

Nile Issues

Small Streams from the Nile Basin
Research Programme

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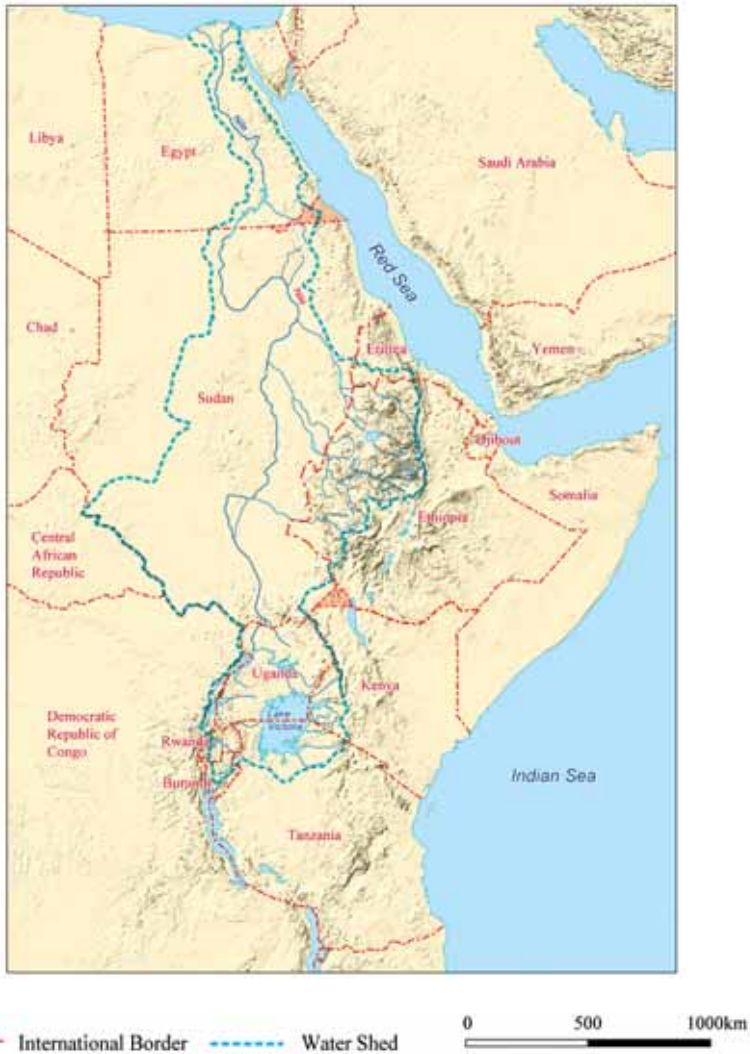
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Lake Nabugabo, Uganda

Introduction

Map of the Nile Basin countries



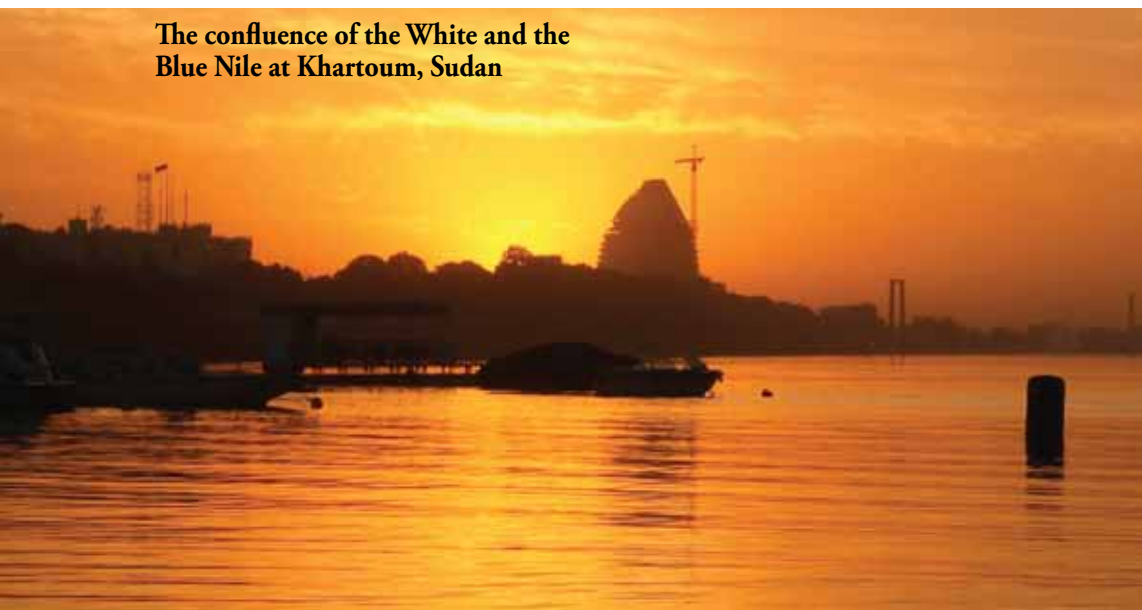
The boundaries and names shown and the designation on this map do not imply the official recognition or acceptance by the Nile Basin Research Programme

The Nile Basin Research Programme (NBRP), as a strategic, multidisciplinary programme for research and higher education on topics related to the Nile Basin, has had the overall aim to enhance and promote quality research on Nile-related issues and to support research collaboration between institutions in the Nile Basin region. It has provided interaction between researchers in the Nile region and has given an opportunity for individual and collaborative research in a fertile academic environment.

The first group of researchers came to Bergen in Norway in January 2007 and during the six semesters from January 2007 to December 2009 altogether 53 researchers from the Nile Basin region participated in the programme as guest researchers in Bergen. Each semester had a different topic emphasising Nile issues from different approaches and perspectives.

In the following chapters a brief description of each semester's topics, research questions and some of the results will be presented. These are only small and selected glimpses of the research conducted and for more in-depth information on the scientific outputs from the research programme, a selected bibliography of publications is included at the end.

The confluence of the White and the Blue Nile at Khartoum, Sudan





Tis Abbay – The Blue Nile Falls in Ethiopia

Water, Politics and Agreements

The River Nile has been considered by many as the most important river in the world. It drains an area which covers about one tenth of the African continent. The Nile Basin catchment area is shared between ten countries: Burundi, the Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda.

The White Nile flows through large parts of equatorial Africa, which enjoys considerable rainfall distributed the whole year, and it runs through two large lakes, Victoria and Albert. Lake Victoria is the world's second-largest freshwater lake, with a surface area of 68,000 km². The maximum depth of the lake is 80-90 m, the average depth is 40 m, and the lake has a volume of 2,760 km³. The lake is shared by Kenya, Uganda and Tanzania.

The White Nile provides approximately 15% of the water to the Nile whereas the Ethiopian tributaries (Abbay, Sobat and Atbara) together contribute approximately 85% of the water in the Nile as measured at Aswan in Egypt, where the total water of the Nile is annually on average 84 billion cubic metres.

The Aswan dam, Egypt



Around 370 million people are living in the Nile Basin countries and approximately 200 million in the basin itself. It is estimated that in 2030 around 600 million people will be living in the Nile Basin countries. Water is already a scarce resource in parts of the basin and with the projected population growth there will be much higher stress on this limited but vital resource for all countries and their inhabitants.

The ways in which the waters of the Nile will be distributed in the future have global political consequences because it may be a source for cooperation or conflict. The use and distribution of water will also be fundamental to the development processes of the respective countries. All states are dependent upon the Nile, but to various degrees.

Egypt is a downstream country located in a desert and it is totally dependent upon the Nile. The Nile is literally the life-artery of the country and it makes Egypt extremely vulnerable to changes in the water supply. The country is listed among the top ten countries in the world which will be most threatened by water shortage in the future. Today, 98% of all Egypt's freshwater comes from the Nile. Since the dawn of civilisation Egypt has used and been dependent upon the Nile, and Egypt claims it has a historic right to use Nile waters. Moreover, Egyptians argue that the upstream states have no tradition for use and control of the Nile and they also have alternative water resources, which Egypt does not have.

Most of the water in the Nile comes from Ethiopia. Each year Ethiopia has 123 billion cubic meter of surface water, which equals 1,5 times the annual water of the Nile, but the country uses hardly any of this water. Only 3% of the water remains in Ethiopia and the rest flows to the neighbouring countries. Ethiopia is one of the poorest countries in the world, where only 5% of the land suitable for irrigation is developed, and its future prosperity is dependent upon utilisation of more water resources. Emperor Haile Selassie emphasised this as

far back as the 1950s, when he also underlined the responsibility of being an upstream country from where most of the Nile waters flow: “[I]t is of paramount importance to Ethiopia, a problem of first order that the waters of the Nile be made to serve the life and the needs of our beloved people now living and those who will follow us in centuries to come. However, generally, Ethiopia may be prepared to share this tremendous God given wealth of hers with friendly nations neighbouring upon her, for the life and welfare of their people”.

