

**CHAPTER-VII**  
**FINDINGS, CONSERVATION POLICIES AND**  
**MANAGEMENT STRATEGIES**

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### **FINDINGS, CONSERVATION POLICIES AND MANAGEMENT STRATEGIES**

#### **7.1 Introduction:**

During the past few decades, conservation of Wetlands has received a great impetus worldwide since all types of wetlands have been confronting different geo-environmental problems due to natural and anthropogenic factors. Anthropogenic factors play a more prominent role in wetland degradation and generate a lot of problems for the wetland dependent population. Depending on their locational and socio-economic characteristics the wetlands are likely to face different environmental problems of varying dimension. Previously, the Wetland's self-purifying system protected them against the deteriorating effects of age old traditional human activities, but now a host of environmental problems are created as the increasing modern human activities have rendered the purifying system ineffective. Thus, the wetlands situated in and around the cities and towns are threatened by fast growing urbanization and associated high magnitude human activities. On the other hand, wetlands situated in the rural areas undergo numerous problems owing to agricultural and pisciculture practices in and around the wetlands. It is astonishing that even the wetlands situated in the heart of the reserved forest, are also under threat due to illegal anthropogenic activities. In view of the ever increasing multidimensional problems, it is an urgent need to make an all-round effort to save these important wetlands from further degradation and decay by reinforcing the existing conservation policies and legislation in India. In this regard, some measures have been suggested for more effective management and conservation of the wetlands of the study area.

#### **7.2. Existing Conservation Policies and Legislations in India:**

Before the attainment of independence, India had no specific policies except 'The Indian Fisheries Act, 1857' and 'The Indian Forest Act of 1927' for protecting the environment. Indian constitution is tacit about the term 'Environment' and there is no such provision about the environmental conservation. However, in 42nd Amendment Bill in 1976, the Government made an effort to ensure the environment protection. The Article 48A declares that "The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country". Article 51-A (g) states that "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes,

rivers and wildlife and to have compassion for living creatures.”The above mentioned articles safeguard the wetlands. It is the duty of the State as well as the citizens to implement preventative measures for the environment which has already been degraded or is polluted. The Indian constitution has three lists: Union, State and Concurrent but there is ambiguity regarding the responsibility of framing the laws encompassing the matters of environmental protection. Although the State List discusses about public health and sanitation, agriculture, water supply, irrigation and drainage and fisheries, the Article 253 empowers the Parliament to legislate on any matter. The Concurrent List highlights the Forestry. At present conservation and wise utilization of wetlands are being ensured through following legal instruments:

### **7.2.1. Legislations:**

- The Indian Fisheries Act, 1857
- The Indian Forest Act, 1927
- Wildlife (Protection) Act, 1972
- Water (Prevention and Control of Pollution) Act, 1974
- Water (Prevention and Control of Pollution) Rules, 1975
- Territorial Water, Continental Shelf, Exclusive Economic Zone and other Marine Zones Act, 1976
- Water Cess Act, 1977
- Forest (Conservation Act), 1980
- Maritime Zone of India (Regulation and fishing by foreign vessels) Act, 1980
- Environmental (Protection) Act, 1986
- Water (Prevention and Control of Pollution) Cess (Amendment) Act, 1991
- Biological Diversity Act, 2002
- Water (Prevention and Control of Pollution) Cess (Amendment) Act, 2003
- Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. In addition to these, there are some Policies, Plans and Project

### **7.2.2. Policies:**

- National Forest Policy, 1988
- National Conservation Strategy and Policy Statement on Environment and Development, 1992
- The National Water Policy, 2002

- National Environment Policy, 2006A
- Wetlands (Conservation and Management) Rules, 2010
- Wetlands (Conservation and Management) Rules, 2017

### **7.2.3. Plans:**

National Biodiversity Action Plan, 2008

### **7.2.4. Project:**

National Wetland Inventory and Assessment (NWIA) Project, 2011

Besides these, some acts like National Environment Tribunal Act of 1995 and National Environment Appellate Authority Act of 1997 have been codified. The Government of India has propounded National Water Policy in September 1987. The Bill was reviewed in 2002 and updated in 2012. It aims to ensure thoughtful use of water resources like monitoring the wise use of ground water to encourage rain water harvesting and checking the loss of runoff, it also imposes restrictions on over withdrawal of water for irrigation. The Government of West Bengal enacted the ‘West Bengal Inland Fisheries Act’ in 1984 for protecting and conserving the environment.

