

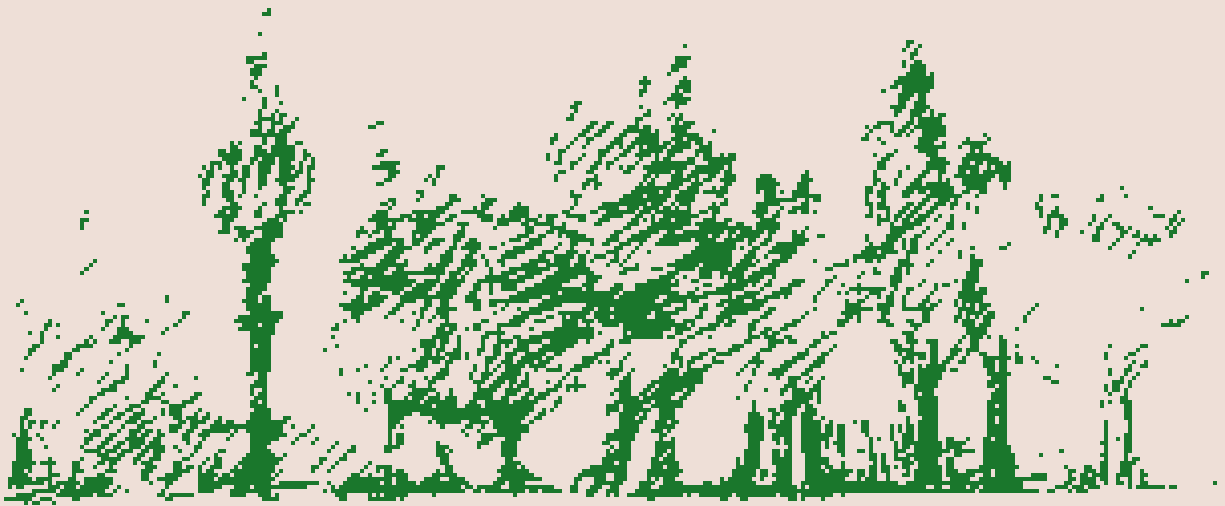
B U S I N E S S & I N V E S T M E N T O P P O R T U N I T I E S



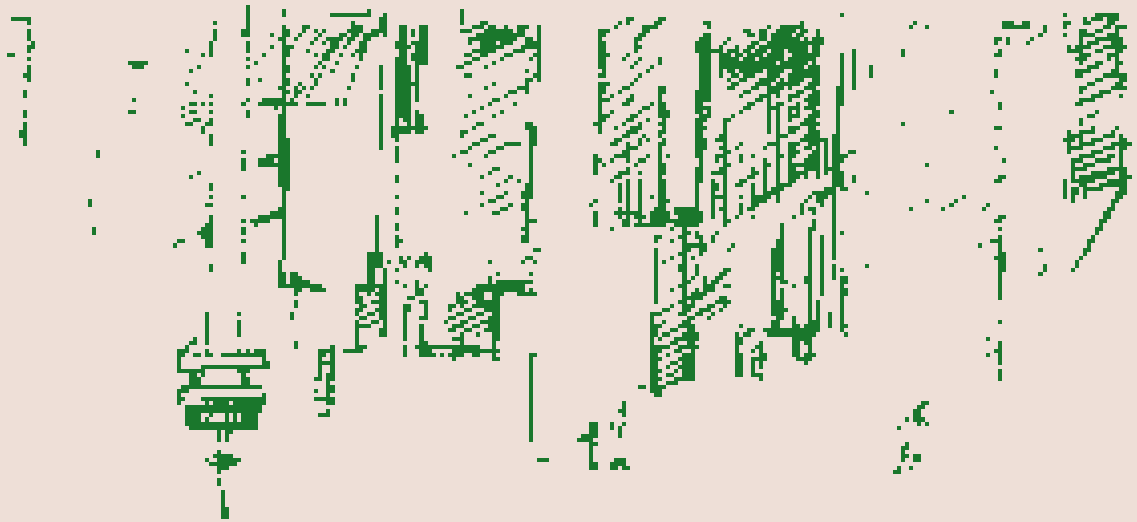
CHILE'S ENVIRONMENTAL MANAGEMENT FRAMEWORK



F O R E I G N I N V E S T M E N T C O M M I T T E E



CHILE'S ENVIRONMENTAL MANAGEMENT FRAMEWORK



BUSINESS OPPORTUNITIES IN SUSTAINABLE DEVELOPMENT



By Jorge Rodríguez
Minister of Economy, Mining and Energy

Chile has made great strides in recent years in developing regulations to protect the environment, which allows us to check the impact on air, soil and water and make rational use of natural resources. There are new emission and quality standards for air and water, a consolidated system of environmental impact assessment, and pollution prevention and abatement programs. These new demands on the productive sector are leading many companies to adopt cleaner or environmentally-friendly technologies, more sophisticated monitoring and measuring systems, and technical analysis and quality certification.

This book, edited by the Foreign Investment Committee, is one more sign of the government's conviction that economic growth and progress towards sustainable development is only possible with the active participation of the private sector, including both local and foreign companies. They are essential to bring in environmentally-friendly technologies and to continue to develop the industries that make use of Chile's natural resources.

Demand for environmental services will grow significantly in areas such as the treatment of liquid industrial effluents, proper disposal of all industrial waste, air emission controls, more energy - efficient productive processes, and recycling and minimization of waste, thus creating new market niches for companies in this sector.

Initiatives such as the Clean Production Agreements (CPAs), the National Council for Clean Production and various CORFO programs, are examples of the government's active determination to collaborate and interact with the business community in improving environmental standards in production processes.

Bringing the environmental factor into the productive sector has also helped create new areas of economic development, and changes in the type of investment projects in sectors such as tourism, urban transport, energy and recycling.

In the tourist industry, for example, there is a growing demand for eco-tourism. Chile's National System of Protected Areas covers 19% of our territory and offers an extraordinary diversity of landscape, flora and fauna, and recreation possibilities. To give access and make better use of these resources, the government is now promoting a "Chile Trail", a path which will stretch the length of the country at the height of the *pre-cordillera* and can be traveled on foot, on horseback or by bicycle. Until now the lack of infrastructure has limited the use of these wonderful natural landscape and countryside resources, and there are wide-ranging business opportunities in this area, for activities such as guided walks, fishing, rafting, mountain and volcano-climbing, gastronomic tours, and visits to folk festivals.

There is another area of new business around the introduction of new technologies and clean fuels in urban transportation. There are initiatives for bringing in new fuels, such as natural and liquid gas in buses and taxis, as well as for improving the quality of conventional fuel. This is a priority in the new pollution prevention and abatement plan for Santiago, as well as for other cities that seek to avoid future air pollution problems.

In the energy sector, the international agreements under the Climate Change Convention, and particularly the mechanism for clean development, offer major business opportunities. Companies from the developed world can, for example, invest in Chile and earn emission credits for operations in their own country, helping to meet their own national reduction targets, and financing a project that brings local and global environmental benefits. Energy sector projects in particular can take advantage of this mechanism, which helps improve energy efficiency and generate electricity from clean energy sources.

A final area with great business potential is waste disposal management, particularly re-using, recycling and disposing of dangerous waste. Chile already re-uses a high proportion of materials such as paper and cardboard, and lower percentage of plastic and glass, thus offering a potential for waste valuation. Treatment and disposal of potentially dangerous waste is an area where much more can be done. New regulations are being drafted on emissions produced by waste incineration, which will allow more use of this technology without harmful environmental effects.

Chile has been very successful in attracting foreign investment, largely thanks to its clear and stable rules. Today we are taking on the new challenge of consolidating our position as a regional leader for environmental services and for investments that make use of our natural resources. To achieve this goal we will stay firmly on the path of active coordination and collaboration between the public and the private sector, national and foreign.

REASONS TO INVEST IN CHILE

Strong Macroeconomic Fundamentals

The country's economy is growing robustly in a framework of low inflation rates, stable external accounts, declining levels of public external debt and strong international reserves. A rules-based approach to macroeconomic management and an autonomous and independent Central Bank ensure fiscal and monetary discipline.

Low-risk, Dynamic Business Environment

Political and social stability, together with the existence of open and competitive markets, guarantee a secure business environment. Stable and transparent rules, an efficient and independent judiciary, and a dynamic and innovative private sector that constitutes the main engine of growth, are all factors that further enhance the country's position as the most competitive economy in the Latin American region.

Outward-looking, Open and Competitive Economy

An extensive network of trade agreements with several other countries and trade blocs puts Chile in a privileged position as a global trader. Moreover, the country's commitment to reducing tariffs gradually until they reach 6% in 2003 will place it among the world's most open economies. Chile has also developed an increasingly dynamic export base, which has grown during the last decade at an average of 10.1% a year. Today, more than 5,600 companies export almost four thousand different products to 176 countries.

Human Capital

Chile shows the biggest advances in Latin America with regards to Human Development according to the United Nations Development Program (UNDP). It has achieved high marks in healthcare, life expectancy, education and housing. The country's total investment in education reaches 7% of GDP. These figures translate into a highly skilled workforce at the professional, technical and blue-collar level.

Solid Guarantees for Foreign Investors

Foreign investment is legally guaranteed by the Foreign Investment Statute (D.L. 600), which establishes clear and permanent rules based on Constitutional principles such as non-discrimination, neutrality and equal treatment for national and foreign investors.

High Marks from International Institutions

Chile is in the lead among Latin American countries and most emerging economies in the rankings and evaluations made by different international agencies such as Moody's, Standard & Poor's, Transparency International, the World Economic Forum, Heritage Foundation and most Wall Street investment banks. The accurate and impartial picture of the country's economic and financial performance provided by these institutions have positioned Chile as one of the most secure locations for foreign investment.

Modern Business and Technological Infrastructure

A modern telecommunications system, an internationally competitive and efficient banking sector, improved infrastructure, high computer penetration, excellent quality of life and increasing access to the Internet have proven to be key factors that have positively impressed foreign investors.

Multinational Investor Satisfaction

Some of the most important foreign multinational companies have chosen to locate production facilities or invest in Chile, operating in different sectors of the economy. Among the companies currently present in the country are: Nestlé, ABN Amro, Alcatel, Motorola, Placer Dome, AT&T, BHP, Mondavi, JP Morgan Chase, McDonald's, Hydro-Quebec, Tractebel, Telefónica de España, Dresdner Bank, Mitsubishi, Suez Lyonnaise Des Eux, Carrefour, Thames Water, Methanex, Endesa España, and Dragados.

Strategic Base in South America

Chile is an excellent base for capturing market share in South America. Many foreign investors and multinational companies have sought to diversify their access to new markets in the region using Chile as a reliable springboard. Thus, strategic alliances among Chilean and foreign businesses in order to invest in third countries have turned into genuine cooperative agreements, leading to the sharing of resources and know-how in a wide range of areas.

Praise and Recognition from Foreign Investors

Foreign Investors who know the country have only favorable opinions about their experience: "We find the Chilean government accessible and supportive" (BHP Minerals); "Chile is Latin America's most competitive country" (Komatsu); "Chile has talent, stability and quality of life" (Cisco); "Chile's lack of bureaucracy facilitates dynamic investment" (Shell); "Chile's foreign investors get the same treatment as local competitors" (Cintra); "Chilean professionals are hard-working and reliable" (Microsoft).

CHILE'S ENVIRONMENTAL POLICY



By Alvaro García
Minister of the Presidency

Since Chile returned to democracy in 1990, sustainable development has come to the fore as one of the country's new challenges. Now enshrined as a government objective, sustainable development requires a growth strategy that is compatible with protection of the environment and is also socially and economically just. Its key aim is to improve quality of life for a country's present inhabitants without mortgaging the prospects for future generations.

That is the Presidential message conveyed in the preface to Chile's Environmental Framework Law: "Sustainable development must protect the earth, water and genetic resources, not damage the environment, and be technically appropriate, economically viable and socially acceptable".

In the Chilean government we understand sustainable development as a triangle, the three sides of which are formed by economic growth, social justice and the protection of the environment. The equilibrium between these three priorities is a dynamic one and, if sustainable development is to be achieved, it is vital that a country's economic, social and environmental policies all converge to this end.

An environmental policy seeks to promote development which is sustainable in environmental terms and safeguards the right of a country's citizens to live in a pollution-free environment while, at the same time, preserving natural resources and environmental assets. An environmental policy's ultimate goal is to improve the quality of life of a country's present and future inhabitants. Environmental management is primarily a government function, but it involves both individual and public responsibilities. It requires the commitment and participation of all sectors of society, including industry, which must be willing to bear the costs of protecting the environment.

The Chilean government's environmental policy for sustainable development is compatible with its priorities in other areas. These include modernizing and decentralizing government, modernizing industry, reducing poverty, promoting equality of opportunity and improving its citizens' quality of life.

Sustainable development is not only an ethical issue; it is also an economic necessity. Legitimate environmental demands, increasingly made by consumers around the world, mean that industry must take environmental issues into account. In the future, production processes that are cleaner, or do not damage Chile's natural resources, will give the country a competitive edge in international markets, which attach mounting importance to the environment and the preservation of natural resources.

As it seeks to move in this direction, Chile already has the advantage of clear and effective rules. These make it easier for those affected to take the right decisions. At the same time, the country is working to strengthen its environmental institutions and is also implementing sector and cross-sector programs to improve the environment and quality of life and to protect eco-systems.

In one example of the progress achieved over recent years, 3,303 projects and productive activities have been submitted for certification under the new Environmental Impact Assessment System. By reducing the negative impact of public and private investment and introducing measures to mitigate or compensate for inevitable side effects, this system has meant a substantial change in the way that Chile is building its future.

In other words, Chile already has a mechanism that guarantees the environmental improvement of new investment projects. Today, no project that could damage environment is allowed to proceed without having passed through rigorous tests.

Chile is also developing a framework of environmental standards. By setting transparent rules, this will help the country to strike the correct balance between economic development and the protection of the environment. These standards establish, with the agreement of different sectors of society, the levels of pollutants that are compatible with public health and the protection of the environment.

By September 2001, eleven standards had been set and were in full operation. Six others were about to come into force while four were in the process of being set. The aim of these norms is to protect the health of the country's inhabitants, its water resources and the quality of its air. By establishing a clear framework for the country's economic activities, these standards make it easier to solve the environmental problems that have already been detected and to prevent problems for future generations.

FOREIGN INVESTMENT COMMITTEE

www.foreigninvestment.cl

The Foreign Investment Committee is the only legal entity authorized to act on behalf of the State of Chile to accept the inflow of foreign capital into the country under the Foreign Investment Statute (D.L. 600).

The Foreign Investment Committee is composed by the Ministers of Economy (who acts as President of the Committee) Finance, Foreign Relations and Planning plus the President of the Central Bank. Additionally, ministers who represent sectors to which a specific investment will be devoted to are required to participate at the Committee's sessions.

Mission

The Foreign Investment Committee aims to consolidate Chile's position as an attractive destination for foreign investment. It conducts all operational tasks related to the legal framework that regulates foreign investment, engages in promotional activities of various nature, and participates in international negotiations that pertain both to foreign investment in Chile and Chilean investment abroad.

Strategic objectives

- To provide a stable and secure environment for foreign investment through the administration of the legal framework stated in the Foreign Investment Statute (D.L. 600).
- To conduct all appropriate activities aimed at informing, promoting, coordinating and executing actions that foster the entry of foreign investment into Chile at the national, sector-specific and regional levels.
- To provide foreign investments in Chile and Chilean investment abroad with a growing level of stability and security through bilateral and multilateral agreements, and to represent Chile before international dispute-resolution entities in case of controversies related to investment issues.
- To maintain an up-to-date and accurate statistics database of foreign investment in Chile authorized and materialized under the D.L. 600.

The Executive Vice-Presidency

The Foreign Investment Committee is managed and administered at the operational level by the Executive Vice-President, who is appointed by the President of the Republic.

The Executive Vice-Presidency provides guidance to any foreign investor regarding the country, its economic and social environment, the legal framework and the policies towards foreign investment. It stands ready to give information on how to begin the process of setting up business in Chile and provide advice on procedures and regulations. In order to promote Chile as an attractive place to invest, it organizes business missions abroad and publishes regular reports on Chile's business climate and investment opportunities, both in print and in electronic form.

SUSTAINABILITY: A POWERFUL BUSINESS DRIVER



On behalf of the Foreign Investment Committee, I am proud to present our latest book, "Chile's Environmental Management Framework: Business & Investment Opportunities".

This new publication provides an overview of our country's environmental policies and of the progress that Chile has achieved since its Environmental Framework Law came into force in 1994. In addition, it seeks to explain the role that the State, business and non-governmental institutions play in environmental management and to provide a complete account of Chile's international environmental commitments. And, looking to the future, it examines the challenges - and business opportunities - that will emerge as the country advances on the path towards sustainable development.

We believe that sustainability is an immensely powerful business driver. The pursuit of sustainable development creates incentives for innovation and opens up new markets, thereby benefiting businesses by generating top-line growth and increased efficiency. Moreover, according to opinion surveys, consumers are increasingly disposed to favor products from those companies that care for the environment. These incentives, combined with the need to comply with new regulations and international commitments, are opening up a myriad of business opportunities in Chile for local and foreign companies that offer environmental products and services.

In this book, we provide comprehensive information about the many, exciting business opportunities that are being created by the move towards sustainable development. These are to be found not only in the environmental arena itself, but also in traditional sectors of the economy, such as mining, fishing and aquaculture, manufacturing and forestry, that need to introduce sustainable production and management techniques.

Foreign companies in Chile, through their adherence to the high standards already in force in their home countries, have pioneered the introduction of cleaner technologies, seeking ISO 14,000 certification and implementing environmental education programs for employees and for the communities in which they are located. Local firms are rapidly following suit and, as a result, we anticipate that the next few years will be extremely productive for environmental consultants and service providers, as well as for suppliers of technology and equipment, who are looking to set up or expand their businesses in Chile.

In compiling, organizing and analyzing the information presented in this book, the Foreign Investment Committee received help from a number of individuals and institutions with extensive experience in the environmental field. We wish to thank Alicia Bárcena and her team at ECLAC's Environmental and Human Settlements Division; Patricia Frenz at the National Commission for the Environment (CONAMA); Mónica Ríos at the Ministry of Economy, Mining and Energy; and Edda Rossi at the Ministry of Foreign Affairs' Division of International Economic Relations (DIRECON) for their invaluable contribution.

We hope this document will prove useful not only to those readers who want to explore business and investment opportunities in Chile's environmental sector, but to all those foreign investors who want to know more about Chile's determined progress on the road to sustainable development.

Welcome to Chile!

Karen Poniachik
Executive Vice-President
Foreign Investment Committee

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I. ECONOMIC & ENVIRONMENTAL GEOGRAPHY OF CHILE

1. Geography

Chile is located along the southwestern coast of South America, stretching approximately 4,300 km (2,666 miles) from the Atacama desert in the north to the polar icecap in the south.

The westernmost point of national territory is Easter Island in the Pacific Ocean, located 3,760 km to the west of Chile's continental coastline. The latter extends from parallel 17° 30' S to parallel 56° 32' S at Cape Horn, the southernmost tip of South America. Chile's claim over Antarctica encompasses the triangle between parallel 60° S and meridians 53° and 90° W as far as the South Pole.

Total land area: 756,626 km² (292,260 square miles) including continental Chile and its oceanic possessions (Easter Island and Sala y Gómez Island). The Chilean Antarctic Region encompasses an area of 1,250,000 km².

Boundaries: Chile's northern border with Peru runs 160 km along a line called *Línea de la Concordia*. To the east, a line linking the highest peaks of the Andes Mountain Range separates Chile from Argentina and Bolivia; its southern boundary is the South Pole, and its western border is the Pacific Ocean.

Coastline: 6,435 km (3,475 miles).

Climate: Chile's climate varies as dramatically as its territory: dry and arid conditions in the Atacama desert in the north, gradually easing to a temperate Mediterranean climate with mild wet winters and long dry summers in the central and southern regions, and areas of heavy rainfall in the extreme south. Average annual rainfall ranges from just a few millimeters in the north to 360 mm in Santiago, 1,300 mm in Concepción (Region VIII), and over 3,000 mm in the far south. Average temperatures in capital city Santiago range from a minimum of 13 C and a maximum of 32 C in the summer, to a minimum of 2 C and a maximum of 15 C in the winter.

Terrain: Chile has four major natural boundaries: the driest desert in the world in the north, the Andes Mountain Range, the Pacific Ocean, and Antarctica. Chile's territorial shape results in a multiplicity of geographic zones, each with particular climatic, hydrographic and ecological features. This results in an extraordinary variety of landscapes, providing enormous potential for economic activities linked to natural resources, particularly tourism and eco-tourism.

Natural resources: The northern regions possess abundant mineral reserves, especially copper. In the central zone there are a number of river valleys offering ideal conditions for vineyards, while in the center-south, the Central Valley provides fertile agricultural soil with extensive forestry resources at higher altitudes. The fjords in the far south provide excellent conditions for both fish farming and tourism. The Andes mountain range holds abundant water resources with great potential for hydroelectric power generation, and has historically acted as a barrier against the spread of plagues and disease. Lastly, the country's extensive coastline offers rich fishing grounds and is well endowed with a variety of marine resources.

Economic Activities linked to Natural Resources in each Geographic Zone

North: Copper, iron ore, nitrates, lithium, precious metals, molybdenum, river valleys suitable for agriculture, seafood.

Center: Agriculture (wheat, oats, barley, rye, rice, corn, beans, lentils, peas, potatoes, sugar beet, sunflower and rapeseed); fruit (plums, apricots, peaches, kiwis, lemons, apples, oranges, nectarines, avocados, pears, and table grapes); grazing lands; forestry; hydroelectric power; seafood.

South: Forestry, oil, natural gas, coal, limestone, sheep farming, seafood.

Demography: The regional distribution of the population varies according to orographic, climatic and hydrographic conditions, the availability and characteristics of natural resources and the dynamics of economic activity in the region - in particular, the location of industry. Population characteristics and dynamics have a major influence on the nation's economic development, land use, infrastructure needs and demand for goods and services, thereby also directly or indirectly affecting the country's natural and environmental resources.

Main Demographic Indicators (2000)

Total Population	15.2 million
Growth Rate	1.4%
Urban Population	85.8%
Rural Population	14.2%
Population Density	20.1 inhabitants per km ²

Source: National Statistics Bureau (www.ine.cl)

Chile's territory is divided into thirteen regions, numbered I to XII and Metropolitan Region. These are further divided into 51 provinces and 342 municipalities.

In Regions I, II and III, mining investments have resulted in human settlements being established close to mining centers, also generating population growth in port-cities, especially Arica, Iquique, Antofagasta and Caldera through which mining products are exported. In the central region, the greater availability and variety of natural resources allows more diversified economic activity, thereby contributing to greater homogeneity in the distribution and use of the land. In the austral region, climate and orographic conditions favor population concentrations in small settlements, although sheep and cattle ranching, together with oil drilling, give Chilean Patagonia a greater regional importance.

Population Density by Region (2000)

Region	Area (km ²)	Population (Million Inhabitants)	Density (Inhabitants/km ²)
I	58,698.1	398.9	6.80
II	126,443.9	468.4	3.70
III	75,573.3	273.6	3.62
IV	40,656.3	577.9	14.21
V	16,396.1	1,561.4	95.22
MR	15,348.8	6,102.2	397.57
VI	16,365.0	788.8	48.20
VII	30,301.7	915.2	30.20
VIII	36,929.3	1,936.3	52.43
IX	31,858.4	874.2	27.44
X	66,997.0	1,061.5	15.84
XI	109,024.9	95.0	0.87
XII	132,033.5	157.8	1.20
Country	756,626.3	15,211.3	20.10

Source: National Statistics Bureau, INE (www.ine.cl)

2. Regional Economic Dynamics

Chile's GDP amounted to approximately US\$ 70 billion in 2000. In Region I, the activities that generate the largest proportion of output are commerce, restaurants and hotels (31%) associated with tourism and the Duty Free Zone of Iquique; and manufacturing industry (18%). Mining is the fastest growing sector and accounts for 15% of regional GDP.

In Regions II, III and IV, mining is the main activity, representing 63%, 47% and 22% of regional GDP in each case. Forestry and farming production, particularly grape exports, generate 14% and 20% of GDP in Regions III and IV, respectively. Commerce and tourism are also important sectors in the coastal area.

Economic activity in Region V is concentrated in the manufacturing industry (19%), mainly tobacco, canned foods, the automobile sector, cement and oil refining; transport and communications (17%), including significant port activity; and commerce, restaurants and hotels (13%), associated with tourism and services for industry.

Farming and forestry are the main activities in Regions VI and VII (accounting for 30% and 32% of their respective output). Fruit exports and forestry, in particular, have enjoyed outstanding development in these regions. Mining is also important in Region VI, (mainly copper), while manufacturing, especially timber production, accounts for 22% of economic activity in Region VII.

Region VIII is dedicated to manufacturing activities (36%) associated with exports of cellulose, timber, fish meal, frozen foods and steel. Transport and communications (12%) related to ports, and commerce (10%) are also important.

Regions IX, X and XI account for a relatively smaller proportion of Chile's economic activity. In these three regions, agro-forestry is important (19%, 16% and 11%, respectively), based on traditional crops of grains and potatoes, together with dairy farming.

In Regions IX and X, the main activities are commerce, restaurants and hotels (19% and 14%, of regional GDP respectively) associated with tourism development. Fishing is the leading activity in Region X (17%), along with public administration (13% in Region X and 12% in Region XI). Although Region XI is geographically isolated, it possesses great potential for farming, forestry, marine resources, hydrogenetics and tourism, now that the Austral Highway makes its development feasible.

Mining (mainly oil, gas and coal production) and manufacturing industry are the main sources of GDP in Region XII (20% and 25% in that order). Livestock, tourism and fishing complete the regional economy.

The Metropolitan Region is the country's administrative, industrial, commercial, financial and cultural center. Commerce, restaurants and hotels account for 30% of local GDP, followed by 27% generated by financial services and 21% by the manufacturing industry.

Regional contributions to national GDP are uneven. While the Metropolitan Region accounts for nearly 48% of national GDP, the other regions, apart from II, V and VIII, contribute less than 5%. Regions II, V and VIII account for around 8%, 9% and 8%, respectively.

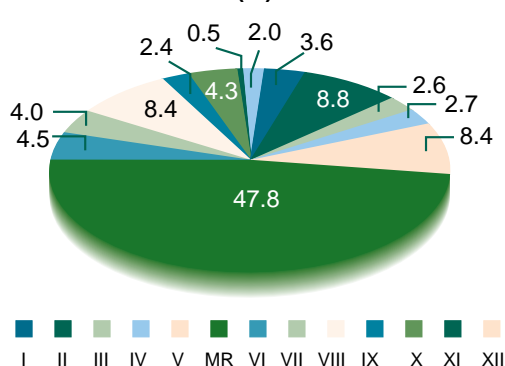
3. Main Economic Activities linked to Natural Resources

Mining

Mining is one of the key sectors in the Chilean economy, accounting for 10.1% of GDP in 2000; it is also the leading export sector, generating over 40% of total exports. The country's main export product, copper, represents 85% of total mining exports. Chile possesses approximately one-quarter of the world's copper reserves and is the world's largest producer. Copper mining activity is mainly concentrated in Region II, while Regions I, II, and III possess most of the nation's metallic and non-metallic mineral reserves.

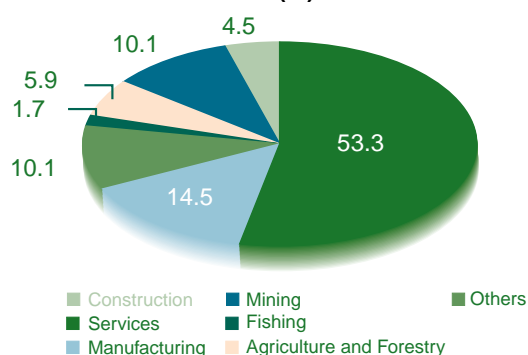
Chile also has the world's largest reserves of lithium (nearly 4.3 million tons at the *Salar de Atacama* in Region II – the largest single lithium deposit in the world). In addition, Chile has a significant fraction of world reserves of minerals such as rhenium, selenium, molybdenum and iodine.

Regional Participation in GDP (1998) (%)



Source: Central Bank of Chile (www.bcentral.cl)

GDP by Economic Sector (2000) (%)



Source: Central Bank of Chile (www.bcentral.cl)

Between 1974 and 2000, mining absorbed 34.5% of total Foreign Direct Investment. Private-sector participation has grown to represent two thirds of the nation's total copper production.

This sector's outstanding development has led to intensified use of water resources, affecting both the availability and quality of water. However, several steps have been taken to tackle this and other environmental problems caused by mining activities, including the adoption of strict emission standards at State copper smelting plants. The latter have yielded positive results, according to Chilean Copper Commission (COCHILCO) figures.

