Bio-resource Utilization and Socio-economic Conditions of the People Living in *Ithing* and *Karang* Island Villages of *Loktak* Lake, Manipur, India

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Abstract

Bio-resources from the wetlands form the major economy of the rural people living in and around it. There is need to conserve the valuable resources of the wetlands from various anthropogenic pressures so that livelihoods of the people are secured. The main aim of the present study was to investigate the natural resource dependency of the people living in *Ithing* and *Karang*, the two island villages of *Loktak* Lake and assess the socio-economic conditions of the villages. Questionnaire survey and direct observation were used for collection of data. Randomly selected households were administered with the questionnaire to obtain information on the various types of bio-resources utilized by them and to find out the socio-economic conditions of the households. It was found that among the bio-resources used from the lake, fishes and prawns (100% and 68.66%) were the major resources. Water from the lake is used for drinking (100%) and firewood (*Phragmites karka*, *Saccharum munja*, etc.) was collected from lake and used (47.33%) as fuel. Fishing and handloom are the major occupations. Average size of family is 8.12 and 31.71% have Primary (Nursery-VIII) level education which is highest in terms of educational level. 54.66% of the respondents were found to have total annual income in the range of Rs. 60,001-90,000/-. Majority of the respondents were found to have own land but lived in kuccha houses (65.33%) and used open pit toilets (46.66%). All the 40 respondents felt that the natural resources of *Loktak* Lake is declining. Therefore, for the conservation and sustainable development of the lake effective conservation and management programmes need to be taken up by the government, local authorities and communities jointly. Traditional fishing with *Athaphums*, prevalent earlier has now been stopped by *Loktak* Development Authority as a conservation measure. Community awareness and participation is essential for successful and sustainable managements.

1. Introduction

Wetlands constitute some of the most important and threatened ecosystems in the world. They are important for biological, hydrological, economic, social-cultural and aesthetic reasons (Terer et al., 2004). *Loktak* lake, the largest freshwater wetland in northeastern region of India, plays an important role in the ecological and economic security of the region. A large population living in and around the lake depends upon its resources for sustenance. People of Manipur are culturally, socially and economically linked with the *Loktak* Lake and hence the lake has been referred to as lifeline of Manipur (Trisal and Manihar, 2002). Livelihood comprises of various assets like natural, physical, human, financial and social capital, the activities and the accesses to these (mediated through institutions and social relation) that helps in providing living to individual households. Livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in future, while not undermining the natural resource base (Chambers and Conway, 1992). The socio-economic values of the lake include hydropower generation, irrigation, fisheries, control of floods, supply of drinking water, production of aquatic organisms for food and of commercial importance, the many uses of *phumdi* (mass of floating vegetation) and water transport (Singh and Singh, 1994).

Most developing countries depend heavily on the exploitation of natural resources from wetland natural, especially biological resources. Most of these wetland resources are utilized by very poor rural communities whose livelihood depends solely on their exploitation (Abila, 2005). In the recent past the *Loktak*

lake has been degraded because of anthropogenic activities like siltation, unsustainable agricultural practices, water pollution, construction of Ithai dam, encroachments in the lake by constructing fishponds, construction of roads and settlements. Considering the above issues of the lake it is important to study the livelihood status of those people depending on the lake. With this background, the present study was undertaken with the objectives of investigating the natural resource dependency and assess the socio-economic conditions of the people living in *Karang* and *Ithing* island villages of *Loktak* lake.

2. Materials and Methods

2.1. Study sites

The study involved two island villages i.e. *Karang* and *Ithing* located in *Loktak* lake. *Loktak* Lake is located between 93º 46' and 93º 55' E and from 24º 25' to 24º 42'N in the southern part of the Imphal valley of Manipur (Figure 1). The lake is in oval shape with maximum length and width of 26 km and 13 km respectively. The depth of the lake varies between 0.5 to 4.58 m with average depth recorded at 2.7 m. *Loktak* lake can be considered as a sub-basin of the Manipur River basin. It has a direct catchment area of 980 sq.km and indirect catchment area of 7157 sq.km. There are 55 rural and urban settlements around the lake with a total population of 100,000 (LDA and WISA, 1999). The characteristic feature of *Loktak* is the presence of floating islands, locally called *phumdis*. Based on its rich biodiversity and socio-economic importance, the lake has been designated by India as a Wetland of International Importance under Ramsar Convention in 1990 (Trisal and Manihar, 2004).

