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Education is a tool for conservation of East Kolkata Wetland in West Bengal: A case study

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ABSTRACT

Wetlands have been identified as one of the key life support systems on this planet in concert with agricultural lands and fish production. Wetlands are most important natural resources. They are a vital element of national and global ecosystems and economies. Wetlands perform many functions that maintain the ecological integrity and also provide many goods and services (Groundwater recharge, shoreline stabilization and flood storage are particularly important). The functions and benefits provided by wetlands are especially important for the general public as it support agriculture, tourism, and biodiversity conservation, social, economic and cultural activities. In the State of West Bengal the only Ramsar site is the East Kolkata Wetlands. The study area is a particular wetland under this Ramsar site covering approx 102.92 ha not only provides livelihood to the surrounding poor people but also act as a life support system in this area. The activities, ecological importance and growing threats have been discussed in this paper along with suitable remedies for better management and future scope.

Keywords: Wetlands, Ramsar Site, Wetland based occupations, Wetland conservation, People's Perception.

INTRODUCTION

Wetlands are an important source of natural resources upon which rural economies depend. They have increasingly been valuable for their goods and services, and the intrinsic ecological value they provide to local populations, as well as people living outside the periphery of the wetlands. Stakeholders' participation is essential to the protection and preservation of wetlands because it plays a very important role economically as well as ecologically in the wetland system. The objective of this study was to determine whether gender, educational status and wetland functions have any influence on the local community. So, the conservation of wetland is one of the most significant indicators of a country's development.

Wetlands are defined as 'lands transitional between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water [1]. The value of the world's wetlands are increasingly receiving due attention as they contribute to a healthy environment in many ways [2].Water is the main dominating factor for controlling the unique characteristics of wetlands. The three main features of wetlands are: (1) groundwater at the surface or within the soil root zones (2) specialized wetland vegetation (hydrophytes), and (3) hydric soils [3]. Wetlands are often described as "kidneys of the landscape" (Mitsch & Gosselink 1986). Hydrologic conditions can directly modify or change chemical and physical properties such as nutrient availability, degree of substrate anoxia, soil salinity, sediment properties and pH. These modifications of the physiochemical environment, in turn, have a direct impact on the biotic response in the wetland [4]. The wetlands exhibit enormous diversity according to their genesis, geographical location, dominant plants and soil or sediment characteristics. The wetlands exhibit enormous diversity according to their genesis, geographical location, dominant plants and soil or sediment characteristics. Naturally, an estimate of a monetary value for wetlands and attitudes toward wetland conservation is the major factor to be considered in policy decisions. Wetland is very important source of natural resources, upon

which the rural economy depends. Wetlands provide many substantial benefits not only to local society, but also to the people, who live far away from wetlands. These benefits are mainly numerous services, flood control, groundwater recharging and pollution reduction. Naturally, from the point of view of economy as well as ecology, the significance of wetland and stakeholders' participation for preserving the wetland is huge [5]. According to Ramsar Convention (1971), wetlands are, " areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six metres". In the year 2002 East Kolkata Wetlands has been recognized a wetland of international significance (Ramsar site no. 1208) to understand the concept of 'wise-use' [6]**.** Science and Environmental Education Society, New Delhi gave a very lucid and straightforward definition of wetlands. According to them," Wetlands are those areas that remain waterlogged or submerged under water, seasonally or throughout the year. Generally, the land is so muddy that one cannot easily walk over it, and the water is so deep that one can neither swim nor get drowned". East Kolkata Wetland, vast lowland is located at eastern fringes of Kolkata, West Bengal, India. East Kolkata Wetland was declared as Ramsar site on 19th August 2002 by Ramsar Convention Bureau. This Wetland stretches its area from South 24 Paraganas to North 24 Paraganas district, adjacent to eastern edges of Kolkata. This wetland is also important for its fishery, cultural and economical activities [7].

