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ASSESSMENT OF SOCIO-CULTURAL AND ECOLOGICAL CONSIDERATION IN CONSERVING WETLANDS–A CASE STUDY OF PRASHAR LAKE IN MANDI DISTRICT, HIMACHAL PRADESH

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ABSTRACT: The Ramsar Convention of IUCN held in 1971 in Iran attracted global attention regarding conservation and management of wetlands. Subsequently, 3 wetlands in the Indian State of Himachal Pradesh have been declared as wetlands of international importance. The lake Prashar is a high altitude lake located in Mandi district is an important lake although it is not an international importance. It is important because of socio-cultural and ecological values and services it provides. Presently lake is under threat due to anthropogenic pressures. There is almost complete breakdown of traditional management system and lack of appropriate and recognized property rights in the vicinity of the lake. The problem is further accentuated because their is loss of water quality data, ecological services, information etc. Thus it is necessary to reclaim and develop the high altitude wetlands for its optimum potential use, for this a reliable and accurate data base is required. Therefore, present study endeavour aimed to generate data base in terms of socio-cultural and ecological aspects i.e. physical aspects / land use, extent of water spread and its water quality, vegetation status of catchment area and surrounding of lake. Further objective of the study was to determine the importance of this wetland for the local people and to give an indication of the distribution of the benefits among various stakeholders. It was found that people are willing to participate in collaborative management initiatives with the state. In this study threats to the high altitude wetlands have been identified and adequate measures for their conservation and management suggested.
Keywords: Prashar lake, Wetland, Socio-cultural, Ecological, Mandi,H.P.

INTRODUCTION

The Himalaya form a shield of great importance right across the Northern facade of India from Jammu and Kashmir in west to Arunachal Pradesh in east. But it is only one state, Himachal Pradesh, to which given the honour to derive its name from the Himalayas. By virtue of its extensive geographical extent, varied terrain and climatic conditions, supports a rich diversity of inland wetland ecosystems. Wetlands are generally sandwiched between a terrestrial eco system and an open water system. Regions generally referred to, as wetlands are lakes, marshes, swamps, temporary ponds, riverbanks, mangroves and paddy fields. As a result of varied Physiographic and climatic condition-coupled with extensive water resource development projects wetlands, are abundant in the country. Wetland defines by Maltby (1986) as *a collective term for ecosystems whose formation has been dominated by water, and whose processes and characteristics are largely controlled by water.* The wetlands located in different physiographic, climatologically and geological regions are major sources of drinking water, irrigation, recreation and fishing. Increased human activating has an adverse influence on the hydro biological regime and the lakes are fast deteriorating or even drying in some place.

This is manifested in prolific weed growth, algal blooms, severe pollution and sediment in fill. These developments have diminished their utility and pore a serious threat to their existence. In Himachal Pradesh, there are few natural wetlands and which have developed by movements, glacial activities and changing river course. Besides these, a few wetlands have developed by impounding large volumes of water. The wetlands development programme is closely linked to food production, environmental protection, soil and water conservation, flood management, wild life conservation, recreation and aesthetic setting. Wetlands management therefore requires planning, system standardization, implementation, impact assessment and monitoring. The wetland ecosystems have not received deserved attention from the planners, although such systems have potential for high biological activity until the Ramsar Convection of IUCN held in 1971. Wetlands of Mandi have assumed national importance as it has a great sacred value to Lord Vishnu & Shiva. In the recent years anthropogenic/pilgrimage pressure has created an ecological imbalance to a great extent. It is therefore felt necessary to reclaim and develop these lakes for its optimum potential use, but a reliable and accurate wetland data is not available. In this study an attempt has been made to generate base line information about spatial distribution of vegetation in and surrounding of lakes by using field survey, GPS for physical verification and water analysis for quality of lake water.

STUDY AREA

Prashar Lake:

At the altitude of 2630 metres, 40 kms from Mandi town in Mandi district, Parashar lake is lies between N 31°.45'.30"′ and E 77°.6'. Its depth and water content remains unestimated. Pagoda like unique rocket-shaped temple lies by the majestic Lake of Parashar and beckons us to the Rig vedic period. The tranquility of this shrine drags our inner soul to leave the world and stay here for whole life. Great Sage Parashar is regarded to have meditated here and the lake is embodiment of Parashar, a holy lake with a floating tiny island.