2.2. Method of data collection

The present study is mainly based on primary data and information collected through household questionnaire survey in *Ithing* and *Karang* islands villages of *Loktak* lake. The villages were selected based on their dependency on the lake and accessibility. The questionnaire was designed in English and asked in Manipuri, the local language of Manipur. Random sampling of about 10% of the households (Sah and Heinin, 2001; Shrivastava and Heinen, 2007; Singh and Moirangleima, 2009) were conducted resulting in the selection of a total of 40 households (25 from *Karang* and 15 from *Ithing*). The questionnaire sought to obtain information on the various types of bio-resources utilized by the people living in the two villages and to find out the socio-economic conditions of the households. It was prepared referring (Sah and Heinin, 2001; Baral, 2005; Baral and Heinin, 2007; Mishra et al., 2008) and in consultation with other relevant literatures.

3. Results and Discussion

3.1. General information of the respondents and their household

The general information of the respondents and their household is presented in Table 1. Among the 40 respondents interviewed from the selected households in the two villages 82% were males and 18% females with an average family size of 8.12 persons per family. Of the total respondents, 31.71% were primary (Nursery-VIII) educated, 29.79% were illiterate, 27.76% secondary (Cl. IX-XII), 5.86% under-graduate and 4.85% graduate and above. The highest percentage of respondents with annual income in the range of ₹ 60,001-90,000/- was 54.66% followed by 37.33% in ₹ 30,001-60,000/- range and 8% above ₹ 90,000/-. In the two villages, none of the respondents had an annual income of less than ₹ 30,000/- .

3.2. Occupation of the respondents

Occupation wise, one finds that 100% villagers are fishermen,

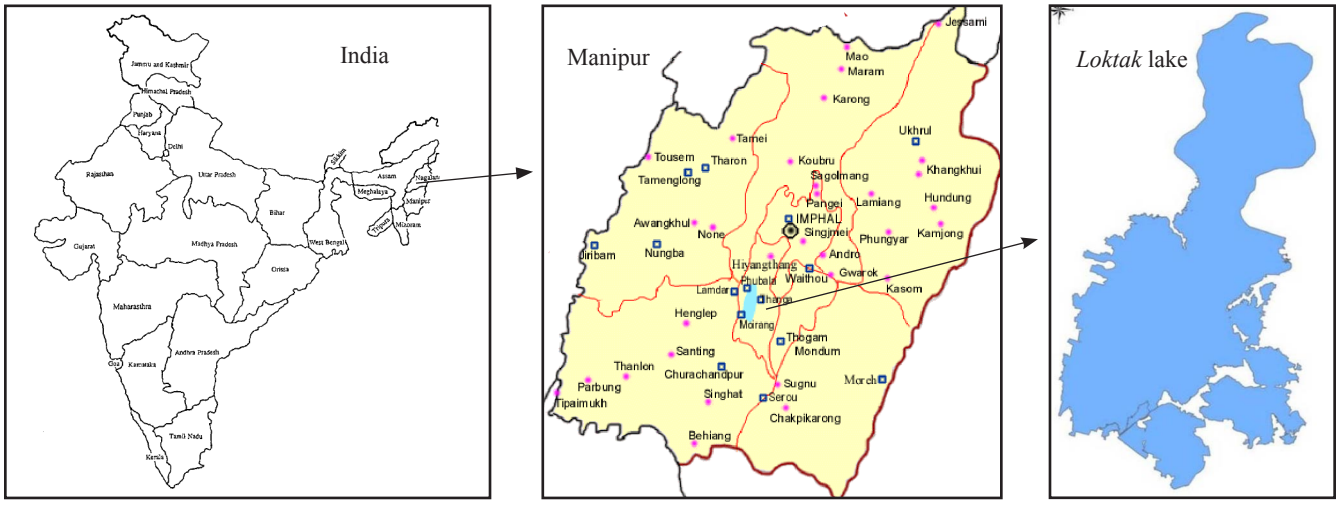

Figure 1: Location map of the study area (Loktak lake) in Manipur. Source: Manipur Remote Sensing Application Centre (MARSAC), Imphal

56.66% were involved in handloom as weaving of clothes, 29.33% as livestock farmers, 18.66% as businessmen, 11.33% as government employees and 5.33% as private employees. In both the villages none of the respondents undertook agriculture. No agricultural practice was found in *Ithing* as there is lack of land while in *Karang* all agricultural lands were submerged under water after the commissioning of Ithai barrage in 1983. Fishermen are engaged in selling of fishes caught from *Loktak* lake. Handloom work like weaving of clothes was found to be done by women weavers. Duck, hen, pig were reared by livestock farmers. Small grocery shops were owned by businessmen (Table 2).