MAIN MINING EXPORTS (1995-2000)
\$US Million FOB

	1995	1996	1997	1998	1999	2000
Copper	6,487.1	6,028.6	6,840.8	5,331.6	5,888.5	7,346.6
Iron	123.9	146.9	149.5	163.4	125.8	141.7
Nitrate and Iodine	133.1	163.3	217.7	250.0	214.5	208.5
Metallic Silver	132.4	153.4	136.8	133.3	125.1	92.1
Oxide and Ferromolybdenum	441.6	223.6	261.6	222.3	171.1	180.8
Lithium Carbonate	38.6	39.6	40.5	39.5	47.9	53.0
Metallic Gold and Metal Doré	368.9	423.1	364.9	275.4	248.0	293.7
Mineral Gold	59.6	57.6	46.3	6.6	59.2	51.5
OTHERS	64.9	87.9	91.0	78.5	53.9	61.7
TOTAL	7,850.1	7,324.0	8,149.1	6,500.6	6,934.0	8,429.6

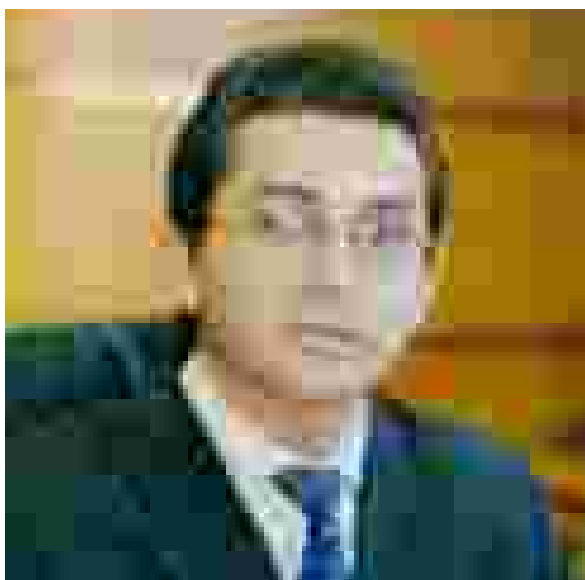
Source: Central Bank of Chile (www.bcentral.cl)

PLANS FOR REDUCING EMISSIONS OF SO₂ EMISSIONS AT STATE COPPER SMELTERS

Smelter / Region	Sulfur Dioxide Emissions (Thousand MT/year)										
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 (e)	2003 (e)
Chuquicamata, II	504	302	274	296	228	186	256	175	175	158	57
Potrerillos, III	330	331	351	347	327	336	283	100	100	100	-
Caletones, VI	789	767	760	760	740	710	479	494	230	230	-
Ventanas, V	119,5	123	118,4	117,3	85,2	44,8	30,7	-	-	-	-
Paipote, III	82,7	62,9	63,7	60	37,1	35,3	20	-	-	-	-
Chagres, V	17,4	13,6	10	12,6	15,4	12,6	12	-	-	-	-
Altonorte, II	-	80,8	102,5	94,9	83,1	43,6	40	-	-	-	-

Real emissions to 1999; Programmed emission limits set by decontamination plans from 2000 onwards
Source: COCHILCO (www.cochilco.cl)

MINING: THE AXIS OF CHILE'S PRESENT AND FUTURE DEVELOPMENT



By Patricio Cartagena
Executive-Vicepresident of the Chilean Copper Commission (COCHILCO)

The principles of sustainable development are universal. All societies must balance their economic, social, and environmental objectives, and meet the needs of their people, respecting social equality and the environment. At the same time they must ensure the same conditions for future generations.

For Chile, whose economy depends heavily on non-renewable mineral resources, sustainable development is critically important, both today and in the future. State and private mining companies have recognized and taken up the challenge of responsible resource management.

Chile is a world-class mining nation, producing more than 40 mining products. In 2000 it was the world's largest producer of copper, responsible for 34.7% of the world supply of mine copper and 18.1% of refined copper. Copper represents 42.5% of total national exports. Chile is also an important molybdenum, gold and silver producer.

Mining needs major capital investments, and offers new and varied jobs and business opportunities. During the 1990's, the sector provided more than 62,000 highly specialized direct jobs with wages above national industry levels; in addition, every direct job in mining generated 5.2 more indirect jobs in mining-related activities.

Mining is the most important industrial activity in northern Chile, where most mineral deposits are located, and it is the main source of income and social benefits for many remote towns close to mining operations. The sector drives the country's economic growth; it generates productive chains in other industrial areas and small businesses; it draws in foreign capital; helps develop highways and port facilities; promotes technology transfers; and contributes to installing and developing sanitary infrastructure. Mining is, quite literally, the axis of Chile's present and future development.

Over the past decade, public and private mining companies have shown special concern to bring their operations into line with the principles of sustainable development, to make their activities environmentally responsible, and to respect and support the social and cultural needs of the communities where they operate.

At the beginning of the 1980's, the industry started applying environmental policies for corporate management; later it implemented these in management systems, such as environmental impact studies, quality and emissions standards, and decontamination plans.

Today, the industry is working to implement sustainable development principles throughout the production cycle, with gains in efficiency and cost reductions. Socially, companies are taking on a role in promoting local development by building stronger ties with the community. The following are some examples of what they are doing:

- Companies have incorporated environmental policies to cover environmental management, security, and quality control, which work their way through the chain from management to workers.
- The industry has pioneered sustainable development principles in its operations, incorporating bio-diversity and environmental performance indicators in mining management, and reporting to the community in annual environmental reports.
- Private enterprises such as Escondida and Candelaria have received ISO 9,000 and 14,000 certifications while State company Codelco is working to obtain ISO 14,000 certification by the next years.
- Companies are adopting water-use efficiency programs with new technologies and more process-water recycling, to be able to reforest eventually.
- The industry is implementing programs to cut energy consumption per unit of metal produced, chiefly in copper mining.
- Socially, companies are actively managing their relationship with the environment, encouraging local social and productive activities to improve living conditions on sustainable bases, with programs for education, health, and the preservation of indigenous cultures.
- On the labor front, the companies can point to unionization rates that are higher than in other productive sectors. Development and training are a key factor in competitiveness. Good wages and benefits, and health and housing plans and programs, are examples of the industry concern to reconcile work with personal and family life. Efficient risk prevention policies have given mining the lowest industrial accident rate nationwide.

Chile, as a mining nation, has been responsible and creative in meeting the present challenges of sustainable growth, and can confidently face the new challenges of the future.

Forestry

Native forest in Chile covers approximately 13.4 million ha., equivalent to 17.8% of the national territory, mainly located in Regions X through XII. The country also has over 1.9 million ha. of planted forest, of which 75% is pine (approximately 1.4 million ha.) and 17% is eucalyptus (approximately 342,000 ha.), covering about 2.8% of the country's land area. Plantations are now the main source of timber, with native forests account for 15% of total forestry consumption.

During the second half of the twentieth century, Chile's forestry sector developed very strongly particularly in the wake of increased forest plantation. Growth in this sector has played a key role in the country's economy, accounting for 3.6% of GDP in 1998 as the second most important economic activity after mining. This economic expansion has

been reflected in higher levels of production and exports. Forestry exports amounted to approximately US\$ 2 billion in 1999 or 11% of total sales abroad, second only in importance copper. The growth of industrial forestry activity has led to the development of large-scale industrial complexes producing a wide variety of products, particularly cellulose, in large amounts, and including sawn timber, wood-chip, newsprint, furniture and hardboard.

Several steps have been taken to address the environmental challenges posed by forestry activities, among them the development of an active policy of reforestation. Reforestation and restoration of degraded land in itself has a social and environmental value, besides its potential for helping to mitigate global climate change.

FORESTRY RESOURCES AND LAND USE IN CHILE (1999)

	Million hectares	Share (%)
Total land area	75.4	100.0
Area suitable for forestation	33.8	44.8
Protected green areas	14.8	19.6
Forest area	15.6	20.8
Native forest	13.4	17.8
Productive native forest	10.4	13.8
Non-productive native forest	3.0	4.0
Tree farms	2.1	2.8
Mixed forest	0.1	0.1
Total timber lands (1)	12.5	16.6

(1) Productive native forest plus tree farms
Source: National Bureau of Forestry Research, INFOR (www.infor.cl)

Fishing and Aquaculture

Fishing in Chile grew at more than 10% per year over the last decade, with fish meal as its most important product. Chile has one of the world's five largest fishing industries, with 88% of total capture resulting from industrial fishing and the remaining 12% taken by small-scale activity.

During the 1990's, fish farming has been consolidating as a result of rapid investment in this sector and the favorable conditions that exist for this activity, particularly in Region X. By mid-2001, Chile was the second largest salmon producer in the world after Norway. Output of farmed salmon (Atlantic, Silver and King type) and trout (rainbow and steel head) totaled 200,600 tons in 1999, and the estimated production for 2000 is 271,500 tons, representing growth of approximately 35.34% in relation to the previous year.

The rapid growth of the fishing sector has posed some environmental challenges, including reductions in fish stocks and in the biomass of certain marine species. Stringent norms regarding discharges of industrial effluents are currently in force in order to combat marine pollution resulting from the increasing use of coastal areas and the concentration of processing plants in urban zones. Fish farming activities have generated problems due to an artificial increase in nutrients, such as nitrogen and phosphorus, and from excess food and fish faeces. Therefore, the government's environmental policies towards aquaculture have focused on promoting a process of industrial refitting aimed at more environmentally sustainable practices, as well as increasing the required standards through Environmental Impact Assessments (EIAS) and a new environmental regulations.

4. State of the Environment in Chile

Air quality

Poor air quality is a problem in several urban areas in Chile, especially in capital city Santiago. Many of the other main cities suffer moderate to high levels of air pollution resulting from urbanization and economic growth.

In Santiago, the magnitude of this problem and its impact on the population are much greater than in any other city.

The main causes of pollution in the capital are its natural geographic setting, demographic growth, and stationary and mobile sources of pollution; in winter these factors are compounded by thermal inversion and a lack of wind. Climatic variables are the key determinants of pollution levels in Santiago, which vary according to the season. An additional problem in Santiago linked to air pollution is noise.

Transport is the most polluting sector in the Metropolitan Region, accounting for 55.4% of emissions of particulate matter (PM₁₀), 81.1% of nitrogen oxides (NO_x), 93% of carbon monoxide (CO), 30% of Volatile Organic Compounds (VOCs) derived from fuel use and 31% of sulfur oxides (SO_x). Stationary sources (industries) account for 24% of particulate matter (PM₁₀) and 66% of sulfur oxides (SO_x). Volatile Organic Compounds (VOC) represent 38% of all residential emissions.

Other cities in Chile are also subject to air pollution stemming from industrial activities, such as oil refining, pulp and paper manufacture, fish meal production, mining and electric power generation.

INVENTORY OF EMISSIONS OF THE METROPOLITAN REGION (2000)

Emitting source	TONS PER YEAR					
	PM ₁₀	CO	NO _x	VOC	SO ₂	NH ₃
Stationary sources	1,043	6,505	8,174	4,128	6,600	201
Transport	2,425	174,196	46,180	24,456	3,130	933
Domestic	328	888	1,392	30,309	239	2,002
Others	576	5,851	1,175	21,198	22	26,213
TOTAL	4,372	187,440	56,921	80,091	9,990	29,348

Source: CONAMA Metropolitan Region (www.conama.cl)

A variety of steps have been taken to improve this situation. Environmental abatement plans are operating and air-quality monitoring systems have been established to evaluate air quality in several cities.

In the Metropolitan Region, additional measures have been taken to reduce pollution levels apart from drawing up a Pollution Abatement Plan. These include removing old and highly polluting buses from the road, introducing natural gas into the productive process of stationary emission sources, improving the quality of diesel fuel, and making catalytic converters compulsory in all new road vehicles. The vast majority of polluting enterprises have submitted pollution abatement action plans to the competent public body.

responsible for 68% of total water used per person/day, whereas agriculture accounts for 84% of consumptive water use.

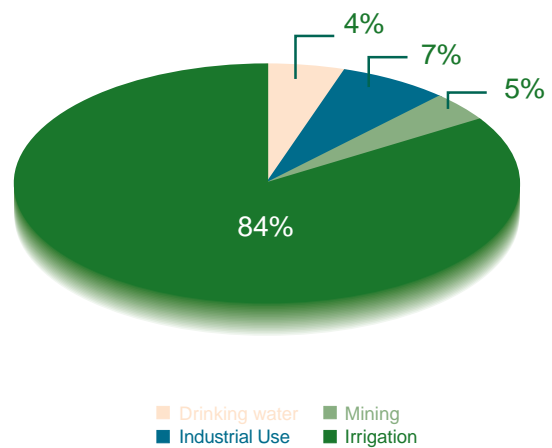
The quality of water stocks has been affected not only by the industrialization process, but also by natural causes, demographic growth and urban expansion. In the past, water pollution stemmed from the direct discharge of untreated domestic and industrial waste into surface, ground and sea waters. However, this practice has been strongly restricted by norms and procedures regulating discharges into rivers, sewage systems and lakes. There are also quality standards for surface inland waters while those for surface sea waters are expected to be in force by 2002.

Water quality and stocks

Chile has considerable surface water stocks, held in a series of river systems that originate in the Andes and flow into the Pacific Ocean. The country also has adequate data on rainfall and the flows and distribution of water courses to plan rational water use. Nonetheless, water availability is becoming a challenge in some parts of Chile, especially in the northern and Central Valley areas. This is not only a result of the productive activities carried out in these areas (mining, for example), which compete with urban or more traditional uses of water, but is also caused by prevailing geographical conditions in these regions, characterized by low rainfall levels.

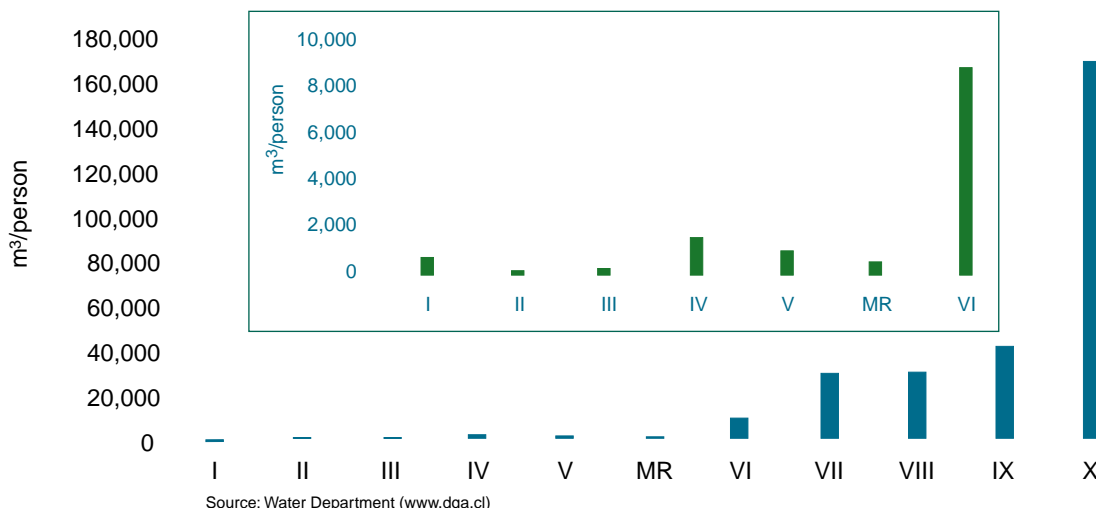
Demand for water comes from multiple sectors and may be for consumption or non-consumptive use, i.e. water that is recycled back to the system after use (for example in hydropower generation). Non-consumptive uses are

Water Demand for Consumptive Use (1999)



Source: Water Department (www.dga.cl)

Water Availability Per Person, by Region (1999)



Source: Water Department (www.dga.cl)

MAIN WATER POLLUTANTS BY REGION (1998)

Affected area	Source	Pollutant
Aconcagua, Maipo, and Bio Bio river basins; bays of Valparaíso (Region V) and San Vicente (Region VIII)	Domestic Waste Industrial Waste	Organic Material
Regions II, III, V and VIII	Domestic Waste Industrial Waste	Nitrogen and Phosphorus
Regions II, III, V and VIII	Domestic Waste Industrial Waste	TSS and TDS
Regions II, III, V and VIII	Domestic Waste Industrial Waste Mining	Metals (Copper, Cadmium, Lead and Zinc)
Elqui Valley (Region IV)	Mining	Arsenic
Regions II, III, V and VIII	Domestic Waste Industrial Waste	Fats

Source: CONAMA (www.conama.cl), Universidad de Talca (www.otalca.cl), Universidad de Concepción (www.udec.cl)

Solid Waste

Chile's domestic, industrial and hazardous solid wastes are mostly disposed of in sanitary landfills located close to urban areas. In addition, several companies treat and dispose hazardous wastes.

The generation of domestic solid wastes has been heavily influenced by population living standards, together with changes in household consumption patterns, and urbanization, compounded by the use of disposable products over recyclable ones. As a result, the volume of domestic solid waste production has grown considerably: In the Metropolitan Region, for example, the daily production of domestic solid waste has almost doubled from 0.6 kg per person in 1997 to 1.1 kg 1999. Similarly, recycling of domestic waste has also been increasing to reach 50% of paper, 30% of glass and 3% of plastics.

TYPES OF SOLID WASTE (1999)

Type	Tons/year
Domestic	3,337,000
Industrial	2,516,000
Construction	3,507,000
Mining	1,764,000
Hospital	29,330

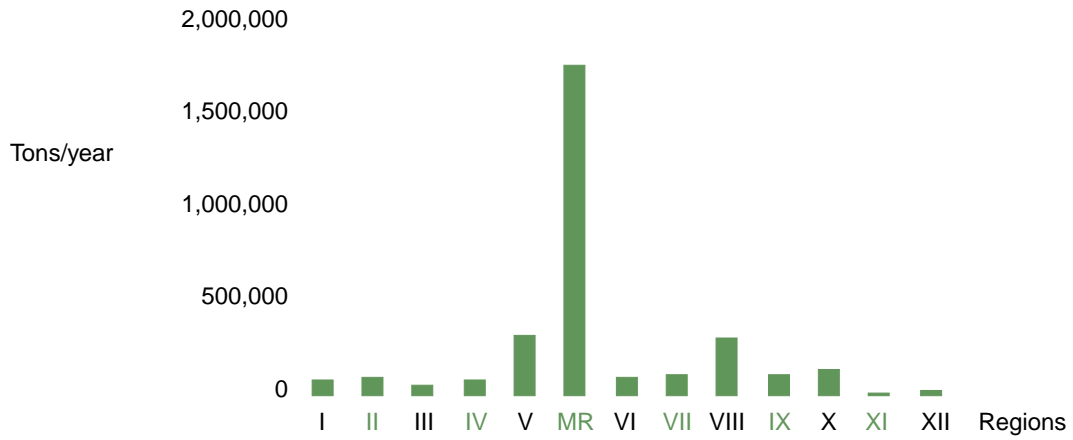
Source: CONAMA (www.conama.cl)

TRENDS IN SOURCES OF DOMESTIC SOLID WASTE IN THE METROPOLITAN REGION (%)

SOURCES	1992	1996	2000
Organic Waste	49.3	44.91	42.29
Paper and Cardboard	18.8	20.27	21.85
Ashes, dross, and other debris	5.9	5.47	5.07
Plastics	10.3	12.50	14.09
Textiles	4.3	4.66	5.04
Metals	2.3	2.38	2.46
Glass	1.6	1.84	2.12
Bones	0.5	0.52	0.54
Others	7.0	7.43	6.54

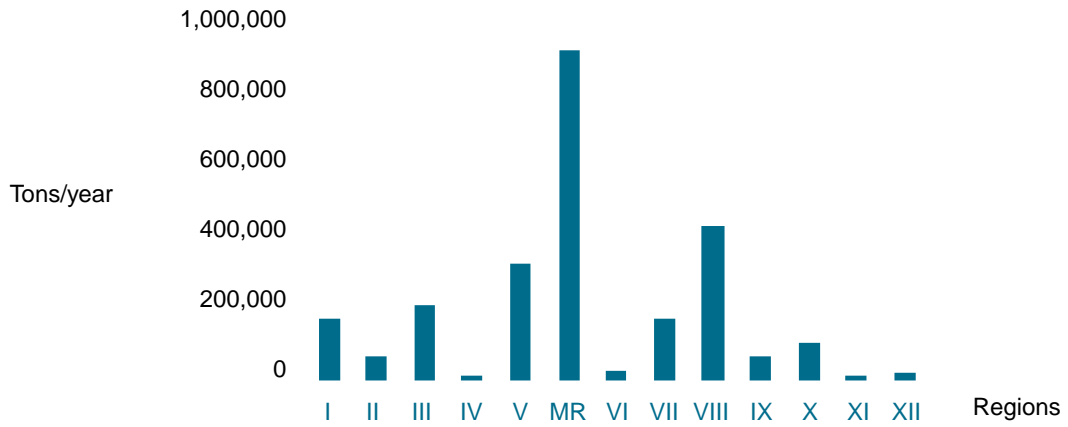
Source: Empresa Metropolitana de Residuos Ltda. (www.emeres.cl)

Domestic Solid Waste by Region



Source: CONAMA (www.conama.cl)

Industrial Solid Waste by Region



Source: CONAMA (www.conama.cl)



Land Use

Of Chile's total surface area of 75.7 million hectares, approximately 44.6% is suitable for forestry, 18% for livestock and agriculture, and the remaining 29.4 % is unproductive for agricultural and forestry activities.

The two main issues affecting land use are soil pollution and erosion. In the north, there are high concentrations of copper and lead in the soil in copper mining zones. In the country's agricultural areas, residues of fertilizers and pesticides affect soil quality, mainly as result of pesticide use in traditional fruit and agriculture crops.

Erosion is another challenge, especially in Regions I through VII, and in Regions XI and XII. Land degradation, caused by water and wind-driven erosion processes, has also been

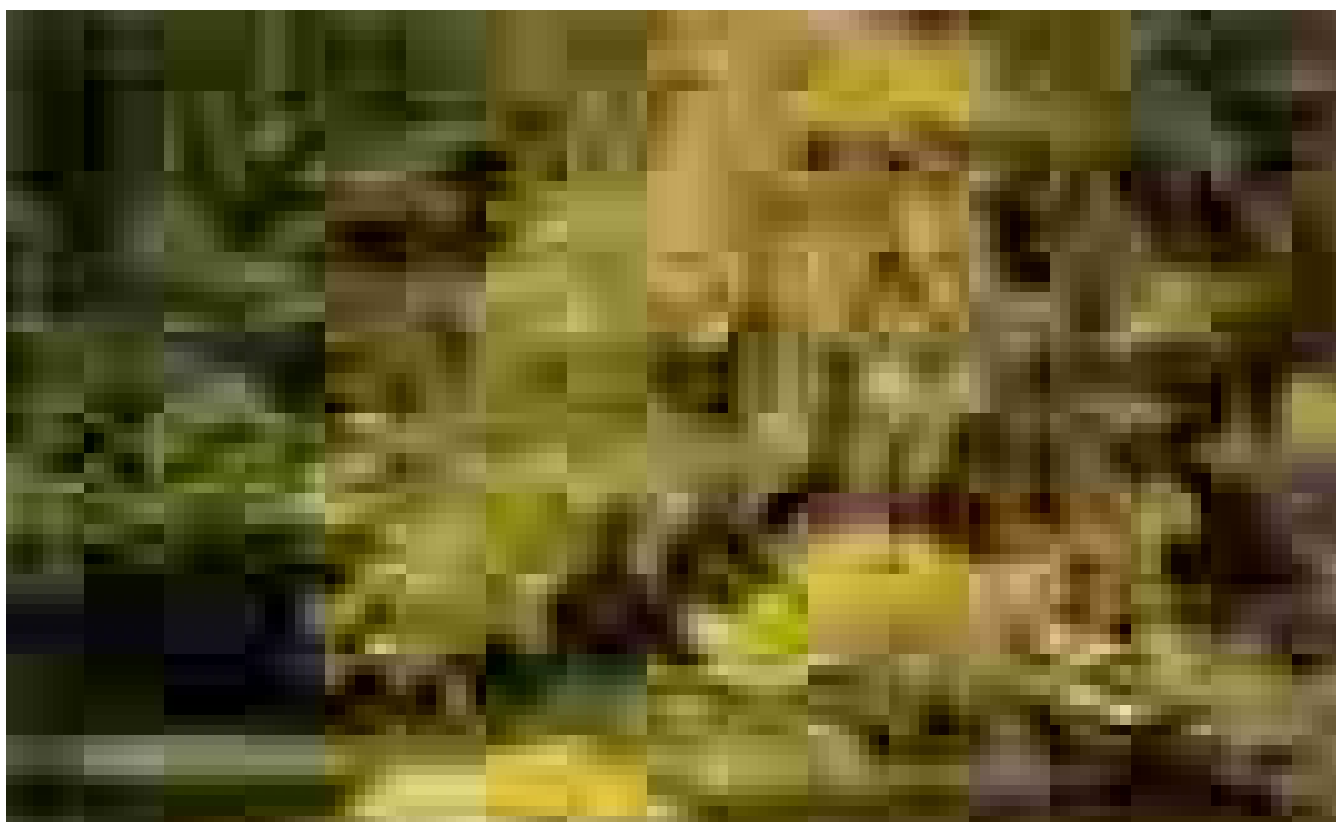
affected by farming and forestry techniques, over-grazing, forest fires and increased salinity. Desertification is also seen as an environmental issue in Chile with major socioeconomic impacts. The global desertification process is currently affecting 62.3% of Chilean territory, mainly between Regions I and VIII, but also in the far south in Regions XI and XII.

In addition, agricultural land has been lost to urban growth, insufficient solid waste management and other productive activities. The loss of terrain suitable for agriculture (mainly good quality arable soil) due to urban expansion amounts to 1,200 ha. per year, which means that of the 5.3 million ha. of arable soil in the whole country by 2001, 18,000 ha. will be lost by 2010.



CAUSES OF LAND DEGRADATION	
Burning, deforestation and loss of organic material	22.8%
Erosion by water	19.3%
Urban and industrial expansion	16.7%
Chemical degradation	15.8%
Erosion by wind	10.5%
Salinity increase	7.0%
Others	7.9%

Source: CONAMA (www.conama.cl)



THE CHALLENGES FOR CHILE'S FORESTRY INDUSTRY



By Carlos Weber
Executive Director of the National Forestry Promotion and Regulatory Agency (CONAF)

Today, Chile's forestry sector stands at a crossroads. The changes that are occurring in the industry are not merely the result of an economic cycle, but are structural. And, unless the right measures are taken soon, they could impair the its future expansion.

That is the challenge for the government. Our diagnosis, based on rigorous analysis of the figures, has led us to conclude that existing policies towards the industry are no longer totally appropriate. Similarly, it would be a mistake to continue to assess the industry's success or failure exclusively on the basis of the hectares of pine that are planted in a given year. Instead, we must seek to increase the yield of existing plantations and bring native forests into production.

This is what the forestry industries of industrialized countries, like Canada, Sweden, and Finland, have done. Instead of focusing on plantation targets, they have sought to make optimum use of existing resources, from which they attempt to extract maximum added value.

Chile was once a country with cheap and abundant land for forestry. But that is no longer the case. An increase in the price of land has made it less attractive for large forestry companies to buy and convert agricultural land. At the same time, farmers are reluctant to switch to forestry production, even on land that produces low crop yields.

That means that Chile, like the industrialized countries, must learn to take maximum advantage of its existing resources, increasing returns in line with higher land prices. Its 2.1 million hectares of forestry plantations are, as figures for industrial consumption show, producing less than they could. The country is also failing to exploit its more than 13 million hectares of native forest, of which at least 3 million hectares are suitable for industrial production.

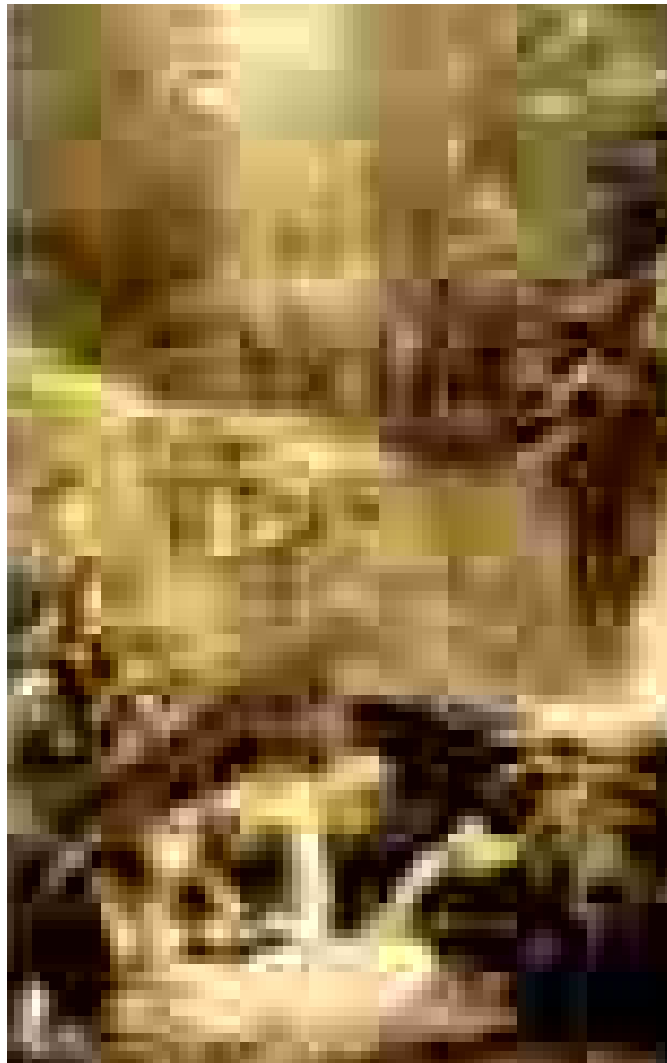
Part of the challenge is to persuade farmers to plant trees, especially on land that is poor from the agricultural point of view, but suitable for forestry plantations. In one move in this direction, the government's incentive program for the forestry industry, contained in Decree Law 701, focuses on small farmers and seeks to encourage the conversion of exhausted and eroded farmland.

In Chile, farmers have traditionally viewed agriculture and forestry as incompatible options and there are few farms that combine the two activities. Overcoming this embedded attitude is another of the industry's challenges.

The development of a secure market for forestry products, that could ensure stable and attractive prices, would be an important step in this direction. But that is mainly a task for the private sector, not for the government.

CONAF has already had some success in persuading traditional farmers to experiment with forest plantations. As a result, they will be able to contribute to the second phase of Chile's export development by expanding its range of products with a high value-added component.

Chile must no longer look only at its plantation figures as a guide to the performance of the forestry industry. Instead, it must also look - as some local and foreign investors are already doing - at ways to increase returns on the sustainable development of its renewable forestry resources.



Huerquehue National Park, Region IX

Energy

In Chile, private enterprise is responsible for electric power generation, transmission and distribution, in keeping with the country's free-market economic policy, while the State plays a subsidiary role as regulator and supervisor.

As of September 2001, Chile's electric power sector consisted of a total of 26 generating companies, five transmission companies and 36 distribution firms, which between them meet aggregate national demand, which in 1999 amounted to 36,084 GWh.

