

ENVIRONMENTAL PERFORMANCE REVIEWS

CHILE

CONCLUSIONS AND RECOMMENDATIONS

**ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
UN ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN**

1

CONCLUSIONS AND RECOMMENDATIONS*

Since 1990, Chile has experienced rapid, increasingly diversified, export-led economic growth, with a 108% rise in GDP. This economic development was supported by sound macroeconomic and social policies and resulted in significant reductions in poverty. It also put considerable pressure on some natural resources, particularly in booming sectors such as mining, forestry and aquaculture. Environmental conditions in Chile should be understood in the context of its rapid pace of development.

Evidence of increasingly severe environmental degradation (e.g. in air quality in the Santiago Metropolitan Region and around copper smelters in northern Chile), together with the restoration of democratic institutions in 1990, led to greater emphasis on environmental protection. Environmental policy has been strongly influenced by concerns over human health and international trade (as Chile exports principally to OECD countries). Chile has strengthened its environmental institutions on the basis of a multisectoral environmental co-ordination model. It has also intensified its environmental actions concerning air, water, waste and biodiversity management, with innovative instruments (e.g. trading) and successful reforms (e.g. in water services). Important challenges remain in continuing with environmental management progress and integrating environmental concerns in sectoral policies (e.g. concerning agriculture, energy, transport, primary industry, tourism and taxation). Chile is aware of the gap regarding convergence with environmental standards of OECD countries, in particular in the context of free trade agreements and multilateral environmental agreements.

To meet these challenges, it will be necessary for Chile to: i) thoroughly and efficiently implement its environmental policies; ii) further integrate environmental concerns into economic, social and sectoral decisions; and iii) strengthen its international environmental co-operation. This report examines progress made by Chile since 1990, and the extent to which the country's domestic objectives and international commitments are being met. Fifty-two recommendations are made that could help strengthen Chile's environmental progress in the context of sustainable development.

* The Environmental Performance Review of Chile was conducted jointly by the OECD and UN ECLAC. The present Conclusions and Recommendations were reviewed and approved by the OECD Working Party on Environmental Performance at its meeting on 24 January 2005.

1. Environmental Management

Implementing environmental policies

During the review period (1990-2004) Chile strengthened its environmental institutions, most notably with the 1994 General Environmental Framework Law, which established the National Environment Commission (CONAMA), reporting directly to the President's office through the Ministry General Secretariat of the Presidency. CONAMA is a public body that operates as a decentralised service under a special regime, with a public legal personality and assets. It co-ordinates government environmental policies, prepares environmental regulations and fosters integration of environmental concerns in other policy. Much of Chile's environmental progress over the review period was driven by concerns about pollution's health impacts (and related effects on health expenditure and labour productivity) and the need for corporate environmental responsibility in industries largely exporting to OECD countries. Chile uses a wide range of instruments in connection with environmental policy: environmental impact assessment (EIA), other regulatory instruments, economic instruments (including trading mechanisms), voluntary approaches and planning and information instruments. It has put relatively low emphasis on regulation and information and, more recently, increased focus on land use planning and voluntary approaches. As a precautionary tool, the EIA system is well established and has proved active and influential. Chile was a pioneer in the use of trading mechanisms such as tradable particulate emission permits in Santiago, nationwide trading of water rights and individual transferable quotas for some fish species. These programmes have provided invaluable experience and are potential first steps towards wider or more active markets, but at their current scale the economic efficiency benefits are small. A major and successful reform in water and sanitation service provision to households led to the restructuring of the water sector, full-cost pricing and rapid infrastructure improvement. This reform reinforced Chile's progress towards fully applying the polluter pays and user pays principles. Efforts to ensure that at least half of municipal solid waste is deposited in sanitary landfills were reinforced in 2002, and the target appears to have been reached for the country as a whole. Voluntary approaches now involve many firms, accounting for about half of GDP, largely because their export markets are OECD countries where consumers, producers and financial institutions are used to high environmental standards. Total public and private environmental expenditure (including water supply) has reached about 1.25% of GDP in recent years. Most expenditure has gone to water-related infrastructure and reducing copper smelter emissions.