3.3. Housing, sanitation, drinking water and fuel for cooking

Housing: In both the villages majority (65.33%) of the respondents were found to live in kuccha houses, 31.33% in semi-pucca houses and only 3.33% in pucca houses. For building kuccha houses, species of grasses like *Zizania latifolia* and *Imperata cylindrica* were used for roof, plants like *Phragmites karka*, *Narenga prophyrocroma* is used for walls, mud and bamboo were used, for floor mud was used and for pillar tree species like *Eucalyptus citriodora* which is collected from the locality and planted by the local communities was found used (Table 3).

Table 1: General information of the respondents and their households

Village name		*Karang*	*Ithing*	
Sl. no	Particulars	A	B	C
1.	Gender of respondents:			
	a. Male	84	80	82
	b. Female	16	20	18
2.	Educational level:			
	a. Illiterate	26.82	32.77	29.79
	b. Primary (Nursery-VIII)	33.17	30.25	31.71
	c. Secondary (Cl. IX-XII)	27.8	27.73	27.76
	d. Under-graduate	5.85	5.88	5.86
	e. Graduate and above	6.34	3.36	4.85
3.	Total annual income:			
	a. <₹ 30,000	0	0	0
	b. ₹ 30,001-60,000	68	6.66	37.33
	c. ₹ 60,001-90,000	16	93.33	54.66
	d. >₹ 90,000	16	0	8

A: Respondents (%); B: Respondents (%); C: Mean/Overall Respondents (%)

Sanitation: In both the villages the use of modern sanitary latrines with septic was found to be low (only 14%) as they are costly and the communities cannot afford. The people of *Ithing* village had higher access to good sanitation (20%) than in *Karang* village (8%). 46.66% of the people used open pit toilet which is highest (Table 3).

Drinking water: In all, two different sources of water for drinking purpose was noticed in the villages, they are *Loktak* lake (100%) and rain water (9.33%). There was no public water supply facility found in both the villages (Table 3).

Fuel used for cooking: Firewood was used in highest percentage as fuel for cooking in both the villages (100% each). Other types of fuel used for cooking in the villages were LPG (Gas) (58%), kerosene (11.33%) and charcoal (10.66%). Firewood was found collected from the *Loktak* lake, localities as well as purchased from shop. Among the firewoods, species like *Phragmites karka*, *Saccharum munja* and *Quercus lamellosa* were collected from the lake, while *Eucalyptus citriodora*, *Grevillea robusta*, *Melia azedirach*, *Litsaea monopetala*, *Castanopsis hystrix*, *Delonix regia* were found to be collected from localities which is planted by the local communities. The people were also found to purchased firewoods from shops as the firewoods collected from the lake and localities could not meet their household requirements (Table 3).

3.4. Bio-resources use from the Loktak lake by the people

Nine different types of bio-resources were found to be used for livelihood (Table 4). Fishes (100%) were found to be highest followed by prawns (68.66%), eels (66%), vegetable items (61.33%), fuelwood (47.33%), thatching materials (21.33%), handicraft materials (10%), medicinal plants and oysters both (4%) each. Species of fishes like *Labeo rohita*, *Ctenopharyngodon idella, Chirhinus mrigala*, *Amblypharyngodon mola, etc.*, prawn like *Macrobrachium dayanum,* eel like *Monopterus albus*, vegetable items like *Hedychium coronarium*, *Alpinia allughas*, *Rotala niveus*,

Table 2: Occupation of the respondents

Village name	*Karang*	*Ithing*	
Particulars	A	B	C
Occupation:			
a. Fishing	100	100	100
b. Agriculture	0	0	0
c. Handloom	60	53.33	56.66
d. Livestock rearing	52	6.66	29.33
e. Business	24	13.33	18.66
f. Government employee	16	6.66	11.33
g. Private employee	4	6.66	5.33

A: Respondents (%); B: Respondents (%); C: Mean/Overall Respondents (%)

Ipomea aquatic, *Oenanthe javanica*, etc. fuelwoods like *Phragmites karka*, *Saccharum munja* and *Quercus lamellosa*, thatching material like *Zizania latifolia,* handicraft material like *Cyperus brevifolius* for making mats, medicinal plants like *Lagenaria vulgaris* and *Melothria purpusilla* and oyster like *Unio marginalis* were used by the people.