### **7.2.5. Important Acts of West Bengal Government:**

Some relevant statues enacted by the Government of West Bengal are listed below:

- a. The West Bengal Panchayat Act, 1973
- b. The West Bengal Town and Country (Planning and Development) Act, 1979 (As amended by West Bengal Act 18 of 2001)
- c. West Bengal Inland Fisheries (Amendment) Act, 1993 & 2008
- d. West Bengal Ground Water Resources (Management, Control and Regulation) Act, 2005
- e. The West Bengal Land Reforms (Amendment) Act, 2005
- f. West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006
- g. The East Kolkata Wetlands (Conservation and Management) Act, 2006. Among these only three important programme and policy are discussed below-

## **7.2.6. Important Wetlands Conservation Acts:**

### **7.2.6.1. National Wetlands Conservation Programme, 1985:**

In the year 1985-86 the Government of India implemented the 'National Wetlands Conservation Programme (NWCP)' in close collaboration with the State/UT Governments. Under this programme, about 115 wetlands all over India have been identified till June 2009 by the Ministry of Environment and Forests, Govt. of India which requires urgent conservation and management interventions. The list includes six wetland situated in the state of West Bengal among which the district of Koch Bihar houses two wetlands namely Rasik Beel and Rasomati Jheel which are also located in the study area. These wetlands are eligible for 100% financial assistance on grant basis to the concerned State Governments for undertaking activities like survey and demarcation of wetland, catchment area treatment, weed control, conservation of biodiversity, pollution abatement, livelihood support, creation of minor infrastructure, capacity building of various stakeholders, educational awareness, and community development.

### **7.2.6.2. National Environment Policy (NEP, 2006):**

National Environment policy, introduced on May 19, 2006, distinguishes the various ecological uses of wetlands. NEP identifies the causes of degradation of wetlands due to drainage from agriculture and human settlements. The policy was set up to create an enforceable regulatory mechanism to identify the valuable wetlands, to protect those from degradation and also to enhance the conservation of wetlands. It is observed that sometimes the economic returns from wetlands is weighed much higher than the environmental services and benefits derived from wetlands, giving way to the environmental degradation of wetlands. Except for Ramsar Convention (1971) there is no other wetland regulation at International level. To cope up with this issue, it is an urgent requirement to form some specific policies to regulate the casual linkage between natural entities and human interference on the wetland. To meet this purpose Government of India formulated the National Environment Policy in the year 2006.

### **7.2.6.3. Wetlands (Conservation and Management) Rules, 2017:**

The Ministry of Environment, Forests and Climate Change put forward new Wetland (Conservation and Management) Rules on September 26, 2017, for decentralization of the management of wetlands among the states/ Union Territories and identified about 2 lakh

wetlands where the illegal activities that trigger degradation and deterioration of the wetlands are to be prohibited. The wetlands are described in the rule as the “vital parts of the hydrological cycle, (that) are highly productive ecosystems which support rich biodiversity and provides a wide range of ecosystem services such as water storage, water purification, flood mitigation, erosion control, aquifer recharge, micro-climate regulation, aesthetic enhancement of landscapes while simultaneously supporting many significant recreational, social and cultural activities, being part of our rich cultural heritage.”The rule also mentioned that the wetlands are under severe threat and are degraded by blockage of drainage and pollution made by human beings. This causes the disruption of the hydrological cycle, loss of Biodiversity and interruption in the ecosystem.

The rule is applicable to the wetlands categorized as Ramsar Sites and also to the wetlands identified by the Central, State and Union Territory administration in different acts such as Indian Forest Act, 1927, the Wild Life (Protection) Act, 1972, the Forest (Conservation) Act, 1980, the State Forest Acts, and the Coastal Regulation Zone Notification, 2011 etc.

