

Conservation of High Altitude Wetlands in Arunachal Pradesh

K. S. Jayachandran

Deputy Conservator of Forests (Biosphere Reserves & Ecotourism)
Department of Environment & Forests, Government of Arunachal Pradesh, Itanagar
Email: mailto:kc@rediffmail.com

Introduction

The state of Arunachal Pradesh (26° 40' - 29° 27' N, 91° 35' - 97° 24' E), which is the land of the 'dawn-lit mountains', is a thinly populated and mountainous tract on the easternmost part of India. It is surrounded on three sides by the international border; Bhutan to the west, China to the north and Myanmar to the east. The state of Assam lies to the south. The total geographical area of the state is 8.37 million ha, which is 2.5% of the land area of the country. Being part of the Eastern Himalayas, the state is mostly hilly and mountainous. The bulk of the land area is still covered by forests and high altitude grasslands and a major proportion is still in its natural state.

Wetlands are the most precious life sustaining water resources, playing a crucial role in the hydrological cycle, becoming the most productive ecosystems of the world and a potential source of carbon sequestration, although they account only for about 4% of the earth's ice-free land surface (Panigrahy *et al.*, 2012). IUCN identified a total of 39 categories of wetlands of which 30 are natural wetlands and nine man-made. In it there are seven landscape units viz., estuaries, open coasts, flood plains, freshwater marshes, lakes, peatlands and swamp forests. High Altitude wetlands are an important category of wetland found in the higher reaches of the Himalayas in Arunachal Pradesh. "High-altitude wetland is a generic term used to describe areas of swamp, marsh, meadow, fen, peatland or water located at an altitude above 3000 m, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or saline. In general, high-altitude wetlands are areas located at altitudes between the continuous natural forest border and the permanent snowline" (Chatterjee *et al.*, 2010).

Inventorisation of Wetlands

The Ministry of Environment and Forests constituted an Expert Group in 1983 for compiling information on the ecological status of wetlands in the country. Earlier to this in 1972, a survey had been initiated to collect some basic information which was subsequently updated. Based on the analysis of the responses, the Directory of Wetlands in India was published in 1990 by the Ministry of Environment & Forests.

The first scientific national inventory of wetlands in the India carried out at 1:250,000 scale by Space Applications Centre (ISRO), Ahmedabad at the behest of the Ministry of Environment and Forests (MoEF), Govt. of India, using IRS satellite data (1992-93 timeframe) put the total wetland extent at about 8.26 million ha. The inventory did not list any of the high altitude lakes in Arunachal Pradesh, though it has shown that there are a sizable fraction of small wetlands in the country. The numerous small wetlands are of great significance for local level management of hydrology. Thus, inventory at 1:50,000 scale was felt essential which would enable mapping of wetlands above the size of 2.25 ha area.

'National Wetland Inventory and Assessment' (NWIA) was thus done at 1:50,000 scale by Space Applications Centre in 2011, sponsored by the Ministry of Environment & Forests, Government of India using advanced techniques like satellite remote sensing and Geographic Information System (GIS) in acquiring and creating accurate and timely spatial database of large areas. All wetlands lying above 3000 m elevation were designated as high altitude wetlands and small lakes (<2.25 ha area) were also mapped as point features and

Table No.1 High altitude lakes in Arunachal Pradesh

Sl. No.	Class	Range	No. of lakes	Area in hectares
1	Very Large	>500 ha	0	0
2	Large	100-500 ha	3	363
3	Medium	25-100 ha	77	3170
4	Small	10-25 ha	251	3916
5	Very Small	<10 ha	900	3974
6	< 2.25 hectares		441	441
	Total		1672	11863

(Source: National Wetland Inventory and Assessment, 2011)

assigned 1.0 ha nominal area.

In Arunachal Pradesh, 2653 wetlands have been identified and mapped at 1:50,000 scale including 119 wetlands which are smaller than 2.25 ha. Total wetland area estimated is 154609 ha, which is around 1.91 per cent of the geographic area of the state. The major wetland types are river/stream accounting for 86 percent of the wetlands (134244 ha), followed by high altitude wetlands (11863 ha), and waterlogged areas (8146 ha).

