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.

The Netherlands

Climate change impacts on water systems

Observed changes and trends	• Average temperature is rising faster than the global average. • Increase in annual precipitation. • Climate change is particularly felt in the risk of flooding or breaching of water-retaining structures.
Projected impacts	• By 2050, there is an 80% chance that the average winter temperature will rise by between 0.9 °C and 2.3 °C and that the sea level will be 15 cm to 35 cm higher than in 1990. • Increase in the likelihood of flood due to an increase in sea level, as well as an increase in peak discharges from rivers in the winter (very likely). Increase in flooding in rural areas during the winter (very likely); more frequent flooding in urban areas (likely) as heavier summer storms may exceed the capacity of sewage systems designed to cope with less violent downpours. • Increase in precipitation (and decreasing contribution of snow) in winter will contribute to higher discharges in the flood basin of the Rhine and Meuse. • Increase in freshwater demand in summer due to higher temperatures and evaporation (very likely). • Greater penetration of saline water into surface water bodies (very likely). Potential salination of groundwater resources (likelihood unknown). • Decrease in levels of surface water and groundwater in the summer. • Insufficient water quality, especially due to non-point source pollution. • Longer periods of drought. • Existing unique ecosystems will be under threat. Increase in salination also constitutes a threat to existing species. However, changes also offer opportunities for new species.

Primary concerns	Water quantity	Water quality	Water supply and sanitation	Extreme weather events	Ecosystems
	✓			✓ (floods, droughts)	

Key vulnerabilities	• The Netherlands is a low-lying country situated in the Delta of the rivers Rhine, Ijssel and Meuse with around 24% of the land below sea level. Without water defences, sixty per cent of Dutch territory is vulnerable to flooding from either the sea or rivers. • The adaptive capacity of the freshwater supply is limited in the current setting. Further warming and an increasing deficit of precipitation could cause considerable problems as early as 2050.

Sources: Ministry of Housing, Spatial Planning and the Environment (2009), *Fifth Netherlands' National Communication under the UNFCCC*, *http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/4903.php* (accessed 20 June 2012); Ministry of Infrastructure and the Environment (2011), *Water Management in the Netherlands*, *www.rijkswaterstaat.nl/en/images/Water%20Management%20in%20the%20Netherlands_tcm224-303503.pdf* (accessed 12 July 2012; Ministry of Transport, Public Works and Water Management; Ministry of Transport, Public Works and Water Management; Ministry of Agriculture, Nature and Food Quality; Ministry of Economic Affairs; Association of Provincial Authorities; Association of Netherlands Municipalities; Association of Water Boards(2007), *Make Room for the Climate,* Memorandum for policy discussion, *www.climateresearchnetherlands.nl/gfx_content/documents/documentation/ARK_make_ room_for_climate.pdf* (accessed 9 July 2012).

Key policy documents

Document	Reference to water?	Type	Year	Responsible institution
Delta Act[1]	Y	Legal act	2012	The Dutch Cabinet/ The Delta Programme Commissioner
National Adaptation Strategy	Y	National adaptation strategy	2007	Ministry of Transport, Public Works and Water Management
Delta Programme	Y	National adaptation action plan	2011	The Delta Programme Commissioner
Royal Netherlands Meteorological Institute (KNMI) Climate Scenarios for 2050 and 2100	Y	National impact assessment	2006	Ministry of Infrastructure and the Environment
6 Delta Area based sub-programmes	Y	Sub-national responses	Under development	The Delta Programme Commissioner