The use and distribution of the Nile waters among the ten countries is a political question regulated by international laws. In 1959 Egypt and Sudan signed the agreement For the Full Utilization of the Nile Waters. This replaced the 1929 agreement, where Egypt and Britain (on behalf of the East African colonies) negotiated the Nile Water Agreement, which stated that “no irrigation or power works or measures are to be constructed or taken on the River Nile and its branches, or on the lakes from which it flows...in such a manner as to entail any prejudice to the interests of Egypt, either reduce the quantity of water arriving in Egypt, or modify the date of its arrival, or lower its level”.

Sudan is in a middle position between the upstream and downstream states, and all the main tributaries – the White, the Blue and the Atbara – flow through the country. In the 1959 agreement all the water in the Nile was divided between Egypt and Sudan. Of the average 84 billion cubic metres that flow along the Nile each year, according to the agreement, Egypt should receive 55,5 billion cubic metres and Sudan 18,5 billion cubic metres, and the rest disappears through evaporation.

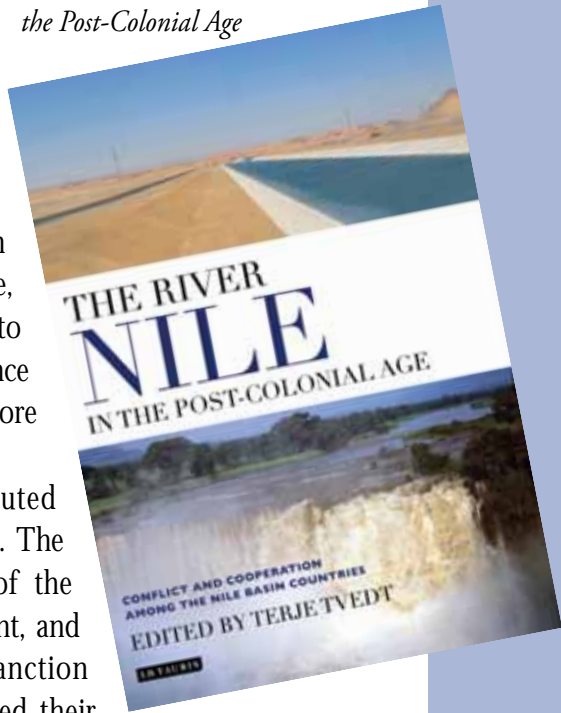
This has always been a controversial issue and raises many questions. To what extent is agreements made during the colonial times still valid today? Are water agreements made by two countries binding for the other countries which were excluded from the negotiations? Can downstream states deny upstream states the right to use water flowing

Cover of the book *The River Nile in the Post-Colonial Age*

through their countries? And can upstream states deny downstream states the use of Nile waters? Can alternative water resources be used and developed in other Nile Basin countries, and if this is possible, are downstream countries willing to finance part of this development since the latter will benefit from using more Nile water?

The 1959 agreement is disputed by the other Nile Basin countries. The agreement was made before all of the countries had become independent, and today they all agree that the sanction of using Nile waters has hindered their development. A new agreement is now being negotiated. The aim is to finalise the Cooperative Framework Agreement (CFA). The Cooperative Framework Agreement is a proposed international treaty, which will lay down principles of cooperative water resources management among all the countries sharing the River Nile. The way the Nile issue is solved will shape not only the ten Nile Basin countries, but it will have implications beyond the region.

The research group reconstructed, by empirical studies, the historical development of Nile utilisation in the different countries and analysed the relative importance and role of Nile water for the countries' development in relation to utilisation of other available water resources. The respective countries have various uses and needs of the river and are dependent upon the Nile to different degrees, which can



be illustrated with some examples from the book *The River Nile in the Post-Colonial Age*.

“Burundi, like other upstream countries of the Nile basin, did not consider itself bound by colonial-era treaties. In any case, Burundi has never felt any pressure in the management of the waters of the Nile, either from the British or from any other foreign power. As a country where agriculture depends almost entirely on rainfall, Burundi posed no threat to the flow of the Nile, and the need to subscribe to regulation of the Nile outflow through treaties and conventions hardly arose”.

“Political rhetoric that blames the two Nile agreements for the sorry state of affairs in the Kenyan Nile basin displays ignorance of socio-economic and political changes that demand a new look at the availability, utilization and management of water in the basin and elsewhere in Kenya. Other factors – population growth, consumption practices and patterns, diversion of water resources, climatic and environmental conditions, and rainfall patterns – have changed so much since the late 1950s that areas that once had adequate rainfall no longer



Bujagali Falls, Uganda

do so. The Kenyan population living within the basin depends on land and water resources; western Kenya has great potential, but is ironically the home of Kenya's poorest population. The Egyptian–Sudanese Nile agreements do not stand in the way of such development: the water and land resources in the region are under-used and mismanaged”.

“Uganda is more interested in the uninterrupted flow of water into Lake Victoria to support her hydropower production at Owen Falls, Kiira and other future hydropower dams...The decreased water level is impacting negatively on the fishery, tourism and water transport industries in the Lake Victoria basin and may affect basinwide activities negatively in future”.

These quotes emphasise the complexity of uses and different dependencies and aims for utilisation of water resources, which may not necessarily contradict each other or cause the same consequences. “Societies along the Nile are neither equally capable of harming their common resource nor equally likely to suffer the consequences of others’ behaviour, not only because some live upstream and others

Lake Edward, Uganda



downstream, but also because individual action need not negatively affect other actors”.

However, “There is no simple institutional solution to the collective action problem in the Nile basin, and no ready-made model that can be copied. This book has highlighted multiple modes of conflict and cooperation surrounding the use and management of the Nile, along with the temporal and spatial scales and the dialectic character of societal development and the physical character of the river system – all factors that are central to an understanding of the relationship between the actors within the basin and of the history of the whole region”.

- The river Nile is shared by ten countries.
- By 2030 the population within the Nile Basin countries will have increased to around 600 million people and there will be more pressure on the water resources.
- In 1959 Egypt and Sudan signed the agreement For the Full Utilization of the Nile Waters, which divided all the water between themselves.
- What will be optimal use of the basin's water resources?
- Will the Nile be a source to cooperation in the future?



Cracked ground as a result of drought

Water, Climate and Health

Nature, as perceived by humans, is to a large extent different waterscapes: Different environments, whether it is deserts, savannas, tropical forests or arctic areas, are water-worlds or waterscapes, which change in accordance to seasons and climatic variables. Following the hydrological cycle, the effect on water availability makes precipitation the climate element with greatest socioeconomic importance for all ten countries in the region.

The characteristics and the dependence on rainfall differ greatly within the region. The precipitation is seasonal and the months of peak are different from area to area. In the Egyptian desert all life depends upon the Nile and the seasonal rains in upstream countries. In Ethiopia, Kenya, Tanzania and Uganda the climate and aridity conditions vary from high-potential highlands with sufficient rains to semi deserts.

These overall water-worlds constantly change in both long- and short-term perspectives. Climate change is often perceived and presented as long-term changes, but for humans these changes are also experienced as dramatic short-term events, such as prolonged droughts or sudden floods. Climate change and differences in the water-worlds have crucial importance for the type of water that is the life-giving water in a given community. If the water-worlds change, then the physical premises for life change. If the rain fails, it may lead to massive human suffering because of drought.



Globally, during times of climate change, the most urgent questions relate to whether there will be more droughts or more floods and where these natural phenomena will take place. Will the melting of glaciers increase the sea levels, and will human constructions to ensure sufficient and safe water supply, such as dams, pipes and drainage systems, be sufficient when the water-world changes?

The overall climate questions for the Nile Basin countries are: Will there be more or less rain and will there be more or less water in the river Nile? The Indian Ocean is an important climatic parameter for the Nile Basin, including the whole of East Africa. Studies suggest that the Indian Ocean is becoming warmer, and thus it is fundamental to know how the precipitation variability with or without Indian Ocean warming will affect the Nile Basin region.

Precipitation information is ultimately the input which can be used for planning and management of the Nile as a fresh-water resource. Moreover, the impacts of climate change on Nile flows will vary depending upon the location of the different sub-basins with subsequently more serious consequences in some regions compared to others.

