

## **APEC SYMPOSIUM ON CLIMATE CHANGE: Adaptation Strategies with Mitigation Potential for Food and Water Security February 6 - 8, 2012. Manila, Philippines**

### **Strategies, Food and Water Security: Climate Change and their effects in Chile**

#### **GHG Emissions and commitments**

Chile, as emerging economy, is not an important emitter of GHG (greenhouses gases). If global emissions associated with the international maritime and air transport are not considered, the contribution of Chile was of a 0.26% of GHG emissions from all the countries in 2006. However, the country's emissions are increasing significantly, mainly due to the growth of the energy sector.

According to the national inventory of GHG, released in the Second National Communication on Climate Change, Chile has total emissions of 60 million tons of carbon dioxide equivalent (tCO<sub>2</sub>e), and 4.1 tCO<sub>2</sub>e per capita. In absolute terms, the Energy Sector has a dominant and increasing contribution to national emissions (73.1%). The second contributing sector is Agriculture (16.9%), followed by Industrial Processes (6.8%) and finally anthropogenic waste emissions (3.2% of the total).

The Land Use, Land Use Change and Forestry sectors (LULUCF) border an average net capture of 19 million tonnes of CO<sub>2</sub>, which allows to "neutralize" the emissions of the agricultural sector, which border the 13 million tons, nominally granting the "carbon neutral" category to the Chilean agriculture sector, and eventually all sectors of the economy, except for Energy.

As part of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP), Chile is committed to conduct national inventories of GHG and communicate them officially to this instance. This national commitment, joined to the volunteer announcement made by the Government of Chile at the Climate Change Summit held in Copenhagen in December 2009, and reaffirmed in the Chilean State of the Nation Address on May 21, 2010, stated to achieve a 20% deviation below the "Business as Usual" emissions growth trajectory by 2020, as projected from year 2007. To accomplish this objective Chile will need a relevant level of international support.

#### **Vulnerability to the effects of climate change**

Chile is a highly vulnerable country to the phenomenon of climate change, because of its diversity of ecosystems, susceptibility to natural disasters, drought and desertification-prone areas, urban areas with problems of air pollution and mountainous ecosystems (Coastal Mountains and Los Andes).

Studies carried out in Chile in recent years in terms of impacts and vulnerability to climate change give an account of this situation, as well as greater understanding of the phenomenon and its potential negative effects on national sustainable development plans. One of them<sup>1</sup>, used the PRECIS Model of the Weather Office of the United Kingdom, of wide use in the projection of the climate at the regional level, whereas two of global GHG emissions scenarios defined by the Intergovernmental Panel on Climate Change (IPCC): A2 (severe) and B2 (moderate).

Changes projected in temperature by the end of century tend to be positive (warming) in all regions, being higher for A2 scenario. Change in average temperature in the A2 scenario, in relation to the current climate of Chile, varies from 2 to 4 °C, being more

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<sup>1</sup> "Estudio de la variabilidad climática en Chile para el siglo XXI" (U. de Chile/ Depto. Geofísica, 2006)

pronounced towards the Andean regions and decreasing from North to South. Only in the southern area, under the B2 scenario, there are small areas with less than 1 °C variations.

In Chile there is a high probability that rainfalls decrease between the regions of Coquimbo and Los Lagos, hoping that the effect of climate change is greater than the natural variability, even in the near future. In Magallanes (Patagonia), there is general agreement as a positive change of rainfall (between 5 and 10% of the present) that do not exceed the level of natural variability. In the Altiplano and the North of Chile, the dispersion of projections is high.

The research on disasters associated with climate and rural territories between 1541 and 2005<sup>2</sup> shows a global tendency to the increase in the number of extremely dry years. On the other hand, while the number of extreme rainfall events tends to decrease in most of the country, increases the occurrence of high precipitation events on days with high temperatures. This has important implications, since the increase in the line of the zero isotherm (warm storms), has the effect of significantly increasing the flow of the rivers. It could generate negative effects by floods and other impacts on the provision of drinking water. An important part of extreme events are associated with the El Niño and Southern Oscillation (ENSO) behaviour.

In Chile, virtually all socio-economic activities are linked to the climate and its behaviour. Some, such as agriculture or forestry, have a direct dependency; due to the climate behaviour determines the existence of primary physical resources. In other cases, resource impacts give rise to consequences cascading impact on the economic activities that benefit from them.

