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Conservation And Management Of Wetland Resources : Case Study Of Goghat-I Block, Hooghly

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Abstract

Water is one of the main components of biosphere covering about 71% of the earth surface. But water scarcity has been a major threat of present day society. If we want to live a life with abundant water as well as healthy environment , we have to conserve and save the wetlands to store the rain water, surface water into it and use this water for irrigation, fishery and other economic purposes. The water of wetlands also can be used as drinking water by filtering in scientific way.So, this present study is mainly emphasizes on the threats faced by the wetlands and attempts to describe the conservation of wetlands along with their flora, fauna and other resources and finally management strategies have been prescribed so that the people living around the wetlands get benefitted socially as well as economically.

Keywords: Water Scarcity, Conservation of wetlands, Resources, Strategies.

1. Introduction:

A wetland is an ecosystem that is inundated by water, either permanently or seasonally. Wetlands are inevitable components of environment. They are ecotone between deep water and upland ecosystems. These are reservoirs of two basic ingredients of environment, viz., water and aquatic life and play vital role as natural sink of pollutants as well as in recharging groundwater (Mitsch et.al,1986). Wetlands are considered to be among the most productive and biologically rich ecosystems (Chaudhuri, 1998). These are Common Property Resources (CPR) and are themselves container of resources (Singh,2015). Some of these resources of wetlands are traditionally known, while there are others which are under-utilized, untapped or exotic in nature. There are macrophytes in wetlands with known medicinal value, some of these are used as vegetables for domestic consumption, some as fodder or animal feed, some as raw materials for production of biofertilizers, medicine and other goods (IWMED, 1997,1998). There is water for irrigation in wetlands, and above all there is a variety of fish and prawn for commercial production. Even good quality pearls can be produced in fresh water condition (IPCC,2010). Man can

make use of this wide array of commodities and services in sustainable ways not only to exploit economic resources, but also to open up new opportunities for generating employment in good measure. Employment generation in wetland related economic activities can usher in rural development and thereby foster social and economic progress of the people (Brazner, et.al.,2007; FAO,2005; Dairis, et.al.,1993).

Wetland are estimated to cover about 6% of the earth's surface. The safety of the Wetland is now a new challenge to the Geographers (ReyahiKhoram and Hosmand 2011). Through some literature review it is clear that wetland managemet and conservation of it's resources are very important steps that should be taken immediately.

Management of wetlands has caught the attention of geographers in the country in recent years. Shee et.al.,(2013) examined the methods of water scarcity management in their work on " Managing water scarcity through construction of farm ponds in the Sundra Basin, Paschim Medinipur, West Bengal". They observed that there is scarcity of irrigation water during the winter-spring seasons of crop cultivation. Water is, however, surplus from uncontrolled runoff during the rainy season. Thus they are in favor of construction of farm ponds for supplying water for irrigation during the dry periods.
Amoros et. al. (2000) discussed the management aspect of wetlands from an environmental standpoint in their paper named "A vegetation based method for ecological diagnosis of reverting wetlands". They observed that wetlands are supportive of specific macrophytes based on their site and situation.

Zedler and Kercher in their paper entitled "Wetland resources : Status , Trends, Ecosystem services and restorability" emphasized on improvement of techniques to restore the wetlands and to recovery its biodiversity.
This present study has been done to fulfill the following objectives:

1. To collect the general information of the study area.
2. To assess the physico-chemical properties of the sample wetlands to detect physical an biological status.
3. To detect the problems or threats facing by wetlands and give measures for conservation and management of wetland resources.

2. Materials and Methods:

2.1 Study Area: Hooghly district comprises many wetlands of different scale. In this study the Goghat I has been selected for attaining thorough information about different type of aquatic resources. The study area is the western most part of Arambagh Subdivision of Hooghly district. Goghat I Block is bounded by Raina II Block in the

north, Arambagh Block in the east, Chandrakona I and Ghatal Blocks in the south, and Goghat II Block in the west. The latitudinal extent and longitudinal extent of the study area is as follows.