Wetland is very important source of natural resources, upon which the rural economy depends. Wetlands provide many substantial benefits not only to local society, but also to the people, who live far away from wetlands. These benefits are mainly numerous services, flood control, groundwater recharging and pollution reduction. Naturally, from the point of view of economy as well as ecology, the significance of wetland and stakeholders' participation for preserving the wetland is huge [8]. Two neural network models were created to estimate whether fisheries can accommodate the enhanced flow. Humans often deal with their waste by using instituted waste management systems in both pre-modern and modern forms [9]. So, the increasing stress on fresh water resources due to ever-rising demands and profligate uses as well as growing population and industrial establishment of Kolkata is an issue of great concern. The study investigated the influence of the land use and the plant species in the waterbed on the water quality of a high-altitude, sub-tropical wetland in India [8]. The estimation capabilities of neuro-genetic models were utilized to identify the inherent relationships between the Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), chlorine (Cl) and Chemical Oxygen Demand (COD) with the land use and wetland zoology. A thematic map of the quality parameters was also generated based on the identified relationship to observe the influence that the morphological and biological diversity in and around the study area has on the quality parameters of the wetland. According to the results, the BOD, COD and Cl were found to vary with differences in land use and the presence of different plant species, whereas the DO was found to be largely invariant with changes in these parameters. The reasons may be contributed to the impact of uncontrolled eco-tourism activities around the wetland [10]. On the other hand, extreme discharge of sewage and other effluents into the lake make the lake water unsuitable for drinking, bathing and the sustenance of the ecosystem as a whole. It is also attempted to identify the pollution level of the lake by employing the water quality index (WQI) method and the multivariate analysis [11]. Thus the impacts of the plantations on the SOC and the nutrients were firstly analyzed through comprehensive chemical analyses and the results were compared with the soil samples collected prior to plantation forestry. Significant changes were observed in SOC content, in nutrients, and in amounts of exchangeable cations [12]. Moreover, the last few decades we have witnessed an enormous rise in awareness of the importance of wetlands. Mathura beel has been assumed to take the attention in recent years because of its ecological significance in terms of flood control, water purification, aquatic productivity, and microclimatic regulation etc. The aim of this paper is to present a complete scenario of Mathura beel through different analyses. To materialize the main objective, the water quality monitoring, socioeconomic analyses, and a perception study on wetland use and wetland threat are considered separately. In this study, the objective was extended to observe the complete socio-economic status, and a detailed perceptional study on wetland use, and wetland threat. At the end of the study, detailed management options have been given to protect and to conserve the economy and the ecosystem of Mathura beel [9]. The micro- and macro-floral population of a wetland can absorb, convert, transform and release different organic or inorganic elements, which can also change or impact the overall quality of the wetland water. Bhomra beel is a floodplain wetland covering 264 ha, playing a crucial role to maintain economical and ecological environment of the region. This wetland is subjected for maximum threat from sedimentation. The overall objective of this paper is to highlight the socio-economic characteristics of the wetland dependent people and also to identify people's willingness to pay for preserving the wetland including management strategies to improve the situation of the existing condition.

EXPERMENTAL SECTION

Methodology

The study is done on the basis of both primary and secondary data. Primary data obtained from wetland dependent households surveys with questionnaire schedule which is done by household survey, personal meetings with Basanti

colony people, municipality members. Total 70 households are surveyed randomly in the Basanti colony. Some of the data and/or information collected from local guide. Secondary data are obtained from literature survey, study of journals, books where ever available and from internet also. Different maps (state, block, and village level), history and livelihood of the wetland dependent people were collected from books, journals, published papers etc. After that started analyzing the collected data on the basis of various types of calculation method. By taking the help of some statistical and cartographic techniques various aspects of the wetland dependent people in the study area are explained. During field survey collection of secondary data and information is included as a part of this study. Map of Bidhannagar municipality and wetland's map were collected from Bheri office. This pre-field study helps me a lot to understand socio economic condition of the wetland dependent people. In the stage of during field at first the entire area was observed by present scholar who visited several households on the random sampling basis and collected data through questionnaire schedule and took photographs. A household survey, focused group discussions and semi- structured interviews were conducted. In addition, analysis of stakeholders involved in wetland conservation was carried out.