Arunachal Pradesh ranks second in the country after Jammu and Kashmir in the number of high altitude lakes. There are 1672 high altitude lakes covering a total area of 11863 ha, accounting for about 7.6 per cent of total wetland area of the state. Maximum number of lakes are of small size (below 10 ha). It is clear from the Table No. 1 that there are no lakes of very large size (>500 ha) in this state.

Maximum number of high altitude lakes was observed in Dibang Valley (443), Lohit (204) and Tawang (204) districts; while high altitude lakes were also observed in West Kameng, East Kameng, West Siang Lower subansiri, Upper Subansiri and Upper Siang districts.

Role of East Himalayan High Altitude Wetlands

The high altitude wetlands of Arunachal Pradesh are source of water for millions of people in Arunachal Pradesh, Assam and Bangladesh and the mountain

system is a source of many rivers, most notably tributaries of the Brahmaputra like Tawangchu, Nyamjangchu, Kameng, Subansiri, Siang, Dibang and Lohit. The East Himalayan regions in Arunachal Pradesh have many high altitude wetlands, which make it a unique ecosystem that fulfills important functions in the overall water cycle of the basins, and provide habitats for wildlife. Wetlands function as simple reservoirs or aquifers, storing water during wet periods and releasing it throughout drier periods, either through runoff, subsurface drainage, or evapotranspiration. They maintain flow of rivers throughout the year. Hydroelectric projects, the recent lifeline of the state's economy depends on the perennial nature of the huge rivers. Since climate controls many ecosystem attributes and functions, changes in temperature and precipitation in future will alter the hydrological processes of wetlands with potentially significant consequences for downstream water resources (Chatterjee *et al*, 2010). Thus, the wetlands serve as natural carbon sinks and local climate stabilizers.

Culturally, high altitude wetlands are considered and revered as sacred sites and their conservation is important for the myths and beliefs of traditional people, especially in the Buddhist regions of Tawang, West Kameng, Mechuka and Lohit regions. They serve as repositories for rich, high-altitude aquatic biodiversity habitats and breeding grounds for important local and migratory species; providing suitable habitat for rare and threatened high altitude fauna like red panda

(*Ailurus fulgens*), takin (*Budorcas taxicolor*), chinese goral (*Nemorhaedus griseus*), red goral (*Naemorhedus baileyi*), wild dog (*Cuon alpinus*), snow leopard (*Panthera uncia*), musk deer (*Moschus chrysogaster*) and several other species (Mazumdar *et al*, 2011). A WWF-India study showed that the high altitude wetlands in western Arunachal Pradesh supported Rhododendrons and gymnosperms, which are the staple diet of red panda, takin, Chinese goral, red goral, wild dog, snow leopard and clouded leopard. Many Important Bird Areas (IBA) such as Mechuka-Monigong-Jorgging, Mouling National Park, Shergaon, Mandla-Phudung-Kalaktang and Zemithang-Nelya consists of mountainous country with small to medium sized natural lakes in the higher reaches above 3,000 m (BirdLife International, 2001). The richness of the region's avifauna largely reflects the diversity of habitats associated with a wide altitudinal range (Birand and Pawar, 2004).

Management Structures

High Altitude wetlands are not covered under any specific administrative jurisdiction in the State Government. The primary responsibility for the management of these ecosystems is in the hands of the local communities, especially those which are located outside Protected Areas. Wetlands inside Protected Areas/Reserved Forests are managed by the State Forest Department through management plans/working plans approved by the Central Government. The Joint Forest Management Committees (JFMCs), or Eco-Development Committees (EDCs), play an active role in conservation and management of wetlands located in forest fringe areas. There is no information on the exact number of wetlands inside and outside the Protected Areas. Local communities in Buddhist tracts manage the wetlands with religious character every year during pilgrimage seasons through weeding and creation of minimal infrastructure for pilgrims. But no scientific management in terms of their long term conservation is in practice. In terms of government support to the local communities managing wetlands outside Protected Areas, effective coordination between the different departments such as forest, fisheries, revenue, agriculture, irrigation, science and technology, transport and water resources, is essential for the

protection of these ecosystems. The State Government is yet to nominate the nodal department or conservation authority for conservation of high altitude wetlands outside Protected Areas.

