Wetland situation analysis for Malawi – Implications for livelihoods, biodiversity management and key ecosystem services

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by

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Presentation Outline

- Overview, classification and status of wetlands in Malawi
  - Definition and overview
  - Wetland classification
  - Wetland status
- Implications for livelihoods
  - Economic
  - Social
- Implications for biodiversity management
  - Wetland biodiversity
  - Critical issues of wetland management impacting biodiversity
- Implications for key ecosystem services
  - The variety of wetland ecosystem services
  - Maintenance of ecosystem health and sustainability issues
- Conclusion

What is a Wetland? …(1)

DEFINITION (1)

Under the Ramsar Convention (1971) wetlands are defined as:

- “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres”

Source: C.M. Breen et al.(1997), IUCN Wetlands Programme

What is a Wetland? …(2)

DEFINITION (2)

The United States Fish and Wildlife Service definition considers wetlands as:

- “lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water”

- Source: C.M. Breen et al.(1997), IUCN Wetlands Programme

The Ramsar mission

- The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

Types of wetlands covered in the Ramsar mission

- lakes and rivers
- swamps and marshes
- wet grasslands and peatlands
- oases
- estuaries
- deltas and tidal flats
- near-shore marine areas
- mangroves and coral reefs, and
- human-made sites (such as fish ponds, rice paddies, reservoirs, and salt pans).

Overview of wetlands in Malawi (1)

- LAKES AND RIVERS
- SWAMPS AND MARSHES
- WET GRASSLANDS AND PEATLANDS
- oases
- estuaries
- deltas and tidal flats
- near-shore marine areas
- mangroves and coral reefs, and
- HUMAN-MADE SITES (SUCH AS FISH PONDS, RICE PADDIES, RESERVOIRS, AND SALT PANS).

Overview of wetlands in Malawi (2)

- Wetlands and other aquatic ecosystems cover about 20% of Malawi's surface area.
- List of potential sites for designation as Ramsar sites:

  <u>Permanent Freshwater Lakes/Storage Areas</u>
  - Lake Malawi (24, 504 km^2)
  - Lake Chilwa (About 2,400 km^2 : open water (680 km^2), *Typha* swamp (600 km^2), marsh (390 km^2, floodplain grassland (580 km^2))
  - Lake Malombe (390 km^2)

  <u>Permanent Freshwater Marshes/pools</u>
  - Mpatsanjoka Dambo (300 km^2)
  - Salima lakeshore plain wetlands (165 km^2), has 11 marshes
  - Nkhota-kota lakeshore lowland wetlands (Unaka Lagoon; Bana Swamp (Bana lagoon, an area of 150 km^2); Dzenza Swamp (28km^2); Chia Lagoon (an area of 11.2 km^2)
  - Limphasa dambo wetlands (120-130 km^2)
  - Ntakataka/… Wetlands
  - Karonga Lakeshore plain wetlands (11 swamps and dambos)
  - Elephant Marsh
  - Ndindi Marsh
  - Mpoto Lagoon
  - Vwaza Marsh
  - Marshes of Chitipa
  - Rungwenya
- Other Wetlands
  - River basins

Wetland classification

Main types of Wetlands …(1)

- **Riverine systems**:
  - Include the freshwater channel and adjacent wetland areas, e.g floodplain and swamps.
  - Perennial rivers: flow throughout the year
  - Intermittent rivers: flow during the rainy season
  - Ephemeral rivers: flow after high rainfall
  - Riverine systems are the primary ecological zones of the inland waters of Malawi

Main types of Wetlands …(2)

- **Floodplains**:
  - Areas of periodic flooding, situated between the river channel and valley sides
  - Although they can be wooded, herbaceous or mixed, they are predominantly herbaceous
  - Wooded floodplains are common in narrow river valleys
  - Floodplains are very much relied upon by local communities for agriculture, fisheries and wildlife
  - Many floodplains are of international importance as they typically have high biological diversity

Main types of Wetlands …(3)

- **Swamps:**
  - Wetlands which develop in the still water areas around lake margins, and in parts of floodplains
  - They may include forest species but are more typically dominated by reeds (*Phragmites* sp.), cattail (*Typha* sp.), and papyrus (*Cyperus papyrus*)
- **Marshes**:
  - Have little or no standing water between vegetation.
  - Thus the term “swamp” usually refers to all area commonly described as marsh and herbaceous or woody swamp; however, both swamps and marshes are well represented in southern Africa. They both depend on permanent shallow water for their development and maintenance.

