

EXPLORING MANAGEMENT STRATEGIES FOR FRESHWATER WETLAND: POLICY OPTIONS FOR SOUTHWEST COASTAL REGION IN BANGLADESH



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ABSTRACT

Article History

Received: 20 January 2017

Revised: 27 February 2017

Accepted: 21 March 2017

Published: 10 April 2017

Keywords

Freshwater wetland
Management strategies
Beel Dakatia
Sustainability
Southwest coastal region
Policy options
Bangladesh.

Freshwater wetland plays a vital role in the national economy as well as the sustainable environment, natural habitats and the ecosystems in Bangladesh. Population explosion is still creating pressure on the limited resources like land, forest, water and specially the freshwater wetland. Over exploitation of resources, variety of economic, flood protection or control embankments, polders, dams, regulators, irrigation channels, dredging, settlements establishments like roads, bridges are the major threat to the freshwater wetland land in the southwest coastal Bangladesh. Thus, the sustainable management practices of existing wetlands need to be taken into considerations to conserve these resources. The wetland management strategies need to be directed at enriching wetland habitats with the component biological resources and also addressing the needs of the resident human population. Beel Dakatia of Dumuria Upazilla in Khulna District with 60 sq. mile is almost in the out of actions from agricultural productions, especially rice production due to water logging. However, the mercy of logged water has facilitated for fisheries, not properly or regularly managed. This study is conducted to seek the suitable or possible, acceptable by the different social groups, management policy options or guidelines that may foster sustainable management practices.

Contribution/ Originality: The study contributes in the existing literature of freshwater wetland management strategies and policy options learnt from the southwest coastal region of Bangladesh. The government initiatives and policy framework for wetland management are, in some cases, become impediments of sustainable wetland management in this area.

1. INTRODUCTION

Wetlands are an invaluable component of the environment; biodiversity and the predominant land feature of Bangladesh. About half (7-8 million hectares) of the area of the country can be considered as wetlands (Byomkesh *et al.*, 2009). The Ganges-Brahmaputra floodplain alone, an estimated 2.1 million hectares of wetlands have been lost to flood control, drainage and irrigation development (Islam, 2016). The main Wetland comprises different types of earth features named, basically Bengal Name- Khal, River, Haor (multiple natural depression), Beel (single natural depression, where water retention is generally common throughout the year), Char lands, Pond (Islam, 2010).

