



ECONOMIC VALUE ASSESSMENT OF BHINDAWAS WETLAND, JHAJJAR HARYANA (INDIA)

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ABSTRACT

Valuing the economic benefits of wetlands can help to set priorities and allocate spending on conservation initiatives. The objective of the present study was to find out the value of goods and services provided by the Bhindawas wetland to the surrounding people. Bhindawas wetland spreads over in 1074 acres in Jhajjar district of Haryana state. A random survey of the houses around the lake was carried out using a standard questionnaire format exclusively designed for this purpose with interviews and direct observation. Market price techniques were used to find out the economic valuation in which the prevailing prices for goods and services traded in domestic or international markets are used for quantifying wetland resources. The total economic dependency value of direct benefits from Bhindawas wetland were calculated Rs. 24167/day.

INTRODUCTION

Wetlands with a share of 0.0001% among the global water sources include swamps, marshes, bogs and similar areas are an important and vital component of the ecosystem (IUCN 1996). A wide variety of wetlands exist across the continents because of regional and local differences in hydrology, vegetation, water chemistry, soils, topography, climate and other factors.

Wetlands perform a variety of functions (Groot 1992). First, wetlands perform regulation functions - wetlands regulate ecological processes that contribute to a healthy environment e.g. recycling of nutrients and human waste, watershed protection and climate regulation. A second function of wetlands is called carrier function: wetlands provide space for activities such as human settlement, cultivation, energy production and habitat for animals. Third, wetlands perform production functions. Wetlands provide resources for people such as food, water, raw materials for building and clothing. The last wetland function is information function in the sense that wetlands contribute to mental health by providing scientific, aesthetic and spiritual information (Prasad et al. 2002, Palanisami et al. 2010, Pant and Verma 2010, Kathiresan and Thakur 2008).

Bhindawas bird sanctuary is a low-lying area in district Jhajjar (Haryana). It is located 15km away from Jhajjar district headquarter and 80km from Delhi located at 76° 31' East

and 28° 32' West. Mean minimum and maximum temperature are 7°C (January) and 40.5 °C (May & June), whereas mean annual rainfall is 444mm in the study area. The wetland and birds in it are the main attraction of the complex. More than 30,000 varieties of migratory birds belonging to over 250 species and resident birds visit the wetland throughout the year. Some of the migratory birds and resident birds: Whiskered Tern, Greater Flamingo, Graylag Goose, Comb Duck, Mallard, Ruddy Shelduck, Great Cormorant, Eurasian Wigeon, Common Teal, Northern Pintail, Common Pochard, Bar-headed Goose, White-throated Kingfisher, Gray Francolin, Black Francolin, Spotted Owlet, Spot-billed Duck, Greater Coucal, Little Grebe, Black-rumped Flameback, Indian Roller, Common Hoopoe, Eurasian Collared Dove, Black Drongo, Plum-headed Parakeet, Rock Pigeon, Laughing Dove, Jungle Babbler, Oriental Darter and Rose-ringed Parakeet. Their number decreases during the summer and picks up during winter. The sanctuary spreads over an area of 1074 acres, which makes it considerably larger. The peripheral embankment is man-made and basically constructed to store the escaped water of the Jawaharlal Nehru Canal through an escape channel at the time of power failure in the Pump House made on the canal. Excess water of the wetland is siphoned off in the drain No. 8 through outlet channel. Drain No.8 extending the Nai Nallah drain from Gohana to Delhi, discharging into the Najafgarh drainage system at the Bhindawas Lake. Najafgarh drain connects

Bhindawas Lake and the Yamuna River. Drain No. 8 is a recipient of storm water as well as sewage, because some towns have a combined system of disposal for sewage and storm water.

Wetlands also have socio-cultural value though it is still relatively unexplored. It is known that wetlands have religious and historical values for many local communities (Schuyt and Brander 2004). Aquatic life forms play an important role in supplementing human diet and nutritional balance; besides, they also support the livelihood and income of a considerable section of society living around them (Jain et al. 2011). The objective of present study was to evaluate economic dependency of local community on Bhindawas wetland.

MATERIALS AND METHODS

Seven villages selected for socio-economic studies around the wetland were Bhindawas, Sahajapur, Bilochpura, Chadwana, Raduwas, Kanwa and Kungiya. Questionnaire was prepared containing demographic information such as family history, domestic water usage, groundwater usage, irrigation, other commercial uses, water uses for livestock, livestock fodder, aesthetic value and recreation, fishing and aquaculture, spiritual value and health effects etc. Questionnaire performas filled in by villager were used for

calculating economic value of wetland resources. Total 140 questionnaires were filled by villagers of seven villages (20 from each village located in the vicinity of the lake). 70 males and 70 females aged between 20 to 60 years and education standard above 10th class were also randomly interviewed. Market price techniques was used to find out the economic valuation in which the prevailing prices for goods and services traded in domestic or international markets were used for quantifying wetland resources.