Demand is supplied territorially by four interconnected grid systems. These are, from north to south: (i) the Interconnected System of the North (SING), which covers the territory between the cities of Arica (Region I) and Antofagasta (Region II) and accounts for 33% of installed capacity in the country; (ii) the Interconnected Central System (SIC), which extends from Taltal (Region II) to Chiloé (Region X) and has 66.2% of total capacity; (iii) the Aysén System (Region XI), which supplies electric power to Region XI and accounts for 0.2% of the country's installed capacity; and (iv) the Magallanes system (Region XII), with 0.6% of total capacity.

The Interconnected System of the North (SING) is predominantly a thermal generation system with power plants fuelled by coal, oil and diesel. Since 1999, it has been using

combined-cycle plants fired by natural gas. There are also two hydroelectric plants. Of total consumption, 90% is accounted for by large mining and industrial companies. The northern grid (SING) is operated by three distribution companies supplying a total of 218,553 customers.

The Interconnected Central System (SIC) is the country's leading electric power provider, supplying 90% of the population. The system is largely hydrothermal 60.5% operates with hydroelectric plants and 39.5% with thermal (coal, oil, diesel) and combined-cycle plants based on natural gas. Power is transmitted along cables belonging to the generating companies, and on power lines belonging to the transmission companies. There are 31 distribution firms supplying a total of 3,658,049 customers.

Energy is an essential element for the country's economic and social development. Over the last ten years, not only has the country's growth rate risen, but rates of annual energy demand have also increased.

Chile does not possess a wide range of conventional energy resources (oil, hydroelectric power, nuclear, etc) and is therefore a net energy importer. Nonetheless, its special geographical characteristics provide great potential for hydroelectric power.

INTERCONNECTED ELECTRIC POWER GRIDS (2000)

Grid	Installed capacity	No. of generating companies	No. of distribution companies	Generating system	Region
SING	33.0%	6	3	Thermal and hydroelectric	I and II
SIC	66.2%	20	31	Hydrothermal	II through X
Aysén	0.2%	1	1	76% Thermal	XI
Magallanes	0.6%	1	1	Thermal	XII

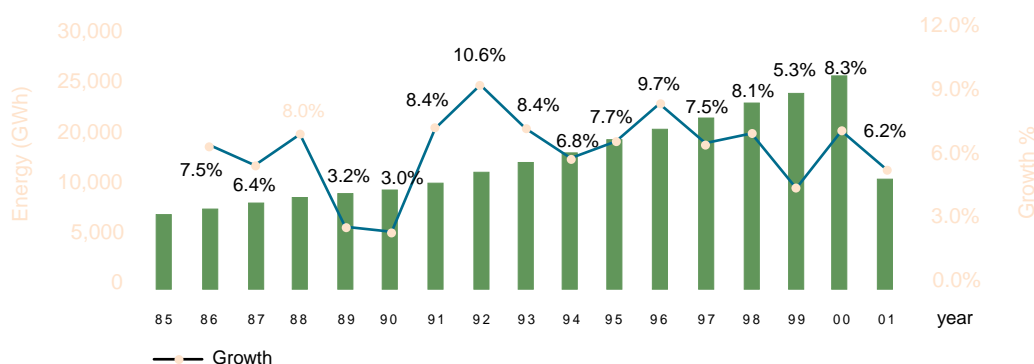
Source: National Energy Commission (www.cne.cl)

ELECTRICITY DEMAND AND POWER GENERATION (2000)

Grid	Installed capacity MW	Demand MW	Generation GWh
SING	3,352	1,211	9,327
SIC	6,646	4,576	29,577
Aysén	17.1	3.75	74.7
Magallanes	64.5	33.7	163.0

Source: National Energy Commission (www.cne.cl)

Growth of Annual Net Demand of Energy



Source: National Energy Commission, CNE (www.cne.cl)

**ENERGY CONSUMPTION BY SECTOR
(Teracalories)**

Sector	1999	Share
Transportation	66,988	26%
Industry and mining	68,838	27%
Commercial, public, residential	52,669	21%
Transformation centers	60,672	26%
Total	249,167	100%

Source: National Energy Commission, CNE (www.cne.cl)

**ENERGY CONSUMPTION (1978-2008)
(Teracalories and Percentages)**

Items	1978	1988	1998	1999	2008 (e)
Gross Consumption	104,370	139,524	250,920	270,348	448,138
Annual average growth		2.9%	6.0%	7.7%	6.0%

Source: National Energy Commission, CNE (www.cne.cl)

**BREAKDOWN OF PRIMARY ENERGY CONSUMPTION (1978-2008)
(Percentages)**

	1978	1988	1998	1999	2008 (e)
Oil	47.6	37.5	40.0	39.0	39.0
Natural Gas	9.3	9.4	11.3	20.0	33.0
Coal	9.2	12.3	16.0	14.0	4.0
Hydroelectric power	18.0	22.6	17.4	12.0	14.0
Wood and other	15.9	18.0	15.5	15.0	10.0

Source: National Energy Commission, CNE (www.cne.cl)

Conservation of Nature and Environment

The National System of State-Protected Wildlife Areas (SNASPE) encompasses natural, terrestrial and marine environments that are protected and managed by the State in order to assure their conservation. It is supervised by the Ministry of Agriculture's National Forestry Promotion and Regulatory Agency, CONAF.

By law, natural resources within national parks cannot be exploited for economic purposes, whereas those in national reserves may be exploited in a sustainable way.

The National System of State-Protected Wildlife Areas consists of 94 areas in all: 31 national parks, 48 national reserves and

15 natural monuments. These cover a land area of approximately 14 million acres, equivalent to 19% of the national territory.

The National System of State-Protected Wildlife Areas consists of 94 areas in all: 31 national parks, 48 national reserves and 15 natural monuments. These cover a land area of approximately 14 million acres, equivalent to 19% of the national territory. According to the World Resources Institute, protected areas cover 6.4% of the total world surface while in Latin America this percentage reaches 7.4 % of the total continental surface.

**SURFACE OF PROTECTED WILD AREAS
(Thousand hectares)**

Year	SNAPSE				NON – SNAPSE		
	Total surface area	National parks	National reserves	Total natural monuments	Protection areas	Total nature Sanctuaries	Sites of scientific interest
1995	13,979	8,495	5,469	14	1,506	27	2,638
1999	14,124	8,759	5,347	17	1,506	27	2,638

Source: National System of State-Protected Wildlife Areas (www.conaf.cl)

Luis Antonio Ayestarán, General Manager of Hidronor: HIDRONOR: TREATING CHILE'S INDUSTRIAL WASTE



Tucked away on the rural outskirts of western Santiago, a small Belgian-owned company is breaking new ground by processing Chile's industrial waste. With the field virtually to itself, Hidronor Chile draws its clients not only from the capital city itself, but also from places as distant as the Magellan Strait (Region XII) in the extreme south of Chile.

"There's another small firm that offers one of our services, but apart from that, we're on our own", says General Manager Luis Antonio Ayestarán. Being a first mover has obvious advantages, but it can also be a lonely business.

"We come under a lot of scrutiny, especially from our neighbors", he reports. And, ironically, getting an environmental permit for the plant wasn't easy. Spain's Hidronor group founded the company in 1991, but it took Hidronor Chile until 1995 to get the environmental go-ahead for its plant. Most of the delays were, recalls Ayestarán, the result of opposition from neighboring communities which feared damage to their immediate environment.

However, after investing US\$ 20 million, Hidronor is now able to treat a wide range of solid and liquid wastes, from some of which it generates alternative energy. In 2000, the company reached sales of almost US\$ 5 million and is now building a second plant in Concepción (Region VIII), southern Chile's main industrial city.

But Hidronor Chile, which was taken over by Belgium's Machiels group in 1998, is still only scraping the surface of its potential market. "We handled 24,000 tons of residue in 2000, but we estimate that Chile generates around one million tons, of which around half is probably hazardous", reports Ayestarán.

Regarding the legal framework to regulate the treatment of hazardous waste, there are still some restrictions. For example, the limits on the liquid effluent that can be disposed of in Chile's rivers and through its wastewater system but, explains Ayestarán, alternative disposal procedures still need to be regulated.

Hidronor's clients, which include mining and forestry companies, as well as energy producers and chemical manufacturers, are mostly large firms. According to Ayestarán they are motivated both by concern for the environment and the desire to protect their own public image, as well -in the case of foreign-owned companies- as by head office policies: "Safe disposal of hazardous waste is undoubtedly an extra cost but for exporters, for example, the availability of our services is vital".

Ayestarán says that he has seen a lot of progress on environmental issues in recent years: "The authorities are still learning, but they're doing it quickly". And, although Chile's market for waste disposal may still be in its infancy, Hidronor knows that it has the advantage of a firm foot in the door.



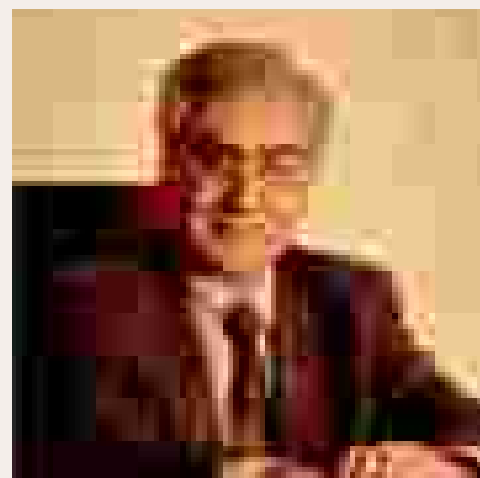
Hidronor's Treatment Plant

NATIONAL STATISTICS AND THE ENVIRONMENT

Environmental statistics is a relatively new field, but it is becoming increasingly important as public policy decision-making and private sector activity aim to achieve the goal of sustainable development.

In recent years, the National Statistic Bureau (INE), has been actively collecting and developing environmental statistics, as part of its overall modernization program. The new statistics will supply precise information that will make it possible to investigate the problems that arise from the interaction of economic activities or individuals with the environment. It will also clarify the availability and quality of existing natural resources.

The need for more and better environmental statistics has led INE to work systematically in this field, in close cooperation with CONAMA, so as to avoid duplicating work. INE has acted as technical partner in the projects to develop regional indicators for sustainable development, and to update the emissions checklist for the Metropolitan Region.



By Máximo Aguilera
Director of the National Statistics Bureau (INE)

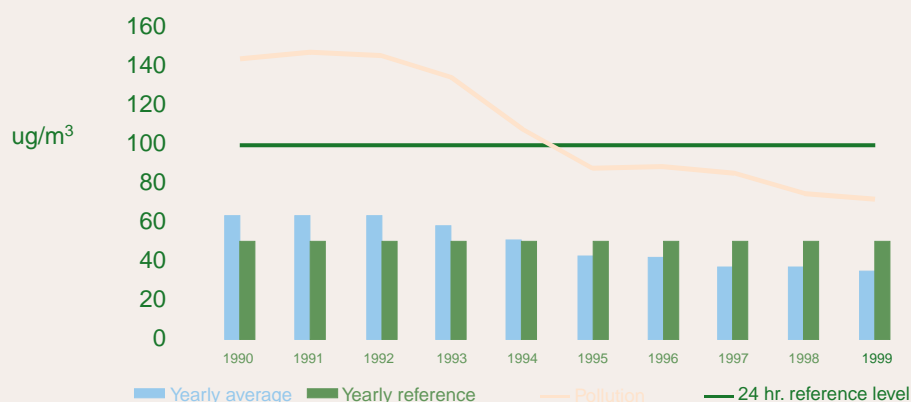
In collaboration with CONAMA, INE published the Annual Report of Environmental Statistics 1995-1999, and is now working on the version for 2000. The report is a specialist official edition for this field of statistics, and presents the levels and availability of the main information on the national environment produced by state organizations. The data in the book complements CONAMA's National System of Environmental Information, SINIA, available via the Internet.

Diversity in environmental statistics: Climatic, geological and geomorphic diversity produces a wide range of resources - natural, tourist, economic and ecological - throughout the country. As a result, different institutions produce related information on a wide range of topics. In many cases the data has been gathered initially for reasons unrelated to the environment. But it can be cross-processed or re-focused to provide useful environmental indicators. The following are some examples of areas where INE has helped collect and process data that illustrate the current state of the national environment.

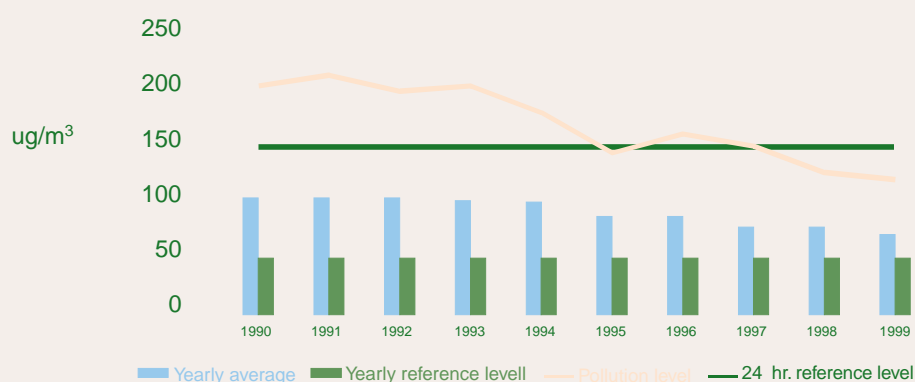
Air pollution in Santiago: Air pollution in Santiago is one of the most obvious national cases of pressure on the environment. The structure of the valley where the capital is located means there are high concentrations of pollutants and suspended particles, particularly in winter, when the layer of thermal inversion is at its lowest. In the summer the gases produced by moving sources (vehicles) and the photosynthetic reaction caused by sunlight convert nitrogen oxide into ozone.

However there has been a reduction in the quantity of particles in suspension over recent years, according to measurements made by the regional health authority, Sesma, through its air quality watch network. In relation to the annual reference figure of 50 micrograms per cubic metre, pollution by bigger particles (MP-10) began to fall from 1993 onwards, though it continues above regulatory levels. Smaller particles, (MP-2.5) showed a measurable fall from 1997 onwards, to below the norm. The smaller particles are more harmful to health since they penetrate the respiratory system more easily.

**Air Pollution in Santiago MP-2.5 Suspended Particles
Station B (1990 - 1999)**



Air Pollution in Santiago MP-10 Suspended Particles Station B (1990-1999)



Cars per thousand inhabitants: Among the causes of air pollution is that created by moving sources (vehicles), which relates to the growth in national vehicle ownership. Problems associated with the steady increase in the number of vehicles, which is a worldwide phenomenon, are traffic jams and blockages, polluting gas and particle emissions (from wear on tires, clutches and brakes), and the quantity of dust cars raise.

INE keeps a systematic record of the stocks of all types of vehicles, based on the annual figures for licences given by the municipal authorities. These show that in 1996 there were 970,891 cars and station wagons, whereas in 2000 the figure had risen to 1,139,471, an increase of 17.36% in this period. The average rate of growth was nevertheless lower than in the period 1995-1999, when it was 28.2%.

By far the highest concentration of private vehicles is in the Metropolitan region, with 48.8% of the national total, 555,736 cars. Region V comes next, with 135,397 vehicles, followed by the Region VIII, with 93,448, or 8.2% of the total.

In 1996 the number of cars per 1000 inhabitants was 67. The figure rose to 76 in 1999, but fell to 75 in 2000. The regions of the far north and far south show the highest proportion, with 123 and 140 cars per 1000 inhabitant respectively. In the Metropolitan region the figure was 91, and in Aysén (Region XI), only 40.

Human settlements: Human beings, through their economic activities and their settlement concentrations, are a major factor for change in natural and constructed environments.

Human settlements exert substantial pressures. On a world scale the growth of urban as opposed to rural populations is evident, among other signs, in the expansion of cities. In Chile the national census of 1907 showed the rural population represented 56.7% of the total, with town-dwellers at 43.3%. From the 1930 census onwards the proportions began to change; the urban population at that point outnumbered the rural by 2%. For 2001 projections based on the 1992 census indicate that 85.8% of the population is now urban (The 2002 census will provide updated figures).

The major urban centres are Santiago (Metropolitan Region), Valparaíso (Region V) and Concepción (Region VIII). The process of migration to the cities produces the spread of urban centres into neighboring villages, producing conurbations such as greater Santiago, with a density of 9.56 inhabitants to the square kilometer, and greater Concepción, with 5.55 inhabitants to the square kilometer. Other conurbations on a smaller scale but regionally significant are Quillota (3.17) and San Antonio (2.86), both in Region V.

GROWTH IN NUMBER OF CARS PER 1,000 INHABITANTS (1996 - 2000) By Region

REGION	1996	1997	1998	1999	2000
National Total	67	69	72	76	75
I	115	124	132	133	123
II	68	73	76	84	80
III	55	52	54	55	56
IV	47	51	55	54	54
V	66	70	74	81	87
VI	61	65	67	70	73
VII	49	48	51	56	59
VIII	43	41	43	46	48
IX	34	35	39	41	43
X	38	41	43	45	45
XI	37	42	44	45	40
XII	117	126	129	133	140
Metropolitan Region	88	89	90	96	91

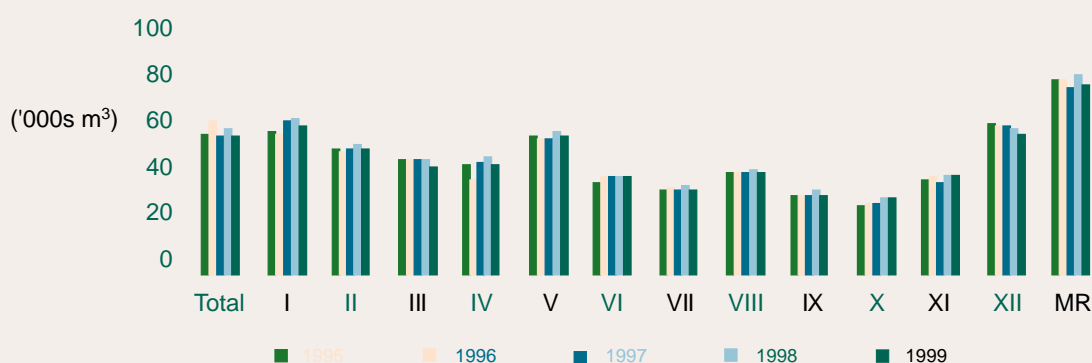
Water needs: In modern societies the demands for water are ever greater, for ever more varied uses, including human and industrial consumption, and irrigation.

Current demand is already high in all three main categories. The World Health Organization (WHO) estimates an individual can subsist on five liters a day or a little less; but to satisfy personal and domestic needs requires 50 liters. In practice, in the developed world the demand for drinking water is between 400 and 500 liters a day.

In 1999 annual domestic use of water by the urban population in Chile was 905 million cubic meters, of which 54.2% was used in the Metropolitan Region, 10.2% in Region V and 9.6% in Region VIII. The lowest consumption was in Region X, with 0.42% of the national total.

Both urban and rural areas are well covered for the supply of drinking water and sewage systems; 99% of the urban population has drinking water, and in the regions cover is close to 100%. National consumption has remained steady at around 61,000 cubic meters per 1000 inhabitants since 1995.

Growth of Drinking Water Consumption per 1,000 Inhabitants, by Region (1995 -1999)



Sewage systems: Increased water use produces increasingly high discharges of sewage, and liquid and solid industrial waste, and with these the loss of cultivable land areas, as a result of the uncontrolled urban sprawl. This may result in neighboring urban centres being absorbed into the conurbation, as in the case of Santiago with San Bernardo and Puente Alto. Fertile cultivable land is lost which, in a natural process and depending on the climate, may take hundreds or even thousands of years to recover.

Figures on sewage disposal show discharges have grown substantially in recent years. From 1995 to 1999 EMOS and Aguas Cordillera, the two main companies in the Metropolitan Region, have recorded an estimated increase from 28.3 to 46.9 million cubic meters.

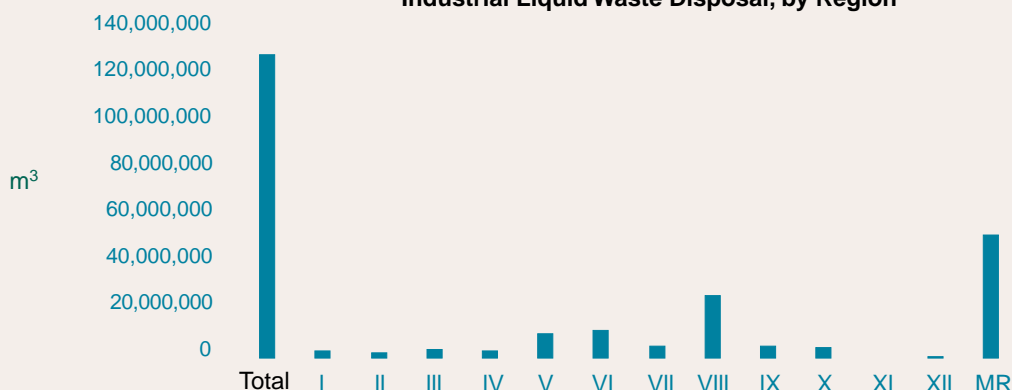
Treatment plants are being developed for this type of discharge. In regions like Chile, with dry-damp cycles, treating and recycling water would allow it to be stored for agricultural use.

Liquid industrial waste: A register of liquid industrial waste was drawn up by the Sanitation Services Regulatory Agency in 1996, and although this first research has not since been updated it has been complemented with data on the number of plants which treat water before disposal.

As of September 2001 a total of 294 industrial plants had treatment systems; 149 disposed into the sewage system and 145 into rivers, filter or irrigation systems or others.

The volume of liquid industrial waste, from sanitary companies and industry, totals 121,476,152 metric tons. The Metropolitan Region accounts for 40.5% of the total, the Region VIII, 20.6%; the Region V, 8.27%; and the Region VI, 8.89%.

Industrial Liquid Waste Disposal, by Region



MAIN SOIL PROBLEMS

PROBLEM	Natural causes	Human factors	Effects
Erosion	Slope Rain Wind speed	Lack of vegetation Bad farming methods Bad irrigation methods Road-building	Physical, chemical and biological soil degradation Loss of productivity Sediment loss Reduced absorption/filtration capacity Erosion of river banks Increased rural poverty Lower biodiversity Loss of commercial value Desertification Advancing sand dunes Loss of attractive landscape
Salination	Soil origin Temperature	Cultivation of salinated soil Irrigation with salt water Incorrect irrigation technology	Poisoning of plant life Reduced crop variety Commercially non-viable farming Physical and chemical soil degradation Contamination of underground waters Less-available nutrients Soil surface hardening Lower productivity Gradual contamination of food chain
Pollution		Industrial activity Mining operations Over-fertilization Agro-chemicals Acid rain	Lower farm production Loss of biological potential Increased illness in local population Gradual contamination of food chain Higher health costs for human population Changed physiol-chemical soil characteristics
Degradation		Urban sprawl Holiday homes Land sub-division Military use	Reduced farming area Altered drainage Socio-economic impact on rural population Inorganic growth and use of territory Loss of biodiversity Loss of attractive landscape Increased "greenhouse" effect
Soil extraction		Gravel works Clay extraction Compost extraction	Loss of farming areas Altered drainage Loss of biodiversity Loss of attractive landscape
Fertility loss		Extractive farming Burn-off	Loss of biological activity Increased pollution from over-use of agro-chemicals Degradation of pasture Higher production costs Lower production and soil productivity

Source: CONAMA (www.conama.cl) and Ministry of Agriculture (www.minagri.cl)

Irrigation: The total land area under irrigation is 1,058,355 hectares, equivalent to 1.4% of the total land surface. The regions with the highest proportion of irrigated land compared with their total land surface are Regions VI (with 12.6%), VII (10.6%), and the Metropolitan Region (9.4%). These are the regions with the highest proportion of irrigable land. The regions with the lowest proportion of irrigated land are Regions I and X (0.1%), IV (1.2%) and XI (1.6%).

IRRIGATED LAND SURFACE (hectares) (1996-97) ^{a/}

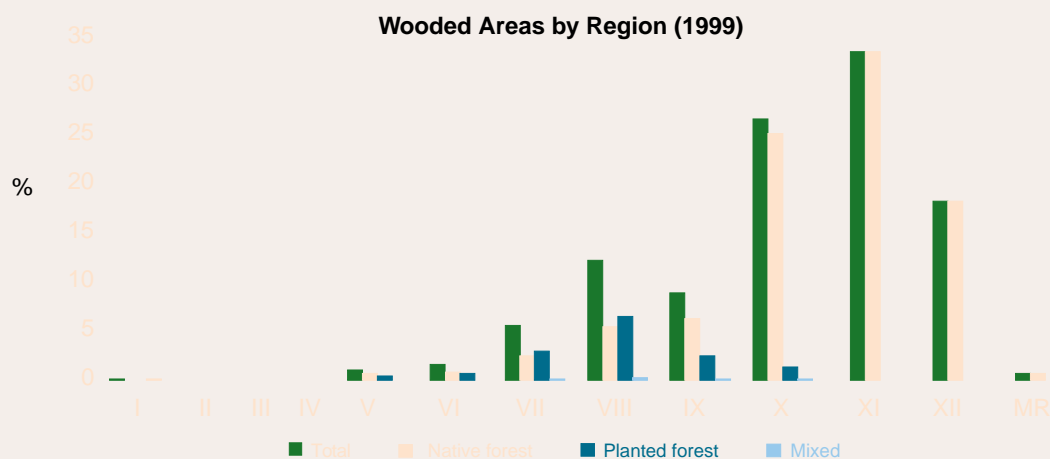
Region	Regional land area	Irrigated land area	% Irrigated land
National total	75,609,630	1,058,356	1.4
I	5,909,910	8,035	0.1
II	12,604,910	2,961	0.0
III	7,517,620	14,186	0.2
IV	4,057,990	48,459	1.2
V	1,639,610	68,808	4.2
VI	1,638,700	206,976	12.6
VII	3,029,610	319,826	10.6
VIII	3,706,260	180,253	4.9
IX	3,184,230	50,724	1.6
X	6,701,310	7,007	0.1
XI	10,849,440	3,485	0.0
XII	13,229,720	1,793	0.0
Metropolitan Region	1,540,320	144,845	9.4

a / Data current for 2001

Land use and forests: Land use is classified in nine areas: industrial and urban; farmland; prairies and heath; woods; marshlands; barren land; permanent snow and glaciers; bodies of water; and uncharted areas.

Barren land is the largest single category; it accounts for 32.7% of national territory, 24,727,790 hectares. Prairies and heath is the second largest area, with 27.2% of land surface; forests account for 20.6%. Uncharted areas represent only 0.5% of the territory, and urban areas, 0.2%.

The current register of native forests shows a total wooded area of 15,637,232 hectares, of which 85.9% is native forest, 13.6% is plantation, and 0.6%, mixed.



Biodiversity: Data collected confirms that 91 species of flora in the national territory are in danger of extinction. The great majority, 72 species, are in Region V, whereas in three regions (I, XI and XII) there are no species at risk. There are 106 species of fauna in danger, of which 51 are mammals, 43, birds, and 12, amphibians, mostly in Regions V, VI, VII and X.

A brief analysis of the relation between endangered species and the number of state-protected areas reveals that Regions IX to the XII have the highest proportion of protected areas, and the lowest proportion of flora at risk (3.5% of the national total). In Regions XI and XII there are no such species at risk. The explanation is in the high proportion of protected areas, which represent 47.9% and 50.3% of the regional land surface.

The pattern for endangered wildlife is similar in most regions, except for Region V, where 24 species are at risk. The reason is the high level of soil erosion in this area, with a loss of subsoil and damage to the habitat which affects the ecological balance.

The results from the data collected by INE, CONAMA and other bodies is helping build up a body of environment statistics, the basis for a future national system, and is also showing how this can be done through coordination by public sector organizations. The two most recent yearbooks, the fruit of the INE-CONAMA agreement, are a major step forward for information about the environment and the pressure it is under. The information will surely serve to guide investors and decision-makers in a range of economic activities.

José Guzmán, General Manager of Agrosuper: AGROSUPER: SETTING ENVIRONMENTAL STANDARDS FOR PIG-FARMING



Pig farms don't have to be hard on their neighbors, argues José Guzmán, General Manager of Agrosuper, Chile's leading pork producer. After fifteen years of rapid growth, the company is now seeking to take the lead in a new area - the improvement of environmental standards for pig farms.

Agrosuper, which started out in the 1950's as an egg producer, branched out from chickens into pork in the mid-1980's. Since then, Chile's per capita pork consumption has trebled to 17 kilos a year, boosted by the new products that the company has introduced. "Pork chops were all that Chileans consumed when we started; now, there's a much wider variety of cuts available", points out Guzmán.

But if the company is to continue to expand its pork production, it must, Guzmán says, ensure that its farms don't become an environmental problem. "Pig farms can smell and they can attract flies; it's up to us to resolve that problem", he explains.

Over the last ten years, Agrosuper has invested US\$ 350 million in the treatment of waste from its chicken, pork and turkey farms and its packaging plants. But it now plans to take the process a step further by using

"This isn't primarily a fuel-saving measure", says Guzmán. The project's main objective is, he emphasizes, to eliminate smells and to produce water that can safely be used to irrigate nearby forestry plantations.

Using technology that it has gathered from pig producers in industrialized countries, Agrosuper has already built a pilot methane plant at one of its farms in Peralillo (Region VI) in central Chile. The first of around 15 that the company will need, the plant, built with equipment from the US, Germany and South Africa, represented an investment of US\$ 1 million.

Under the new system, pig waste is washed into a sealed capsule, where it is kept at a constant temperature while special bacteria eliminate smells and harmful germs. The methane that is produced is used in the plant's own heating system and may also eventually go to produce electricity.

"Our previous waste-treatment system was 60% effective, but the methane plant increases that to 98%", says Guzmán. It also, he adds, puts Agrosuper well ahead of Chile's environmental regulation and in the forefront of clean energy production.

In an additional spin-off, the plant will stand Agrosuper in good stead for the development of its export markets in Europe and Japan. "That we're in those markets is a sign of the quality of our products", says Guzmán, "and a clean production process is an added advantage".