1. The Delta Act is an amendment of the Water Act.

Policy instruments

Areas \ Policy mix	Regulatory instruments	Economic instruments	Information and other instruments
Water quantity			• National Adaptation Agenda: A part of ARK (National programme for Spatial Adaptation to Climate Change), the National Adaptation Agenda sets out activities that must be undertaken to climate proof spatial planning both in theory and practice. • The Helpdesk Water: Provides an information base for people working in water policy, water management and water safety-issues. It was created through collaboration between the Dutch government, provinces, municipalities and the local water board's union, *www.helpdeskwater.nl/algemene-onderdelen/serviceblok/english*. • Living with Water: Aims to stimulate co-operation between water management and spatial planning, science and practice, economy and sociology. It is organised by the Water Knowledge Platform, which co-ordinates the supply and demand of water-related knowledge, *www.levenmetwater.nl/home* (in Dutch).
Water quality			
Water supply and sanitation			
Extreme weather events	• Room for the River: Recognising that extremely high river discharges for the Rhine tributaries will occur more frequently in the future, a package of 39 measures[1] was approved in 2007. The measures aim to ensure that the rivers can discharge the greater volumes of water forecasted without flooding. EUR 2.1 billion has set aside for the period 2008-20, *www.ruimtevoorderivier.nl/meta-navigatie/english/room-for-the-river- programme*. • Meuse Projects: Aim to improve flood protection by increasing the peak discharge level that the Meuse can handle by establishing a link between water and spatial planning. EUR 400 million has set aside for the 2008-20 period. • Climate Buffers: Serve to reduce the risk of flooding by temporary storage and thus simultaneously reducing the effects of prolonged drought. Work is underway at 35 sites, with interesting combinations of wet and robust nature, improved water security, and different functions (walking, living, water storage) per landscape type, *www.klimaatbuffers.nl/english-homepage-2*.	• Taxes paid by inhabitants and landowners of dike rings to the water boards to maintain the flood defences and regional water systems.	
Ecosystems			

1. The measures aim to meet the 2015 target for the statutory level of protection for a river discharge of 16 000 m³/s and enhance the environmental quality of the river region. The extra room the rivers will need in the coming decades to cope with higher discharges due to the forecast climate changes will remain permanently available.

Main research programmes

- Deltares research on climate change: Deltares helps to develop new concepts for flood and drought management as well as adaptive strategies for spatial planning and the development of infrastructure and ecosystems. The scope of activities includes: Preparation of water scenarios, impact and vulnerability assessment, adaptation strategies and measures and mitigation, *www.deltares.nl/en/expertise/100795/climate-change*.
- Knowledge for Climate: Research programme for the development of knowledge and services, which makes it possible to climate proof the Netherlands. Governmental organisations (central government, provinces, municipalities and water boards) and businesses, actively participate in research programming through the input of additional resources, *http://knowledgeforclimate.climateresearchnetherlands.nl*.
- Climate Services: Founded in 2006, provides knowledge and information on past, current and future climate, including impacts on the water sector, *www.knmi.nl/research/climate_services*.
- Climate adaptation in the Dutch Delta strategic options for a climate-proof development of the Netherlands: Sets out the first steps in developing strategic adaptation options. The study analysed how The Netherlands could adapt to expected changes in climate in four areas: Flood protection; freshwater supplies; rural areas, ecosystems and biodiversity; and urban areas. It was undertaken by the Netherlands Environmental Assessment Agency (PBL) in 2011, *www.anpassung.net/SharedDocs/Downloads/DE/Climate_20Adaptation_20in_20the_20Dutch_20Delta,templateId= raw,property=publicationFile.pdf/Climate%20Adaptation%20in%20the%20Dutch%20Delta.pdf*.
- Routeplanner (2006): Commissioned by the National Programme for Spatial Adaptation to Climate Change (ARK).

Principal financing mechanisms and investment programmes

- The Flood Protection Programme: Reinforcing the primary defence structures along the coast, the rivers and the major delta waters that were shown not to meet the statutory standards. The budget of EUR 2.5 billion for the 2009-20 period will cover all measures to be taken.
- The Delta Fund: Covers the cost of measures and provisions for flood protection and freshwater supplies. Alongside construction and the improvement, the Delta Fund also provides funding for the management, maintenance, and operation of water works and related research. As of 2020, EUR 1 billion will be allocated by the Government for the implementation of the Delta Programme. The Delta Fund and the contribution from the water authorities ensure a secure source of financing for flood protection.
- Taxes paid by inhabitants and landowners to the Regional Water Authorities to maintain the flood defences and regional water systems.

Highlights and innovative initiatives

- **The Delta Programme:** Seeks to ensure that present and future generations are safe from water and will have sufficient freshwater in the centuries ahead. The programme takes an "adaptive delta management" approach, taking measures in the short term that will expand capacity to adapt to long-term changes and withstand extreme situations. *www.government.nl/issues/water-management/delta-programme*.
- **Room for the River:** Designed for the Rhine tributaries, this programme has three objectives:
  - by 2015, the branches of the Rhine will cope with a discharge capacity of 16 000 m³/s of water per second without flooding;
  - the measures implemented to increase safety will also improve the overall environmental quality of the river region;
  - the extra room the rivers will need in the coming decades to cope with higher discharges due to the projected climate changes will remain permanently available, *www.ruimtevoorderivier.nl/meta-navigatie/english/room-for-the-river-programme*.