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IMPACT OF ANTHROPOGENIC ACTIVITY AND LAND USE PATTERN ON THE ECOLOGY OF CHATLAM WETLAND KASHMIR HIMALAYA

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ABSTRACT

The anthropogenic intervention and land use pattern in the catchment area of suburban wetland Chatlam in Kashmir Himalayan valley has been evaluated together with its impact on the ecology of the ecosystem. The catchment area of the wetland houses 12 hamlets inhabited by about 4000 families in the catchment with human population of 33000 and cattle head count of 11800 which variously affects the ecology and general health of the lentic ecosystem. The assessment of land use practice in the catchment indicates 1330 ha under various agri-horticultural activities involving annual use of 263 metric tons of fertilizers and 1.73 metric tons of pesticides. Saffron cultivation accounts for 79%, paddy 14% and the rest under willow/popular cultivation. The combined effect of intensive agricultural practices and horizontal expansion/urbanization together with unsustainable exploitation of wetland resources has drastically altered the environmental status of the wetland. Reduction in the wetland area from 44 to 39 ha with inherent potential of avifaunal habitat deterioration is a major environmental concern. The paper stresses on the need for proper catchment area treatment and ecological rehabilitation of the ecosystem.

Keywords: Catchment, Land use, Anthropogenic intervention.Catchment, Wetland.

I.INTRODUCTION

Aquatic ecosystems together with their catchments including the entire watersheds are reciprocally integrated and the scientific management of an aquatic ecosystem in isolation from its catchment and watershed environment is a difficult task. Varied human activities in the catchments have direct as well as indirect impacts on the ecology of such ecosystems which at times result in serious environmental manifestations like red tides, anoxic conditions including fish mortality, avifaunal deaths due to chemical contamination etc. Keeping in view great socio-economic importance of wetlands on one hand and their vulnerable environmental status on the other, wetland research gained impetus through Ramsar Convention adopted in 1971 and a number of workers

like Khare (1989), Mander and Jongman (2000), Mender and Jensen (2002), Triouris *et al*. (2002), Pant *et al.* (2003), Guild *et al*. (2004), Jain *et al.* (2007), Kiage et al. (2007), Rai (2008), Dhir *et al.* (2009), Melendez-Pastor *et al.* (2010), Alam *et al.* (2011), Molur *et al.* (2011), Singh (2012), Singh and Kumar (2014) etc have worked on varied aspects of the wetlands.

Meybeck (1982) found that excess of nutrients may locally enhance planktonic primary production carbon sequestration. Lake catchment is frequently a major determinant of lake water chemistry, it often has important effects on species composition and community structure and consequently, on function of lake ecosystem . The amount and quality of inputs in lake depends on types of vegetation and catchment area. A lake with intense agriculture activity on its catchment area is likely to have high nutrient concentration and productivity.

In Kashmir valley Zutshi studied the impact of human activities on the evolution of Dal Lake environment. Pandith attempted to assess the impact of human settlements on Dal Lake ecosystem.Khan 1977 provided information on endangered Dal Lake ecosystem with special reference to human impact. Khan related the biological invasion and development of red tide in Dal Lake to anthropogenic perturbations in the lake environment, Wanganeo et al., also related the decline in bird population in vindhyan ecosystem to human interference.

II.MATERIALS AND METHODS

Chatlam wetland also called as BODSAR with total area of 2.1 sq. km, water covered area of 0.7 sq km and marshy area of 1.4 sq km (**latitude 34^0-1` long. $75^0$ 58`**) lies about 16kms twords the south of Srinagar city. The wetland is permanent but relatively shallow water body with fluvial origin and enjoys a sub Mediterranean climate. The wetland having an area of 2.1 km2 is surrounded by a vast catchment extending from Pampore and Bagi-inayatullah in the west and Konibal and Wuyan in the east. The 12 hamlets spread in the catchment inhabit a human population of about 33000 utilizing the water body for various purposes like fishing, hunting and drining water out of the wetland for irrigation and domestic usage. The cattle head count of 11805 in the catchment also pose a heavy grazing pressure on the wetland. The expanding agricultural activities in the catchment are marked by various land use practices dominated by saffron and rice cultivation.

