DGIS/DANIDA

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MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD

MEGHNA ESTUARY STUDY

DATA VOLUME MES - 111

WATER MANAGEMENT & DRAINAGE DATA

September 1998

DHV CONSULTANTS BV

in association with

KAMPSAX INTERNATIONAL
DANISH HYDRAULIC INSTITUTE

DEVELOPMENT DESIGN CONSULTANTS
SURFACE WATER MODELLING CENTRE
AQUA CONSULTANTS AND ASS. LTD.

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A : BASIC DATA

1. Rainfall and meteorological data

Rainfall

The following 20 BWDB rainfall stations are located in or near to the study area:

Station No.	Name	Owner	Latitude (N)	Longitude (E)	Period	No. Years	Remark
R 255	Bauphal	BWDB	22° 25.1'	90° 33.8'	1961-1995	34	
R 257	Barhanuddin	BWDB	22° 29.9'	90° 43.1'	1962-1995	33	
R 260	Bhola	BWDB	22° 41.0'	90° 39.1'	1962-1995	33	
R 261	Daulat Khan	BWDB	22° 37.0'	90° 46.8'	1961-1995	33	
R 262	Galachipa	BWDB	22° 10.0'	90° 24.7'	1961-1995	31	
R 268	Charfesson	BWDB	22° 15.0'	90° 48.0'	1968-1978	11	closed
R 269	Khepupara	BWDB	21° 59.0'	90° 13.8'	1968-1995	26	
R 270	Anjurhat	BWDB	22° 07.6'	90° 39.3'	1968-1978	11	closed
R 273	Rangabali	BWDB	21° 57.3'	90° 24.7'	1968-1978	11	closed
R 306	Chittagong	BWDB	22° 21.0'	91° 48.5'	1957-1995	38	
R 320	Mirsarai	BWDB	22° 47.0'	91° 34.3'	1961-1995	33	
R 331	Sandwip	BWDB	22° 29.0'	91° 26.5'	1961-1994	32	
R 334	Sitakunda	BWDB	22° 37.5'	91° 39.5'	1966-1995	30	
R 353	Basurhat	BWDB	22° 52.3'	91° 16.7'	1962-1994	31	
R 354	Chandpur	BWDB	23° 14.3'	90° 40.0'	1961-1994	32	
R 361	Hatia	BWDB	22° 16.5'	91° 07.5'	1962-1994	31	
R 364	Lakshmipur	BWDB	22° 56.2'	90° 50.2'	1961-1994	33	
R 369	Noakhali	BWDB	22° 50.3'	91° 06.0'	1961-1994	32	
R 372	Raipur	BWDB	23° 02.5'	90° 45.8'	1962-1994	31	
R 375	Ramgati	BWDB	22° 34.0'	91° 01.0'	1962-1994	30	

Source: BWDB, 1996

The year wise availability for each station is shown in figure 1. At this stage of the study, the data of three selected rainfall stations have been analysed, Sandwip, Hatia and Kepupara, representative for the land clusters A, B and C, south-west of Bhola, Hatia and north-west of Sandwip.

Figure 2 shows the average annual rainfall inside the study area.

Rainfall data will be used in evaluation and development of drainage design criteria.