Climate change and changes in precipitation patterns will have context-dependent and regional consequences. Some areas may be favoured or not affected too much by these changes whereas, in other areas, the very same changes may have dramatic and devastating impacts. Changes in the rain pattern will have less consequences in Ethiopia than in Egypt since the latter country is totally dependent upon the waters in the Nile.

A research group compared and analysed a unique set of data with important implications for the future. The researchers made predictions of the amount of water in the Blue Nile. The outputs of 17 general circulation models were analysed. Global Circulation Models (GCMs)

are commonly considered to be the best method to analyse future climate scenarios. GCMs work fairly well on global and continental scales, but often fail to simulate climate scenarios on a regional scale, which is required for integrated water resources management. However, based on the analyses conducted it was possible to provide a fine-scale hydrological model of the Nile Basin and a water scenario for the 2081-2098 period was proposed.

The upper Blue Nile basin covers an area of ca. 185,000 km². The sub-basin is characterised by a highly seasonal rain pattern. The mean annual rainfall is generally between 1,200-1,300 mm, and more than 70% of this rain falls during the four-months rainy season from June to September. How much water there is in the Nile depends upon three factors: 1) the annual precipitation, 2) runoff, and 3) evaporation, which is temperature sensitive.

The analyses focused on the impacts of climate change on the flows of the upper Blue Nile at Diem, since about 60% of the annual flow of the Nile at Dongola comes from here. Based on the GCMs there is no consensus with regards to the direction of precipitation change. The models show changes in the annual precipitation ranging between minus 15% and plus 14%. However, more models suggest decreases than increases. Taking all the models together, they show almost no change in the annual rainfall and only a slight reduction of minus 2,4% in the wet season.

In the same time period it is predicted by all models, based on the predicted increase of CO₂ in the atmosphere, that the temperature will increase by between 2°C and 5°C. With increased temperature and evaporation there will be less runoff and less water in the Nile, which moves the basin to a more moisture-constrained regime.

Even with increased rainfall the actual amount of water in the Nile may be less due to increased evaporation. Thus, the amount of

water in the Nile is highly sensitive to changes in both precipitation and evaporation. The ensemble mean annual runoff due to increased temperature is therefore reduced by about 3,5%. This has severe consequences for the flow of the Nile and may result in 15% reduction of the annual flow at Diem compared to today's baseline. However, since the Nile is highly sensitive to rainfall patterns and since the models for predicting future precipitation change are not robust, this estimate has to be interpreted and used with care. Moreover, how climate change will impact on Nile flows will vary depending on the location of the studied sub-basin, and some sub-basins may also receive more water than others. Therefore, there are uncertainties with models predicting future climate scenarios and how much water there will be in the Nile.

Climate change affects and changes the actual water-world, which has direct consequences for people's lives and health. In today's world, with its 6,5 billion people, it is estimated that over 1,5 billion people lack access to safe water supplies, 2,5 billions lack adequate sanitation and more than one third of the growing urban population in developing countries live in slums. It is said, "Water is life; sanitation is dignity", and the lack of adequate sanitation is the world's largest killer. The consequence is that, worldwide, some 10,000 people die each day of

**The anopheles mosquito
which transmits malaria**

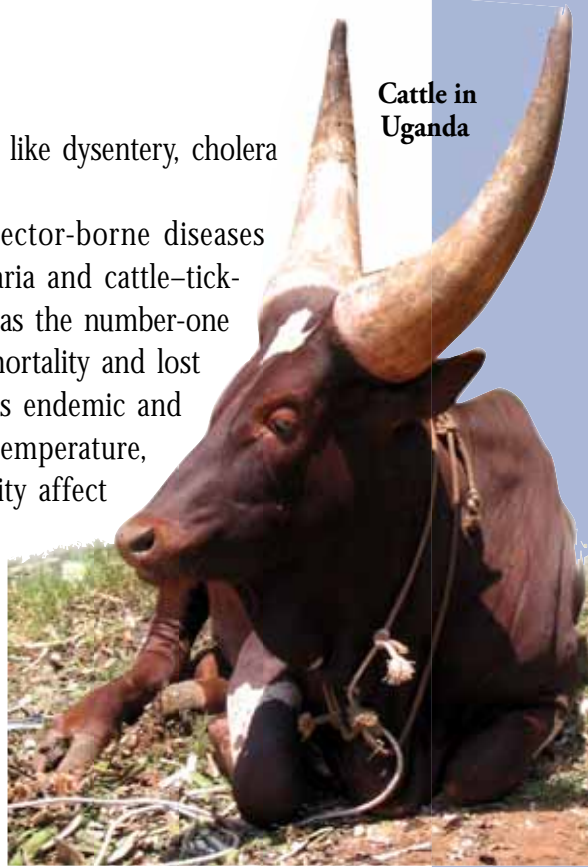


malaria and water-borne diseases like dysentery, cholera and various diarrhoeal diseases.

The relation between two vector-borne diseases and climate were analysed: malaria and cattle-tick-borne disease. Malaria is ranked as the number-one disease in terms of morbidity, mortality and lost productivity. In Sudan, malaria is endemic and climatic conditions relating to temperature, precipitation and relative humidity affect the development of mosquitoes and malaria parasites. Thus, the spread of malaria is most likely affected by climate change and the control of malaria is therefore seen as a serious challenge due to global warming.

In this case study in Sudan, high temperatures during the rainy season led to rapid population increase of malaria mosquitoes, and prolonged high temperatures sustained the larval development. However, maximum temperatures in water, above 33°C, reduced the number of larva drastically. Humidity is also a crucial factor. The infection rate increases substantially as humidity increases, and the risk of malaria at 80% humidity is twice the risk at 60% humidity. A combination of the climatic factors temperature, precipitation and relative humidity explains between 39-54% of the changes in the spread of malaria whereas the rest is explained by other, non-climatic variables, such as increased drug resistance.

Another disease of global importance is cattle-tick-borne disease. In Mbarara district of western Uganda there was a positive correlation



between climate variability and the spread of the disease. Increased rainfall and humidity led to increased incidence of the disease. Fluctuations in precipitation patterns had significant impact on the disease, although this was not the only variable of importance. Other factors, such as temperature, vegetation cover, types of husbandry and crops, and population density also influence the spread of cattle-tick-borne diseases.

Thus, changes in rainfall patterns have numerous dramatic consequences for the Nile Basin region. The amount of water in the Nile is the result of the amount of rain in relation to runoff and evaporation. The spread of diseases such as malaria and cattle-tick-borne fever is also affected by rainfall, temperature and humidity. These physical parameters create ecological premises which are altered by human interaction with the environment, but biodiversity and species richness are affected more directly by human land use than by changing climate variables.

- Climate change manifests in different water-worlds with effects such as floods or droughts, causing human suffering and death.
- Water-borne diseases present a major threat to health on the African continent and the diseases are affected by climate change.
- With global warming the Nile Basin will move to a more moisture-constrained regime.
- Understanding the precipitation patterns is important for planning and management of the Nile.
- There are uncertainties with models predicting future climate scenarios and how much water there will be in the Nile.

Water, Biodiversity and Land Use

Water and food are the two most fundamental necessities for human life. Without either of them humans soon die. It is not possible to grow anything without water and droughts are the direct consequence of the absence or too little water. Farmers need a specific type of water at a particular time for their crops. If agriculture depends upon seasonal rains or the annual flood, it is of utmost importance that it comes at the right time and in the right amount. Too much water at the wrong time of year is as devastating as too little water when it is really needed, and it may lead to crop failures and subsequently famines. Farming is obviously very sensitive to the water-world, and the ecological diversity and uneven dependence upon the Nile as the only source or one of several bodies of water create different opportunities and restrictions for agriculture. With a global food security crisis looming, the way the land is used has fundamental consequences for how this challenge will be handled with regards to both humans and biodiversity.

The Nile Basin consists of a number of ecological zones between two extreme opposites: the rainforest in the DRC and the Sahara desert, which receives almost no rain. Some regions receive most or exclusively all of their water from the Nile, while others receive most of the water from rain, or from a combination of water sources. Still, it is the water in the Nile which links the otherwise different ecological zones together. It is the rains in the DRC, Burundi, Rwanda, Tanzania, Kenya, Uganda and Ethiopia which provide the Nile with water so the river can flow and give life to barren and desert areas in Sudan and Egypt.

Climate change affects the overall water-world. Some places become drier and experience more droughts whereas others are more regularly flooded or experience more fluctuations in precipitation patterns. These are overall climatic premises, but there are also human factors.