The States and the UTs will set up ‘State Wetland Authority’ by including the MIC, Environment, and Government Officials, expert in the related fields such as hydrology, planning, fisheries, socio-economists and wetland ecology. The Central Government has also constituted the ‘National Wetlands Committee’ with the Government Officials and experts in the related fields. The authority will formulate ‘wise use principle’ of wetlands so that conservation, sustainable use and proper management of the wetlands can be attained. The rule also aims at decentralization of powers.

### **7.3. Major Findings of the Study:**

The study investigates the geo-environmental status of wetlands of Tufanganj and Koch Bihar Sadar sub-division in Koch Bihar District, West Bengal, India. Here ‘geographical status’ of a wetland means an insight into the distribution and classification of the wetlands in the study area. To determine the ‘Environmental Status’ of the wetlands, investigation on the utilization pattern of the wetlands, soil & water quality, floral and faunal status of wetlands has been conducted. In order to propose some Management strategies for the Wetlands, the findings of the different chapters are summarized below:

1. In the study area, a thorough investigation on nature and the modifications of the wetlands were made and then categorized into three broad divisions namely Natural wetland, Quasi-natural wetland and man-made wetland, of which natural wetlands have 3 sub-divisions namely River/ Stream, Oxbow lake and Riverine wetland. The quasi-natural wetland has 2 sub-divisions namely Quasi-natural Oxbow Lake and Quasi-natural Riverine wetland. On the other hand, the Man-made wetland has also 2 sub-divisions namely Brick/Clay/sand pit and Pond/ Tank. Among the different types of wetland, river has highest percentage (63.08%) followed by oxbow lake (18.55%), Riverine wetland (6.12%), Quasi-natural Oxbow Lake (5.47%), pond (3.39%), Quasi-natural Riverine wetland (2.09%) lastly Brick/Clay/sand pit (1.30%).
  
2. The researcher has identified 486 wetlands that cover a total area of 7898 ha, which are unevenly distributed in the study area. Of all the blocks in the study area, Koch Bihar-I has highest number of wetlands (230) with highest wetland area of 2229 hectare followed by Tufanganj-I (128) with 2009 hectare area, Koch Bihar-II(74) has 2091 hectare area, and Tufanganj-II (54) has 1569 hectares area. In the study area 74 oxbow lakes have been identified, the majority of which is in Tufanganj-I (32) followed by Tufanganj-II (16) and the rest 26 i.e 13 each in Koch Bihar-I and Koch Bihar-II. Riverine wetlands are 89 in number; of which 28 are in Koch Bihar-I, 15 in Koch Bihar-II, 25 in Tufanganj-I and 21 in Tufanganj-II. Quasi- Natural oxbow lakes are 37 in number; 17 in Koch Bihar-I, 9 in Koch Bihar-II, 7 in Tufanganj-I and 4 in Tufanganj-II. The Quasi-Natural Riverine Wetlands are 25 in number, 10 of which are situated in Tufanganj-I, 6 each; 12 in Koch Bihar-I and Koch Bihar- II and 3 in Tufanganj-II. Apart from these 237 ponds have been identified in the study area of which 171 are in Koch Bihar- I, 31 in Koch Bihar-II, 25 in Tufanganj-I and 10 in Tufanganj- II. Brick/ Clay pits are 24 in number, a majority of 19 pits are located in Tufanganj-I, and the rest 5 in Koch Bihar- I.
  
3. The usability of a wetland depends on the nature, location, and environmental status of the wetlands. It also depends on the factors like ownership of the wetland, the degree of restriction imposed by the government, the economic status of the dependent people of wetland, the extent of awareness etc. Through the survey conducted, it is revealed that with an exception of few, the wetlands of the study area provide about 27 types of services or uses. The most important uses of the wetlands of the study area are in agriculture, pisciculture, grazing, fodder & edible plant collection, construction for

settlement & commercial purpose, dumping of organic and inorganic wastes. Generally, wetlands provide a range of different services, but from the field survey it is observed that on an average 46.8% of wetland services are not found, 32.10% are rarely observed, 15.43% wetland services are occasional and only 6.17% wetland services are commonly observed. Of all the wetlands, a sharp decline in the number of services is observed in Chandan Dighi (20) and Rasomati Jheel (18) on account of being the most degraded wetland in the study area and a protected wetland respectively.

