



December, 2009



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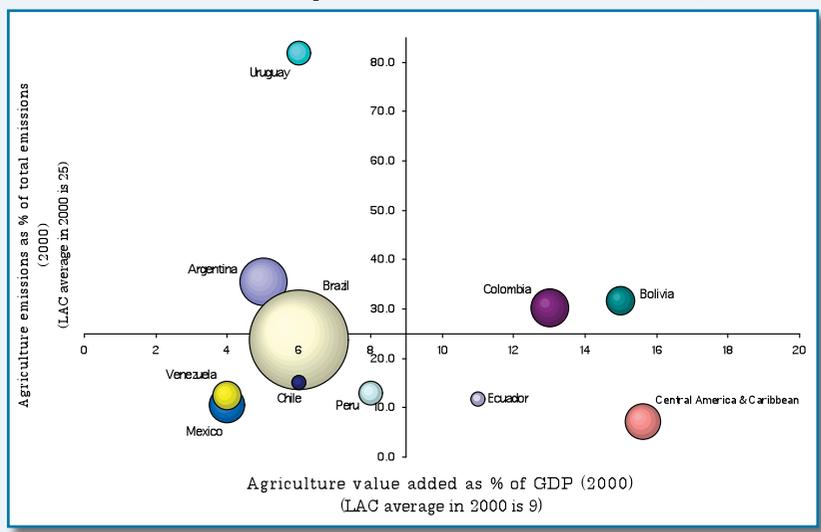
CHILE

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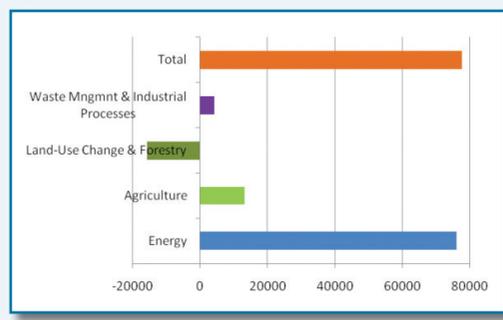
Country Note on Climate Change Aspects in Agriculture

This Country Note briefly summarizes information relevant to both climate change and agriculture in Chile, with focus on policy developments (including action plans and programs) and institutional make-up.

Contribution of agriculture (without LUCF) to the economy and to emissions in LAC countries (size of bubble in MTCO₂ of LUCF emissions; axes cross at LAC average)

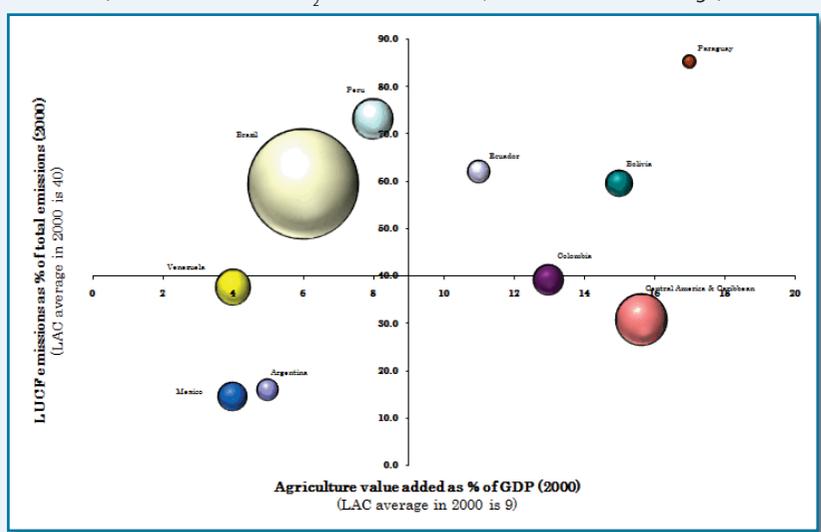


GHG emissions in CO₂ equivalent, by sector

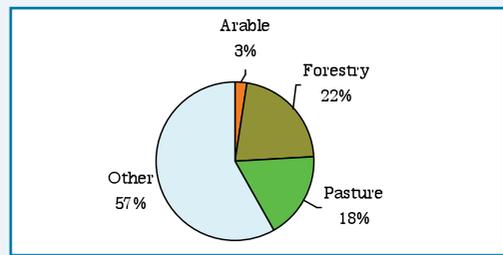


Source: INIA, National GHG Inventory 1984-2003

Contribution of agriculture to the economy and of LUCF to emissions in LAC countries (size of bubble in MTCO₂ of LUCF emissions; axes cross at LAC average)

