

# Fact sheet #3

## Climate information for managing water needs

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[www.wmo.int/wcc3](http://www.wmo.int/wcc3) website

By the World Meteorological Organization (WMO), with UN-Water, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and other international partners

**From drinking supplies to irrigation to hydropower, water controls all aspects of our day-to-day needs. Information about water resources is vital for all communities. Increasingly, population growth and climate change are altering the availability and use of water worldwide. Freshwater sources are degrading, while weather extremes and sea-level rise carry the threat of more frequent floods in some regions and droughts in other regions. Water managers need accurate and timely climate information, including seasonal forecasts, to meet water needs and avoid conflict.**

With global population expected to grow from more than 6 billion today to 9 billion by 2050, water demand will rise. At the most basic level, people need freshwater drinking supplies, which are becoming increasingly scarce in some areas, such as arid regions of South America and Africa and inland regions of Asia and Australia. In general, decreases in precipitation are likely in most subtropical regions, while increases in precipitation are very likely in high latitudes. Areas that do not have capacity to store water during the wet periods for use in dry seasons are the most vulnerable.

Higher water temperatures and changes in extreme conditions, including floods and droughts, are projected to worsen water quality. A reduction in groundwater along a coast, for example, can cause an intrusion of saltwater

into the water supply. Sea-level rise in low-lying areas likewise affects groundwater aquifers in coastal areas, reducing freshwater availability. Floods also release and mobilize contaminants and create stagnant water that is conducive to water- and vector-borne illnesses.

Agriculture consumes more than 75 per cent of freshwater resources worldwide. Knowing about the rainy or dry season ahead helps farmers plan their crops. If water is projected to be scarce, for example, they can choose more drought-resistant plants or plants that require less water. Likewise, climate conditions affect the amount of water available to hydropower and hydroelectric energy developers and managers. Better management of water levels in reservoirs, rivers and streams helps moderate the impacts of droughts and floods, benefiting the energy sector as well as the ecosystems.

Balancing the needs of water for living and survival, agriculture and energy will become more challenging with increased variation in the amount of precipitation regions receive. The most vulnerable regions include small islands at risk from sea-level rise, arid regions with already scarce water resources and high-altitude regions that rely on summertime snow melt during their dry seasons. Water sector management decisions, such as the relative use of groundwater vis-à-vis the surface water, contribute to mitigation efforts.



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World Climate Conference-3  
Geneva, Switzerland, 31 August–4 September 2009



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[www.un.org/climatechange](http://www.un.org/climatechange)

## Melting glaciers threaten water supply for millions

Snow and ice in the Andes Mountains, high above the tropical regions of Bolivia, Peru, Ecuador and Colombia, supply the drinking water for 30 million people. That ice has been dwindling in recent years due to rising temperatures, threatening the region's water supply, agriculture and power generation. Scientists are stepping in to help, using monitoring data to improve understanding of the region's water cycle and better plan for future needs.

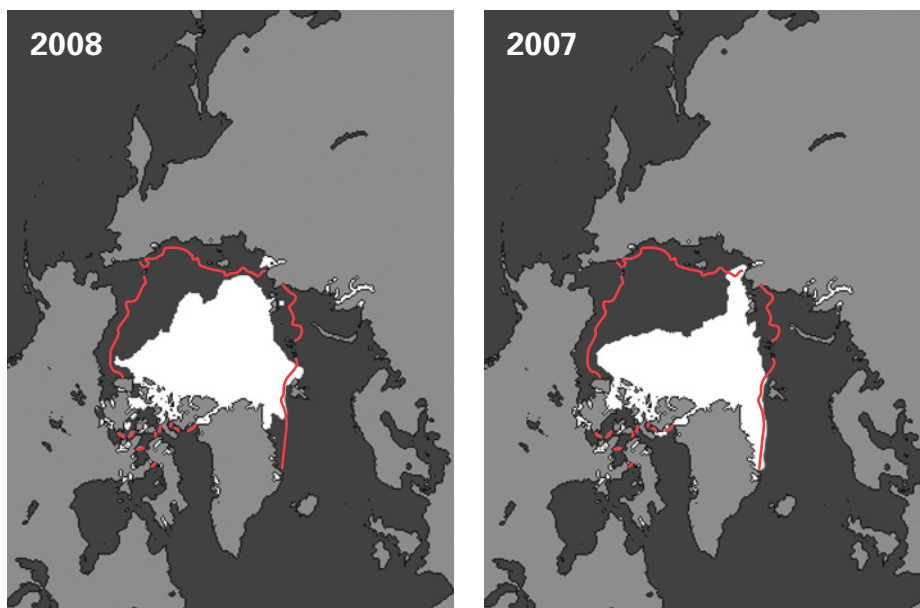
The high Andes Cordillera is home to 70 per cent of the world's so-called tropical glaciers. During the winter, the glaciers accumulate and store rain and snow that then melts off in the summer, providing a freshwater source during the otherwise dry periods. Quito, Ecuador, draws 50 per cent of its water from the glacial basin, while this source accounts for 30 per cent of the water used in La Paz, Bolivia. This water supply is now in jeopardy, with warmer temperatures changing the timing of the glacial melt and the amount of precipitation over the mountains; warmer temperatures cause the clouds that cover the Andes to condense at higher altitudes and release even more heat along the way.