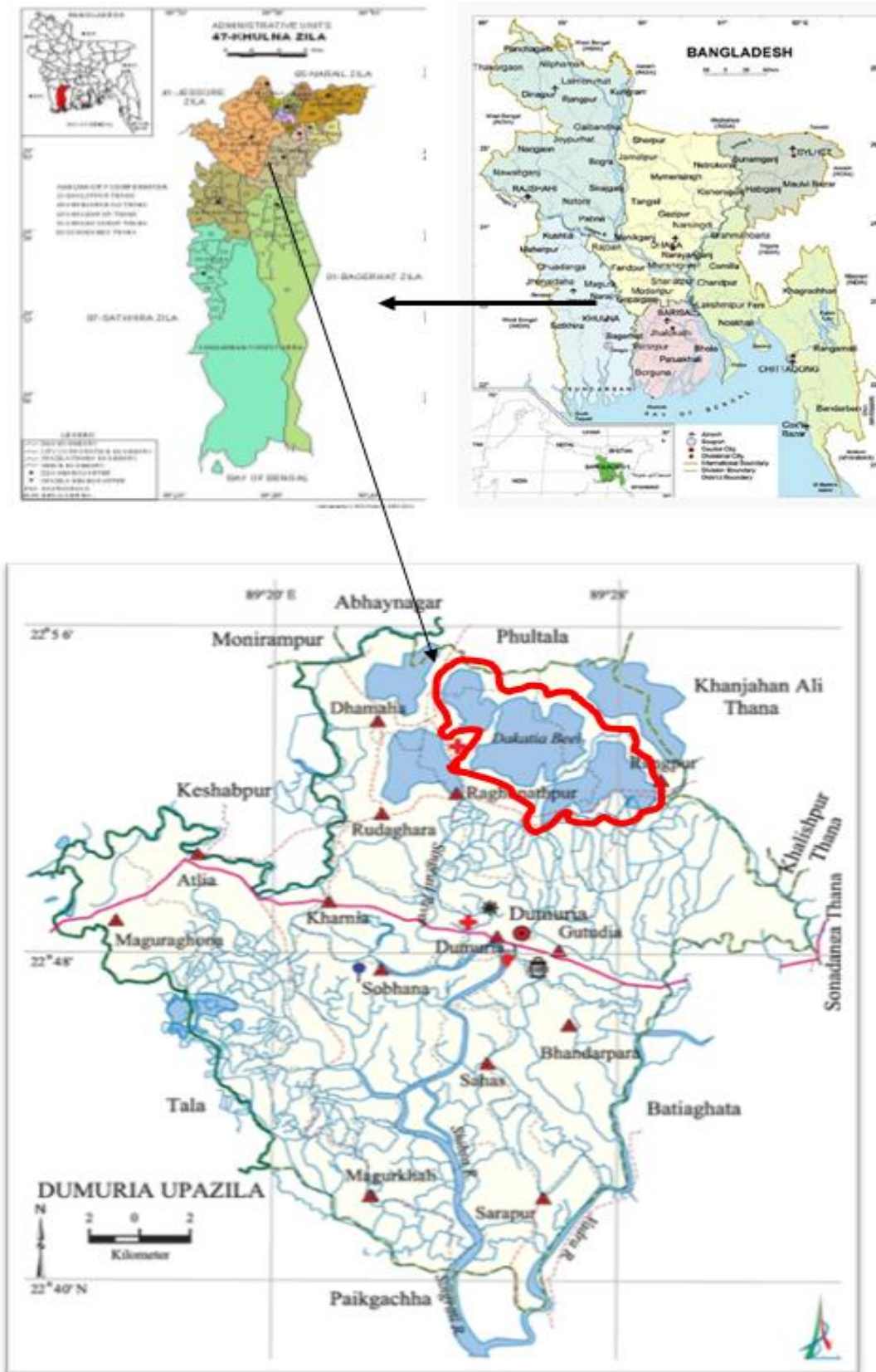
Wetlands serve a wide variety of functions, such as flood control, water purification, protection from natural disaster with the vegetation coverage on it Kusler (1990) source of livelihood, habitat for wild life and fish, navigation, energy sources, bio-diversity and natural life cycle (Parikh and Datye, 2003). Excessive erosion in the catchment areas has the major impact on the key wetland areas. They are being continuously lost or degraded primarily because of the recent developments, especially, the shrimp culture and cultivation that interrupt wetland functions and values. Interestingly, the potentials of the resources of nature create demand of proper management like of fresh water wetland (Thompson and Sultana, 1996). Furthermore, possible policy options have also been important considerations to protect wetlands. Beel Dakatia is the largest Beel in the southwest region of Bangladesh (60 sq. mile) has already been under threat due to variety of problems (Sumi *et al.*, 2015). It is a great challenge to look into the policy options for sustainable management of wetland. Over exploitation of resources (e.g. uncontrolled open water fisheries, swamp or wetland forest, birds of different species) as the sources of biomass or medicine, raw materials for cottage industry and fuel or timber, variety of economic activities in the estuarine wetlands flood protection or control embankments, polders, dams, regulators, irrigation channels, dredging, settlements establishments like roads, bridges are the major threat to the freshwater wetland land in Bangladesh.

