

# Climate Change Adaptation in the Water Sector

## Background

Climate change effects, such as global warming, changes in precipitation patterns and sea level rise, have severe effects on the hydrological cycle and may cause water scarcity, droughts, flooding and erosion (biophysical impacts). Climate change adaptation in the water sector is vital to increase resilience against these threats to economic growth, public health, infrastructure, social cohesion and political stability (socioeconomic impacts).

Many developing countries are located in the most affected regions, and the poor and thereof women and girls are the most vulnerable group.

The estimated annual costs of adaptation to a 2 degree warmer world vary between US\$30–100 billion, of which 70 per cent is water-related. This requires that the full range of financing options are used, including innovative financing mechanisms, private sources and public funding from developed countries.

In Africa alone, 75 to 250 million people may face increased water stress by 2020 due to climate change.

## Adaptation Strategies

The impacts of climate change on the water sector can be categorised into water scarcity, increased uncertainty regarding future environmental conditions, and floods. The strategies to adapt to these impacts (Figure 1) are diverse and often interconnected. Each strategy includes a wide range of potential measures (Figure 2). In many cases, adaptation programmes comprise of no-regret or low-regret measures, which create benefits both with and without the impacts of climate change.

## Diversification of Water Resources

In areas where water supply relies on a single source, the population is highly vulnerable to reduced rainfall. Diversification of water resources reduces the pressure on single sources and minimises the risks of water supply systems not providing water of adequate quantity and quality.

## Added Value from Water Resources

With increasing water scarcity, it is crucial to use the available resources in a technically and economically efficient manner in order to maximise the resulting economic value per amount of water used. In the development context, it is also important to increase the socially sustainable value of water by aiming at equitable access and poverty reduction.

## Stakeholder Dialogue and Conflict Management

Increasing water scarcity can cause or amplify national or transnational conflicts. Integrated Water Resources Management (IWRM) aims at the allocation of water resources in an equitable, transparent, ecologically sustainable and peaceful manner. Water management institutions can hereby connect stakeholders and promote policy development.

The Mekong River Commission promotes cooperative and sustainable use of the Mekong resources by all lower riparian countries. It is a platform for expertise, training and standards development in transboundary water management.

## Coordination and Sector-Policy Planning

As water is the primary medium through which climate change affects livelihoods and societies, water expertise must be included in the development of national adaptation strategies. Cross-sectoral planning instruments and a Nexus approach can improve the quality of water management and infrastructure, increase technical knowledge, and expand institutional and financial capacities to enhance water, energy and food security.

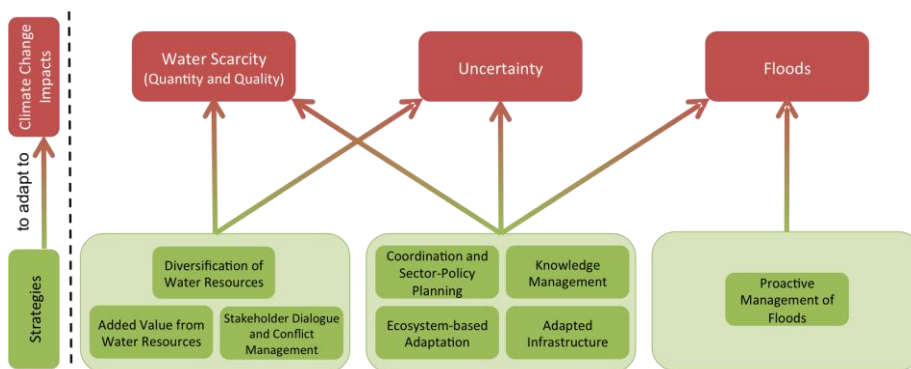


Figure 1: Climate change impacts and adaptation strategies

## Knowledge Management

Knowledge management regarding the interface between climate change and the water sector is particularly central to reduce uncertainty. Regional climate change projections or impact and vulnerability assessments help to increase expertise of decision makers and practitioners as well as public awareness on the need for adaptation.

## Ecosystem-based Adaptation

Humankind benefits from a multitude of ecosystem services. Increasing the adaptation capacity of humans and societies by preserving and making use of these services is called ecosystem-based adaptation. Floods and droughts, for instance, can be prevented by water storage in vegetation, soil and aquifers.