Lat : 22^0 43′ N to 22^0 56′ N

Long : 87^0 40′ E to 87^0 45′ 22′′ E

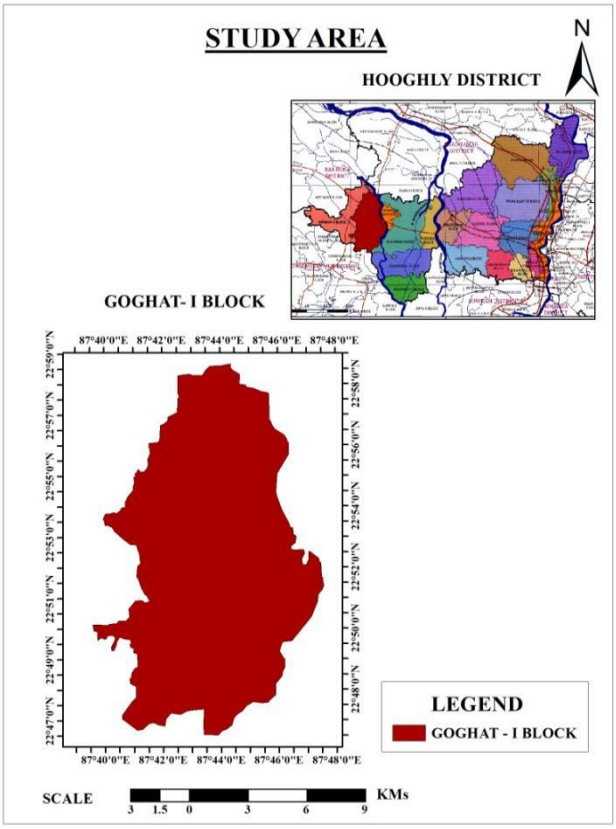

Fig.1 Location Map of the Study Area

Fig.2 Google image of Study Area

2.2 Physical Background: A thorough study about the physical environment of the study area is most important for a research paper work. The study area Goghat-I block has an area of 186.32 square kilometer , is the part of western uplands, which is an extension of the rocky undulating physiography found in adjoining Bankura District. The average elevation of this area is 16 meter. Goghat-I block is mainly alluvium. The study area consists mainly two types of alluvium. The area about 300-400 meters around the Dwarakeswar river mainly consists new alluvium and the area away from river bed is mainly covered by older alluvium. The main river of this area is Dwarakeswr. But another stream canal is flowing through North-western part of Goghat-I block, which is named as Amodar river. This channel was one of the main branch of Dwarakeswar River. But now it is left as a small channel which is flooded only in rainy season. The climate is mainly hot and humid summer and cold and dry winter. The kalbaisakhi are often violent in premonsoon season.

2.3 Socio-economic Background: This region is famous for rice and potato cultivation. Watermelon and ground nut are also broadly cultivated here. Population density is moderate to high. In addition to agriculture, people are engaged in fishing, agro-based industries and retail business. The study area is surrounded by small towns and other blocks. According to 2011 census, the population is 140,030, all which have rural. As per 2011 census, he total literates in Goghat-I was 98,732.

2.4 Database: This study has been done on the basis of both primary and secondary data. For the fulfillment of aim and objectives of present study various governmental and non-governmental data are used. Some primary data have been collected through direct field survey and observation method, data of laboratory analysis, secondary data from governmental records have been used. Unpublished thesis, books, journals etc. have been used for writing this paper. American Public Health Association (APHA 2012) , Central Pollution Control Board (CPCB) (PFI-PRB, 2007), guidelines have been followed for analyzing the soil and water properties of sample wetlands. For preparing the database of wetlands both the observation method and field survey method with questionnaires have been used. GPS, Secchi Disc, Thermometers, BOD Bottles, pH meter, TDS meter etc. Survey tools and analytical apparatus have been used maps, various softwares and satellite image have been used for making location map and statistical data representation.

3. **Results and Discussions:** The Goghat-I Block is full of wetland areas. The total area of Goghat-I block is 18630 hectares from which 1266.73 hectares is covered by wetlands. So, a vast amount of ground water is coming from wetlands. The rural economy can be developed from the wetland resources, if

those will be utilized in a proper way. In this paper 6 wetlands are taken as sample sites to find out the problems facing by wetlands and it's resources and to recommended the solutions of those problems.

3.1 **Surveyed Wetlands And Their Characterisation:** Several water bodies have been observed in this study area during field survey, as many as 6 wetlands each with an area more than 2 acres (0.80 hectares) were be recorded. These wetlands were marked in the block map and included in an inventory using their common names. These wetlands are all of fresh water types with no marine linkage.