Southwest Bangladesh, Beel Dakatia, have remarkable potentialities having its natural resources to meet the human needs (Habitat, 2010). Beel Dakatia is the location of Dumuria Thana of Khulna district used to play an important role through its resources like fisheries, agriculture and other bio-species to conserve the bio-diversity; ecology and the sustainable development (Tutu, 2004). However, recent years, it has been seen that the Beel has been out of action due to water logging. For this, it is felt that the conservation and management of the Beel is badly needed for the socio-economic development of the people of the Beel area (Islam, 2010). This paper is an attempt to focus some specific issues as: to review the management scenario of wetland in southwest west coastal Bangladesh, to find out the existing situation of Beel Dakatia, to identify the reason behind mismanagement the Beel Dakatia area and to develop some possible policy options for sustainable management practices of the Beel area. To grab those objectives in the real field, we considered both secondary and primary information to support the study. A review of present status of management techniques and the involved authorities (Both GO and NGO) give clear ideas for their strengths and weaknesses. At the same time, the local people were interviewed to identify the major problems from their part. Several project works have been introduced in some projects like: Coastal Embankment Project, Khulna–Jessore Drainage Rehabilitation Project, Sundarbans Biodiversity Conservation Project to manage the wetlands in a better way (Dewan *et al.*, 2015). However, there are some conflicts among the projects, the local people and the local government authorities. This paper also tries to find those problems and coordination and lastly will give some policies that can bring a better and fruitful impact to manage the wetland in Beel Dakatia area. The study will explore the type and extent of management practices regarding wetland management in the study area. Due to the lack of proper management policies the beneficiaries are exploiting the resources of wetland which is threatening the concept of sustainable development

2. MATERIAL AND METHODS

2.1. Methods

A Mixed methods research approach was adopted for this study. This research approach utilized both quantitative and qualitative methods. This research has been conducted based on the secondary information (e.g. desk research) and the telephone interviews of the people from different stakeholders. The field survey was not performed by this research project, but field data was mostly collected by a local NGO named Coastal Development Partnership (CDP).



Map-1. Beel Dakatia Area of Dumuria Upazila of Khulna District
 Source: Bangladesh Bureau of Statistics, 2015

3. SOUTHWEST REGION OF BANGLADESH

Southwest Bangladesh, Beel Dakatia, was selected as the study area with its remarkable potentialities with its socio-economic and environmental drivers. Beel Dakatia is located in Dumuria Upazila of Khulna district mainly

providing resources like fisheries, agriculture and other bio-species. The southwest Bangladesh generally comprises districts of Satkhira, Khulna, Bagerhat, southern part of Jessore and sometimes Narail. General characteristics of the region are-Tidal flood plain land, Natural linkage within the rivers and other wetlands that show the almost proper natural drainage system, Soil and water are more saline. Very close to the sea (Bay of Bengal) and very lower means sea level. According to the Population Census of 2011, published by the Bangladesh Bureau of Statistics, the districts of Bagerhat, Khulna and Satkhira, Jessore and Narail (Table1) having 41 Thanas (Police Stations) including 5 metropolitan thanas, again subdivided into 347 unions and a total population of 9,266,791 inhabits a total area 15,745.78 square kilometres (Bangladesh Bureau of Statistics, 2012).

Table-1. Administrative Units of Southwest Coastal Region of Bangladesh

District	Thana	Union	Population	Area (sq.km)
Bagerhat	9	75	1,476,090	3,959.11
Khulna	14	67	2,318,527	4,394.45
Satkhira	7	77	1,985,959	3,817.29
Jessore	8	91	2,764,547	2,606.94
Narail	3	37	721,668	967.99
Total	41	347	9,266,791	15,745.78

Source: BBS, Population Census, 2011

General characteristics of the region are:

- Tidal flood plain land
- Natural linkage within the rivers and other wetlands that show the almost proper natural drainage system
- Soil and water are more saline
- Very close to the sea (Bay of Bengal) and very lower means sea level

