

**Water Issues in the Horn of Africa**

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## Water Woes in the Horn of Africa

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**Countryside by a River. Photo credit: Ludwig Siege.**

The Horn of Africa is a cradle of ancient civilizations, rich biodiversity and singular water woes. Each of the countries in the Horn – Ethiopia, Somalia, Eritrea, and Djibouti, has water scarcity issues. The Horn is vulnerable to climate change and recurring drought. This in turn accentuates poverty, food security and biodiversity loss. Historically, drought has been a constant feature in the Horn and rainfall records are a pointer to shorter drought cycle and lesser rains each year. The local communities are constantly migrating with their livestock to locate water sources, grazing lands and perhaps some bush meat in the passing. Most people own guns and don't hesitate to use them to settle water scores. Water geopolitics is the primary driver of regional brinkmanship in the region.

Africa's population is expected to peak at 1.6 billion in 2030, from 1.1 billion in 2015. Can the Horn of Africa provide water to 300 million people by then? An affirmative needs wise-use of wetlands by the countries as well as sharing of water resources. The Blue Nile originates from Lake Tana in Ethiopia to merge with the White Nile in Khartoum, Sudan, to form the longest river in the world. Egypt is regarded as 'gift of the Nile' and has enjoyed a monopoly of its waters from ancient times. With Ethiopia building the Great Renaissance Dam (GRD) along its border with Sudan, the water sharing dynamics will soon undergo a sea change. Ethiopia could share more waters with Eritrea and Djibouti for the use of sea ports so vital for its economy. Somalia is too caught up with infighting to solve its water problems.

The use of groundwater in the Horn is still in its infancy, and this is a blessing in disguise. There are many countries in Africa where aquifers were over exploited to the detriment of people, animals and their

shared environment. Once again political stability and visionary leaders could promote better groundwater management which is critical in the Horn. Ecohydrology is science that focuses on ecological processes within the hydrological cycle and provides solutions for sustainability of wetlands. In practice, reversal of degraded wetlands is harder than reclaiming them for settlements.

There are so many reasons to celebrate in the Horn of Africa. Water use could figure in this list only when the local communities appreciate it as a finite resource. While this applies to the world at large, the Horn is a special place to soak up on safe, potable water made available at the flick of household taps.

## A Long River, Big Dam and Fight on Hands

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The Grand Renaissance Dam (GRD) is Ethiopia's work-in-progress to dam up the Nile close to its border with Sudan. The 10 Nile basin countries (see map) especially Egypt, have had water resources infrastructure on the Nile. Ethiopia is the second most populous country in Africa and among the top 5 growing economies in the world. The GRD is a pointer to its regional hegemony and it would be Africa's largest dam on the world's longest river when completed - 1,800 m long, 170 m high and handling 10 million m<sup>3</sup> of water. Egypt has misgivings about GRD and it would be a big setback to regional water sharing if Egypt and Ethiopia do not reconcile their differences over the dam.

The sharing of Nile waters became contentious in 1959 when Egypt and Sudan inked an agreement for the full utilization of the Nile. Both these countries built dams – the Roseires on the Blue Nile (Sudan) and the Aswan High Dam (Egypt) on the Main Nile. No water was spared for other Nile basin countries, including Ethiopia, which supplies 83% of the annual flow of the Main Nile at Dongola, near Aswan Dam. The Egypt-Sudan pact held water for 50 years although rancor and bitterness seeped between the Nile basin countries. Ethiopia never acquiesced to the 1959 pact and five decades later began building the mother of all dams on the Nile and all of Africa.

Ethiopia and Egypt could defuse tensions over the construction of the GRD with a two-part deal. Firstly, Ethiopia needs to agree with Egypt and Sudan on rules for filling the GRD and how to operate it during drought. Secondly, Egypt has to accept Ethiopia's right to develop its water resources for its people on the basis of equitable use and not hinder Ethiopia's efforts to make GRD feasible. Sudan has a lot to gain



**Nile River Basin. Photo credit: The IBRD.**

when Ethiopia and Egypt reconcile their differences over GRD and it would be a beneficiary of a win-win deal. That said, the formation of South Sudan in 2011 makes sharing of Nile waters more complex.

As of now, one-third of GRD is completed, and the rest probably needs 8 years with the total cost pegged at US\$5 billion. Ethiopia is raising funds to build the dam with its own money given its economy is on the upswing. The main purpose of GRD is hydropower generation, which would garner 80% of the total economic benefits of the dam. More hydropower means greater the incentive for Ethiopia to direct the Blue Nile waters for hydroelectricity generation rather than irrigation use, and Egypt should encourage this option which would not undermine its share of the Nile waters.

