CHAPTER 9
BLUE NILE SUB-BASIN
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OVERVIEW

HOTSPOTS IN THE WETLAND AREA

WETLAND INTEGRITY
- Unmodified/natural
- Largely natural with few modifications
- Moderately modified
- Largely modified
- Seriously modified
- Not assessed

WETLAND SITES
- 55 Dinder Floodplain
- 56 Lake Tana
- 57 Fincha-Chomen
- 58 El Roseires
- 59 Sennar

WETLAND SITES

HOTSPOT
- Alien species/invasives
- Overgrazing
- Stunting
- Deforestation
- Fire clearance
- Overfishing
- Salinity
- Soil extraction
- Water pollution
- Potential carbon release

WETLAND INTEGRITY

POTENTIAL WATER LEVEL CHANGE AND SILTATION
- Dams
- Existing hydropower plants
- Proposed hydropower plants
- Country
- Sub-basin
- City
- Water body
- River

OVERVIEW

» Wetland area of the Blue Nile Sub-basin (Sudan and Ethiopia) has a proportion of 1.4% to the 313,861 sq.km large sub-basin.
» Majority of the ~ 4500 sq.km large wetland area is permanent (82%).
» 5 wetlands delineated: 1 Ramsar site (Dinder wetland at the border between Sudan and Ethiopia) since 2005, 3 IBA’s with 1 wetland having a medium threat score.
» Agriculture plays a central role in the Ethiopian economy, where about 85% of all employment relies on, mainly small-scale farmers working with rain-fed mixed farming exist. Crop production accounts for about 60% of the agricultural outputs.
» Major uses are irrigated agriculture, farming, intensive grazing, fishery, energy production, commercial navigation, eucalyptus plantations, leather tanning.
» Hotspots are draining of wetlands, fire clearance, deforestation, water abstraction and pollution, waste dumping.
» Impacts include erosion, sedimentation, water level reduction, excessive flooding of the wetlands, competition for water resources, pollution of water sources and introduction of alien species.
The wetland area of the Blue Nile Sub-basin has a proportion of 1.4% to the 313,861 sq.km large sub-basin. The majority of the ~4500 sq.km large wetland area is permanent (82%).

The Blue Nile and its main tributaries, Dinder and Rahad rivers, flow out of Lake Tana in the central Ethiopian highlands towards the Northwest until the confluence with the White Nile at Khartoum (Sudan).

In contrast with the White Nile profile, the Blue Nile flows through a very steep area so its flow is torrential, and the discharge contribution of the Blue Nile system is about twice that of the White Nile system (Dumont, 2009; NBI, 2017).

The sub-basin stretches south to north, from humid to semi-arid conditions from a Sudanese savanna to the Sahelian acacia savanna ecoregion.
The Lake Tana wetlands (#58) occur in the northern highlands of Ethiopia and are the source of the Blue Nile. Lake Tana is Ethiopia’s largest lake (Hughes & Hughes, 1992; Menbere & Menbere, 2018; Vijverberg et al, 2009) and contains about half the country’s freshwater.

After receiving water from various tributaries such as the Dinder, the Dabus and Rahad the Blue Nile connects to the Main Nile close to Khartoum in Sudan. With 55 billion m³, the Blue Nile contributes 60% of the combined flows of all Nile tributaries.

The discharge of the Blue Nile is highly seasonal, with peak flows in the one rainy season between July and September. During this period ~ 70% of the Blue Nile flow occurs (NBI, 2016).

The Dinder River is a tributary to the Blue Nile in the lower part of its course in Sudan. The Dinder wetlands (#55, Mayas) are located in the floodplain between the Dinder and Rahad rivers in Sudan. Maximum rainfalls occur over the southern tributaries of the Blue Nile, in the highlands with more than 1,200 mm per year. During the wet season, the inflowing rivers carry heavy loads of suspended silt into the lake, thus increasing the turbidity of the lake’s water.

The suspended sediments reduce the below water light intensity and as such the primary production, the basis of the food web (Vijverberg et al., 2009).

Closer to the confluence of Blue and White Nile the annual rainfall decreases to < 400 mm. The average annual potential evapotranspiration is 1,760 mm per year (NBI, 2016).

Mayas: The seasonal wetlands are back swamps, formed due to the meandering of the river, erosion and deposition processes. They are a unique ecosystem of the Dinder National Park, in Sudan. During the dry season from November to June, the Mayas are the main source of food and water for wildlife (Hassaballah et al., 2018; Mahgoub & Riak; Nile Eco VWU, 2016; Rebelo & McCartney, 2012).
**Wetland sites in the Blue Nile Sub-basin**

- **WETLAND SITES**
  - 55 Dinder Floodplain
  - 56 Lake Tana
  - 57 Fincha-Chomen
  - 58 El Roseires
  - 59 Sennar

**Water level of Lake Tana**

- **Country**
- **Sub-basin**
- **City**
- **Water body**
- **River**

**Wetland Cover**
- Permanent wetland
- Seasonal wetland

**Wetland Classification**
- Ramsar Site
- Transboundary
- Ramsar Site Transboundary

**Water Levels [m]**

- **Water Level (Altimetry, SGD)**
- **Water Level (Altimetry, SGD)**

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During the rainy season, the surrounding swamps (#58) relate to the main lake, and act as nurseries for most fish populations in the lake (Vijverberg et al., 2009). Fishing at the mouths of the tributaries while fish migration for spawning occurs is a threat to these fish (Hughes & Hughes, 1992; McKee, 2007).