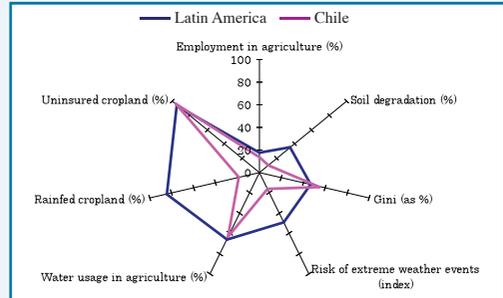


Land use (2005)



Source: World Development Indicators

Vulnerability Indicators



Note: Employment in agriculture (% of total employment)*; Rainfed cropland (% of total cropland)*; Gini*; Water usage in agriculture (% of total annual fresh water withdrawals)*; Uninsured cropland (% of total cultivated land area)**; Soil degradation (% of total land)***; Risk of extreme weather events (index; annual average 1997-2006)****

Sources: *World Development Indicators 2007, 2000-2007 average; **IADB, IICA, 2002/2003 figures; ***FAO AGL 2005!; ****Germanwatch

Note: In the first bubble graph, the total emissions for Uruguay do not account for the positive effects of LUCF (i.e. afforestation efforts). If they are considered, agriculture represents 222% of total emissions. Because of afforestation efforts in Uruguay and Chile, land use change and forestry (LUCF) is not a net contributor to emissions; hence the countries do not appear in the second bubble graph, but are considered in the calculation of the average in the vertical axis.

1 <http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp?country=CHL&search=Display+map+%21>

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Summary

Like most countries in Latin America, Chile has submitted one national communication to the United Nations Framework Convention on Climate Change (UNFCCC) with a second one under preparation. Agriculture contributes little, in relative terms, to total GHG emissions and the mitigation potential in the sector is mainly related to afforestation and the sustainable management of native forests. Agriculture is highly vulnerable to weather extremes, in particular in the Central parts of the country, where water scarcity is an issue. Desertification and soil erosion are some of the other major problems facing the country, though measures for reducing erosion are yielding positive results. A greater emphasis on developing and applying adequate insurance mechanisms can be placed for better management of public resources in light of natural disasters in the agriculture sector.

Working definitions

Agriculture is defined as a managed system of crops, livestock, soil management, forest resources (productive use, goods & services) and water resources (irrigation), including land use and land use change. **Climate change** encompasses both **mitigation** and adaptation activities within the agricultural sector. On the mitigation side, the focus is on the potential to reduce green house gas emissions by the different sub-sectors. On the **adaptation** side, the focus is on the potential to build resilience to climate and to increase the adaptive capacity through sustainable management of agriculture and other complementary factors (e.g. financial instruments). There is no specific **time frame** used in the country notes. An effort was made to collect the most recent available information on country indicators and policy matters.

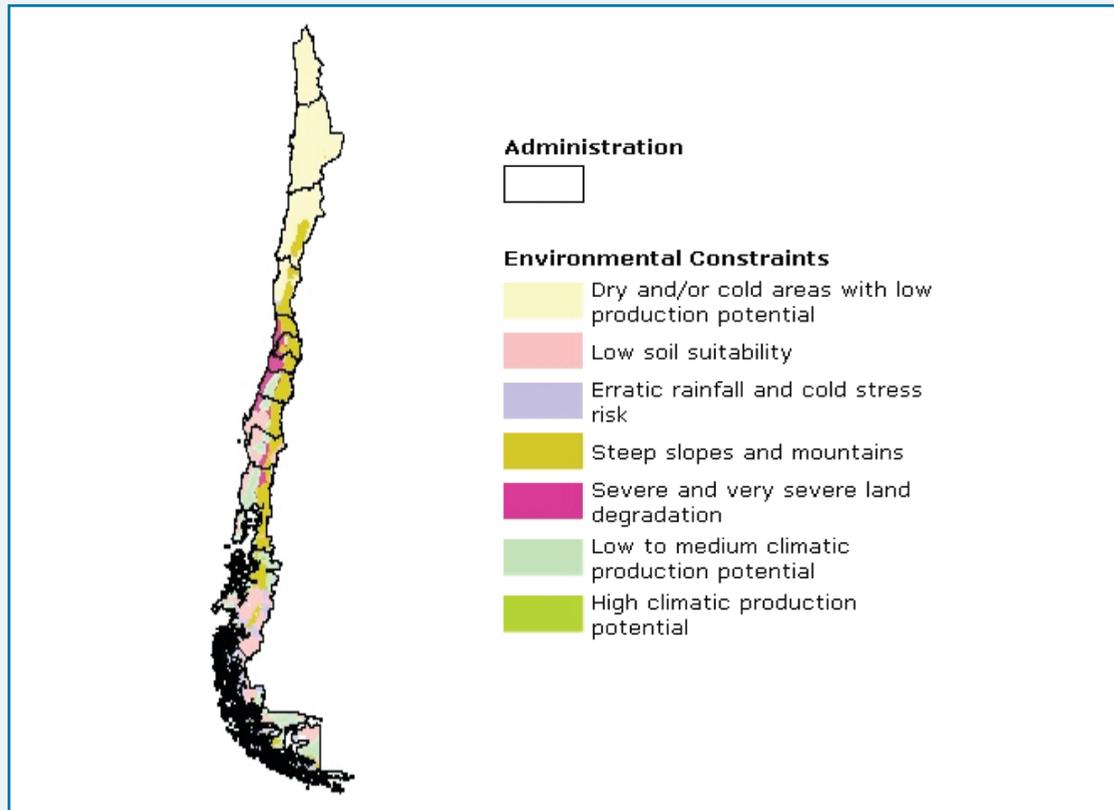
Acknowledgments:

