

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.

United States

Climate change impacts on water systems¹

| | | | | | |
|-----------------------------|---|---------------|-----------------------------|--|------------|
| Observed changes and trends | <p>Water is an issue in every region. Examples of regional changes already observed include:</p> <ul style="list-style-type: none"> • Over the past several decades, extended dry periods have become more frequent in parts of the United States, especially in the southwest and the eastern US. Important agricultural areas in the central US are currently experiencing severe to exceptional drought conditions. • Reduction of snowpack/snow-water equivalent in the West. Over the last 50 years, there have been widespread temperature-related reductions in snowpack in the West, with the largest reductions occurring in lower elevation mountains in the Northwest, and in California, where snowfall occurs at temperatures close to freezing point. The Northeast has also experienced snow pack reductions over a similar period. • Increase in the incidence of heavy precipitation events across most of the US. In the past century, averaged over the US, total precipitation has increased by about 7%, while the heaviest 1% of rain events increased by nearly 20%. This has been particularly noteworthy in the Northeast. • Increase in stream flow in the eastern US. During the last century, consistent increases in precipitation have been found in the Midwest and the Northeast, along with the increased runoff. • Reduced ice cover on the Great Lakes. | | | | |
| Projected impacts | <ul style="list-style-type: none"> • All of the impacts describes above are projected to continue, along with additional emerging disruptions to the current state of the water cycle. • Temperature increases are expected to change the mix of precipitation toward more rain and less snow. Such precipitation shifts affect the origin and timing of runoff, leading to less runoff from spring snowmelt and more runoff from winter rainfall, particularly in high-latitude or mountainous areas. • Northern areas will receive more precipitation, and southern areas, particularly in the West, will become drier. • Precipitation changes have led to concerns that both droughts and floods will occur more frequently and be more severe. Increased frequency and intensity of the heaviest downpours. • In the Western US, less total annual rainfall, less snowpack in the mountains, and earlier snowmelt mean that less water will likely be available during the summer months when demand is highest. • Warmer air and water temperatures along with changes in precipitation patterns exacerbate water pollution problems, which could lead to an increase in the number of water bodies categorised as "impaired". • Increase in the frequency, severity and duration of drought, changing patterns of precipitation and snowmelt, increased evaporation, and aquifer saltwater intrusion impact on the availability of drinking water supplies. • Heavy downpours increase the amount of runoff into rivers and lakes, washing sediment, nutrients, pollutants, trash, animal waste, and other materials into water supplies, making them unusable, unsafe, or in need of water treatment. • Warmer air and water temperature and changing flows will result in deterioration of aquatic ecosystem health in some areas. • A warmer climate in the Southwest is predicted to result in widespread tree mortality that likely will cause substantial changes in forest and species distributions. These changes will alter watershed hydrology in differing ways. | | | | |
| Primary concerns | Water quantity | Water quality | Water supply and sanitation | Extreme weather events | Ecosystems |
| | ✓ | ✓ | ✓ | ✓ (drought, especially in the West) | |
| Key vulnerabilities | <ul style="list-style-type: none"> • Many areas, particularly in the Southwest, are likely to suffer from conflict over water resources by 2025, even in the absence of climate change owing to a combination of factors including population trends and potential endangered species' need for water. • Impacts on coastal areas resulting from a combination of sea level rise, increased damage from floods and storms, coastal erosion, salt water intrusion to drinking water supplies, as well as increasing temperature and acidification of the oceans. | | | | |

1. The next National Climate Assessment (NCA), conducted under the auspices of the Global Change Research Act of 1990, is scheduled to be completed in 2013. The NCAs act as status reports about climate change science and impacts. Relevant chapters for freshwater systems include: Chapter 3 – Water Resources; Chapter 10 – Water, Energy, and Land Use; Chapter 11 – Urban Systems, Infrastructure, and Vulnerability; and Chapter 25 – Coastal Zone Development and Ecosystems.