Market price method

$$\text{Gross benefit} = q \times p$$

Where, q = quantity of products, p = market prices

RESULTS AND DISCUSSION

Valuing the economic benefits of wetlands can help to set priorities and allocate spending on conservation initiatives. Valuation can also be used to consider the public's values of wetland systems and encourage public participation in certain initiatives (Table 1). Putting an economic value on the ecological services of a wetland is a difficult idea for most people. More commonly, the open market puts rupees values on society's goods and services. In the case of wetlands, there is no direct market for services such as clean water,

Table 1. Classification of total economic value for wetlands

Use Value/Benefits			Non-Use Value/Benefits
Direct Use Benefits	Indirect Use Benefits	Option and Quasi-Option Benefits	Existence Benefits
-recreation	-nutrient retention	-potential future	-biodiversity
- boating	-flood control	uses (as per direct	-culture
- fauna (birds, etc.)	-storm protection	and indirect uses)	-heritage
- wildlife	-groundwater	-future value of	-bequest
- viewing	recharge	information, e.g.,	
- walking	-external ecosystem	pharmaceuticals,	
- fishing	support	education	
commercial harvest	-micro-climatic		
- fish	stabilisation		
- fuel wood	-shoreline		
- transport	stabilisation, etc		
- nuts	-water filtration		
- berries	-erosion control		
- grains			
- peat/energy			
forestry			
-Wildlife harvesting			
- agriculture			

Source: Barbier et al. 1997



Figure 1. Photographs of Bhindawas wetland (A) Animal grazing (B) Fodder collection by women (C) Fuel wood collection (D) Tube well for irrigation

maintenance of biodiversity and flood control. There is, however, a growing recognition that such natural benefits do have real economic value and that these values need to be included in decision-making processes.

The results of socio-economic survey in 7 villages have been given in Table 2 while photograph of Bhindawas wetland in Figure 1.

Irrigation Water: Wetland water was not used directly for irrigation purpose by the surrounded villages, but indirectly from the channel adjacent to wetland in which water come from the wetland and inlet water channel from JLN (Jawahar Lal Nehru) canal to wetland used for the irrigation. A total of 18 Tube wells were installed on the adjacent channel and 103 Tube wells were installed on the inlet channel. The farmer use water directly from these channels. On the basis of survey it was also observed that market value of irrigation of one acre was Rs. 200 without fuel of pump engine in surrounding area, one Tube well irrigated approximate 50 acre area in a year. Total economic dependency for irrigated water from inlet and adjacent channels to the periphery was calculated

Rs. 493 and Rs. 2822 /day, respectively. Even in the surrounding fields, wetland increases the availability of moisture and nutrients by which crop farming area has increased, considering the fact that wetlands have all year round reliable moisture for crop growth. Successes in socio-economic development to local communities from use of wetlands for crop farming have also been reported by Dixon and Wood (2003) in Ethiopia.

Fuel wood: On the basis of questionnaires it was noted that about 75 individuals collect the 10 kg fuel wood per individual per day especially poor people of the surrounded village. The market rate of fuel wood was Rs 7/ kg. So the total dependency value of fuel wood was Rs. 5250/day.

Animal Fodder: Women of the surrounded villages also harvested grasses from the wetland to feed their cattle. On the basis of survey, it was found that approx. 100 women, on an average of 15kg fodder was collected per women per day. The market value of the fodder is Rs. 3/ Kg. Beside about 130 animal grazed in the wetland area. The economic dependency of communities for animal fodder in Bhindawas

wetland area was around Rs. 6450 /day. Kakuru et al. (2013) reported that wetlands were also valued for provision of fodder, especially during the drought periods, when alternative pastures were not readily available. Pastures from wetlands not only provided fodder but also enhanced milk production, thus contributing to food security. However, most of the wetlands suffer from overgrazing. Overgrazing disturbed shore and led soil compaction due to removal of vegetation (Janson and Robertson 2001).

Fishing: Fishing is not allowed in the wetland though people from Bilochpur do it illegally in night which is difficult to account and not included in this study. Drain No.8 receiving water from the wetland outlet was rich in fish and the annual contract of fisheries of drain No.8 near the outlet was Rs. 5 lacks. Ponds receiving water from the wetland are used for fisheries and annual contract of these ponds were Rs. 3lakh 20 thousands. Total value of fishing from drain No. 8 and ponds were Rs. 2247/day. Gupta and Kaushik (2012) mentioned there are in all 8065 ponds in Haryana out of which 90% are fish ponds producing 1,00,000 MT of fish worth crores of rupees. A net profit of Rs. 61000 per hectare per year is obtained.

