

pounds used to explain classification patterns and phylogenetic relationships⁵. They are under investigation to understand their basic cellular and skeletal organization that will help to understand the evolution process and establishment of Porifera as a model organism for the understanding of the metazoan body plan, immune systems and diseases. Analyses of the genome organization of marine sponges led to the elucidation of selected genes and gene arrangements that exist in gene clusters⁶ (e.g. the receptor tyrosine kinase cluster and the allograft inflammatory factor cluster). They add knowledge to our fundamental understanding of marine organisms and oceanic

processes comprising marine ecosystem, structure, dynamics and resilience. This advanced genetic study deciphers evolutionary processes at the molecular level and builds a platform in order to obtain gene processes and approaches for the benefit of the industry, research and to support sustainable management of the world's ocean.

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Conserving Deepar Beel Ramsar Site, Assam

Wetlands serve as suitable habitats for a variety of amphibians, fishes, reptiles, waterfowls and migratory birds¹. Depending on the water requirement and the relative position of the various parts of the plants in water, a wide variety of aquatic plants exist. Along with the aquatic plants, some non-aquatic marshy or amphibian plants are found in the catchment area, making a unique ecosystem around the wetlands². Assam is a part of the Indo-Burma biodiversity hotspot³ with unique floristic and faunal wealth and has a great number of wetlands.

Deepar Beel (26°03'26"–26°09'26"N and 90°36'39"–90°41'25"E) is situated in lower Assam. It is the lone Ramsar Site of the state and the second of its kind in Northeast India, after Loktak in Manipur. It plays a vital role in sheltering waterfowls of residential and migratory nature² (P. Saikia and P. C. Bhattacharjee, unpublished). The Beel has a perennial water-holding area of about 10.1 sq. km (Figure 1a), which extends up to 40.1 sq. km during floods. The depth increases up to 4 m, and drops to 1 m during winter. This large water body is not only a food source and breeding ground for a large variety of aquatic birds (Figure 1b), but it also houses a wide variety of amphibians, reptiles, insects, macrophytes, terrestrial weeds, lianas and tree species of ecological and economic importance² (P. Saikia and P. C. Bhattacharjee, unpublished).

The Government of Assam declared 10.1 sq. km area of Deepar Beel as the 'Deepar Beel Wildlife Sanctuary' in 1989. It was also proposed that the 4.1 sq. km core area be designated a 'Bird Sanctuary'; about 122 species of seasonal, migratory and residential birds visit the Beel every year² (P. Saikia and P. C. Bhattacharjee, unpublished). Considering the importance of the wetland, Deepar Beel has been included in Asian Wetland Directory⁴ and has been also declared as a Ramsar Site² (No. 1207) in 2002.

In view of these, Deepar Beel Ramsar Site was selected to explore and evaluate its botanical wealth, in order to work out the baseline information needed for conservation strategies to save the wetland from degradation and destruction. About 435 species were documented under 305 genera and 103 families of angiosperms and 13 species belonging to 12 genera and 11 families of pteridophytes. Out of the total 114 families, 82 were dicotyledons, 21 monocots and 11 pteridophytes. Among the total 448 species, dicotyledons represented 65.62%, monocotyledons 31.47% and pteridophytes 2.9% of the flora. Herbs comprised 334 species (74.55%), shrubs 51 (11.38%), climbers 28 (6.25%) and trees 35 (7.81%). The dominant families of Deepar Beel were Poaceae (28/46), Cyperaceae (11/36), Asteraceae (25/31), Scrophulariaceae (7/19) and Fabaceae (7/13). The dominant genera of the wetland were *Cyperus* (12),

Lindernia (9), *Persicaria* (7), *Desmodium* (5) and *Fimbristylis* (5). Within the flora, 11 species were of rare and threatened categories, along with six species endemic to northeastern India².