As well as protecting the environment, Agrosuper is committed to regional development. Most of the company's plants, which employ 7,000 people, as well as creating an estimated 4,000 jobs indirectly, are located in the Region VI. But in 1997, the company took a further step towards decentralization and moved its head office out of the capital Santiago to Doñihue (Region VI), where most of its executives now live. That is just one more reason for maintaining good relations with its neighbors.



II. INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL ISSUES

1. Chile's Institutional Framework for Environmental Protection

Since 1990, public management of environmental issues has concentrated on designing and implementing an institutional and regulatory framework to address the country's main environmental problems from a sustainable development perspective. Initiatives have involved not only the technical area, but also political and social aspects, thereby giving public services a new orientation.

Special emphasis has been placed on establishing a national system for environmental management and on creating the necessary conditions for its implementation. This, through the enactment of a legal framework and an institutional strengthening process that encourages community participation and civil awareness on environmental issues.

The Environmental Framework Law (Law 19,300), passed in 1994, has been a key factor in integrating the various sectors that interact in the environmental domain, and in laying the foundations for the current institutional structure. This Law set out key definitions and concepts, along with instruments and general procedures for sustainable environmental management. It also led to the formal establishment of the National Commission for the Environment (CONAMA), supported throughout the country by the Regional Commissions for the Environment (COREMAs). These organizations' main responsibilities are to assess the environmental impact of investment projects and directly tackle environmental problems affecting the community. Law 19,300 also recognizes and covers the legal and technical competencies existing in the different ministries and public services.

Chronological sequence of recent efforts made in Chile in the environmental field:

- 1990:** Creation of the National Commission for the Environment (CONAMA), as an advisory body to the Executive. Its main task was to design and implement a legal regulatory framework for the environment in Chile, and to lay the foundations for an environmental management process. Since that date, several environmental units in ministries with environmental competencies have been created, which have prepared their respective policies on this theme.
- Creation of a Special Commission for Pollution Decontamination in the Metropolitan Region, to draw up and implement public policies to control environmental pollution in Santiago.
- 1993:** Publication of Presidential Guidelines for the environmental impact assessment of investment projects, establishing a voluntary procedure aimed mainly at the private sector.
- 1994:** Enactment of the Environmental Framework Law (Law 19,300) creating a legal framework for the environment and setting out key definitions and concepts, along with instruments and general procedures for sustainable

environmental management, and formally establishing the National Commission for the Environment (CONAMA) as a coordinating body.

- 1995-1997:** Enactment of regulatory procedures pursuant to Law 19,300: (a) Regulation regarding the drafting of environmental quality and emission standards (1995); (b) Regulation laying down procedures and stages for establishing pollution prevention and abatement plans (1995); (c) Regulation on the environmental impact assessment system (1997).
- Promotion of a progressive public service modernization process, aimed at redesigning the role of the State in order to assign it with effective regulatory capacity in the domestic market, thereby satisfying environmental control and supervision requirements.
- 1995-2000:** Progressive community engagement in environmental management processes, and growing environmental awareness among the public.
- 1996-2000:** Increasing progress achieved by the private sector, displayed in productive transformation processes, technological refitting, and, in recent years, creation of environmental management units in large corporations.
- 1990-2000:** Progressive interest in ISO 14,000 (1997) certification.

To summarize, the current institutional structure is built on three pillars: (i) the Environmental Framework Law (Law 19,300) of 1994, which creates CONAMA; (ii) sector-specific regulations with environmental aspects, which authorize the various public services to supervise and control, or manage the use of natural resources and to protect environmental quality; and (iii) Constitutional Law 18,575 of 1986, which defines the organization of public administration and the competencies of each of its branches.

2. Key Environmental Institutions

The National Commission for the Environment (CONAMA)

Law 19,300 establishes the National Commission for the Environment (CONAMA) as a decentralized and autonomous public service, operating under the supervision of the Ministry of the Presidency. The Law recognizes that environmental issues are transversal and multisectoral, cutting across the different sectors. CONAMA is at the hub of the system, acting as a body for consultation, analysis, communication and coordination of the State apparatus on matters related to environmental policy, and also managing the Environmental Impact Assessment System (EIAS).

The main responsibilities of CONAMA are to:

- act as a body for consultation, analysis, communication, and coordination on issues related to the environment.
- maintain a national public system providing environmental information.

•manage the environmental impact assessment system at the national level, coordinate the process of drawing up environmental quality standards, and define programs to implement them.

•collaborate with other authorities in designing, approving and developing environmental education programs to create national awareness on environmental protection, preservation of nature and environmental heritage; and to promote community participation in these areas.

•coordinate with relevant bodies to obtain international support for environmental projects and act as a national counterpart for internationally funded environmental projects.

•finance projects and activities to protect the environment, preserve nature and safeguard the country's natural heritage.

The CONAMA institutional structure consists of: i) an Executive Council or Council of Ministers; ii) an Executive Directorate office headed by an Executive Director; and iii) an Advisory Council.

At the apex of its organizational hierarchy, the **Council of Ministers** is the Commission's top decision-making body and reflects its transversal coordinating function. The Ministry of the Presidency heads this Council, which is composed by thirteen Ministers. Its directives and agreements are mandatory and are administered through orders issued by ministers to the bodies under their authority.

As the head and legal representative of the Commission, the **Executive Director** appoints the members of the Directorate. The Executive Director is responsible for implementing and enforcing relevant legal provisions, and for implementing the agreements and guidelines established by the Council of Ministers.

The **Advisory Council** is a consultative body that provides support to the Board of Directors and Executive Directorate. Its members represent the main civil society sectors including business, labor, non-governmental organizations working in the field of environmental protection and research and the academic sphere. The Minister of the Presidency, in his capacity of President of CONAMA, heads this consultative board.

CONAMA is decentralized through **Regional Commissions for the Environment (COREMAs)**. Each COREMA has its own Regional Director, appointed by the Executive Director of CONAMA, and is composed by the Regional Governor, the provincial governors, the regional secretaries of the Ministries represented on the Executive Council, and four regional councilors. There are also Advisory Councils in each region.

Environmental Units in Ministries and Public Services

The Environmental units of the various ministries are an important element in Chile's environmental institutional structure. Their main objective is to collaborate with CONAMA offering technical sector-specific expertise, coordinating with other services, and promoting environmental issues inside

their respective ministry. They also work to build management capacities in each ministry to enable it to assume these responsibilities in its sector.

Every ministry has an environment unit, in some cases formed by a group of professionals working on environmental issues and in others raised to the level of an Executive Secretariat or even a Division.

The aims of the environment units relate to the internal management of each ministry. The following are some examples of their objectives:

•Define policies and draw up action guidelines for the sector.

•Diagnose environmental impact and assess environmental impact studies.

•Help relevant bodies formulate environmental regulations and standards.

•Provide advisory services in designing abatement plans and coordinate their supervision with the relevant bodies.

•Ensure the environmental dimensions are taken into consideration when developing public projects, to ensure that environmental standards established in the future do not undermine the competitiveness of the sector.

There are also several other government agencies with environmental competencies, which depend from other ministries:

MINISTRY OF ECONOMY, MINING AND ENERGY

•Economic Development Agency (CORFO)

A development agency responsible for promoting the nation's productive activities. Its actions are aimed at technological innovation and the development and improvement of corporate management and competitiveness. It designs and manages financial instruments to meet modernization needs in the private sector, and to promote regional productive development and emerging economic sectors. **CORFO Divisions and Units:** Technological Research Institute (INTEC), Natural Resources Information Center (CIREN), National Bureau of Forestry Research (INFOR), and National Bureau for Fishing Promotion (IFOP). These organizations provide information, carry out research and conduct studies on environmental quality, cleaner technologies, continental natural resources, ocean resources and timber lands.

•National Council for Clean Production

This body was created in March 1998 by the Ministry of Economy, Mining and Energy to carry out actions within the framework of cleaner production development policy, supporting the Public-Private National Council for Clean Production in its activities. This entity is in charge of coordinating and promoting initiatives between the public and private sector in the field of clean production and industrial pollution abatement, in particular by signing voluntary agreements on cleaner production.

•National Center for Cleaner Production (NCPC)

This Center is currently hosted by the Technological Research Institute (INTEC). CORFO is its main funding agency and provides top management. Among its duties are certifying cleaner production technologies and promoting efficient energy use, together with developing voluntary agreements for cleaner production (promoted by the Ministry of Economy), new policies and tools to foster implementation of cleaner production, and strengthening of the network of national and international organizations working in these areas.

•National Fisheries Service (SERNAPESCA)

It executes national fishing policy, sets standards and oversees their compliance. In addition, it also ensures the application of legal standards and regulations on fishing, and on all forms of exploiting hydro-biological resources.

•National Geologic and Mining State Agency (SERNAGEOMIN)

It maintains and disseminates information on the characteristics, development and conservation of the country's mineral resources. It acts as a technical advisor to CONAMA in environmental impact assessments, and participates in the environmental management system on issues relating to mineral and geological resources.

•National Energy Commission (CNE)

Responsible for drafting and coordinating the plans, policies and standards necessary for the correct functioning and development of the country's energy sector; supervising compliance in all energy-related matters, in both production and use; and the promoting of efficient energy use.

•Chilean Commission of Nuclear Energy (CCHEN)

Its mission is to examine issues relating to the production, acquisition, transfer, transport and peaceful use of atomic energy and of fissionable and radioactive materials.

•National Tourism Bureau (SERNATUR)

Government agency that proposes and implements tourism development strategies.

•National Institute of Standardization (INN)

Responsible for developing and managing technical standardization processes, accrediting certification, and developing the use of metrology, as key instruments for improving the competitiveness of production processes in the country. It operates on the basis of voluntary certification, having developed a National System of Certification for this

purpose, guaranteeing that its certifications comply with ISO standards and other international guidelines.

MINISTRY OF FOREIGN AFFAIRS

•PROCHILE, Chilean Exports Promotion Bureau

Its mission is to promote exports and the internationalization of Chilean companies, in keeping with the country's policy on international economic linkages. The work of its Environmental Unit includes promoting the country internationally as a reliable provider of high-quality goods and services, satisfying national and international environmental standards. It also informs about business opportunities in the environmental sector, expanding the base for promoting cleaner production, increased competitiveness and enhanced environmental performance in the private sector.

MINISTRY OF PUBLIC WORKS, TRANSPORTATION AND TELECOMMUNICATIONS

•Undersecretariat of Transportation

It regulates agencies carrying out technical inspections of road vehicles, and establishes the technical procedures for such revisions. It also sets maximum permissible levels of pollutants for the agencies involved.

•Public Work's Concessions Unit (CGC)

In charge of public infrastructure concessions program for roadways, airports, prisons, and other projects, which will be built, maintained and operated by private companies.

•Executive Secretariat for the Environment and Land (SEMAT)

This service is in charge of defining and coordinating the environmental policy of the Ministry of Public Works, Transportation and Telecommunications at both national and regional level. It proposes environmental quality standards and measures to mitigate environmental damage, and promotes community participation in infrastructure works, thereby ensuring that the environmental dimension is taken into consideration in the ministry's projects.

•Water Department (DGA)

It makes recommendations on optimal water use; it also carries out research, supervises and measures water stocks, and monitors user organizations.

NEW INFRASTRUCTURE SECRETARIAT FOR THE ENVIRONMENT AND LAND



By Eduardo Arriagada
General Director of Public Works at the Ministry of Public Works

In 2001, the investment budget of the Ministry of Public Works, Transportation and Telecommunications represented 60% of total government investment. Outlay on that scale, although a powerful tool for promoting Chile's economic and social development, also inevitably causes environmental damage and can entangle the Ministry in conflicts with communities that are affected by its projects.

Since 1997, more than 70 Ministry projects have successfully sought approval from the country's environmental authorities, a process that has sometimes involved significant design changes to mitigate negative side-effects or to take account of objections from local communities. However, the Ministry believes that it can and should do more to improve its performance in this field.

To this end, it has recently set up a new organization -an Executive Secretariat for the Environment and Land (SEMAT) to spearhead this effort. SEMAT's mission is to ensure that environmental and community considerations are incorporated at an early stage of a project's development, thereby minimizing delays, reducing compensation payments and avoiding unnecessary opposition from local communities.

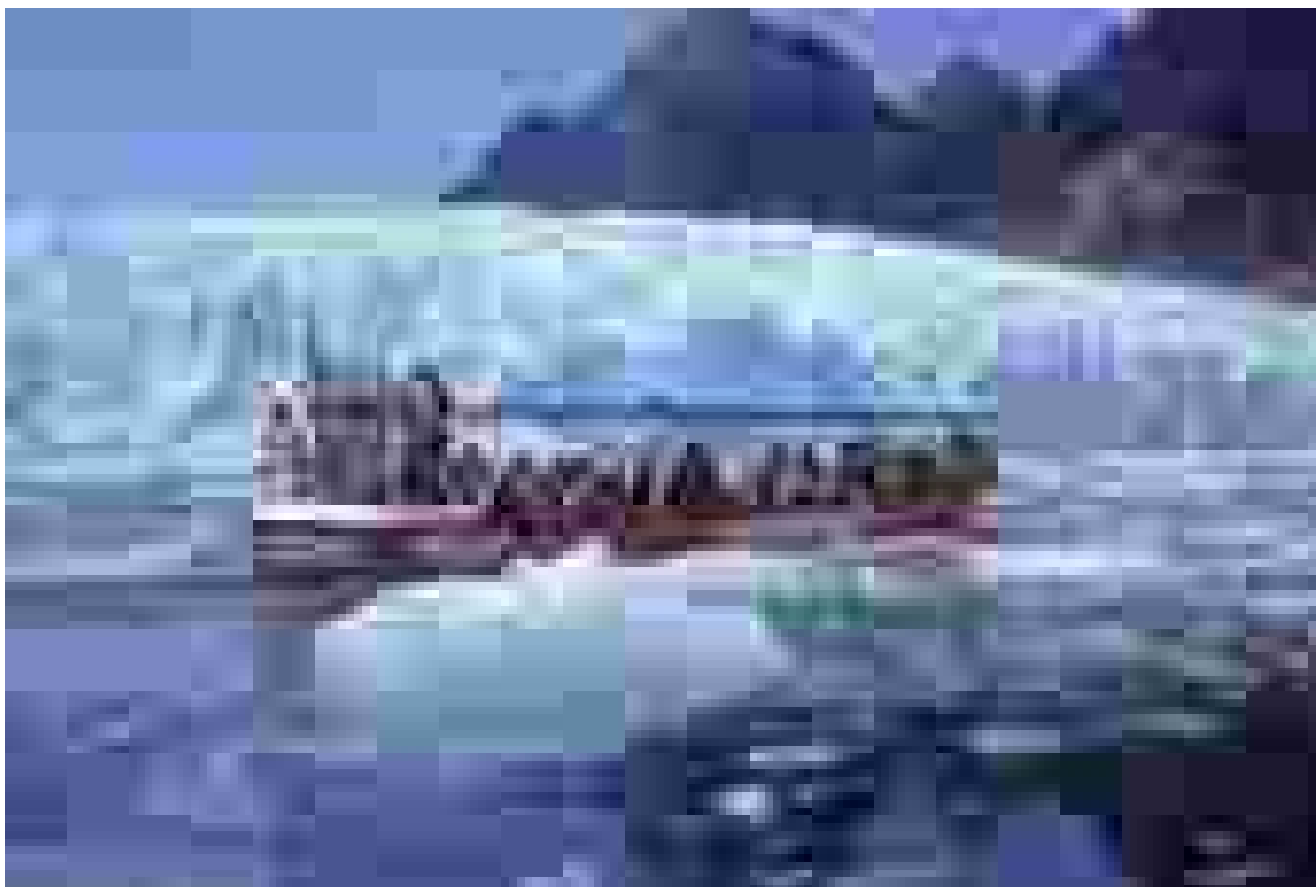
In order to accomplish this mission, SEMAT assists the Ministry in developing and implementing environmental policies that relate to the development of new infrastructure. The Secretariat has been located in the General Directorate for Public Works (DGOP), the focal point from which public infrastructure decisions are coordinated, and has a wide-ranging remit to introduce new procedures and support systems throughout the Ministry's production process.

The SEMAT team is composed of 12 professionals and has been organized into four departments, corresponding to the main tasks that it will perform within the Ministry. The Secretariat's Research, Policy and Development Department is charged with preparing environmental policy guidelines. The Auditing, Monitoring and Control Department is responsible for monitoring the compliance of public infrastructure projects with environmental procedures and standards, as well as for controlling the quality of Environmental Impact Studies carried out for the Ministry and supervising the mitigation, restoration and/or compensation measures required for new projects.

SEMAT's Citizen Participation and Territorial Management Department was set up to advise the Ministry on community issues and will assist it in the design of citizen participation programs. At a local level, its Regional Management Department is designed to strengthen the Ministry's capacity to handle environmental and community issues at a regional level, including co-ordination with local government authorities.



Santiago-Talca Highway



MINISTRY OF HEALTH

•Metropolitan Environmental Health Service (SESMA)

This body's role is to guarantee citizens' right to a healthy environment. It is responsible for ensuring elimination of all environmental factors, elements, and agents that adversely affect the population's health, safety and well-being.

MINISTRY OF AGRICULTURE

•Agricultural and Livestock Agency (SAG)

This service's role is to protect, maintain, and promote animal and plant health. This includes monitoring the hygiene of products, subproducts or other derivative goods that could carry or cause disease or plagues.

•National Forestry Promotion and Regulatory Agency (CONAF)

It helps conserve, expand, manage, and efficiently exploit timber lands. It participates in the formulation and execution of national and regional forestry development, conservation and protection plans, while administering and developing the State's forestry holdings. In addition, CONAF seeks ways to appropriately manage and exploit the timber land reserves it has established. It is also responsible for managing the National System of State-Protected Wildlife Areas (SNASPE).

OTHER STATE AGENCIES WITH ENVIRONMENTAL COMPETENCIES

•Sanitation Services Regulatory Agency (SISS)

This agency studies, proposes and monitors compliance with technical rules on the design, construction, and use of sanitation and industrial sewage services throughout the country. It also awards expands or modifies concessions, and imposes fines on sanitation service providers that infringe the regulations.

•General Directorate for Territorial Waters and the Merchant Navy (DIRECTEMAR)

A division of Chile's Navy responsible for preventing marine pollution and protecting the aquatic environment, by enforcing the Navigation Act and regulating discharge of liquid wastes into water courses.

In addition, the municipalities along Chilean Territory are responsible for regulating household wastes and enforcing environmental sanitation at the local level, to meet community needs. The municipalities are also setting up environmental units to strengthen their management capacity. They are subject to their own constitutional charter, which grants them substantial autonomy in taking environmental decisions.

CLEAN PRODUCTION: MORE EFFICIENCY, HIGHER PROFITS



By María E. Torres
Manager of Technology Transfer at the National Center
for Cleaner Production - INTEC

At home and abroad, producers face increasingly strict environmental regulation and the pressures on Chilean companies will probably intensify in the future as a result of trade agreements with the United States and the European Union. Firms need to act now to bring their production processes into line with these new requirements.

Many firms recognize that environmental behavior is not only a matter of ethics, but also has a direct impact on their business performance. Most also realize that if they fail to comply with international standards, they will no longer be able to compete in world markets.

There is a growing awareness among businesses that environmentally-friendly production makes for higher profits, not increased costs. A process, for example, that creates less waste means optimum use of resources because it reduces input losses. The introduction of a more efficient production process requires an initial outlay but, as well as making a firm more competitive and boosting its profits, also helps it to comply with regulations and, by reducing damage to the environment, improves its relations with the local community.

Industrial waste is one of the main sources of damage to the environment. Clean Production (CP) addresses the dilemma of how to increase production, while protecting the environment, by seeking to reduce waste levels and to use energy and other resources more efficiently. It is also a preventive strategy applicable across fields of activity that range from mining, manufacturing and farming to hospitals, hotels and office rental.

The CP concept first appeared in the US, when manufacturers began to wonder how to deal with accumulating waste and increasing pollution levels. Internationally, the United Nations finances a program to set up CP Centers in developing countries. There are

now 18 of these centers in countries that include Mexico, Colombia, Costa Rica, Brazil and Guatemala as well as the Slovak Republic the Czech Republic, Hungary and China. Similar centers also exist in developed countries such as the US, Canada and Austria.

In 1997, a government decision made Chile one of only two countries worldwide to have a national CP promotion policy. A CP Committee was set up jointly by CORFO, the government's economic development agency, and the CP Program of INTEC-CHILE, a state technology research institute. The Clean Production Program is financed through a development and innovation fund, managed by CORFO and by Germany's GTZ technical co-operation agency and is also supported by FUNDES International, a sustainable development foundation.

Although it is not always easy to convince firms of the benefits of a CP strategy, these should be self-evident, particularly for small and medium-sized businesses. Apart from the gains for the community, companies stand to benefit financially, operationally and commercially because better waste and energy management means lower costs, increased efficiency and an improvement in occupational health and safety. In addition, a company's product lines can be expanded and improved through the use of waste materials, giving it access to new markets, and its public image benefits, along with its relations with the authorities and the local community.



Capital City, Santiago

III. SUSTAINABLE DEVELOPMENT POLICY AND LEGAL FRAMEWORK

1. The Scope of Environmental Policy

Sustainable development has been actively promoted in Chile since 1990, and has had an influence on areas such as civil-society participation, international policy and economic development. Environmental regulations, implementation of environmental management tools and efforts to modernize public management are consistent with its goals.

One of the aims of the sustainable development strategy is to increase investment in sectors that use natural resources less intensively, and to create higher value-added and productive efficiency in those that do depend on such resources.

Since 1990, the approach taken by different governments to environmental protection and the sustainability of natural resources has shifted from a policy that imposed obligations on the State to one in which all economic agents, public and private, share duties and responsibilities. The sustainability policy is not only limited to environmental conservation, but also seeks to assure economic activity over time by developing cleaner technologies and improving production processes.

Environmental policy is based on seven principles that provide coherence and direct the legal, institutional and instrumental aspects of the government's environmental management system:

- Prevention** - environmental damage should be prevented rather than repaired once it has occurred.
- The "Polluter Pays" principle** - polluting agents should take all necessary steps to avoid environmental damage and should bear the environmental costs of their activities.
- Liability** - those harming the environment must compensate victims and repair damaged caused.
- Efficiency** - measures taken to solve environmental problems should allocate resources in the most efficient way possible at the lowest possible social cost.
- Gradualism** - environmental management should be implemented progressively, to allow for long-term structural reform.
- Viability** - the solution of environmental problems should take mode and timeliness into consideration together with the available means and resources.

•**Participation** - the various interested and affected parties in each case should be encouraged to participate, thereby involving decision makers, technical entities, public and private investors, scientific and academic organizations, non-governmental organizations and the community at large.

These principles are aimed at: **Recognizing** that environmental protection is an efficient and crucial tool for assuring a better quality of life for the population; **Ensuring** environmental management with an institutional structure that coordinates and guides sectoral authorities; **Involving** all social actors in tackling environmental issues, emphasizing community participation; and **Ensuring** pollution abatement in the country's main cities, together with sustainable use of natural resources and the management of urban habitats.

As a result of enactment and implementation of the Environmental Framework Law and in accordance with the principles described above, common environmental management standards have been used since the 1990's. Their basic purpose is to promote adequate use of the management tools contained in the legislation, in order to protect the health of the population, use resources in a sustainable way, and apply environmental quality standards throughout the community.

The general features of environmental management include:

- Training and strengthening** the public sector in the environmental domain;
- Adapting** the industrial sector and technologies in accordance with the needs of consumers;
- Assessing** the environmental impacts of major investment projects;
- Applying** sustainability criteria in the use of natural resources;
- Setting** environmental quality standards;
- Implementing** prevention and abatement plans, and;
- Fostering** public participation in the application of environmental management tools.



2. Legal Framework for the Environment

The 1980 Chilean Constitution contains three important provisions on the environment. Article 19 provides: (1) that every person has the right to live in a pollution-free environment (mandating a State duty to uphold this right and to safeguard the preservation of nature); and (2) that only the law can establish the means of acquiring ownership of property, together with its beneficial use and disposal, and the limitations and obligations deriving from its social function (the social function of property stems from the Nation's general interests, national security, public utility and health, and the conservation of the environmental heritage). Article 20, (3) establishes the constitutional remedy to safeguard the legal exercise of the right to live in a pollution-free environment.

The 1994 Environmental Framework Law (Law 19,300) represents a major effort aimed at coordinating Chile's environmental protection regime and organizing its previously fragmented legislation, without abolishing pre-existing sectoral laws and regulations. For this purpose, it created CONAMA supported by the COREMAS located in each region; these bodies are responsible for coordinating environmental management in Chile.

The following regulations have been enacted pursuant to this law: Regulation regarding the drafting of environmental quality and emission standards (1995); Regulation laying down procedures and stages for establishing prevention and

abatement plans (1995); Regulation on the Advisory Councils of the National and Regional Commissions for the Environment (1995); and Regulation on the environmental impact assessment system (1997).

The Environmental Framework Law also establishes seven different tools for environmental management:

- Research and education.
- Environmental impact assessment.
- Community participation in the environmental assessment procedure, as well as in setting environmental quality and emission standards and decontamination plans.
- Environmental quality standards and emission standards.
- Management plans, promotion of private owned protected areas, and species classification and inventories to preserve nature and conserve the environmental heritage.
- Pollution management, prevention and abatement plans.
- Responsibility for environmental damage.



SUSTAINABLE ARCHITECTURE: A HARMONIOUS USE OF RESOURCES



By Jaime Ravinet
Minister of Housing, Urban Development and National Heritage

Sustainable development can be seen as a triangle, its points formed by a strong social base, a solid economy and a healthy environment. As a process it leads us to seek economic growth, social equity and a well-conserved environment, so that we can pass on to our heirs a world in at least the same conditions, and perhaps even better than the one we received.

True, the global and local ecosystems have limits that must be respected. But the basic premise of sustainable development is that proper management of technology and of social behavior allows us to push these frontiers outwards.

Cities can open up the way to sustainable development, or they can block its path. They are home to the great majority of the population – 85% of all Chileans, for example, are urban dwellers. The cities consume resources and generate waste, but they also represent economies of scale that change unsustainable patterns of consumption. They offer extraordinary scope for creative measures to lift the obstacles to sustainable development.

One such measure is a new form of architecture, known as sustainable, or ecological or bioclimatic architecture. The new system seeks to harmonize the building, the climate, the user, and his rhythm and way of life; to match concept and construction. It aims to meet the occupants' needs for the right temperature in different seasons, and for good light and good air, through the best possible use of energy for heating, air-conditioning and lighting in the building.

Sustainable Architecture Offers Savings

Figures from Spanish experts show that sustainable architecture can produce savings of 50% to 70% in the

use of fuel, conventional energy and air-conditioning. Air-polluting agents can be cut by similar amounts, water costs can be reduced by 30%, and lighting by 20%.

All this can be done without bizarre inventions, simply with new designs for existing models, and the know-how to get the most out of the natural resources in the environment. Generating human resources is a key factor; intelligence and creativity are indispensable, above and beyond the technology. Many "primitive" peoples, after all, used bio-climatic principles without the benefit of computers or software.

Sustainable Architecture Sets Its Seal On Building Processes

Sustainable architecture goes well beyond energy saving, to cover every material aspect of the building industry, from elaborating and transporting materials to start-up work on a site, the use of a building, demolition work and the possible recycling of materials. It changes and sets its own mark on the building process. What it does not do is put at risk economic growth and social equity.

As part of its policy of promoting this scheme of development, the Ministry of Housing and Urban Development produced a study, in 1998, on "Diagnosis and Design for Thermal Conditioning". It analyzed and defined the heating needs in different areas of the country and then drew up thermal regulations, which are now obligatory in the new bylaws on urban development and construction.

The regulations improve home temperature standards, for the benefit of the families who live in them and for the country. There are energy savings on heating, lower air pollution both inside and outside the home, less wear and tear on building materials and parts, and, above all, fewer respiratory illnesses caused by poor heating.

In the first phase, the thermal regulations set insulating requirements for house roofing; specifications are now being drawn up for walls. House roofing must comply with the geographic zone specifications, and with the regulations for attics or sloping surfaces, the surfaces to be covered (chain courses, beams, crossbeams) skylights, sills, lintels and windows that form part of the roof. The building must conform to an approved model in the Ministry's official register.

This topic, which seems highly specialized, has a major impact on development in a country which builds 14 million square meters of housing a year, and where ordinary people can now live in more comfortable homes and spend less to heat or cool them. It is clear why the Ministry of Housing, with a strong commitment to the people but also to national growth, is a driving force in developing sustainable architecture.

AEPA: PROMOTING SUSTAINABLE DEVELOPMENT



By Denise Reculé
General Manager of the Association of Companies and Professionals for the Environment (AEPA)

The Association of Companies and Professionals for the Environment (AEPA) is a non-profit organization that was set up in February 1999. By July 2001, 32 companies had joined the Association, in addition to five Embassies, which have honorary membership. Out of AEPA's company members, 18 are locally-owned companies, while the remainder are controlled by firms from the United States, Canada, and Europe.

The Association's purpose is to promote sustainable development by monitoring environmental practices and encouraging the use of cleaner production processes. Within this general framework, our specific goal is to build an organization, based on ethical and professional principles, that represents the sector and can contribute to the development of balanced environmental regulation, while also facilitating the growth and expansion of its member companies.

In pursuance of these goals, AEPA has organized various seminars and workshops, both in the regions and in Santiago. These have served to bring together regulatory and government authorities, the industrial sector and businesses that offer environmental services and equipment.

In a bid to familiarize member firms with international cutting-edge technology, we organize missions to environmental fairs and events, such as the Americana'2001 Fair in Canada and the Waste Expo

2001 Fair in the US, and also arrange visits to, for example, recycling, composting and wastewater treatment centers in other countries. In addition, AEPA has sponsored trade missions to Brazil and Bolivia.