Legal and Policy Issues

High Altitude wetlands conservation in Arunachal Pradesh is indirectly influenced by an array of policy and legislative measures. Some of the key legislations are given below:

1. The Indian Fisheries Act, 1857
2. The Indian Forest Act, 1927
3. Assam Forest Regulation, 1891
4. Wildlife (Protection) Act, 1972
5. Water (Prevention and Control of Pollution) Act, 1974
6. Forest (Conservation) Act, 1980
7. Environmental (Protection) Act, 1986
8. Wildlife (Protection) Amendment Act, 1991
9. Biological Diversity Act, 2002

India is signatory to the Ramsar Convention on Wetlands and the Convention of Biological Diversity. In neighbouring states, Deepor Beel in Assam and Loktak Lake in Manipur have already been designated as "Ramsar sites" and are protected. But there are no Ramsar sites in Arunachal Pradesh. The State Forest Department is taking steps to bring some of the high altitude lakes into fold of Ramsar Convention. Arunachal Pradesh which follows the Assam Forest Regulation, 1891 is in the process of enacting its own Forest Act. Arunachal Pradesh is also drafting its first ecotourism policy. It remains to be seen whether conservation of high altitude lakes finds a deserving mention in the legislation or the policy.

Conservation

The State Government does not have any specific scheme for conservation and management of high altitude wetlands. National Programme for Conservation and Management of Wetlands offered 100% grant basis to the concerned State Governments for undertaking activities like survey and demarcation, catchment area treatment, conservation of biodiversity,

livelihood support, educational awareness and community development. But none of the wetlands of Arunachal Pradesh were covered under this Central Scheme. Hence the present conservation efforts are primarily through the management plans/ working plans of Protected Areas/Reserved Forests and the local communities. Scientific management with focus on wetlands has not happened.

Activities of Non Governmental Organisations

WWF-India, has been working since 2005 on documentation of high altitude wetlands (above 3,000m altitude) of western Arunachal Pradesh in collaboration with the state forest department, State Forest Research Institute, Itanagar as well as Govind Ballav Pant Institute of Himalayan Environment and Development. High Altitude Wetlands of Western Arunachal Pradesh Landscape covering West Kameng and Tawang districts are taken up for documentation and conservation of high altitude wetlands of the area by WWF-India. The organisation jointly with State Forest Department, Indian Army and local villagers have identified four wetland complexes in the region – Bhagajang Wetland Complex, Nagula Wetland Complex, Thembang Bapu CCA Wetland Complex and Pangchen Lumpo Muchat CCA Wetland Complex.

Threats

The high altitude lakes in Arunachal Pradesh along with the spectacular flora of the region are exhibiting a wide spectrum of pressure by both biotic and abiotic factors. Its picturesque snow clad peaks and beautiful alpine lakes attract thousands of visitors and naturalists from all over the world every year imparting indirect pressure on biodiversity. The natural habitat is being affected by the recent road constructions, firewood collection, rampant tree cutting in catchment areas and grazing of livestock by the local people. Moreover, construction of hydro electric projects and roads is creating an onslaught of labour camps in the higher altitudes. The area is also very much prone to landslide during rains causing mass destruction to natural habitats. Habitat destruction ultimately leads to loss of fish and decrease in number of migratory birds. The

most serious land degradation occurs in places where local communities have lost their authority to manage their own natural resources, where people are so impoverished that their livelihoods become acts of desperation, and thus it is difficult to imagine a sustainable future where the needs of both the society and nature are met (Zurick and Pacheco, 2006). This holds true in the high altitude hamlets leading to degradation of habitats. On the other hand it should be admitted that in comparison with other regions in the country, wetlands of Arunachal Pradesh face lesser degrees of abiotic pressures from encroachment and pollution. A very low political priority on wetland conservation is the biggest threat faced by younger states like Arunachal Pradesh due to less awareness; and consequently wetlands have received little attention so far in terms of their conservation and management, but they are increasingly becoming crucial due to the possible consequences of the global climate change, and globalization in economic development.