Table 1: Showing the data of wetland area of Goghat-I block

Name of the Block	Total Area(ha)	Total Wetland Area (ha)	Name of the GPs	Division of wetland areas within GPs
Goghat-I	18630	1266.66	Goghat	218.57
			Bali	182.81
			Raghubati	265.63
			Seora	151.24
			Nakunda	81.98
			Bhadur	139.86
			Kumursa	226.64

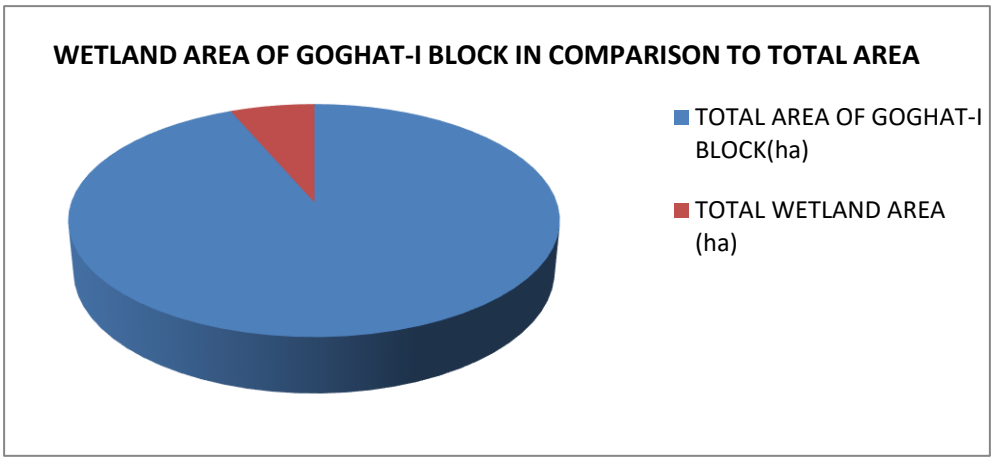

Fig. 3: Showing the Total Area of Goghat-I Block in Comparison to Total Area

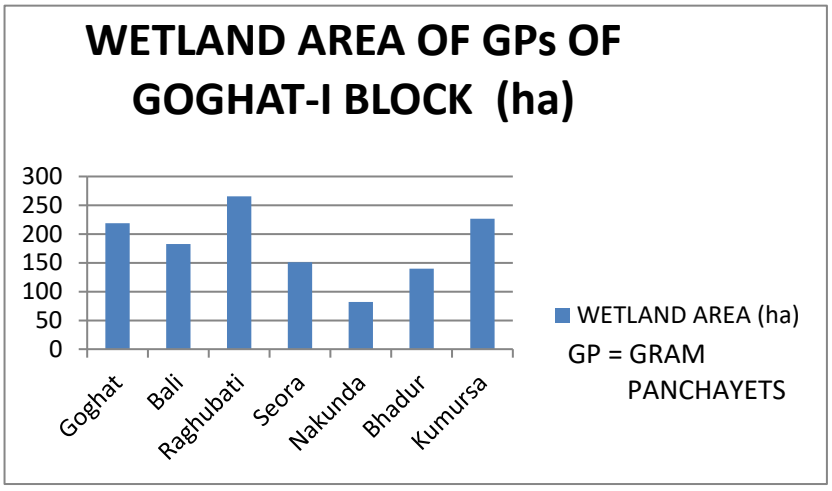

Fig. 4: Showing the Wetland Area of Gram Panchayets of Goghat-I Block(ha)

Table 2: Showing the Location of Surveyed Wetlands

Sl. No.	Block Name	Local name of surveyed Wetlands	Latitude	Longitude
1	Goghat – I	Bheladighi	$22^0 52' 53.6412''$ N	$87^0 45' 54.1836''$E
2		Bhabadighi	$22^0 54' 7.3944''$ N	$87^0 41' 3.858''$E
3		Sultandighi	$22^0 55' 18.9610''$ N	$87^0 41' 15.591''$E
4		Nakunda Jola	$22^0 50' 41.8128''$ N	$87^0 42' 10.368''$E
5		Bankadighi	$22^0 52' 6.6612''$ N	$87^0 42' 53.0676''$E
6		Kanadighi	$22^0 52' 6.0276''$ N	$87^0 42' 51.8652''$E