Meteorological Data

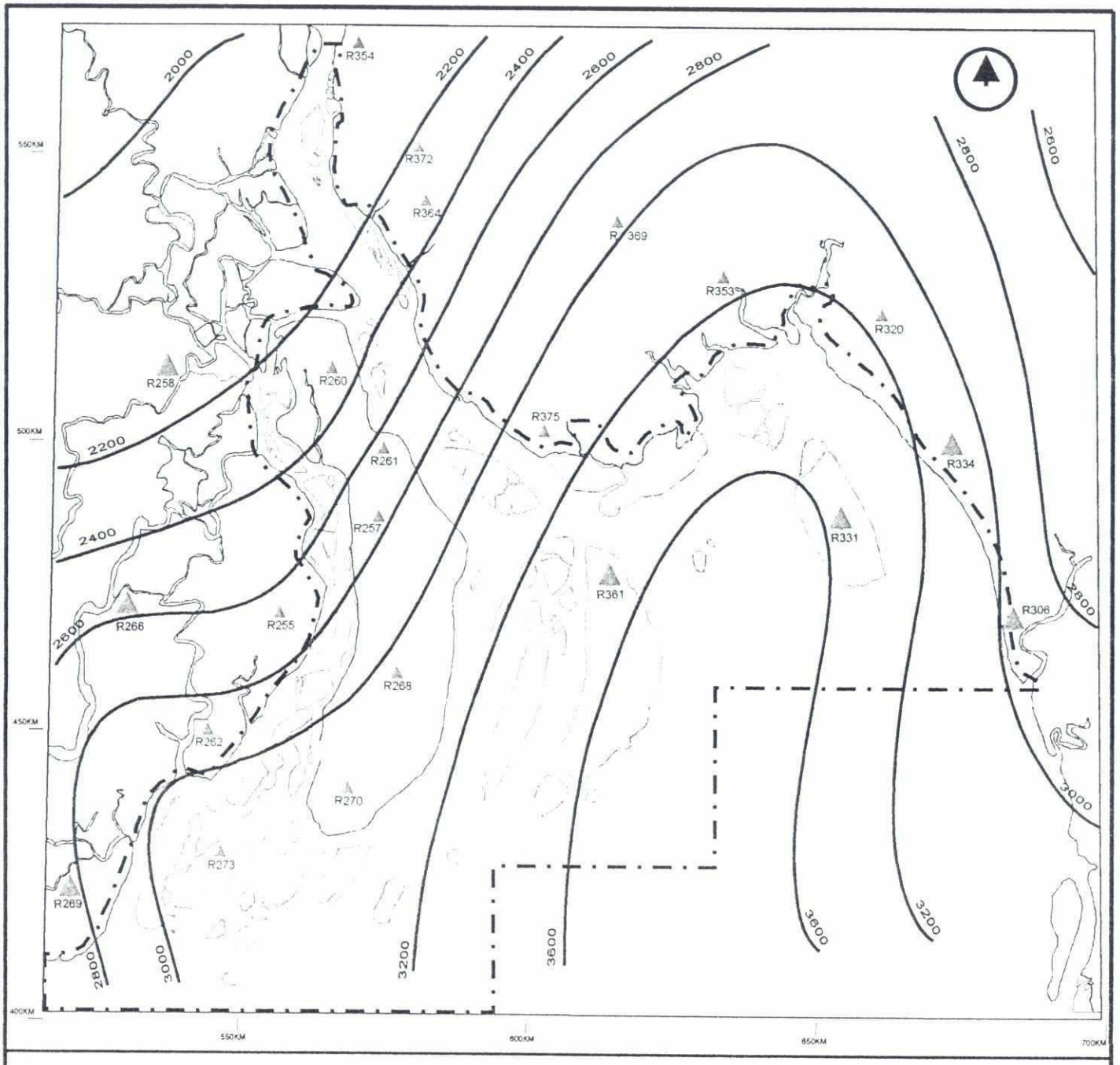
The following 9 BMD meteorological stations are located in or near to the study area:

Station No.	Name	Owner	Latitude (N)	Longitude (E)	Altitude (m)	Period	Years
11316/941	Chandpur	BMD	23° 16.0'	90° 42.0'	5.5	1964-1995	27
11704/950	Barisal	BMD	22° 45.0'	90° 22.0'	2.1	1949-1995	45
11706/951	Bhola	BMD	22° 41.0'	90° 39.0'	4.3	1949-1995	46
11814/963	Hatia	BMD	22° 26.0'	91° 06.0'	2.4	1966-1995	29
11912/965	Sitakundia	BMD	23° 35.0'	91° 42.0'	6.0	1949-1995	46
11916/964	Sandwip	BMD	22° 29.0'	91° 26.0'	2.1	1949-1995	45
12103/960	Patuakhali	BMD	22° 20.0'	90° 20.0'	1.5	1949-1995	44
12110/984	Kepupara	BMD	21° 59.0'	90° 14.0'	1.8	1949-1995	45
11921/978	Chittagong	BMD	21° 16.0'	90° 49.0'	4.3	1961-1997	36

Source: BMD, 1996

The year wise availability for each station is shown in figure 1.

Daily maximum, minimum and mean temperature, daily relative humidity, 3-hourly wind speed and sunshine hours are measured and can used to calculate the potential evapotranspiration.