Looking ahead, health issues and export-oriented concerns will continue to drive environmental progress in Chile, including further reductions in air emissions (e.g. from industry, energy production and transport) and continued improvement in water-related infrastructure and domestic and industrial waste management. Nature and biodiversity should increasingly be protected as assets for the domestic and international recreation and tourism industries. As the road to environmental convergence with many OECD countries will remain long as regards several issues, it will be necessary to strengthen and expand environmental institutions considerably. In particular, stronger actions are needed concerning EIAs; quality and emission standards for air, water, waste and nature management; the use of economic instruments; territorial management policies; and national as well as regional plans and strategies. An environmental enforcement policy based on co-ordination of various sectoral enforcement bodies is not the most effective institutional arrangement to assure compliance. Integration of environmental concerns in regional and municipal land use planning is needed, and the coverage and implementation of spatial plans should be expanded and strengthened. Economic information and analysis affecting environmental decisions should be strengthened considerably.

Recommendations:

- develop and strengthen the environmental institutions at national and regional levels;
- further develop and strengthen regulatory frameworks (e.g. standards) to improve environmental health and to achieve Chile's international commitments; review ways to strengthen compliance and enforcement capacity, including through institutional reforms, for instance the establishment of an environmental inspectorate;
- review the scope for introducing new economic instruments (e.g. product charges on hazardous waste, air emission charges, water pollution charges) and improve trading mechanisms;
- further apply the polluter pays and user pays principles through appropriate charges (e.g. on waste management, for access to protected areas, for natural resources), with due regard to social constraints;
- further develop and strengthen land use plans: municipal and intermunicipal plans, regional urban development plans and coastline and watershed management plans; survey wetlands and assure their protection through regulations and incentives;
- develop a national set of indicators to measure environmental performance with respect to domestic objectives and international commitments.

Air

Changes in fuel quality have helped reduce the amount of sulphur from mobile and stationary sources and have eliminated lead from petrol. National ambient air quality standards have been made more stringent and, for some air pollutants such as particulate matter, include triggers for alerts, pre-emergencies and emergencies. New vehicle standards will be only five years behind the EU and US standards. Plans for air pollution prevention and control in the Metropolitan Region (1998 and 2004) have been, respectively, implemented and launched, allowing significant reductions in emissions of criteria pollutants and in the number of pre-emergencies. No emergency levels have been recorded since 2000. The transport plan of Santiago could significantly improve traffic management in the Metropolitan Region. An emission trading programme for particulates was established in 1992 for point sources. Switching to natural gas contributed to sizable reductions in PM₁₀ and PM_{2.5} levels. The elimination of coal subsidies was also environmentally beneficial. Sulphur, particulate and arsenic emissions from copper smelters have been considerably reduced.

Chile continues to face major health and air pollution challenges in the Metropolitan Region (which accounts for 40% of the country's population and 48% of GDP) and in the mining sector (with major sources of SO_x, particulates and arsenic). General emission standards are lacking for industrial processes and for emitters of toxic air contaminants (except arsenic from copper smelters). Air quality is monitored, and emission inventories have been developed, only for a few major cities and for areas surrounding copper smelters. Emissions of SO_x remain very high, mainly because of copper smelter emissions, and should be further reduced. The pollution prevention and control goals for NO_x emissions in the Metropolitan Region were not achieved, largely because of traffic growth; new, more stringent goals have been set for 2010. The national energy efficiency programme has been discontinued. Little effort has been made to diversify energy sources with a view to reducing emissions of air pollutants and greenhouse gases. Highly polluting solid fuels (e.g. coal and coke) are untaxed. Little attention has been given to the use of fiscal instruments to internalise environmental externalities in the transport and energy sectors.