METHODOLOGY

The study was made during 2009-10 in order to know the current status of wetlands in district Mandi. This study was mainly focused on wetland namely Prashar Lake based on field survey of lake and its surrounding area for its vegetation, physical parameter by use of GPS and water analysis for water quality of lake were studied.

RESULTS & DISCUSSION

Physical Aspects*:* Rocks are sedimentary and the natural origin, cold water, mountainous soil, no land use pattern and it is used only as pasture land. This area is situated between the Dhauladhar and upper Siwalik ranges which run from south east to northwest of Mandi district. This region is separated from Kulu valley by a mid Himalayan range called upper Siwalik. Geographical features of this area determine the climate and it varies considerably with the elevations. By virtue of its elevation, the valley may broadly be said to have a climate with winters from November to March, during this period snowfall is occur. However, from November to the end of March, the area generally remains covered under snow and all activities remain suspended. Summers are rather showing, only from May to October.

Water quality*:* water quality of the lake is good. No any type of threat is found. pH observed during the study period for different sites an average 7.25 Hydrogen ion concentration below 4.5 and above 9 is particularly injuries and unproductive. Beside being toxic to the aquatic life they react with the natural alkalinity of the water there by increasing the carbonate hardness and thus rendering it unfit for further use. Electrical conductivity (EC) 74.0 is dependent on temperature of the water and it increases with increase in temperature. EC is a direct indicator of total dissolved ions in water.

Total suspended solid (TSS) is 0.10, with the increase in turbidity total suspended solids in the lake water increases. Alkalinity is 49, a measure of bicarbonates, carbonates and hydrates. Fluctuation in Alkalinity damages the aquatic environment. This also alters the pH of the water, which leads to the death of aquatic biota. Dissolve oxygen was observed above 4.1 mg/L in all the study sites. The level of dissolve oxygen ranged between 8.9 to 10.5 mg/L. The concentration of dissolves oxygen decreases with increase in temperature Matcaff and Eddy, 1979, made same observation. Low concentration of DO indicates the presence of organic matter in water. With high organic load, dissolve oxygen is consumed rapidly during the putrifaction of organic substances contained in the lakebed. If vertical mixing of water is insufficient due to stratification, oxygen dissolves on the surface of water from the atmospheric air can't reach the bottom. In addition poor clarity of water weakens sufficient penetration of the sun bim and significantly photosynthetic reaction in the bottom water layer. Under these conditions the DO in the bottom water will decrease ultimately leading 0-oxygen state. As a result aquatic fauna in that area seriously affected. Biological Oxygen Demand (BOD) is 0.8, demand of water has been a quantity related to the amount of water present in water sample, BOD indicates the amount of dissolve oxygen used up during the oxidation of oxygen demanding waste. It could be found out incubating a sample of water for 5 days at 20^0C. Increase in BOD indicates higher organic matter contents in the lake water sample. Chemical Oxygen Demand (COD) is 1.69 The minimum of COD loading is insignification to cause any adverse impacts on water quality. COD values were found to be very low indicating absence of organic pollution load. Turbidity is zero Clear ponds with less than 25 ppm turbidity have 12-8 times more plankton and 5.5 times more fish production than ponds with a turbidity exceeding 100 ppm (Prabbakar, 2000). The increased silt in the lake increased turbidity and reduces the oxygen intake in the water leading to impact on all life in the lake.

Water temperature in lake varied at a range of 4.0 to 10.0^{o}C. During the summer, and a decline in water temperature was recorded in the winter season. Increase in temperature accelerate the biodegradation of the organic matter, both in bottom deposits and over lying water. This enhances the BOD level. Some aquatic fauna remain active in near 0^0C temperature which prevail in streams of the lesser and greater Himalayas during Dec and Jan. Water temperature also regulates species composition, metabolism and reproduction of essentially pikilothermic aquatic life. It is an influential water quality characteristic to life in water. At higher temperature oxygen becomes less soluble and in order to cope with biodegradation, results in oxygen depletion. Dissolve oxygen has been a fundamental requirement of life for the plant and animal population. Their survival is dependent upon the availability of water to maintain certain minimal consideration. The disappearance of plant and animal life is an obvious result of the oxygen depletion.