LEGEND

STUDY BOUNDARY

STUDY AREA

SUBMERGED LAND AREA

RAINFALL CONTOUR (mm) — 3000

RAINFALL STATION — R273

METEOROLOGICAL STATION — R269

REMARK: BHOLA IS EXCLUDED FROM THE STUDY AREA

SOURCE: BANGLADESH METEOROLOGICAL DEPARTMENT, 1994
BWDB, 1995

MEGHNA ESTUARY STUDY

AVERAGE ANNUAL RAINFALL

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1998

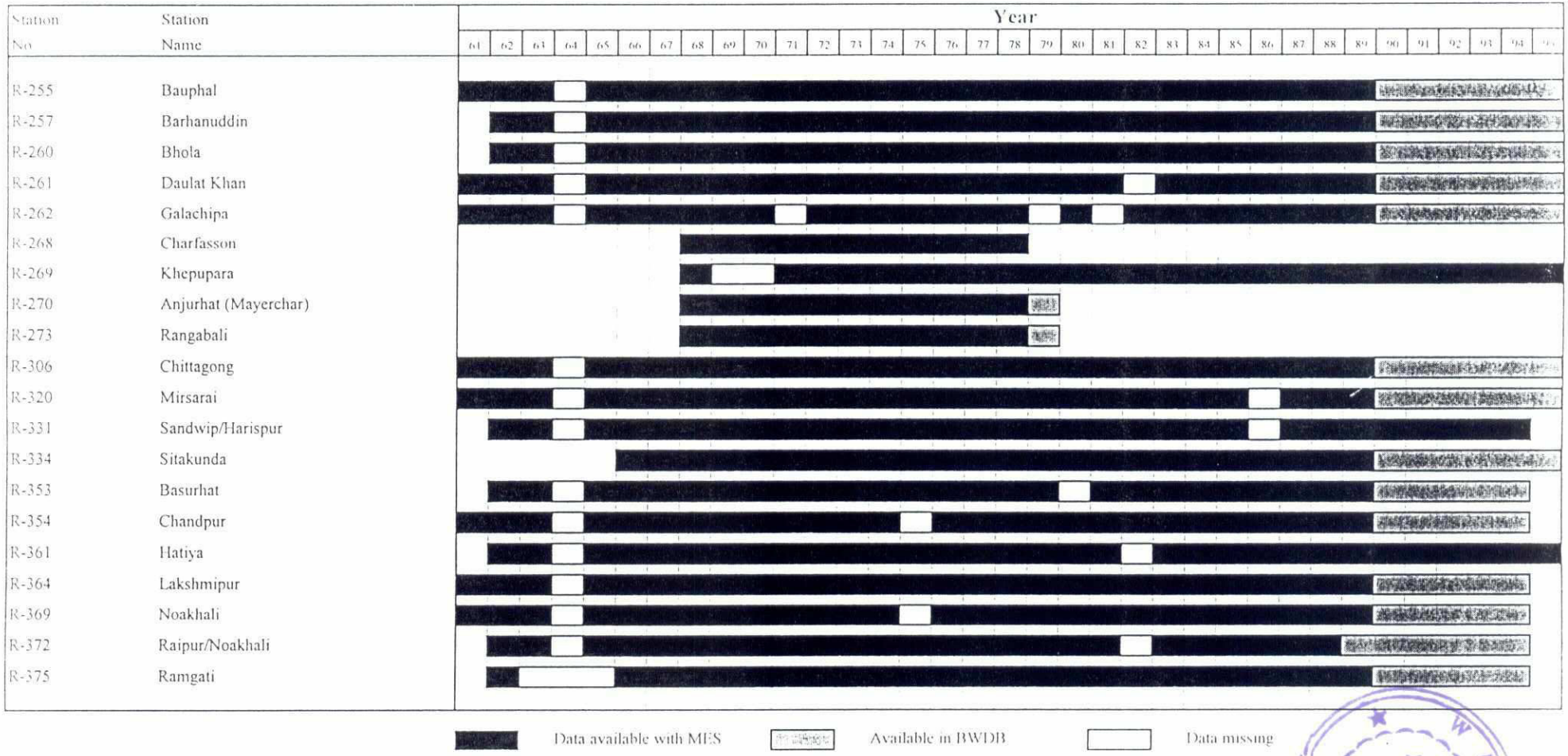
10 10 20 30 40KM

SCALE

File : C:\TOM\RAINFALL.COR

Meghna Estuary Study

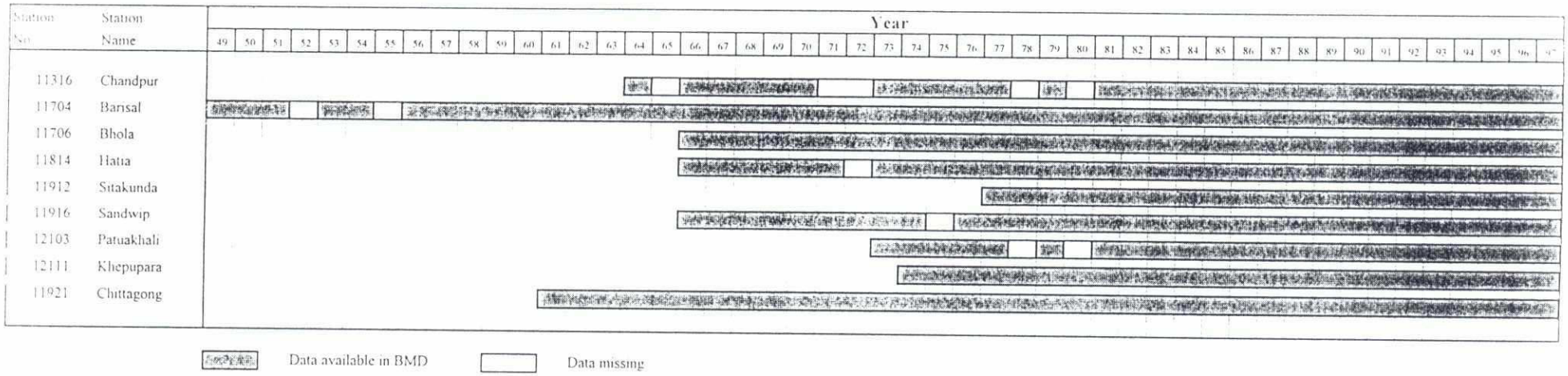
Rainfall Data Availability



Source : Surface Water Hydrology-2, BWDB

Meghna Estuary Study

Meteorological Data Availability



Source : Bangladesh Meteorological Department (BMD)

2. Water salinity data

Most of the available water salinity have been compiled in a technical note on salinity (MES, January 1997). This report covers the results from two salinity studies, a comprehensive salinity study done by CEP (Coastal Embankment Project) from January 1966 until June 1967. The second, but less comprehensive, study was implemented by LRP. Most salinity measurements have been done in combination with occasional flow measurements (LRP, 1984-1986) and long term salinity measurements have been taken at four stations, mainly in the north-east part of the estuary.

Important for water management is the salinity level of 1.5 to 2.0 dS/m at 25 °C (1500 to 2000 micromho/cm or approximately 0.9-1.0 ppt). Water below this salinity level in considered safe for irrigation of crops, like rice, with moderate salt tolerance. Flooding of land with water with higher salinity levels will contribute to resalinisation.

At a given location, there exists no significant stratification of water layers with different salinity levels and no significant difference of salinity is observed between daily high and low tides. Some difference in salinity occurs between the fortnightly spring and neap tides. Storm surges may also cause considerable, although short, change in salinity levels. However, too little data are available to assess such impact.

Salinity levels show a great variation throughout the year in the Meghna Estuary. Variations are caused by the enormous change in discharge of the Meghna River. In the dry season, when the Meghna discharges are small, saline water enters deep into the estuary. The highest values are measured from March to May. From May to August salinity decreases quickly and during the monsoon, from August to October, water in the estuary is almost fresh. From October to March salinity levels increase again gradually to their highest levels. The south-west part of the estuary is least affected by saline water, contrary to the east and north-east part where water remains much longer saline.

Figure 3 and 4 show the probable 2 dS/m contour lines mainly for the different months in the year, based on results of the CEP and LRP studies.

Under MES salinity data are collected in combination with flow measurements. In separate north-south grids salinity data will be collected at 1 km interval and at various depths.