3.1. Wetland Situation of Southwest Bangladesh

3.1.1. Beels of the Region

This is the land feature, mainly enclosed by two or more riverbanks (creation of high land through siltation at the banks during it flows). Most of the Beels of southwest Bangladesh produce rice, jute, fish and other agricultural products (Tutu, 2004). There are 67 Beels in the southwest Bangladesh. The table belongs to the areas of the beels (information that has been collected as far as possible), total area 348.1 sq. mile. The Beels that are still now producing fish, crops and being engaging various economic activities. Most of the beels produce rice or fish (Figure 1). The highest frequency of beels is found in Debhata, Kaliganj, Satkhira but in context of the boundary Dumuria/Daulatpur Thana of Khulna Districts comprises the largest area (Awal, 2014). Recently, the scenario is changing. More or less, the Beels of southwest Bangladesh are under threat for water logging (due to coastal embankments or dams and polders) and other problems like contradictory shrimp and crops production. Beel Dakatia of Dumuria/Daulatpur Thana of Khulna district has been suffering fully for water logging. Narnia beel of Khulna region expanded through three thanas (650 acres in Rupsha, 2500 acres in Mollahat and 3000 acres in Fakirhat), now severely affected by water logging problem (where water 150acres of Rupsha and full areas of the rest areas of Mollahat and Fakirhat are water logged). As like Narnia Beel, Beel Kedaria of Mollahat thana of Bagerhat district has also been water logged and has been losing cropping intensity and open water fisheries that had a major contributions in the GNP through industrial shrimp cultivation within the logged water of the beel (BBS, 2012). The people of Southwest Bangladesh are affected by water logging problems due to polder or dam that force to trap the rainwater within the polder area and creates water logging for a long period. About 69.81, 25.38, 6.77 sq. mile sq. Areas of the beel of Khulna, Bgerhat and Satkhira respectively are suffering from water. Not all the

Beels reserve water all the year round; most of the beels are water logged for the period of 6-7 months (about half of the year).

Table-2. Beels of Different Upazilas'

Thana	Area (sq.mile)	No of Beels
Shamnagar	36.68	7
Kaliganj	17.5	3
Debhata	64	15
Satkhira	35	5
Kalaroa	20	5
Tala	0.5	1
Ashashuni	12.5	3
Dumuria/Daulatpur	93	3
Batiaghata	10	1
Terokhada	9.5	1
Rupsha	11.42	11
Mollahat	38	12
Total	348.1	67

Source: Water Logging in South-west Bangladesh, CDP Resource center, 2015, Khulna

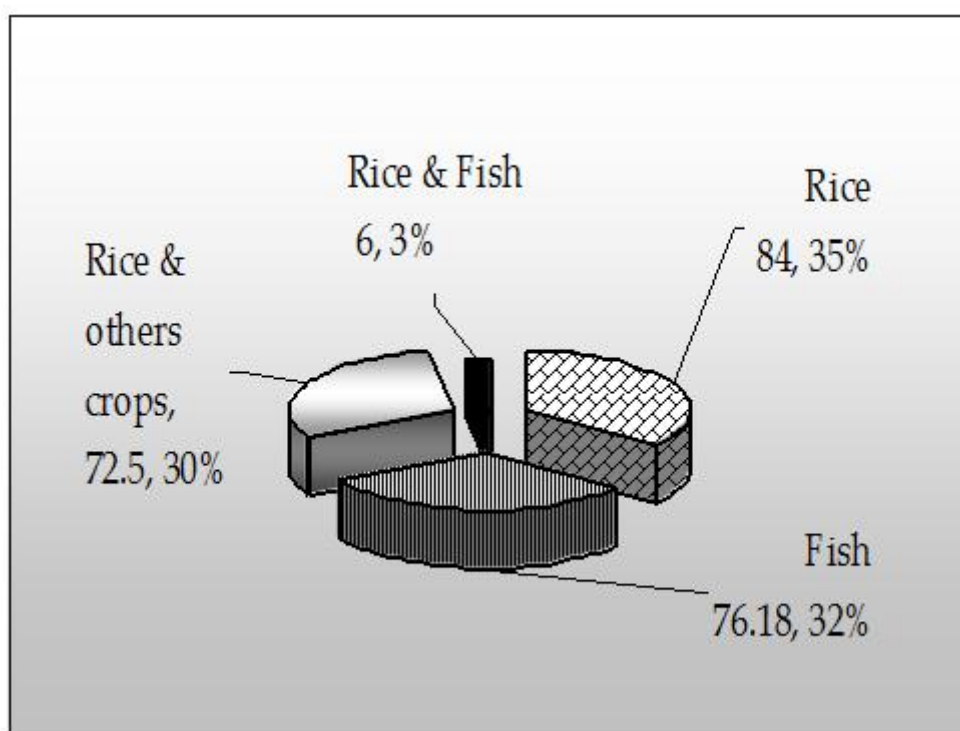


Figure-1. Various Uses of Beels

Source: Water Logging in South-west Bangladesh. CDP Resource Center, Khulna.