Table:1. Water Parameters and its values

Sr. No.	Parameters	Values
1.	pH	7.25
2.	Electrical Conductivity µmhocm^{-1}	74.0
3.	Total suspended solids, mg/l	0.10
4.	Total alkalinity mg/l	49
5.	Dissolve oxygen (DO) mg/l	4.1
6.	BOD, mg/l	0.8
7.	COD, mg/l	1.69
8.	Turbidity NTU	0
9.	NH_3-M	0.008
10.	Silicates	35.9

Vegetation: There is scattered vegetation in and around the lake. But no vegetation above the lake toward hill top. Above tree line, pastures land for grazing, number of wild and medicinal plants are found to be here.

Above tree line, pastures vegetation of catchment has verity of plants due to variation in climate and topography. Along an altitudinal gradient, *Pinus roxburghiana, P. wallichiana, Quercus leucotrichophora, Cedrus deodara,* mixed, and broad leaved deciduous mixed forests; *Abies pindrow, Picea smithiana,* and *Q. semecarpifolia* forests are distributed. The forest zone is followed by alpine scrubs and thatches (meadows). The alpine scrubs are dominated by the species of *Rhododendron, Rosa, Cotoneaster, Juniperus, etc.* The alpine meadows are dominated by the species of *Anemone, Polygonum, Potentilla, Euphorbia, Selinium, Caltha, Saxifraga, Impatiens,* etc. A large numbers of medicinal plant are found scattered all over the catchment's area and many of them are endemic to the region.

Table:2. Some Common Plants of Lake's catchment area

S.No.	*Name*	Families	Types*			Uses*			
			T	S	H	E	MU	T	F
1	*Abies pindrow Royle*	Pinaceae	+				+		
2	*Achillea millefolium*	Asteraceae		+		+			
3	*Anaphalis margaritacea*	*Asteraceae*			+	+			
4	*Anemone obtusiloba*	*Ranunculaceae*			+	+			
5	*Arisaema jacquemontii*	Araceae			+				
6	*Berberis lycium*	Berberidaceae		+		+			+
7	*Caltha*	Ranunculaceae			+	+			
8	*Cedrus deodara*	Pinaceae	+				+		
9	*Chenopodium album Linn.*	Chenopodiaceae			+	+			
10	*Cotoneaster*	Rosaceae		+			+		
11	*Digitalis purpurea*	Plantaginaceae			+	+	+		
12	*Diplazium spp.*	*Dryopteridaceae*			+				
13	*Euphorbia spp.*	Euphorbiaceae		+		+			
14	*Gentiana ornata*	Gentianaceae			+	+			
15	*Gypsophilla cerastioides*	caryophyllaceae			+		+		
16	*Impatien spp*	Balsaminaceae		+			+		
17	*Juniperus spp.*	Cypressaceae		+		+			
18	*Lotus corniculatus*	Fabaceae		+					
19	*P. wallichiana*	Pinaceae	+			+	+		
20	*Pedicularis hoffmeisteri*	Scrophulariaceae			+	+			
21	*Picea smithiana*	Pinaceae	+				+		
22	*Pinus roxburghiana*	Pinaceae	+			+	+		
23	*Podophyllum hexandrum*	Podophyllaceae		+		+			
24	*Polygonum*	Polygonaceae			+	+			
25	*Potentilla argyrophylla*	Rosaceae			+				
26	*Potentilla atrosanguinea*	Rosaceae			+				
27	*Potentilla fulgen*	Rosaceae			+				
28	*Potentilla nepalensis*	Rosaceae			+				
29	*Q. semecarpifolia*	Fagaceae	+				+		
30	*Quercus leucotrichophora*	Fagaceae	+				+		
31	*Rhododendron spp.*	Ericaceae	+			+			
32	*Rosa spp.*	Rosaceae		+		+			
33	*Roscoea alpina*	Zingiberaceae			+	+			
34	*Rumex nepalensis*	Polygonaceae		+		+			
35	*Saxifraga spp.*	Saxifragaceae			+				
36	*Selinum veginatum*								
37	*Taraxacum officinale*	Asteraceae			+	+			
38	*Trifolium pratense*	Fabaceae			+	+			
39	*Trifolium repens*	Fabaceae			+	+			

*T-Tree, H-Herb, S-Shrub, E-Ethno-botanical, MU- Multiple uses, Ti-Timber, F-fuel

Fauna: the wilds animals found in the study area are listed in table 3. It is reveled that no any animals found to here which included in the list of endangered species of the world. The development of the forest in the area will help protection as well as expanding the habitat for these wild animals.