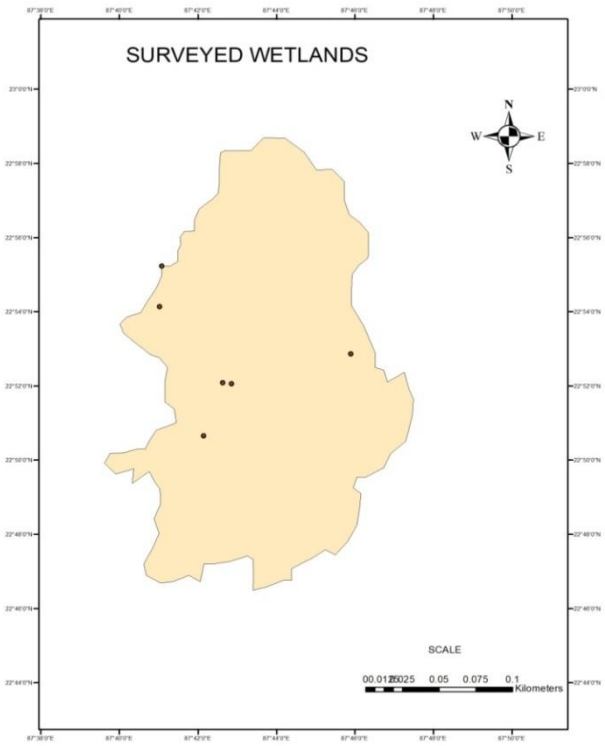

Fig. 5: Location of Surveyed Wetlands

Resume Of Surveyed Wetlands:

Bhela Dighi: Bhela Dighi is located in Kumursa Mouza in Goghat–I Block. Geographical location is 22° 52′ 53.6412″ N and 87° 45′ 54.1836″ E. This is community owned manmade wetland. It is perennial wetland and occupies 2.86 hectares of land as a water area. Embankment and adjacent area covered by road, plants. This is rainwater fed wetland and its water regime depth ranges from 7 feet (May-pre-monsoon) to 10 feet (during monsoon-August-Sept). This wetland is mainly used for pisciculture and domestic purpose. This wetland acts as a natural nest to the valuable migratory birds as well as local birds. Siltation is a chronic problem of this wetland. Vegetation Status is poor. Management steps have not been taken by the government.

Bhaba Dighi: Bhaba Dighi is located in Goghat Mouza in Goghat – I block. Geographical location is 22°54′ 7.3944″ N and 87° 41′3.858″ E. This is community owned manmade wetland. It is perennial and occupies 3.4058 hectares of land as a water area. Embankment and adjacent area are covered by agri-lands. This is rain water and canal fed wetland and its water depth ranges from 6 feet (May, pre-monsoon) to 10 feet (during monsoon, AugustSept). This wetland is mainly used for pisciculture, irrigation and domestic purpose. This wetland acts as a natural nest to the valuable migratory birds as well as local birds. Siltation is a chronic problem of this wetland. There is a dispute about

ownership. Vegetation status is rich. Management steps have not been taken by the government.

Sultan Dighi: Sultan Dighi is located in Raghubati Mouza in Goghat-I block. Geographical location is 22° 55′ 18.961″ N and 87° 41′15.591″ E. This is private owned manmade wetland. It is a perennial wetland and occupies about 4.15 hectares of land as a water-covered area. This is a rainwater – fed and canal- fed wetland and its average water depth ranges from 9 feet (May, premonsoon) to 11 feet (during monsoon, August-Sept). Embankments and adjacent areas are covered by grassland, tree species planted under social forestry scheme and agricultural fields. This wetland acts as a natural nest to the valuable migratory birds as well as local birds and is mainly used for pisciculture and irrigation purpose. Siltation, shrinkage are the common problems of this wetland. Its vegetation status is poor. No management step has been taken by the government but some sorts of management steps like clearing of aquatic weeds etc. are done at private level.

Nakunda Jola: Vast stretches of Goghat Panchayet, particularly in Nakunda mouza and Saora mouza is included under this wetland. The Geographical location is 22^0 50′ 41.8128″ N and 87^0 42′ 10.368″ E. This wetland is seasonal in nature and it is nature-made. During rainy season particularly between June and october, excess water from all surrounding upland regions are stored upon this wetland.Through this wetland several canals and Amodar river flow. During rainy season these canals and rivers carry maximum amount of water to fill up the Nakunda Lowland which exists upto December. Paddy is the main crop alongwith other crops like til, potato, vegetables etc. are grown.

Banka Dighi: Banka Dighi is located in Goghat Mouza of Goghat-I Block. Geographical location is 22° 52′ 6.6612″ N and 87° 42′ 53.0676″ E. This is a private- owned nature-made wetland. It is perennial and occupies 1.3 hectares of land as water area. This is rainwater fed wetland and its average water depth ranges from 6 feet (May, pre-monsoon) to 9 feet (during monsoon, August-Sept). The adjacent areas are covered by tree species planted under private schemes . This wetland is mainly used for pisciculture, domestic and irrigation purposes. Shrinkage is the problem of this wetland. Vegetation status is poor.Algael growth is major problem here causing rise in BOD level. No management step was taken in any level..