Opportunities

The conservation and management of high altitude wetlands is a specialized and scientific field where multi-disciplinary approach is required, involving a number of technical components like water management, fisheries development, hydrological aspects, socio-economic issues, community participation, weed control, biodiversity conservation and wildlife management. These aspects need to be dealt with in a coordinated manner involving agencies like NGO's, academic and research institutions, national institutions, government departments and local community institutions. It is very essential to take up activities like survey and demarcation, weed control, catchment area treatment, desiltation, conservation of biodiversity, pollution abatement, livelihood support, creation of minor infrastructure, educational awareness, capacity building of various stakeholders, and community development through innovative support schemes and institutional mechanisms.

Though the state of Arunachal Pradesh includes 12 protected areas across the state, none of them covers any high altitude alpine area. There is an urgent need for development of protected areas in these alpine zones.

Apart from government regulation, development of better monitoring methods is needed to increase the knowledge of the physical and biological characteristics of each high altitude wetland resources. Arunachal Pradesh being one of the biodiversity hotspots should strive to conserve the ecological character of these ecosystems along with the biodiversity of the flora and fauna associated with these ecosystems.

The state government may be encouraged to formulate long-term comprehensive management action plans for a period of 5 years, coinciding with the plan period to invite central financial assistance, with clear well defined objectives taking into consideration specific local factors responsible for degradation of the wetland.

The state government may elevate the importance of the wetland site at the international level gaining

access to expert advice and latest information by working hard on getting some of the larger high altitude wetlands designated as Ramsar sites of International importance. Inventorisation, collection of information, networking and capacity building, encouraging research and generation of baseline information, development of guidelines for effective management/wise use, formulation of comprehensive management plans, evolving monitoring mechanisms to track the conservation and health of high altitude wetlands, creating awareness and ensuring local participation, developing policy recommendations based on field experiences and research results would pave the way towards long term conservation of high altitude wetlands in Arunachal Pradesh through involving wetlands in poverty alleviation and wealth generation.

References

- Chatterjee Archana, Blom Esther, Gujja Biksham, Jacimovic Ruzica, Beevers Lindsay, O'Keeffe Jay, Beland Michael, and Biggs Trent (2010). WWF Initiatives to Study the Impact of Climate Change on Himalayan High- altitude Wetlands (HAWs). *Mountain Research and Development* 30(1): 42–52
- Birand, A. and Pawar, S. (2004). An ornithological survey in north-east India. *Forktail* 20:15-24
- BirdLife International (2001). Important Bird Areas (IBAs) in Asia: Project briefing book. BirdLife International, Cambridge, U.K.,
- Zurick David and Pacheco Julsun (2006). *Illustrated Atlas of the Himalaya*. Indian Research Press, New Delhi pp. 30
- Mazumdar Kripal jyoti, Maheswari Aishwarya, Dutta P. K., Pronob Jyoti Borah and Wange P. (2011). High altitude wetlands of western Arunachal Pradesh: new breeding ground for Ruddy Shelduck (*Tadorna ferruginea*), *Zoo's Print*, 26 (8):9
- Report of the National Wetland Inventory and Assessment (2011). Ministry of Environment and Forests, Government of India
- Nandy S.N., Dhyani P.P. and Samal P.K. (2006). Resource Information Database of the Indian Himalaya, ENVIS Monograph 3: 82
- Panigrahy Sushma, Murthy T. V. R., Patel J. G. and Singh T. S. (2012). Wetlands of India: inventory and assessment at 1: 50,000 scale using geospatial techniques *Current Science* 102(6): 852-856