4. Based on the results, it can be said that none of the wetlands are indicative of a balanced ecosystem. The pH value of all selected wetlands except Sagar Dighi (9.2) are below the standard limit for aquatic life though the TDS, EC and Iron parameters of water were at the permissible limit for aquatic life. The dissolved oxygen (DO) level, required for a healthy aquatic life is very low in Dangdhar Chhara (3.8 mg/L) and Chandan Dighi (1.8 mg/L & 1.9 mg/L) since Dangdhar Chhara is located in the vicinity of brick kiln industry and Chandan Dighi is the most neglected wetland, which is converted into a dumping site of waste materials. The BOD level was also high in most wetlands, but the highest was in Dangdhar Chhara (81mg/L) and Chandan Dighi (86.9 mg/L). Only Satwabhangana Nadi had BOD at the permissible limit in all season. The value TA and TH of water was at the permissible limit in all the selected wetlands except Rasomati Jheel. The free CO<sub>2</sub> of water is much higher than the standard value in all the selected wetlands except Sagar Dighi.

The pH of the soil in the wetland bottom was at permissible limit except Sagar dighi. The Organic Carbon levels are much higher than the standard levels in Bochamari Beel (4.95 percent), Rasomati Jheel (4.57 percent), Satwabhangana Nadi (3.61 percent). Due to the higher nutrient value of the wetland soil, the growth and reproduction of aquatic plants are much higher, thus destroying the ecosystem balance. The lowest nitrogen concentration is found in Baiganbari Chhara (37.63 mg/kg).

From the survey, a continuous decline in the aquatic life and extinction of many endemic species is observed. In the wetlands under study, 66.67% flora and 55.56 % fauna may be on the verge of Extinction. For example, indigenous reptiles like Gharials and turtles, amphibians like Bull Frog (*RanaTigerina*) etc cease to exist now.



5. In total 16 causes are identified for wetland degradation in the study area, out of which 6 are major causes. They are i) sedimentation in wetland bed ii) clogging of feeder channel iii) construction of engineering structures and fishing obstacles in the wetlands. iv) encroachment of wetland v) over-exploitation of wetland resources like excessive fishing, irrigation, agriculture, Jute retting v) fragmentation of the wetlands vi) garbage dumping & pollutants inflow in wetlands. The indifference of the Government and the NGOs towards building awareness also causes degradation of wetlands.
6. Consequences of the degradation of wetlands and their effect on the environment and economy of the individuals in the vicinity of wetlands are identified by water quality index (WQI), soil quality standard, flora and faunal status, areal shrinkage of wetland and effect on the local and regional economy. In the study area, all selected wetlands are unsuitable for aquatic life except Sagar Dighi (WQI=30.66) and Rasomati Jheel (WQI=43.92). The water area of the wetlands in the study area is steadily declining as observed between the years 1971 to 2017. Baiganbari Chhara has witnessed the maximum negative change (-84.03%) followed by Dhangdhar Chhara (-34.74%), Rasik Beel (-12.39%), Rasomati Jheel (-7.01%), Chandan Dighi (-6.0%). The wetland degradation affects the occupation and economy of the surrounding inhabitants and about 13% of fishermen and 20.83% of edible plant collectors had to change their occupation

#### **7.4. Recommendations and Management Strategies of the Wetlands:**

Based on the major findings of the study and a brief review of the existing wetland conservation policies and legislations in India and West Bengal, the following recommendations and management strategies are proposed:

1. No decision-making is complete without the active participation of local people who are dependent on the wetland resources for their livelihood. Surrounding people have been using wetlands since time immemorial. Therefore there is a need to blend both traditional and latest scientific technologies if long-term conservation goals are to be achieved. Wise use of the wetland resources should be assured and local people's participation must be ensured in wetland management. The dependent community should involve themselves in maintaining the environmental integrity of the beels or wetlands.