Kana Dighi: Kana Dighi is located in Goghat Mouza of Goghat-I block. Geographical location is 22° 52′ 6.0276″ N and 87° 42′ 51.8652″ E. This is private- owned nature-made wetland. It is perennial and occupies 0.9 hectares of land as water- covered area. This is a rainwater- fed wetland and its average water depth ranges from 04 feet (May, pre-monsoon) to 7.0 feet (during monsoon, August-September). Embankment and adjacent area are covered by tree species and agricultural fields.The wetland bed is covered by different types of hydrophytes. This wetland is mainly left almost unused.Maximum eutrophication is a common phenomenon here.

Physico-Chemical Properties of Water and Soil Samples of Surveyed Wetlands:

Water quality is a complex subject, which involves physical, chemical, hydrological and biological characteristics of water and their complex and delicate relations. From the user's point of view, the term "water quality" is defined as "those physical, chemical or biological characteristics of water by which the user evaluates the acceptability of water"(CPCB, 2007).

The optimum fish production is totally dependent on the physical, chemical and biological qualities of water to most of the extent. Fish is an major source of protein and an important cash crop in many regions of the world and water is the physical support in which they carry out their life functions such as feeding, swimming, breeding, digestion and excretion (Bronmark and Hansson, 2005). Water quality is determined by various physico-chemical and biological factors, as they may directly or indirectly affect its quality and consequently its suitability for the distribution and production of fish and other aquatic animals (Moses, 1983). Many workers have reported the status of water bodies (lentic and lotic) after receiving various kinds of pollutants altering water quality characteristics (physical, chemical and biological). All living organisms have tolerable limits of water quality parameters in which they perform optimally. A sharp drop or an increase within these limits has adverse effects on their body functions (Davenport, 1993: Kiran, 2010). So, good water quality is very essential for survival and growth of fishes. As we know fish is an important protein-rich food resource and there has been sharp increase in demand for fish products due to increasing population pressure in this century. Thus to meet the demand of present food supply, water quality management in fish ponds is a necessary measure that is required to be taken up.

Viewing the important uses of the wetlands i.e. pisciculture, domestic uses (bathing and washing) and irrigation from wetlands some parameters basically pH, Water temperature, Turbidity, B.O.D, Alkalinity, Hardness of water have been selected for the physico-chemical analysis to know the present status or potentiality of various uses i.e. pisciculture, domestic uses as well as to know the influence of domestic sewage, surface runoff (adjacent higherland and agricultural field) on the qualities of parameters.

The physico-chemical characteristics of WATER SAMPLES of selected 06 wetlands were monitored/analyzed:

Table:3 Physico-Chemical Characteristics of Water Samples

Sl. No.	Name of the Wetlands	Temp. (^{0}c)	Turbidity (PPM)	TDS (mg/l)	Soil pH	Hardness (mg/l)	Water Transperency	DO (mg/l)	Alkalinity (mg/l)	Salinity (%)	BOD (mg/l)	Euphotic Limit (cm)
1	Bhela Dighi	33.5	29.615	65.5	6.83	42	15.06	3.88	48.13	0.07	1.12	150.75
2	Bhaba Dighi	21.04	16.555	56.5	7.24	64	26.83	2.54	39.01	0.10	2.43	48.89
3	Sultan Dighi	24.7	20.37	91.5	7.7	88	11.21	2.67	28.00	0.09	0.85	50.80
4	Nakunda Jola	31	170.335	126.5	7.05	86	45.50	2.10	35.00	0.08	3.30	102.95
5	Banka Dighi	27.25	76.22	74	6.50	40	22.53	1.22	27.13	0.07	2.95	32.70
6	Kana Dighi	29.09	81.62	123	6.97	40	33.01	1.78	40.00	0.09	1.75	27.50

Air temperature: Minimum air temperature is recorded as 18 ^{0}C in the Bhaba Dighi where maximum air temperature is recorded as 29 ^{0}C in the Nakunda Jola. The mean air temperature is 23.5°C of this study area. Air temperature is responsible for D.O. concentration from water surface air. Temperatures of all sites except Nakunda Jola are more or less equal with mean 23.5°C .