The richness of species depends partly on climate variables such as temperature and rainfall patterns, but also on human activities and how they interact with the environment. Human actions and how people practice agriculture impact on nature, water resources and landscapes. By introducing species and animals which are more robust than others or demanding less labour, the ecology changes.

The Sahel zone is climatically very hot and dry, but it has still the highest population growth in the world. The climate in northern Sudan is arid and semi-arid in many areas. Pastoralism is the main land use and it has changed the vegetation from open woodland to a very open shrubland. Goats are today the dominant animal kept, together with sheep. In some areas increased grazing has reduced the number of plants, but arid grazing land is in general very persistent. Hardwood



Pastoralism on the Serengeti, Tanzania

trees and other cash-generating plants are cut and sold, and trees are disappearing from the land due to charcoal production. In areas with high population growth and increased need for houses, wood is used for domestic purposes, such as fuel. Due to the impact of human land use the vegetation may lose its unique identity and become more homogeneous.

New plant species are often introduced in marginal lands to prevent land degradation and to provide new means of livelihood for the residents. Some of the species have been very successful and spread rapidly to new areas. An *Acacia*-like tree type was introduced in Sudan from Mexico, which is resistant to drought and was seen as a way to combat desertification and as a source of fuel. However, the presence of this invasive tree in new environments has had a negative effect on





Murchison Falls, Uganda

the other vegetation and the species richness. When humans introduce in ecosystems species and organisms from other continents, it may result in unforeseen consequences.

Changes in land use are often a consequence of growing population and urbanisation, leading to new challenges. In the lower Kihansi River Gorge in Tanzania a dam was constructed in the late 1990s and water from the river was diverted to the hydro-power station. This resulted in decreased river flow and the wetlands downstream became drier. The direct consequence was a change in plant species composition. An endangered and endemic frog became almost extinct, though it was saved by introducing a sprinkler system on the wetlands. Water supply and electricity generates prosperity for humans, but it may easily change the living conditions for certain endangered species which, in the long run, may have negative impact on society.

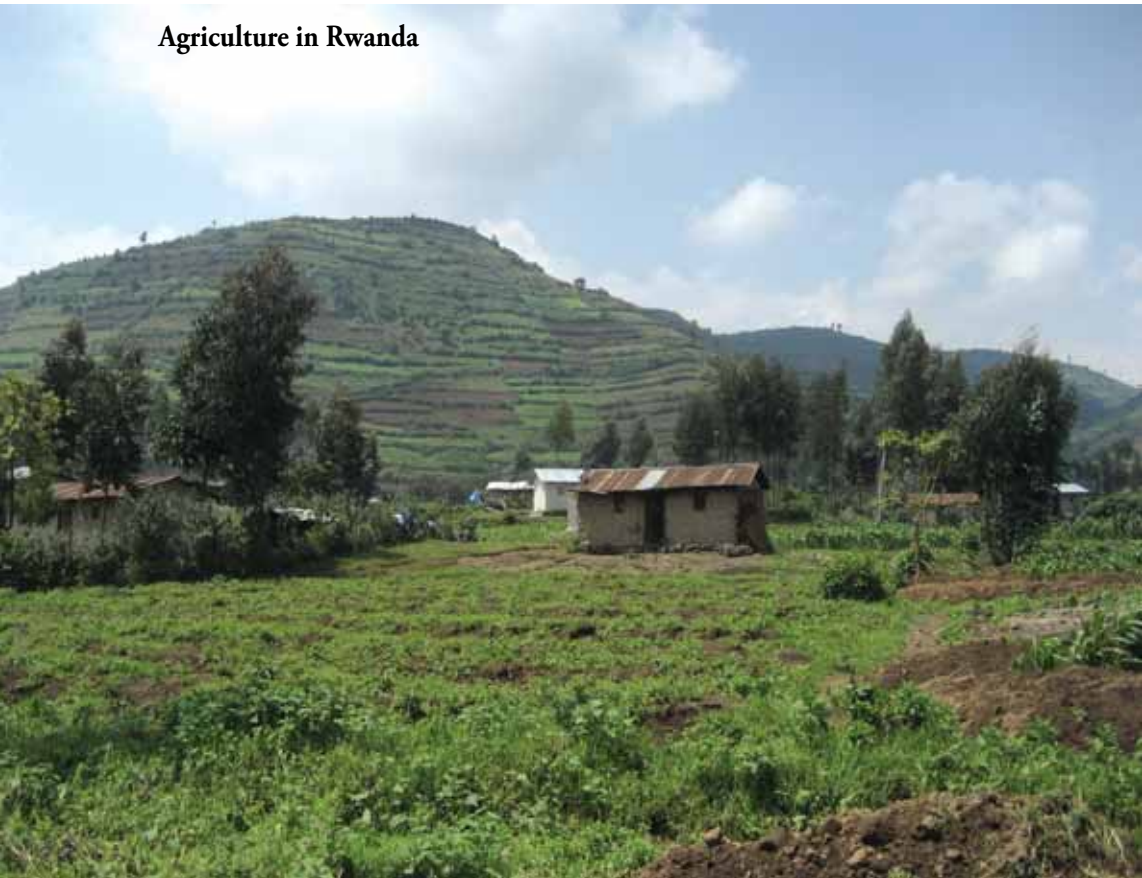
Constructions of dams have different consequences for the environment. The Turkwel Gorge Dam in north-western Kenya had minor consequences for the grazing land below the dam although there were drastic changes in the river flow regime. Although the number of one endemic tree species was reduced significantly, in this case there were few ecological changes with the introduction of the power-station. Thus, development and industrialisation may not necessarily impact negatively on the environment.

Some Nile Basin countries encourage industrialisation as a means to reduce poverty. In Uganda the government has over the last two decades put in place mechanisms which encourage investment in numerous business enterprises. In order to achieve this goal two urban forest reserves have been turned into industrial parks. The development processes and industrialisation, in many cases, take place at the expense of the biodiversity, affecting the vegetation, birds and small mammals. The increased human impact on landscapes threatens the species

richness and one way to combine the need for development and the biodiversity is to maintain some green areas within industrial parks.

Rwanda is often called the “green belt” because of its rich biodiversity and abundant forests, which are green throughout the year. However, in tropical highland regions, natural factors cause the soil to become weathered, fragile and acid, and together with cropping systems with low-input use, the soil fertility and the biodiversity are reduced. Recycling of the vegetation may, on the other hand, restore the soil fertility. After the cropping season the quality of the soil is renewed with the right use of green compost. Increased pressure on resources where the aim is to achieve greater yield from each crop may decrease the quality of the land, but by ample means it is possible to achieve sustainable agriculture.

Agriculture in Rwanda



Land use is closely related to water use. Varying amounts of precipitation and where and when rain falls define agricultural practices. Water is a prerequisite for food production, but the water itself is a source of food and life. In the great lakes, such as Victoria, Albert, George, Edward and Tana, together with all the tributaries forming the Nile, fish has always been a natural and important resource. The waterways provide people with important minerals and vitamins, but the fish species are highly vulnerable to human pollution and overfishing. Sources of water are often seen as places where wastes and toxins can be disposed of resulting in extinction of fish and aquatic species. The Nile perch was introduced in Lake Victoria in the 1950s and it has become an export commodity for the countries around the lake. However, human pollution such as sewage and fertilizers has reduced the rich diversity of fish in Lake Victoria.

The relation between water and land use shows the complex and difficult relationship between humans and the environment. All human activities have consequences for the environment. Changes in the water-worlds influence the environment and species richness. Introduction of new species may solve some problems, but at the same time create new ones, which may be more serious than the original ones.

Due to population growth there will increased pressure on natural and water resources. Climate change may worsen the situation, but human land use at a local level, such as use of forests, agricultural systems and construction of dams and reservoirs, has a greater effect on the actual environment and the biodiversity than climate change.

Thus, when humans exert greater pressure on ecosystems, the impacts include habitat loss and changes in the nutrient cycling. Many ecosystems of high conservation value have developed under long-term low-intensity land use. The halting or discontinuity of these practices is therefore a major threat to the conservation of these ecosystems.

- The Nile Basin consists of a number of ecological zones from rainforests to deserts.
- Human land use has a stronger and more immediate impact on the environment than climate change.
- Deforestation, agricultural systems and construction of dams increase the pressure on ecosystems.
- The variation and composition of life forms within an ecosystem are influenced by humans and the richness of species is threatened.
- Good water management can conserve ecosystems benefiting humans and the biodiversity.