Since 1970, the Andean glaciers have lost 20 per cent of their volume, according to Peru's National Meteorology and Hydrology Service. Some models project that many of the lower-altitude glaciers could disappear entirely in

the next 10 to 20 years. Because these glaciers are the major regulators of the water supply for the region, a global effort is under way to help the region cope with increased local climate variability and global climate change.

WMO Members are contributing to a multidisciplinary project, led by the World Bank and the Global Environment Facility, to address the situation in the Andes. Several WMO Members are monitoring changes in the glaciers with the use of high-resolution satellite images. Improved observation and assessment practices enable the region to better map out the vulnerable areas and develop adaptation strategies. Adaptation measures include the development of alternative water sources, diversification of the energy supply and shifting to alternative crops and advanced irrigation systems.

The Colombian Government has adopted an Integrated National Adaptation Plan that includes pilot projects to regulate water in the high-altitude moorlands and to compensate for loss of available water in the insular areas. In all of these efforts, climate information plays a key role. Effective water management requires advance warning of dramatic changes in the hydrological cycle. The ultimate goal is for climate scientists to be able to provide the necessary forecasts to water managers everywhere.



Sea-ice extent for September 2008 and September 2007; the red line indicates the long-term median from the 1979–2000 base period. The sea-ice extent in September 2008 was 4.67 million square kilometres, reaching the second lowest value after the record of 4.28 million square kilometres observed in 2007.

Source: National Snow and Ice Data Center, United States

# Activities that support climate information for water management around the world

Water managers everywhere need tools that empower them to make operational decisions and plan for short- and long-term changes to water supplies. The Tropical Andes project and the Colombian adaptation plan are just two of several collaborative projects that are aimed at gaining a better understanding of the role of climate in the hydrological cycle and using that information to manage water resources. A sampling of other recent and ongoing projects includes:

The World Hydrological Cycle Observing System (WHYCOS) programme of WMO supports the hydrological observation networks necessary for water resources assessment — the first step in any water management effort. This system generates accurate, timely and accessible information for the sustainable development of freshwater resources and provides the forecasts that enable planning for water storage, agricultural activities and urban development, especially in developing countries.

The Beijing Climate Centre of the China Meteorological Administration has developed tools for drought monitoring in China. Data on rainfall and soil moisture come from a network of agricultural meteorological stations and satellites. This information is then used in the preparation of drought bulletins, weekly broadcasts and daily maps.

In Thailand, rainfall data from a network of meteorological stations and a telemetering project, as well as a seasonal climate forecast from the National Climate Centre, are regularly disseminated to various organizations, such as the Royal Irrigation Department and Department of Disaster Prevention and Mitigation. This information is useful for water monitoring, water storage and water supply measures to minimize the risks of flood and drought.

The Croatian Meteorological and Hydrological Service conducted a climate-based analysis of water resources to aid water management for Hrvatske vode (Croatian Waters), which performs integrated management of Croatian water resources.

The WMO Associated Programme on Flood Management is helping countries in the development and implementation of Integrated Flood Management policies by providing tools and sharing the best practices for flood risk assessments, flood forecasting and flood preparedness.