2. Surrounding villagers and wetland dependent population should be made aware of the conservation and sustainable management of wetlands. In this regard, government agencies and NGOs should play a vital role to create as well as boost up awareness among the common people. Various environmental awareness campaigns such as workshops, rally, folk dances, and street theatres should be initiated. Various publicity materials on wetland conservation like handbills, leaflets, banners, training/awareness programmes, posters and hoardings should be created utilizing print and electronic media.
3. Setting up of a Rasik Beeland Rasomati Beel Development Authority for collecting reliable data on the biodiversity of the Rasik Beel and Rasomatibeel and its surrounding forest areas and publishing biodiversity atlas of these Wetlands and undertaking necessary action for declaration of Ramsar site.
4. The restriction should be imposed on picnic parties since they, disturb the environmental equilibrium in a number of ways like littering the area with non-eco-friendly materials such as thermocol (Expanded Polystyrene is a non-biodegradable synthetic aromatic polymer, plastic and also by playing loudspeaker indiscriminately in the wetland areas. To mitigate this, hoardings should be hanged in the picnic areas and leaflets mentioning all the Do's & Don'ts in details should be distributed at the time of entrance. Simultaneously spot fine system should be introduced for violating the rules in the wetland areas.
5. It is necessary to cut down the overgrowth of floating and submerged vegetation, without the use of any chemicals because chemical elimination of weeds not only harms the aquatic vegetation but also affects the aquatic animals to a great extent. In this view, traditional knowledge should be employed to generate revenue from weeds by converting weeds into compost and mineral recycling agents.
6. Wetlands may be re-connected with the feeder channel by removing the blockage in connecting portion between the wetland and the feeder channel for maintaining the proper flow in the rainy season.

7. Most of the wetlands lack proper boundary. Proper demarcation of the wetland boundary would be helpful in curbing encroachment in the wetland and fringe areas. In this regard, the Land and Land Revenue department must take some initiatives to settle wetland-boundaries. All types of illegal settlement should be vacated from the wetland areas. If it is not possible the existing wetland areas should be strictly protected from further encroachment.
8. Unwise future constructions of engineering structures like roads, bridges, railway lines, irrigation canals and road cum embankment across the wetland constructed by various departments should be stopped. It must be ensured that all the necessary constructions should be made only after proper consultation and co-ordination among the concerned departments since the construction of various roads and railways across the wetlands and its surrounding is a threat to the wetlands. If it is unavoidable, necessary slope analysis should be made before proper construction of the roads and a sufficient number of bridges must be constructed over all the outlets in order to maintain the natural flow of the water.
9. Community fishing in the dry season by withdrawing and draining water is common almost in all the wetland areas which is very harmful. In many places, local inhabitants make merry/observe a special festive occasion during which all the villagers fish together in the wetland which makes the water so muddy and polluted that later on a good amount of small fish and other aquatic animals face death. Therefore, such practices should be stopped and the government should enforce laws against such practices rules and should build awareness in people of the surrounding areas.
10. At present, the wetlands are controlled by different departments of government. Overlapping of the management and lack of proper co-ordination among these departments, cause various problems in the effective management of these water bodies. Therefore, all the wetlands should be brought under control of a single department for their proper management and all the wetlands should be registered categorically according to their status.
11. Discharge of all sorts of runoff and effluents from industries, urban areas and agricultural field must be checked at the source. Agricultural activity in the catchment area of the wetland is the main source of pesticides, insecticides, herbicides, and

chemical fertilizers which are drained to wetlands causing wetland degradation. Therefore, measures should be taken to stop such inflow in wetlands and making the people aware of the harmful effects of such chemicals used in the agricultural field. Animal wastes should not be dumped in the wetlands. It is the common practices of wetland edge dwellers to sewage their toilet outlet directly into the wetland thus creating unhygienic living conditions. This practice should be stopped to facilitate the well being of the wetlands.