Recommendations:

- make further progress with the implementation of air quality programmes, including those concerning the mining sector and those focusing on PM_{2.5}, PM₁₀ and ozone; monitor progress and the programmes' impact on health through appropriate indicators;
- develop nationwide emission standards (e.g. for a range of industrial sources and for toxic air pollutants);
- develop air monitoring in all major cities and an integrated air data management system;
- develop energy efficiency measures for all aspects of energy consumption;
- review the future energy supply mix (including contingency plans), taking into account environmental concerns (such as emissions of air pollutants and greenhouse gases);
- implement air, traffic and transport management plans in the Metropolitan Region; develop and implement improved plans to reduce emissions from transport in all cities.

Water

Since the late 1990s Chile has undertaken a major water reform concerning the delivery of water supply and sanitation services. As a result, provision of water infrastructure has dramatically increased in line with the regionalisation and privatisation of water companies. Two-thirds of the urban population is now connected to waste water treatment, and plans call for urban sewage treatment to continue to increase. Full cost recovery pricing applies to public water supply and sewage treatment, in the context of price regulation at the regional level and subsidies to the poorest 18-20% of the population. Water prices increase in summer to reflect water scarcity. Minimum river flow is included in the 1994 General Environmental Framework Law and is broadly taken into account in the allocation of surface water rights; more specific legal provisions have been proposed for inclusion in the Water Code. A pioneering nationwide system of tradable water rights was introduced for surface water and groundwater with the 1981 Water Code, but active trading remains mainly confined to some irrigated areas. There is high compliance with the World Health Organization drinking water quality standards. Effluent discharge standards were recently introduced for industry, covering both direct discharges and discharges to sewers.

However, even though most Chilean water bodies are of acceptable quality, water quality is poor in some lakes, rivers and coastal waters, mainly due to untreated urban and industrial sewage discharges. There is also pressure from heavy metals from mining in the north, salmon farming inputs in the south and farm inputs in rural areas. A large share of freshwater species is endangered. There are no water quality objectives aimed at preserving ecosystems, though they are being discussed. Water quality monitoring and inspection are dispersed among various agencies. Only the Health Code provides authority for enforcement (sanctions), environmental standards having a lower legal status. Irrigation subsidies have contributed to water scarcity problems in the centre-north, though efforts are being made to increase cost recovery. Flood management has not received much attention in urban planning and there is a lack of storm water collectors. The concept of river basin management is only just being talked about.

Recommendations:

- continue to invest in sewerage, waste water treatment and other sanitation infrastructure in urban and rural areas;
- increase the effective treatment of industrial effluents, and strengthen water inspection and enforcement capacities;
- reduce the effects of agriculture (e.g. those related to irrigation, nutrients, pesticides and salinisation) on water quality and quantity;
- develop an integrated watershed approach to improve water and forest resource management and to provide environment-related services more efficiently;
- give greater weight in water management to protection of aquatic ecosystems; improve the integration of nature concerns in water management by setting up a robust regime for minimum ecological flows and biological water quality standards;
- improve the information and knowledge base for water management (e.g. monitoring of ambient water quality, registry of water rights, data on expenditure and financing).

Nature and biodiversity

Since 1990 Chile has enacted several laws with a nature protection dimension, and it adopted a national biodiversity strategy in late 2003. More detailed regional biodiversity strategies and a national biodiversity action plan are in preparation. Natural resource laws and regulations incorporate sustainable management provisions, as do the plans for tourism development. Chile has designated for legal protection almost one-fifth of its territory, including nine Ramsar sites and seven UNESCO biosphere reserves. In addition, private interests (NGOs, companies and individuals) manage almost 17 000 km² (equivalent to about 12% of state protected areas) for conservation purposes. Agencies operate recovery programmes for threatened species such as the Andean deer and the flamingo but not for freshwater species. Progress has been made in recent years in setting up and consolidating a knowledge base about nature and ecosystems.