All said and done, GRD has emerged as a learning curve for geopolitics in the Nile basin countries. The major players happen to be Ethiopia, Egypt, Sudan and possibly South Sudan. All of them need to sit across the table and come to terms over the new dam. They also need to factor in the impacts of climate change that would likely reduce mean discharge of Nile waters, in addition to evaporation losses and increased crop water requirements. After years of taking the Nile for granted, Egypt has come to grips with water efficiency by reducing transmission and irrigation losses and water recycling. That is the real fight that needs to be won by all the 10 Nile basin countries.

## Saving Ethiopia's Dying Lakes

Murali Pai



**Overgrazing and shrinkage of wetlands. Photo credit: The Ethiopian Institute of Water Resources.**

Abijata-Shalla National Park (ASLP), Ethiopia's only wetlands given the status of National Park, provides livelihoods to teeming local communities and grazing for their livestock as well. The Central Rift Valley in Ethiopia has an area of about 13,000km<sup>2</sup> and encompasses four lakes: Ziway, Langan, Abijata and Shalla within the Ziway Shalla basin. The two Central Rift Valley lakes, Lake Abijata and Lake Shalla are separated by three kilometers of hilly land, and together form ASLNP, and declared as such in 1970.

ASLNP has surface area of 887 km<sup>2</sup>, of which 482 km<sup>2</sup> is covered by Lakes Abijata and Shalla. The Park is located within the Ziway-Shalla Basin, part of Ethiopia Rift Valley within altitude of 1540-2075 M.S.L. It is 200 km from Addis Ababa located within the Oromiya regional state. ASLP is home to over 400 bird species, which amounts to almost half the number recorded in the whole country. They include ducks, geese, coots, great white pelicans, greater and lesser flamingo, white-necked cormorant, African fish eagle, Egyptian geese, and plover and herons species.

Major threats include settlements, overgrazing, sand mining, overfishing and soda ash mining. The site is overpopulated and the productivity of the waters can no longer maintain the once rich bird and fish life as major ecological systems have been broken up forever. The area is located in a water deficit spot of the country and as a result also has natural problems. External problems include upstream water

abstraction especially from the Bulbula River, increased human settlements on the periphery of the park and vegetation loss in water catchments on all sides of the basin. ASLP has almost turned into a desert due to overgrazing and a concomitant alarming drop in water level. A loss of its biodiversity and rampant pollution could turn it into wasteland in the next 20 -50 years.

I found the local communities kept too many unproductive livestock that were turned out to the grasslands of ASLP for pasture; no concentrates were fed at all to the cattle, sheep and goats which were reared by poor husbandry practices. Better pasture management practices would improve the situation and allow regeneration of vegetation. A good strategy to resolve issues impacting biodiversity conservation and wildlife management would ensure engaging the local communities by conservation awareness. This is especially important in situations of policy paralysis and apathy at governmental and administrative levels. NGOs working in the region have a big role to play and in the interest of the larger cause, every effort must be made to save Ethiopia's crucial wetlands.

## Cleaning Up the Messy Tanneries in Ethiopia

Murali Pai



**Effluents from Bahir Dar Tannery. Photo credit: Fitsum Kibret.**

Ethiopia has the dubious distinction of the largest livestock population in Africa, and the least quality control in both its prime industries – meat production and tanneries. The affluent discharges by tanneries raking in annual revenues pegged at \$150 million are polluting wetlands to the levels of an environmental catastrophe. Chromium poisoning cases are on the rise in communities using water contaminated by tanneries and the heavy metal is implicated in diseases from gastroenteritis to lung cancer. As more and more tanneries get into business close to wetlands in Ethiopia, it must be mandatory to install wastewater treatment plants in these tanneries.

The Bahir Dar tannery (BDT) is located in the town of Bahir Dar, the capital of Amhara National Regional State of Ethiopia. The town is situated 578 km northwest of Addis Ababa, and the southern shore of Lake Tana – the largest freshwater Lake in the country and the source of the River Blue Nile. The tannery processes 4000 sheep/goat skins and 50 cow hides per day for export to international markets in Europe and Asia. Tanneries are pollution-intensive industries and discharge liquid and solid effluents into water bodies, landfills and the atmosphere. Toxic chemicals include sodium sulfide, sulfuric acid, chromium, ammonia and chlorine, all known to cause severe life threatening illnesses.

BDT employs 100 people, 83% of them earn about 15 USD per month, and the majority of workers were not well informed of their occupational hazards. Tetanus, anthrax, leptospirosis, and brucellosis are some zoonotic diseases that could be contracted by the workers at BDT and many suffer from general malaise, cold, fever and asthma due to pervasive bad odor on the job. In addition, the socio-economic



impacts to tannery workers relegate them to the fringes of the society due to insanitary living conditions. Therefore, long term mental health counselling is indicated to address these impacts.

The contamination of the Blue Nile, the drinking water source for the homesteads around BDT, has resulted in the spread of typhoid, giardiasis and skin infections amidst the local communities. Remedial measures should aim at reversing the adverse health impacts with the implementation of a standardized waste treatment and disposal system, issue of mandatory protective gear to workers, medical facility on premises to monitor staff health, and improve work conditions for mitigating foul odors in the factory.