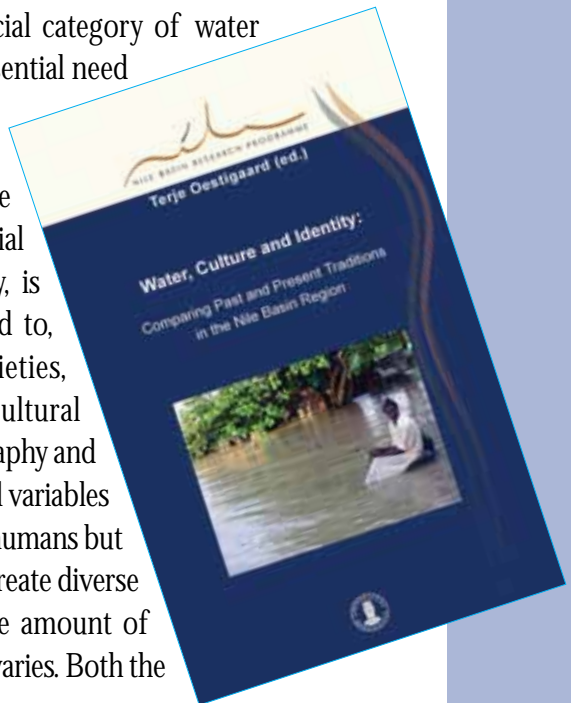


Transport on the Nile, Sudan

Water, Culture and Identity

Water is not only a physical substance, biological necessity or scarce resource, but it is also an intrinsic part of peoples' identities, cultures, worldviews, and for devotees it includes religious perceptions of themselves and the "otherworld" or the life thereafter. The social, cultural, ideological and religious roles of water include identities ranging from personal perceptions and gender relations to rainmaking and fertility rites for the benefit of the whole society, as well as perceptions of cosmological realms and religious beliefs. Peoples' ideas of themselves and their waters in the various water-worlds are not restricted and limited to national identities, but include a range of ecological zones transcending national borders.

Life-giving water is in a special category of water because it highlights humans' essential need for a specific type of water at a particular time, whether it is for religious purposes, agriculture or daily survival. What the crucial and life-giving water is and why, is dependent upon, but not limited to, different organisations of societies, modes of subsistence or agricultural practices. The climate, the topography and the hydrological cycle – ecological variables which are beyond the control of humans but which they have to react upon – create diverse water-worlds where not only the amount of water, but also the type of water, varies. Both the



Cover of the book *Water, Culture and Identity*

amount of water and how it annually reoccurs as rain, rivers, lakes and oases, influence and affect the way water is incorporated into people's lives and worldviews. Consequently, the ways the various water-worlds or waterscapes are used practically, interpreted symbolically and given values according to local and regional traditions and norms are a result of humans' continuous mediation of cultural and natural variables.

Traditionally, at the household level collecting water has been the task of women, thus creating gender relations but also relations and divisions between women of different ages. The seasonal agricultural cycle is dependent upon when the life-giving waters occur, structuring the whole community by collective practices including the sowing and the harvesting of the crops as well as the type and amount of husbandry possible. In traditional societies it was often the leader's responsibility to ensure and provide sufficient water for the welfare of the people, and the procurement of the life-giving water involved religious ceremonies such as rainmaking or rituals securing the Nile's annual inundation. The chieftain or king was also often held responsible if the life-giving water failed to appear with the consequence of harvest failure or famine and possible death. The arrival of the first water was celebrated with religious festivals as well as other celebrations related to the agricultural cycle, and water rituals are part of many world religions.

Water holds deep religious values. Religions and divinities can be understood through water symbolism and cosmological realms can be expressed and defined by the gods, as perceived by humans, through water. Water is considered to be holy, as it represents the material element of the spiritual core of religion. In many religions practiced in the Nile Basin, from the ancient Egyptians' pharaonic cosmology to Christianity and Islam's rivers of Eden, cosmos is either made from primeval waters or links or unites the divine realms to this world.

Thus, water or parts of the water in the hydrological cycle belong to the divine realms; either linking gods to humans or serving as media by which humans can reach their gods. Humans' perceptions of water in religion influence how, why and which water can be used in what manner, and it affects peoples' actions and responses to changes in waterscapes, because water or certain types of bodies of water is often seen as a divine gift.

Gish Abay, the source of the Blue Nile which flows into Lake Tana, is considered by Christians and Muslims to be the heavenly river Gihon, one of the four rivers in paradise. The Christians use this holy water for healing and blessing, and the source is a pilgrimage site. Along the Blue Nile indigenous practices involving sacrifice of oxen and other animals to the river still prevail, and Christians have also made sacrifices to the river. The most important religious festival in Ethiopia is Timkat or the epiphany celebrating the baptism of Jesus.

Far from the Blue Nile's source, in the rainforest of DRC hunters and gatherers live traditional lives depending upon what nature offers. In this water-world of rain and dependence on the river, fluctuations in precipitation create seasonal variations; the rainfall pattern determines when they can hunt, gather and fish. As a water people and considered as the finest fishermen, the river has a central place in initiation rituals which mark the change from childhood to manhood. The culture is defined by water.

In many areas people's lives are dependent upon that the seasonal rains come at the right time. In traditional African societies rainmaking has been a fundamental part of culture and religion. The rainmaker has been a medium between the gods and the ancestors providing the life-giving waters. Rainmaking has been a fundamental part of societies with varying complexity, from hunter-gatherers to divine kingdoms. In Rwanda and Burundi rainmaking is related to rock-art



The source of the Blue Nile in Ethiopia where devotees collect holy water



among marginalised hunters and gatherers. In Tanzania conflicts arose between traditional rainmakers and a state-initiated project, where the government invited rainmakers from Thailand to fill the biggest national dam, as the local rainmakers are allegedly unable to work at a national level. In Lake Turkana in Kenya climate change and droughts influence rainmaking rituals among pastoralists.

The archaeology of Sudan, from Neolithic prehistory to modern times, illustrates different societies depending on rivers and rain for their subsistence. However, it is not only agriculturalists that have been dependent upon the Nile for their economy. The Nile has, throughout history, been a highway for transportation and towns have been built along the river's shores. Thus, the river has created different economic possibilities and shaped ideologies.

The cultural history of the Nile has made it the most famous river in the world. Classical Greek and Roman writers had enormous admiration for the Nile. The Syrian writer Heliodorus wrote that the Nile is "the father of Egypt", Diodorus said that "The Nile surpasses all the rivers of the inhabited world in the benefactions to humanity," Arnobius proclaimed that the Nile is "the greatest of rivers", and Herodotus said the famous words: "Egypt is the gift of the Nile".

The Nile was the artery of life in Ancient Egypt. The living King and Pharaoh was Horus, and when he died he became Osiris, the King of the Nether World. Osiris also appeared as the divine power immanent within the Nile, and particularly within the waters of the flood. A low Nile implied the disappearance of the god and this was mourned, while the coming of the flood represented Osiris' revitalisation and restoration. When the Nile was inundated the event was celebrated with great festivals.

Apart from the Egyptian civilisation, from an archaeological perspective the most important role of the Nile has to be seen in relation to agriculture, the development of pottery and the use of

aquatic resources. The earliest pottery in Africa is found in the region of the Sahara and the Sahel and along the Nile in central Sudan; the pottery is more than 10,000 years old. The exploitation of rich aquatic resources in the Nile Valleys goes back 25,000-40,000 years. Thus, cultures and civilisations emerged along the shores of the Nile.

Ideas of water have had and still are part of peoples' identities and core value systems in past and present regional traditions, societies and religions in the Nile Basin region. Water in itself is used to express meaning and define social relations and cultural aspects. Different and changing water environments and water-worlds have impacted on traditions, cultures and religions and created identities, social values and religious beliefs. Which types of waters have been absent and present, or in which combinations they have occurred at a given time, have been incorporated into society and belief systems.

In the past as well in the present the Nile and the different water-worlds have had impact on the development of social organisations and ritual practices. The role of water in development processes will be of even more importance in the Nile Basin region in the future.

- Ideas about and beliefs in water are important parts of culture and religion.
- People's lives are based on the life-giving water that shapes their identities and traditions.
- All societies, from the earliest societies to the major civilisations, have been organised around water.
- The types of water and the presence and absence of rain and rivers have been given different values in societies.
- Understanding the role of water in traditions may improve and optimise future water management.

Water, Knowledge and Universities

Knowledge of water in society, culture and nature is important for understanding development processes in the Nile Basin countries. This obvious statement opens up a huge area of uncertainties and difficulties, because without understanding different knowledge regimes it may lead to devastating consequences in the Nile Basin region. What is knowledge and what are universities? These are not philosophical questions but relate directly to how knowledge can be used to improve society in the face of the predicted water scarcity.