AEPA also participated in the creation of the Ibero-American Federation of the Environment (FIMA), together with Argentina's Business Chamber for the Environment (CEMA), the Federation of Industries of the State of Sao Paulo (FIESP), the Colombian Association of Sanitary and Environmental Engineering (ACODAL), Mexico's National Council of Ecologist Industries AC (CONIENCO) and Spain's Cluster Association of Environmental Industries of Euskadi (ACLIMA). FIMA aims to act as a forum for permanent co-operation, promoting the integration of Ibero-American companies. Through collaboration between its members and with international environmental organizations, it also seeks to promote the development of environmental markets in the signatory countries and to increase trade among member countries.

In order to be able to collaborate more effectively in the design of balanced environmental regulation in Chile, the AEPA has established alliances with a number of international organizations. These include an Environmental Agreement of Understanding with the State of Pennsylvania in the US that binds the two sides to encourage the use of cleaner technology and to cooperate in promoting environmental business opportunities in Pennsylvania and Chile. Other organizations with which AEPA is in contact include the International Solid Waste Association (ISWA) and the Canadian Environmental Industry Association (CEIA).

The Association has also set up its own Working Commissions to participate in different workshops and seminars, as well as taking an active role in the design of new regulation. These Commissions cover areas that range from environmental management and solid and commercial waste to the treatment of liquid waste and atmospheric emissions.

In April 2001, the AEPA was one of the organizers of a seminar on "The Industry and its Environmental Challenges", held in Santiago within the framework of the first International Fair on Technology and Services for the Environment, ECOEFICIENCIA 2001. Ten countries were represented at this Fair during which firms from various sectors presented their products and services.

The Environmental Impact Assessment System (EIAS)

One of the primary goals of Chile's environmental policy in relation to the presentation and development of investment projects is to harmonize economic development with adequate environmental protection, reconciling economic development with sustainable natural resource use in the development of public and private investment projects and activities.

The **Environmental Impact Assessment (EIA)** is a preventive tool in the environmental management system, which is used to identify and evaluate the impacts of a project or activity on the various components of the environment in any of its phases, prior to implementation. Its purpose is to design measures to reduce or mitigate negative impacts and to strengthen positive impacts.

In Chile, EIA for investment projects operates in accordance with the mechanisms set forth in Law 19,300 and in the 1997 environmental impact assessment system regulation. All major investment projects since the latter's enactment have been subjected to EIA, thereby providing the Chilean environmental authorities with valuable experience in operating the system and in detecting and correcting its flaws and shortcomings.

Law 19,300 came into force without abolishing pre-existing legislation; thus a project or activity submitted to EIA must also comply in complementary fashion with the sectoral environmental standards applicable to the project or activity.

The environmental impact assessment system has two different ways for evaluating the environmental impacts of a project or activity, namely the **Environmental Impact Study** and the **Environmental Impact Statement**.

PROJECTS SUBMITTED TO EIAs BY REGION (January 1997- July 2001)

Region	Environmental Impact Statement	Environmental Impact Study	Total
I	144	14	158
II	170	36	206
III	111	10	121
IV	164	15	179
V	210	26	236
VI	117	6	123
VII	264	4	268
VIII	346	24	370
IX	187	15	202
X	532	14	546
XI	117	4	121
XII	80	10	90
MR	589	58	647
Inter-regional	22	14	36
TOTAL	3,053	250	3,303

Source: CONAMA (www.conama.cl)

Steps in the Environmental Impact Assessment System:

Prior to carrying out or modifying a project or activity, investors must undertake a comprehensive review of the listed criteria in order to determine the need for an EIA. In the event that the proposed project or activity is not mentioned on this list, it can still submit voluntarily to EIA.

The following projects or activities liable to cause environmental impact during any of their phases must be submitted to EIA:

- a) Aqueducts, dams, reservoirs and siphon spillways shall be subject to the authorization laid down in Article 294 of the Water Code. Significant damming, draining, drying, dredging, defenses or alterations of natural water bodies or courses.
- b) High-voltage electric power transmission lines and their substations.
- c) Power generation plants generating in excess of 3 MW.
- d) Nuclear reactors and plants and related facilities.
- e) Airports, bus and truck terminals, train stations, railroads, gasoline stations, highways and public roads likely to affect protected areas.
- f) Ports, navigation channels, shipyards and maritime terminals.
- g) Urban or tourism development projects located in areas not included in a plan referred to in Article 10 (h) of Law 19,300.
- h) Regional urban development plans, inter-district urban plans, district zoning plans, section plans, industrial or real-estate projects or modifications carried out in zones declared as latent or saturated.
- i) Mining projects, including coal, oil and gas and covering prospecting, extraction, processing plants and disposal of wastes and rock matter, industrial quarrying of rock aggregate, peat and clay.
- j) Oil pipelines, gas pipelines, mining flumes and other similar facilities.
- k) Industrial-scale manufacturing facilities such as metallurgy, chemicals, textiles, construction materials, metal equipment and products, and tanneries.
- l) Industrial-scale agribusiness, slaughterhouses, facilities and stables for livestock breeding, milking and fattening.
- m) Industrial-scale forestry projects on fragile soils or in native forests; cellulose, furniture and paper plants, wood-chip, plywood and timber plants and sawmills.
- n) Projects involving intensive exploitation or cultivation of hydro-biological resources, and processing plants. Intensive exploitation projects involve the use, for any purpose, of hydro-biological resources officially classified in one of the following preservation categories: endangered, vulnerable or rare; and which do not have management plans; and where extraction takes place using factory-type fishing vessels.
- o) Custom production, storage, transports, disposal or reuse of toxic, explosive, radioactive, inflammable, corrosive or reactive substances.
- p) Environmental sanitation projects, such as sewerage and potable water systems, water and non-industrial solid waste treatment plants, sanitary landfills, submarine diffusion ducts, systems for treatment and disposal of liquid or solid industrial wastes.
- q) Carrying out civil works, programs or activities in national parks, national reserves, natural monuments, virgin zone reserves, nature sanctuaries, marine parks, marine reserves or in any other area under official protection.
- r) Mass application of chemicals in urban areas or in rural zones near populated areas, or by water courses or bodies that could be affected.

If a project or activity is contained in this list, or if it is voluntarily included, the proponent of the project or activity must submit either an Environmental Impact Statement or an Environmental Impact Study.

An investor must submit an Environmental Impact Study for mandatory assessment of the environmental impacts of the project or activity, during any of its phases, if it is likely to generate or result in at least one of the following effects, characteristics or circumstances:

- a) risk to human health resulting from the quality and quantity of emissions, effluents and waste;
- b) significant adverse effects on the quality and quantity of renewable natural resources, including soil, water and air;
- c) resettlement of human communities or significant alteration to the way of life and customs of an affected population;
- d) location of the project or activity in the proximity of protected areas, resources and areas liable to be affected, as well as the environmental value of the territory on which the project or activity will be located;
- e) significant alteration, in terms of magnitude or duration, of the scenic landscape or tourist value of the area; or
- f) alteration to monuments, sites of anthropological, archaeological and/or historical value and, in general, sites which are considered part of the country's cultural heritage.

An **Environmental Impact Statement** should be filed if the project or activity does not generate or involve any of the above effects, characteristics or circumstances.

An **Environmental Impact Study** must contain the following information: a description of the project or activity baseline, together with an action plan for complying with applicable environmental legislation; identification, prediction and assessment of the environmental impacts likely to be caused by the project or activity, including potential risk situations; and a plan for mitigation, restoration and compensation measures, together with any applicable measures for risk prevention and accident control.

An **Environmental Impact Statement** must be filed in the form of an affidavit, containing a description of the prospective project or activity, or the modifications which the applicant plans to make, declaring compliance with the applicable environmental legislation. It may include voluntary environmental commitments not required by law, that the proponent of the project or activity intends to fulfil.

The environmental impact statement or study must be submitted to the Regional Commission for the Environment (COREMA) of the region where the physical works envisaged in the project or activity are to be carried out, prior to execution. When the activity or project could cause environmental impacts in areas located in more than one regions, the corresponding statement or study must be submitted to the Executive Office of CONAMA.

The respective COREMA or the Executive Office of CONAMA, as appropriate, has up to 120 working days to evaluate an Environmental Impact Study. In duly justified cases, this period may be extended one time for an additional 60 working

days. Within the evaluation period, the institutions may request the clarification, rectification or amplification of the contents of the study, as it sees fit, granting the applicant an additional period of time. If both parties agree, the deadline for finalizing the impact study assessment process may be postponed in the meantime.

In cases where an environmental impact statement is submitted, the respective COREMA or CONAMA has up to 60 working days to make its evaluation. This period may be extended once for an additional 30 working days. If during the evaluation period, the corresponding Commission finds errors, omissions or inaccuracies, it may request clarification, rectification or extension, as necessary, giving the applicant an additional deadline to reply. If both parties agree, the deadline for finalizing the impact statement assessment process may be suspended pending the reply.

During the evaluation period, copies of the environmental impact statement or study are distributed to the public services with environmental competence in the area of the project or activity, for review on compliance with the respective regulations and comment on the measures proposed in the project or activity.

To insure that the community is duly informed, the respective COREMA or CONAMA must publish, within 10 days of submission, an abstract of the study in the Official Gazette and in a national or regional newspaper, as appropriate.

In the case of an environmental impact statement, on the first working day of every month the National or Regional Commission for the Environment must publish in the Official Gazette and in a national or regional newspaper, as applicable, a list of the projects or activities that have submitted impact statements during the previous month. In addition, the commission must send a copy of this list to the municipalities where the works or activities envisaged in the project under evaluation are to be carried out.

The assessment process concludes issuing with the **Environmental Rating Resolution**, which may or may not be favorable. A favorable resolution certifies the project's compliance with the requirements and formalities that Law 19,300 and the EIAS regulations establish for impact statements or studies.

In the case of an environmental impact statement, a favorable resolution will certify that all applicable environmental requirements are met; and that the project or activity complies with environmental legislation, including the environmental requirements contemplated by the applicable sectoral permits; and that suitable mitigation, compensation and recovery measures have been proposed in light of the possible effects, characteristics, or circumstances set forth in Article 11 of the Law. The resolution can also impose certain conditions to be met before starting the project or activity.

A favorable resolution for an impact statement certifies that the project or activity fully satisfies all applicable environmental requirements, including those considered for sectoral environmental permits; that the project or activity does not require an environmental impact study, since it does not fall within the scope of Article 11 of Law 19,300; and that all errors, omissions or inaccuracies that may have existed in the impact statement have been duly clarified.

Paola Grandela, Gerdau Aza's Head of Environmental Affairs: GERDAU AZA: AN ISO-CERTIFIED STEEL PRODUCER



The Chilean subsidiary of Brazil's Gerdau steel group is proud of the ISO 9,000 and 14,000 certification that it achieved in 2000. "We're the first company in the group to obtain certification", points out Paola Grandela, Head of Environmental Affairs.

At its two plants in Santiago, Gerdau AZA produces steel bars, rods and profiles from scrap metal, mostly for use by the Chilean construction industry. The location of its plants in the smoggy capital city was one of the company's prime reasons for seeking ISO certification.

"A foundry that operates in Santiago needs to watch its behavior and image", points out Grandela. The company, in fact, started to take its first measures to protect the environment well before Chilean law required them.

Certification has not meant that Gerdau AZA's products can command higher prices. The company sells mostly

to the local market, which is, Grandela says, still not prepared to pay a premium for environmentally friendly products. But the improvements that ISO certification requires have helped the company to reduce its costs.

Because it has cut its pollution indices, Gerdau AZA does not risk the forced stoppages that can affect some Santiago firms when the city's air contamination hits critical levels. And, by reducing its waste, the company has been able to reduce input losses and to save on cleaning costs.

But disposing of industrial waste can be expensive in Santiago. "There aren't many specialized waste disposal firms and lack of competition has kept prices high", points out Grandela.

She identifies delays in approving new legislation on the treatment of hazardous waste as one of the causes for this market vacuum: "Waste disposal companies aren't going to invest unless they know that clients will be obliged to use their services".

Gerdau AZA got an environmental head start because its second plant, built in the mid-1990's, was designed with environmental criteria in mind. Around 10% of the plant's total cost of US\$ 100 million went on environmental protection measures, recalls Grandela.

Lack of experience can also make the system cumbersome, as when the authorities demand blanket monitoring, rather than focusing on the substances which represent a real risk. That can mean investing in expensive equipment just for a trial period to allay official anxieties. "Both sides are still learning, but we're getting there", concludes Grandela.

Gerdau AZA's Steel Production Facility in Santiago



An Environmental Impact statement shall be rejected if it does not comply with the environmental legislation; the mistakes, omissions or inaccuracies in the statement are not corrected; and if the project or activity requires an EIS.

If the resolution is favorable, the Ministries and public services must issue the relevant sectoral environmental permits. On the other hand, if the resolution is unfavorable, neither the proposed project or activity, nor its modifications, may be carried out; and the relevant authorities are bound to withhold the relevant authorizations or permits relating to the project's environmental impact, even if all other legal requirements are met.

The Law provides the following avenues for administrative appeal against an unfavorable resolution or to challenge specific conditions established in a favorable resolution:

a) Appeal against the resolution of an environmental impact statement may be filed before CONAMA'S Executive Office.

b) Appeal against a resolution rejecting or imposing conditions or requirements on an impact study may be filed with the Council of Ministers of CONAMA.

Any such appeal must be filed by the proponent of the project within 30 days following the date of notice of the corresponding resolution. The competent authorities shall render their final decision within a 60-day period from the filing date of the appeal.

The decision of the administrative appeal in turn can be appealed, within 30 days of its date of notice, before the civil judge of the competent jurisdiction.

Further information on Chile's Environmental Impact Assessment System can be found at www.conama.cl/seia.

It is worth noting that most investment projects require additional permits and/or must fulfil other requirements besides those set forth in the EIAs. All investment projects, both foreign and local, must comply with the country's general and sector-specific legislation, at the national, regional and municipal level.



Andrés Camaño, Manager for Environmental Affairs of Escondida:

ESCONDIDA: IN CHILE'S ENVIRONMENTAL VANGUARD



In the late 1980's, when Australia's Broken Hill Proprietary Company (BHP) started to develop Escondida, the world's largest copper mine, in northern Chile's remote Atacama Desert (Region II), it needn't have worried too much about the environment. "Back then, Chile's environmental regulation was still loose and hadn't been consolidated into a single legal structure", recalls Andrés Camaño, Escondida's Manager for Environmental Affairs.

But BHP took a decision. Where Chilean rules existed, it followed them; where they didn't, it imported international standards. That meant, for instance, a base line study for the mine that it was under no obligation to present and an environmental impact study for its filtering operation and concentrate loading facilities at the port of Coloso.

Because of Chile's inexperience in the area, BHP initially had to rely heavily on overseas expertise and technology. But the know-how that it gradually built up was transferred to local companies. "We made a point of incorporating Chilean professionals and universities; the result is that, nowadays, our monitoring can be done by local companies", says Camaño.

However, according to Camaño, there are still important opportunities for overseas investors and more will be created as new environmental norms come into force.

One area, in which Chile is not very experienced and which will soon come to the fore, he predicts, is the shutdown of old mines.

Himself a marine biologist, he says that Escondida's environmental policy has also brought a cultural change: "At first, the topic was new and people were just curious; now, they realize that the environmental variable is a business risk that must be controlled because it can affect a company's operational results".

Camaño recognizes that Chile's environmental regulation is still in its early days and suffers from some teething problems. However, he says that he has seen enormous progress over the last ten years: "In our experience, the system works well and environmental officials, with whom we maintain a fluid working relationship, are both competent and honest".

Domestic investors are still prone to complain that Chile's environmental regulations are contained in too many different laws and supervised by a multitude of government offices, making them cumbersome. But Camaño says that, in Escondida's experience, that problem is well on the way to being resolved.

Pushing ahead with its own environmental program, BHP -which has recently merged with UK-based Billiton plc- is gradually seeking ISO 14,000 certification for its Escondida facilities. According to Camaño, certification doesn't change the price that the mine's products fetch, but does affect the way they are perceived on international markets.

After obtaining certification for its processing plant, Escondida is currently working on its oxides plant, support services and water management, before tackling the mine itself. "We haven't actually had to make many changes, just improve the organization of what we already do", says Camaño. "One of the main challenges and benefits has been the involvement of our staff in the process", he concludes.



Escondida Copper Mine, Region II

ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE



3. Other Key Environmental Management Tools

Environmental Quality And Emission Standards

Environmental quality and emission standards regulate a wide range of environmental media, including air, water, soil, as well as issues concerning noise pollution, land degradation, industrial and domestic waste emissions, to protect human health and natural resources.

A. Environmental Quality Standards: define the characteristics and composition of water, air and soil, setting values for concentrations and allowable maximum and minimum periods for certain elements and substances, whose presence or absence in the environment could be hazardous for their protection targets. Implementation of such standards helps to determine the existence of pollution, thereby making it easier to take action to attain the desired environmental quality level.

The Environmental Framework Law defines two types of quality standards.

Primary standards that protect human health. These set levels defining emergency situations and are applicable throughout the country. The standards are promulgated through Decree by the Ministry of the Presidency and the Ministry of Health. The following criteria are taken into consideration in drawing up a primary standard:

- a) the seriousness and frequency of damage and the adverse effects observed;
- b) the size of the exposed population;
- c) the location, abundance, persistence and origin of the pollutant in the environment; and
- d) the environmental transformation or secondary metabolic alterations of the pollutant.

Secondary standards focusing on other objects of environmental protection. They are also promulgated through Decree by the Ministry of the Presidency and the sectoral Ministry with jurisdiction over the issue concerned. They can be applied throughout the country or in a part of it, depending on their nature. The following criteria, at least, are taken into consideration when drawing up a secondary standard:

- a) significant alteration to the geographical distribution of a species of flora or fauna, or of a specific type of national ecosystem, especially those considered unique, scarce or representative, putting its permanence, regeneration, evolution, and development capacity in danger.
- b) significant alteration to the population of species or subspecies of flora or fauna, or of a specific type of community or ecosystem, putting its presence in the environment at risk.
- c) alteration to components of the environment used by local populations, especially plants, animals, soil and water; and
- d) significant damage to valuable monuments, as well as anthropological, archaeological, and historical sites and, in general, to those belonging to the country's cultural heritage.

B. Emission Standards: establish the maximum acceptable amount of a pollutant measured at the emission source. They can be used either to prevent pollution or its effects, or as an environmental management tool within the framework of a pollution abatement or prevention plan. Emission standards are issued through Supreme Decree specifying their territorial scope of application. They indicate, at least, the standard's measurement methodology and control procedures, the critical values giving rise to situations of environmental emergency, the terms under which they come into force and the public agencies responsible for supervising their compliance. In particular, these standards regulate:

- a) the maximum allowable quantity of a pollutant measured at the point of emission;
- b) the environmental protection objectives and results expected from applying the standard;
- c) its territorial scope of application;
- d) the types of sources regulated;
- e) the deadlines and levels programmed for compliance with the standard.

The National System for Environmental Management created under Law 19,300 gives CONAMA direct responsibility for coordinating the procedures for dictating environmental standards and establishing programs for their compliance.

Annually, CONAMA designs a priority program for drafting environmental quality and emission standards. The program is drawn up in consultation with the competent state ministries and other bodies. As of September 2001, six priority programs had been designed, containing a total of thirty-four standards. Eleven of these standards were already in force at that time, while eleven others were in the process of being implemented. There is a timetable for the discussion, drafting and promulgation of pending standards.

The main standards that were in effect or in the process of promulgation by September 2001 were:

- Primary quality standard for the following air pollutants: SO₂, NO_x, PM₁₀, O₃, CO, Lead, and PM_{2.5}
- Quality standards for ocean and continental waters
- Emission standards for the discharge of liquid waste into sewage systems and surface waters
- Acoustic pollution standard
- Emission standards for mobile sources
- Standards for emissions of arsenic (for foundries) and TRS gases (for cellulose plants) into the atmosphere.

Further information on priority programs for environmental standards can be found at CONAMA's website (www.conama.cl).

Eduardo Morandé, General Manager of Metrogas: METROGAS: CLEANING UP SANTIAGO'S AIR



On a clear day, the snow-capped Andes Mountains sparkle above Santiago; on bad days, they are shrouded from view by a gray pall of air pollution. That problem -identified as one of Chile's most urgent environmental challenge- is one that Metrogas S.A., the capital city's natural gas distributor, is helping to alleviate.

Chile has few natural gas reserves of its own and Metrogas started operations in 1997, once the GasAndes pipeline, in which it is also a minority partner, connected the city to natural gas fields in Argentina. Nowadays, natural gas -welcomed as perhaps the single most important contribution to cleaning up Santiago's air- is used by around 90% of the city's industries, replacing mainly diesel and fuel oils.

The rapid conversion was possible partly because Metrogas was willing to chip in with technical and financial support for industries that made the switch. "But it wasn't too difficult to convince them", reports Metrogas General Manager Eduardo Morandé: "The costs were on our side".

As well as being a cheaper fuel, natural gas has allowed firms to save on mitigation measures that they would otherwise have needed as Santiago's clean air regulations gradually tightened. Set against that, the cost of conversion is, points out Morandé, quite modest, usually only involving a change of burners.

Some environmentalists were wary of the effect of natural gas on Santiago, arguing that the availability of a cheaper fuel would encourage industries to huddle in the already polluted city. Morandé is convinced that this has not happened. "For most industries, fuel costs aren't important enough to affect their decision on where to locate", he argues. In any case, Metrogas is planning to expand its distribution network to other areas, starting with the city of Rancagua (Region VI), 87 kms south of Santiago.

Now that Metrogas has converted most of Santiago's industries, its attention is turning to public transport, particularly the city's diesel-fired buses. "Private studies

suggest that converting the buses to natural gas is one of the four measures that would now do most to clean up Santiago's air", says Morandé.

Metrogas has so far helped one small bus company to make the switch, but is aware that more widespread conversion is a long-term project. New concessions to operate bus services in the city are expected to stipulate the use of natural gas, but converting the city's existing buses will not be easy, warns Morandé, because it involves an expensive engine change. However, he expects that the use of natural gas by taxis will be easier to implement, because conversion costs are lower and can be recovered in less than two years through a drop in expenditure on fuel.

According to Morandé, the advent of natural gas has opened up new market niches for foreign investors and suppliers. "A lot of the technology that our clients are now using was developed in other countries, where environmental controls have a longer history", he points out.

And those opportunities are constantly expanding. In another new venture, Metrogas is helping some industrial clients to assess the feasibility of co-generation projects, using gas not only for their industrial processes, but also to produce electricity. Efficient energy use is a relatively new concern in Chile, but one that will, according to Morandé, create new market niches for international companies with experience in the field.



Buses Converted to Natural Gas in Santiago



Pollution Management, Prevention and Abatement Plans

Management Plans: Regulate the use of renewable natural resources, in order to ensure their capacity to regenerate and to preserve biological diversity.

Under current legislation, the public body legally appointed to regulate the use or exploitation of natural resources in a specific area requires the submission of and compliance with management plans to ensure conservation of the resources concerned.

Such plans must include the following environmental considerations, among other things:

- a) conservation of water flows and soils;
- b) conservation of landscape value; and
- c) protection of endangered, vulnerable, rare or insufficiently known species.

Prevention and abatement plans: Before a prevention and abatement plan can be adopted in an area of the country, the zone must be declared either latent or saturated on the basis of measurements certified by the competent public bodies, showing the existence of specific pollution levels and conditions.

Latent area: area where pollutant concentrations in air, water or soil are between 80% and 100% of the levels established by the relevant environmental quality standards.
Saturated area: area where one or more environmental quality standards are exceeded.

Prevention and abatement o decontamination plans are enacted through Decree by the Ministry of the Presidency

and the relevant sectoral ministry; they contain a detailed specification of the geographical area where they will be applied. The relevant COREMA is responsible for drafting these plans; if the area subject to the plan is situated in more than one region, the procedure is the responsibility of CONAMA.

A **Prevention Plan** is an environmental management tool aimed at preventing one or more primary or secondary environmental quality standards being exceeded in a **latent area**.

An **Abatement Plan** is an environmental management tool aimed at regaining the levels established in primary and/or secondary environmental quality standards in a **saturated area**. Its purpose is to define a master plan for the abatement of particulate emissions, and other measures.

These plans must contain a timetable for emissions reduction and an operational plan for the management of critical or emergency situations. They do not regulate the technology to be used, which is decided by the emission sources, nor do they modify the fiscalization and supervising competencies of the different services, which remain fully applicable under the current scheme of national environmental management.

The atmospheric decontamination plan for the Metropolitan Region set in motion before the Environmental Framework Law was enacted, and subsequently revised according to the procedures established therein, is the largest-scale plan currently operating. Plans have also been implemented in specific locations, particularly in areas affected by pollution caused by mining activities or other point sources.

Further information on these plans can be found at CONAMA's website (www.conama.cl).



Civil Society Participation In The National System For Environmental Management

The environment law considers community participation as a crucial element in achieving adequate levels of environmental protection. The legislation establishes a basic platform and makes governmental authorities responsible for guaranteeing informed participation by civil society. Depending on the administrative, either CONAMA or the respective COREMA is responsible for ensuring mechanisms to guarantee informed participation in EIAS and the procedures for drafting environmental standards and plans by the organized community.

Community participation is a management instrument included in EIAS, the drafting of environmental quality and emission standards, and pollution prevention and abatement plans.

The government has directed its efforts towards strengthening institutional participation mechanisms in order to truly engage the community in environmental management. The challenge in recent years has been to make these opportunities operational and manage them adequately, by promoting activities that allow civil society to exercise its right to participate. To further engage the community, the Law

establishes an instrument for local environmental actions, known as the Environmental Protection Fund, which is managed by CONAMA to provide funding for environmental restoration and protection initiatives.

4. The National Environmental Budget and other Key Initiatives

According to estimates by CONAMA's Environmental Economics Department, the total public-sector environmental budget (current expenditures plus investments) for the year 2000 was US\$ 307.5 million, which represents 1.86% of the total public-sector budget. CONAMA's budget for 2000 totaled US\$ 20.15 million.

The following table shows environmental expenditure by type of environmental activities for the years 1999 and 2000. Environmental protection is the most significant activity, accounting for 67% of total environmental expenditure in the period, followed by environmental research and planning.

In 2000, the regions with the highest environmental expenditures were the Metropolitan Region, followed by Regions V and VIII, areas that also concentrate the largest population and urban centers.

Environmental Expenditure by Type of Environmental Activity (%)

Categories of environmental activity	1999	2000
A Environmental protection	67.7	65.0
B Environmental research and planning	10.5	12.4
C Environmental regulation	1.3	1.9
D Environmental impact assessment	3.4	3.4
E Environmental control	9.2	8.6
F Civil society participation, environmental education and information	8	8.7
TOTAL	US\$ 297.2 million 100%	US\$ 307.5 million 100%

Source: CONAMA (www.conama.cl)

Regional Environmental Expenditure (US\$ million)

Year	Regions														Total (100%)
	Region	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	MR	
1999	40.2	0.9	1.8	1.8	2.76	10.06	2.6	2.6	10.2	2.3	4.3	1.03	0.75	18.24	297.2
2000	39.2	2.2	3.08	1.7	3.01	8.3	2.2	2.09	7.22	1.8	3.4	0.8	1.07	23.09	307.5

Source: CONAMA (www.conama.cl)

The government has directed its efforts towards increasing environmental management capacities, especially the EIAS for investment projects undertaken by public - and private - sectors alike, by:

- implementing technical support units in CONAMA, in COREMAs and in several specific ministries.
- training public-sector workers to prepare and revise environmental impact studies, creating the necessary infrastructure for this purpose and improving technical capacities.
- designing and developing criteria and procedures for carrying out evaluations.
- identifying pilot projects for drafting guidelines and designing standardized methodologies for priority projects.
- defining terms for applying environmental quality standards in the environmental impact assessment framework.

Another major initiative has been the creation of the National System for Environmental Information (SINIA). This affords public access to information and improves institutional coordination and decision-making on relevant environmental issues.

The country has never before had access to so much information on the environment as it does today, through systematic efforts carried out by institutions. Progress is being made in processing and applying such data to better understand and solve the country's environmental problems.

The National System for Environmental Information (SINIA) is coordinated by CONAMA and has the following key objectives:

- To establish an institutional structure to develop a system that aids the decision-making process, help ensure compatibility between sectoral environmental information systems, and evaluate the technical and financial feasibility of their implementation in the country.
- To design and develop an environmental database on a variety of priority topics. This includes selecting the type of information relevant to decision-making at the central, sector-specific and territorial level; and implementing a technical platform to assist in generating, gathering, processing and distributing environmental data.
- To strengthen institutional and technical capacity in productive sectors that base their activity on the exploitation of natural resources, and in institutions that control pollution and the sustainable use of natural resources.

In the program to support the forestry sector, improvements are being made in setting environmental policies, strategies and in the preparation, follow-up and evaluation of programs and projects. This key objective is to be achieved through three actions:

- registry and up-dated assessment of natural vegetation resources, carried out with airborne-photogrammetric and satellite data;
- establishment of a system to follow up and monitor the conservation of the different forms of native vegetation;
- institutional strengthening in monitoring bodies.

The program for the industrial sector entails supporting development of institutional capacities needed to control industrial pollution. This is carried out by designing policies, implementing an institutional structure at the national and regional levels, defining and implementing technical activities and human resource training, together with economic incentives for industrial refitting to incorporate clean technology.

The program for protecting the ozone layer outlines strategies for totally eliminating the use of ozone-depleting substances in the country. The method chosen for this purpose does not prohibit the use of ozone-depleting substances, but instead is based on market strategies, and subsidies to promote industrial conversion, as well as on the pressure from public opinion. Accordingly, a national program for the protection of the ozone layer has been implemented, consisting of the following main components:

- a campaign to mobilize public opinion and raise awareness of the ozone layer problem, teaching self-help attitudes to reduce exposure to ultraviolet light.
- an "ozone-friendly" label attached to products that do not contain ozone-depleting substances or use them in any stage of their production process.
- a subsidy program (TECFIN) to promote technological refitting among industries moving towards permanent technologies that do not deplete the ozone layer.

In the sphere of international environmental standards, efforts are being made to promote environmental certification among Chilean firms. One of the most common methods is certification of compliance with the ISO 14,000 standards, whereby client companies guarantee that their suppliers use systems of environmental management that enables them to detect and solve environmental problems at all stages of production or service provision.