Study area

The total area of East Kolkata Wetland (EKW) is 12741.30 ha comprising of 364 sewage fed fisheries, several other bodies, agricultural area, garbage disposal site, urban and rural settlement area. Out of this, total water area is about 5852.14 ha. Before 1930, the main source of water for the fisheries was the tidal Bidyadhari River. With the silting up of the river Bidyadhari, entire area became a vast derelict swamp with the elimination of tidal water in these areas [13]. At present dry weather flow leads to DWF channels amounting to approximately 1000 MLD as per Kolkata Municipal Corporation (KMC) [14]. Bidhannagar Municipality (Salt Lake City – 12.5 sq km) area was filled up with silt from the river Hooghly. In 1995 after the formation of the municipal board, an area consisting of a large part of the East Kolkata Wetland was added to the planned city, thus increasing the area from 12.5 sq km to 33.5 sq km. The Bidhannagar Municipality consists of 5 sectors, 24 wards, 39 blocks and 42 wetlands. There are 21 urban slums. Out of which three slums are in 17 no. ward which is situated near the Bheri being my study area and is located at 220 33'29.39'' North to 880 25'12.32" East. These three slums are Basanti colony, Nabapalli, RA Block colony and Nabapalli slum supplies maximum Bheri labourers. So, I carried survey work in the said slums. 20 sq km areas (out of 33.5 sq km) of Bidhannagar Municipality are wetland which is the part of the East Kolkata Wetland. Out of the total East Kolkata Wetland 15% is occupied by the Bheri. This Bheri is important due to its nearness to the municipal main settlements and eastern bypass road.

Climate of the study area is more or less sub-tropical with the annual mean rainfall around 150 cm. The maximum temperature during summer rises around 39^0C, while minimum temperature during winter is around 12^0C. The average temperature during most part of the year is around 30^0C during day time. Hydrology of this wetland is particularly different from any other aquatic systems. The wetland has as such no catchment area of its own, although an estimated amount of approximately 10 million gallons of sewage per day is being charged into it. So far as ground water is concerned, there is hardly any good aquifer up to a depth of 400 feet. Water is present in basically perched aquifers. The water table stands at a depth of 8m with a downward fluctuation of 1-2 m during summer. In the fishery water the average pH is 7.5 as regards the soil, there is no manner of doubt that it has very high moisture content of a mixed clay and alluvium type. This wetland is the left channel of the moribund Bidyadhari River. This wetland is made of fresh water because the connection with sea water was cut off. So, salt water did not enter. So, fresh water fisheries have been grown up here. The name of the fishes which are cultivated here are – *Rahu, Katla, Bata, Telapia, Magur, Silver Carp, Common Carp* etc. Here some vegetables also cultivated. These are - *Cauli-Flower, Bringal, Gouard,* and *Maize* etc. In this year the average fish production is 800 kg. After the formation of Salt Lake City sewage water of Kolkata is pumped out in this Bheri, developing the "sewage fed fisheries:" Since 1986 this Bheri was running on co-operative basis. At present 260 labourers are employed in this Bheri.

RESULTS AND DISCUSSION

In this part this paper has discussed about the various aspects of wetland dependent people through the following heads:

Demographic profile

Population composition of sample survey shows in this diagram, where about 256 sample populations have been surveyed. Out of total sample population 133 are sample male and 123 are sample female populations. So, the composition of population is more or less equal (Fig.1).

The most important demographic characteristic of population is its age-sex structure also known as population pyramids. Here the age-group of the people has been divided into three broad categories. Fig. 2 shows that the

proportion of group 14-60 years is very high, the proportion of elderly people is low when it is compared with the working age group. It is also shows that the proportion of dependency people is medium.

Education is an important social aspect. Education is the wealth of knowledge acquired by an individual after studying particular subject matters or experiencing life lessons that provide an understanding of something. Fig. 3 shows the level of education at different stages. Here the educational level of the surveyed people has been divided into six broad categories. This graph shows that the maximum number of male persons studied up to 5-8 standard and maximum number of females studied up to 4 standards. The level of higher studies is low in case of both male and female persons. It reveals that the economic condition hinder their higher studies. So the educational status of the surveyed people is low.