Today, there is no common agreed definition of what a university is and there are a vast number of institutions called universities. To indicate variations in research and quality, the term “Research University” or “Flagship University” has developed referring to institutions where knowledge production and research take place, distinguishing these universities from private universities and universities without a research component, which only conduct teaching and education.

The research university serves many purposes and involves a number of activities, which all are held together and given value by being science. Research universities define what “reality” is and consider some realities to be scientifically more valid and valued than other realities. However, the research university in many countries in Africa is in crisis because of privatisation of universities, too many students, civil war, religious and political control, lack of funding, lack of public support and absence of belief in indigenous knowledge.

Research and higher education have historically been strongly linked to the nation state as a project of modernisation. The university is therefore in a paradoxical situation. On the one hand, it is dependent upon the state for finance. On the other hand, a research university has to be independent of the state and have an institutional autonomy,

academic freedom and freedom of speech, which cannot be upheld if the university has to serve dictatorial regimes.

Hence, in an ideal world, the university is a public institution where the state is the guardian of its autonomy, which includes funding and academic freedom, and because of this, the university is also dependent upon that the state is relatively autonomous from groups such as elites or parties seeking to use the state for their own benefit, because otherwise the university may not maintain its autonomy. This condition is best favoured by democracy.

Knowledge itself does not necessarily lead to democracy and tolerance, and democracy does not automatically follow from development. Democracy disperses power in society, the powerless get power and protection from misuse of power, and it creates possibilities to influence important decisions. Democracy does not emerge from development because elites are educated at “flagship” universities as such, but because there are governmental institutions securing power distribution. When an increasing percentage of a population is getting higher education, knowledge and power are diffused to the masses and thereby changing society and contributing to processes of democratisation.



The Mahmoud Salih Collection at the University of Bergen, which is a unique book collection on the Sudan containing about 2000 books

Politics and knowledge are intrinsically linked together in what may be called a knowledge regime. On the one hand, a knowledge regime can be defined as how political and knowledge institutions relate to each other defining a country's knowledge sphere and need of knowledge since the research university is generally a political project created by the state. However, universities and politicians may not share the same visions regarding knowledge production. Therefore, on the other hand, a knowledge regime is also shaped by how universities act in relation to the nation state project.

In many countries science is good when it benefits society whereas in the West science is good when it benefits science and the aim is to seek "knowledge for its own sake." These two opposite views regarding the rationale for the existence of universities have different political and scientific consequences, with implications for social development.



When the educational system develops, it transforms society and the social structure by creating a middle class, which historically has been important in the process of democratisation. However, the challenge is how a knowledge society can work in a region where only 5% of the population have higher education and the knowledge needs for development are linked to the working and agricultural classes, often dominated by women.

How a knowledge regime may benefit society depends upon political decisions: should it benefit everybody, or the elite, the middle class or the working class? Which parts of the public sphere are the university expected to contribute to and what relation should there be between a research university and the formation of democratic citizenship? In other words, what does it mean that a research university has social obligations towards the general public? Most often there will be conflicting interests regarding these questions, and the way

Makerere University in Uganda, which is now the host of NBRP's regional office



universities are organised impact dramatically on how science can benefit society.

With the establishments of private universities all over Africa as part of globalisation and internationalisation, the universities aim to make profit. As part of this process, a mechanical and positivist view of knowledge has been institutionalised. Knowledge and expertise can be imported as packages produced by the international education business. Curriculums and books are seen as “context free” representing “objective knowledge,” and this paradigm sends a message to political authorities that they do not need to develop their own research institutions and knowledge base, but buy it where it is available. This may lead to a serious degradation of research universities and independent knowledge production. It represents reproduction and not production of knowledge. In the end, this is a kind of global, cultural imperialism, which creates new problems.

When students have got their education “overseas”, often the knowledge has to be recreated when they arrive back in their respective countries. Although global and comparative perspectives are crucial for the renewal and creativity of research universities, it is important for the development and modernisation of a country that knowledge grows out of local and regional contexts.

Since no knowledge is objectively given and development problems are context dependent, it is fundamental for a country's future that it has its own research universities conducting independent research defined by the researchers themselves.

Knowledge is a powerful human capital which transforms society; it is a condition for economic growth, planning and development, and for socialising and institutionalising people. Knowledge is power, and politics is about achieving, maintaining and using power to defend the regime. A knowledge regime is therefore constantly in a position

of competition over power and a relation of trust. With modernity knowledge is believed to be trustworthy because it has a relative autonomy from politics.

Trust is a mutual relation. Governments need to trust the research universities and give them academic freedom limiting political interference in the research process, and society has to trust that the knowledge produced is scientific and unbiased. This balance between knowledge and politics is historically best maintained through institutionalisation of democratic values.

Thus, the relations between knowledge and politics are manifold. The kind of research that is conducted is not objectively given, but is a product of a number of social and political factors. Knowledge cannot be seen apart from the context in which it is created. In Nile Basin countries where research universities exist, they are organised in a number of ways with specific unique traits, which relate to former colonial rule, how the state was formed, level of internal structure, cultural and political traditions, and the dependency of the marked vs. the state.

The future development of the Nile Basin region will be impacted by the ways universities and higher education are organised and it is therefore important to understand the conditions and premises for knowledge production in order to evaluate the outcomes of the different knowledge regimes.

However, the research university has a very difficult time in most of the Nile Basin countries, which is a consequence of both external and internal forces, and how they combine. In some of the Nile Basin countries it is hard to see how a research university can emerge, and it is therefore of utmost importance that the constructive factors which may enhance future Nile networking and cooperation across borders are emphasised. Unless the research university emerges, a unique

opportunity to create a cross-national dialogue for solving urgent issues in the Nile region in the future will be forfeited.

- The research university in many African countries is in crisis.
- Private universities working for profit undermine the development of intellectual traditions and original knowledge production.
- The development of the Nile Basin region is dependent upon independent research on particular and context-specific questions and problems.
- Scientific knowledge has to be shared within the Nile Basin region to solve future challenges.
- Reshaping the research university is a difficult and slow process.

Lake Victoria



Water, Development and International Aid

The international aid system is, undoubtedly, a very powerful and enduring structural force impacting on institutional and policy development in Nile Basin countries. In many countries the aid system finances the bulk of development interventions, shapes institutional arrangements, frames policy alternatives, and provides mediating structure(s) for conflict resolution. In other countries the aid system's influence is more marginal. Nevertheless, its concepts, institutions, administrative arrangements and fiscal resources help shape the most critical aspects of development and politics.

The aid system in the Nile Basin can be analysed as a new type of international social system, but with entirely new characteristics:



conceptually and normatively concentrated around dominant ideas relating to development, democracy, human rights, gender equality, sustainability etc.; institutionalised in an economic context of gift economy; and politically organised as a balancing act between donor/receiver relationships and “partnership”. The system has played a very important role not only in identifying and establishing development aid and the dominant development discourse, but also, due to its different forms of economic, political, conceptual and moral capital, it has impacted on issues related to sustainability, resource policies, and democratic development – in largely yet unknown ways in the Nile Basin.

The aim of this research group was not primarily to ask whether or not aid “works”, or in which cases it does, but to inquire into how the international aid system influences, and is influenced by, the national and regional political agendas of Nile Basin countries. The aim was to review and analyse dominant views on development aid, democratisation etc, and to question how these issues are conceptualised and problematised within the international aid system itself.

Thus, the aim was to improve the understanding of this system and how it functions and relates to the Nile Basin countries, and to the discourse on sustainability, poverty, democratisation, resource politics, peace and conflict in the region. The approach of the group departed from the dominant research tradition on the aid system in two important areas; first in that the aid system was analysed as a whole; i.e. the linkages and connections between the multilateral organisations, the bilateral organisations, NGOs and Nile Basin states, and second, how they influence each other and are related to the external world. Based on new empirical research and the collection of new data, some case studies may illustrate such relations.

Like many African countries, Rwanda has been politically, economically and culturally dominated by its former colonial powers even after independence. Since the colonial era the foreign aid in the education sector can be seen as having favoured the donors rather than the Rwandan people. The Belgians used aid in education to create a type of local elite which helped them to increase their colonial power. The main aim of French aid in the education sector was to enhance French culture in Rwanda through the French language, and Rwanda was part of France's zone of influence. Today, the United Kingdom is the dominant aid donor in the education sector. The motivation for UK's involvement does not differ much from that of the French. When Rwanda decided to anglicise education and administration, this decision was influenced by the United Kingdom, which helped Rwanda to join the Commonwealth Community.

