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Rahman Ahidur

Department of Geography,
Poona College of Arts, Science &
Commerce Camp, Pune,
Maharashtra, India

Study of biotic community in and around Tamaranga (beel) wetland: A case study of Bongaigaon district, Assam, India

Rahman Ahidur

Abstract

Wetlands are one of the crucial natural resources. It is increasingly realized that the planet earth is facing grave environmental problems with fast depleting natural resources and threatening the existence of most of the ecosystems. The present investigation reveals that some biotic community are going to deplete in and around the Tamaranga beel of Bongaigaon district, Assam, India. Tamaranga (beel) wetland is situated 26° 19'08''N latitude and 90°34'19''E longitude in Bongaigaon district of Assam, covering an area of 627 ha. It is one of the inland natural wetlands. The average annual rainfall is 3000mm. with maximum and minimum temperatures of 36 °C and 7 °C respectively. The present study reveals that some species of plants and animals are going to deplete due to the reclaimed for construction of houses, roads, agricultural land, degrading in nature due to the effect of human activities.

Keywords: Wetland, Biotic community, Degrading, Tamaranga, Assam

Introduction

Wetlands are unique ecosystems which provide water and habitat for a diverse range of plants and animals. The wetlands are sometimes described as “the kidneys of the landscape” for their functions they perform in hydrological and chemical cycles and as downstream receivers of wastes from both natural and human sources (Mitch and Gosselink, 1986) ^[16]. At present Assam has an estimated area of 7, 64,372 ha under wetlands which is about 9.74 percent of the state’s geographical area. The majority (about 84%) of these wetlands are formed by rivers and streams and riverine wetlands Ramsar convention is the first modern global intergovernmental treaty on conservation and wise use of natural resources (www.ramsar.org). Ramsar convention entered into force in 1975. Under the text of the Convention (Article 1.1) wetlands are defined as: “areas of marsh, fen, peat-land 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 meters”. In addition, the Convention (Article 2.1) provides that wetlands: “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands”.

Wetlands locally known as beels are the most common and integral features of the fluvial landscape of Assam. The wetlands are on the floodplains of the rivers Brahmaputra and Barak and their tributaries. There are large number of beels, swamps and marshes, locally known as *jalah*, *doloni*, *hola* and *pitoni*. All these water bodies comprise a vast sheet of water with varying shape, size and depth with rich flora and fauna.

Materials and methods

The present study is focusing on aquatic and terrestrial flora and fauna are decreasing in number due to human interventions in Tamaranga beel of Bongaigaon district of Assam, India. The study is based on primary and secondary data collected from various sources such as Journals, Books, and other published work. The Tamaranga (beel) wetland is selected for the study of physiography, biodiversity, use for human welfare in different role in functioning of ecosystem, landscape like cycling of carbon, water and nutrients, water purification, regulation of flow, support migration of birds, climate control, reducing extreme events like, flood, droughts etc. During the course of study it is also observed that fishing and transportation are the two foremost contributions of these areas to human settlements around them. They also provide fodder for domestic cattle and aquatic eeds such as giant water lily.

Correspondence

Rahman Ahidur

Department of Geography,
Poona College of Arts, Science &
Commerce Camp, Pune,
Maharashtra, India

Observation

Physiography

Tamaranga-Dalani-Bhairab Complex includes the wetlands of Tamaranga, Konora, Paropota and Dalani, and an isolated hillock, Bhairab Pahar, in western Assam. Tamaranga (beel) wetland is situated 26° 19' 8" N, 90° 34' 19" E longitude in Bongaigaon district of Assam, covering an area of 627 ha. It is one of the inland natural wetlands. It is an important freshwater (beel) wetland. The nearby Bhairab Reserve Forest is rocky hillock, part of an Archaean plateau, covered with degraded Tropical Moist Deciduous Forest dominated by *Sal Shorea robusta* and Bamboo brakes. The average annual rainfall is 3000mm. with maximum and minimum temperatures of 36 °C and 7 °C respectively. It is hot in summer. Bongaigaon summer highest day temperature is in between 28° C to 40° C and in winter it is 7 °C to 22 °C.

Faunal & Floral diversity

The beel attracts many migratory birds and is a good breeding ground for resident aquatic avian fauna. Some of the important bird species found in this wetland are Oriental White-backed Vulture (*Gyps bengalensis*), Slender-billed Vulture (*Gyps tenuirostris*), Greater Adjutant (*Leptoptilos dubius*), Lesser Adjutant (*Leptoptilos javanicus*), Baer's Pochard (*Aythya baeri*), Pallas's Fish-Eagle (*Haliaeetus leucorhynchus*), Darter (*Anhinga melanogaster*), Ferruginous Pochard (*Aythya nyroca*), etc.