This *Country Note* was produced by a World Bank team of specialists (in agriculture, forestry, social development, risk and knowledge management) from the Latin America and the Caribbean region and other units of the World Bank. The team is very grateful for all the comments and suggestions received from the focal points on climate change and agriculture in many of the countries.

1. The Climate Context

The baseline map provides a visual characterization of Chile's agricultural potential given current environmental constraints and their regional distribution. Around 21% of Chile's land is used for agriculture (18% for pasture and 3% for cultivation), with forestry occupying 22% of the land in the country (WDI, 2005).

Baseline map: Current Major Environmental Constraints related to Agricultural Potential



Source: FAO Note: For more maps on Chile and agricultural resources, go to <http://www.fao.org/countryprofiles/Maps/CHL/04/ec/index.html>

1.1. Country Projections

According to the First National Communication and to the vulnerability and adaptation to climate change study in Chile², the following future climate change related events are to be expected in the country for the future:

- a) **increases in temperature** – in the north of Chile (Region I and II) the temperature will increase by up to 2°C by 2100 while as in the central part and in the South, it could increase by up to 3°C, according to three general circulation models (UKMO, GISS and GFDL);
- b) **changes in precipitations** – a future scenario with a doubling of the CO₂ concentration shows over a 30% variation in the annual rainfall over the next 40 years, such that an increase of precipitation in the altiplano will be recorded due to tropical cyclone activity, a decrease up to 20-25% in Second Region to Puerto Montt in the Tenth Region and an increase of precipitation from Chiloé to the south;

² <http://unfccc.int/resource/docs/natc/chin1.pdf>

- c) **changes in the water regime** – a decrease in yearly precipitation is expected in the central part of Chile, which, along with temperature increases, will lead to increased evapotranspiration;
- d) **changes in heat regimes** – the climate in the central part of the country will become warmer.

In recent years (between 2000 and 2008), floods and extreme temperatures have had high human and economic impact in Chile, with losses for the period 1997-2006 averaging at 0.08% of GDP. 558,371 people (around 0.4% of population) have been affected by floods (7 events) with the cost of damages reaching US\$ 0.2 billion, and 25,000 (around 0.001% of population) people have been affected by extreme temperatures (1 event) with the cost of damages reaching US\$10 million³.

1.2. Agriculture-Related Impacts

All global models agree that climate change will make the Central and Southern regions of Chile more arid, while the Southern end of the country will receive greater rainfall. In the central area, the expected decreases in precipitation between 25% and 35% for the year 2040 and 2070 respectively, coupled with increasing temperatures of about 2 ° C to 4 ° C could displace current climatic zones further South. Most annual crops could change their planting dates, with some crops being affected adversely (e.g. wheat), while others benefiting (e.g. maize)⁴.

2. The Policy Context

Chile has submitted only one **National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)**⁵ in February 2000. The Communication established the National GHG Inventory with 1994 as its base year, including agriculture, land-use change and forestry; it also includes climate vulnerability scenarios for agriculture, water and forestry for the future 40 years as well as vulnerability studies and adaptation and mitigation measures to climate change in the farm, forestry and water sector. It also provides a brief description of the institutions involved in climate change related topics as well as future measures to be taken to improve agricultural and forestry practices.

A **Second National Communication** is under preparation and scheduled to be submitted by 2010. It will contain a revised national GHG inventory, vulnerability studies, strategies and measures for regional and sectoral adaptation and formulation of policies for the development and implementation of adaptation strategies⁶.