WMO and its Members work to address risks posed by glacial lake outburst floods, which occur when bodies of glacial melt suddenly destabilize and flood a region. The risk of such outbursts is increasing as warmer global temperatures accelerate glacial melt in various regions. The Regional Glacial Lake Outburst Floods Risk Mitigation Project, which is focused on the Hindu Kush-Himalaya region, including Bhutan, India, Nepal and Pakistan, and is sponsored by the European Commission and the United Nations Development Programme, seeks to strengthen understanding of the risk and shore up infrastructure and community-based efforts to prevent disaster.

Through the Special Climate Change Fund of the United Nations Framework Convention on Climate Change, the World Bank is sponsoring an adaptation program to assess climate effects in Mexico's national water budget, specifically focusing on impacts from salinization and subsidence (sinking land) on the Gulf Coast of Mexico.

The United States Natural Resources Conservation Service runs the National Water and Climate Center, which issues water and snow supply forecasts that can be used by all sectors, including agriculture and energy. National programmes elsewhere, sometimes run through the National Meteorological and Hydrological Services, provide similar services.

Australia's Water for a Healthy Country Flagship research programme is working to improve rural water use and management, address rising urban demand for water and restore the country's water ecosystems. It is also cooperating with the Water Resources Observation Network to monitor, forecast and manage water demand, supply, quality and use patterns. All major research areas and themes are focused on water monitoring, management and adaptation in light of climate change.

## Facts and figures

- Climate models project that average river runoff and water availability will increase by 10 to 40 per cent at high altitudes and in some wet tropical areas. [Intergovernmental Panel on Climate Change (IPCC)]
- The same models project a decrease in water availability of 10 to 30 per cent in dry regions in low and mid-latitudes. Between 75 million and 250 million people will be exposed to water stress by 2020, 350 million to 600 million by 2050. [IPCC]
- More than 1 billion people worldwide lack access to clean water. [United Nations]
- Nearly 200 million people live in coastal zones that are at risk due to flooding; in South Asia alone the number at risk for coastal floods exceeds 60 million people. [IPCC]
- Drought and desertification threaten the livelihoods of over 1.2 billion people worldwide. [United Nations Convention to Combat Desertification (UNCCD)]
- The most recent drought in Ethiopia has affected 25 million people. [Oxfam International]
- Experts at the International Water Association Congress in 2008 called for a doubling of investment in water infrastructure from the current level of US\$ 80 billion a year to avoid widespread drought, flooding and disease. [International Water Association Congress]
- The 2006 drought in Australia saw the lowest average rainfall in the state of South Australia since 1900. [WMO]
- By 2100, sea level will be 18 to 59 centimetres (cm) higher, with a possible additional rise of 10 to 20 cm if the recent accelerated melting of land ice sheets continues. [IPCC]
- Loss of the Andean glaciers threatens the water supply of 30 million people. [World Bank]
- As of February 2009, usable water storage along the Murray-Darling Basin river system in south-eastern Australia was at 16 per cent of capacity and 73 per cent below normal for that time of the year, according to the Murray-Darling Basin Authority. [UNCCD]

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**WCC-3 will initiate actions to enhance climate services for climate adaptation and the management of climate risks and opportunities around the world.**

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### For more on climate and managing water:

#### UN Water:

<http://www.unwater.org/>

#### UNESCO:

<http://www.unesco.org/water/>

#### WMO homepage on water:

[http://www.wmo.int/pages/themes/water/index\\_en.html](http://www.wmo.int/pages/themes/water/index_en.html)  
<http://www.whycos.org> and <http://www.apfm.info>

#### World Bank Website on Andean glaciers project:

<http://go.worldbank.org/PVZHO48WT0>

#### Drought Monitoring Centre for the Greater Horn of Africa:

<http://www.icpac.net/>

#### Beijing Climate Centre:

<http://bcc.cma.gov.cn/en/>

#### Regional Glacial Lake Outburst Floods Regional Risk Mitigation:

<http://www.managingclimaterisk.org/index.php?>

#### The US National Water and Climate Center:

<http://www.wcc.nrcs.usda.gov/factpub/intrpret.html>

#### Water for a Healthy Country Flagship:

<http://www.csiro.au/org/WfHC.html>

#### Environment Canada's Freshwater Website:

[http://www.ec.gc.ca/Water/en/nature/clim/e\\_clim.htm](http://www.ec.gc.ca/Water/en/nature/clim/e_clim.htm)

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