12. Poor infrastructure, economic and educational backwardness in the wetland areas are the other causes of degradation of wetlands. The economic condition of the wetland dependent communities is so poor that they try to earn their daily meals through all round exploitation of the wetland resources resulting in depletion of flora and fauna in the wetlands. Therefore, government, through different competent authorities should take appropriate measures to improve the people's economic condition. Moreover, emphasis should be given to the development of eco-tourism and generating other eco-friendly employment sources. In addition to this, some necessary steps should be adopted to provide alternative livelihood measures like piggery, animal husbandry, duckery, small cottage industry and edible vegetable cultivation to the people residing in and around the wetlands.
13. Poaching and hunting of residential and migratory birds in the restricted as well as unrestricted wetlands, should be stopped at any cost. Poaching of the waterfowls during the winter season is practiced in the study area by the local people causing the extinction of the birds in these areas. Such practices should be banned by building proper awareness in the local people and enforcing the government rules.
14. In the wetlands of the study area, soil quarrying and deep tillage have become a common phenomenon. It degrades the wetland environment through sedimentation on wetland beds and erosion on bank areas. In this regard, land and land revenue departments and respective Gram Panchayat Authorities should enforce laws so that people refrain from such damaging practices.
15. Most pathetic part is that wetlands have been handed over to the individual renter for pisciculture which not only deprives the local people of catching fishes but also

degrades the wetlands through the indifferent policies of the renters who are only concerned with their own benefit. Therefore, it is suggested that wetlands should be rented to the fishermen co-operative society or government involving local people and NGO's.

16. Fishing must be restricted during the breeding period for the conservation of fish community. Fishermen should be also forbidden from using small hole fishing net and catching fingerling. The government should make arrangements for alternative occupation for the fishermen during the restricted period or special allowances should be provided to the fishermen during the lean season.
17. As many of the wetlands in the study area are infested with overgrowth of floating and submerged vegetation, which reduces their productivity, it is necessary to remove such weeds from the wetlands on a regular basis. To facilitate natural water flow of the wetland the excess organic and inorganic bottom deposition should be dragged. The govt. may perform these programmes by implementing National Rural Employment Guarantee Scheme (NREGS) and Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Through the implementation of this programme garbage in and around rural and urban wetland should be cleared up regularly.
18. Afforestation programme should be initiated in the wetland catchment areas as well as in the wetland edges for reducing the sediment load of runoff which drains into the wetlands. It is a vital wetland management program in the study area where the soil is mainly alluvial in nature as siltation in wetland beds reduces the life span of wetlands.
19. Paddy cultivation should be replaced by the cultivation of different wetland compatible edible plants like *Kalmi*, *Hincha* in dry season Water Lily etc in monsoon season for the better economic benefit and ecosystem maintenance. Commercial pisciculture should be replaced with a commercial breeding of native wetland fish like Singi, Magur etc. Fish-Duck-Paddy system with organic manure should be implemented for economic benefit and better ecosystem management in wetlands located in the rural areas. This system involves the cultivation of paddy with some native fish and duck simultaneously in the same wetland.

20. After some primary treatment of the wetland environment, Government should spare the native fingerling of these wetlands for the development of fisherman community as well as for the wellbeing of the wetland ecosystem. Accordingly, Government should also spare the indigenous snail species which are an important dietary source of different local and migratory birds.
21. Joint wetland management Committees which are expected to play an active role in conservation and management of wetlands should be formed by including the fishermen, farmers in and around the wetlands, local panchayat personnel or municipality officials, selected officers from the block and district level. NGOs and environmental experts. For this purpose co-operative system should be adopted for the betterment of the beneficiaries as well as the wetland.
22. The government should constitute a Special Protection Force for the protection of the wetland not only in the study area but for the whole of West Bengal with the help of Civic volunteer and Village Police.
23. There should be a provision in the fishery laws to restrict the use of undersized mesh in fishing nets. Until and unless the nets of smaller mesh size like “fashijal” (a type of rill net), “Mosharijal” (a type of draw net) are totally banned, particularly during the months of May to November, the multiplication of fishes in the wetlands is impossible.
24. At present, only the registered wetlands are given on lease to the fisherman co-operative society or individual only for a period of three years. During this period, the lease holders of ‘wetlands’ do not take any development measures, rather they aim at maximizing their profit by catching all most all the fishes in a wetland, they even do not spare fry and fingerlings of any variety. Unless the lease period is extended at least for 10 years, this malpractice cannot be stopped.