Nevertheless, the protection of nature has so far not been given enough emphasis and resources to deal with long-term threats to Chile's highly endemic biodiversity. There is no dedicated nature conservation law, and institutional and management structures make conservation objectives secondary to the wider goals of relevant agencies. Despite improvements over the review period, nature and biodiversity protection and its enforcement are still underfunded. The country's species, their conservation status and the functioning of Chile's ecosystems remain insufficiently known. Government policies do not adequately acknowledge the value of nature as a vital asset for the tourism industry or make the most of tourism's potential to contribute to the financing of nature management. Despite the high overall protection ratio, many significant ecosystems and habitat types are under-represented, and the target of protecting 10% of all significant ecosystems by 2010 will not be met at the present rate of progress. The management of protected areas suffers from a lack of financing and investment. The absence of effective arrangements for spatial planning, other than sectoral planning mechanisms, leaves habitats outside of protected areas vulnerable to destruction. Native forests not in protected areas continue to suffer from fires of human origin and illegal cutting of valuable species. Only limited progress has been made so far in integrating biodiversity considerations in water management.

Recommendations:

- complete, firmly implement and devote adequate resources to the national and regional biodiversity strategies and action plans;
- review institutional and legislative arrangements for the management of nature and biodiversity;
- develop a strategic vision of the complementary roles of state and private protected areas in order to achieve a coherent network of core protected areas, buffer zones and ecological corridors;
- step up financial efforts to meet the target of protecting 10% of all significant ecosystems in Chile (including coastal and marine areas) and boost nature-related enforcement activities;
- mount a co-ordinated effort by state agencies and academia to build the scientific knowledge base (including cataloguing of living species) required for nature management;
- speed up progress towards establishing an effective land use planning system capable of taking biodiversity values into account;
- identify and use further mechanisms, including economic instruments, for creating win-win opportunities in tourism and nature policies.

2. Towards Sustainable Development

Integration of environmental concerns in economic decisions

From 1990 to 2004 Chile experienced high, diversified, export-led growth supported by sound macroeconomic and social policies, resulting in significant reductions in poverty but also considerable pressure on some natural resources, though certain pressures (e.g. from SO_x) have been reduced. The 1994 General Environmental Framework Law incorporates the notion of sustainable development in recognising three clear objectives: i) sustaining equitable improvement in individuals' quality of life without compromising future generations' expectations; ii) ensuring that socio-economic development and environmental sustainability are complementary; and iii) improving social equity and eradicating poverty. Policy coherence for sustainable development is supported by the Sustainable Development Council, established in 1998 as an advisory body to the President. With few production-based or input subsidies, Chile does not have many potentially environmentally harmful subsidies; however, there are subsidies for irrigation water and for afforestation projects, mainly oriented towards small-scale farmers. Availability of natural gas from Argentina led to the relatively rapid spread of combined-cycle gas turbine generators beginning in 1998, displacing coal and fuel oil; this, together with retrofitting of home heating systems, led to substantial reductions in emissions of particulate matter from power generation along with lower CO₂ emissions. New public and private investment proposals are subject to EIA, ensuring that some attention is given to environmental considerations at project level. Desire to meet the demands of buyers in Chile's export markets, for instance for agricultural products, led to clean production agreements (e.g. with pig producers, winegrowers, fruit and vegetable exporters and cheese producers) and a national certification system for organic products. Implementation of environmental policies does not seem to have diminished the country's international competitiveness; in a number of sectors, rigorous compliance with demanding environmental standards is seen as necessary for the penetration of Chilean products on OECD countries' markets.