Chile is not included in the **Climate Change Performance Index**⁷ of 56 countries responsible for more than 90 percent of global energy related CO₂ due to its overall relatively small contribution of GHG emissions to the atmosphere.

2.1. National Climate Change Plans, Strategies and Programs

In 2006, the Executive Council of the **National Environmental Commission**⁸ (CONAMA, Spanish acronym) approved the **National Climate Change Strategy**⁹. The Strategy allows for a more coordinated, multi-sectoral and multidisciplinary approach to climate change and consists of three components: adaptation to climate change impacts, mitigation of GHG emissions and creation and fostering of climate change capacity.

The **Climate Change Action Plan 2008-2012**¹⁰ (PACC, Spanish acronym) was approved in December 2008 by the Executive Council of CONAMA. It constitutes the framework for activities

³ [http://www.emdat.be/Database/CountryProfile/countryprofile.php?disgroup=natural&country=chl&period=1999\\$2008](http://www.emdat.be/Database/CountryProfile/countryprofile.php?disgroup=natural&country=chl&period=1999$2008)

⁴ http://www.sinia.cl/1292/articles-46115_capitulo1_resumen.pdf

⁵ <http://unfccc.int/resource/docs/natc/chinc1.pdf>

⁶ <http://www.conama.cl/portal/1301/article-46280.html>

⁷ <http://www.germanwatch.org/klima/ccpi2008.pdf>

⁸ www.conama.cl

⁹ http://www.sinia.cl/1292/articles-35209_estr_cc.pdf

¹⁰ www.conama.cl/portal/1301/article-44691.html

related to impact assessment, vulnerability and adaptation to climate change and for mitigation of greenhouse gas emissions. It proposes actions along the three main pillars of the strategy: i) adaptation to climate change impacts, ii) mitigation of greenhouse gas emissions and iii) creation and capacity building to address this problem in Chile.

2.2. Agricultural Sector Initiatives

The **Climate Change and Agriculture Council**¹¹ was created in May 2008 under the wing of the Ministry of Agriculture and is comprised of professionals from the academic, private and public sector. Its main objective is to design Chile's response to the effects of global climate change by delineating the actions to be considered in an adaptation program to climate change in the agricultural sector, as well as the main mitigation measures to be considered in the same sector.

3. The Institutional Context

The **National Environmental Commission (CONAMA)**, Spanish acronym) is the national environmental authority created in 1994 and is also the Designated National Authority (DNA) on climate change to the UNFCCC in Chile. Its main function is to coordinate the environmental management of the country.

The country counts with a focal point on climate change within the Ministry of Agriculture, based in the **Office of Agricultural Studies and Policies**¹² (**ODEPA**, Spanish acronym).

3.1. Inter-Sectoral Coordination

The **National Advisory Committee on Global Change**¹³ (**CNACG**, Spanish acronym) was created by the Ministry of Foreign Affairs in May 1996 with CONAMA as its Chair and the Ministry of Foreign Affairs as its Vice-Chair. The Committee's main role is to advise the Ministry of Foreign Affairs on the definition of Chile's position on the Climate Change Convention, to advise CONAMA on global change in Chile and the application of related plans and programs, to advise institutions working on global change research and to act as a coordinating body among all the organizations whose work is linked to climate change or global change. One of the main duties of the Committee has been the creation of the strategic guidelines on climate change in Chile.

3.2. Agricultural Sector Institutions

The **Ministry of Agriculture**¹⁴ (**MINAGRI**, Spanish acronym) is responsible for the formulation of policies related to agriculture, livestock and natural resources, including forestry as well as its overseas climate change related programs and activities through its different institutions.

The **Institute for Agricultural Research**¹⁵ (**INIA**, Spanish acronym) is responsible for agricultural research and operates under the Ministry of Agriculture. It performs research and participates in workshops related to climate change and its impact on agriculture in Chile.

The Ministry of Public Works, through its **Water Division**¹⁶ (**DGA**, Spanish acronym) is responsible for the administration of water resources and their use, including in agriculture. Furthermore, it addresses the water scarcity in the country through its Inter-ministerial Committee for addressing drought problems.

The **Foundation for Agrarian Innovation**¹⁷ (**FIA**, Spanish acronym) is a private institution dependent on the Ministry of Agriculture that coordinates the efforts made by the farm sector in innovation activities. As part of this, it recently opened a session of "Studies about the impact, vulnerability and adaptation to climate change in the forestry and agricultural sector of Chile".