3.1.2. Rivers of the Southwest Coastal Bangladesh

Rivers, considered as freshwater wetland, play major role amongst the open water bodies. Almost 78 rivers of the southwest region are demanding the integrated and proper management for the sustainable environment. The major rivers of the region are- Bhairab (length 250 km), Rupsha (37.5 km), Kapatskha (47.5 km), Betna (192 km), Bhadra (190 km), Shibsha (95), Pasur (85 km), Chitra (130 km), Naboganga (230 km) and some rivers under threat named Gallamari River, upper and lower Shailmari River (Islam, 2006). The graph shows the frequency of the affected rivers. Almost dead rivers are more frequent in the area, amongst the highest frequency has been found in the Bagerhat district. Dead rivers are found in the Satkhira and Khulna district with a high frequency than other district. The figure (Figure2) shows that the total rivers of the southwest region by different categories like dead is 17, almost dead 23, closed (flows of rivers are not being continuing due to embankments or dams across the river)

3, affected or directly hampered 11, partially or indirectly affected 21 and the rivers are not under threats 3. Bhairab, Shailmari (both upper and lower) river are most important for draining the water as well as managing the irrigation activities. Beel Dakatia deserves the continuous flows of those rivers for the agricultural productions and sustainable environment.

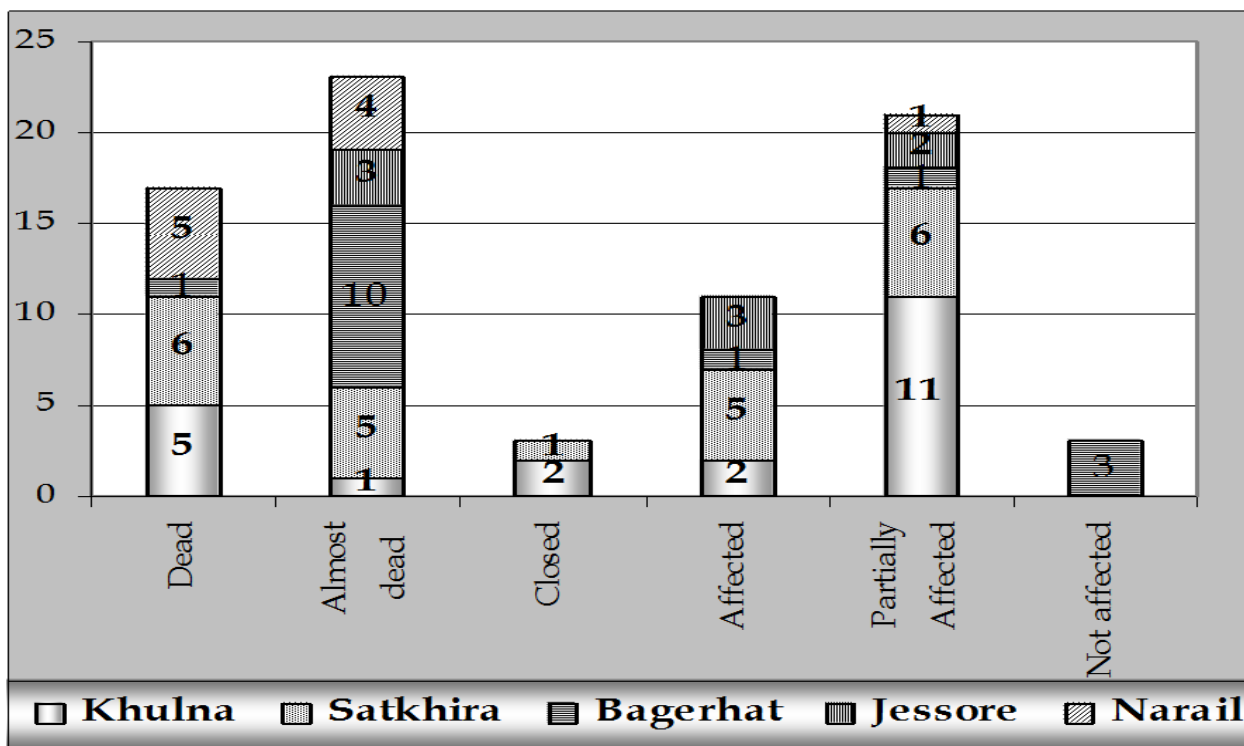


Figure-2. Rivers of Southwest Coastal Bangladesh

Source: Awal (2014).