Overall, Chile has not achieved the strong decoupling between environmental pressures and growth seen in a number of OECD countries (except SO_x and PM₁₀ emissions in the Metropolitan Region). A national investment system is responsible for standards, techniques and procedures to guide public sector investment approvals, but gives little attention to environmental issues. Quantitative cost-benefit analyses are carried out for the establishment of environmental standards and decontamination plans; they should be

used more extensively to support decisions concerning projects and instruments affecting the environment. In the annual budgeting process at national level, most environmental expenditure originates with sectoral ministries, where environmental priorities compete with others. Although the sustainable growth of the electric power sector is an explicit goal of Chilean energy policy, little attention is given to environmental concerns as such. No strategic environmental assessment of national energy development and regional or national transport plans has yet been done. In agriculture, environmental concerns are only partially integrated through growing awareness regarding water quality, water quantity in several regions, and pesticide use. More analysis of the environmental significance of distorted market signals is needed in some sectors. Regarding tax policy, there is no explicit use of taxes for environmental purposes, and the environment-related taxes in the energy and transport sectors were designed with little attention to their environmental impact. Chile has no national sustainable development strategy. Overall, integration of environmental concerns into economic and sectoral decision making should be fostered to improve environmental performance and move towards sustainable development. Such integration is also needed to achieve cost-effective responses to environmental challenges. Economic forces and changes in such sectors as energy, transport, industry, tourism, agriculture and other primary sectors strongly influence environmental conditions and trends, and hence can enhance or diminish the benefits of environmental policies. With its export-led growth, Chile has a considerable chance to capture the economic and environmental benefits of win-win situations.

Recommendations:

- develop economic analyses of environment-related policies, expanding both economic information on the environment (e.g. on environmental expenditure, environment-related taxes, health risk assessment, water and energy prices) and cost-benefit analysis of projects and legislation relating to the environment;
- review ways and means of integrating environmental concerns in fiscal instruments and policies;
- undertake strategic environmental assessments concerning i) Chile's energy policy framework and ii) long-term transport plans for the Santiago Metropolitan Region, for other urban areas and at national level;
- based on analysis of the social cost and benefits of energy efficiency and non-conventional renewables, consider providing a positive financial incentive to encourage faster uptake;
- ensure that successors to the clean production agreements in the agriculture sector include dated targets for pesticide and nutrient management, expressed as intensity of use, and annual audited progress reports;
- formalise institutional integration mechanisms relating to sustainable development.

Sectoral integration: mining, forestry, aquaculture

Mining

The mining sector accounts for 8.2% of GDP and 42% of export value. Chile is the world's biggest copper producer. Mine output has increased by 265% since 1990. Copper production is capital-intensive and employs 1.2% of the total labour force. An environmental unit was created in the Ministry of Mining in 1991. Chile has reduced copper smelters' SO_x emissions by two-thirds, set standards for their arsenic emissions and improved their energy efficiency. Mining was an early user of EIAs. The country's 14 largest mining companies, including state-owned CODELCO (the world's largest single producer of copper), have ISO 14001 certification or apply their own systems of corporate environmental management. Large mining companies have engaged in a voluntary clean production agreement. Progress towards environmentally sustainable mining is well on its way.

Nevertheless, mining activities still cause the bulk of SO_x emissions in Chile and arsenic emissions in several regions. Particulate emissions need to be further reduced and water use efficiency increased in the sector. One-third of abandoned tailing dams are in unacceptable or deficient condition. Nearly half of mining sewage from large companies is not treated. Small and medium-sized mining companies often do not comply with regulations. Little is known about soil contamination by heavy metals and toxic contaminants generated by mining activities. Chile has no clean-up plans for abandoned mines. The environmental impact of transporting minerals has been evaluated only in the context of the EIA system. Progress towards sustainable mining will require an appropriate balance among its economic, environmental and social dimensions, including mechanisms to support investment in human and social capital, to apply the polluter pays principle and to capture resource rents associated with mineral exploitation.