Sources: Brekke, L.D. et al. (2009), *Climate Change and Water Resources Management*, Federal Perspective, Circular 1331, US Department of the Interior and US Geological Survey, Reston, Virginia, US; Interagency Climate Change Adaptation Task Force (2011), *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate*, www.whitehouse.gov/sites/default/files/microsites/ceq/2011_national_action_plan.pdf (accessed 10 August 2012); US Department of State (2010), *Fifth National Communication of the United States of America under the UNFCCC*, http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/4903.php (accessed 20 June 2012); US Drought Monitor (2012), www.droughtmonitor.unl.edu (accessed 14 November 2012); US Environmental Protection Agency (2012), *National Water Program 2012 Strategy: Response to Climate Change*, Environmental Protection Agency, Washington, DC; US Global Change Research Programme (2009), *Global Climate Change Impacts in the United States*, Cambridge University Press, New York, http://oceanservice.noaa.gov/education/pd/climate/teachingclimate/climate_impacts_report.pdf (accessed 15 July 2012).

Key policy documents

| Document | Reference to water | Type | Year | Responsible institution |
|--|--------------------|---|-----------------------------|--|
| Executive Order 13514 | Y | Executive order | 2009 | US Federal Agencies |
| SECURE Water Act ¹ | Y | Legal act | 2009 | US Department of the Interior, Bureau of Reclamation |
| Biggert-Waters Flood Insurance Reform Act | Y | Legal act | 2012 | Federal Emergency Management Agency |
| Interagency Climate Change Adaptation Task Force Progress Reports | Y | Progress reports on climate change adaptation | 2010, 2011 | Interagency Climate Change Adaptation Task Force |
| Draft National Ocean Policy Implementation Plan | Y | Implementation plan (draft) | 2012 | National Ocean Council |
| Climate Change and Water Resources Management | Y | Interagency report | 2009 | Department of Interior |
| National Water Programme 2012 Strategy: Response to Climate Change | | National water strategy | 2012 (public comment draft) | US Environmental Protection Agency |
| National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate | Y | National adaptation plan for freshwater | 2011 | Interagency Climate Change Adaptation Task Force |
| Global Climate Change Impacts in the United States | Y | National risk assessment | 2009 | The US Global Change Research Programme (USGCRP) |

1. The Act authorised the Bureau of Reclamation to continually evaluate and report on the risks and impacts from a changing climate and to identify appropriate adaptation and mitigation strategies utilising the best available science in conjunction with stakeholders, www.usbr.gov/climate/SECURE.

Policy instruments

| Areas | Policy mix | Regulatory instruments | Economic instruments | Information and other instruments |
|----------------|------------|--|----------------------|--|
| Water quantity | | | | |
| Water quality | | <ul style="list-style-type: none"> Water quality standards for surface waters, http://water.epa.gov/scitech/swguidance/standards/index.cfm. | | <ul style="list-style-type: none"> Climate Ready Water Utilities Initiative: developed by the US Environmental Protection Agency (EPA) to assist water and wastewater utilities in becoming "climate ready". It supports the implementation of plans and adaptation strategies at water and wastewater utilities that account for potential climate change impacts and build water sector resilience, http://water.epa.gov/infrastructure/watersecurity/climate. Flood: Risk Mapping, Assessment, and Planning (MAP), www.fema.gov/rm-main#1. WaterSMART (Sustain and Manage America's Resources for Tomorrow) Programme: The SECURE Water Act authorises federal water and science agencies to work together with state and local water managers to plan for climate change and the other threats to water supplies and to take action to secure water resources for the communities, economies and the ecosystem they support. To meet these challenges, Water SMART was established in 2010, www.usbr.gov/WaterSMART/index.cfm. |

Policy instruments (cont.)

| Areas | Policy mix | Regulatory instruments | Economic instruments | Information and other instruments |
|-----------------------------|------------|---|--|--|
| Water supply and sanitation | | <ul style="list-style-type: none"> EO 13514 requires federal agencies to reduce potable water consumption intensity 26% by FY 2020 (compared to a FY 2007 baseline). This extends the water consumption intensity reduction requirement of EO 13423 by five years. | | <ul style="list-style-type: none"> Healthy Watershed Initiative: The EPA, in partnership with others, launched the Healthy Watersheds Initiative to protect and maintain healthy watersheds with natural, intact aquatic ecosystems, prevent them from becoming impaired, and accelerate restoration. Initiative includes both assessment and management approaches that encourage states, local governments, watershed organisations, and others to take a strategic, systems approach, http://water.epa.gov/polwaste/nps/watershed/index.cfm. WaterSense: A partnership program of the EPA that seeks to protect the future of the nation's water supply by offering people a simple way to use less water with water-efficient products, new homes, and services, www.epa.gov/watersense. |
| Extreme weather events | | <ul style="list-style-type: none"> Stormwater management: under the new Section 438 of the Energy Independence and Security Act (EISA) of 2007, federal agencies have new requirements to reduce stormwater runoff from federal development and redevelopment projects in order to protect water resources. The EPA issued technical guidance on the implementation of stormwater management for federal projects, www.epa.gov/owow/NPS/lid/section438. | <ul style="list-style-type: none"> Biggert-Waters Flood Insurance Reform Act of 2012: The recent reform of the National Flood Insurance Programme (NFIP) introduced a number of measures synergistic with adapting the programme to climate change, www.fema.gov/national-flood-insurance-program. | |
| Ecosystems | | | | |