¹¹ <http://www.chilecologico.cl/ministra-hornkohl-anuncia-creacion-de-consejo-de-cambio-climatico-y-agricultura/259>

¹² <http://www.odepa.gob.cl/odepaweb/jsp/odepad.jsp>

¹³ http://www.directemar.cl/spmaa/areas_trabajo/CambioGlobal.htm

¹⁴ <http://www.agricultura.gob.cl/>

¹⁵ <http://www.inia.cl/link.cgi/>

¹⁶ www.dga.cl

¹⁷ www.fia.gob.cl

The **Chilean Weather Directorate**¹⁸ (**DMC**, Spanish acronym) is responsible for providing weather information for aeronautical purposes and to other sectors of the economy and to realize research studies, among others on climate change issues as well as produces climate bulletins for the agricultural sector with information about extreme events such as frost periods, extreme temperatures, etc.

The **National Forest Corporation**¹⁹ (**CONAF**, Spanish acronym), under the Ministry of Agriculture is the government institution responsible for the protection of national forests through various programs and actions (control of desertification, combating of forest fires, afforestation, and management of native forests) as well as conservation and administration of national parks. CONAF also coordinates the implementation of the United Nations Convention for the Fight against Drought and Desertification through the National Action Plan against Desertification and Drought²⁰ (**PANCCD**, Spanish acronym) which contains a climate change component.

The **Agriculture and Livestock Service**²¹ (**SAG**, Spanish acronym) is responsible, among others, for protecting, preserving and improving the natural resources used in agriculture.

The **National Irrigation Commission**²² (**CNR**, Spanish acronym) is responsible for implementing its own irrigation and drainage policies, programs and projects and promotes public actions oriented to agricultural development and training in the areas that benefit from irrigation projects.

3.3. Fostering Capacity to Deal with Climate Change

Emission inventory: Chile counts with a National GHG Inventory with 1984 as its base year. The inventory includes information on emissions from agriculture, land-use change and forestry, providing disaggregated information by type of emission and type of agricultural resource. A newer inventory²³, produced by INIA, provides information from 1984-2003 for emissions from the non-energy sector.

Studies related to climate change and agriculture: Two vulnerability studies were conducted under the "Enabling Activities" program sponsored by the Global Environment Fund in preparation for the First National Communication, as follows: a) *Vulnerability and adaptation analysis in agriculture, forestry and aquifers* (1998); b) *Vulnerability and adaptation analysis in coastal areas and fisheries* (1998). A project, titled *Institutional adaptation to climate change project: Canada-Chile*, was implemented as a case study on adaptation to dry-land River basins aimed at developing an understanding of the capacities of regional institutions to formulate and implement strategies of adaptation to climate change risks in dry-land environments in Region IV.

Two studies related to agriculture have been finished as an input to the Second National Communication: a) *Climate Variability Study in Chile for the XXI Century*²⁴ (2007) realized by the Geophysics Department of the University of Chile for CONAMA, and b) *Vulnerability and adaptation analysis in agriculture, soils and water resources* (2008) realized by the Faculty of Agronomy of the **University of Chile**²⁵. The University of Chile is one of the places in Latin America where regional modeling is undertaken for climate prediction and climate change projections, running regional models²⁶.

Among other analytical work being undertaken in the context of adaptation is: 1) "*Socioeconomic assessment of climate change impact on the agricultural and forestry sector*" by the Agricultural

¹⁸ www.meteochile.cl

¹⁹ www.conaf.gob.cl

²⁰ <http://www.unccd.int/actionprogrammes/lac/national/1997/chile-spa.pdf>

²¹ www.sag.gob.cl

²² www.chileriego.cl

²³ "Inventarios Anuales de Gases de Efecto Invernadero de Chile: Serie temporal 1984/2003 para sectores No-energía". Boletín INIA # 185.

²⁴ <http://catalogo.bcn.cl/ipac.jsp?session=125R7R242D262.409190&profile=bcn&uri=link=3100007-1575494-13100001-13100002&aspect=subtab146&menu=search&ri=2&source=~!horizon&term=Inventarios+anuales+de+gases+de+efecto+invernadero+de+Chile+%3A+serie+temporal+1984%2F2003+para+sectores+no-energ%C3%ADa+%2F&index=ALITLPL#focus>

²⁵ http://www.conama.cl/portal/1301/articles-39442_pdf_Estudio_texto.pdf

²⁶ http://www.sinia.cl/1292/articles-46115_capitulo1_resumen.pdf

²⁶ http://unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200609_background_latin_american_wkshp.pdf

Economics Department of the Catholic University of Chile for ODEPA; 2) Studies to identify measures and climate change adaptation projects in the agricultural and forestry sector in Chile suitable for family agriculture, by INIA for FIA; 3) Develop a system for managing agro-climatic risks and agricultural emergencies, jointly developed with FAO; 4) Put in place a Program for Genetic Improvement for the development of agricultural and forestry varieties adapted to climate change (INIA and INFOR); 5) Program for efficient water use in agriculture (**National Commission on Irrigation, (CNR)**, Spanish acronym).