Forestry

The forestry industry accounts for 3.5% of GDP and 12% of export value. Chile is the world's third-largest exporter of wood chips and sixth-largest of pulp. Planting of trees, a renewable natural resource, has increased dramatically: at 2.2 million hectares, plantations make up 14% of forest cover. Harvest in plantation forests has increased by 180% since 1990, easing pressure for harvest in native forests, whose cover has remained remarkably high at 13.4 million hectares. Chile has adopted standards concerning deforestation, such as compulsory reforestation after forest harvesting, selective thinning on heavy slopes, and soil classification to avoid conversion to farming. Almost one-third of native forests are in protected areas. Since 1974, intensive tree planting (mainly Monterey pine) on coastal mountains has aided restoration of eroded land abandoned by farmers. A draft law on native forests seeks to introduce payments to farmers who own native forests and adopt sustainable forest management practices while diversifying their income. Progress towards sustainable forest management has begun. Pilot projects using sustainable management have been carried out in native forest since 1992. Forest certification has spread in recent years.

However, little attention has been given to the environmental effects, both beneficial and harmful, of tree planting (e.g. as regards soil and water conservation, water quality and biodiversity). Any forest harvest of more than 500 hectares a year is supposed to undergo EIA, but owners avoid this by segmenting the area cut; nor is EIA required for new planting. Though timber harvesting in native forest decreased as the use of plantation timber spread, harvesting for fuel continues. Tree plantations have little genetic diversity, and the growing reliance on clonal eucalypt plantations for pulp production increases the risk of epidemics. Tree planting subsidies (USD 225 million since 1974) have created an incentive for conversion of some native forest, though not on a major scale; subsidisation has been redirected to small landowners and soil conservation objectives. Little effort has been made to protect wooded river banks despite legal provisions to this effect. More attention could also be given to grouping forest owners for economies of scale in moving towards sustainable management of native forests.

Aquaculture

The volume of aquaculture production has grown by 825% since 1990, and Chile has become the world's second-largest producer and exporter of salmonids (after Norway). Under current plans production will double, particularly in the southern Regions X and XI, where aquaculture has become a capital-intensive industry with direct and indirect benefits for employment. The 2001 environmental regulation for aquaculture led to measures to safeguard the environment at cultivation sites and make aquaculture more sustainable. Preliminary site characterisation of new fish farms has become compulsory. The first reports on the state of the environment in the aquaculture sector are being prepared. Of about 1 400 aquaculture projects that have undergone EIAs, 60% were approved. In addition, 48 salmon producers (accounting for 80% of salmon exports) have signed a clean production agreement.

However, progress towards sustainable aquaculture is recent. Both the government and the fish farming industry have recognised the challenge and started addressing it. Water pollution by excess food and faeces can contribute to eutrophication of lakes, fjords and coastal areas. Controlling water quality in aquaculture areas also involves policies for other sectors, such as forestry (since the potential for salmon raising is higher in lakes surrounded by forested watersheds), agriculture (whose nutrient run-off affects water quality) and water services (given the effects of urban and industrial sewage treatment). Effective control of water quality thus requires comprehensive, intersectoral policies. Chilean aquaculture has made extensive use of antibiotics; regulations were established in 2003 to start controlling their use. Accidental escapes of adult salmon from sea cages in aquatic ecosystems have not been assessed. Particular attention should be paid to the rising demand for fishmeal in salmon farming, which could put pressure on some sea fish stocks (e.g. anchovy, mackerel, sardine), even though these stocks are under total allowable catch programmes. Local conflicts have arisen between industrial salmon farming and the tourism industry, though efforts are being made to complete delineation of areas deemed appropriate for aquaculture.

Recommendations:

- further reduce the environmental impact of the mining sector (e.g. air pollution by SO₂ and arsenic, water pollution, abandoned sites and tailing dams);
- give special attention to small and medium-sized mining enterprises through technological, financial and consultancy assistance and improved relationships with the largest mining firms;
- increase the financial contribution of the mining sector to support long-term investment in human and social capital and to apply the polluter pays principle according to the General Environmental Framework Law; consider a mechanism for proper capture of resource rents associated with mineral exploitation;
- promote agreement among stakeholders on strategic national orientations concerning forest resources (protection, sustainable management, plantation);
- adopt and implement measures to assure sustainable management of native forest, including rewards for environmental services, cross-compliance mechanisms, partnerships and co-operation among stakeholders on overall management;
- strengthen the enforcement capacities of the National Forestry Corporation (CONAF);
- improve environmental and health protection in aquaculture (e.g. as regards eutrophication, salmon escapes, ecological balance of lakes, antibiotics, epidemiological vigilance, eradication of infectious disease), particularly through strengthened enforcement capacities;
- apply the polluter pays principle in the aquaculture industry in the context of the General Environmental Framework Law;
- complete a precise aquaculture coastal zoning plan; adopt integrated environmental management for coastal areas.