Main types of Wetlands …(4)

- Palustrine systems:
  - Regarded as freshwater habitats occurring around ponds, springs or headwaters, and can be herbaceous or forested, e.g dambos
  - Dambos are defined as any permanently or seasonally wet land in valleys, depressions, or floodplains with open herbaceous vegetation, mainly grasses and sedges, and an absence of trees.
  - Dambos are classified according to:
    - **Drainage** (Headwater dambos; Stream or River dambos; Residual dambos) **;**
    - **Seasonality**;
    - **Vegetation** (Sour dambos; Sweet dambos)
  - Dambos are intensively used for dry season agriculture, grazing, and water supply for domestic purposes.
  - They are generally small is size and are considered extremely vulnerable to poor agricultural practices.

Main types of Wetlands …(5)

- Lacustrine systems:
  - Typically situated in topographic depressions or dammed river channels. The larger systems occur along the Great Rift Valley.
  - Categories of Lacustrine systems in the region:
    - **Large fresh water lakes**
    - Alkaline lakes e.g. Eyasi & Manyara (Tanzania); Etosha Pan (Namibia); Makgadikgadi (Botswana) – in arid and semi-arid zones with high evaporation, and/or lakes that are very shallow with limited inflow
    - Volcanic or crater lakes e.g. Ngorongoro & Ngurdoto (Tanzania)
    - **Impoundments** e.g. Kariba, Cabora Bassa etc – the largest group, being utilised for hydroelectric power and irrigation

Wetlands Status

International Status of Wetlands in Malawi

- The Ramsar Convention:
  - 1997: Lake Chilwa wetland designated a Ramsar Site
- Biosphere Reserve
  - At their 19th session, held at UNESCO Headquarters in Paris from 23 to 27 October 2006, the MAB's International Coordinating Council designated Lake Chilwa Wetland as a Biosphere Reserve.
- World Heritage – UNESCO
  - Lake Malawi National Park

Why should we be concerned about wetlands? (1)

- Aquatic ecosystems are critical elements of Earth's dynamic processes and essential to human economies and health.
- Wetlands connect land and water, serving as natural filters, reducing pollution, controlling floods, and acting as nurseries for many aquatic species. Rivers, lakes, and estuaries serve as important transportation, recreation, and wildlife hubs.
- Two percent of fresh water is locked in snow and ice, leaving less than one percent for us.
- Freshwater ecosystems cover less than one percent of Earth's surface, but are home to 35 percent of all vertebrate species.
- Industry and agriculture are concentrated alongside flowing waters, and sooner or later the residue of virtually everything we do winds up running down the nearest creek—if we haven't dried up the creek first.

Source: National Geographic, September 2014 (Water: Special Issue).
http://ngm.nationalgeographic.com/2010/04/table-of-contents/

Why should we be concerned about wetlands? (2)

- Lakes, swamps, and rivers make up less than 0.3 percent of fresh water and less than .01 percent of all the water on Earth.
- Yet these waters are home to as many as 126,000 of the world's animal species, including snails, mussels, crocodiles, turtles, amphibians, and fish.
- Almost half the 30,000 known species of fish live in lakes and rivers, and many aren't doing well.
- Freshwater animals in general are disappearing at a rate four to six times as fast as animals on land or at sea.

Source: National Geographic, September 2014 (Water: Special Issue).
http://ngm.nationalgeographic.com/2010/04/table-of-contents/

Lake Chilwa waterfowl…(1)

- 164 bird species
  - 41% are palearctic migrants
  - 14% intra-African migrants
- 1.5 million resident and migratory birds altogether

Lake Chilwa waterfowl(2)

- The wetland is a breeding ground and a resting and feeding station along an important flyway to southern Africa

Wetland functions

Fishing

Grazing

Wetland functions

Transport

Biodiversity

Wetland functions

Agriculture (rice)

Dimba garden

Implications for Livelihoods

Basis for livelihoods

- Wetlands give life-sustaining services to people.
  - important sources of drinking water,
  - Food (rice, maize, sorghum, millet, beans, cassava and sweet potatoes)
  - irrigation for crops
  - highways for transportation, commerce and
  - sources of energy.

- For poor rural households who are short of food, wetlands often offer good soils as well as water for irrigation, so that cultivation can take place in the dry season. In this way wetlands can provide a safety net for poor households.

- The clearing of native vegetation for forestry plantations and the draining of wetlands for expansion of cattle grazing is severely impacting wildlife, fisheries and wetlands.
- The loss of traditional livelihoods as a result of wetland degradation has increased rural poverty.

- Climate change is impacting water cycles. In some dry regions, declining precipitation is reducing runoff and water flows.