SUSTENTABLE.CL: THE WEBSITE OF THE ENVIRONMENT IN CHILE



Clemente Pérez
Executive Director of Sustentable.cl

The following are excerpts from an article published in Latin Trade magazine on September 2001 (www.latintrade.com)

Pollution might not be a popular subject among business leaders, but it could soon be a lucrative business. Sustentable.cl, a new Chilean website, promises to make a good on chemical waste and other unpleasant leftovers. Under the site's scheme, physical waste can be bought and sold and emissions credits, a kilo-per-day measurement of output traded like stock.

In Chile's Metropolitan Region, surrounding the smog-bound capital Santiago, state environmental agencies have dissected the air, searching for a few known culprits in their uphill battle against la contaminación. Industry, they concluded, contributes 20% of floating particulate matter, while buses and cars are responsible for 40%. Other sources include wood-burning fireplaces in Santiago-area homes, which dump about 13% of solid matter into the air.

Picking its battles carefully, the government has focused on industry and private transport first. Companies that plan to expand or open new plants must reduce or compensate their current emissions by 150%. This policy, part of the Clean Air Act in place since 1998, also establishes a cap on emissions until 2011. Industries that have reached output limits must buy emissions credits from other sources which pollute less. The idea is to provide an economic incentive to comply with regulations which might otherwise go unheeded.

Regulators hope contaminants in the air will lessen over time thanks to the introduction of cleaner technologies, in tandem with the compensation requirement of 150%. Since 1998, when emissions rules went into effect, annual levels of particulate matter in the air have fallen significantly, to 2,600 tons from 8,200 tons.

Dirt Trader: Enter Sustentable, pollution's middleman. The site has created the first emissions exchange in Latin America. Since launching in January 2001, Sustentable has earned the respect of both big industry and government agencies. Its main clients, however, are small businesses, which often get weighed down by a

bureaucratic permit process which can cost up to US\$ 9,000 a year, an onerous amount for small firms in Chile.

Windsor Industrial Dry Cleaning, a small, family-run business, decided to replace its fuel burner with natural gas, which meant it would pick up credits that could be sold on the online exchange.

Windsor's third-generation owner, Jorge Karzulovic, was among the first to list the company's "stock" in emissions output, currently 8.6 kilos per day. Another company that has already reached full capacity can buy Windsor stock, allowing everyone to continue operating. "Contacting Sustentable just made sense", says Karzulovic. "Now I don't think about the restrictions anymore. It's a much better arrangement. I can put my feet up now in the winter months".

These businesses also need basic services like news - there are no environmental trade publications - and guidance to find technologies that minimize pollution and maximize their emissions quota. "Without a doubt, Sustentable's service is invaluable. The lack of information surrounding the cause and effect of emissions and the ambiguity in the current regulations leaves room for a lot of error", says Alejandro Cofré, general manager of the industrial division at Ambar, an environmental engineering firm.

In coordination with regional government agencies, the website provides the proper complaint forms to report a bus spewing black fumes or a business dumping waste in empty lots. It also offers visitors the documents necessary for submitting an opinion on pollution-related proposals, criticism that must be reviewed and included in the final analysis before legislation is proposed.

Gerdau Aza, an air-filter manufacturer with 320 employees, placed its first ad with Sustentable.cl. "I had no where else to go with the my high-tech air filters, so I decided to place an ad on their site", says Fernando Santiviáñez, general manager at Gerdau Aza. "Then I learned about the other services and now have three items on the residuals exchange. Sustentable has opened doors to new clients".

Information Source: Clemente Pérez, Sustentable's director and a former head of the government environmental agency's metro region commission, says helping industry meet clean air standards was an economic niche begging to be filled.

"Most of our business is concentrated in consultant work, because there is a need for basic services and access to information regarding policies which are constantly changing as contamination levels rise and fall", Pérez says. "I think it will be successful in the long term, because it is an innovative solution for business and it brings an economic incentive to a loathsome task".

Other polluted cities in the region, such as Mexico City and São Paulo, have similar regulations in place for industry, yet compliance is low. According to a study by the UN's Economic Commission on Latin America and the Caribbean (ECLAC), Santiago's industrial sector is ahead of the game, comparatively: 3,000 of its approximately 5,000 industrial pollution sources are up to speed on emissions rules. This translates into fewer emergency alert days and better business, since shutdowns are less frequent.

Mexico City and São Paulo maintain the same limits as Santiago on daily emissions but have left industry to police itself, concentrating government resources instead on regulating other polluters, such as transportation. Santiago, like Mexico City, has alternating days for restriction on private vehicles such as cars, but that's where regulations end, leaving the city choked with freelance bus drivers who contribute up to 40% of particulate matter, as well as other toxins.

The study concluded that in all three cities regulations must be constantly revised to accurately reflect the state of pollution, keeping a close eye on what works and what doesn't. Pérez believes compensation laws can and should be extended to other sectors in Santiago, such as public transportation, construction and homes.

Changing Rules: Regulations have forced many companies to rebuild their business with newer, cleaner technologies, such as compressed natural gas, which reduces emissions to 2.5% from 7%. As contamination rises, however, the threat of mandated production

stoppages makes compensation regulations and waste recycling attractive alternatives in the battle to cut air pollution.

Some authorities say that with the introduction of natural gas over coal and oil an emissions exchange will become superfluous. Pérez admits the exchange is still in an embryonic stage. "No one knew at what price to set their stock, and it has been a step-by-step process", Pérez says. He points out, however, that natural gas is not the bottom line in emissions because current regulations only restrict the amount of breathable particulate matter. Other contaminants, he says, such as sulfur dioxide, volatile organic matter and ammonia, will soon be limited under new compensation laws.

An emissions exchange such as Sustentable, Pérez believes, can double the success rate of compensation laws, cutting the level of toxins in the air and making smog less and less a part of city life, something for which both manufacturers and school kids in the Santiago valley can be thankful.



BUSINESS OPPORTUNITIES IN THE CHILEAN ENVIRONMENTAL SECTOR



By Laura Novoa
Senior Partner at Philippi, Yrarrázaval, Pulido & Brunner

In the 1980's Chile began designing an innovative and realistic environmental policy within the framework of the country's economic and social model, respecting private property and free competition along with promoting social justice and citizens' welfare.

The first step was to draft a framework law to systematize the variety of existing laws and administrative regulations on the subject and create the foundations of a new institutional framework. Law 19,300, enacted in 1994, introduced major environmental management practices into our legal system, the most important of which was the environmental impact assessment system (EIAS) to evaluate projects and activities, which may impact the environment or human health.

With several years' experience of the new law, we have seen how the EIAS has consolidated, giving investors much greater assurance in terms of timetables, demands, procedures and jurisdiction for the environmental permits for specific projects and activities. Greater regulatory clarity has become, in our view, a decisive element for foreign investors.

A second notable marker was the approval of an Environmental Policy for Sustainable Development defined by the Government in 1998. Its main policy objectives are "to promote economic development seeking at the same time to recover and improve basic environmental quality and maintain its component parts at a level compatible with sustainability, to protect the health of citizens and ecosystems", and "to perfect environmental legislation and develop new management methods".

As part of this policy the Chilean State has been revising and issuing regulations to improve environment quality and prevent deterioration of the air, water and soil. The regulations have been drafted in line with internationally applied scientific, technical and economic standards, adapted for Chile and with the active participation of the public and private institutions involved.

Many of the new regulations are designed to deal with serious environmental problems like water pollution, a consequence of the practice of disposing of untreated sewage and industrial waste water in the rivers, and soil pollution resulting from inadequate domestic and industrial solid waste disposal. The need to solve these problems has opened up a range of business opportunities.

On the issue of water pollution, the government has drafted regulations on emission standards and quality controls for liquid waste disposal in sewage systems, lakes and the sea, and underground rivers. Industries must gradually install modern water treatment systems to meet the new emission standards. The water companies that treat sewage must also comply with the new regulations.

On the issue of soil pollution resulting from inadequate solid waste disposal methods, the government is preparing and discussing an integrated policy to cover waste management in all phases from initial production to final disposal, that includes the activities of collection, transport, storage, reduction, recycling and re-use. This will translate into new regulations, including one covering the management of dangerous industrial waste, to complement Chile's commitments to relevant international conventions, such as the 1989 Basle Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Both international experience and our own show that, contrary to some expectations, checks and controls on the productive sector to achieve clean production in waste generation and disposal do not have a negative effect, but quite the opposite: The new regulations create and strengthen new industries and businesses related to pollution control.

The new "eco-industry" offers surprising rewarding new opportunities for services and equipment, integrated technology solutions and training in environmental issues. Liquid waste disposal requires the design and installation of sophisticated treatment systems, developed directly by the producers or by third parties. More than half the plants that produce liquid waste lack treatment systems that comply with the regulations, making this an attractive opportunity for new companies. The state has also continued to award concessions for sanitation services, including collection, transport, treatment and final disposal of sewage.

The solid waste management business is equally attractive, with the same opportunities in the transport, treatment and disposal of domestic waste and dangerous industrial waste, which will be particularly interesting in view of the planned new regulations. Both areas are also open for consulting work and technical solutions.

As legal advisers to medium-sized and large companies, most of them international, we have seen both a growing demand for environmental services and significant and growing interest from investors in new eco-business opportunities, above and beyond the enduring interest in traditional areas, particularly in natural resources, where the environment is a very relevant issue.

IV. ACTIONS BY ECONOMIC AND SOCIAL AGENTS IN THE ENVIRONMENTAL DOMAIN

1. Environmental Awareness in Chilean Society

The process of raising environmental awareness in Chile has been marked by several factors, including the government's decision to establish an institutional structure, develop a clear legal framework and open the environmental decision making process to public participation; the role played by NGOs in the national arena; the influence of opinion leaders; and the need among Chilean companies to adapt to growing international demands on environmental issues.

In the business field, the vigorous progress made on environmental control and management, promoted by both the public and private sectors, is very significant.

Since community participation is a basic principle in the legislation, a number of channels have been created to allow for exchange of opinion and discussion between government agencies and the different sectors of society. Several private-sector organizations are working towards sustainable development, thus providing support for the implementation of this process in Chile.

The fact that Chilean society is steadily becoming more environmentally aware shows through in the behavior of economic agents in a number of ways.

2. Business Initiatives

At the business level, environmental awareness has been promoted in part by the ongoing internationalization of the Chilean economy. A number of large corporations in Chile have drawn up environmental management policies, as a result of interaction with foreign companies subject to stringent and demanding systems of environmental regulation, and because of the need to commit themselves to environmental protection in order to compete in international markets.

The presence of foreign capital in mining megaprojects during the 1990's has set precedents in the environmental domain. Foreign investors participating in the local market have applied environmental-friendly technologies from the earliest stages of the productive process, which, apart from complying with high environmental management standards and stringent international regulations, has forced local industries to strive for similar levels. Mining megaprojects involving foreign capital have also been forced to comply with strict environmental conditions attached to the loans financing them.

At present, several corporate associations have their own working groups on environmental issues. For example, the Chilean Federation of Industries (SOFOFA) has set up an environmental unit while the Chemical Manufacturers Trade Association (ASIQUM) and the Forestry Products Trade Association (CORMA) have hired environmental specialists. The National Mining Trade Association (SONAMI) has created an

environmental commission with representatives from all the segments of the mining industry, while the Chilean Chamber of Construction has its own Environmental Protection Commission.

Since the 1990's, SOFOFA and other organizations have worked in direct cooperation with CONAMA through task forces formed by representatives from the public and private sectors.

During the transition period (1993-1997) that ended when Law 19,300 came fully into force, the government issued guidelines for voluntarily submitting projects for environmental impact studies. The extent of private-sector environmental commitment became evident when more than 180 megaprojects were voluntarily submitted to the environmental impact assessment system. While most of them were approved by the government, the projects were authorized only after satisfying legal requirements.

The movement to incorporate environmental issues and sustainable development has been evident in medium-size and small firms as well as in large ones. The mandatory system of environmental impact assessment and at other aspects on the Environmental Framework Law have reinforced this tendency.

The national business sector has raised awareness of sustainable development in Chile, carrying out initiatives that have enhanced the importance of environmental issues in corporate strategies by: (i) developing environmental-friendly processes; (ii) incorporating processes requiring lower levels of energy consumption; (iii) recycling and reducing waste; (iv) requiring supplier products to have been manufactured in environmental-friendly processes; (v) educating consumers on product use and the disposal of packaging; and (vi) cooperating with the authorities in developing appropriate environmental standards.

Within the framework of these commitments, businesses, workers and academic associations have organized consultative councils nationally to train environmental specialists. A permanent program of seminars and conferences involving all the trade associations is currently being developed.

The growing concern for adequate environmental management has led to the growth and establishment of numerous environment-consulting firms. By mid-2001, there were nearly 30 highly qualified firms engaged in environmental impact studies and attending to demands deriving from the application of management tools. Many of these have entered joint ventures with international corporations, thereby benefiting from current international knowledge and levels of practice.

3. Civil Society Participation

Local NGOs are a heterogeneous group of bodies with specialties in a variety of topics. Their common objectives are, firstly, to work together to raise national awareness of environmental problems; and, secondly to promote socially and environmentally sustainable development policies in Chile. Participation by environmental NGOs has often been very useful to the system, especially with regard to supporting communities with resources and technical expertise.

Civil society not only participates through NGOs, but is also directly represented by the organized community through different channels. The growth of public awareness on environmental issues has been displayed through the community's increasing involvement in this field. In fact, the Environmental Framework Law expressly establishes the right of public consultation on a number of environmental projects or initiatives.

Individual citizens, in their role as consumers interacting with the market, nowadays are now more often aware of environmental issues affecting their health and better informed about risks present in their general daily activities. Many of their concerns are voiced through a number of public and private channels.

At governmental level, the National Consumer Protection Service (SERNAC), along with SESMA the private together with consumer associations, processes many of the population's environmental concerns.

Another of these channels are the political parties, which have working groups or commissions dedicated to environmental issues. Both Chambers of Congress - the Chamber of Deputies and the Senate- have commissions working not only on the environment but also on other related quality of life issues.

MANUFACTURING AND THE ENVIRONMENT



By Jaime Dinamarca
Head of the Environment Division at SOFOFA

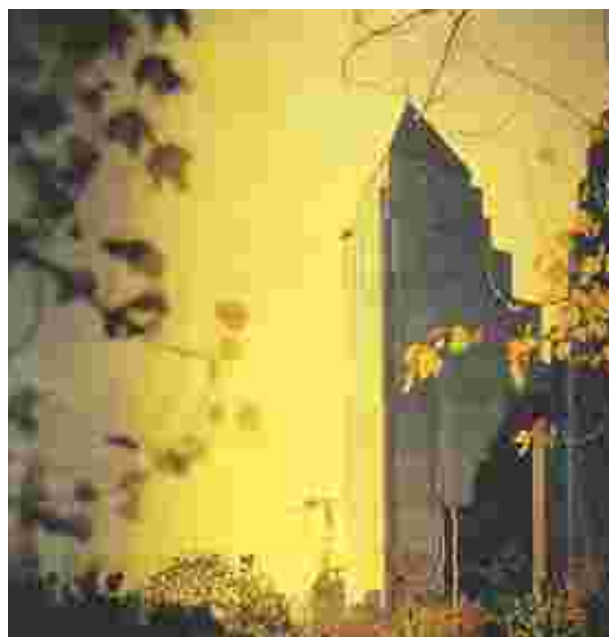
A range of public and private organizations including SOFOFA, the industrialists' association, took part in the discussions on the Environmental Framework Law, which has been in place since March 1994. The process helped bring constitutional rights in line with the principles of Chile's free market economy and the right of its citizens to live in a pollution-free environment.

SOFOFA understands that protecting the environment, far from being an obstacle to development, is one of its essential components. Its members realize the concept of sustainable development demands a modern approach to environment management, and that clean production is a useful tool for greater efficiency and a better environment.

SOFOFA has helped bring tools such as tradable emission permits into public environment management, as effective methods for controlling air and water pollution. In Santiago,

for example, there were 5,000 stationary sources of air pollution in 1990 (823 industrial boilers, 1,850 heating boilers, 1,023 industrial processes, and 1,347 bakeries) which emitted 8,200 tons of particles a year. By mid-2001, the total had been reduced to 1,207 sources, emitting fewer than 1,000 tons a year. This major change has allowed the country to continue to grow, without increasing pollution. This was possible thanks to the allocation of tradable emission permits.

Chile is now in the process of introducing new environmental measures that will vitally affect the future. These include regulations on the treatment of solid and liquid waste, air pollution, urban planning and environmental impact assessments. A total of 34 new emission and quality standards affecting air and water resources have been announced, of which 11 were already in force by September 2001. They provide an objective regulatory framework for developing new investment projects, and a major challenge for existing activities, which must adapt production processes to comply with the new requirements.



SOFOFA's Headquarters in Santiago

CHILE AND THE ENVIRONMENT: AN NGO'S VIEW



By Guillermo Geisse
Executive Director of the Environmental Research and Planning Center (CIPMA)

In the developed countries, NGOs and business have a history of clashes and much of that antagonism has now spread to the developing world. But in Chile - for historical reasons - conflict has been less severe.

In most countries, NGOs headed the campaign for environmental protection, raising the issue ahead of either governments or industry. By contrast, in Chile, the government, business and NGOs incorporated the environment into their agenda almost simultaneously.

The environment came to the fore in Chile during the 1990's. By then, after the restoration of democracy in 1990, NGOs once again enjoyed freedom of speech and could turn their attention to other issues, such as the environment. But Chilean firms, because of their early exposure to international markets -a decade before the rest of Latin America- were already aware of the importance of environmental standards. And when the government, responding to pressure at home and from export markets, introduced the country's first environmental legislation -the Framework Environmental Law- in 1994, it did so with widespread support.

The Center for Environmental Research and Planning (CIPMA), an NGO that was set up in 1980, actively encourages this convergence, promoting the involvement of different sectors of society in debate about environmental issues. In a complementary activity, we seek to act as a channel for information about approaches to the environment that take account of the need for growth and for social justice and to encourage the participation of different players in their implementation.

The Scientific Meetings, which CIPMA has held every three years since 1983 and which have become a traditional event in Chile's environmental calendar, are one of our main tools for achieving these objectives. The Meetings bring together scientists, businesspeople, NGO delegates, politicians and government officials, providing a forum to discuss environmental problems and to identify opportunities for sustainable development, as well as the barriers that hamper progress in this direction. Each Meeting produces a set of recommendations on environmental policy and management that targets both the public and private sectors.

In April 2002, CIPMA plans to hold its 7th Scientific Meeting in Antofagasta in northern Chile. By identifying synergies between economic growth, environmental protection and social justice, this Meeting will attempt to demonstrate that convergence can be the rule, rather than the exception, and work to the mutual benefit of different sectors of society.

CIPMA also develops permanent research programs, which are updated every three years in the light of the findings of its Scientific Meetings. The main goal of these programs is to contribute to the improvement and renewal of sustainable development policies and to provide scientific and technical information for use at our Meetings. Some of the areas covered by our research programs are:

Trade and the Environment: In recent years, environmental debate in Chile has tended to focus on the standards required by export markets in industrialized countries and on the implications of free trade treaties. Through this particular program, introduced after our 5th Scientific Meeting in 1995, CIPMA aims to contribute to this national debate proactively and preventively, rather than reacting passively.

In one of the projects in this program, CIPMA is working together with Yale University's Global Environment and Trade Study (GETS) and Costa Rica's International Economic Policy Center for Sustainable Development (CINPE) to develop an environmental agenda for talks on the proposed Free Trade Area of the Americas (FTAA). A second project, *Green Markets: Often A Lost Opportunity for Developing Countries? - A Case Study Between Chile And The EU*, focuses on the environmental standards that the European Union requires for Chilean exports.

Business-Community Relations: This program was set up in 1994 to look at ways of preventing conflicts arising from large investment projects that were started before environmental certification became obligatory. The results of our research were subsequently used in the design of the Environmental Impact Assessment System (EIAS) that came into force in 1997, precisely to prevent this type of conflict and to ensure citizen participation in decisions.

The program was extended through to 2000. By studying the evolution of relations between firms and the community during the first two years after the EIAS was set up, we were able to propose improvements to the system. The program identified new forms of business-community relations that have developed as citizens' socio-environmental expectations have changed and examined ways of maximizing the benefits of the socio-environmental investment that firms are increasingly making in the sustainable development of the areas in which they are located.

Private Conservation of Bio-diversity: Over the last decade, private investment in the conservation of bio-diversity has increased substantially and, since 1993, CIPMA has been studying this process. After compiling a register of the protected areas in Chile that are in private hands, we went on to study the motives for this investment, ranging from philanthropy to the development of eco-tourism projects, and looked at the type of technical assistance that these investors require.

More recently, we have moved on to examine ways of filling the legal, financial and national planning gaps that can prevent these investments, which are mostly isolated and spontaneous, from making the optimum social contribution to the development of the surrounding area. As a test case, we are conducting a three-year study, financed by the World Bank through its Global Environmental Facility (GEF), of the Lake District of southern Chile. This is Chile's richest area in terms of bio-diversity and has been identified as an international conservation priority. It has also emerged as a pole of new investment that, either directly or indirectly, contributes to the conservation of bio-diversity.

THE EFFICIENT USE OF ENERGY FOR SUSTAINABLE DEVELOPMENT



By Miguel Márquez
Researcher of the Universidad de Chile's Energy Program

The efficient use of energy (EUE) constitutes one of the most important technological options for expanding energy production within the framework of sustainable development. A determined and effective EUE policy contributes to the protection of the environment, the improvement of a country's international competitiveness, the preservation of energy resources and the reduction of social inequalities. In addition, investment in EUE offers a high level of both private and social returns, making it doubly attractive.

Renewable sources of energy (RSE) can also contribute significantly to sustainable development. In the short term, they help to increase access to energy in isolated rural areas, benefiting some of society's most vulnerable sectors. In the medium and long term, RSE can also become an important component of a balanced energy matrix, with positive environmental implications that include a reduction of Greenhouse Gases (GHG) and of energetic vulnerability.

Potential Savings through Efficient Use of Energy:

The Energy Research Program (PRIEN) of the Universidad de Chile has estimated potential energy saving in Chile. These calculations are set out in a report entitled Inventory of Greenhouse Gases for Chile and Mitigation Policies, published by the National Commission for the Environment (CONAMA). The methodology employed in this study was one recommended by the Intergovernmental Panel for Climate Change (IPCC).

Table 1 shows the potential saving from EUE in the generation, transmission and use of electricity in Chile. In the Base Scenario, measurements of energy efficiency that are not contemplated in the GHG mitigation policy were incorporated, thus partially reducing the estimated potential saving shown in Table 1.

Table 1
Estimates of the Potential Saving
in Electricity Generation
(GWh/year)

Year	Final Consumption	Final Consumption	Potential saving
	Base Scenario ^a	Mitigation Scenario ^b	
2000	41,895	38,669	3,226
2005	50,539	44,948	5,591
2010	60,570	53,586	6,984
2015	69,929	58,700	11,229
2020	80,862	67,501	13,361

Source: PRIEN, **Mitigation of Greenhouse Gases**, 1999, Final Report.

^a: estimates based on a projected GDP growth rate of 5%.

^b: includes all the technological options that are feasible in Chile.

The data used for the Mitigation Scenario is conservative. The information available does not permit an evaluation of the profitability of a wider range of more efficient energy and environmental technologies. In addition, although the technologies considered in this exercise include the introduction of motors, equipment and efficient boilers, they exclude other more far-reaching changes, such as the modification of productive processes, that normally generate more significant improvements than the introduction of new technology.

Notwithstanding, the estimated potential saving that could be achieved through more efficient electricity use is significant. It would border on 7,000 GWh/year by 2010, representing nearly 1/6 of the energy consumption in the Base Scenario, and a little more than 13,000 GWh/year by 2020, corresponding to almost 17% of the Base Scenario for that year.

Table 2 shows the potential saving from EUE in the consumption of oil derivatives, pointing to a significant reduction in demand. By 2010, the reduction would be just over 1.2 million m³, rising to 3.5 million m³ by 2020.

Table 2
Estimates of the Potential Saving
in Oil Derivatives

Year	(Thousands m ³ /year)		Potential saving
	Base Scenario ^a	Mitigation Scenario ^b	
2000	12,775	12,775	0
2005	16,086	15,665	421
2010	20,030	18,859	1,171
2015	23,147	20,942	2,205
2020	26,377	22,910	3,467

Source: PRIEN, **Mitigation of Greenhouse Gases**, 1999, Final Report.

^a: estimates based on a projected GDP annual growth rate of 5%.

^b: includes all the technological options that are feasible in Chile.

In the Base Scenario, the effect of the Decontamination Program for Santiago is considered, as well as its possible application in other cities. This Plan is very ambitious in its goals, leaving little margin for savings under the Mitigation Scenario.

Table 3 sets out, the energy that could be produced by incorporating renewable sources and co-generation.

Table 3
Potential Electricity Output from Renewable Sources and Co-Generation

(GWh/year)				
Year	Gross Generation*	Co-generation	Renewable sources	Total
2000	41,788	0	0	41,788
2010	55,899	1,680	1,170	58,749
2020	73,052	2,380	1,934	77,366

*: Includes generation in the Interconnected Central System, the Interconnected System of the North and independent producers.
Source: PRIEN

These results suggest a limited gain from the use of renewable sources and co-generation. This is due partly to the existence of legal and institutional impediments, but reflects mainly the relatively cheap price of fuels and

the low cost of conventional solutions, which conspire against the development of alternative sources.

However, the potential output from renewable sources has increased recently both as result of a Rural Electrification Program (PER) and of new opportunities created in southern Chile where the higher cost of electricity and the reticence of generators to supply distributors have created incentives for independent producers.

In 2001, independent producers were developing two generation projects in southern Chile's Region X, involving a total capacity of 1.4 MW. Both plants were being built without special financial aid by private investors who had previously secured a supply contract with the area's electricity distributor, SAESA-FRONTTEL.

There is, in addition, a growing market for the Clean Development Mechanism (CDM) and the possibility of obtaining carbon certificates. The National Energy Commission has launched a six-year program that will channel nearly US\$ 35 million into the promotion of the CDM. The initiative, which has been submitted for climate change approval from the Global Environment Facility (GEF), will support the electrification program for rural and isolated areas in Regions IV, VII, IX, and X and aims to implement projects related with renewable sources, thereby opening up additional business opportunities for independent producers.



Eduardo Verdugo, Thames Water Managing Director for Chile:
THAMES WATER : CLEANING UP CHILE'S RIVERS



For the water industry, Chile's fast-flowing rivers are at once a blessing and a trap. Rushing down from the Andes Mountains into the Pacific Ocean, they have an apparently inexhaustible capacity to wash away waste from the towns and cities on their banks. But that very virtue has enabled the country to turn a blind eye to one of its main health hazards - untreated wastewater.

UK Thames Water discovered that trap in 2000 when it took control of Essbio, the water company for southern Chile's Bío-Bío (Region VIII). Essbio's development plan stipulated the construction of a treatment plant for wastewater from the city of Concepción, but Thames Water found that only primary treatment - the removal of solids - was required, ignoring the problem of the bacteria that currently flow into the beautiful Bío-Bío River.

Eduardo Verdugo, Thames Water Managing Director for Chile, reports that the UK water company decided to apply its own stricter standards and will be incorporating secondary treatment in the plant, for which it is in the process of awarding a construction contract. "That means that the water that goes back into the river will be fit for agricultural irrigation", he explains.

Over the next five years, Thames Water plans to invest around US\$ 250 million in Essbio and Essel, the company for the Region VI, which it took over in early 2000. That total includes three new wastewater treatment plants, serving a population of 1.3 million. "The plant that we're building in Region VI will be one of the most modern in Latin America", boasts Verdugo.

One of the main benefits granted with the new Wastewater Treatment Plant for Region VI will be the improvement of water quality to irrigate agricultural lands. In this region where one of the main activities is the production of wine and fruits for export, the agricultural sector will also profit considerably.

Thames Water also plans to improve the quality of the drinking water that its clients receive. "Chilean water standards are among the best in Latin America, but there are variations in quality", says Verdugo, adding that Thames Water aims to achieve more homogeneous standards.

New investment in the water industry has been triggered by a privatization program, which means that three-quarters of the country's 15 million population now gets its water from a privately-run company. Recently, the privatization model has been changed to a BOT concessions scheme, which is equally attractive for Thames Water. According to Verdugo, that change will continue to open up new investment opportunities in areas such as the treatment of industrial effluent and prospecting for new water sources.

In addition, it has also created new market niches for overseas suppliers. Apart from the obvious increase in demand for drinking and wastewater treatment equipment, there is also increasing demand for meters. "They mostly have to be imported and there's a strong argument for at least assembling them here", says Verdugo, adding wistfully that local manufacture would do wonders for his company's costs.

Thames Water's Treatment Plant, Region VIII



V. CHILE'S INTERNATIONAL ENVIRONMENTAL COMMITMENTS

1. The International Context

Chile has recognized the need to build environmental concerns into its economic internationalization process, in order to be able to compete and make headway in foreign markets. It has also recognized its duty to achieve economic growth as an environmentally healthy and clean country, with export products that pose no threat to health or environment in consuming countries. In this context, the Canada-Chile Agreement on Environmental Cooperation, signed in conjunction with the Free Trade Agreement (FTA) between both countries, contains provisions on the observance or preparation of environmental protection rules. The item is also incorporated in the FTA negotiations agenda with the United States.

In the international domain, the 1992 Earth Summit, held in Rio de Janeiro, Brazil, has had a major influence on Chile's environmental policy. During this summit, the assembled leaders signed the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, also endorsing the Rio Declaration on Environment and Development and the Forest Principles, and adopting Agenda 21 - an action plan for achieving sustainable development in the twenty-first century.

Agenda 21 represented a mayor commitment by countries in favor of sustainable economic development. Chile is committed to its fulfillment, making progress towards a rational use of resources by encouraging the use of environmentally friendly technologies and cleaner production mechanisms.