Water Temperature: Minimum air temperature is recorded as 21.04 ^{0}C in the Bhaba Dighi where maximum air temperature is recorded as 33.5 ^{0}C in the Bhela Dighi. It is under stress for 9.5 ^{0}C plus water temperature than the desirable limit.The mean air temperature is 23.5 ^{0}C in this study area. Water Temperature is responsible for salinity directly and indirectly for turbidity also. High temperature has increased the suspended particles and decreased the euphotic limit and turbidity. As fish is a cold blooded aquatic animal, its body temperature changes according to that of environment affecting its metabolism and physiology and ultimately affecting the production. Higher temperature increases the rate of bio-chemical activity of the micro-biota, plant respiratory rate, and so increase in oxygen demand.

Turbidity (PPM): Minimum Turbidity is recorded as 16.555 at Bhaba Dighi, where maximum Turbidity is recorded as 170.335 at Nakunda Jola. Ability of water to transmit the light that restricts light penetration and limit photosynthesis is termed as turbidity. Boyd and Lichtkoppler (1979)

suggested that the clay turbidity in water to 30 cm or less may prevent development of plankton blooms. According to Bhatnagar et al. (2004) "turbidity range from 30-80 cm is good for fish health; 15-40 cm is good for intensive culture system and < 12 cm and >35 cm causes stress". According to Santhosh and Singh (2007) "the secchi disk transparency between 30 and 40 cm indicates optimum productivity of a pond for good fish culture (Bhatnagar, 2013). Seasonally, in wetlands water turbidities are high in the summer than in the winter season but desirable turbidity is observed in the rainy season. Increased turbidity decreases light penetration, plant growth and oxygen production into the water which is not good for survival of fishes and aquatic animals. In this study area only Nakunda Jola is turbidity prone wetland.

T.D.S (mg/lt): The study area's mean T.D.S is 89.5 mg/lt. Minimum T.D.S recorded is 56.5mg/lt found in the Bhaba Dighi and maximum T.D.S recorded is 126.5 mg/lt found in the Nakunda Jola. The highest TDS was found in the Nakunda Jola because of temperature, suspended materials etc. Standard desirable limit is 500 mg/lt. maximum.

pH: Study area's mean pH is 7.05. Minimum pH recorded is 6.5 in the Banka Dighi and maximum pH recorded is 7.7 in the Sultan Dighi. Fishes have an average blood pH of 7.4, a little deviation from this value; generally between7.0 to 8.5 is more optimum and conducive to fish life. pH between 7.0 to 8.5 is ideal for biological productivity, fishes can become stressed in water with a pH ranging from 4.0 to 6.5 and 9.0 to 11.0 and death is almost certain at a pH of less than 4.0 or greater than 11.0 (Ekubo and Abowei, 2011). pH value is 6.5 as the lowest in Banka Dighi, where 7.7 is the high pH in Sultan Dighi. pH values are more or less same in all the wetlands. Most of the wetlands are within normal range of pH(7.0).

Hardness (mg/lt): Mean hardness (60 mg/lt) of six wetlands showed the wide variability from 40 mg/lt to 88 mg/lt. Desirable range is 75-150(mg/lt). Hardness is the measure of alkaline earth elements such as calcium and magnesium in an aquatic body along with other ions such as aluminium, iron, manganese, strontium, zinc, and hydrogen ions. Calcium and magnesium are essential to fish for metabolic reactions such as bone and scale formation. Bhela Dighi, Banka Dighi and Kana Dighi are under desirable range of hardness.

Water Transparency(cm): Maximum water transpartency is 45.50cm in Sultan Dighi and minimum transparency is 11.21 cm in Nakunda Jola. The mean water transparency is 25.69 cm. Transparency is the main factor which involved photosynthesis of hydrophytes. Extreme high or low transparency is bad for the biological growth of wetlands. Medium transparency is suitable for growth of microphytes as well as fishes.

Dissolved Oxygen(mg/lit.): The minimum amount of DO is 1.22 mg/l (Banka Dighi) and maximum is 3.88 mg/l (Bhaba Dighi). A mean value of DO is 2.37mg/l. The desirable range of DO for pisciculture is 4 and >4 and 5 and <5 is for bathing.

Alkalinity (mg/l): Maximum alkalinity is 27.13 mg/l in Bankadighi and minimum alkalinity is 48.13 mg/l in Bheladighi. The mean alkalinity is 36.21mg/l. Desirable standard limit is 25-100 mg/l(Bhatnagar,2015) or 200mg/l(BSI). Alkalinity is the ability of water to resist changes in pH and alkalinity is the measure of total concentration of bases in pond water including carbonates, bicarbonates, phosphates, borates, hydroxides, dissolved calcium, magnesium etc.

