

Keibul Lamjao National Park: an ecological and cultural heritage of Manipur, North East India

Loktak Lake, North East India's largest freshwater lake, is a Ramsar site which harbours rich biodiversity. The lake is a lifeline for Manipur since it is socially, economically and culturally significant to its people. To conserve the endemic and endangered Manipur brow-antlered deer locally called the sangai (the state animal of Manipur; *Rucervus eldii eldii*), the southern part of Loktak Lake has been established as the Keibul Lamjao National Park (KLNP), covering 40 km² area (Figure 1 a). The Park is located in Bishnupur district, between 93°48'E and 93°52'E long., 24°26'N and 24°32'N lat. On 23 March 1990, Loktak Lake was declared as a Wetland of International Importance, drawing national and international attention to the Park¹. KLNP was established to protect the endangered *R. e. eldii* and *Axis porcinus* (Indian hog deer), which have diminishing populations causing international concern^{1,2}. It is the only floating national park globally and the only natural home for the sangai (Figure 1 a). The Park is known for its unique floating meadows of varying thickness, locally known as phumdi, which are made up of a heterogeneous blend of decaying plant, soil and organic matter in several stages of decay. KLNP is divided into three zones based on the thickness of the phumdi – eastern zone, western zone and northern zone³. The western zone has thick phumdi (~3 m). Slender Phumdi covers the eastern zone with sporadic open water. The Pabot and Toya hills, situated in the northern and southern parts of this zone, serve as shelters and resting places of the sangai during floods. The northern zone is a space of vast water covered with slender, fluctuating phumdi of thickness <60 cm.

KLNP comprises terrestrial, aquatic and wetland ecosystems⁴. The terrestrial ecosystem is represented by the three hillocks, viz. Chingjao, Pabot, and Toya, as well as Chingmei hills and grasslands at Thangbrei Yangbi, Bogra Yangbi and Hangamhoubi Yang (Figure 1 b and c). Forests and meadows over the hillocks are found in raised strips. The Park plays an imperative role in conservation as it provides shelter to animals during monsoon season, while salt licks and trees act as a medium for scouring for shedding antlers. Aquatic ecosystems include the northern part of

KLNP, an expansion of the Loktak Lake covered with slender, fluctuating phumdi. Phumdis spread over an area of 26 km². They are a mass of decomposing soil, vegetation, and organic debris which is heterogeneous in composition. The Phumdis hover one-fifth of its thickness above the surface and four-fifths beneath the water surface on the lake. This is critical to the ecological processes and functioning of the Lake. Phumdis serve as natural sinks for essential nutrients and help manage the water and nutrient cycles of the Loktak Lake. The throbbing water level in the Lake is fundamental for the development of phumdis. The top layer of the Phumdis holds little bushes and tall grasses, a wellspring of food, and a favourable place for Sangai. KLNP harbours a total of 185 plant species, with 90 species found in floating meadows (phumdis) and open water, 19 in terrestrial habitats, and 76 species common to both terrestrial and floating-meadow ecosystems⁵. *Zizania latifolia*, *Saccharum munja*, *Saccharum bengalense*, *Phragmites karka*, *Hedychium coronarium*, *Cynodon dactylon*, *Alpinia galanga*, *Arundo donax*,

Erianthus arundinaceus and *Erianthus procerus* are some of the important plant species in wetland ecosystems⁵. According to the 2016 census by the State Forest Department of Manipur, the KLNP is home to an estimated 260 sangai deer and an overwhelming number of hog deer. The Park is home to 21 mammal species, including the wild pig (*Sus scrofa*), common otter (*Lutra lutra*), and Indian civet cat (*Viverricula indica*), as well as 24 amphibian species, including Asian common toad (*Duttaphrynus melanostictus*), green frog (*Euphlyctis hexadactylus*), etc.⁶. Freshwater turtles, vipers, kraits, cobras and pythons are among the reptiles found in KLNP. The Park also has around 131 bird species comprising meadow and water birds, both migratory and native⁷. It is home to a variety of migratory birds, including Baer's pochard (*Aythya baeri*), Mandarin duck (*Aix galericulata*), Ruddy shelduck (*Tadorna ferruginea*), bar-headed goose (*Anser indicus*), shoveler (*Spatula clypeata*) and little cormorant (*Phalacrocorax niger*). Slender-billed babbler (*Chatarrhaea longirastris*) and black breasted parrotbill (*Paradoxornis*



Figure 1 a-g. Glimpses of ecological and cultural aspects of Keibul Lamjao National Park, Manipur. *Source: Lamlak-kee Thawai, The Soul of Nature Souvenir (eds Joshi *et al.*), 65th Wildlife Week Celebration, Wildlife Wing, Forest Department of Manipur, 2020, p. 54.