The creation of the Chilean Council on Sustainable Development in 1998 was a step forward in implementing Agenda 21. The Council's task is to propose actions to promote and guarantee sustainable development, assuring effective civil society participation in decision-making processes concerning the environment, equity and economic growth.

2. International Agreements

Multilateral Environmental Agreements

Chile is party to all the main multilateral environmental agreements that regulate the different areas of environmental protection. These have either been sponsored by the United Nations or else have been proposed in conferences specifically convened for this purpose by other organizations.

Chile has signed several international agreements:

- The 1985 **Vienna Convention for the Protection of the Ozone Layer** and the 1987 **Montreal Protocol on Substances that Deplete the Ozone Layer**, which seek to protect human health and the environment from adverse effects resulting from the depletion of the ozone layer, establishing mechanisms to regulate their use. Chile has drawn up a National Ozone Program, which has been in force since 1994 under the responsibility of CONAMA, to implement strategies for reducing the use of ozone-depleting substances in the country. Similarly, actions have been taken in order to control the consumption of such substances. Preparation of a policy to reduce the importation and use of these substances, together with corresponding legislation, was being considered by the government by 2001.

- The 1992 **Framework Convention on Climate Change** for the reduction of greenhouse gases (GHGs): this is aimed at stabilizing concentrations of greenhouse gases in the atmosphere at a level that does not interfere with the climate system. The **1997 Kyoto Protocol** contains specific commitments for developed countries concerning the reduction of greenhouse gases. Chile has made efforts to implement the Convention, by developing projects to monitor and mitigate the consequences of the GHGs, preparing an inventory of GHG emissions and setting up a national consulting committee on climate change. Although the process of ratifying the Kyoto Protocol was still underway by mid-2001, the government has also shown an interest in participating in the Protocol's mechanisms by sponsoring initiatives and research aimed at their implementation.

- The 1992 **Convention on Biological Diversity** calls for conservation of biological diversity and regulation of biotechnology. Activities in this field include conducting surveys to identify native plant resources, promotion of privately owned protected areas, and implementation of other environmental management tools - for example, management plans and SNASPE. National authorities, coordinated by CONAMA, are drawing up a national strategy on biological diversity setting targets for the conservation and sustainable use thereof. Chile also signed the **2000 Cartagena Protocol on Biosafety**, which seeks to contribute to ensure an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology.

- The 1989 **Basle Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** aims at minimizing the production of hazardous wastes and controlling their movement. Chile bans the entry of hazardous wastes from third countries. Initiatives carried out in implementing this Convention are coordinated by CONAMA and the Undersecretariat of Health.

- The 1994 **United Nations Convention to Combat Desertification** fights to combat desertification and halt the degradation of fertile soils. As a party to this convention, Chile made a diagnosis of the situation in the country in 1994, adopted a national action plan against desertification in 1997, and has set up a working group, coordinated by CONAF, to implement this convention.

- The 1973 **Convention on International Trade in Endangered Species of Wild Fauna and Flora, (CITES)** regulates international trade in endangered species, cataloguing species according to their state of conservation. SERNAPESCA, together with the Undersecretariat for Fishing, CONAF and SAG, which acts as focal point, are responsible for implementing this convention and verifying compliance with its standards, both at national borders and inside the country.

- The 1971 **Convention on Wetlands** provides a framework for national action and international cooperation in the conservation and wise use of wetlands and their resources. In order to conserve these ecosystems, including their habitat, fauna and flora, Chile has registered a series of sites under this convention and has worked on drawing up a national wetlands strategy.

- The 2001 **Stockholm Convention on Persistent Organic Pollutants (POPs)** regulates the production, use and trade of POPs, chemical substances that persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment. Chile signed this Convention on May 2001 in Sweden.

- The 1998 **Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade** promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment.

In keeping with its international environmental policy, Chile also participates in several international global forums, such as the United Nations Commission on Sustainable Development (CSD), the Inter-American Commission on Sustainable Development of the Organization of American States (OAS), the Valdivia Group, the World Forum for the Environment, the Forum of Environment Ministers of Latin America and the Caribbean, the Committee of Trade and Environment of World Trade Organization (WTO) and Mercosur's Sub-group 6 on Environment.

Chile has also signed a series of bilateral agreements with other States, specifically to promote cooperation on the environment. For example, the 1991 environmental agreement with Argentina has allowed the two countries to jointly carry out a number of actions dealing with global issues (climate change, the chemical agenda, desertification, etc.), and sectoral issues (shared fauna and flora, exotic species, etc.).

3. Canada-Chile Agreement on Environmental Cooperation

The most important bilateral agreement is the Canada-Chile Agreement on Environmental Cooperation (CCAEC), which is one of two side agreements to the Canada-Chile Free Trade Agreement. It has been in force since July 1997.

The decision by the parties to sign an environmental agreement alongside the Free Trade Agreement, reflects their mutual commitment in promoting environmental cooperation and effectively enforcing environmental legislation along with trade liberalization, setting up an institutional structure to deal with environmental issues.

The agreement's broad objective is to foster environmental protection in the two countries and to promote sustainable development on a cooperative basis. In pursuing this, the parties are required to enforce their own environmental laws and regulations, such as those on water, air, toxic substances and wildlife, through effective government action (e.g. monitoring compliance, environmental audits, training of inspectors, and so on).

At an institutional level, the agreement creates a series of bodies, such as the Canada-Chile Commission for Environmental Cooperation, consisting of a Council, a Joint Submissions Committee and a Joint Public Advisory Committee, and each party's National Secretariat. Follow-up and implementation of the agreement in Chile is in the hands of CONAMA. Cooperative activities are carried out through the annual work program and the Commission's budget.

The agreement does not force the parties to harmonize their environmental standards. On the contrary, each country agrees to enforce its own legislation and regulations, in a sustainable development framework, while preserving the right to set its own level of environmental protection, policies and priorities. As a result of this agreement, a process to review and systematize the national environmental legislation has been set in motion in Chile.

Furthermore, neither Party is empowered to carry out activities to enforce environmental laws and regulations in the other Party's territory, nor is it permitted to use lax environmental regulations to attract investment.

The agreement contains provisions allowing citizens and non-governmental organizations in the two countries to make submissions alleging a Party's failure to effectively enforce its own environmental laws.

In order to avert potential environmental disputes, a dispute settlement system is available for persistent patterns of non-enforcement. This makes it possible to anticipate and discuss potential conflicts, facilitating their regulated settlement and enabling the Parties to reach equitable solutions. The agreement does not include commercial sanctions, just a fine which is addressed to improve the problem.

The Commission's second annual work program, covering the period July 2000-July 2001, has focused on three priority areas: environmental enforcement and compliance, community participation in environmental management, and trade and environment, which was added as a new work area.

The most recent cooperation projects carried out under this agreement include:

- the updating of national reports on environmental enforcement, in order to foster and maintain a thorough understanding of how each government is enforcing its own regulations;
- information exchange and training of Chilean officials for effective implementation of the Basle Convention;
- the creation of websites to facilitate access to and exchange of environmental information to the general public;
- establishment of a roundtable on trade and environment, to facilitate exchange of information, experiences and viewpoints on the trade-environment relationship, and to explore potential areas for cooperation.



Rodolfo Krause, Methanex's Senior Vice-President for Latin America: METHANEX CORPORATION: A RESPONSIBLE CARE COMPANY



Defying the popular image of chemical companies as prone to hide dirty secrets under the corporate carpet, Canada's Methanex Corporation makes a point of informing the community about any threat that its plants could pose to the environment.

That policy is part of its commitment to the Responsible Care initiative, an international program that aims to address public concerns about the manufacture, distribution, use and disposal of chemicals. "Methanex was one of the companies that introduced the program into Chile", recalls Rodolfo Krause, Methanex's Senior Vice-President for Latin America.

In Punta Arenas (Region XII), in the extreme south of Chile, where Methanex operates the world's largest methanol facility, the company regularly opens its doors to the local community. In addition, it hosts a committee through which the city's residents can not only receive information about the plant and its operations, but also voice criticisms and misgivings.

But the Responsible Care initiative, developed by the Canadian Chemical Producers' Association, is not only about community relations. It is also about care for

the environment. "It's a comprehensive program that covers everything from plant design and control of production processes to transport safety and the education of clients in the use of our products", explains Krause.

The manufacture of methanol from natural gas is, in fact, a relatively clean process that does not, for example, cause air pollution. However, Methanex worries about the details. In one sign of its concern for the environment, it has invested around US\$ 1 million to ensure that the water it uses in its cooling process goes back into the sea with less than a one degree temperature difference from the surrounding water.

But caring for the environment can come expensive in Chile. Lack of facilities in Punta Arenas means that Methanex has to ship its oil waste to Santiago for safe disposal. And the metals that it uses as catalysts go to Europe for disposal because there aren't appropriate facilities in Chile.

According to Krause, Methanex's experience of working within Chile's environmental legislation has been positive. "Investors sometimes complain that bureaucracy causes delays, but that hasn't been our experience", he reports.

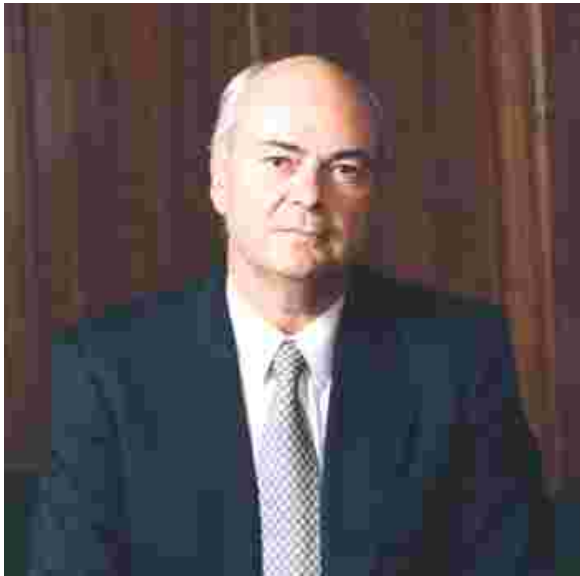
And there is room for better standards in some areas. "There's still a lack of specialist advice in Chile on how to avoid fires in chemical warehouses", he says, adding that the occasional fire and consequent air pollution, along with road accidents and chemical spills, sully the industry's public image.

Under the sponsorship of the Chemical Manufacturers Trade Association (www.asiquim.cl), of which Methanex is an active member, the Responsible Care program is gradually being extended to other Chilean chemical producers. And, as part of that initiative, Methanex and other large firms have undertaken to share their expertise with smaller firms in a bid to promote more widespread care of the environment and help the industry improve its image.



Methanex's Production Facility, Region XII

CLEANER CONSTRUCTION: BUILDING IN AN ENVIRONMENTALLY FRIENDLY WAY



Juan Ignacio Silva
President of the Chilean Construction Chamber

Construction is often viewed as an environmentally unfriendly activity that necessarily causes pollution. Most people associate a building site with dust, noise, rubble and waste of every kind, which overshadows the benefits that the industry generates as an important source of jobs and demand for associated goods and services.

In developed countries, there are plenty of examples to show that the construction industry is not necessarily environmentally unfriendly. The introduction of environmental standards, backed up by active research programs can, for instance, vastly improve the industry's environmental image.

In Chile, concern about the construction industry and its impact on the environment is not new. In fact, the Chilean Construction Chamber, a trade association that groups together the main construction companies, has done a great deal to reduce this impact by taking a pro-active attitude with regards to the protection of the environment and vigorously promoting cleaner and sustainable construction practices. In 1989, the Chamber set up its Environment Protection Commission to advise the Chamber's Board of Directors and its associates on environmental matters.

In this context, the Chilean Construction Chamber has elaborated an Environmental Policy that includes general values and principles, based on the concept of sustainability and preventive action. This specifically takes into account the transitory nature of most construction projects.

The main goal of the Chamber's environmental policy is to reduce the environmental impact of new building

projects, of industrial construction and of public infrastructure projects through cleaner and sustainable construction practices.

The basic principles of the Environmental Policy are:

- A commitment to gradual progress that guarantees continuous and efficient improvement, while protecting the profitability of investments.
- A pro-active attitude, expressed in appropriate participation in the urgent process of reviewing the legal regulatory framework for construction activity, that seeks to promote the use of incentives, rather than of tighter legal controls.
- Support for the incorporation of technological advances and the promotion of available research and technological advances as a way of facilitating the efficient use of resources.
- Collaboration in land use planning processes, taking into account environmental variables, the impact of new building and the creation of areas that provide adequate environmental quality.
- The participation of all sectors that are directly involved and are technically qualified to do so.

In our definition, **cleaner construction** means building in an environmentally friendly way, using the best available experience and technology in order to adequately protect and use natural resources. **Sustainable construction** is the result of cleaner construction, which improves the activity's environmental quality and minimizes its impact throughout a project's life cycle in accordance with current conditions in Chile.

In relation to **cleaner construction**, we have signed a Cleaner Production Agreement (CPA) with the Ministry of Economy through its National Council for Clean Production and CORFO. In addition, we are helping to reduce the industry's environmental impact with respect to air and acoustic pollution and the generation of solid waste by producing cleaner construction manuals and designing monitoring systems to verify the results of mitigation measures.

With regards to **sustainable construction**, the planning and architectural design of new projects needs to take into account variables such as location, historical and cultural heritage, landscape and ecosystems, climate, energy and water resources, reuse and recycling of materials, and, in general, the adequate use of renewable and non-renewable resources. In addition, sustainability indicators are being developed in order to evaluate construction projects in accordance with environmental variables. "Green-Building-Chile", sponsored by the international organization with the same name, is developing projects in this area.

VI. BUSINESS OPPORTUNITIES IN THE ENVIRONMENTAL FIELD

1. Rewarding Opportunities

Private-sector participation is particularly important in the country's sustainable development strategy. Environmental management requires the active participation of individuals and companies involved in all sort of activities, from consulting to waste treatment and disposal, and from infrastructure to energy.

In order to comply with environmental regulations and procedures, Chilean public institutions and companies in the industrial and natural resources sectors need to invest in cleaner technologies, pollution abatement, monitoring and prevention, training, recycling and specialized equipment. This translates into rewarding opportunities for local and foreign firms offering these types of services and products.

The supply of environmental services has increased over the last few years, largely because of the growing need, particularly among export firms, to access to information, technology and professional expertise in order to meet the rising demands of international markets.

2. Business Opportunities in Specific Sectors

Cleaner Technologies

In 1997, the government intensified its efforts to introduce cleaner technologies in production processes as a response to the requirements of environmental legislation (both domestic and international) and to demands from domestic and external markets.

In fulfillment of its commitment towards sustainable development, the government has allocated funds to promote the use of cleaner production: By Mid-2001, CORFO was offering three new funds to help small and medium-sized enterprises finance environmental projects.

The creation in January 2001 of the Clean Production Development Committee (CFPL) under the auspices of CORFO reflects the importance the government attaches

to this topic. The CFPL serves as meeting place for the different participants in the process (government-companies-consumers), allowing them to exchange opinions and design action plans. The Committee has four main lines of action: Public-private cooperation; incentives and financing; technological capabilities; and public management and coordination. Thus, CFPL assists in searching for solutions to firms' pollution problems, improving their situation vis-à-vis the regulatory bodies and their corporate image.

By August 2001, the CFPL was preparing a new Cleaner Production Development Policy (2001-2005) with the objectives of encouraging public-private cooperation in promoting cleaner production; developing regulatory frameworks to facilitate pollution prevention; integrating, adapting and developing incentives for cleaner production; enhancing capacities to provide cleaner production; monitoring and controlling the system of cleaner production and; promoting an international agenda.

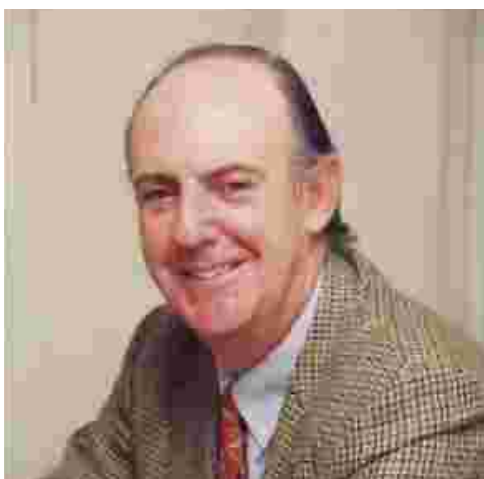
The use of new technologies is not only beneficial to the modern, mainly urban-environmental sector of the economy; cleaner production also has a key role to play in solving problems facing the country's economic development. Cleaner production or environmentally friendly technologies seek to use resources efficiently, produce goods and services in a cleaner way, and manage wastes appropriately. They can be implemented in a variety of productive sectors including raw materials extraction, manufacturing, fishing, agriculture, construction, tourism, energy, information systems, and export activities.

The Chilean government has made major efforts to strengthen interdisciplinary and intersectoral research by creating a number of different centers, the most important of which are the National Center for Cleaner Production, the Clean Production Fund, the Environmental Technologies Division of the Technological Research Corporation (INTEC), and the CORFO Development and Innovation Fund (FID).

Business Opportunities in the Environmental Services Sector

Service	Subsector
Consulting	Consulting in environmental management Consulting in solid waste management Consulting in liquid waste management Consulting in management of atmospheric emissions
Treatment	Treatment of hospital wastes Treatment of hazardous wastes Treatment of alternative fuels Treatment of industrial liquid wastes Treatment of industrial solid wastes Treatment of waste waters
Engineering	Construction of manufacturing plants
Transport	Transport of industrial wastes
Disposal	Disposal of domestic and industrial wastes
Composting	Composting of organic wastes
Monitoring	Monitoring services Equipment representation
Technical Publications	Specialized environmental journals

THE FORESTRY INDUSTRY: A DECADE OF CONCERN FOR THE ENVIRONMENT



By José Ignacio Letamendi
President of the National Forestry Products Trade Association (CORMA)

Care of the environment has become an important issue in Chile in recent years, but there are productive sectors, such as the forestry industry, which have been concerned for these matters far longer.

The industry can claim to have played a fundamental part in national growth in recent decades, as a pillar of the economy. It contributes US\$ 2.4 billion a year in export earnings, and provides almost 400,000 jobs, directly and indirectly.

Its own needs and its focus on international markets mean environmental issues have been a constant concern since the beginning of the 1990's, and it has taken initiatives to improve its activities and their impact on the environment. In 1997 the sector produced a code of forestry practices, the work of CORMA, state authorities and labor organizations, supported by the International Labor Organization (ILO).

In 1998, 65 forestry companies signed a Declaration of Environmental Values, which showed how forestry development was compatible with conservation of the environment. Subsequently, clean production agreements were signed by all the wood pulp producers and some 70 sawmills and manufacturing plants.

The challenge of introducing environmental policies in parallel with the forestry business has brought the companies to see this as a fundamental issue, as central as productive activity, and not simply a body of regulations or recommendations. They have sought international certification to increase market opportunities as well as to improve their public image.

In 1998 three forestry companies, *Forestal Millalemu*, *Forestal Monteágula* and *Forestal Arauco* (ex-Licancel), were among the first nine Chilean enterprises to receive ISO 14,000 certification, a regulation introduced the previous year which allows continuous improvement to comply with integrated environmental, economic and

social functions, and to meet current demands without prejudicing those of future generations. This group served as an example for a second group, coordinated by CORMA, which took on the task of drawing up and certifying a system of environment management based on three basic principles: pollution prevention, legal compliance, and continuous improvement.

Given the importance of this initiative for the entire sector, another seven companies joined the group, including both major companies, such as *Forestal Arauco* and *Forestal Mininco* and also medium-sized *Bosques de Chile*, *Bosques SA*, *Forestal Tornagaleones*, *Forestal Cementos Bío Bío* and *Forestal Quilpolemu*. One has already been certified and the other six are expected to do so before the end of the year 2001.

A complementary line of work has been the development of regulations adapted to national conditions which can be validated by international initiatives, and which will allow the Chilean forestry industry to compete in all markets with products from guaranteed sustainable resources.

CORMA, Fundación Chile and the National Bureau of Forestry Research, with the backing of the Ministry of Agriculture, are currently working on a national standard, to provide an alternative "seal" to those already in the market, which will allow the customer to choose. The system will certify that producers meet proper management standards set in line with national conditions and with the requirements of internationally-recognized concepts of sustainability. The system will be independent, private, voluntary, recognized by other national systems, transparent, simple and cost-effective.

The new seal should help incorporate more medium-sized and small forestry companies into the certification process; many of them cannot accede to other systems, but are suppliers to the major companies. The new standard should come into operation in 2002 for planted woods and in 2003 for native forests.

By the end of 2001, 60% of the planted woods (1.2 million hectares) will be certified under ISO 14,000. This and the other projects under way are a strong signal of the sector's constant concern for the environment.



Cleaner Production Agreements (CPAs) are among the mechanisms through which the government operates in conjunction with the private sector. These are public-private, non-binding agreements that establish certain actions and goals aimed at solving specific environmental problems in the short term and at promoting productive and sustainable capabilities among the companies that sign them. They are drafted under principles of transparency, gradualism, prevention, and producer responsibility.

CPAs make a diagnosis of the sector and of the individual firm involved, typifying and researching specific technologies, and establishing measurable results targets. Their goal is to find solutions to the concrete problems faced by the company or companies that are party to the agreement. As of August 2001, there were two framework agreements and seven specific agreements in the areas of cellulose, chemicals, mining, forestry and smelting, porcine products and construction.

CPAs seek to create a more transparent public-private relationship and to prepare and promote the use of development tools. The signing of such agreements by a large number of firms generates several benefits: economies of scale, lower public monitoring costs (by developing single security and control systems), and more and easier access to funds or CORFO financing mechanisms.

A good example of a CPA is the one reached with the Metallic and Metallurgic Manufacturers Trade Association (ASIMET) covering 23 companies, which aims at reducing atmospheric emissions through more efficient solid waste management. Other CPAs have been signed with the cellulose and chemicals sector: In 1999, the six major firms in the cellulose sector (members of CORMA) decided to make progress in complying with legislation regulating the discharge of waste matter into surface waters. That same year, 29 chemical industries (members of ASQUIM) signed an agreement to take steps aimed at complying with legislation regulating liquid industrial waste effluents.

One of the key goals of cleaner production is to reduce, reuse, recycle and manage the maximum amount of liquid, solid and hazardous wastes in and around the industrial plant that produce them. In 1999, the government launched a program to implement an integrated solid waste management policy. This program includes fourteen activities, several of which are currently in operation, such as the drafting of regulations for the management of hazardous wastes, a project to minimize waste from containers and packaging, and programs to reduce solid wastes in specific regions of the country.

There is also a market for agents interested in trading waste, in which CONAMA and SESMA participate, financed by the CORFO Development and Innovation Fund (FID). Trade associations and unions, together with CORFO, are managing waste through this market, and there has been strong public-private collaboration between a number of firms and the municipalities. Waste management training programs (valuation of waste, trading in waste, management of landfills) also exist at different levels.

The use of recycling programs in firms is growing and there are several business opportunities in this field. Organic wastes need to be treated through composting. This type of residue is increasing at a rate of 5% per year; 60% can be converted into compost, but only 7% was being recycled by mid-2001. In the Metropolitan Region, 1.8% of organic waste was being treated through composting, equivalent to 6,000 tons per month.

The government's role in wastewater treatment is to supervise collection and disposal services and to avoid interruptions in the treatment system. As of December 2000, there were 22 concession-holders handling liquid wastes through 121 treatment plants.

STATE FINANCIAL SUPPORT FOR CLEANER PRODUCTION FOR SMALL AND MEDIUM-SIZED FIRMS

The Chilean Economic Development Agency (CORFO), is offering three new mechanisms to help small and medium enterprises adopt cleaner production standards: 1) Co-financing to help pay specialized technical experts in order to help set up streamlined cleaner production processes and products; 2) Co-financing for pre-investment studies to encourage investment decisions on pollution prevention and monitoring; and 3) Long-term financing for investments in cleaner production and end-of-pipe technologies through banks and leasing, with a total funding available of US\$ 32 million.

According to the Minister of the Economy, Jorge Rodríguez, the adoption of cleaner production techniques is a plus for all companies: Whenever they set up in a given location they must comply with environmental standards and quality control for both products and processes, and protect their employees' health. In addition, they must be environmentally friendly to gain access to a competitive world where consumers are increasingly sensitive to these issues, particularly in export markets. "Strict compliance with environmental protection regulations is essential to gain a foothold and maintain it in foreign markets", he stressed.

CORFO's Executive Vice-President, Gonzalo Rivas said that the new mechanisms were designed to cover the different stages of a "cleaner production" project - initial diagnosis, pre-investment studies, application of technical assistance, and the investment in proper technologies - through continued financial support.

CORFO's Clean Production Technical Support Fund (FAT) helps pay for part of the cost of specialized outside consulting services incurred by companies, either individually or collectively. The advisers first provide the client company with a cleaner production audit and a range of improvement options, and then with advice on how to introduce cleaner production processes.

Where the technical support is contracted by a single company, CORFO co-finances up to 70% of the cost to a maximum of 250 UF*. For a group of businesses, CORFO contributes up to 200 UF per company, also up to a maximum of 70% of the cost. The beneficiaries are firms with annual sales of up to 100,000 UF.

Once the company has incorporated cleaner production practices and shown it is in a condition to invest, it may then access co-financing for pre-

investment projects. Through this mechanism, beginning by September 2001, CORFO contributes up to 50%, to a maximum 200 UF, of the cost of specialized consulting services, to provide technical, economical, and financial evaluation studies for preventive and/or monitoring projects.

These may be in areas such as environmental emissions, liquid waste, solid waste, acoustic solutions, energy efficiency and risk assessment. This benefit is available to companies with annual sales of up to 1 million UF.

The CORFO-KfW environmentally related loans, funded by the German and Chilean governments, handle the long-term financing of environmental protection investments. The resources are available as bank loans and leasing operations, in UFs or dollars, with a maximum of US\$ 1 million per operation. Lending is at a fixed prime rate (below that of other CORFO loans), and repayment can range from three to twelve years, including grace periods of up to 30 months on capital repayments.

Loans are for a maximum 80% of the total investment; and up to 30% of the total loan can be used as working capital for the project's start-up operations. Businesses with annual sales of up to US\$ 30 million in productive areas such as manufacturing, farming, mining, and fishing, and in services such as tourism and health are eligible.

The financing can be used for investments such as:

Introducing or applying technologies to cut waste generation at the source; reducing environmental pollution through preventive or corrective treatment of gas emissions and solid and liquid waste; reducing acoustic contamination; equipping to produce domestic environmental assets with a high technology content; electricity rationing or substitution with other sources of energy; and relocating to meet environmental or urban planning requirements.

* UF = unidad de fomento, an index-linked accounting unit.

For more information, please visit CORFO's website (www.corfo.cl) or contact CORFO's National Council for Clean Production, tel. (562) 6318701 (www.produccionlimpia.cl).

Infrastructure and Transportation

Chile's Public Works Concessions Program, implemented in 1995, gave way to private sector involvement in infrastructure through the Public-Private-Partnership system (PPP). Twenty-seven projects -highways & airports- were awarded to foreign and local private consortia between 1995 and 2000, for a total investment of US\$ 4.6 billion. The program, managed by the Ministry of Public Works, Transportation and Telecommunications (MOPTT) and its Concessions Unit, has had a major positive effect in the environment throughout the country since it has led to a decrease in air-pollution through reductions in journey times, traffic congestion, and drop in wear-and-tear on vehicles.

The second phase of the Program, launched in 2001, extends the PPPs to a wider range of infrastructure, including irrigation systems, reservoirs, prisons, urban transport terminals, river defenses, sports and recreation centers, suburban commuter train services and transfer stations for a total investment of US\$ 1.25 billion in 2001 and estimated investments of US\$ 1.2 billion and US\$ 1 billion in 2002 and 2003, respectively. The 2001-2003 portfolio also includes additional highways, roads, bridges and airports. These projects will continue alleviating traffic congestion and improving vehicle flows in major cities, thus reducing air pollution. They will also lead to an increase in irrigated and green areas.

MOPTT is responsible for 60% of all public-sector investment, and 7% of its budget is assigned to environmental and land-use planning, impact assessment, environmental regulation, land-use design, and frameworks for participation plans. The Ministry has important environmental competencies that include responsibility for preparing the water resource management policy, implemented by the Water and the Hydraulic Works Departments. The policy takes an integrated view of river basins in establishing water resource management strategies, thereby providing a reliable framework for the private sector and the community to operate in.

In early 2001, MOPTT created an Executive Secretariat for the Environment and Land (SEMAT) to provide information and technical criteria to guide the Ministry's environmental policy. Its purpose is to incorporate environmental and territorial variables into infrastructure investment projects in order to detect, anticipate and avert anomalies, thus avoiding the costs imposed by delays and compensations.

The Executive Secretariat operates on two levels, one transversal (regional) and the other vertical (with agents responsible for the specific projects).

The private construction sector has already developed its own environmental policy to mitigate the environmental impact of its activity through cleaner and more sustainable modes of construction. The policy takes a life-cycle approach to construction in buildings, public works, industrial installations and productive infrastructure. This has resulted in the construction industry making a major contribution to waste management.

In the transport sector program announced in 2001 covers a wide variety of issues: sectoral modernization, integration of services, transport regulation, and cities' renewal. The Clean Development Mechanism (CDM) established in the Kyoto Protocol offers a major opportunity for attracting investments to Chile, with its enormous potential for reducing greenhouse gas emissions in a variety of sectors such as energy, industry and transport. The transport sector in Chile is likely to benefit from the application of the CDM, as it promotes projects to reduce polluting emissions in the atmosphere, which is one of the key goals of Santiago's environmental policy and pollution abatement plan. These projects also have associated local benefits, helping to finance biological diversity conservation, technology transfer, enhanced energy efficiency, reduction of polluting emissions (and associated health impacts), among other things, thereby contributing to sustainable development in Chile.

The government's urban transport policy encourages the use of public transport to reduce the high levels of air pollution and traffic congestion in the country's main cities, especially Santiago. The policy seeks to achieve urban mobility that is sustainable from the economic and environmental standpoint and to improve the quality of life of the population. The public transport modernization and improvement plan is based on restructuring bus routes, establishing an integrated fare system between the different transport modes, and constructing modal transfer stations.