In the context of mitigation work, the following activities have been undertaken: 1) *"Socioeconomic and environmental assessment of three prototypes of biodigestors on farms of small milk producers"*, by Ingeniería Alemana for ODEPA; 2) Technical and economic assessment of the production and use of bio-fuels, by CIREN for ODEPA; 3) Determine the carbon footprint of the main agricultural export products, by INIA for FIA; 4) Estimate carbon capture in plantations of Radiata pine and Eucalyptus, by the Catholic University of Chile for ODEPA; 5) Assessments of MINAGRI development programs with relation to their contribution to carbon capture and the reduction of the use of fossil fuels.

4. The Impact of Agriculture on Climate Change - Mitigation Measures

According to the First National Communication, the land used for agriculture and forest plantations represents around 8% of the total surface area of Chile (75,609,600 ha). The forests only of the country cover around 20.7% of the territory. Agriculture accounts for 15% of total GHG emissions in the country in 2000, forests and land-use change for 17%. Chile's per capita carbon dioxide emissions in 2004 stand at 3.9 tCO₂/capita (representing 0.2% of global emissions), compared to the Latin America region of 2.6 tCO₂/capita and the world at 4.5 tCO₂/capita²⁷.

In the context of mitigation priorities established in the **PACC**, the main objective of the Ministry of Agriculture during 2010 is to formulate a **Mitigation Plan for the Agricultural and Forestry Sector**. For this purpose, in 2009 CONAMA, FIA and ODEPA signed an Inter-institutional Cooperation Agreement on Climate Change Mitigation, created for sharing information, experiences, financial resources and professional capacity to develop a series of diagnostic studies to enable the identification of the most efficient sectoral measures, priority actions and the mitigation potential of such actions.

4.1. Action Frameworks

4.1.1. Forestry and Land Use Change

Chile accounts for 0.5% of forested land worldwide and 1.9% in Latin America²⁸. The forests of Chile represent around 20.7% (16 million ha of the territory: 86% native forest, 13.5% forest plantations and the remaining 0.5% of mixed forest²⁹. Chile has had positive developments in this sector through increased afforestation activities leading to an average annual negative deforestation rate (actual reforestation) of -0.4% for the period 1990-2005³⁰.

The government of Chile has introduced measures aimed at improving forest management through a law that allows for a onetime bonus for the following activities: i) reforestation of fragile soils, marshes or areas threatened by desertification; ii) recovery and forestation activities for eroded non-arable dry soils and iii) sand dune stabilization and forestation.

²⁷ http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_CHL.html

²⁸ http://ase.tufts.edu/gdae/Pubs/rp/DP15Borregaard_Dufey_WinchesterApr08.pdf

²⁹ http://www.conaf.cl/?page=home/contents&seccion_id=77eb700ddeb37eb9d254c652cdbff617&unidad=0&

³⁰ World Development Indicators 2005,2007

A few projects have been sponsored in the forest sector aimed at a better understanding of the role of forests in the carbon market:

- “Río Condor Carbon Sequestration” in collaboration with Fundación Chile
- “Measuring Carbon Capture in Chilean Forests and its Promotion in the World Carbon Market” in collaboration with the Southern University of Chile and
- “Demonstrating the increase in carbon capture in Chilean forests by inoculating seedlings” in collaboration with the Forestry Institute.

4.1.2. Livestock

Livestock (domestic cattle raising) is the main responsible for the emissions of methane in Chile in 2003, representing 94% of its total (approximately 6,900 Gg/year) from non-energy related sources and it represents nearly 52% of the total emissions from the agricultural sector alone. The main source for this is enteric fermentation from farm animals and emissions from animal manure³¹.

4.2. Carbon Trading and Agriculture

Under the Clean Development Mechanism (CDM), developed (also referred to as Annex I) countries can implement project activities that reduce emissions in developing (non-Annex I) countries. Though the CDM is expected to generate investment in developing countries, especially from the private sector, and promote the transfer of environmentally-friendly technologies in that direction, the global share of agricultural sector projects (including afforestation and reforestation) is very small (5.71% of total registered projects globally as of December 2009)³² and the potential is country-specific. Latin America, as a region, currently holds the largest share of registered agricultural projects globally, 61% (75 projects).