Table: 3.List of Wild animals in the Study Area

Sr.No.	Common Name	Scientfic Name
Mammals		
1.	Jungle cat	*Felis chaus*
2.	Himalayan black bear	*Selenarctos thibetanus*
3.	Himalyan fox	*Vulpes bengalensis*
4.	Goral	*Nemorhaedus goral*
5.	Red faced monkey	*Macaca mulatta*
6.	Himalayan langur	*Presbytis entellus*
Birds		
1.	Jungle fowl	*Gallus gallus murghi*
2.	Impeyan pheasant	*Lophophorus impejanus*
3.	Chakor	*Alectoris graeca*
4.	Gray partridge	*Fancolinus pondicerianus*
5.	Whistling thrush	*Myophoneus caerulens*
6.	Himalayan pied woodpecker	*Cryobates himalayenensis*
7.	Red vented bulbul	*Molpastes cafer*
8.	Blue bearded bee eater	*Alcemerops althertoni*
9.	Hill myna	*Gracula religiosa*
10.	Himalayan griffon vulture	*Gyps himalayensis*
11.	Himalyan barred owlet	*Glancidium cuculoides*

Source: Forest Department, Himachal Pradesh

Cultural Heritage: Pagoda like temple lies by the majestic Lake of Parashar and beckons us to the Rig vedic period. Great Sage Parashar is regarded to have meditated here and the lake is embodiment of Parashar. clear lake water no human habitation around the lake, So, water is considered as holy water and taken to home for worship. Religious importance of this lake is, people relate it to their social values because this lake sacred to lord Vishnu and have a high sacred significance.

Local Human Population: Only little human habitation is occur in the form of temporary hamlet of Gujjer community. Very low literacy rate leads people toward rearing of Buffalo, sheep and goat, many of them involve in sale of Milk and it's by products like Ghee, Pineer etc. They migrate along with Buffalo, sheep flocks and goat herd toward low altitude or plane area in the winter season. And come back at their temporary hamlet in summer season.

Visitor and Visitor Facilities: Very few people are coming to lake in summer season except shepherd of this region. But number of peoples comes to Lake at the time of Annual Pilgrimage or holy Yatra in the month August and September. People have to make its own arrangement of Boarding and lodging for pilgrimage. Otherwise people go back on the same day stay in Mandi town. Little arrangements are made by Government, only two Gust house are available here for night stay. Along with it Temple authority also arranges some accommodation for pilgrimage. There is Kachha pathway to lake but pilgrim fallow the path of Gaddi who grazing their sheep flock in this region in summer. This is totally a trekking route. This area is endowed with a rich diversity; attract number of trekkers, mountaineers, and other people who are keen interested in art and culture, traditions customs of the peoples.

Scientific Research and Facilities: There are no scientific study have been conducted in this region. First time this lake is studied by us.

Conservation values: Still this lake or valley is untouched and unexplored, so no any pressure of ecological imbalance in this area. There are no any activities done by government officials regarding forest and environment. Even that pilgrimage is also not registered and organized by state government. This area is visited only by local Gujjer community for grazing their Buffalos, sheep flocks in summer season. Otherwise in winter season this valley is totally closed by heavy snowfall. Vast area is cover with derbies of fallen tree. Due to inaccessibility, local peoples are not able to get it for their domestic uses. All the accessible Pasture land is used by local migratory herds. Roads are going to be constructed in this valley. No Pressure of solid waste, over grazing and herbs collections.

Ethnobotanical Conservation Matrix: it is documented that the accomplishments of native people in understanding the plant properties so extensively must be simply that result of long and intimate association with their floras experimentation and their letter dependence on flora for living. Area under this study is such a hot spot which have pockets of tribal population alongwith areas of endemic centers. Plant diversity centers may form the mosaic of conservation area matrix. A proper appreciation of Biodiversity and a meticulous cataloging of it are the essential first steps in any effort for its conservation, weather in situ or ex-situ.

Conservation & management:

Due to unexplored and untouched valley government should make proper management plan for the development of this region particularly in the area of eco tourism, religious tourism and understanding local culture for foreign tourists. Literacy of this valley is very low so extinctive development of this region to be done in future. No management plan is prepared for this lake i.e, for organizing festival, making roads, clear trekking route, temporary camp, tents for pilgrims etc. Little work is done by Local Temple authorities, they providing Sarai /Guest house only for two or three days at near the lake.

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