Tanneries do contribute much to a growing economy such as Ethiopia, but to the detriment of people, animals, plants and the shared environment, when regulatory agencies turn a blind eye to those giving a short shrift to safety standards. Mandatory waste treatment and disposal plants need to be fully functional when tannery units are operationalized.

## Effects of a Large Dam on Malaria Risk in Ethiopia

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The alarming rise of malaria in the Horn of Africa has direct links to the numerous dams and reservoirs built to ward off water scarcity. The Koka reservoir in Ethiopia is a case in point. A peer-reviewed study found high risk prevalence of *Plasmodium falciparum* infections in the communities living within 3 km of the reservoir. Cerebral malaria manifests with fever, seizures, coma and other neurological symptoms which need fast and accurate treatment to avert death.

Koka reservoir is located 100 km southeast of Addis Ababa at 1590 masl in the Rift Valley. Built in 1961, the Koka dam is Ethiopia's oldest large dam. The local communities usually reside in mud huts (tukuls) and few use bed nets to sleep in. The dam authority absolves itself from any responsibility in malaria control and don't believe in preventive water level manipulation of the reservoir. Instead, the onus is vested with health authorities of the Oromia National Regional State, which seeks to reduce malaria risk primarily by spraying DDT/malathion in the homesteads, and treating malaria cases. There is a spurt in malaria cases from mid-September to mid-November, after the rainy season in the Koka dam region. The major vectors are mosquitoes of the *Anopheles* species.

The malaria-enhancing effect of the Koka reservoir likely occurs due to 3 factors. The reservoir increases the ground water levels to cause formation of puddles and breed mosquitoes. The permanent water bodies of the reservoir also favor *Anopheles* larvae, and water seepage below the dam has led to a swamp from which it is almost impossible to exterminate the disease vectors. Thus, adjusting water levels in the reservoir to try reducing mosquito larvae production could control malaria incidence in the Koka reservoir region. All other methods like spraying repellents are not only ineffective but also harmful to human health.

The risk and incidence of malaria transmission around reservoirs is a given and has an important bearing on epidemiology and prevention of a disease causing increasing morbidity and mortalities in Africa. Integrated approaches to disease ecology and water resources management and collaboration between health and water sectors could reduce the spread of malaria, the use of a vaccine for malaria notwithstanding.

## The Importance of Wetlands for Biodiversity Conservation in Ethiopia

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**White-eared kobs at Akobo River. Photo credit: Ludwig Siege.**

Ethiopia holds one-fourth of Africa's biodiversity with 320 mammals, 860 birds, 240 reptiles, 71 amphibians, 150 freshwater fish, and over 1,225 arthropods and 6,600 plant species and a high rate of endemism. The volcanic and Rift Valley Lakes are the commonest wetlands of Ethiopia. Among the former are Tana, Hayik, Ardibu, Ashenghe, Wonchi and Zengena and the latter comprise of Ziway, Abijata, Langano, Shalla, Awasa, Abaya, Chamo, Chew Bahir and Turkana. The Blue Nile originates from Lake Tana and merges with the White Nile in Khartoum, Sudan, to form the longest River in the world.

Ethiopia has 212 species of wetland birds or 43% of 492 species found in Africa. There are 88 species that are migrants from the north and 124 are residents and some African migrants. The blue-winged goose, saddle-bill stork, shoebill, hadada, sacred ibis and wattled ibis are residents whereas the lesser and greater flamingoes and black stork are examples of migrants. The eutrophication of wetlands and concomitant growth of algal blooms has decreased bird counts in Ethiopian wetlands. In addition, important wetlands like Abijata-Shalla are slowly but surely shrinking due to unwise use of resources.



**Saddle-bill storks in Gambella. Photo credit: Ludwig Siege.**

Ethiopia is also a range country for the Nile crocodile, and Lake Chamo, a southern Rift Valley Lake near the town of Arba Minch is perhaps one of its best habitat in entire Africa. A ranch was established in 1984 at Arba Minch with the aim to sustainably utilize Nile crocodile skins for export to Europe. Hippopotamus also abound in the Rift Valley Lakes. Considering the rhino went extinct in Ethiopia and the African elephants are restricted to Babilie elephant sanctuary in the east near Harar, hippo populations are faring better in Ethiopia.

The loss of wetlands to industrial and agricultural development, high pollution levels, and increasing human-wildlife conflicts are taking a toll on biodiversity conservation. Ethiopia lacks a water policy that gives more teeth to an autonomous wetlands authority. For a landlocked country, its wetlands are its lifeline, most importantly the Nile, and its rift valley lakes. But even a cursory look at Ethiopia's wetlands is a pointer to unsustainable use of wetlands making water security a lip-service in a country that is vital to the overall well-being of the Horn of Africa.