ClimDev-Africa

Policy Brief 4

Climate Change and Water in Africa: Challenges, Opportunities and Recommendations

The water sector in Africa is very sensitive to changes in climate and prolonged climate variability. Climate change is expected to alter the hydrological cycle, temperature balance, and rainfall patterns across Africa and thus has the potential to add to existing pressure on water availability, accessibility, and demand, thereby affecting economic development, ecosystems, and biodiversity. Even in the absence of climate change, present population trends and patterns of water use indicate that more countries in Africa will exceed the limits of their economically usable, land-based water resources before 2025. However, climate change will not have uniform impacts on water resources across the continent. In some parts, it will aggravate water stress while in others it will reduce it. Water management is a pressing challenge, which, if not improved now, could see its problems greatly exacerbated in a future, warmer climate. Major concerns for the water sector in Africa include limited access to water, including groundwater, and limited governance capacity. Limited access is a result of insufficient infrastructure to provide reliable supplies of water for drinking, agriculture, and other uses.

Key messages

- Many vital water resources in Africa are already under pressure.
- Climate change plus population increase will add to the pressure on Africa's water resources.
- A wide variety of options exist to help Africa adapt its water management systems to a changing climate.
- Integrated Water Resources Management (IWRM) is key to effective and efficient management of water resources.

Challenges

Observational evidence shows that many vital sources of water in Africa, including lakes, rivers, and snow-covered mountains are under pressure. Although part of the cause may be blamed on greatly increasing demand, climate change and climate variability are clearly putting significant pressure on Africa's water resources. The future impact of climate on water resources remains uncertain, but some of the challenges Africa faces are clear:

- **Water supply and sanitation**. Only 64% of the potentially available water in Africa has been developed to date. Many countries, however, will shift from water surplus to water scarcity between now and 2025. Water supply utilities have major challenges in coping with inadequate water storage, inadequate and poorly maintained supply networks, and the vulnerability of many water supply systems to droughts and floods. Water supply and sanitation can be improved with increased financing, enhanced public-private partnerships, empowerment of women, and special help for rural populations.
- **Agriculture and irrigation**. Much of Africa suffers from food insecurity, and 30% of the population lives with chronic hunger. Explanatory factors include low agricultural

productivity and inadequate water for irrigation. However, Africa has a large untapped irrigation potential, amounting to some 40m ha of irrigable land. In the context of climate change, better management of water for agriculture can reduce the risk of production failure, as well as agricultural expansion to marginal areas. It can also lead to increasing the harvest per unit of land per volume of water.

- **Hydropower development**. Water has the potential to play a much larger role in power generation in many countries in Africa. Hydropower in these countries is especially important for economic development, while presenting a practical mitigation option. Furthermore, hydropower development has benefits for consumptive and non-consumptive water use and for management of extreme events, such as droughts and floods.
- **Water Quality.** Degradation of water quality is a serious challenge in Africa. The expansion of agriculture to marginal land, deforestation, urbanisation, and urban waste pollution are reducing water quality. Integrated Water Resources Management (IWRM) can help to overcome the challenge of water pollution.
- **Transboundary river basins**. Many international water agreements have been negotiated to enhance the management of shared water resources. Where agreements do not exist or are outdated, new agreements must take climate change and projected population growth into account. The challenge is to equitably address the need for water for multiple purposes across international boundaries, thereby avoiding conflict between countries sharing a river basin.
- **Modelling and impact studies:** Assessments of impact on water resources currently do not fully capture water stress arising from multiple future water usage and must therefore be approached with caution. Due to uncertainties about rainfall patterns across basins and the influence of complex water management and water governance structures, no clear indication exists of how flows will be affected by climate change.

Adapting water resources to a changing climate

Some general policy options for adaptation of water resources for climate change and/or variability include:

- Adoption of contingency planning for droughts;
- Making marginal changes in the construction of new infrastructure;
- Using inter-basin transfers;
- Maintaining options to develop new dam sites;
- Conserving water;
- Allocating water supplies using market-based mechanisms; and
- Controlling pollution.

Technical interventions that can help Africa adapt its water systems to a changing climate include IWRM. A concept adopted in the early 1990s, Integrated Water Resources Management advocates the coordinated development of water, land and related resources in a manner that promotes equity and social well being without endangering vital ecosystems. Other interventions include traditional and modern water harvesting techniques, water conservation and storage, and improved recycling and re-use of water. One of the most important adaptation options will be to build on traditional practices used to harvest water. Organisations such as those offering agricultural extension services can work to sensitise and train farmers on the best practices to adopt in order to minimise water stress. Water storage options have an important role to play. A number of options exist, including *in situ* rainwater management techniques, groundwater storage, use of ponds and tanks, and construction of reservoirs. Storage options need to be carefully tailored to suit varying climate conditions and socio-economic needs. The role of natural ecosystems (e.g. of forests and wetlands) in the hydrological cycle and the functions they perform also needs to be incorporated into adaptation planning.

Recommendations

To maximise their use of available technology and best practice, African countries need to assess surface water and groundwater resources, understand the impact of climate change on these resources, catalogue available good practice, cost adaptation and investment options, promote river basin-based flexible water development, and ensure that access to available technology and best practice is provided. A better understanding of climate change requires new African modelling that incorporates the complexities of atmosphere-ocean circulation and local climate drivers and feedbacks. This in turn requires building Africa's human capacity and developing regional centres of excellence. The following actions are recommended:

- Invest in water-related risk prevention and climate management strategies, such as early warning systems, information networks, and data sharing;
- Invest more across Africa to improve both small-scale and large-scale water infrastructure;
- Consider both traditional and modern knowledge, such as water harvesting techniques, water conservation and storage, and improved recycling and re-use of water;
- Strengthen capacity building related to surface and groundwater management, irrigation, water storage, infrastructure for water transportation, supply chains for agriculture and drinking water, sanitation, access, and utilisation;
- Increase soil moisture content and fertility, promoting effective and low cost irrigation technologies and reducing agricultural expansion to marginal lands;
- Develop shared water management and governance structures at all scales with a focus on operational responsibilities, dialogue and, conjunctive use of water as an adaptation strategy;
- Reinforce water research, including modelling and impact assessment, to fully capture future multiple water usage and water stress; and
- Reinforce agricultural extension institutions and similar organisations for assisting, sensitising, and training farmers on adaptation best practice.

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This document is an output from research carried out by the African Climate Policy Centre (ACPC) in collaboration with selected experts and editors. ACPC is part of the Climate for Development (ClimDev-Africa Programme, a joint initiative of the African Union Commission (AUC); the United Nations Economic Commission for Africa (ECA); and the African Development Bank (AfDB). The programme is supported by several development agencies and governments. However, the views expressed and information contained in the brief are not necessarily those of or endorsed by these partner institutions which can accept no responsibility for such views or information placed on them.

United Nations Economic Commission for Africa
African Union Commission
African Development Bank