Labour under various Govt. schemes. People from surrounding villages are also employed for labour work in the wetland under various Govt. schemes like Mahatma Gandhi National Rural Employment Guarantee Act and Weed Cleaning Scheme from the forest department Haryana. Total value of labour work was Rs. 6905 per day.

Many research studies indicated that wetlands support millions of people and provide goods and services both directly and indirectly. The direct benefits of wetlands are in the form of fish, agriculture, fuel wood, recreation and water supply etc. and their indirect benefits arise from functions occurring within the ecosystem such as flood control, ground water recharge and storm protection. Kakuru et al. (2013) reported that wetlands provide food and non-food products that contribute to income and food security in Uganda. They determined the economic value of wetland resources and their contribution to food security in the three agro-ecological zones of Uganda. The per capita value of fish was approximately US\$ 0.49 person per person. Fish spawning was valued at approximately US\$ 363,815 per year, livestock

pastures at US\$ 4.24 million, domestic water use at US\$ 34 million per year, and the gross annual value added by wetlands to milk production at US\$ 1.22 million. Flood control was valued at approximately US\$ 1,702,934,880 per hectare per year and water regulation and recharge at US\$ 7,056,360 per hectare per year. While, socio-economic impacts of wetland cultivation in southwest Ethiopia was identified by Mulatu et al. (2015). They reported that greater number of households (65.48%) interviewed were benefited from wetlands cultivation. About 23.4% of them collected medicinal plants from wetland in their life time. 91.27% collect wetland grass for thatching, 69.84% of them used domestic water from wetlands springs near wetlands, 91.67% of them used water from wetlands for livestock, while 100% of them used grasses from wetlands for plastering wall and for fodder. Similar studies on socio-economic benefits of wetlands from different parts of world were reported by Mark Drew et al. (2005), Setlhogile et al. (2011) and Jogo and Hassan (2010).

However limited research has been made on socio-economic aspect of lakes and wetlands in India. Ramachandra et al. (2005) discussed valuation of ecosystem considering the direct, indirect and existence benefits. They conducted economic valuation of Amruthalli and Rachenahalli lakes situated in Bangalore. Higher benefits were obtained from Rachenahalli lake (Rs. 10435/ha/day) but it was about Rs. 20/ha/day for Amruthelli lake. Similarly Ramachandra et al. (2011) evaluated the socio-economic benefits of Varthur wetland in India. They observed that Varthur, a sewage fed wetland has a value of Rs. 118.9/ha/day. The direct benefits from wetland in the present study were Rs. 24167/day (Rs. 56/ha/day). The economic dependency of people living around Bhindawas wetland was therefore less than those living around Rachenahalli and Varthur lakes.

It is concluded that Bhindawas wetland play important contribution to the livelihoods of the surrounding community in terms of socio-economic benefits. Such contribution not only involve animal fodder and fuel wood, but also some specific goods and services such as increase in crop production through irrigation. The dependence of the poor community especially for fuel wood was higher. The economic dependency of local community on Bhindawas was Rs. 24167/day.

Table 2. Economic valuation of Bhindawas wetland

Wetland	Direct use		Indirect value	Existence value
	Use	Value in Rupees/day		
Bhindawas	1. Irrigation Water		• Ground water table varies from	• Birds and migratory birds
	. From the wetland	Nil	10 (vicinity of lake)	• Culture and heritage value.
	From Channel adjacent to wetland	493	- 80ft (at 2-3 km away from lake).	
	Inlet Channel from JLN canal to wetland	2822	Ground water quality improved near wetland	
	2. Fuel wood	5250	Wetland received flooded water from surround area and store the excess water of drain no. 8 in rainy season and reduce the load on drain and protect the drain from damage.	
	3. Animal Fodder			
	Grasses harvested by women	4500		
	Animal Grazing	1950		
	4. Fishing		Aprox. 2000 tourist and 1000 student were visit for recreational and education purpose in a year.	
	From the wetland	Nil		
	Drain no.8 near the lake outlet	1370		
	Chadwana village Pond adjacent to wetland	877		
	5. Labour under various Govt. scheme	6905		
Result	Total value is Rs. 24167/day		Ground water recharge and flood protection mainly received water from drain no.8	Functional aspects, biodiversity, cultural and recreational aspects indicate importance of wetland eco system.

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