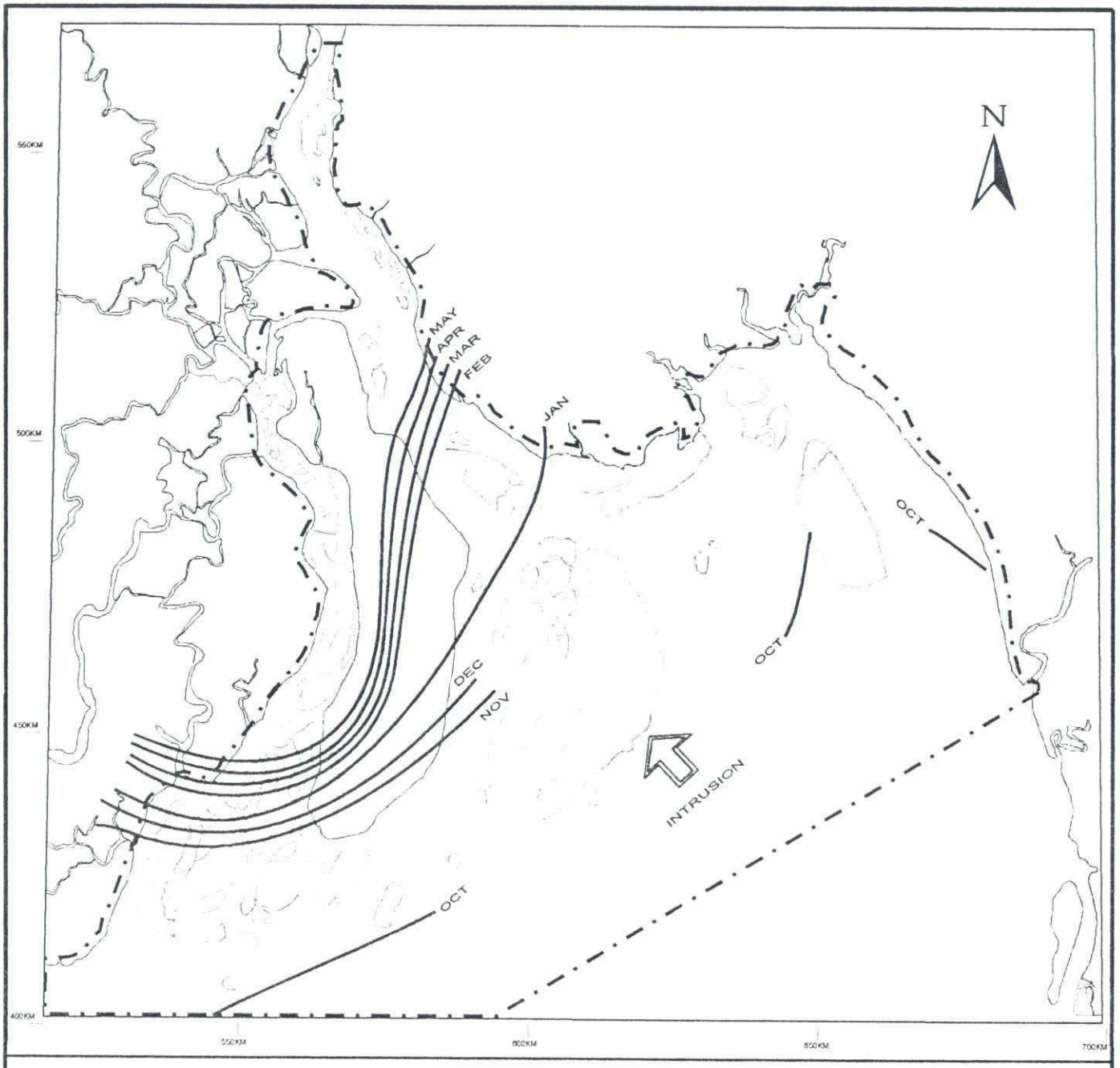
3. Soil properties

Soil Texture

The land inside the project area is classified as Young Meghna Estuarine Floodplain. The soils consist of fine stratified, deep sediments of fine sand, sandy loam, silty loam, loam and silty clay loam. These soils contain a high percentage of silt and shallow groundwater is saline.

Physical characteristics

Few detailed soil data are available. LRP undertook for several years soil investigations and their findings can be considered indicative for the soils of the Young Meghna Estuarine Floodplain. Strong seasonal resalinisation is observed throughout the estuary. LRP found that this phenomenon is strongly related to the poor permeability and the fine texture of the soil (see 3.1.4).