Main research programmes

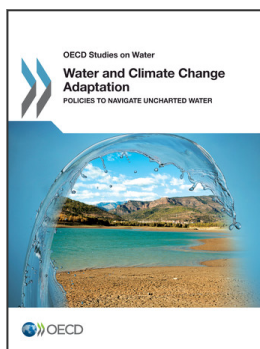
- US Global Change Research Programme: Co-ordinates and integrates federal research on changes in the global environment and their implications for society, www.globalchange.gov.
- EPA's Water Resource Adaptation Program (WRAP): Scientists and engineers investigate the potential effects of climate change on the nation's watersheds and water infrastructures. Based on the results of these investigations, practical and effective adaptation solutions are being developed. The program's research is also a part of the *Drinking Water Research Program* and the *Global Change Research Program* in the Office of Research and Development, www.epa.gov/nrmrl/wswrd/wq/wrap/index.html.
- Federal Climate Change and Water Working Group (CAWWG): Formed in 2008, the group is pursuing many collaborative efforts including working with the federal and non-federal water management community to identify the most critical gaps to forecast and adapt to climate change, conduct collaborative research and technology development, and engage in a dialog, in which decision-making informs climate science research priorities, www.esrl.noaa.gov/psd/ccawwg.
- WaterSMART Basin Study Program: Assesses climate change risks for water and environmental resources in major river basins, including the Colorado, Columbia, Klamath, Missouri, Rio Grande, Sacramento, San Joaquin, and Truckee River basins. The program is undertaken by the US Department of the Interior's Bureau of Reclamation to accomplish its authorities under the SECURE Water Act, www.usbr.gov/WaterSMART/docs/west-wide-climate-risk-assessments.pdf. In the context of the Basin Study Program, the Colorado River Basin Water Supply and Demand Study released in December 2012, www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=41645.

Principal financing mechanisms and investment programmes

- The Water Infrastructure Resiliency and Sustainability Act of 2011: Submitted to the US Congress in October 2011. This bill would authorise the Administrator of the EPA to establish a program of awarding grants to owners or operators of water systems to increase the resiliency or adaptability of the systems to any ongoing or forecasted changes to the hydrological conditions of a region of the United States.

Highlights and innovative initiatives

- **Hurricane Sandy Rebuilding Task Force:** Established by Executive Order on 7 December 2012, the Task Force builds on lessons learned during previous disasters, where experience has shown that planning for long term rebuilding must begin even as the response is ongoing. Working within the National Disaster Recovery Framework, the Task Force works with federal, state, and local officials, as well as the private sector, NGOs and community-based organizations. In August 2013, a rebuilding strategy was released, which contains 69 policy recommendations to build resilience to future storms. It also serves as a model for communities across the nation facing greater risks from extreme weather while continuing to help the Sandy-affected region rebuild. <http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding>.
- **Reform of the National Flood Insurance Programme (NFIP):** Recent reforms to the NFIP (Biggert-Waters Flood Insurance Reform Act of 2012) introduced a number of measures synergistic with adapting the programme to climate change, www.fema.gov/national-flood-insurance-program.
- **Agency Adaptation Plan reporting for 2012:** Required Federal agencies to take into account national cross-cutting strategies (among other things), such as the National Action Plan for Managing Freshwater Resources in a Changing Climate. Public release of the plans is forthcoming (pending final review and certification by the Office of Management and Budget).
- **Interagency Climate Change Adaptation Task Force:** Convened in 2009, the Task Force is co-chaired by the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA). It includes representatives from more than 20 Federal agencies. On October 2009, President Obama signed an Executive Order directing the Task Force to develop a report with recommendations for how the Federal Government can strengthen policies and programs to better prepare the Nation to adapt to the impacts of climate change, www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation.



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