

This country profile was compiled by the OECD Secretariat and reflects information available as of June 2013. Further information and analysis can be found in the publication: OECD (2013) *Water and Climate Change Adaptation: Policies to Navigate Uncharted Waters*, OECD Studies on Water, OECD Publishing. <http://dx.doi.org/10.1787/9789264200449-en>. Country profiles for all OECD member countries are available for download at: www.oecd.org/env/resources/waterandclimatechange.htm. These profiles will be regularly updated and it is planned to expand coverage over time to include key partner countries.

Chile

Climate change impacts on water systems

Observed changes and trends	<ul style="list-style-type: none"> Rise in temperature in the Central Valley and particularly the Andes Mountains (where most of Chile's water resources are stored) for the period 1979-2006. For the same period, temperatures in the ocean and on the coast have tended to drop. Glaciers are in retreat. 				
Projected impacts	<ul style="list-style-type: none"> Increase in mean temperature for continental Chile by 2 °C to 4 °C, with greater increase in Andean regions and smaller increases toward the South. Only in southern Chile are temperatures projected to rise by less than 1 °C. Greater warming in summer, exceeding 5 °C in some areas of the high Andes. Change in annual precipitation by more than 30% in some areas of the country by 2040. Central Chile (where 70% of the total population lives) may see significant reduction in precipitation. Decrease in precipitation of around 20 to 25% between Antofagasta and Puerto Montt, but an increase from Chiloé Island to the south. Reduction in the mountainous area capable of storing snow over successive years and shift in snow line towards higher altitudes. Retreat of glaciers will have a significant impact on water supply, as glaciers act as strategic water reserves, not only supplying water to river basins in summer, but providing the single most important source of replenishment for rivers, lakes, and groundwater in arid regions during periods of drought. Decreasing available water flow in all river basins that have been assessed. Reductions will be greater in the most northern and southern regions (the Limarí and Cautín Basins) while the remaining basins are projected to experience slight reductions in flow levels in the short-term and significant reductions in the mid-term. Major increase in the number of months with a hydrologic deficit in practically all river basins, due to the projected changes in availability and seasonal distribution of the water flows. This will greatly affect the availability of water resources, with low-flows occurring more frequently. Decreasing ecosystem services of surface and ground water will have a significant impact on the quality of water resources. In general, the water system's capacity to dilute and regulate pollutants and liquid waste emissions will be reduced. In addition, increased frequency of extreme events will degrade surface water quality. Increase in drought, especially in the northern and central regions. River overflows across the country due to <i>El Niño</i> Southern Oscillation (ENSO) events. Negative impacts on ecosystems that depend on the quality and quantity of water resources. Water quality affects the natural conditions that allow for the development of aquatic ecosystems and biodiversity. In addition, ecosystems that depend on groundwater supply will be affected. 				
Primary concerns	Water quantity	Water quality	Water supply and sanitation	Extreme weather events	Ecosystems
	✓	✓	✓	✓	✓ (impoverishment of aquatic life and alteration of biodiversity depending on groundwater availability)
	(decrease in average annual river flows and recharge of groundwater; change in seasonal patterns of snow melt)	(degradation of surface water quality due to extreme events; groundwater salinisation in coastal zones; degradation of groundwater quality in northern areas; decrease in the regulation ability of water systems, such as dilution of pollutants)	(increased water scarcity and increased demand from other sectors can affect availability of drinking water)	(drought, especially in northern and central basins; river overflows across the country due to ENSO events)	
Key vulnerabilities	<ul style="list-style-type: none"> Northern and central Chile where water is already scarce and where considerable reductions in rainfall are expected. Chile has the highest continental concentration of glaciers in the Southern Hemisphere. In 2007, the country's 1 835 glaciers composed a total area of 15 500 km². Chile has more than 20 000 km² of ice reserves, 75 % of which is found in the northern and southern Patagonian Ice Fields. 				

Sources: Economic Commission for Latin America and the Caribbean (2012), *La Economía del Cambio Climático en Chile*, www.eclac.org/publicaciones/xml/0/47220/La_economia_del_cambio_climatico_en_Chile_Completo.pdf (accessed 8 August 2012); Ministerio de Energía (2011), *Selección y Aplicación de un Modelo Hidrológico para estimar los Impactos del Cambio Climático en la Generación de Energía del Sistema Interconectado Central*, www.minenergia.cl/documentos/estudios/seleccion-y-aplicacion-de-un-modelo.html (accessed 10 September 2012); Ministerio del Medio Ambiente (2011), *Segunda Comunicación Nacional de Chile*, http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php (accessed 22 June 2012); National Environmental Commission (CONAMA) (2010), *Análisis de Vulnerabilidad de Recursos Hídricos frente a escenarios de Cambio Climático para las cuencas Cautín, Aconcagua, Teno e Illapel*, National Environmental Commission, Department of Climate Change; National Environmental Commission (CONAMA) (2008), *National Climate Change Action Plan for 2008-12*, National Environmental Commission, Department of Climate Change, www.mma.gob.cl/1304/articles-49744_Plan_02.pdf (accessed 15 September 2012).