As of December 2009, there are 35 registered projects in Chile. Currently, there are 7 registered CDM projects in agriculture in Chile, with no projects registered under the “afforestation and reforestation” category³³.

5. Impact of Climate Change on Agriculture - Adaptation Measures

Chile is taking its first steps in implementing adaptation initiatives. A **National Adaptation Plan** is currently being developed and is scheduled to be implemented by the year 2012. Furthermore, there is an agreement between the **Office of Agrarian Studies and Policies (ODEPA, Spanish acronym)**, FIA and CONAMA to study the adaptation of the forestry sector to climate change leading to the formulation of a specific adaptation policy for the sector by 2010. There are also various studies evaluating the impact of climate change on specific productive sectors of the economy. It is worth mentioning that there are no specific adaptation programs currently in place, designed to address the issue of climate change, but rather sectoral public policies with a climate change component (such as the fight against desertification and drought)³⁴. These are described in more detail below.

5.1. Action Frameworks

5.1.1. Land Management

The agricultural sector and primarily soil cultivation, is the main responsible for NOx emissions in 2003 with 3,360 Gg/year (approximately 53%)³⁵. The use of nitrogen based fertilizers is the source of a large part of these emissions. The intensity of fertilizer use in Chile of 207kg fertilizers/hectare

³¹ “Inventarios Anuales de Gases de Efecto Invernadero de Chile: Serie temporal 1984/2003 para sectores No-energía”. Boletín INIA # 185

³² <http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html>

³³ <http://cdm.unfccc.int/Projects/projsearch.html>

³⁴ Claro, E., “La adaptación al cambio climático y su consideración en las políticas de desarrollo: el caso de Chile”, Santiago, 2007, RIDES (www.rides.cl)

³⁵ “Inventarios Anuales de Gases de Efecto Invernadero de Chile: Serie temporal 1984/2003 para sectores No-energía”. Boletín INIA # 185

of cropland in 1998 is way above the OECD average and the Latin America and the Caribbean average of 74kg/hectare of cropland³⁶. In the 1980s the use of fertilizers in Chile increased by more than 223%³⁷. Soil erosion has been one of the main problems facing the country with 46.8% of the national territory being affected by it and 75% of the productive soil³⁸. Some of the main causes for this were deforestation to make space for crop cultivation, overgrazing of livestock, and excessive use of land for agriculture and forest fires. Though the effects of past erosion are still felt, land degradation is currently under control³⁹.

The **Institute for Farm Development**⁴⁰ (INDAP, Spanish acronym) along with the **Farm and Livestock Service**⁴¹ (SAG, Spanish acronym) administer a program titled **Soil Recovery Program**⁴² aimed at reverting the soil erosion process and the rapid salinity of these by offering cash incentives to producers that execute proper soil management and recovery practices. As a result of this program, around 1.7 million ha were improved for the period 2000-2005, corresponding to 40% of the land with erosion and/or salinity problems and around 30% of the land devoted to agriculture⁴³.

For the period 2000-2005, the **National Action Plan against Desertification and Drought** (PANCCD, Spanish acronym), aimed at reverting the process of desertification and drought affecting Chile through various government programs and actions, attracted public investments of US\$ 480 million, covering an intervened surface of 2.4 million ha benefiting 414,000 persons affected by these events.

5.1.2. Water Use

Rapid shrinkage of glaciers in the Andean countries, for example in Bolivia, Chile, Ecuador and Peru, could lead to droughts which would affect people and the biodiversity of the region. An observed increase in run-off has only been temporary. It cannot last very long without increasing precipitation. The melting of glaciers will cause water shortage for millions of people in the region. This is the main vulnerability in the Andean region⁴⁴.

Agriculture is responsible for 63.6% of total water withdrawal in the country⁴⁵. Around 1.8 million ha of agricultural land is irrigated, representing 35% of the arable land devoted to agriculture⁴⁶.

The **Irrigation Development Program for Poor Areas** (Programa Desarrollo del Riego en Comunas Pobres) administered by the National Irrigation Commission is designed to provide subsidies for poorer farmers for on-farm irrigation that are received only once the work is done.

The **Associative Irrigation Works Program** (Programa de Riego Asociativo/Bono al Riego) administered by INDAP provides subsidies for small scale farmers that are associated for the investment in irrigation or drainage work.