### **Institutional response to Climate Change in Chile**

Since 2008 Chile has a National Action Plan on Climate Change, whose three strategic axes are adaptation to the impacts of climate change, mitigation of GHG emissions and capacity building. In this plan, coordinated by Ministry of Environment, tasks were set out for various public institutions.

The various sectors and ministries have been carrying out a set of studies in order to have adequate information on the vulnerability and the potential impacts of climate change in different economic activities, regions and social groups as well as analysing the various options for adaptation and mitigation. Much of the information and achievements of these activities have allowed the country to develop a Second National Communication on Climate Change, main commitment of Chile with the UNFCCC and compiling more than one decade of activities, initiatives and information generated by the country on various matters related to climate change.

In the case of the Chilean agrifood and forestry sectors, whose institutional responsibilities rely on the Ministry of Agriculture, it concentrates more than 30% of the actions contained in the National Action Plan on Climate Change. GHG mitigation has been an important positive externality of a series of efficiency in the use of resources, and production stimulating measures. Energy efficiency and lean production policies on the one hand, plus the influence of LULUCF via the promotion of afforestation and sustainable management of native forests helped to attenuate and partially uncoupling the increase of emissions with the economic development of the country. Chile now handles an interesting portfolio of nationally appropriate mitigation actions (NAMA) with

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<sup>2</sup> Aldunce, P. y Gonzalez, P. (2009). Desastres Asociados al Clima en la Agricultura y Medio Rural en Chile, Santiago, Chile.

interesting potential for mitigation, prepared to receive international support from funds established by the UNFCCC.

### **Agrifood and forestry adaptation measures**

Regarding adaptation, a sectoral adaptation plan proposal was prepared, pioneer to other sectors of the Chilean economy, proposal that brings together a series of actions and suggestions that consider the following criteria:

- High vulnerability to the effects of climate change to which the Chilean agrifood and forestry sector are exposed.
- Projected Scenarios and impacts that represent climate change only serve to strengthen the efforts towards a comprehensive modernization of the Chilean agrifood and forestry sectors.
- The social, economic and environmental effects and impacts vary heavily depending on territory, crops and types of producers.
- Sectorial adaptation is a long term effort, which should concentrate on the water use efficiency, risk management, long-term research and innovation, new crops varieties and pests and diseases control.

A series of ministerial measures directly aimed to the promotion and in the context of adaptation to climate change can be considered as “early actions”, and have been promoted permanently in this endeavour projected to anticipate and adapt farming systems to these impacts. Among these actions are:

- Implementation of the Building Private Investment in Works of Irrigation and Drainage Act (Act N° 18.450), allowing the incorporation of more than 79 thousands hectares with high tech irrigation during the 2006 to 2011 period.
- Coverage of direct costs of production in crops of small and medium farmers through the subscription of over 84 thousand policies of the Chilean Agricultural Insurance, between 2006 and 2011.
- Implementation of instruments of promotion for the soil protection and recovery of more than 2.5 million hectares of agricultural and forest soils degraded by the incentive system for the agri-environmental sustainability of the agricultural and forest soils between 2001 and 2011.

The challenges on climate change matters in the Chilean agrifood and forestry sector are large and imperative to deal with. In this regard, the institutionality of the Ministry of Agriculture is being redefined, inlinewith the Sectoral Adaptation Plan, process supported by the environmental authority that will act as a significant guide for the elaboration of adaptation plans in other sectors, and in the process of elaboration of the National Plan for Adaptation of Chile.

While many of adaptation measures promoted early have been recognized nationally as generators of positive externalities to the entire economy, the incorporation of adjustments that maximise their contribution to the global response that makes more resilient the Chilean agrifood and forestry systems is necessary, mainly in the local dimension, and to benefit the rural population. These effects require reinforced by actions that promote food security in the Chilean context, i.e., promoting freedom of trade, a better and more efficient maritime transport and the reduction of tariffs and non-tariff barriers.

These challenges in the case of Chile are of a particular importance, given the multiple commitments that the country must address as a member of the Organisation for

Economic Co-operation and Development (OECD), especially with related to sustainable development and the competitiveness of the economies in the context of trade liberalization and globalization.