Water stewardship is an approach aiming to motivate water users, particularly the private sector, to reduce their environmental impact and support sustainable management of freshwater resources.

The main advantage of ecosystem-based adaptation is lower costs as compared to 'grey' infrastructure investments due to low demand in technical expertise and materials. Preserving biodiversity is a positive side effect.

## Adapted Infrastructure

Changes in amount and intensity of precipitation can lead to a breakdown of the service and regulation functions of existing infrastructure. As a certain amount of uncertainty always remains, project design needs to be resilient in dealing with changes that cannot be fully predicted. Multi-use infrastructure for water storage, flood retention, hydro-power production and/or agriculture has positive effects on all water supply, energy and food security (Nexus approach) and is hence particularly adapted.

## Proactive Management of Floods

Floods can have serious effects on human health and infrastructure. Early warning and disaster response systems, a close cooperation of stakeholders, as well as adapted flood protection infrastructure are needed to lower the impacts of water-related extreme events. Ecosystem-based adaptation can contribute to flood prevention on the watershed level.

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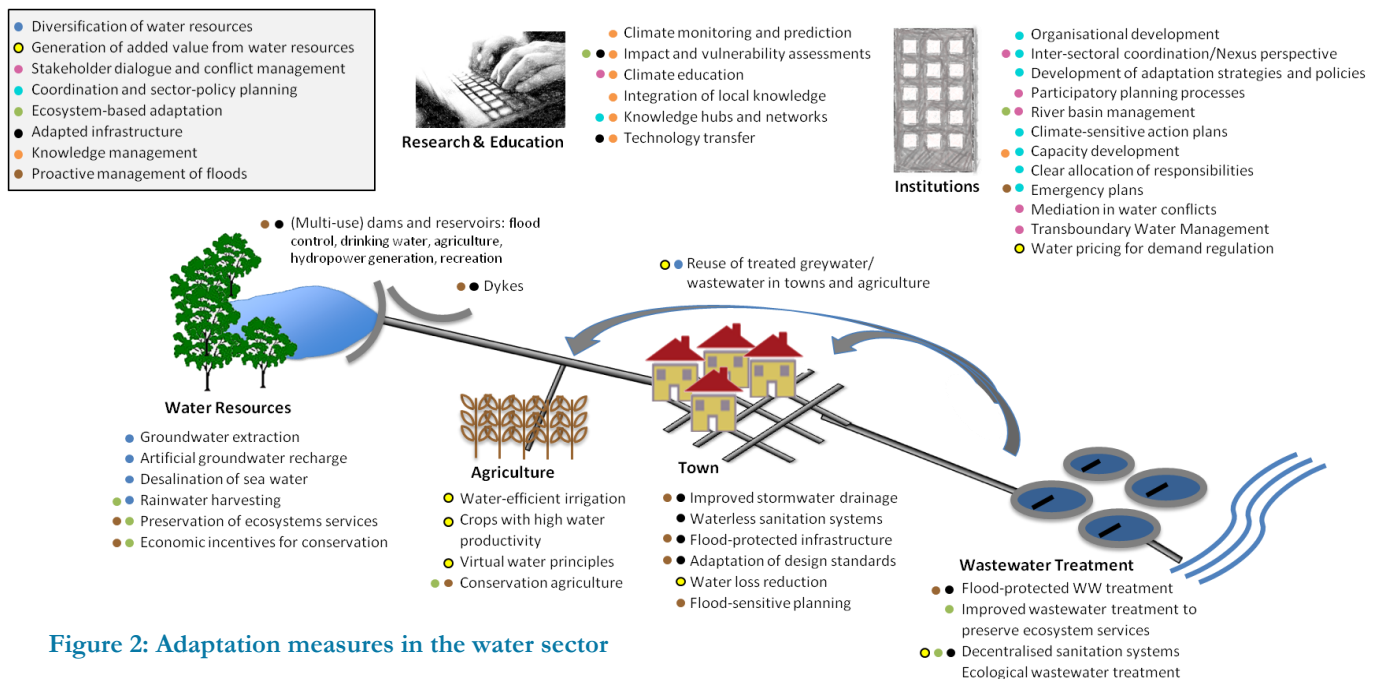


Figure 2: Adaptation measures in the water sector

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