4. WETLAND MANAGEMENT SCENARIO OF SOUTHWEST BANGLADESH

In the early decades, nature manages its resources through its natural process. Explosion of population, different development activities have been demanding more resources and facilities as well as the basic needs like badly needed services land, food and shelter. As the property, especially land property (wetlands) was not solely owned by the government regulations; it was very critical and complex job for managing wetland. Historically, local people or a community would initiate to trap the rain or flood as well as seasonal monsoon water with mud dams (embankments). Then the preserved water was very important for the irrigation for agriculture and fisheries (Rahman, 1995). People actually used to construct cross dams during late rainy season or early winter (month of October) to protect the paddy and demolish the dams after gathering the crops from the water body (Beel) during rainy season (month of June) to make sure the water flows freely to make the tidal water land elevated with the help of silt. This annual (managing wetland for 8 months of a year with) construction and demolition of cross dams was more familiar with the local people that were not possible to handle for a man only. For this, the community people manage the systems all together.

4.1. International Financial Institutions (IFI) Projects

Sustainable wetland management comprises almost all management practices of its resources like water, fisheries, agriculture and any other species of the boundary. For managing as well as conserving these resources of wetland, several projects (public or private) have already been introduced in the southwest region of Bangladesh with the financial aid of IFI the water resource, fisheries, forest and agriculture. ‘Bangladesh Water Development Board (BWDB)’ supervised a vast number of projects through the participation of community people-as for

example, Khalashis (operator) were frequently employed for operation of sluice gates. Over the year they have become an institution and have played a crucial role in the day-today water management through the operation of the various water control structures (regulators, sluices etc.).

4.2. Coastal Embankment Project (CEP)

To take advantage of the 'Green Revolution' inspired by the development of High Yielding Varieties (HYV) of wheat and rice, the then East Pakistan Water and Power Development Authority (EPWAPDA) implemented the coastal Embankment project funded by USAID.

- Activities performed- Altogether 4000 km of high embankments with 780 sluices were built, out of which 1566 km of embankments and 282 were in the Khulna region alone. These embankments enclosed all the land in the coastal region within 92 polders, out of which are in the Khulna region alone (Coastal News Letter, December 2002).
- Comments- With the coastal embankments natural and free flows of river water were hampered severely and the silt carried by the tides deposited on the riverbed and caused water logging, Salinity intrusion, river siltation, industrial shrimp cultivation.

4.3. Khulna Jessore Drainage Rehabilitation Project

This project aimed to resolve the water logging issue. Finally, the BWDB in 1995-96 came up with the US dollar 62m million Asian Development Bank (Khan *et al.*, 2015) assisted the project KJDRP. Manirampur, Keshobpur and Abhoynagar of Jessore district and Dumuria and Phultala of Khulna district- total 100,600 ha implemented by the agencies- BWDB, Department of Fisheries (DAF), Department of Agricultural Extension (DAE) started at 1995 and expected to complete within 2002 (Nakashima and Khan, 1994). Activities Performed- River dredging-28 km, Drainage channel-404 km Closure-1no. Embankments-24.5 km, Hydraulic structure-7 no. Rehabilitation of hydraulic structure-8 no. Outlet structure-12 no. Tidal basin perimeter-9.5 km Culvert/bridge-24 no.

- Ongoing activities- River dredging-2 km, Drainage channel-150.70 km, Embankment-8.86 km, Rehabilitation of hydraulic structure 11 no. Outlet structure-8 no. Tidal basin perimeter- 0.5 km, Culvert-bridge-14 no (The KJDRP has been wound up on December 31, 2002).
- Comments- several times people gathered to protest against the activities of KJDRP. The project aims are not achieved at a satisfactory level

4.4. Gorai River Restoration Project

10 districts of southwest Bangladesh were started with this project. This is an ongoing project implementing by BWDB and executing by DHV-Haskoning Construction and associates MLSMEC-DETS-DPM-HCL funded by the Government of Netherlands (of US\$ 60 million).

