

Impact of climate change on the Nile river basin

The River Nile provides an invaluable source of livelihoods to over 300 million people. As the populations grew and civilisation evolved, the demand for more water resources took a toll in the region. The climate change effects have further compounded water management in the basin. Water and food security in the region is under threat, so that there is a need for robust transboundary water management in a region that has only finite water resources.

The Nile River is of unparalleled social, historic and economic importance to the ten riparian countries of Burundi, DR Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda, and it is the world's longest river. However, the basin has a low supply compared to basins of comparable size. This relative scarcity of the water resources given the competing demands for productivity and livelihoods poses a threat to peace and stability as well as food and water security in the basin. The threshold sufficiency of its water and lack of alternative water sources are of vital importance for the riparian states. Already in ancient Egypt, the annual flooding of the Nile Basin was the earliest recorded reference to regular gauging (see Box).

The great dependence on food from the Nile dominated regional security considerations in ancient times and still does nowadays. The Roman empire was so dependent on the harvest from Egypt

that Roman dependence on Egyptian grain led Emperor Augustus to administer it himself – so jealousy that no high-ranking Roman could visit it without his permission (Arthur C. Aufderheide: *The scientific study of mummies*).

Food security is the most important issue in today's Nile River negotiations. Over 80 percent of water withdrawn from the basin is for irrigation. As populations grow enormously (Ethiopia,



Photo: Petermann

Children learn at school age of the great importance of Nile water in ensuring food supplies for people living in riparian states.

Congo and Egypt are expected to reach 100 million by 2025, with Uganda leading the smaller countries with 60 million in the same period), fear of demand for food for this growing population has cast a pall on the negotiations about water allocation for Nile riparian states.

Climate change is now becoming a key driver in considerations over food and energy security in the Nile. The appalling consequences of inadequate rains over Eastern Africa during the 2004–2006 period that reduced

Annual Nile flooding in ancient Egypt

In the days when the Pharaohs ruled Egypt, a temple stood far up the Nile, beyond the cataracts in Nubia, in what is now the northern desert of the Sudan. Three tributaries joined in that region to form the Nile, which flowed down one thousand miles to produce a miraculous event each year, the flooding of its river basin, which permitted Egyptian farmers to grow crops in the hot, rainless midsummer.

In spring, the temple priests would gather at the river's edge to check the colour of the water. If it was clear, the White Nile, which flowed from Lake Victoria through the Sudanese swamps, would dominate the flow. Flooding would be mild, and late; farmers would produce a minimum of crops. If the stream appeared dark, the stronger waters of the Blue Nile, which joined the White Nile at Khartoum, would prevail. The flood would rise enough to saturate the fields and provide a bountiful harvest. Finally, if the stream was dominated by the green-brown waters of the Atbara, which came rushing down from the Ethiopian highlands, then the floods would be early and catastrophically high. The crops might drown; indeed, the Pharaoh might have to use his grain stores as a reserve. Each year, the priests sent messengers to inform the king about the colour of the water. The Pharaoh then knew how prosperous the farmers in his kingdom would be, and how much he could raise in taxes. As the pioneer of scenario planning, Pierre Wack, would say, the priests of the Sudanese Nile were the world's first long-term forecasters. They understood the meaning of predetermined elements and critical uncertainties.

Peter Schartz, Art of the long view

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by half industrial outputs for Uganda, Rwanda and Burundi, with large-scale famines in Kenya, Ethiopia and Eritrea, have created an opportunity for joint investment projects, particularly on hydropower, as a counterbalance to securing water for food.

Climate change will hit Africa worst

In fact, Africa, especially sub-Saharan Africa, is one of the most affected areas of the world affected by climate change. In recent years, Africa has experienced an increased frequency in extreme weather events followed by related calamities like famine and flood damage, including loss of lives. It is reported that climate-related issues can reduce the per capita economic growth in the order of one to two percent. Africa has the lowest capacity to adapt to projected climate change and is therefore the most vulnerable continent on the globe.

Lack of structural capacity to regulate the effects of extreme weather conditions has contributed to the adverse effects that climate change has had on Africa. The water storage capacity necessary for the mitigation of drought effects and attenuation of floods is generally low compared to the rest of the world.

Major flood control hydraulic structures comprise the major dams on the

Nile: these are Roseires Dam and Sennar Dam in Sudan, Aswan High Dam in Egypt, and Owen Falls Dam in Uganda. The Roseires and Sennar Dams are situated on the Blue Nile and were mainly constructed for irrigation in the early 1900s. The Owen Falls Dam, commissioned in 1954 mainly for hydroelectric power supply, is situated on the White Nile at the mouth of Lake Victoria. The High Aswan Dam is more recent, having been commissioned in 1970 and constructed mainly as a multi-purpose facility to control flooding, supply power and water for agriculture.

However, the capacity for soft tools like early warning systems for mitigation measures is also underdeveloped in Africa. There is a lack of long-period and good quality data and models to assess climate change and climate variability impacts in the region, so that so far, it has not been possible to undertake appropriate adaptive actions to mitigate climate change.

There are, however, traditional practices that have been used for adaptability and mitigation of the effects of extreme weather scenarios. These include storage of food in preparation for famine that usually follows droughts. In general, climate issues are interwoven with many elements of our livelihoods and need deliberate and multi-pronged efforts to avert their adverse effects.