A majority of the biological wealth in the wetland is in a state of gradual depletion due to the increased impact of human interference² (P. Saikia and P. C. Bhattacharjee, unpublished). Although the area has been declared as Ramsar Site/Wildlife Sanctuary, it has not received much attention regarding conservation. The area is not well protected and there is no enforcement of strict laws of wildlife protection. Regular fishing both in the buffer and core zones also contributes to the degradation of the wetland^{2,4}. Release of toxic pollutants from a nearby woollen mill is a serious threat to the plants and fishes; this is a major cause for the disappearance of many avian species from the area (P. Saikia and P. C. Bhattacharjee, unpublished). Bodo paddy cultivation during winter season and different construction activities in the periphery are destroying natural habitats leading to rapid invasion by the Invasive Alien Species (IAS), by creating havoc for less competitive native species^{2,5}. Indiscriminate felling of trees in the catchment zone has changed the overall physiognomy of the area, thereby decreasing the shelter/nest-forming plants for the birds. There is an urgent need to save the diversified life forms of the area. For



Figure 1. *a*, Winter scenario of Deepar Beel. *b*, Visit of the migratory birds to the wetland (Photograph: UB PHOTOS). *c*, *Ipomoea carnea* Jacq. sub. sp. *fistulosa* (Mart. ex Choisy) D. Austin, is among one of the invasive alien species posing serious threat to the native species in the wetland.

effective management of the wetland it is imperative that the core area be protected by prohibiting fishing, imposing restrictions for cultivation in the buffer zone and other kinds of human interference. It is also necessary to educate the local inhabitants about the importance of the Beel and the far-reaching consequences they may face if the area becomes degraded. The Beel can serve as a unique site to boost ecotourism. A joint management policy maybe worked out by the

Forest Department and NGOs for conservation of biodiversity of the area, with the NGOs serving as a link between the Government agencies and the local community.

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***Boerhaavia diffusa*: An over-exploited plant of medicinal importance in eastern Uttar Pradesh**

Boerhaavia diffusa is a herbaceous plant species growing prostrate or ascending upward in habitats like grasslands, agricultural fields, fallow lands, wastelands and residential compounds. It belongs to the family Nyctaginaceae of Agiosperms. The plant is mentioned in the *Atharvaveda* with the name ‘Punarnava’, because the top of the plant dries up during the summer season and regenerates again during the rainy season. Thus the plant generally perennates through the roots in the soil. According to *Atharvaveda*, the plant is digestive, diuretic, anti-inflammatory and is effective in jaundice and stomach ailments. Besides, it provides relief from cough, serves as a potent anti-poison and is also effective against insect bites.

In eastern Uttar Pradesh it is generally known as ‘Gajpunna’. Medicinal attributes of the plant are found in its root, which is stout, fusiform and penetrating deep in the soil. Roots of the plant are used to

cure jaundice in rural areas of the region, as an indigenous system of disease treatment.

In eastern Uttar Pradesh, which is one of the most backward regions of the state, especially in the districts of Varanasi, Ghazipur, Chandauli, Mirzapur, Bhadohi, Sonebhadra, Gorakhpur, Basti, Deoria, Ballia, Mau and Azamgarh, this plant species is under intense exploitation by rural communities for the cure of jaundice; in the modern system of disease treatment (allopathy), there is no medicine available against the disease. Due to drinking of contaminated water, jaundice has become a major health problem in recent days in the region. In addition, pharmaceutical companies are investing for purchase of the roots of *B. diffusa*.

The Banaras Hindu University, Varanasi has a protected, verdant campus spreading over 1300 acres of land area. The villagers nearby are seen frequently

collecting roots of *B. diffusa* in the campus for medicinal needs and for sale. The university administration has now put complete ban on collection or extraction of the roots of *B. diffusa* as well as other medicinal plants and their parts. However, pilferage of this important medicinal plant is still going on in the university campus.

If the present level of exploitation continues, then within a decade this valuable plant species will vanish from the region. It is the need of the hour to lay special emphasis on conservation of this plant species of medicinal value in eastern Uttar Pradesh.

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