

Income generating plants of Keibul Lamjao National Park, Loktak Lake, Manipur and man-animal conflicts

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Abstract

Keibul Lamjao National Park (KLNP), a Ramsar Site of International importance, is situated in the south-eastern corner of Loktak Lake, Manipur in North-eastern India. The park covers an area of 40 sq km. This study investigated the high potential income generating plants growing in KLNP. The paper enumerated 22 species of income generating plants belonging to 20 genera and 11 families (Poaceae 7, Zingiberaceae 3, Apiaceae 2, Polygonaceae 2 and one species each of Asteraceae, Convolvulaceae, Cucurbitaceae, Fabaceae, Hydrocharitaceae, Nelumbonaceae and Nymphaeaceae). Among the highly preferred income generating plants, some are also the natural food of the endemic Sangai deer (*Rucervus eldii eldii* McClelland) and other herbivore animals thereby bringing conflicts between human and animals. Overharvesting of these plants by the lake dwellers may cause serious competition for food to the animals thus aggravating their existence in the park.

Key words: Income generating plants, KLNP, Loktak, *phumdi*, Sangai deer

INTRODUCTION

Wetlands are important and one of the world's most productive ecosystems. These areas play essential role for the health, welfare and safety of people living in or around it. Keibul Lamjao National Park (KLNP) is located between 24° 27'2" to 24° 31'2" N latitudes and 93° 53'2" to 93° 55'2" E longitudes at the south-eastern corner of the Loktak Lake covering an area of 40 sq km. This wetland has a unique type of floating mat, called *phumdi*, which is a heterogenous mass of soil, vegetation and organic matter at different stages of decay Devi *et al.* (2012b). It is the natural home of herbivorous animals viz., endangered Bro-antlered deer (*Rucervus eldii eldii* McClelland) locally known as Sangai, Wild boar (*Lamok*; *Sus scrofa* Linnaeus), Sambar (*Rusa unicorn* Kerr), Barking deer (*Mutiacus muntjak* Zimmermann) etc. The park supports many plants species including some income generating plants and also some faunal species. Several workers have surveyed these area and recorded many species. Among them, Deb (1961) listed 125 species; Bhatia (1981) recorded 159 species from Loktak area and Sinha (1990a, b) recorded 157 wetland species. Singh (2002) investigated the management of *phumdis* in Loktak lake and also reported the ethnobotanical uses of 24 species. Shyamjai (2002) reported 145 macrophytes from *phumdis*, whereas Trisal & Manihar (2004) reported 131 macrophytic species. Devi (2007, 2009) studied the

phumdi plants of the lake and also the consumable parts of wild plants. Devi *et al.* (2013a) studied important food plants growing in KLNP both for bro-antlered deer and also for human. Devi *et al.* (2012a, 2012b, 2013b,) also studied the traditional medicine from KLNP, fodder plants and also recorded 19 species of macrophytes for the area. L.D.A. (1996) took initiatives to save the lake against siltation by removing the unwanted *phumdi*. Anandale (1921) referred the lake as swampy due to these floating mats of vegetation. All wetlands have their values and benefits whether for fish production, agriculture, other food production, ground water recharge, recreation, water fowl habitat, flood control, etc. On the other hand, wetlands provide tremendous economic benefits. Among the wetlands, KLNP is also one of the most economically important wetland of Manipur. However, there is some cold-war for their livelihood between human invaders and the resident wild animals dependant on these macrophytes growing on the *phumdi* in KLNP.

METHODOLOGY

Extensive field surveys, recognition, collection and documentation on the uses of different macrophytic species were made with the help of Loktak Lake dwellers of the KLNP through discussion and consultation during the years 2009 to 2013. Information was also collected from plant collectors and the forest security guard of the KLNP. Highly potential plants for various purposes were growing in KLNP. Local people collect these plants throughout the year and sell those to generate some income to fulfil their daily needs for survival. During the present survey, the plant specimens collected and processed into mounted herbarium specimens following standard methods of Jain & Rao (1977). The specimens were identified with the help of different floras (Singh *et al.* 2000; Clarke 1889; Kaith 1932, 1936; Deb 1956, 1957, 1961 a,b; Singh & Arora 1978; Sinha 1987 a,b; 1996 a,b; Singh *et al.* 1988; Shyamananda 1991; Shamungou 1992; & Tombi 1992) in the Department of Life Sciences, Manipur University, Canchipur, Imphal and Botanical Survey of India, Eastern Circle, Shillong and were finally matched at ASSAM. The voucher specimens were deposited at the herbarium of Department of Life Sciences, Manipur University. Online data bases like The International Plant Names Index (www.ipni.org) and The Plant Lists (www.theplantlist.org) was referred for correct nomenclature and author citations.