Integration of environmental and social concerns

Chile made outstanding progress over the review period in reducing the share of the population living in poverty, from nearly 39% to 19%. More than 50% of the income of the poorest decile is derived from national social policies addressing: i) basic income needs, through transfers such as assistance pensions, family subsidies and water subsidies; ii) slums and other housing problems, through measures such as the Chile Barrio programme; iii) education, by providing primary education for all; iv) health, through a universal access plan (AUGE) covering 56 costly and common diseases; v) labour issues, by raising the minimum wage and introducing unemployment insurance; and vi) extreme poverty affecting people not covered by social networks, notably through the Chile Solidario programme. Although further

progress is needed, improvement in these areas is impressive. Poverty indicators are also taken into account in the distribution of regional funds and in municipal financing.

Regarding environmental democracy, progress has been made in the provision of environmental information (e.g. production of environmental statistics and publication of state of the environment reports) and legal bases for access to information, along with public participation and access to justice, and actions such as the establishment of a National Environmental Information System (SINIA). The National Statistics Institute has published environmental data each year since 1990. In 2001 it carried out the first survey on firms' environmental management. Improving participation and access to information have been clear goals of environmental policy in Chile. For instance, the General Environmental Framework Law establishes the principle of participation, while legislation on public transparency and integrity establishes the obligation to inform the public. The large number of environmental disputes treated in court shows that access to justice is exercised in practice. Health concerns drove many of the environmental improvements made by Chile in the review period. Remarkable results have been achieved in this respect. Air pollution abatement (e.g. of SO_x and particulates in the Metropolitan Region and of arsenic in Antofagasta Region II) and expansion of environmental infrastructure (drinking water supply, waste water treatment, solid waste disposal in sanitary landfills) have helped reduce and prevent ailments such as respiratory diseases, cancers, cholera, typhoid fever and hepatitis A. Some progress has also been made in environmental education, e.g. with the introduction of environmental material in primary and high school, the environmental certification of 132 schools and the environmental scout movement.

However, concerning environmental information, work on environmental data, environmental reporting and environmental indicators needs to be consolidated and regularly carried out. SINIA is to be further developed to integrate sectoral information, improve the quality of physical environmental information and include economic information on the environment (e.g. environmental expenditure, environmental employment, water prices). Public participation mechanisms and practice, which progressed over the review period, should be made more effective and systematic, both at national and territorial level, particularly in association with project-based EIAs and strategic environmental assessments (SEAs) of public policies, plans and programmes. Despite remarkable environmental health progress, much remains to be done. Health problems that have emerged or remain on the health-environment agenda include those related to outdoor air pollution from NO_x, ozone and fine particulates; to indoor pollution, which especially affects the poor; and to lack of access to safe water supply and sanitation services, also for the poor (in line with United Nations goals). For instance, 900 000 people still lack drinking water supply and sanitation. Continuous efforts are needed to combat respiratory diseases (particularly in children), cancer and emerging allergies. Environmental improvements should result in further health progress and related benefits in terms of reduced health costs, improved well-being and increased productivity in the Chilean economy. Regarding environmental education and awareness, much remains to be done concerning formal school curricula, as well as in the private sector (e.g. involving staff more in certification and corporate social responsibility, and promoting environmental training through professional associations) and the public sector (e.g. in association with sustainable development initiatives, project-related EIAs and SEAs of public policies, plans and programmes, and use of environmental performance indicators). Education and environmental campaigns increase acceptance of environmental policies and help prevent illegal dumping, energy inefficiency, water wastage, overuse of private transport and unhealthy behaviour.