With regard to public transport routes, a study is being made of certain key road networks in the city of Santiago, while new technology is being introduced (including guided buses, trams and light trains).



A CLEAN PRODUCTION FRAMEWORK AGREEMENT WITH THE MINING INDUSTRY



By Mauro Valdés
General Manager of the Chilean Mining Council

On 27 November 2000, the government of Chile, represented by the Ministry of Economy, Mining and Energy and other government organizations, signed a Clean Production Agreement (CPA) with the Chilean Mining Council, a private association that brings together the country's main copper, gold and silver producers. This agreement forms part of the government's overall policy of promoting cleaner production.

This Framework Agreement with the mining industry is a pioneer step towards increasing the industry's efficiency and competitiveness, as well as a significant contribution towards preventing contamination and promoting the

adoption of cleaner production processes. It also promises to open the way to increased collaboration between the country's health and environmental authorities and the mining industry.

The government's policy for promoting clean production, spearheaded by the Ministry of Economy, Mining and Energy, sets out a conceptual framework for improving the implementation of environmental strategies, helping to harmonize the demands of productive development with those of preventing damage to the environment. The government has also defined a number of specific tools to be used in pursuance of its clean production policy, including self-regulation and framework agreements of the type signed with the Mining Council.

This Agreement identifies relevant issues, proposing mechanisms for handling them and for facilitating collaboration between the government and the private sector. In addition, it included the creation of a Technical Committee, coordinated by the Undersecretariat of Mining.

Almost a year after the Agreement was signed, both sides are very satisfied with the results. The Agreement is undoubtedly both a landmark in itself and a signpost towards the future.

The Mining Council sincerely hopes that the CPA will continue to facilitate relations between the government and the private sector, acting as a focus for the discussion of relevant issues and contributing towards mutual understanding. In addition, we believe that agreements of this type help to promote and strengthen business initiative.



SUSTAINABLE TRANSPORT: CHALLENGES AND OPPORTUNITIES



By Ana Luisa Covarrubias
Director of *Instituto Libertad y Desarrollo's* Environmental Program*

Santiago has made substantial progress in controlling the pollutants produced by the city's industries. Today, its main priority is to achieve an environmentally sustainable transport system and, as the appropriate incentives are gradually put into place, this is opening up new business and investment opportunities for the private sector.

Santiago's battle with pollution began in the mid-1980's when high levels of inhalable particulate matter, sulfur oxides and carbon monoxide were detected. The authorities' immediate response was to order a freeze on industrial emissions of fine particulates (PM₁₀) and, in a bid to control carbon monoxide pollution, to encourage the city's buses to switch from gasoline to diesel. In a further measure, the burning of wood was restricted to double-chamber stoves and furnaces. At same time, cars with catalytic converters made their debut on the city's roads. Over the next ten years, the level of PM₁₀ fell by 24%, including a 43% drop in the finest particulates, which are the most hazardous from the health point of view.

In 1997, a new decontamination plan was introduced after Greater Santiago was declared "saturated" with PM₁₀, carbon monoxide and ozone and a "latent risk" for nitrogen oxides. A review of this plan in 2000 revealed that the city's industries had fulfilled the targets for their sector, leaving transport as the main source of the city's air pollution.

Santiago's main pollution problem continues to be PM₁₀. Even if the dust lifted by vehicles is excluded, transport accounts for just under half of PM₁₀. In addition, diesel-fired vehicles produce more than 80% of pollutant precursors¹, as well as very fine particulates (PM_{2.5}). The government is seeking to combat this problem by improving public transport standards and discouraging the use of private cars.

In one important measure, the state-owned National Petroleum Company (ENAP) has begun producing low-sulfur diesel² for use in Santiago. As well as reducing the presence of precursors, this cleaner fuel permits the installation of filters that were not practical for vehicles using fuel with a high sulfur content. In addition, outside Santiago where the low-sulfur diesel is not yet available, buses and lorries are starting to use both locally-developed and imported pollutant-reducing technology that is suitable for use with high-sulfur fuels.

By mid-2001, the Undersecretariat of Transportation was spearheading a pilot plan to introduce buses fired with natural gas or liquefied petroleum gas in Santiago. As well as representing an important opportunity for gas companies, this initiative also promises to open up new markets for equipment suppliers. The government is also analyzing alternative forms of public transport, such as light urban railways, and several of these have been shown to offer an attractive private return. In an additional opportunity for the private sector, a number of the country's boroughs are seeking to combat traffic congestion and pollution by offering concession contracts to build and operate underground parking facilities.

However, it is clear that car users will not switch to public transport unless it is to their personal convenience to do so. As a result, an improvement in Chile's public transport standards continues to be an important challenge. In late 2001, the government was preparing to present to Congress a bill that would introduce tradable pollution quotas. By allowing firms to reap the reward of cleaner production, the implementation of this system will be a key step in expanding the market for pollution-reducing technology, monitoring systems and environmental advisory services.

There are several other initiatives that can be implemented in order to reduce road congestion and air pollution in Chile's capital city. Measures aimed at reducing taxes for new vehicles and increasing them for polluting fuels could well provide an incentive for the use of cleaner and safer technology. These steps, in turn, would open further investment and commercial opportunities for both local and foreign firms involved in the sustainable transport business.

* *Libertad y Desarrollo* is a think-tank based in Santiago

1 Substances in the air, such as nitrogen oxides, sulfur oxides and ammonia that react to produce other pollutants.

2 With a sulfur content of 300 ppm, down from 1,500 ppm.

PORTFOLIO OF PROJECTS UNDER EVALUATION BY THE MOPTT'S CONCESSIONS PROGRAM (2002-2003)

Name of Project	Estimated Investment \$US Million	Region
Convento Viejo Reservoir	45	VI
Rural electrification program "Los Lagos"	11	X
Public transport lines and modal transfer stations	444	Metropolitan
Punilla Reservoir	240	VIII
Ancoa Reservoir	50	VII
Mapocho River transformation	30	Metropolitan
Elqui Province solid waste treatment plant	24	IV
Improvement of Route G-21, leading to ski centers	10	Metropolitan
Ecology Recreation and Cultural Complex	150	Metropolitan
River defenses and road on northern bank of Bío-Bío River	155	VIII

Source: Based on information provided by MOPTT (www.moptt.cl)

Eco-tourism Programs

Eco-tourism, a form of sustainable tourism, offers multiple investment opportunities for local and foreign investors. Besides contributing to protect natural areas and raise awareness about the conservation of environmental and cultural heritage, it generates economic benefits and offers alternative job opportunities.

In Chile, three government bodies have responsibility for eco-tourism programs: The National Forestry Promotion and Regulatory Agency (CONAF) and its affiliated institution, the National System of State-Protected Wildlife Areas (SNASPE); and the National Tourism Bureau (SERNATUR).

The country's infrastructure for eco-tourism is being upgraded, while the number of visitors attracted by this type of activity is growing at about 4% per year, amounting to nearly one million in 2000. Between 1999 and 2000, the number of visitors increased by 32%.

CONAF has designed a program to satisfy the needs of eco-tourism activities. Its objectives are:

- Improvement and creation of new alternatives for eco-tourism services in protected wild areas, within the sustainable development framework.
- Strengthening of CONAF's management of SNASPE in the areas of environmental protection and education.
- Improvement of living standards among local rural communities.
- Encouragement for the private-sector to participate as an executing agent and concessions operator for eco-tourism development in protected wild areas.

An important aspect of the program involves offering private enterprises the possibility of enhancing the supply of eco-tourism services through concessions or other mechanisms (agreements, subcontracting, joint ventures). Another aspect

involves reinvesting part of the revenues arising from concession fees and other arrangements. The program also looks into incorporating the communities in the supply of eco-tourism services in protected areas, with local people acting as tourist guides and providing basic services (food, equipment, souvenirs), or contributing in other ways to enhance and diversify the local economy.

There are several mechanisms available for private-sector participation in the development of eco-tourism within SNASPE: Through one of these mechanisms, CONAF invites entrepreneurs to put forward ideas to develop eco-tourism in protected wild areas, selected for their diversity and, in some cases, the exclusivity of its natural and cultural values. The private sector can also play a direct part in the construction of adequate basic infrastructure, such as hotels, hostels, cabins, shelters, restaurants, coffee shops and souvenir stands. It can also operate services to develop eco-tourism activities, such as horseback riding, bird or fauna watching, excursions or trekking, climbing, sailing on lakes or canals, mountain-biking and photographic safaris.

The expected results from the promotion of eco-tourism are:

- Greater community appreciation of protected wild areas, through environmental education and interpretation;
- Higher level of visitor satisfaction in relation to the quality of the recreational experience in such areas;
- Generation of sustainable investment opportunities, with private-sector participation;
- Contribution to improving the quality of life in communities living in protected wild areas, through job creation and income from tourism, such as handicrafts, supplies and services.

The National Tourism Bureau (SERNATUR) is taking part in the tender run by the Ministry of Housing and National Heritage for several pieces of land to develop tourist activity, and eco-tourism in particular, in the coast border of Antofagasta (Region II). The tender will favor innovative proposals aimed at developing the region economically, through tourism, urbanization and environmental conservation; in addition, investments connected with the original project, such as water treatment plants, are also being promoted.

The initiatives to be carried out in these zones need to balance preservation of the natural attributes of the territory with the development of productive and tourism projects. Both national and foreign investment is being invited to participate.

LIST OF PUBLIC PROJECTS MANAGED BY THE MINISTRY OF HOUSING AND NATIONAL HERITAGE

Site	Surface area	Reserve Price of Tender (UF)*	Activity	Region
<i>Playa Ramada</i>	143 Ha	2,145 - 9,619	Housing and equipment sale	III
<i>Ojos del Salado</i> (Concession)	166,000 Ha	1,700	Park in the Andes (concession)	III
Borough of <i>Alto del Carmen</i>		100,000	Community Initiative in Eco-tourism	III
<i>Ike-Ike**</i>	114 Ha	6,460.8	Tourist Town	I
<i>Isla Gaviota</i> (Concession)	160 Ha	12,422	Eco-tourism	IV
<i>Olivares</i>	30,400 Ha	34,890	Multipurpose Mountain Park	Metropolitan

*UF = unidad de fomento, an index-linked accounting unit.

** The Ike-Ike project requires the construction of a road for an estimated investment of US\$ 3 million.

Source: ECLAC (www.eclac.cl), Ministry of National Heritage (www.minvu.cl)

Another major source of eco-tourism investment is the Fundación Chile organization, which has identified several projects in various areas the Country:

Project Name	Activity	Cost of project US\$	Region
<i>Estancia Villorrio Río Verde</i>	Agro-tourism project	430,000	XII
Tourism Development in the <i>Soncor</i> sector, <i>Miscanti</i> and <i>Miñiques</i> lagoons	Extension of supply of eco-tourism in <i>Los Flamencos</i> National Reserve	1,587,171	II
<i>Estancia San Gregorio</i>	Restoration of the <i>San Gregorio</i> Estate to supply tourism services and cultural attractions.	310,000	XII
<i>Fundo El Rosario</i>	Agro-tourism	700,000	V

ECO-TOURISM: A NEW SPIN ON CHILE'S NATURAL BEAUTY



By Gonzalo Salamanca
Director for Eco-tourism at Fundación Chile

Tapping into its experience in developing projects that increase the value of Chile's natural and cultural heritage, Fundación Chile, a Santiago-based technology transfer institute, has decided to add a new string to its bow - eco-tourism - expanding out of biotechnology and education, the areas that have been its traditional preserve.

Chile's remote beauty spots are a still largely untapped resource and, at Fundación Chile, that has spurred us to promote the development of economically and environmentally sustainable eco-tourism projects. Because these beauty spots are in remote places, our projects target discriminating international travelers from higher-income brackets.

The *Torres del Paine* National Park in the extreme south of Chile (Region XII), down by the Magellan Strait, is well known internationally, but the area's other attractions are less visited. Fundación Chile is seeking to promote some of these, such as *Villorio de Río Verde*, a former agricultural estate located opposite the beautiful Riesco Island, and *Estancia San Gregorio*, a lodge on the Tierra del Fuego Island.

Similarly, in northern Chile's Atacama desert, one of the driest spots on earth, Fundación Chile is behind the Eco-Lodge project, an initiative that aims to involve the Atacameño people, increasing local job opportunities while preserving the environmental sustainability of the nearby Chaxa, Miscanti and Miñiques lakes.

And, for travelers who do not want to venture so far afield, we are supporting *Fundo El Rosario*, an agricultural tourism project, located in the Central Valley, the heart of Chile's agriculture and its colonial past.

We believe that these projects represent interesting opportunities for local venture capital funds and for foreign investors. In the case of overseas investors, we anticipate that the most attractive projects will be those which discriminate positively in favor of disadvantaged local communities and are environmentally sustainable.

As part of our involvement in eco-tourism, we have developed an active and on-going working relationship with a number of international institutions and technological centers. This has led to strategic co-operation agreements with, among others, British Columbia National Parks, the Green Economy Secretariat of British Columbia and Alliance & Manufactures. Helped by these agreements, we aim to develop local skills in areas such as of agri-tourism, fly fishing, and ethnic-tourism and to access international expertise in managing wild life, national parks and theme paths.

Likewise, we have signed important agreements with the authorities of Italy's Tuscany Region and with the French Association of Rural Tourism, through which we are seeking to assess other development opportunities.

We believe that Chile's cultural and environmental assets would benefit from quality certification systems for specific products and services and we are developing Codes of Good Practice for the local tourist industry, a "fair trade" certification system and denominations of origin. Similarly, we are helping disadvantaged rural communities and ethnic groups to certify their products, supporting the development of organic production and certifying non-timber forest products.



San Pedro de Atacama, Region III

ENVIRONMENTAL SUPPORT FOR EXPORT COMPANIES



By Paola Conca
Head of ProChile's Environment Division

Consumers and companies around the world are demanding greater care for the environment. For exporters, this means regulation that can hamper access to markets, particularly for agricultural, forestry and food products, and for ProChile, the Chilean government's export bureau, it means helping local producers to adapt to new requirements as a key to preserving traditional markets and penetrating new ones.

One of the main tasks of ProChile's Environment Division is to keep exporters abreast of changes in international environmental requirements and to ensure that the country's export structure is compatible with these norms. In addition, the Division seeks to identify and publicize new export opportunities in the provision of environmental services.

Environmental advisory services - in areas such as the treatment of liquid and solid waste, control of air pollution and clean production - are needed by local firms in order to ensure the sustainable development of the Chilean economy. However, in 2000, they also joined Chile's growing list of exports, while local companies that offer waste treatment services and distributors of imported environmental equipment are increasingly eyeing markets in other South American countries.

In 2000, exports of environmental services totaled an estimated US\$ 300,000 and are expected to increase

to around US\$ 3.5 million in 2001. The main markets for these services are in Central and South America.

Through ProChile's website, the Environment Division publishes environmental information of interest to businesspeople, potential foreign investors and importers, including international environmental norms, Chilean standards and a list of the environmental services that are available locally. It also uses the site to post national and international environmental news and information on the status of Chile's multilateral and bilateral environmental negotiations, including meetings of the Trade and Environment Committee of the WTO and Mercosur.

In a bid to help exporters adopt international standards, ProChile runs a program of seminars that present cleaner production as a tool that improves international competitiveness, rather than as an additional cost. Through a tailor-made fund, managed by ProChile, exporters can also apply for financial support to help their move towards cleaner production processes and compliance with international environmental standards.

The initiatives that are eligible for support through this fund include the audit of environmental management systems, certification under international schemes, such as ISO 14,000, 9,000 and 065 and Hazard Analysis and Critical Control Points (HACCP), as well as by organizations such as the Forest Stewardship Council (FSC). In addition, the fund helps to finance visits by international environmental experts and the preparation of market studies.

ProChile has also recently adapted its National Export Promotion Contest to include environmental and cleaner production criteria, allowing the contest to be used to reward companies that excel in this field. As a result, the support that has traditionally been available through the Contest for market exploration, penetration and consolidation is now also available for environmental initiatives.

This support includes the organization and sponsorship by ProChile of fact-finding missions to other countries to enable participants to become acquainted with local regulation, environmental standards and technology, as well as acquiring more general market information and establishing initial business contacts. In addition, the agency organizes visits to international environmental fairs and marketing missions to promote Chilean products and services.

VII. WEBSITES THAT PROVIDE INFORMATION ON ENVIRONMENTAL ISSUES

STATE AGENCIES

www.gobiernodechile.cl	Official portal of the Government of Chile (English).
www.presidencia.cl	Official website of the Chilean Presidency.
www.congreso.cl	Official portal of the Chilean Congress. It allows access to the Senate's, Chamber of Deputies' and Library of Congress' websites.
www.minhda.cl	Ministry of Finance (English).
www.minecon.cl	Ministry of Economy, Mining and Energy.
www.minrel.cl	Ministry of Foreign Relations.
www.segegob.cl	Ministry of the Presidency.
www.moptt.cl	Ministry of Public Works, Transportation and Telecommunications.
www.minagri.gob.cl	Ministry of Agriculture.
www.minsal.cl	Ministry of Health.
www.minvu.cl	Ministry of Housing, Urban Development and National Heritage.
www.mineduc.cl	Ministry of Education.
www.bcentral.cl	Central Bank of Chile (English).
www.foreigninvestment.cl	Foreign Investment Committee (English).
www.conama.cl	CONAMA, National Commission for the Environment.
www.corfo.cl	CORFO, Chilean Economic Development Agency (English).
www.direcon.cl	DIRECON, the Ministry of Foreign Relations' Division for International Economic Relations.
www.prochile.cl	Prochile, Chilean Exports Promotion Bureau.
www.ine.cl	National Statistics Bureau. It provides information and statistics on a wide range of topics, including economics, demography and geography.
www.sinia.cl	SINIA, National System for Environmental Information, managed by CONAMA. This website includes a search engine focused on environmental issues.
www.cnpl.cl	National Center for Cleaner Production-INTEC.
www.produccionlimpia.cl	National Council for Clean Production. It certifies cleaner production technologies and promotes efficient energy use, as well as coordinating and promoting public-private initiatives in cleaner production and industrial pollution abatement, including voluntary agreements on cleaner production (CPAs).
www.sernac.cl	National Consumer Protection Service. This website provides information about consumers' legal rights.
www.inn.cl	National Institute of Standardization. Responsible for developing and managing technical standardization processes, accrediting certification and developing the use of metrology. It guarantees that its certifications comply with ISO standards and other international guidelines.
www.sesma.cl	SESMA, Metropolitan Environmental Health Service.
www.conaf.cl	CONAF, the Ministry of Agriculture's National Forestry Promotion and Regulatory Agency.
www.sernatur.cl	SERNATUR, the National Tourism Bureau. The government agency that proposes and implements tourism development strategies. This website provides a glance at Chile's main tourist attractions (English).
www.cochilco.cl	COCHILCO, Chilean Copper Commission. It designs, proposes and implements policies and strategies to promote the sustainable and permanent development of Chile's public and private mining industries (English).
www.sernageomin.cl	National Geologic and Mining Agency. It promotes mining development and carries out applied research on mining, geology and related environmental issues.
www.codelcochile.com	CODELCO, National Copper Corporation. The world's main copper producer dedicated to the exploration, exploitation, processing and commercialization of copper and its main sub-products (English).

www.enami.cl	ENAMI, the State's National Mining Company. It refines copper in its own plants and provides assistance to small producers (English).
www.cne.cl	National Energy Commission. It designs and coordinates policies, projects and regulation for the energy sector.
www.sec.c	Electricity and Fuels Regulatory Agency. This website includes details of the regulatory framework, statistics and information on tariffs.
www.enap.cl	ENAP, the State's National Petroleum Company. This Website includes news, commercial information, statistics and a description of projects and new businesses developed by the company and its affiliates.
www.cimm.cl	Mining and Metallurgical Research Center. This center, supervised by the Ministry of Mining, carries out applied research, including environmental topics.
www.cchen.cl	Chilean Nuclear Energy Commission. State agency in charge of the research, development and adaptation of nuclear energy's peaceful uses and for their regulation, control and inspection.
www.mtt.cl	Undersecretariat of Transportation. It regulates agencies carrying out vehicle roadworthiness tests, establishing the technical procedures for these tests and setting maximum permissible pollutant levels.
www.concesioneschile.cl	The Ministry of Public Works' Concessions Unit. This Website contains detailed information on the public infrastructure concessions program for roads, airports, prisons and other projects, which will be built, maintained, and operated by private companies. It includes a list of present and future projects (English).
www.dga.cl	The Ministry of Public Work's Water Department. It makes recommendations on optimal water use; it also carries out research, supervises and measures water stocks and monitors user organizations.
www.siss.cl	Sanitation Services Regulatory Agency. This agency studies, proposes and monitors compliance with technical norms for the design, construction and operation of residential and industrial water and disposal services throughout the country. It also awards expands or modifies concessions and imposes fines on service providers that infringe norms.
www.sag.gob.cl	SAG, the Agricultural and Livestock Agency, affiliated to the Ministry of Agriculture. It contains information on regulatory, sanitary and environmental issues related to agriculture.
www.inia.cl	National Institute of Agricultural Research, affiliated to the Ministry of Agriculture. It promotes innovation in the agricultural, livestock and forestry sectors by creating, adapting, and transferring scientific and technologic knowledge.
www.chileriego.cl	National Commission for Irrigation, affiliated to the Ministry of Agriculture. It finances irrigation and drainage projects.
www.fia.cl	Institute for Agricultural Innovation, affiliated to the Ministry of Agriculture.
www.intec.cl	INTEC, Technological Research Institute, affiliated to CORFO. Its mission is to promote technological development, manage high impact projects and contribute to the improvement of management capabilities (English).
www.infor.cl	National Bureau of Forestry Research, affiliated to CORFO. Government institution that supports public and private entities related to the forestry industry. It provides information and technology for an efficient and sustainable use of forest resources.
www.ifop.cl	National Bureau for Fishing Promotion, affiliated to CORFO. It carries out scientific and technologic research for the development and exploitation of fishing resources, including aquaculture.
www.ciren.cl	Natural Resource Information Center, affiliated to CORFO. It provides information on natural resources and their sustainable use.
www.subpesca.cl	Undersecretariat of Fishing.
www.sernapesca.cl	SERNAPESCA, the Ministry of Economy's National Fisheries Service. Its mission is to execute national fishing policies and supervise compliance with norms and laws.
www.achm.cl	Association of Chilean Municipalities. This organization groups together Chile's 341 municipal governments.
www.conicyt.cl	CONICYT, National Commission for Scientific and Technological Research, a public institution that promotes research and training.
www.inach.cl	National Institute for Antarctic Affairs, affiliated to the Ministry of Foreign Relations. Its mission is to co-ordinate research activity conducted in the Chilean Antarctic.

www.directemar.cl	General Directorate for Territorial Waters and the Merchant Navy, affiliated to the Chilean Navy. Its mission includes enforcing compliance with international laws and treaties signed by Chile, protecting marine resources and regulating all activities carried out in Chile's territorial waters.
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BUSINESS ORGANIZATIONS

www.aepa.cl	AEPA, Association of Companies and Professionals for the Environment. It brings together companies and professional consultants in the environmental field.
www.sofofa.cl	SOFOFA, Chilean Federation of Industries. A trade association that represents the views and interests of the Chilean manufacturing sector.
www.cchc.cl	Chilean Chamber of Construction. Its mission is to promote construction in Chile, contributing to generate infrastructure and real estate policies. This website includes statistics, details of business opportunities and information on the regulatory framework.
www.asexma.cl	ASEXMA, Manufactured Goods Exporters Trade Association. It supports exporters and provides information to foreign companies and organizations interested in finding partners in Chile. It also coordinates the participation of Chilean companies in international trade fairs and missions abroad.
www.asiquim.cl	ASIQUM, Chemical Manufacturers Trade Association. This website includes a detailed list of associates, a summary of contents of the Chilean Chemical Industry Guide and foreign trade statistics (members only).
www.asimet.cl	ASIMET, Metallic and Metallurgic Manufacturers Trade Association. It provides legal and technical assistance and support for export-import operations.
www.asipla.cl	Plastic Manufacturers Trade Association. It represents manufacturers of plastic products and related companies. This website provides news, statistics, information about suppliers and a complete list of members.
www.amchamchile.cl	The Chilean-American Chamber of Commerce (English).
www.chile-canada-chamber.cl	The Chilean-Canadian Chamber of Commerce (English).
www.cachial.com	The Chilean-German Chamber of Commerce (German).
www.corma.cl	CORMA, Chile's National Forestry Products Trade Association. It represents companies in the pulp and wood business.
www.salmonchile.cl	Association of Chilean Salmon and Trout Farmers. This website contains news, regulatory information and statistics (English).
www.fis.com/sonapesca	The National Fishing Association. It groups shipbuilders, fishing companies, the main shipyard owners and regional associations of salmon producers (English).
www.sonami.cl	SONAMI, National Mining Society. This website provides information on legislation, new business opportunities, environmental issues and statistics.
www.brisa.cl	San Bernardo Industrial Waste Exchange. A private initiative set up by the Industrial Association of San Bernardo (Metropolitan Region), ASIMET and CORFO.
www.residuos.cl	A waste exchange initiative, developed by INTEC.

MULTILATERAL INSTITUTIONS

www.iadb.org	Inter-American Development Bank (English).
www.eclac.org	Economic Commission for Latin America and the Caribbean (English).
www.unep.org	United Nations Environment Program (English).
www.worldbank.org	World Bank (English).
www.undp.org	United Nations Development Program (English).
www.fao.org	FAO, United Nations Food and Agriculture Organization (English).
www.ictsd.org	ICTSD, International Center for Trade and Sustainable Development, affiliated to the World Trade Organization, WTO (English).

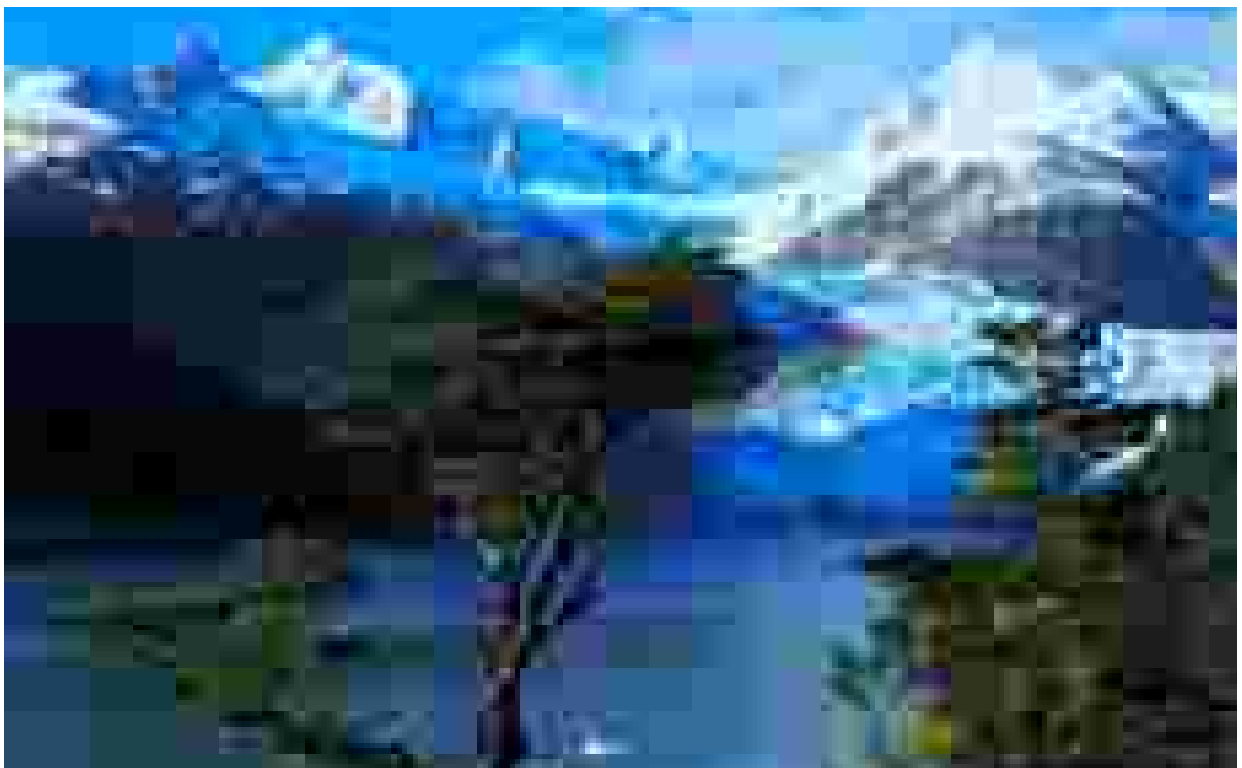
www.unhcs.org	Habitat, United Nations Center for Human Settlements (English).
www.wto.org	World Trade Organization (English).
www.who.int	United Nations World Health Organization.

ACADEMIC AND NON-PROFIT INSTITUTIONS

www.fundch.cl	Fundación Chile, an autonomous non-profit foundation that promotes innovation and technological development in sectors such as agribusiness, forestry and Eco-tourism.
www.cipma.cl	CIPMA, Environmental Research and Planning Center. An independent research center dedicated to fostering sustainable economic development.
www.cenma.cl	National Center for the Environment, affiliated to the Universidad de Chile (www.uchile.cl).
www.eula.cl	European-Latin American International Center for Research and Training in Environmental Sciences, affiliated to the Universidad de Concepción (www.udec.cl).
www.ima.cl	Environmental Management Initiative, affiliated to the Universidad de Santiago de Chile (www.usach.cl).
www.fdfa.cl	The Americas Fund, established in 1993 under an agreement signed between the United States and Chile, to support sustainable development programs.
www.chilesustentable.net	Program for a Sustainable Chile, an initiative that brings together environmental organizations and research institutes in pursuit of a sustainable model of economic development.
www.siai.cl	Information System for Environmental Investment, a database developed by INTEC.

OTHER ORGANIZATIONS

www.sustentable.cl	Environmental news Internet portal.
www.negociosambientales.cl	Environmental news Internet portal.



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