More than 150 bird species are known to occur in this Complex. More than 20,000 waterfowl are reported regularly in winter. The nearby Bhairab Pahar harbours an important population of the Golden Langur and Gaur. The surrounding forest is Tropical Moist Deciduous, dominated by *Sal Shorea robusta*. The adjacent area is used for agriculture. Water Hyacinth *Eichhornia crassipes* is the major weed. Wherever this pernicious weed is not found, submerged and emergent plants are observed.

The Tamaranga beel is also used for fishing. Fishing is the main activity of the people living around the wetland. The wetland is being overexploited for fishing. As a result some species of fish like *Botia (Botia dario)*, Chital (*Notopterus chitala*), Chanda (*Chanda nama*), Aari (*Aoerichthys seenghala*), Kawoi (*Anabus testudineus*), Kholihona (*Calisa lalia*), etc. are going to deplete.

Use for Human Welfare

Landscape position affects the amount and source of water in a wetland. For example, wetlands that are near a topographical height, such as a mountain bog, will not receive as much runoff as a marsh in a low area amidst fields.

This wetland is important for bird habitats and uses them for breeding, nesting rearing young. It also supports fish, reptiles, aquatic vegetation etc. Both these features make the wetland a biodiversity hot spot and need a systematic conservation strategy. This help in maintaining the pollution free environment and balanced ecosystem. This is also the source of fish production in the area and mainly helpful for fishing activity.

Practice of agriculture in the wetland during winter season and lack of adequate sanitary facilities which leads pollution level increase due to which some aquatic vegetation is decreasing like Hydrilla, *Sagittaria Sagittifolia*, *Trapa natans*, etc. Some migratory bird species like Ferruginous Duck *Aythya nyroca*, Baer's Pochard *A. baeri* are threatening

mainly due to human being. Gradually the migratory birds are also decreasing in number due to unavailability of enough habitats.

Tamaranga (beel) wetlands also help in maintaining and improving the water quality of Bongaigaon district's streams, rivers, lakes, and estuaries. It also helps in water supply for domestic purposes and irrigation for agricultural field to the surrounding area of wetlands.

Role in Ecological balance

Since wetlands are located between uplands and water resources, many can intercept runoff from the land before it reaches open water. As runoff and surface water pass through, wetlands remove or transform pollutants through physical, chemical, and biological processes. As a result, pollution is less in and around the Tamaranga (beel) wetlands.

Nitrous oxides, sulfurous oxides, pesticides, hydrocarbons, radionuclide, and other organic and inorganic are released into the atmosphere by surrounding industries. Agricultural fields and vehicles are also contributing different pesticides, carbon dioxide and entering the wetlands through wet and dry atmospheric deposition and can adversely affect aquatic organisms and the terrestrial organisms that feed on them.

Results and Discussion

During the course of study it is observed that both flora and fauna are decreasing in number; especially some migratory bird species like Ferruginous Duck (*Aythya nyroca*) fauna like water hyacinth (*Eichhornia*), water lily etc.

Wetland ecosystems support diverse and unique habitats and are distributed across various topographic and climatic regimes. They are considered to be a vital part of hydrological cycle and are highly productive systems in their natural forms. Wetlands not only support large biological diversity but also provide a wide array of ecosystem goods and services (Wetlands Rules, 2010). The Tamaranga (Beel) wetland provides multiple services, including irrigation, domestic water supply, freshwater fisheries and water for recreation. Jhingram (1993) ^[2] opined that the wetlands are the world's most threatened habitats due to accelerated drainage, land reclamation, pollution and over-exploitation of wetland species. Classifying wetlands as wastelands should be avoided as wetlands play an important biological, cultural, economical, aesthetic and spiritual role (Asad Rahmani, BNHS Director). They are also playing important role in groundwater recharge, flood control, carbon sequestration and pollution abatement. Protection of wetlands will help control floods and recharge the ground water levels across the country (Asad Rahmani, BNHS Director). Global climate change is expected to become an important driver of loss and change in wet-land ecosystem (MEA, 2005; UNESCO, 2007). It is expected that changes in temperature and precipitation will alter ground water recharge to aquifers, causing shifts in water table levels in unconfined aquifers as a first response to climate trends (Changnon *et al.* 1988; Zektser and Loaiciga) ^[3]. This activity may have a considerable impact on wetland systems that are ground water driven where a change of less than one foot in the surficial water table elevation can significantly impact a wetland. Though wetlands contribute about 40% of global methane (CH₄) emissions, they have the highest carbon (C) density among terrestrial ecosystems and relatively greater capacities to sequester additional carbon dioxide (CO₂) (Pant *et al.*, 2003). Herpetologist Dr. Firoz