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flavirostris) listed as Vulnerable in the IUCN Red list have also been recorded in the Park⁷. There are 48 species of fish, including climbing perch (*Anabas testudineus*), striped snakehead (*Channa striata*), freshwater eel (*Monopterus albus*), *Catla catla*, etc.⁸.

The sangai has an attractive movement as it prances around in the floating meadow, and hence is called the 'dancing deer' (Figure 1 d). This species has become part of the culture of the people of Manipur. Songs and poems have been penned for years in praise of its beauty. The sangai and its habitat are mentioned frequently in local mythology and folklore. The epic love story of the seven 'Khamba Thoibi' incarnations is linked to the Loktak Lake and Keibul Lamjao⁹. The locals still revere numerous sacred sites related to the Khamba and Thoibi epics. Sangai, on the other hand, is linked to many tales¹⁰. The prominence of Sangai in the historical culture of the people of Manipur shows how intertwined their lives are with the ecosystem. The Sangai Festival is inspired by the sangai deer and is celebrated every year from 21 to 30 November. The aim of this Festival is to promote Manipur as a top tourism destination. It exhibits the traditional and

cultural diversity of various tribes, and also showcases their fascinating arts and culture, handicrafts, handloom, cuisine, indigenous sports and other unique experiences¹¹ (Figure 1 e–g). KLNP, the only floating national park in the world, and is an ecological and cultural heritage of Manipur and India.

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KAMBAM BOXEN MEETE¹
MERIBENI TSOPOE¹
KRISHNA GIRI^{1,2,*}
R. S. C. JAYARAJ^{1,3}

¹Rain Forest Research Institute,
Jorhat 785 001, India

²Centre of Excellence on Sustainable and
Management,
Indian Council of Forestry Research and
Education,
Dehradun 248 006, India

³Principal Chief Conservator of Forests,
Andaman and Nicobar Islands,
Van Sadan Haddo 744 102, India
*e-mail: krishna.goswami87@gmail.com

Indian intervention to boost makhana in the domestic market and overseas

Makhana (*Euryale ferox* Salisb.), also known as Gorgon nut or fox nut, is one of the cash crops of family Nymphaeaceae which is cultivated in tropical and subtropical regions of wetland ecosystem¹. The starchy white puffs derived from the seeds of makhana are nutritious and sold as a premium dry fruit commodity (Figure 1). Makhana is low in calorific value and rich in fibre and carbohydrates, making it a healthy snack. Fifty grams of makhana generates about 180 calories energy after cellular combustion. On the other hand, makhana contains lower amounts of cholesterol, sodium and saturated fats, which are generally not considered good for human health.

India is considered as the production hub of makhana, with various initiatives and innovative schemes introduced by the Government to boost makhana manufacturing by improving the entire supply chain right

from the farmer to the final consumer through proper channel. The need to boost makhana production and to meet both domestic and global demand for this nutritional non-cereal food has led to a series of Government initiatives such as the introduction of technological interventions, reduction of intermediaries in the supply chain, formation of a highly organized sector, creation of an efficient marketing structure and improvement of socio-economic status of makhana growers.

The Government of India has taken various initiatives to boost makhana production. These include empowering farmers, leveraging additional manpower and refurbishing agricultural infrastructure of the Makhana Research Centre in Darbhanga, Bihar, India. The Government is also aiding other states like Jammu and Kashmir, Rajasthan, etc. Moreover, with Bihar being the main pro-

ducer of makhana, the State Government has taken a number of initiatives in the past decades in the interest of makhana growers.

Stamp duty and registration fees waiver in lease/sale/transfer of land for setting up units, tax rebates and reimbursement of the deposited amount for those setting up makhana farming and other infrastructure, reimbursement on the capital investment on plant and machinery for captive power and state-level and district committees set up for approval of applications within stipulated timelines are some of the initiatives. The Government has also facilitated a single-window clearance system to boost makhana production. The development of makhana seed variety 'Suvama vaidehi' by the Indian Council of Agricultural Research, New Delhi has revolutionized the farming system of makhana^{2,3}. There has been a concerted and cumulative effort to streamline