- Comments- as work on Gorai Restoration has remained suspended after the experimental dredging during two seasons, the large amounts spent on the project have become totally unproductive.

4.5. NGOs Initiatives

Different NGOs have taken initiatives and are continuing their activities with the natural resources like freshwater wetland in the southwest Bangladesh. CARE-Bangladesh, Coastal Development Partnership, JJS, WRDS, RUSTIC, UTTARAN have been introduced as the leading NGOs that have taken initiatives and conducted their voice for managing or conserving wetlands. SBCP watch group has been arranged for supervising the Sunderban Biodiversity Conservation Project (SBCP). Wetland Resource Development Society (WRDS) are continuing the managing wetlands in the southwest coastal Bangladesh. They are still working

with the concepts of soil less agriculture. UTTARAN a local NGO of Satkhira District had been working with the direct interactions of the local people of Debhata Union of Kaliganj thana of Satkhira district while the poor people were being torturing by the influential or armed elite group of the society who were intended to cultivate or were attempted to take the possession.

4.6. People's Initiatives

Local people of the southwest Bangladesh reacted several times against the wrong decided projects launched by different IFI as well as government projects. When the Coastal Embankment Project (CEP) was launched, peasant leaders warned against its possible adverse consequences. Day by day, it was becoming severe and the local people, the peasants' organizations and local political leaders joined forces to form the 'Beel Dakatia Sangram Committee'. In 1990, the Sangram Committee called a mass meeting to be held on August 17. The local administration imposed section 144 in and around the meeting venue. Bangladesh Water Development Board (BWDB) approached to provide a viable solution to the water- logging, failing which the people would breach the embankment. Later, the period was extended, but finally, the people breached the embankment of Polder 25 at four places on September 18, 1990.

5. PROBLEMS IN RELATION TO WETLAND MANAGEMENT

5.1. Land use Conflicts

There are about 2180000 landless in the Bangladesh. It is common and major problem in our country with limited land property and unequal distribution of land to the people. A balance of interdependence of land, water and people is essential to achieve an integrated development. The poor and landless coastal people have, for generations, tried to settle on newly accreted lands and chars.

5.2. Social as Well as Political Conflicts

The expansion of shrimp cultivation has generated social conflicts in many areas. For this, social conflicts and political movement and hazards face frequently. For this, the sustainable wetland management is not possible.

5.3. Development Activities

Coastal Dam, Regulators, settlements, roads and bridge, industrial shrimp cultivation, small-scale as well as large-scale cottage industries based on the raw materials from the wetlands are essential for the excess population is the real obstacle to manage the wetland.

5.4. Salinity Intrusion

Due to the unique geographical characteristics, the southwest coastal region encompasses saline water and several Beels, river and other estuaries. Though the saline water is protected by the polder, in dry season the ground saline water comes to the upper land area with the help of capillary action of the salt water and hampers the agriculture.

5.5. Institutional and Policy Conflicts

In the country, it is more common and severely hampers the management. Inter institutional coordination and policy of different agencies become frequently contradictory in the management of wetlands.

6. BEEL DAKATIA AS WETLAND

6.1. Existing Situation and the Brief History of Beel Dakatia

The area where Beel Dakatia is situated is the part of the deltaic Bengal plains. Beel Dakatia is the beel of 60 sq. mile area now are fully water logged. In 1960s, Coastal Embankments Project launched through construction of 37 polders and 282 sluices and the water were becoming trapped into the polder. Water logged Beel Dakatia is the product of these project. Government moved, though slowly, to mitigate the sufferings of the people who were submerged. In 1984, GOB requested ADB to investigate the possibility of investment in the rehabilitation of 400,000 ha of land originally enclosed by coastal embankments in Khulna region (Rahman, 1995). Recently, there are large numbers of shrimp ghers have been constructed in Beel Dakatia. The logged or trapped water has been sucked by shallow pump for rice production and the scarcity of water for irrigation purposes has already found. Shailmari and Shalta rivers are going to be silted up due to the scarce flows of rivers water.