Wetlands are one of the most productive and resourceful areas, which provide food, non-food aquatic resources and retain the ecological balance for the local residents as well as for the nation (Dugan, 1990; IWRB, 1992). Sah and Heinin (2001) highlighted the use of wetland resource and conservation attitudes among indigenous and migrant people in Ghodaghodi lake area, Nepal to explore the socio-economic status of indigenous and non-indigenous inhabitants, patterns of use of forest and wetland resources and attitudes about conservation in Ghodaghodi lake. Terer et al. (2004) studied socio-economic values and traditional strategies of managing wetland resources in Lower Tana River, Kenya by the communities in order to manage wetland resources in Tana River National Primate Reserve and its environs sustainably. In the present study high dependency on *Loktak* lake's bio-resources for livelihood and income generation was observed. Both the villages were found socio-economically poor with high illiteracy, low income, poor sanitation, lack of safe drinking water supply. Due to the various anthropogenic pressures, the lake was found to be affected from pollution and ecological degradation resulting in poor socio-economic condition of the people. All the 40 respondents felt that the natural resources of the lake are declining. At present, fishes like *Osteobrama belangeri*, *Wallago attu*, etc. vegetables like *Trapa natans, Polygonum barbatum*, etc. fuelwoods like *Narenga prophyrocroma* and *Saccharum procerum*, thatch grass like *Imperata cylindrica*, handicraft material like *Scirpus lacustris* were lost from the lake according to the villagers. This has severely threatened their livelihoods.

3.5. Conservation and management of the Loktak lake

The Government of Manipur constituted *Loktak* Development Authority (LDA) in 1986 for the overall improvement and management of the Lake. *Phumdi* management, water management, catchment conservation, biodiversity conservation, sustainable resource development and livelihood improvement, communication, education, participation and awareness, monitoring and evaluation, etc. are being taken up by this organization.

Athaphum fishing is a traditional fishing method involving preparation of a fishing enclosure made up of *phumdis*. This method was widely practiced in the lake as large quantities of fishes were caught in single operation and the fishermen could earn large amount of income in short time. This has now been stopped by the LDA as a conservation measure as it leads to the proliferation of *phumdis* and deterioration of water quality. As a part of lake management, LDA also recently (in the year

Table 3: Housing, sanitation, drinking water and fuel for cooking

Village name		*Karang*	*Ithing*	
Sl. no	Particulars	A	B	C
1.	Type of house:			
	a. Kuccha	64	66.66	65.33
	b. Pucca	0	6.66	3.33
	c. Semi-pucca	36	26.66	31.33
2.	Mode of sanitation:			
	a. Septic	8	20	14
	b. Open pit	20	73.33	46.66
	c. Low cost toilets	72	6.66	39.33
3.	Source of drinking water			
	a. *Loktak* lake	100	100	100
	b. Rain water	12	6.66	9.33
	c. Public water supply	0	0	0
4.	Type of fuel used for cooking			
	a. Firewood	100	100	100
	b. Charcoal	8	13.33	10.66
	c. Kerosene	16	6.66	11.33
	d. LPG (Gas)	76	40	58

A: Respondents (%); B: Respondents (%); C: Mean/Overall Respondents (%)

Table 4: Bio-resources use from the *Loktak* lake by the people

Village name	*Karang*	*Ithing*	
Particulars	A	B	C
a. Fishes	100	100	100
b. Vegetable items	96	26.66	61.33
c. Prawns	64	73.33	68.66
d. Thatching materials	36	6.66	21.33
e. Handicraft materials	20	0	10
f. Fuelwood	88	6.66	47.33
g. Medicinal plants	8	0	4
h. Oysters	8	0	4
i. Eels	52	80	66

A: Respondents (%); B: Respondents (%); C: Mean/Overall Respondents (%)

2011) evicted those floating huts built over the *phumdis* on the basis that the fisher communities living in these huts are polluting the lake.

4. Conclusion

It is seen from the present study that the people living in the two island villages of *Loktak* lake, *Karang* and *Ithing* are heavily dependent on the bio-resources of the *Loktak* lake for its livelihood. They were also seen to be socio-economically poor. But the lake has been found in degrading conditions because of various threats. Therefore, for the conservation and for successful sustainable management of the lake and to secure the livelihood of the people effective conservation measures need to be taken up by the concerned authorities. The concerned authorities may need to work in such a way that the step taken up by them for the conservation and management of the lake does not unintentionally affect the livelihood of the people. Hence, effective inclusion of the local communities in the management and conservation programmes of the lake is recommended.

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