LEGEND

STUDY BOUNDARY

STUDY AREA

TIDAL MUD FLATS

2dS/m SALINITY LINE

REMARK: BHOLA IS EXCLUDED FROM THE STUDY AREA

SOURCE: CEP (1966 - 1967), LRP (1984 - 1986)

MEGHNA ESTUARY STUDY

2 dS/m SALINITY CONTOUR LINES OCTOBER TO MAY

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1996
PRODUCED BY	MES WM, GIS/RS/CAD UNIT

10 10 20 30 40KM

SCALE

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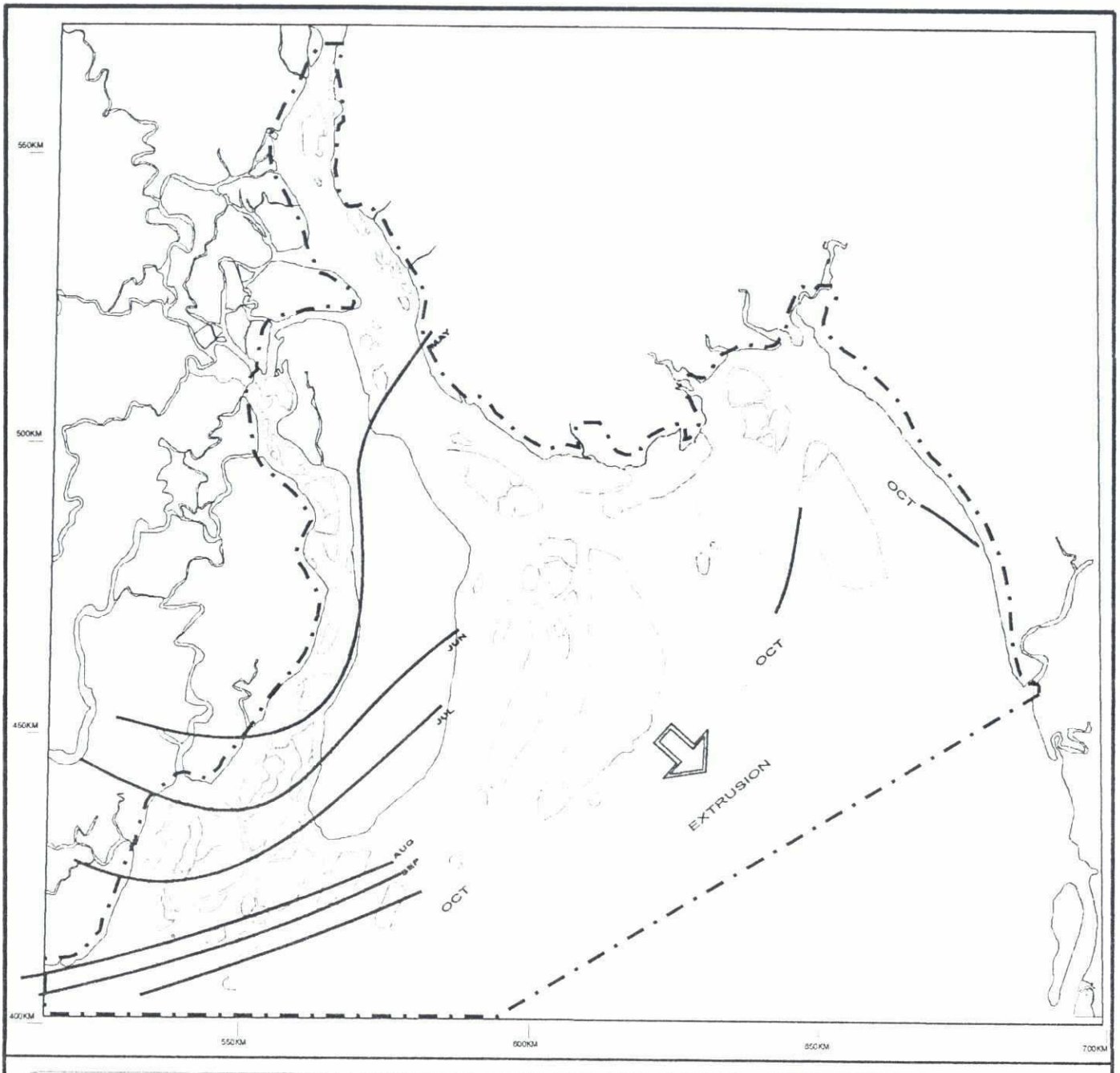


LEGEND

STUDY BOUNDARY

STUDY AREA

TIDAL MUD FLATS

2dS/m SALINITY LINE

REMARK: BHOLA IS EXCLUDED FROM THE STUDY AREA

SOURCE: CEP (1966 - 1967), LRP (1984 - 1986)

MEGHNA ESTUARY STUDY

2dS/m SALINITY CONTOUR LINES MAY TO OCTOBER

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1996

10 10 20 30 40KM

SCALE

File: C:\TOM\1\SAL_M_O.COR

Soil salinity

The parameter for soil salinity is the electric conductivity at 25°C of the saturation extract noted as EC_e. Soils with EC_e values below 4 dS/m are considered free of salts. Between 4 and 8 dS/m soil are slightly affected and crop yields are reduced.