Institutional mechanisms for mitigation and adaptation

Institutional arrangements and responsiveness have increased following growing world concern over climate change as witnessed in various trends and confirmed by scientists. Institutional mechanisms are important in determining the quality of governance of climate change matters at all levels. These mechanisms translate the strategies for climate change management to effective mitigation measures and adaptive practices, and as such institutional mechanisms are key drivers to climate change mitigation and adaptation measures. Institutional mechanisms provide tools to address variability and extremes not restricted to infrastructure. These institutional mechanisms are often cheaper and more effective and can complement infrastructure.

The institutional mechanisms can be assessed based on their vertical and horizontal orientations. Regarding horizontal orientation, there is strong emphasis of co-ordination and collaboration among stakeholders at the same level of hierarchy. This could be among sectors at the global, regional, national, or community levels. Effective linkages and liaisons among stakeholders in areas like information sharing are key and useful at all levels of climate change as they facilitate prudent co-ordination of climate change activities and harness synergies.

Climate change issues in the Nile River Basin

The Nile Basin is a natural surface drainage system of strategic importance on the continent of Africa. Covering a basin area accounting for ten percent of Africa's area, its effective management and control is of prime strategic importance in management

Information sharing and collaboration among stakeholders on climate change issues are of utmost importance.



Photo: Petermann

of the continent's water resources. The contemporary management of the basin, the Nile Basin Initiative (NBI), is deemed to bring many returns and rewards to the riparian countries and formidable lessons for the neighbouring states if not the entire continent.

The Nile Basin Initiative is a transitional institution which was established in 1999, pending the establishment of a permanent river basin organisation. The NBI is guided by a shared vision which claims *"To achieve sustainable socioeconomic development through the equitable utilisation of, and benefit from, the common Nile Basin Water resources."* The NBI was formed to spearhead the implementation of the development track in the Nile Basin countries. The NBI is aimed at a co-operative development of the basin utilising on the water resources and has been engaged in formulating and implementing development projects since its formation.

At the inception of the Nile Basin Initiative, the region was characterised by many economic, human and societal challenges. It would often present appalling statistics in international development trends, reflecting poverty, lack of investment and environment degradation among others. At that time the pressing and immediate needs of the Nile Basin countries did not warrant directly prioritising the climate change issues; as such they were not given prominence in the initial formulation of the first generations of projects.

However, mitigation measures were intertwined in the activities in myriad forms. The Shared Vision Program Projects (SVPs) have built capacity for mitigation of climate change through training, including demonstrations and micro-grant projects. Also, frameworks under SVP and Subsidiary Action Programmes (SAPs) and small-scale investments under the SAPs are aligned to buffering effects of climate change. Along the implementation period and, of course, in the last decade, the issues of climate change have taken centre stage in the development initiatives. A concept note aimed at developing a project that will address climate change impacts and adaptation in the Nile Basin has been developed to pave way for the development of a full proposal of a project on climate change.

Through the implementation of the first generation of activities, the gains through capacity, trust and confidence-building have evolved towards the Nile Basin countries keenly identifying and preparing joint development and investment projects. This evolution will lead to private and loan-based investments, joint infrastructure development in the areas of power, agriculture and water access to the over 300 million population of the Nile Basin



Photo: Petermann

countries. The Nile Basin Initiative fully recognises the vulnerability of the region to climate change impacts and the need to adapt and mitigate the impacts.

The overall objective of the project is to climate buffer NBI's development projects, and it addresses climate risks management and adaptation through co-operative action on a basin scale. At the end of the project, there will be enhanced understanding of the impact that climate change has on the Nile Basin's bio-physical system. The risks related to climate change within the investment and development projects will be mitigated, or at least the effect will be lessened. Adaptive capacity at the level of the basin and individual riparian countries will be enhanced. And of course, it will be possible to integrate climate change parameters in decision-making on the Nile issues.

Zusammenfassung

Das Niltal gilt als eine Wiege der menschlichen Zivilisation. Für die mehr als 300 Millionen Menschen, die in seinem Tal leben, ist der Nil eine Lebensader von unschätzbarem Wert. Doch ist die Wasserversorgung in der Region durch das Bevölkerungswachstum und die damit einhergehende wachsende Nachfrage nach der wertvollen Ressource zunehmend gefährdet. Die Auswirkungen des Klimawandels verschärfen das Problem. Um die Wasserversorgung und Ernährungssicherung

in der Region künftig sicherzustellen, sind nachhaltige Formen eines grenzüberschreitenden Wassermanagements gefragt. Voraussetzung für diesen Prozess ist eine wirksame Vernetzung und Zusammenarbeit der einzelnen Institutionen.

Resumen

El río Nilo representa una fuente invaluable de medios de vida para más de 300 millones de personas que viven a lo largo de su valle. El valle de este río tiene gran renombre como cuna de la

civilización. A medida que las poblaciones aumentaron y la civilización fue evolucionando, la demanda de mayores recursos de agua ha afectado la región. Los efectos visibles más recientes, causados por el cambio climático, han complicado aun más la gestión del agua en la cuenca hidrográfica. La seguridad del suministro de agua y alimentos en la región está amenazada, por lo cual se requiere una sólida gestión transfronteriza del agua. Una estructura institucional eficiente es un factor clave para facilitar este proceso.