- Encouraging technologies:
  - Small-scale aquaculture and the possibility of ponds acting as a focal point for improving natural resource management – the dimba-pond systems with emphasis on vegetable production.
  - The integrated rice, fish and vegetables has boosted the food and cash production of households.

Way forward

- Enhancing the capacity of rural communities to sustainably manage natural resources and improve household income from sales of natural resource-based products.
- Working extensively with community based organizations where communities can see immediate benefits through diversified livelihood sources, food availability and activities that promoted natural resources management.
  - e.g Community Partnerships for Sustainable Resources Management (COMPASS) which was concluded in 2009
  - Other NGOs

Source: Kosamu, Ishmael B. M., Wouter T. de Groot, Patrick S. Kambewa and Geert R. de Snoo (*2012).* Institutions and Ecosystem-Based Development Potentials of the Elephant Marsh, Malawi. *Sustainability 4: 3326-3345*

Implications for biodiversity management

Maintaining biodiversity

- There are many justifications for conserving biodiversity including five types of positive arguments: *economic, indirect economic, ecological, aesthetic* and *ethical*
- Wetlands provide critical habitat for fish and other freshwater animals such as amphibians and molluscs. Thousands of species rely on healthy water flows for their survival.

Examples of use of biodiversity

- Papyrus and reeds grow thickly in some wetlands and are used locally to make mats, hats, chairs, thatch, granaries, baskets and fishing gear,
- Papyrus is also used as a lining for coffins. Lily bulbs (locally known as *nyika* in Elephant Marsh) are sometimes eaten for carbohydrates especially in years of poor crop harvest. Value addition, crafts development plus urban and tourist marketing may promote the livelihood of the locals and enhance their motivation to protect the ecosystem.

  (Source: Kosamu, Ishmael B. M., Wouter T. de Groot, Patrick S. Kambewa and Geert R. de Snoo (*2012).* Institutions and Ecosystem-Based Development Potentials of the Elephant Marsh, Malawi. *Sustainability 4: 3326-3345)*
- Medicinal value

Implications for key ecosystem services

Ecosystem services

- Ecosystems perform services beyond production of food, fiber, fuel and income such as:
  - recycling of nutrients
  - control of local microclimates
  - regulation of local hydrological processes
  - regulation of the abundance of undesirable organisms
  - detoxification of noxious chemicals.

Wetland ecosystem services

- Wetlands are important for many ecosystem services, such as fisheries, agriculture, livestock grazing, (eco) tourism, water supply, water purification, carbon sequestration, wildlife goods, natural products, biodiversity, recreation, and transport.
- Quite often however, wetlands are subjected to a development paradigm that maximizes the one or two ecosystem services for which markets are readily available, such as cash crop production.

(Source: Kosamu, Ishmael B. M., Wouter T. de Groot, Patrick S. Kambewa and Geert R. de Snoo (*2012).* Institutions and Ecosystem-Based Development Potentials of the Elephant Marsh, Malawi. *Sustainability 4: 3326-3345)*

Threats to ecosystem services

- A ‘good’ wetland - a wetland that provides high biodiversity, as well as high nitrogen and phosphorus retention.

  (Source: Lars-Anders Hansson, Christer Bro¨ Nmark, P. Anders Nilsson and Kajsa Abjo¨ Rnsson. Conflicting demands on wetland ecosystem services: nutrient retention, biodiversity or both? *Freshwater Biology* (2005) 50, 705–714.)

- However, there are rising pressures such as overexploitation and agricultural conversion which are mainly driven by population growth, rural poverty, climate change and market growth.
- Initiatives for wetland protection include restoration of river banks.

Threats to ecosystem services

Factors affecting aquatic ecosystem health

- A wide range of human activities can impact on aquatic ecosystems, such as:
  - point source discharges (for example, from factories or sewage treatment works)
  - non-point source runoff from agriculture, urban or mining areas
  - alteration of channel characteristics via sedimentation or siltation
  - changes in the stream flow regime through dams or diversions
  - removal of riparian zone vegetation
  - introduction of exotic or alien species

Threats to ecosystem services

- Wetlands offer the opportunity of growing a second harvest and it has become the policy of many African countries to use them more.
- There is a danger of over exploitation leading to the water drying up and a decline in crop production.
- In addition the ecology could change meaning fewer wildlife species and a decline in other products like reeds and grasses used to thatch homes.

Conclusion

- Wetlands are experiencing increasing pressures from population growth, poverty, overexploitation, changing climate and agricultural conversion.
- Polluter-pays principle should be intensified
- Payment for ecosystem services: planning for both use of wetland resources and maintenance of the catchment
- Working with communities throughout to devise readily acceptable solutions