Salinity (%): The minimum percentage of salinity is 0.07 in Bheladighi and Bankadighi and maximum percentage is 0.10 at Bhabadighi and the mean is 0.5. Salinity is the total concentration of electrically charged ions (Cations: Ca^{++}, Mg^{++}, K^{+}, Na^{+}; Anions : CO_3^{-}, HCO_3^{-} , SO_4^{-}, Cl^{-} etc.). Salinity affects the density and growth of aquatic organisms population.

BOD (mg/l): BOD ranges from 0.85mg/l to 3.30mg/l and mean value of BOD is 2.07mg/l. The desirable range of BOD is 1-2mg/l. BOD represents the amount of Dissolved Oxygen consumed by micro-organisms for bio-degradation of organic matter.

Euphotic Limit: Euphotic limit is one of the main factor which controls photosynthesis of hydrophytes. Extremely high and low euphotic limit is not suitable for aquatic flora and fauna.

The physico-chemical characteristics of SOIL SAMPLES of selected 06 wetlands were monitored/analyzed:

Table: 4 Physico-Chemical characteristics of Soil Samples

Sl. No.	Name Of The Wetlands	Soil Temp. (^{0}C)	Soil pH	Organic Carbon (%)	Nitrate Nitrogen (G/Kg)	Phosphate Phosphorus (G/Kg)
1	Bhela Dighi	27.50	7.87	0.70	0.10	0.20
2	Bhaba Dighi	27.88	8.01	0.71	0.11	0.41
3	Sultan Dighi	27.80	7.00	0.69	0.08	0.13

4	Nakunda Jola	27.57	7.92	0.71	0.09	0.23
5	Banka Dighi	26.74	8.10	0.72	0.11	0.39
6	Kana Dighi	26.84	8.08	0.69	0.12	0.15

Soil Temperature (^{0}c): Minimum soil temperature is 26.74^{0}c at Banka dighi and maximum temperature is 27.88^{0}c at Bhaba dighi.The mean temperature is 27.39^{0}c.

Soil pH: pH values range from 7.0 to 8.10 and mean value is 7.83.

Organic Carbon (%) : Maximum percentage of Organic Carbon is 0.72 at Banka Dighi and minimum percentage is 0.69 at Sultan Dighi and Kana Dighi.

Nitrate Nitrogen (g/kg) : Minimum Nitrate nitrogen is 0.08 g/kg at Sultandighi and maximum amount is 0.12g/kg at Kana Dighi. The mean amount is 0.12g/kg.

Phosphate Phosphorus (g/kg) : Minimum amount of Phosphate Phosphorus is 0.13g/kg at Sultan Dighi and maximum Phosphate Phosphorus is 0.41 g/kg at Bhaba dighi. The mean amount is 0.25 g/kg.

Table:5 List of floral and faunal resources of the surveyed wetlands

Name of wetlands	**Floral Resources**	**Faunal Resources**
Bhela Dighi	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor), Leucas aspera, Monochoria hastata	Chhoto Machhranga (Alcedo atthis), Pankouri (Phalacrocorax niger), Gugly (Shell fish), Rohu fish (Lebio rohita), Katla Fish (Katla katla), Various small and big fishes and migratory bird in winter season.
Bhaba Dighi	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor),	Chhoto Machhranga (Alcedo atthis), Pankouri

	Leucas aspera, Salvinia molesta, Alternanthera philoxeroides,Pana (Lemna acquinoctialis), Chrisopogan aciculatus, Scirpus juncoids, Aeschynomene indica, Monochoria hastate,.	(Phalacrocorax niger), Gugly (Shell fish), Rohu fish (Lebio rohita), Katla Fish (Katla katla), Various small and big fishes and migratory bird in winter season.
Sultan Dighi	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor), Alternanthera philoxeroides	Chhoto Machhranga (Alcedo atthis), Pankouri (Phalacrocorax niger), Gugly (Shell fish), Rohu fish (Lebio rohita), Katla Fish (Katla katla), Various small and big fishes and migratory bird in winter season.
Nakunda Jola	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor), Pana(Lemna acquinoctialis)	Gugly (Shell fish), Riceand Potato cultivation in dry season when the wetland turns into a agricultural field.
Banka Dighi	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor),Pana (Lemna acquinoctialis), Algae .	Chhoto Machhranga (Alcedo atthis), Pankouri (Phalacrocorax niger), Gugly (Shell fish), Rohu fish (Lebio rohita), Katla Fish (Katla katla), Various small and big fishes .
Kana Dighi	Common Water Hyacinth (Eichornia crassipes), Pistia, Duckweed (Lemna minor), Scirpus juncoides,Padma (Nelumbo nucifera)	Chhoto Machhranga (Alcedo atthis), Pankouri (Phalacrocorax niger). Rohu fish (Lebio rohita), Katla Fish (Katla katla) etc.