This biodiversity hotspot provides nesting, breeding, and feeding sites for globally threatened and migratory birds. A winter bird count for just Lake Tana exceeded 150,000 (Menbere & Menbere, 2018). The wetlands are the home of the Fogera cattle which have broad hoofs as an adaptation to moving in marshes.

The shoreline Cyperus papyrus (papyrus), vegetation has dramatically declined in its distribution with some local extinction due to overexploitation (Degaga, 2018; Menbere & Menbere, 2018; Vijverberg, et al 2009). Some of the 17 endemic fish species of Lake Tana include Garra regressus, G. tana and Barbus tanapelagius (Shkil et al., 2017). The transboundary Dinder floodplain (#55) is a protected area as part of the Dinder National Park (DNP). This park preserves a natural wildlife migration corridor between Sudan and Ethiopia (ENTRO, 2009) and is very rich in biodiversity.

Mammal flagship species include Aonyx capensis (African Clawless Otter), Hippopotamus amphibius (hippopotamus), and Syncerus caffer (African buffalo). The populations of migrant grazers such as Damaliscus corrigumtiang (Tiang antelope), and Kobus ellipsiprymnus (Waterbuck) are under pressure as land outside the park across has been converted to farmland.

The Dinder floodplain occurs within the migration route of the African wintering birds. The world’s largest population of Numida meleagris (tufted Guinea fowl) occurs with the Dinder (Nile-Eco-VWU). Some fowl species are also an important source of food for the local people (Nile-Eco-VWU).
Wetland population in the Blue Nile Sub-basin

Number of people per grid square

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<th>6-25</th>
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<th>51-100</th>
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<th>251-500</th>
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Ecosystem services of wetlands in Blue Nile Sub-basin

The Lake Tana wetland (#58) provide raw materials as firewood, medical flora and fauna, hydroelectricity and transport possibilities. The wetlands offer habitat for wildlife and the human population also makes use of the fishing resources. Some species are preferred over others (like Barbus over catfish) for cultural and religious reasons.

Lake Tana wetlands also provide area for crop cultivation and fresh water for agriculture and cattle. People also use it for transportation (Agimass & Mekonnen, 2011). Regulating services, like waterflow regulation and water purification, are also important and are being lost due to wetland conversion and loss of plant cover, increasing the silt inflow into the lake (Agimass & Mekonnen, 2011).

Other potential ecosystem services of Lake Tana are natural hazard and climate regulation, soil formation, nutrient cycling, and recreational and educational values.

The main provisioning services of the Dinder wetlands (#55) are fresh water, farmland along the riverbanks, food, timber, and non-timber forest products (Nile-Eco-VWU).

The main crops cultivated in the Dinder area are sorghum, sesame, beans, pumpkins, okra, cucumber, maize and groundnuts. The Mayas provide resources for rope making, bed making, fishing and capturing birds in ponds (Nile-Eco-VWU, 2016).

These wetlands are an important source of water and nutritious grasses for livestock, particularly during the dry season (Rebelo & McCartney, 2012). They provide important regulating services like air quality regulation, water purification and regulation, climate and erosion regulation, soil formation, pollination, biological control, and nutrient cycling.

The DNP is also an important area for recreation and education opportunities (Nile-Eco-VWU).
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Dinder wetlands

As a result of population increase, more land is needed for agricultural production in the Blue Nile Basin. Hence, forests, woodlands and shrublands are cleared. Woodland is additionally used for fuelwood production (ENTRO, 2009).

Riverbank erosion, especially along the Blue Nile is accelerated due to excavation of soil for brick making and removal of trees along the banks (ENTERO, 2009).

Sedimentation due to agricultural loss in the reservoir can lead to high losses in storage capacity. In wetlands, sediment accumulation can impact species richness and composition, influence soil properties and topography (Wang et al., 2014).

Even though the Dinder floodplains lie mostly in the Dinder National Park, Sudan, where cattle grazing is not allowed, there are considerable incursions of livestock into the park (ENTRO, 2009).

Traditional cattle herders are being displaced from their traditional grazing lands by the expansion of crop agriculture and growing population around the Dinder National Park. These herders then graze their cattle within the national park despite the risk of having half of their herd confiscated.

The causal effects are overgrazing within the national park and outbreaks of rinderpest particularly among buffaloes and tiang (Mahgoub & Riak; Nile-Eco-VWU, 2016).
Major hotspots

- During dry season, new gained areas due to lake level drop lead to extended agricultural land use
- In consequence, deforestation, erosion, sedimentation, water level reduction, flooding of the wetlands, competition for water resources, pollution of water sources and introduction of alien species may occur.

Major potentials

- Lake Tana wetlands are located in the UNESCO Lake Tana Biosphere Reserve
- provide valuable resources
- Lake Tana is Ethiopia's largest lake and contains about half the country's freshwater, nurseries for fish populations, breeding areas for birds and mammals
- Dinder National Park, preserving a natural wildlife migration corridor between Sudan and Ethiopia, provides habitat for wildlife and hosts endangered species

Management initiatives

- The Biodiversity, Wetlands, and Water Quality of the Lake Tana Sub Basin, 2009, NTEAP, NBI
- Status of Wetlands and Biodiversity in Ethiopia, 2009, NBI