The international aid system's relations to governments take different forms. It has been estimated that African countries annually lose as much as 25% of their GDP to corruption. Uganda is listed as one of the most corrupt countries in the world, losing about US \$300 million each year due to corruption and bad investments. Corruption has been identified as a major reason for the faltering reforms and donors allocated resources for civil society anticorruption initiatives. The combination of assistance and pressure from donors led to the promulgation of laws and specialised institutions for handling corruption. Anticorruption civil society organisations working to stop corruption have achieved some results against lower-level and petty corruption, but it has been difficult to achieve results at regional and national levels. Among the ruling elites there has been a lack of political will to end corruption and the government seems to have turned a "blind-eye" towards the problem. Moreover, the ruling elite has had

strong control of the major state institutions and often uses the law and state resources to co-opt or suppress counter-corruption forces like advocacy and anticorruption NGOs.

In Eritrea the governmental relations with NGOs and the international aid system are guided by the policy of self reliance and independence. NGOs are not allowed to operate with funding from bilateral donors and the UN system, and Eritrea's aim is that the country should not fall into the aid-dependency syndrome where relations with NGOs are determined by donor influences. Eritrea only accepts international aid which is apolitical and seen as relevant for solving real problems as defined by the government. Thus, the country is refusing aid which perpetuates dependence. As a consequence, international aid is limited and it does not play a determinant role in the development processes of the country.

Ethiopia is one of the Sub-Saharan African countries which receive significant aid, which accounts for ca. 12% of the GDP. Ethiopia's food security is constantly dependent upon foreign aid, which provides 10-15% of the annual food the country needs in normal years and up to 25% in periods of bad harvests. This means that between 5 and 6 million people are constantly living in danger of hunger and they are totally dependent upon foreign aid for their survival.

Disaster relief has been important in averting major humanitarian disasters. This has resulted in a general belief that for Ethiopia to break out of its "poverty-trap" and to achieve long-term and sustainable development, the role and the importance of foreign development aid is crucial. However, the lack of an adequate aid resource policy influences and contributes to the perennial food security problems in Ethiopia. The problem has been the management of the different forms of aid at the lower level of the administrative hierarchy as well as institutional instability and improper investments. Without appropriate



The Merowe dam, Sudan

management practices, development policies and institutional reforms, this will increase future vulnerability and the deepening dependence on externally financed relief operations runs the risk of institutionalising unsustainable practices.

Sudan has often suffered from floods and droughts, even though it has about 80 million ha of fertile land. The country has an urgent need for Nile water resources for irrigation and hydropower, which will enable industrial projects in Northern Sudan and provide Khartoum with electricity. In order to develop the country, the Merowe Hydropower Dam was built at the Fourth Cataract. The Merowe Dam, which is also called the Pearl of the Nile, was inaugurated in 2008.

Due to the political regime in Sudan, from 1997 Western aid has dried up. Western aid is accompanied by pressure for economic and political reforms, processes of democratisation, human and gender rights, etc. When Sudan was blocked from the international aid system, it opened up for direct investments by China and other Arab countries. China offered an alternative source of support and has a “non-interference” policy in other countries’ domestic politics.

China provided almost US \$2 billion in funding for the Merowe Dam. China has two main interests in this project. First, it gives China an advantage when competing for resources globally, since China imports oil from Sudan. Second, it provides an alternative to the Western consensus with regards to development policies, which are implemented with social and political ideologies.

By providing non-conditional aid China and other countries have challenged the Western development aid hegemony. The international aid system has been a political tool for propagating Western values and norms, first and foremost democracy and human rights. The political map of Africa and the Nile Basin countries have changed when Western

countries are no longer the only development aid actors defining the premises for the future. Development aid is also global politics.

- The international aid system has a strong impact on institutional and policy development.
- The question is not only if aid “works,” but how it influences and is influenced by political agendas.
- The international aid system represents a new international social system with specific norms about democracy, human rights, sustainability and development.
- The Western development aid hegemony has been challenged by countries not sharing this ideology.



The Nile at Aswan, Egypt



Water for the Future

The Nile Basin region faces immense challenges in the future. The population growth will increase dramatically and more people will be dependent upon the Nile water, though to various degrees. The importance of the Nile for the people living in the region will be more important than it has ever been. The ways in which Nile issues are solved will have enduring consequences for the development of the region and whether water will be a source to conflict or cooperation, peace and stability. The future challenges are many and involve:

- Who owns and who can use the Nile water and in which quantity? How is it possible to make optimal water utilisation agreements which all countries can accept?
- How does climate change affect the rain patterns and the amount of water in the Nile? If there will be less water in the Nile, how can societies be organised around this even more scarce resource? And how does climate change affect the spread of water-borne diseases?
- How does human land use, which is water use, worsen the situation? How can human interference in the environment reduce the water scarcity, secure species richness and conserve ecosystems?

- How can ideas about water in cultural and religious traditions be a source to cooperation and development, and how can development processes include existing values of water in society?
- How can the shaping of research universities become a basis for shared knowledge on Nile issues? How can a scientific knowledge base be optimised for integrated water resources management across the region?
- How does the international aid system influence and is influenced by the political agenda in the Nile Basin countries at both national and regional levels?

The Nile Basin Research Programme has addressed these issues. Researchers from the ten Nile Basin countries conducted independent and interdisciplinary research on the topics from the different countries' perspectives, contexts and needs. It has been the vision of the programme that collaboration between researchers and exchange of knowledge across political and academic barriers will enable dialogue and a knowledge base for the future development of the Nile Basin region. By building trust and capacity it creates an environment for investments and integrated water resource planning and management. NBRP has aimed to facilitate such capacity-building activities and interchange of knowledge among researchers.





Nile Basin Research Programme, Research Groups and Participants

The core activity of Nile Basin Research Programme (NBRP) has been to be a guest researcher programme where up to two senior researchers from each of the ten Nile Basin countries annually visited the University of Bergen in Norway to conduct research on the Nile for 4-6 months. Thus, NBRP has been one of the leading independent Nile research programmes in the world.

The idea of the Nile Basin Research Programme was first presented to Nile-Com in 1999, which is the meeting for the Nile Basin Water Ministers. In September 2003 a concept note for a programme was presented to Nile-Com in Addis Ababa. In June 2004 a final proposal was jointly submitted to the Norwegian Ministry of Affairs by the University of Bergen and the Nile Basin Initiative, and the contract was signed with MFA in December 2005.

The programme was officially inaugurated on March 15, 2006, by the Norwegian Minister of International Development, Erik Solheim, and NBRP has been financed by the Ministry of Foreign Affairs. The first phase of the programme (2006-2010) had a budget of 44 million NoK (ca. US \$ 7,6 million) and a second phase is proposed for the period 2011-2014.

On the initiative of ATP and the NBRP the Nile Basin University Forum was launched in Kampala in June 2009 and currently it has 18 Nile Basin universities as members. It is intended to be an organisation of universities for the whole Nile Basin, crossing physical, language and cultural borders. It will concentrate on issues relating to Integrated

Water and Resources Management in its widest sense and promote mobility of staff and students. It will also address issues of syllabus harmonisation between universities.

The Nile Basin University Forum is being developed as an important tool for regional cooperation within research and higher education. Further NBRP activities will as far as possible utilise this network, while at the same time strengthening relations with other institutions and networks in the region.

The research groups and the participants have been as follows:

Spring 2007: Contested resources in the Nile Basin: Nile development and Nile planning in the post-colonial period. Economic development, power and Nile projects. This theme was the foundation for the other research topics. The group analysed Nile water development during the last half-century and how the Nile water issue relates to other available water resources in the respective countries' development.

Participants

Pascal Nkurunziza, Burundi

Hosam Elemam, Egypt

Yacob Arsano, Ethiopia

Fadwa Taha, Sudan

Robert Baligira, Rwanda

James Mulira, Uganda

Honest Prosper Ngowi, Tanzania

Mary Mwiandi, Kenya

Terje Tvedt (academic leader)



Participants at the Nile Basin Research Conference
8-11 June 2009, Dar es Salaam, Tanzania



Autumn 2007: Climate in the Nile Basin area, with particular reference to climate change and climate and health. The group compiled a set of precipitation data for the Nile countries in order to address the question if there will be more or less water in the Nile in the future, and how changing climate and water regimes affect the spread of diseases.