Socio-economic profile

Fig. 4 shows the occupational structure of the wetland dependent people. The maximum number of male peoples are engaged in fish production activity and maximum number of female population worked other activities such as maid servant, tailor, some of them act as a home tutor etc. so, there are variety of occupation found. Fig. 5 depicts the monthly income and expenditure of surveyed families. It reveals that the income and expenditure almost same most of the families and their savings also low. It also proves that maximum people belong in lower income group and they are BPL category people. Almost 6 to 7 families monthly income exceed Rs. 10000. Table 1 shows that maximum number of Bheri labourers is employed 12 to 20 years and 8 labourers are employed very early compared with previous labour. So the Bheri is old pronounced Bheri and the span of occupation of the Bheri labour also lengthy.

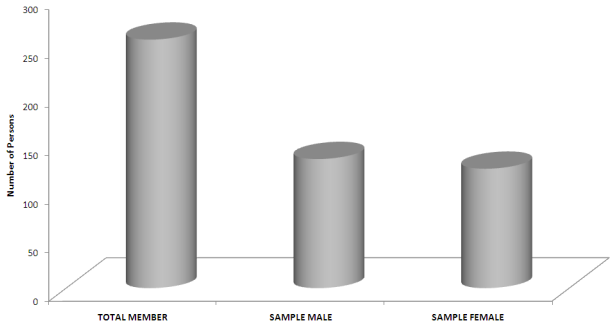

Fig.1:Population Composition of Sample Survey

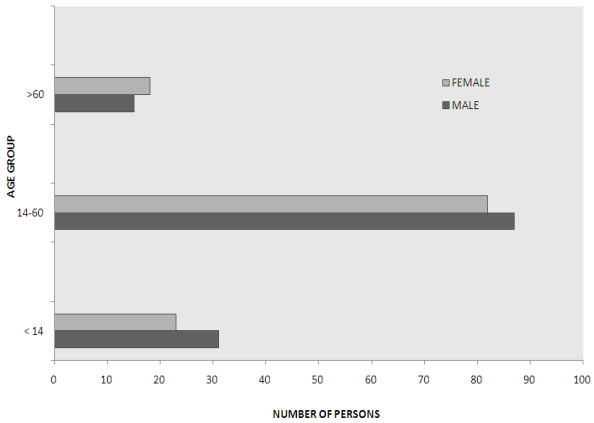

Fig.2:Age-Sex Structure of Sample Population

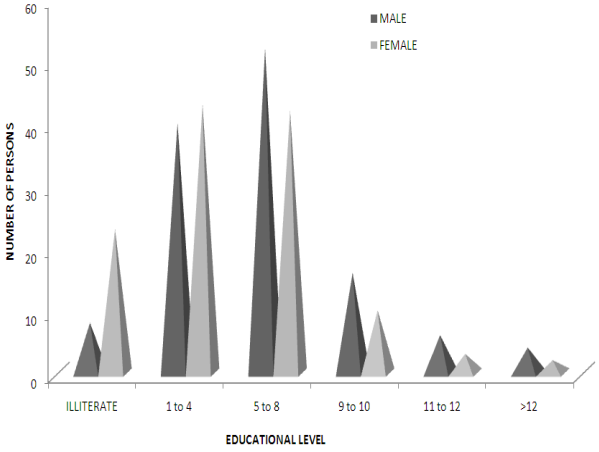

Fig.3:Education Structure of Sample Population

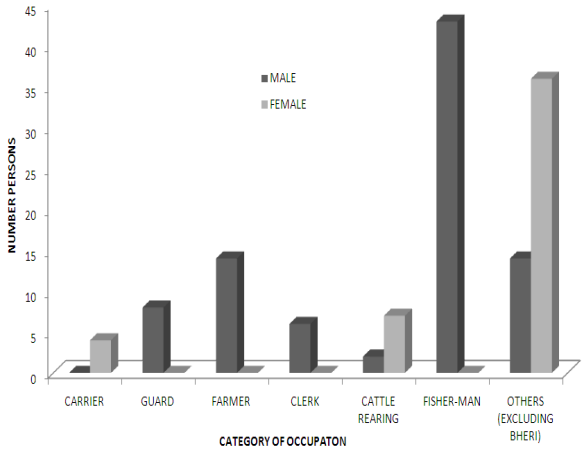

Fig.4:Occupational Structure of Sample Population

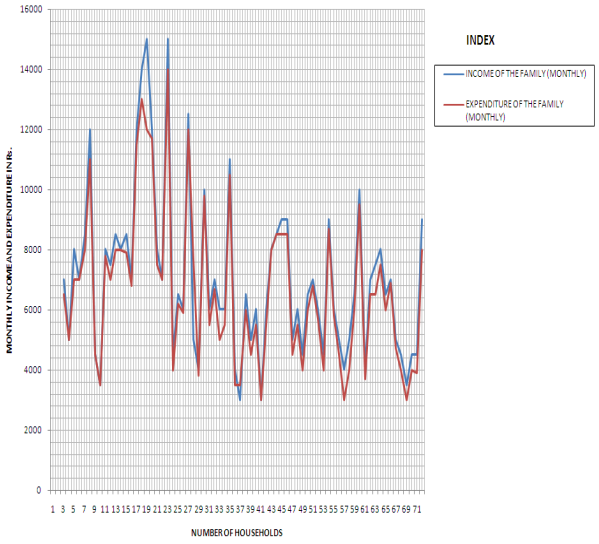

Fig. 5: Monthly Income and Expenditure per household

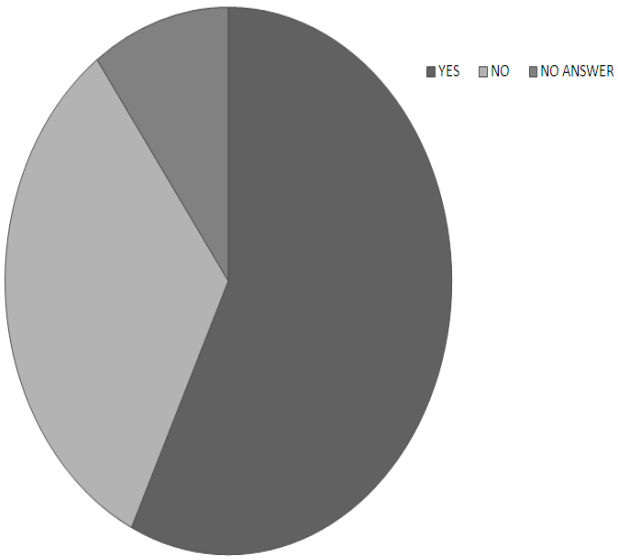

Fig.6:Number Of People Willing To Pay Money

Table 1. Occupation of the Wetland Labour

Span of Occupation	
Years	Number of People
<12	8
12 to 20	42
>20	20

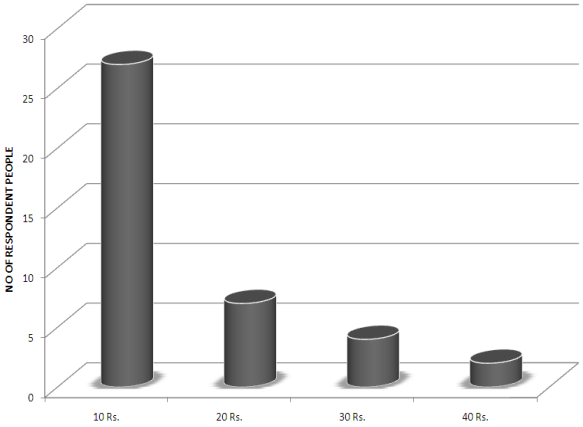

Fig.7: Willingness to pay

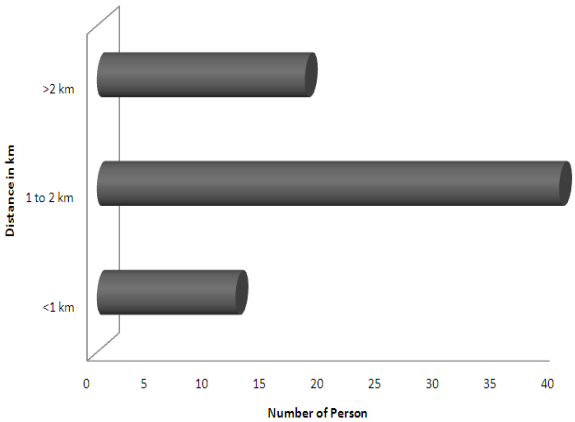

Fig.8:Distance of Houses from Wetland

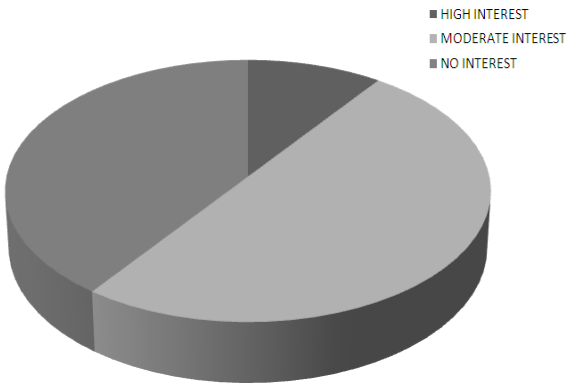