RESULTS AND DISCUSSION

The present survey recorded 22 species of income generating plants from KLNP belonging to 20 genera and 11 families. Highest number of 7 species has been recorded for Poaceae, which is followed by Zingiberaceae (3 spp.), Apiaceae and Polygonaceae 2 species each and one species in each for the families Asteraceae, Convolvulaceae, Cucurbitaceae, Fabaceae, Hydrocharitaceae, Nelumbonaceae and Nymphaeaceae (Table-1). Majority of the plants i.e. 18 species are emergent (E), 2 are rooted with floating leaves (RF); and one is submerged plant (S) (Table-1). Out of the 21 plant species, 14 are being marketed (M) and others are not marketed (NM) but are sold in bundles in a boat. *Hydrilla verticillata* (NM) however is sold at Rs. 40 – 100 per boat-full for covering fish during transportation and also as fish food. *Cymbopogon citratus* and *Imperata cylindrica* are used as thatching materials and are marketed at Rs.100 – 200 per boat-full.

Human interference creates disturbance to the animals living naturally in KLNP especially during the time of breeding. Villagers collect plants only to fulfil their needs, unaware of the fact that animals depend on these macrophytes. The scarcity of food affects the animals especially *Rucervus eldii eldii* which is endemic to Manipur.

Table 1. Some commonly available Income generating plants of KLNP [Marketed (M) and Not Marketed (NM)]

Plant Name [Family]; Local Name; Voucher specimen Acc. No.	Habit	Commercial Value (Rs.)	Ethnobotanical Uses
<i>Alpinia nigra</i> (Gaertner) Burt [Zingiberaceae]; <i>Pullei</i> ; Acc. No. 000512	Emergent	10 – 20 per bundle of 3 – 5 plant parts (M)	Rhizome used in cough, fever and dizziness; young shoot & rhizome used as vegetable and spice for its aromatic taste. Also used in socio religious purposes.
<i>Centella asiatica</i> (Linnaeus) Urban [Apiaceae]; <i>Peruk</i> ; Acc. No. 000835	Emergent	30 – 40 per bundle (M)	Whole plant is edible as vegetable; used against stomach ulcers, brain tonic, urinary trouble, digestive complaints, dysentery and as tonic.
<i>Curcuma angustifolia</i> Roxburgh [Zingiberaceae]; <i>Yaiple</i> ; Acc. No. 1316	Emergent	30 bundle (M)	Inflorescence used as vegetable, for its flavour & taste; religious during <i>Cheirouba</i> .
<i>Cymbopogon citratus</i> (de Candolle) Stapf [Poaceae]; <i>Charot</i> ; Acc. No. 000837	Emergent	50 – 100 per boat-full for thatching (M) as fodder (NM)	Thatching and as fodder; leaves used to prepare local herbal lotion (<i>Chinghee</i>) and <i>Cymbopogon</i> tea (Cytronella tea), leaf-infusion is stimulant, antiperiodic.
<i>Hedychium coronarium</i> J. Koenig [Zingiberaceae]; <i>Loklei</i> ; Acc. No. 000819	Emergent	20-30 per bundle of rhizome and tender shoots (M)	Rhizome and tender shoots are edible with aromatic taste and used as fodder; rhizome in cough, fever and dizziness; young shoot and rhizome as vegetable, in religious ceremonies of Manipuris.
<i>Helichrysum luteoalbum</i> (Linnaeus) Reichenbach [Asteraceae]; <i>Phumin</i> ; Acc. No. 1374	Emergent	10 per bundle (M)	Use as vegetable, leave paste is put on the fore head to reduce headache
<i>Hydrilla verticillata</i> (Linnaeus f.) Royle [Hydrocharitaceae]; <i>Charang kokchaobi</i> ; Acc. No. 000825	Submerged	40-100 per boat-full (NM)	Fish food and for covering fresh fish during transportation.
<i>Imperata cylindrica</i> (Linnaeus) Rausch [Poaceae]; <i>Eee</i> ; Acc. No. 000846	Emergent	100-200 per boat-full (M)	High quality thatching material.
<i>Ipomoea aquatica</i> Forsskal [Convolvulaceae]; <i>Kolmani</i> ; Acc. No. 000822	Emergent	10-15 per bundle (M)	Tender shoot is edible.
<i>Melothria purpusilla</i> (Blume) Cogniaux [Cucurbitaceae]; <i>Lamthabi</i> ; Acc. No. 000847	Emergent	50-100 per bundle (M)	The plant is boiled about 15 min, the decoction to cure jaundice. This plant is not cultivated but plant is highly potential value.
<i>Nelumbo nucifera</i> Gaertner [Nelumbonaceae]; <i>Thambal</i> ; Acc. No. 000848	Rooted-flooding	10-20 per bundle of fruit; 10-100 or 10-1000 per flower* (M)	Flower for religious purposes; tender leaves, rhizomes, flower, seeds are edible; mature leaves as a green plate.
<i>Nymphaea pubescens</i> Willdenow [Nymphaeaceae]; <i>Tharo angouba</i> ; Acc. No. 000850	Rooted - floating	10-15 per bunch (M)	Flower and flower stalks are edible.
<i>Oenanthe javanica</i> (Blume) DC. [Apiaceae]; <i>Komprek</i> ; Acc. No. 000820	Emergent	10-15 per bunch (M)	Tender shoot is appetizer and digestive, vegetable in raw and cooked, in religious ceremony