Participants

Mohamed Elshamy, Egypt

Eman Hassan, Egypt

Everline Komutunga, Uganda

Semu Ayalew Moges, Ethiopia

Stephen Munga, Kenya

Joseph N. Mutemi, Kenya

Robert Baligira, Rwanda

Mohamed Yassen, Sudan

Howaida Abdelrahman, Sudan

Asgeir Sorteberg (academic leader)

Rune Nilsen

Ivar Seierstad

Ellen Marie Viste

Spring 2008: Water, culture and identity: comparing past and present traditions in the Nile Basin region. Water is not only a physical premise for life, but different water worlds and the presence and absence of the life-giving water are incorporated into culture and religion, thereby shaping and defining identities. The group analysed such relations in past and present contexts in order to deepen the understanding of the role of water in society since the way water is conceptualised culturally and religiously influences how it is possible to improve future water management.

Participants

Raphael Muamba Tshimanga, DR Congo
Intisar Soghayroun Elzain Soghayroun, Sudan
Azhari Mustafa Sadig Ali, Sudan
Bertram Baltasar Mapunda, Tanzania
Rose-Marie Mukarutabana, Rwanda
Terje Oestigaard (academic leader)

Autumn 2008: Shaping research universities: Knowledge production and higher education. This research group focused on the role of research universities in social, economic and national development. These analyses provided a better understanding of why and how different societies develop universities differently, but also why reforms of research universities cannot follow from translation of certain dominating or popular models to the local situation.

Participants

Amani Elrayes, Egypt
Hosam Elemam, Egypt
Kassahun Berhanu Alemu, Ethiopia
Mary Mwiandi, Kenya
Rebecca Sima, Tanzania
Kukunda Elizabeth Bacwayo, Uganda
Roberts Muriisa, Uganda
Joseph Gahama, Rwanda
Yasin Abdalla Eltayeb Elhadary, Sudan
Léonidas Barakamfitiye, Burundi
Tor Halvorsen (academic leader)
Tom Skauge

Atle Nyhagen
Marit Tjomsland

Spring 2009: Biodiversity and land-use change. Different land-use practices have various consequences, and knowledge about the impacts of humans' engagement with the environment is fundamental in order to identify those factors which change the water regimes. The group focused on patterns of species richness along climate gradients such as temperature and rainfall, and how human impact has direct consequences on the conservation or deterioration of biodiversity.

Participants

Magdi Ali, Egypt
Getachew Tesfaye, Ethiopia
Henry Ndangalasi, Tanzania
Jean Jacques Mbonigaba Muhinda, Rwanda
Nada Babiker Hamza, Sudan
Ghebrehiwet Medhanie Ghebreamlak, Eritrea
Gaspard Ntakimazi, Burundi
Hassan Roba, Kenya
Robert Kityo, Uganda
Edward Mwavu, Uganda
Nseu Bekeli Mbomba, DR Congo
Elsir Omer Salih, Sudan
Ole Reidar Vetaas (academic leader)
Inger Elisabeth Måren (academic coordinator)
John-Arvid Grytnes
Vigdis Vandvik
Richard Telford

Autumn 2009: International aid system in the Nile Basin. The international aid system and its actors finance the bulk of development interventions and investments in numerous countries. The aid system can be seen as a new international social system influencing regional and national political agendas, and the group analysed how the aid system in the Nile Basin countries influences and is influenced by political agendas.

Participants

Jacques Niyongabo, Burundi

Godfrey Asiimwe, Uganda

Khaled Abou El Nour, Egypt

Ghiorgis Tekle Gebreghiorgis, Eritrea

Deribe Gurmu, Ethiopia

Mwangi Peter Wanderi, Kenya

Joseph Nkusi, Rwanda

Suad Badri, Sudan

Johnson Ishengoma, Tanzania

Tabitha Mulyampiti, Uganda

Paul Opoku-Mensah (academic coordinator)

Terje Tvedt (academic leader)

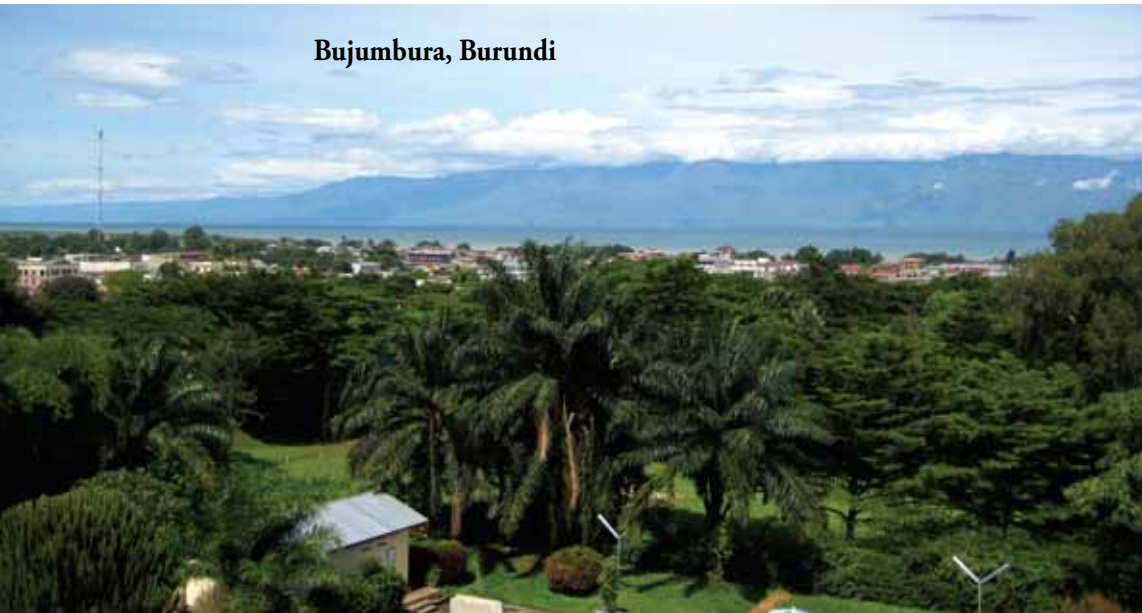
As part of knowledge production and contribution, it has been an explicit aim that the publications should be available in open-access libraries where researchers from the entire world can access the literature electronically free of charge. University libraries form the core of academic research for future knowledge production. Library cooperation and development is therefore of vital importance. NBRP has cooperated with the University Library of Bergen to facilitate such developments and dissemination

of knowledge in the region. In order to further address the future challenges and water issues in the Nile Basin region, NBRP is also producing a documentary film, *The Nile Quest*, which will have world-wide distribution and dissemination.

For further information:

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Bujumbura, Burundi



Selected publications

The programme publishes its research results through a series of edited books and monographs as well as articles in peer-review journals. Among the recent and forthcoming books are:

- *Water, Culture and Identity: Comparing Past and Present Traditions in the Nile Basin Region*, Terje Oestigaard (ed.). Bergen: BRIC Press. 2009.
- *The River Nile in the Post-Colonial Age*, Terje Tvedt (ed.). London: IB Tauris. 2010.
- *The Neolithic of the Middle Nile Region. An Archaeology of Central Sudan and Nubia*, Azhari M.S. Ali. Kampala: Fountain Publishers. 2010.
- *Climate and Health in the Nile Basin*, Asgeir Sorteberg and Ellen Viste (eds.). Kampala: Fountain Publishers, in press.
- *Contemplating the Fipa Iron Working*, Bertram B.B. Mapunda. Kampala: Fountain Publishers, in press.
- *Traditional Water Management in the Congo Rainforest*, Raphael Tshimanga. Kampala: Fountain Publishers, in press.
- *Wadis Systems and Trade in Muslim Sudan*, Intisar Soghayroun Elzein Soghayroun. Kampala: Fountain Publishers, in press.
- *The Nile Knowledge Societies: Shaping the Research University in Times of Mass Tertiary Education Demands*, Mary Mwiandi, Kassahun Berhanu and Tor Halvorsen (eds.). Kampala: Fountain Publishers, in press.

- *(Re)shaping the Research University of the Nile Region?* Kassahun Berhanu, Mary Mwiandi and Tor Halvorsen (eds.). Kampala: Fountain Publishers, in press.
- *Ecological Characteristics of the Fishes of Congo River*, Mbomba Nseu Bekeli (ed.). Kampala: Fountain Publishers, in press.
- *Shire, the River of Malawi*, Dean Kampanje Phiri. Kampala: Fountain Publishers, in press.
- *The International Aid System in the Nile Basin*, Terje Tvedt (ed.), in press.

Publications, when possible, are made available for free to download from BORA (Bergen Online Research Archive), <http://bora.uib.no>. For an overview of publications (including journal articles), see www.nile.uib.no/publications.



Food transport, Uganda