The adjoining areas around the Chatlam wetland were surveyed to demarcate the catchment. The catchment was divided into various sub catchments each of wich inturn was surveyed for collecting information on human and cattle population. The information on land use/ land cover pattern was collected besides local survey, from Revenue records and Agricultural Department, Govt. of J&K.

Twelve villages were identified in the catchment of Chatlam wetland during the present survey,sustaining a total of 4000 families with an approximate human population of 33000 and cattle head count of 11800. The village wie break up of human and cattle population is depicted in Table-1. The trend of human settlements in the

catchment reveal that Pampore, Wuyan, konibal and Ladoo are the high pressure zones followed by relatively lower ones including Bagi-inayatullah, Meej,Munpoor and Gundbal.

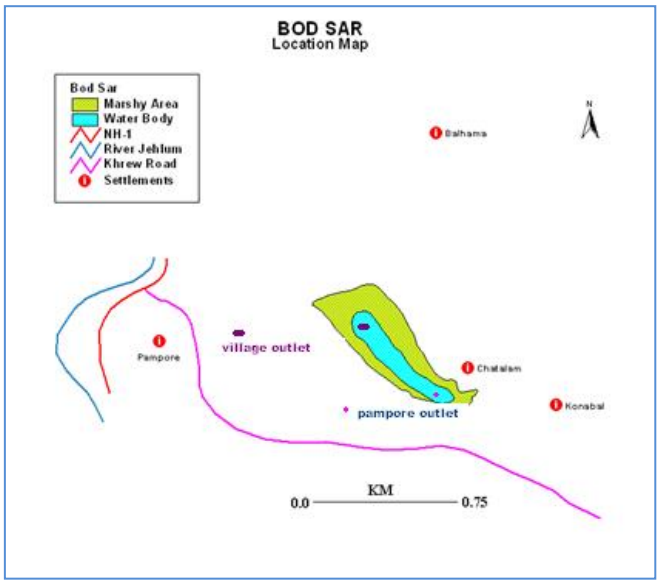

Table 1 . Fertilizer and pesticide load used annually in the catchment of Chatlam wetland, Pampore.

Name of the localities in the catchment	Fertilizer and pesticide used in Kg	
	Fertilizer used (Kg)	Pesticide used(Kg)
Lalpora (chatlam)	17585	165
Konibal	40765	71
Bagi-inayatullah	2055	22
Wuyan	46610	460
Meej	17222	157

Munpoor	**16830**	**200**
Pampore	**80738**	**33**
Chandhora	**22120**	**351**
Krantz	**3000**	**38**
Gundbal	**3100**	**54**
Ladoo	**8500**	**110**
Doos	**4600**	**76**
Total	**263125**	**1737**

Table 2:

Population survey in the catchment of Chatlam Wetland

Hamlet	**Human population**	**Cattle head count**
Lal pora (chatlam)	**1400**	**800**
Konibal	**3500**	**1600**
Bagi-inayatullah	**300**	**145**
Wuyan	**6000**	**1800**
Meej	**1500**	**350**
Munpoor	**1250**	**360**
Pampore	**12000**	**4500**
Chandhora	**2450**	**1100**
Krantz	**380**	**130**

Gandbal	**320**	**100**
Ladoo	**3200**	**800**
Doos	**410**	**120**
Total	**32,710**	**11,805**

Table 3: Land use pattern in the catchment of Chatlam wetland , Pampore

Hamlet	**Land use/Land cover pattern in hactare**				
	Paddy	**Vegetable**	**Willow & Popular**	**Saffron**	**Total**
Lalpora	26	4.5	-	80.9	111.3
Konibal	8	5	2	243	258
Bagi-inayatullah	3	1	-	9	13
Wuyan	75	10	-	210	295
Meej	20	9	-	80	109
Munpoor	25	12	-	65	102
Pampore	1	5	5	500	511
Chandhora	50	15	-	75	140
Krantz	5	2	-	12	19
Gandbal	7	3	-	10	20
Ladoo	12	8	4	30	54