Plant Name [Family]; Local Name; Voucher specimen Acc. No.	Habit	Commercial Value (Rs.)	Ethnobotanical Uses
<i>Oryza rufipogon</i> Griffith [Poaceae]; <i>Wainuchara</i> ; Acc. No. 000867	Emergent	NM	Young twigs as fodder, grains as substitute to paddy
<i>Persicaria barbata</i> (Linnaeus) H. Hara [Polygonaceae]; <i>Yellang</i> ; Acc. No. 000821	Emergent	10-20 per bunch of shoot (M)	Tender shoot as vegetable, stomach disease, ulcer, tonic and purgative and colic.
<i>Phragmites australis</i> (Cavanilles) Trinius <i>ex</i> Steudel [Poaceae]; <i>Tou angangba</i> ; Acc. No. 000520	Emergent	50-100 per boat-full (M); fodder & fuel (NM)	Fodder and religious, stem, plant extract in cooling, diuretic and diaphoretic, diabetes. Stem as firewood, house construction.
<i>Phragmites karka</i> (Retzius) Trinius <i>ex</i> Steudel [Poaceae]; <i>Tou angouba</i> ; Acc. No. 000823	Emergent	50-100 per boat-full for thatching (M); fodder & fuel (NM)	Tender shoot as fodder, in cooling, diuretic and diaphoretic, diabetes, religious, stem as firewood, house construction.
<i>Polygonum plebeium</i> R. Brown [Polygonaceae]; <i>Tharam mana</i> ; Acc. No. 000855	Emergent	10-15 per bunch (M)	Tender shoot as vegetable, decoction is carminative; bowel complaints and pneumonia.
<i>Saccharum arundinaceum</i> Retzius [Poaceae]; <i>Singut</i> ; Acc. No. 000856	Emergent	50-100 per boat-full for thatching (M)	Tender shoot as fodder, stem as firewood, house construction.
<i>Saccharum procerum</i> Roxburgh [Poaceae]; <i>Singnang</i> ; Acc. No. 000858	Emergent	50-100 per boat-full for thatching (NM)	Tender shoot as fodder, stem as firewood, house construction.
<i>Vigna mungo</i> (Linnaeus) Hepper [Fabaceae]; <i>Phum hawai</i> ; Acc. No. 000863	Emergent	10-20 per bunch (M)	Pods are edible, pulse in rheumatism, nervous, hepatic diseases, as diuretic.
<i>Zizania latifolia</i> (Grisebach) Turczaninow <i>ex</i> Stapf [Poaceae]; <i>Ishing kambong</i> ; Acc. No. 000824	Emergent	10-15 per bundle of -young twigs, infected culm (M); young twigs as fodder (NM)	Young twigs and infected culms are edible, nutritious, and in anaemia, fever, diuretic, heart, kidney and liver troubles, as fodder for wild animals.

Table-2. Plants which make conflicts between human and animals, based on the dependency of the plants growing in KLNP

Scientific name	Consumed part by wild herbivores	Consumed part by man
<i>Alpinia nigra</i>	Tender shoot & rhizome	Tender shoot & rhizome
<i>Hedychium coronarium</i>	Tender shoot & rhizome	Tender shoot & rhizome
<i>Oryza rufipogon</i>	Tender shoot & inflorescence	Tender shoot & inflorescence
<i>Persicaria sagittata</i>	Tender leaf	Tender leaf
<i>Zizania latifolia</i>	Tender shoot	Infected culm & tender shoot

The important fodder plant species for healthy and better conservation of animals are *Hedychium coronarium*, *Alpinia nigra*, *Oryza rufipogon* and *Zizania latifolia* (Devi *et al.* 2013 a). Five plant species growing in KLNP are consumed both by the human and

animals and create conflict between them (Table 2). As these plants are important for both humans and animals, appropriate steps should be taken to conserve these species through sustainable harvesting in near future, so that there will be mutual benefit for both communities - humans and animals (Devi *et al.* 2013 a,b,c).

CONCLUSION

Lake dwellers have their own choice of collection among the income generating plants of the park throughout the year. Many of the highly preferred plants collected by them are the natural food of the herbivorous animals (Wild boar, Sambar, Barking deer, etc.) thereby, bringing conflicts between human and animals. Overharvesting of these plants may cause serious competition for food to the animals and will, certainly, endanger their existence. At the same time, the age old tradition as well as demand for survival of traditional communities needs to uphold to conserve and maintain the protected areas. Considering these various aspects, highlighting the importance of community based approach in reduction of overharvesting becomes relevant. The survival of the lake dwellers is the crisis of the biodiversity, which is intimately linked with the disappearance of ecological diversity and ultimately the struggles for the preservation of biodiversity. And, the conservation in KLNP will become meaningless and will lose its basic criteria to remain as a 'Wildlife Sanctuary'!

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