Ahmed, who is familiar with a number of wetlands feel that a large number of wildlife, including amphibians will be seriously endangered with degradation of wetlands (The Assam Tribune, April 18, 2012). A number of fish species, such as *Puntius jerdoni*, *Begarius bagarius* and *Semiplotus semiplotus* are on the verge of extinction (Dubey and Ahmed 1995) ^[17]. However, management of wetlands has received inadequate attention in the national water sector agenda. As a result, the wetlands in urban and rural areas are subject to anthropogenic pressures, including land use changes in the catchment, pollution from industry and households; encroachments; tourism; and over exploitation of their natural resources.

Wetlands are among the most productive ecosystems in the world (Mitsch and Gosselink 1993). Immense varieties of species of microbes, plants, insects, amphibians, reptiles, birds, fish, and other wildlife depend in some way on wetlands. Flora of wetland provides breeding and nursery sites, resting areas for migratory species, and refuge from predators (Crance 1988). Decomposed plant matter (detritus) released into the water is important food for many invertebrates and fish both in the wetland and in associated aquatic systems (Crance 1988).

Climate control is another hydrologic function of wetlands. Many wetlands return over two-thirds of their annual water inputs to the atmosphere through evapotranspiration (Richardson and McCarthy 1994). Wetlands play an important role in flood control. Wetlands help to lessen the impacts of flooding by absorbing water and reducing the speed at which flood water flows. Further, during periods of flooding, they trap suspended solids and nutrient load. Thus, streams flowing into rivers through wetlands will transport fewer suspended solids and nutrients to the rivers than if they flow directly into the rivers. In view of their effectiveness associated with flood damage avoidance, wetlands are considered to be a natural capital substitute for conventional flood control investments such as dykes, dams, and embankments (Boyd and Banzhaf, 2007).

In a world of global climate change, wetlands are considered one of the biggest unknowns of the near future regarding element dynamics and matter fluxes (IPCC 2001; Paul *et al.* 2006). Pressures on wetlands are likely to be mediated through changes in hydrology, direct and indirect effects of changes in temperatures, as well as land use change (Ferrati *et al.* 2005).

Herpetologist Dr. Firoz Ahmed, who is familiar with a number of wetlands feel that a large number of wildlife, including amphibians will be seriously endangered with degradation of wetlands (The Assam Tribune, April 18, 2012). Water in most Asian rivers, lakes, streams and wetlands has been heavily degraded, mainly due to agricultural runoff of pesticides and fertilizers, and industrial and municipal wastewater discharges, all of which cause widespread eutrophication (Liu and Diamond, 2005; Prasad *et al.*, 2002) ^[9, 11]. Wetlands are polluted through agricultural runoff and discharge of untreated sewage and other waste from surrounding areas. Runoff from agricultural fields is the major source of non-point pollution for the Indian rivers flowing through Indo-Gangetic plains (Jain *et al.*, 2007a,b) ^[7]. Eutrophication can reduce or eliminate fish populations (Verhoeven *et al.*, 2006) ^[13]. Under normal conditions, wetlands do retain pollutants from surface and sub-surface runoff from the catchment and prevent them from entering

into streams and rivers. This adversely affects the wetland water quality and its biodiversity. Results from monitoring of Indian aquatic resources also show that water bodies, such as rivers and lakes, near to urban centres are becoming increasingly saprobic and eutrophicated due to the discharge of partly treated or untreated wastewater (Central Pollution Control Board, 2010).

Global climate change is expected to become an important driver of loss and change in wet-land ecosystem (MEA, 2005; UNESCO, 2007) ^[12].

Conclusion and Recommendations

As like the other wetlands of the state the Tamaranga beel experience the most dramatic changes in the biotic community. The existence of these unique resources in this region is under threat due to various developmental activities and human population pressure. From the present observation it can be concluded that encroachment, siltation, surface runoff, carrying fertilizer from agricultural field, degradation of water quality affect the biotic community badly. It is considered opinion that if the depletion continues in such way then in near future biotic community will drastically decrease; as a result human being will be affected. Therefore, restoration of the beel is very much important for maintaining the biodiversity. This calls for a long term planning for preservation and conservation of these resources.

From the above study it is clear that biotic communities in and around wetland should be protected and states and **local governments** occupy perhaps the best position to take the lead on wetland protection because they are more aware of and responsive to local needs.

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