Doos	8	6	-	15	29
Total	240	80.5	11	1329.9	1662.9

III.SURVEY AND DESCRIPTION OF THE STUDY AREA

The data on Land use /Land pattern in the catchment of the wetland clearly depicts the saffron, paddy and vegetables to be the main agro-horticultural practices followed by a large area. There are no natural forests in the catchment,however a small area 11 ha is under willow/ popular cultivation and a small area of1.5 ha includes fallow land (Rakh) used particularly for grazing purposes (Table 2). Aange of fertilizers (Table 3) find use for the agro horticultural purposes mainly Diammonium phosphate (DAP) ,potash and Farm yard manure. About 263125 kg of fertilizers were estimated to be used annually in the catchment of the wetland. Besides fertilizers different types of pesticides , mainly including Butachlor,benzenehexachloride,Nuvan,Foret granules, Hexacanazol, Zirom, Mancozeb, Adephanphas etc., are used in high doses irrespective of recommended schedules. The annual use of about 1800 kg of pesticides was recorded during the study period.

The growing population in the immediate catchment of the wetland contribute to the heavy nutrient inputs particularly nitrogen and phosphorus causing a shift in trophic status of the wetland and its evolution from mesotrophy to eutrophy. During the study period an anthropogenic input of 114.7 metric tons and phosphorus input of 30.5 metric tons was estimated for the water body.This is however , relatively less than nitrogen and phosphorus inputs of Dal Lake where Ishaq (1985) estimated their anthropogenic input of 500 metric tons and 70.8 metric tons respectivlly. This discrepancy in the nutrient load of the two water bodies is obviously a reflection of the impact of increasing urbanization on Dal Lake as compared to Chatlam wetland. In addition to this nutrient loading the large quantities of solid waste both degradable and non biodegradable finds way in the water body there by causing the gradual filling in of the water body.

The assessment of catchment components under different agri/ horticultural practices (Table 2) reveal that most of the land is under saffron and paddy cultivation that suffer usually for irrigation due to water scarcity (drought) conditions prevalent during recent times. The people however drain the wetland waters both mechanically and manually there by causing drastic hydrological fluctuations in the already water starved Chatlam wetland. These hydrological fluctuations coupled with high sedimentation / siltation rate have caused

the fragmentation of the wetland habitat and its compartmentalization into marshland , aquatic vegetation zone, open water area, silted area, and willow plantation there by drastically influencing avifaunal diversity and distribution vis-à-vis affecting macrophytic community architecture of this ecosystem.

After paddy cultivation vegetable cultivation comprises the dominant agro horticultural activity consuming heavy quantity of fertilizrs and pesticides that are ultimately leached out into water body thereby adding to its nutrient status. Such eutrophication at times leads to blooming phenomenon. Khan relates such blooms in Dal lake to anthropogenic perturbations in the lake environment.

Due to the absence of natural forest cover in the catchment, the erosion rate is considerably higher as compared to well forested wetlands. Watershed management technologies in tune with socio economic concerns and strong data base is needed with effective coordination between various governmental agenciesfo planning, monitoring and evaluation at various levels by ensuring the active involvement of local people in preparation, execuation and maintenance of the watershed structures. For this an integrated and holistic approach is, however, needed for complete evaluation of catchment components by employing modern techniques lke Remote sening and Geographical Information system (GIS).

The burgeoning human and cattle population in the wetland catchment and unsustainable exploration of wetland resources is a potential threat to the carrying capacity and the very survival of the wetland. The local people utilize the waterbody quite non judiciously for hunting, fishing and macrophytic harvesting there by threatening its gene pool. The ignorance of the people and state machinery is reflected by the fact that the pesticides like BHC banned the world over are still in vogue at an alarming high rate.

IV.CONCLUSION

The present study stresses need for an integrated approach for the catchment treatment for reducing the surface run-off and improving sub soil regime, reducing rateof erosion and nutrient loss in he catchment and diversifying the land use pattern. These objectives can be achieved by following sound conservation strategies and discussed by Khan. Eroding pastures (fallow land) for reducing grazing pressures, undertaking massive afforestation for conserving soil and minimizing nutrient liss, going for biological pest controlfollowing integrated pest management programme (IPM) , and launching mass awareness campaigns by active involvement of edia, both print and electronic and NGO;S for the urgent ecorestoration of the wetland.

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