The **Rural Community Local Conservation Project**⁴⁷ (CIDA) focuses on the three poorest municipalities in the Coquimbo region of Chile by delivering education and training programs aimed at improving the ability of rural women, non-government organizations and government agencies to address sustainable water management issues for rural communities affected by

³⁶ http://earthtrends.wri.org/pdf_library/country_profiles/agr_cou_152.pdf

³⁷ http://books.google.com/books?id=I4ImU9OXSl0C&pg=PA87&lpg=PA87&dq=programa+de+riego+chile&source=web&ots=7rjw6HihN&sig=tvwKay2dY-wPkBvRWhKMm3XdXn8&hl=en&sa=X&oi=book_result&resnum=5&ct=result#PPA85,M1

³⁸ http://www.conaf.cl/?seccion_id=561f7748bcbe4650bd0a7cfb955b6830&unidad=0

³⁹ Personal communication with ODEPA (climate change unit).

⁴⁰ www.indap.gob.cl

⁴¹ www.sag.gob.cl

⁴² <http://www.minagri.gob.cl/suelos/sirsd.htm>

⁴³ http://books.google.com/books?id=I4ImU9OXSl0C&pg=PA87&lpg=PA87&dq=programa+de+riego+chile&source=web&ots=7rjw6HihN&sig=tvwKay2dY-wPkBvRWhKMm3XdXn8&hl=en&sa=X&oi=book_result&resnum=5&ct=result#PPA84,M1

⁴⁴ http://unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200609_background_latin_american_wkshp.pdf

⁴⁵ <http://www.fao.org/nr/water/aquastat/data/query/results.html>

⁴⁶ <http://www.odepa.gob.cl/odepaweb/servlet/contenidos.ServletDetallesScr;jsessionid=E9AAA8A063D9634CA0842AF8CB8BABB?idcla=3&idn=1686>

⁴⁷ <http://www.cprc.ca/projects.htm>

desertification and the impacts of climate change. Its goal is to improve water security and water quality for the poorest rural communities in the region and to enhance leadership capacity among rural women for water management.

5.2. Social Aspects and Interventions

In terms of social vulnerability, the high percentage of migrant and temporary agricultural labor employed in the fruit industry, are the most exposed to any shocks in the industry, including climate risk, given their low capacity to organize themselves and seek social safety either from their employer or from the state (in 1998, only 7% of them were organized in unions)⁴⁸.

The **Chile Solidario**⁴⁹ program was launched in 2002 by the government and had reached out to 225,000 families by 2005, living in extreme poverty in 13 regions of the country's 15 regions.

The **Local Rural Communities Development Program (PRODESAL**, Spanish acronym) is executed through rural municipalities with a high incidence of poverty. It consists of a series of subsidies providing technical assistance for primary production, environmental improvement and organizational development.

The **Indigenous Development Program (ORIGENES**, Spanish acronym) is implemented at the national level with the help of several ministries and is aimed at promoting the economic, social, environmental and cultural development of indigenous areas. INDAP, as a co-executor of the program, participates with subsidies for technical assistance for agricultural, livestock and irrigation activities.

The **Rural Women Training Program (PRODEMU**, Spanish acronym) designed to promote the participation of poor women in the society. INDAP provides subsidies for training in different areas of agricultural activities.

5.3. Insurance Instruments

Agricultural insurance was first introduced in Chile in the 1980s. The Government subsidizes agricultural insurance premiums by 50% for small and medium size farmers. In the case of severe droughts, the Government tends to intervene providing credit bailouts and waiving tax payments for producers. It also provides R&D resources and technical assistance, as well as facilitates delivery of insurance contracts through the **National Commission for Agricultural Insurance (COMSA**, Spanish acronym) dependent of the **National Development Corporation (CORFO**, Spanish acronym) and other public sector institutions.

⁴⁸ Winn, Peter, ed. 2004. "Victims of the Chilean Miracle: Workers and Neoliberalism in the Pinochet Era: 1973 – 2002" *Duke University Press*, p.283

⁴⁹ <http://www.chilesolidario.gov.cl/?language=english>



About *Country Notes on Climate Change Aspects in Agriculture...*

The **Country Notes** are a series of country briefs on climate change and agriculture for 19 countries in Latin America and the Caribbean region, with focus on policy developments (action plans and programs), institutional make-up, specific adaptation and mitigation strategies, as well as social aspects and insurance mechanisms to address risk in the sector. The **Country Notes** provide a snapshot of key vulnerability indicators and establish a baseline of knowledge on climate change and agriculture in each country. The **Country Notes** are the beginning of a process of information gathering on climate change and agriculture. The **Country Notes** are “live” documents and are periodically updated.



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Feedback

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