Fig.9: Interest for Conserving Wetland

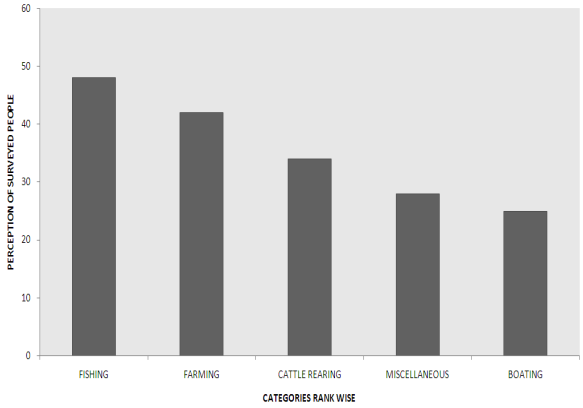

Fig. 10: Uses Of Wetland (Priority Rank)

Perception of wetland

Fig. 6 shows the number of people ready to contribute financially according to their limit for protect wetland. Among my interviewed persons 40 people are agreed to pay some money and denied 23 people and 7 are indifferent. So, they love their wetland for their livelihood. On the basis of above data the persons who are able to pay for conserving wetland how much they can pay that shows in this diagram. Here maximum numbers of people want to pay Rs. 10 and minimum numbers of people want to pay Rs. 40 for conserving wetland. It reveals that most of Bheri labours very much eager to conserve the wetland but they are unable to pay more than Rs. 10 due to their financial condition highlighted in Fig. 7. Maximum numbers of peoples are used to walk about 1 to 2 km to reach in this wetland for working purpose. So, the distance of the wetland from their house is walking distance. Nabapalli colony is situated within the said distance from 4 no. wetland where from maximum labours are come to that Bheri for their earnings depicted in Fig. 8. Fig. 9 depicts that it is needless to say the workers who lives beyond 2 km from wetland they are not at all interested to conserve wetland due to distance bar. Another side the people who are lives within 1 to 2 km or < 1 km is highly interested to conserve and protect wetland. Besides this some people said that they are moderate interest for conserving wetland. The survey data also shows the correlation between educational level and willingness to protect wetland. Here the relation is found positive that is maximum number of uneducated people say