Recommendations:

- consolidate efforts to produce environmental data, state of the environment reports and environmental indicators so as to strengthen decision making and public information, taking into account international methodologies;
- continue to develop public participation in processes such as project-based environmental impact assessments and strategic environmental assessments of public policies, plans and programmes;
- continue efforts to improve health through targeted environmental progress, with special attention to the poor; review the health impacts of pesticide use on agricultural workers and rural communities and implement risk reduction strategies and measures;
- strengthen environmental education and awareness through a long-term strategy of environmental learning and a national environmental education plan, including: i) further integration of environmental material in primary and secondary school curricula, and ii) development of environmental knowledge through professional associations and environmental management systems within enterprises;
- develop environmental employment, with specific attention to the material and cultural heritage as a base for tourism development and to biofood production for agriculture development.

3. Strengthening International Commitments

Over the review period, Chile concluded a number of trade agreements incorporating environmental dimensions and participated in global efforts to address environmental challenges. In the context of trade agreements, Chile has taken on significant obligations to promote high standards of environmental protection, to enforce environmental laws effectively and to not derogate such laws to attract investment. It has also promoted corporate social responsibility, with particular attention to environmental management in key export sectors. Chile has been a strong participant in the global environmental agenda as well, signing and ratifying most major multilateral environmental agreements and taking an active role in efforts to address ozone layer depletion as well as marine and maritime issues, especially as regards potential oil spills in its southern seaways, which receive heavy international traffic. At regional level Chile has been active in work to preserve the Antarctic, to reverse the vicuña's endangered status (efforts involve Argentina, Bolivia, Ecuador and Peru), to combat desertification of the Altiplano-Puna ecosystem shared with Peru, Argentina and Bolivia, and to preserve Ramsar Convention wetlands.

Chile's trade and environment agenda is influenced by market access concerns and treaty negotiating dynamics vis-à-vis its trade partners, as well as efforts to identify and address possible environmental effects of very rapid growth in natural resource-based export sectors. Chilean export companies have made progress in product certification and environmental management, improving Chile's reputation as a reliable supplier and securing access to foreign markets, but this has not always prevented local environmental damage from rapidly expanding export sectors. Regarding multilateral environmental agreements ratified by Chile, some lack follow-up implementation: legislation may be pending (e.g. on native forests and persistent organic pollutants), national action plans may not be in place (e.g. on biodiversity) or enforcement may be too weak (e.g. regarding endangered species).

Recommendations:

- continue efforts leading to ratification and implementation of international agreements and, as appropriate, OECD legal instruments, and publish periodic reviews of actions taken to meet international environmental commitments;
- continue to promote mutually supportive trade and environment policies through effective implementation and strengthening of the environmental regulatory framework and promotion of corporate social responsibility;
- ensure that co-operative activities associated with trade agreements are targeted to mitigate any adverse environmental impacts from large-scale natural resource exportation;
- strengthen chemical and hazardous waste management according to international agreements, notably the Stockholm, Rotterdam and Basel Conventions; complete and implement national plans for persistent organic pollutants and hazardous waste; strengthen enforcement activities, develop pollutant release and transfer registers and improve the regulatory framework to better manage chemicals throughout their life cycle;
- continue national and bilateral efforts in the areas of research, monitoring and sustainable management of marine ecosystems (e.g. sustainable fisheries, prevention of marine pollution); strengthen oil spill prevention and mitigation capacities;
- develop a balanced, scheduled strategy concerning climate change issues; strengthen energy efficiency and greenhouse gas mitigation policies, including through a cleaner energy mix, and promote the use of clean development mechanisms in the context of the UNFCCC and the Kyoto Protocol;
- develop further international environmental policies reflecting potential OECD membership, and an increasing role in Latin America and the world.