU Association Agreement and the US performed an environmental review of the Chile-US FTA. Chile has some experience in this field; it employed a computable general equilibrium model to assess the potential effects of the Chile-US and Chile-EU FTAs. More in-depth assessments of the potential impact in various sectors could assist Chile in anticipating and responding to environmental pressures and identifying co-operative activities.