no against the conservation and protection of the wetland. Fig. 10 shows the uses of the said wetland according to the rank priority of Bheri workers. Maximum numbers of people give first priority to the fishing activity, and minimum numbers of people give 5^{th} priority to the boating.

Threats to wetland

- The firstly there is a major problem with silt. This fishpond, that was initially six feet deep, has silted up to within two feet of the surface, cutting potential fish production by two-thirds. The dredging and transport that would be required to clean out such a big area of ponds is a huge undertaking, also costly.
- Secondly, problem is one of encroaching urban development.
- There is third problem that will also be widely recognized that is fish productivity and problems of the region have been known for many years. Research, mostly concentrating on the technical and financial aspects of wetland management, has continued throughout.
- Fourthly, the wages of this wetland among the workers is low than the government registered wetland.

CONCLUSION

India is being a mega-diversity country. There is obviously much ground to be covered in our conservation efforts of wetlands. In addition, a paradigm shift in conservation ethic is also a strong need of the hour. This shift is necessary and perhaps mandatory due to the very nature of resource being conserved and 'protected'. Since wetlands are a common property resource, it is an uphill task to protect or conserve the ecosystems unless; the principal stakeholders are involved in the process. The dynamic nature of wetlands necessitates the widespread and consistent use of satellite based remote sensors and low cost, affordable GIS tools for effective management and monitoring.