#### **7.5. Conclusion:**

The present investigation was carried out to study the geo-environmental status of wetlands of the study area including classification, distribution and use of wetlands in the study area. The impetus is also given to the water & soil quality, floral & faunal status of wetlands, causes and consequences of wetland degradation, conservation practices and management strategies for the wetlands.

The study area abounds in numerous wetlands, which include marshes, *beels*, and pools of stagnant water and tanks or ponds. These wetlands play a significant role in the environmental and economic condition of the study area. But unfortunately, they are presently facing a serious threat to their existence due to population growth and its related causes. Low man to land ratio in the study area forces the people to reclaim new land from the wetlands for agriculture, settlement and commercial use. The major uses of wetlands are agriculture, pisciculture, grazing, fodder & edible plant collection, construction for settlement & commercial purpose, dumping of organic and inorganic wastes. Generally, wetland provides a range of multivariate services, but from the field survey it is observed that on an average 46.8% of wetland services are not found, 32.10% are rarely observed, 15.43% services are occasional and only 6.17% services are commonly observed.

It is obvious from the study that physical condition of wetlands of the study area is not in the satisfactory state. Water Quality of all the selected wetlands are unsuitable for aquatic life except Sagar Dighi (WQI=30.66) and Rasomati Jheel (WQI=43.92). The pH value of all the selected wetlands except Sagar Dighi (9.2) is under the standard limit suitable for aquatic life. The dissolved oxygen (DO) level, required for healthy aquatic life is very low in Dangdhar Chhara (3.8 mg/L) and Chandan Dighi (1.8 mg/L & 1.9 mg/L). The BOD level was also so high in Dangdhar Chhara (81mg/L) and Chandan Dighi (86.9 mg/L) and only Satwabhangana Nadi had BOD at the permissible limit in all seasons. The free CO<sub>2</sub> of water is much higher than the standard value in all the selected wetlands except Sagar Dighi. On the other hand, soil quality of selected wetlands is in moderate condition. A continuous decline in the aquatic life and extinction of many endemic species is observed. It is estimated that 66.67% flora and 55.56 % fauna of wetlands of the study area may be on the verge of extinction. There are many causes for wetland degradation in the study area. The main causes are over-exploitation of wetland resources through fishing, irrigation, agriculture, Jute retting; sedimentation and fragmentation of the wetlands, clogging of feeder channel, construction of engineering structures, garbage dumping & pollutants inflow in the wetlands.

Due to the degradation of wetlands in the study area, it is evident that environment is deteriorated and economic conditions of the wetland beneficiaries of the are in viable. It is further noticed that different wetland services are declining day by day. About 46.8 % wetland services are not found in the study area. A considerable number of water birds (-44.45%) has been extinct during the last two years. About 66.67% flora and 55.56 % fauna

are on the verge of extinction in the wetlands of the study area. Areal shrinkage is another serious concern in the study area. The present researcher observed that about 84.03 % and 34.74% water area of Baiganbari Chhara and Dhangdhar Chhara has been disappeared. The wetland degradation affects the occupation and economy of the surrounding inhabitants as 13% fisherman and 20.83% edible plant collectors are forced to change their occupation.

Thus, there is an urgent need to conserve wetlands of the study area. A joint wetland management committee should be formed by including the fishermen, farmers and selected government officials and NGOs for conservation & management of wetland and the betterment of the beneficiaries. Community fishing, poaching and hunting of residential and migratory birds in the wetlands should be stopped at any cost. The government should arrange for alternative occupation for the fishermen during the breeding period. Paddy cultivation should be replaced by the cultivation of different wetland compatible edible plants like *Kalmi*, *Hincha* in the dry season and *saluk* in the monsoon season. Fish-Duck-Paddy system with organic manure should be implemented for economic benefit. If the wetlands are properly managed, it may bring a change in the environmental and economic aspect of the study area.

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