Key policy documents

Document	Reference to water?	Type	Year	Responsible institution
National Climate Change Strategy	Y	National climate change strategy	2006	National Environmental Commission (CONAMA)
National Climate Change Action Plan for 2008-12	Y	National climate change action plan	2008	CONAMA
Eight National Adaptation Plans for key sectors (including water resources)	Y	National sectoral adaptation plan	Under development (2012-17)	Climate Change Office, Ministry of Environment
National Adaptation Plan ¹		National adaptation plan	Under development	Climate Change Office, Ministry of Environment
Water Resources Adaptation Strategy ²	Y	Water resources adaptation strategy	Under development	Climate Change Office, Ministry of Environment
Glacier protection and conservation policy	Y		2009	General Directorate of Water of the Ministry of Public Works

1. It will propose the lines of action to address adaptation to climate change.
2. It will propose specific measures for water resources.

Policy instruments

Areas	Policy mix	Regulatory instruments	Economic instruments	Information and other instruments
Water quantity		<ul style="list-style-type: none"> Water Code (DFL 1122): Modification (pending approval) that introduces changes to the Water Code, increasing fines and imprisonment for illegal water extraction. Establishes penalties for noncompliance with the process of executing transfers of water rights, according to the responsible bodies (Notaries and Water Rights Conservatories). Improvements in supervision of extractions and water market are also expected. 		<ul style="list-style-type: none"> National Plan for Climate Change Education and Awareness: incorporating the subject into curricula at all educational levels (Ministry of Education, planned). Improved prediction and response for floods. National irrigation strategy includes a plan considering the construction of 15 reservoirs in the long term, and 4 during the present administration in order to expand irrigation. The General Directorate of Water is conducting studies to provide information about the feasibility of desalination plants.
Water quality		<ul style="list-style-type: none"> Emission Norm for regulation of the pollutants associated with liquid waste discharges to marine and continental surface water (DS 90/2000, of the Ministry of the Secretary General of the Presidency). Emission Norm of liquid waste to ground water (DS 46/2002, of the Ministry of the Secretary General of the Presidency).¹ 		
Water supply and sanitation		<ul style="list-style-type: none"> Emission Norm for regulation of the pollutants associated with industrial liquid waste discharges to main drainage systems (DS 609/98, of the Ministry of Public Works) provides a quality standard to reduce the costs of water treatment. Water Resources National Strategy: proposes (among other measures) the creation of new sources of water. This includes a plan of reservoirs to be addressed in the next 10 years and groundwater infiltration projects, with a first pilot project in the Aconcagua Valley. Both measures aim to mitigate water scarcity due to climate change. 		

Policy instruments (cont.)

Areas	Policy mix	Regulatory instruments	Economic instruments	Information and other instruments
Extreme weather events				
Ecosystems		<ul style="list-style-type: none"> Quality Environment Secondary Norm for the water protection of the Llanquihue Lake (DS 122/10, of the Ministry of the Secretary General of the Presidency). Quality Environment Secondary Norm for the protection of continental surface water of the Serrano River Basin (DS 75/10, of the Ministry of the Secretary General of the Presidency).² 	<ul style="list-style-type: none"> Currently (2012) the Ministry of Environment analyses the feasibility of a “compensation bank” as an instrument of public policy to compensate losses in biodiversity through the SEIA (Environmental Impact Evaluation system) framework. 	

1. These norms are the current instruments that provide assurance in terms of water quality. They could help to address the effects of climate change on water quality due to decreases in flows.
2. Other secondary norms are in process of approval. These norms are instruments for protection of the ecosystems related to water bodies and could reduce the negative effects of climate change.

Main research programmes

- Glaciology and Snow Unit: created in 2008 within the Ministry of Public Works' General Directorate of Water. The Unit is intended to establish and implement a national glaciology programme that will develop a glacier inventory, study and monitor glaciers in Chile. It will also define responses to climate change for glaciers and identify adaptation strategies for different climate scenarios.
- The National Irrigation Commission supports research on climate change adaptation and water, focusing on irrigation and associated impacts, developed by universities and research centres in Chile with national and international funding. The main research topics are: 1) decision making support to reduce vulnerability of irrigated agriculture to climate variability and long-term change; and 2) the development of an adaptation process to address climate change impacts and vulnerability in water management at the basin level.

Principal financing mechanisms and/ or investment programmes

- The Global Environment Facility (GEF) and its implementing agencies, along with bilateral development co-operation partners, have provided funding and technical support to develop and strengthen activities related to climate change. The Government of Chile has provided funding for managing climate change, enabling the creation of permanent working groups charged with addressing climate change from within their ministries and the allocation of budgets to implement their activities.