Management Options

1. Increase in knowledge and awareness of this wetland and their values and capacity building.
2. Interchange of experience and information on the wetland policy, conservation and wise use between States/drainage basins.
3. To increase awareness and understanding of decision makers and the public of the benefits, values and wise use, of this wetland including:

- sediment and erosion control
- support for fisheries, grazing and agriculture,
- outdoor recreation and education for human society,
- provision of habitat for wildlife, especially water birds, and
- contribution to climatic stability;

4. Training of appropriate staff in the disciplines which will assist in implementation of the wetland conservation action and policies.
5. Stewardship generation for this wetland conservation and management targeted to owners/operators and responsible NGOs.
6. Establishing state-wide awareness campaigns and programmes involving students in particular.
7. Inclusion of this wetland awareness theme in school curriculum including adoption of local wetlands for education.
8. The guideline for implementation of a policy should indicate the roles of the Government, owner/operator, NGOs etc. Specific guidelines for implementing authorities should be available. Resource mobilization plans should be in place to undertake conservation/management actions.

9. Regular cycles of surveys and reviewing status of this wetland will be necessary. A monitoring network should be established.
10. Encouraging fund-raising activities by the corporate sector (particularly under corporate social responsibility) may facilitate conservation activities. However, objectives of such initiatives should adhere to the policy on the wetland conservation of the State.
11. Conservation efforts can be supported by allowing incentives to the wetland owners/operators for conservation initiatives in the form of new and better economic opportunities.
12. Immediate restoration of degraded the wetland sites.

REFERENCES

[1] WJ Mitsh, JG Gossolink. Wetlands, 2nd Edition, Van Nostrand Reinhold, New York, **1986.**
[2] SN Prasad; TV Ramachandra; N Ahalya; T Sengupta; A Kumar; AK Tiwari; VS Vijayani; L Vijayan, *Tropical Ecology*, **2002**, 43 (1), 173 – 186.
[3] S Bhattacharya; A Ganguli; S Bose, *Research & Reviews in BioSciences*, **2012**, 6(11).
[4] T Soderqvist; WJ Mitsch; RK Turner, *Ecological Economics*, **2000**, 35 (1), 1-6.
[5] MB Roy; PK Roy; NR Samal; A Mazumdar, *Environment and Natural Resources Research*, **2012**, 2(4), 30-44.
[6] A Bhattacharya; S Sen; PK Roy; A Mazunder, A Critical Study on Status of East Kolkata Wetlands with Special Emphasis on Water Birds as Bio-indicator, *Proceedings of Taal*, 12th World Lake Conference, **2008**,1561-1570.
[7] S Dasgupta; AK Panigrahi, *International Journal of Research in Applied, Natural and Social Sciences*, **2014**, 2(4), 145-152.
[8] MB Roy; PK Roy; A Mazumder; A Majumder, NR Samal, *Journal of Water Resource and Protection*, **2012**, 4, 576-589.
[9] MB Roy; NR Samal; PK Roy; A Mazumder, *Global Nest*, **2011**, 13(1), 1-10.
[10] PK Roy; G Banerjee; A Mazumder; A Kar; A Mazumder; MB Roy, *European Journal of Sustainable Development*, **2012**, 1(2),97-112.
[11] NR Samal; P Saha; PK Roy; MB Roy; RV Ramana; A Mazumdar, *Journal Desalination and Water Treatment*, **2011**, 30, 217-228.
[12] PK Roy; NR Samal; MB Roy; A Mazumder, *Journal of Clean – Soil, Air, Water (Wiley Inter Science)*, **2010**, 38(8), 706-712
[13] PK Roy; MB Roy; A Majumder; A Mazumdar, *Journal of Chemical and Pharmaceutical Research*, **2014**, 6(9), 328-333.
[14] PK Roy; A Majumder; A Mazumdar; M Majumder; MB Roy, *African Journal of Environmental Science and Technology*, **2011**, 5(7), 512-521.