6.2. Reasons behind Mismanagement

In the Beel Dakatia area, main drawbacks for the management are briefly noted below:

- Lack of proper maintenance of the regulators or sluices of the polder no. 25 Marginal farmers and landless people have no or little access to contribute the management of the Beel
- Land ownership pattern is the critical and complex problem in the Beel area
- Shrimp lords and influential persons create pressure to the people to transferred by lease
- Inter organizational coordination and the wrong or insincere decisions from the government and international organizations
- Lack of people's participation and involvement of different NGOs, CBOs and voluntary organizations
- Lack of public awareness to overcome the problems of the Beel area

6.3. Potentialities of the Beel

There are several types of wetland resources are found in the Beel area. A large amount of land are very much potential for fisheries development, agricultural production (especially rice), raw materials like hogla for small scale cottage industry, different types of aquatic species (like snail, grab and others) may contribute to the socio-economic status. If the Beel can possible to manage properly the cropping intensity may be increased up to 2 or 3 of the year.

7. POLICY OPTIONS FOR SUSTAINABLE MANAGEMENT

7.1. Policy Options for Managing the Beel

The wetland management strategies need to be directed at enriching wetland habitats with the component biological resources and also addressing the needs of the resident human population (wetlands of Bangladesh, BCAS, page-66). The goal of conservation should not be to stop wetland development but ensure that it is done in a way which minimizes the environmental costs.

The possible policy or strategy options are briefly listed below:

7.2. Socioeconomic Options

- Population stabilization through economic development and family planning through education
- Enhancement of the capability of NGOs and government agencies to deliver educational and ecological awareness programs to the local people
- Participation of the local people in the planning process enforcement of planning decisions

- Evaluation of previous developmental projects for having the experience
- Promotion of ecologically sound land use practices for marginal agriculture and fisheries
- Reduction of pollution with the contradictory cultivation of shrimp and crops
- Participation of women in the management practices and planning decisions in the management of the Beel
- Reduction of institutional and policy conflicts as far as possible through adequate coordination through different concern agencies
- The target group or the beneficiaries in the Beel area must be decided to a common policy that may be sustainable

7.3. Technical Options

- Ensure regular dredging of the Shailmari (both upper and lower) river to drain the logged water
- Modern and integrated agricultural technology may be propose for the adoption to have a sustainable management system
- Proper utilization of the logged water as much as possible with the collaboration of different beneficiaries may be the option. For this, the beneficiaries may initiate combined fisheries (sweet water fisheries) and agriculture by establishing cooperatives or committee
- Full accounting of wetland values including habitats and biological diversity in all environmental impact assessments (EIA) of projects which could affect them including roads, flood control, drainage or irrigation schemes
- The scheme as GK project may be launched in the Beel Dakatia of 60 sq. mile area. A high quality pumping machine can be used to discharge the excess water and the channel within the Beel for gathering water from different point of the Beel.

7.4. Legislative Options

To begin with, the existing rules and regulations should be strictly enforced. Different agencies are executing wetland with sectoral laws or multiple legal statuses. It becomes clear that from the study that a number of laws need to be identified and examined to conceptualize the prevailing regulatory regime on wetland. Some of these are as follows: The state Acquisition and Tenancy Act, 1950, The Acquisition of Waste Land Act, 1950, The Culturable Waster Land (utilization) Ordinance, 1959, The Forest Act, 1927, the wild life (preservation) (Amendment) Act, 1974, The Canals Act, 1864, The Land Reforms Ordinance, 1984, The Agricultural Pesticides Ordinance, 1971, The Embankment and Drainage Act, 1952.

8. CONCLUSION

Several projects have been launched and different agencies and the individuals have conducted various research works but due to the lack of proper management policies the beneficiaries are exploiting the resources of wetland which is threatening the concept of sustainable development.

In the southwest zone of Bangladesh wetland management practices are based on the sectoral approach that lead lack of co-ordination among the projects. The policy options above guided for the management have considered various multilateral issues in relation to wetland management. For the sustainable or long term project management all of the community people and different GOs and NGOs should approach cordially. The problems associated with the proper management of Beel Dakatia are very much influenced by the lack of coordination and mismanagement. The proper management of the wetland is the determining the livelihood pattern of the wetland community. In this context better management practices can ensure sustainable development.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: Both authors contributed equally to the conception and design of the study.

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