3.2 Problems faced by surveyed wetlands:

Bhela Dighi:

1. Depth of Bheladighi has been decreased a lot within past few years. No excavation was done for reform of the wetland.
2. Encroachment of settlement and agricultural land towards wetland is a major problem.
3. Water quality is also adversely affected by the domestic use of water for several purposes.
4. As a result of water pollution the ecosystem for aquatic flora and fauna are adversely affected or deteriorated.
5. Hazardous pesticides and remnants of chemical fertilizers washed away from the adjacent crop fields are also damaging the quality of water and very much harmful for aquatic life.
6. The cooperative of the fishermen in Bheladighi is not functioning satisfactorily.
7. Indigenous species of fishes are gradually becoming extinct.

Bhaba Dighi:

1. Encroachment of village settlement in three sides of the wetland is gradually becoming a major problem.
2. Modern equipments of netting are not widely used by the stakeholders.
3. The construction of Tarakeshwar – Bishnupur railway line through the Bhabadighi by a railway bridge has become stopped because of the movement of the villagers who are engaged in pisciculture for a few generations. The production of large amount of fishes each year has been totally stopped.
4. Reforms of the wetland is also very necessary step towards wetland development planning of Bhabadighi .

Sultan Dighi:

1. The same problems like encroachment of settlements towards the wetland and also water pollution by domestic activities are major problems.
2. The political turmoil which created lot of problems for a number of years during the previous state Govt. damaging the previous management system. Pisciculture and other commercial activities were stopped by the political musclemen for almost a decade.
3. The incidents of immersion of idols of Gods and Goddesses in the northern bank of Sultandighi causes a major problem of chemical pollution in water damaging aquatic life of the wetland.
4. Siltation is also a major problem in this wetland.

Nakunda Jola (Non-perinnial) :

1. In this low-lying area water stagnates for only 6-7 months in a year. So permanent pisciculture is not possible here. Some small fishes are found in the canals and Amodar Nod (river) bifurcating the area.
2. Both Aman and Boro paddy are cultivated. Collection of the aquatic plants like Hingcha, Kalmi, Kulekhara etc. are done. Kachuipana and other aquatic plants also collected to be used as fodder for domestic animals. But the aquatic resources are not found sufficiently throughout the year.
3. No proper planning is done to use this wetland as resource.
4. Proper land use planning is necessary. Mainly agricultural land use practices are to be changed according to the environmental situations and local resources.
5. The endangered species of indigenous variety of plant, weed and faunal species are to be conserved.
6. Eutrophication of the water storages because of the excessive growth of water hyacinth and other plants has become a major environmental problem in this wetland.

Kana Dighi:

1. Eutrophication due to excessive growth of aquatic plants is a major problem here.
2. A thin layer of yellowish algae is found to be developed on the surface of water that hinders penetration of sunlight inside waterbody. This causes increase of BOD damaging aquatic life.
3. Recently visit of migratory birds during winter season has declined a lot. Only good management practices can develop the situation.

Banka Dighi:

1. Eutrophication of the water storages because of the excessive growth of water hyacinth and other plants has become a major environmental problem in this wetland.
2. Due to excessive growth of aquatic plants, fish cultivation is not easily possible.

4. **Conservation Measures and Management:** There are some general problems in the wetlands of Goghat- 1 block that maximum wetlands are suffering from. Some general conservation measures and management remedies for betterment of these wetland resources are:

1. Stopping agricultural drainage into the wetlands.
2. Stopping drainage of domestic sewages to the wetland water.
3. Banning cattle bath and laundering into the wetland water.

4. Excavation and reforms of wetlands should be done regularly.
5. Excessive use of insecticides and chemical fertilizers in the adjacent crop fields of the wetlands should be stopped.
6. Bleaching and other water purifying medicines which does not damage aquatic flora & fauna must be added into the wetlands.
7. Removing the excessive hydrophytes especially which are useless and also stopping the algal bloom to get rid of eutrophication.
8. Assessment of water quality (e.g. alkalinity, salinity,turbidity pH etc.) should be done seasonally.
9. The Governmental policies about conservation and management of wetland resources should be followed by local panchayets and cooperatives.
10. Soil erosion is to be checked to minimise siltation and afforestation on the embankments and adjacent fields are to be done.

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