The salinity of soils within the estuary varies throughout the year. The lowest salinity levels are measured in the mid-monsoon period (July to August). The highest salinity levels are observed in the dry-season (pre-monsoon, March to April).

Most saline soil are found on the mudlands with EC_e values between of 20 and 40 dS/m and are not-suitable for agriculture. Well accreted but still unprotected char lands gives EC_e values over 8 dS/m during the monsoon. Low yielding salt tolerant Aman rice crops are cultivated during the monsoon on unprotected lands with EC_e values up to 15 dS/m.

A soil survey conducted by LRP in the post monsoon period of 1990 on South Hatia and Nijhum Dwip produced EC_e values of 5 to 8 dS/m in unprotected areas. A more recent survey in 1994 of the same area by SRDI in the pre-monsoon showed slightly lower EC_e values ranging from 1 to 3 dS/m inside and 3 to 9 dS/m outside the coastal embankment of South Hatia.

4. Ground water

Throughout the estuary shallow groundwater is slightly saline and aquifers are poor. Only at 250 to 300 meters depth fresh water is found. The quantity of fresh ground water appears to be limited. Exploitation of ground water at these depths, if sufficient, will be very costly and not-feasible. Ground water is therefore mainly used for the supply of drinking water.

5. BWDB

Background

BWDB is the sole government institute responsible for planning, design and implementation of Flood Control and Drainage (FCD) projects in Bangladesh. LGED is more involved in road works, although it has a mandate for minor hydraulic infrastructural works. Recently LGED started with the construction of marginal embankments in the estuary (Char Chalitia Bunia).

BWDB started with the Coastal Embankment Project in the early sixties and seventies. A planning for 68 polders was made and by the end of the seventies most of these polders were constructed. The construction of a polder is basically limited to construction of a ring embankment and sluices. However, some polders have not yet been constructed (Polder 52/53, Char Bara Baishdia).

Already in the eighties a need for rehabilitation of the polders emerged. At the same time it was concluded that O&M required more attention and BWDB was reorganised in O&M zones, circles and divisions. Parts of coastal embankments have been washed away and many embankments and sluices required serious maintenance. Projects like Systems Rehabilitation Project (SRP) and Coastal Embankment Rehabilitation Project (CERP) are focusing on rehabilitation as well as O&M.

In general it can be said that the benefits realised in FCD projects, in particular regarding the agricultural production is below expectations. Lack of maintenance, drainage congestion and poor operation management are major constraints. Under project such as SRP, CPP, CDSP and FAP-16, BWDB has started to address these problems.

Jurisdiction

The figure hereafter shows the jurisdiction boundaries of the various BWDB O&M Divisions present inside the MES project area, eight in total. Bhola is the only island with an O&M Division. Hatia and Sandwip each accommodates an O&M Sub-Division.

Responsibility

The tasks of the BWDB is to operate and maintain the FCD schemes, consisting of embankments and sluices. The O&M divisions are responsible for earth and concrete & brick works, while the Mechanical Division is responsible for the sluice gates. Khals are the property of the Ministry of Land and excavation is often arranged through non-BWDB channels (Union Parishad, LGED, Thana Administration etc.), in many cases under Food For Work, although BWDB can take up such works in their Annual Development Plan. Operation of sluices is handed over to sluice committees, which do exist on paper, but not in practice. Operation is often in the hands of local and influential stakeholders[1].

Staffing

Each O&M division is headed by an Executive Engineer (XEN) and consist of three O&M Sub-Divisions, each headed by a Sub-Division Engineer (SDE). The latter has a staff of Sectional Officers, Topographers and Work Assistants. The staff profile and experiences of BWDB are related to new civil works, rehabilitation and emergency maintenance. Little or no experience has been build-up on routine and periodical maintenance and operation by involving water users.

Establishment.

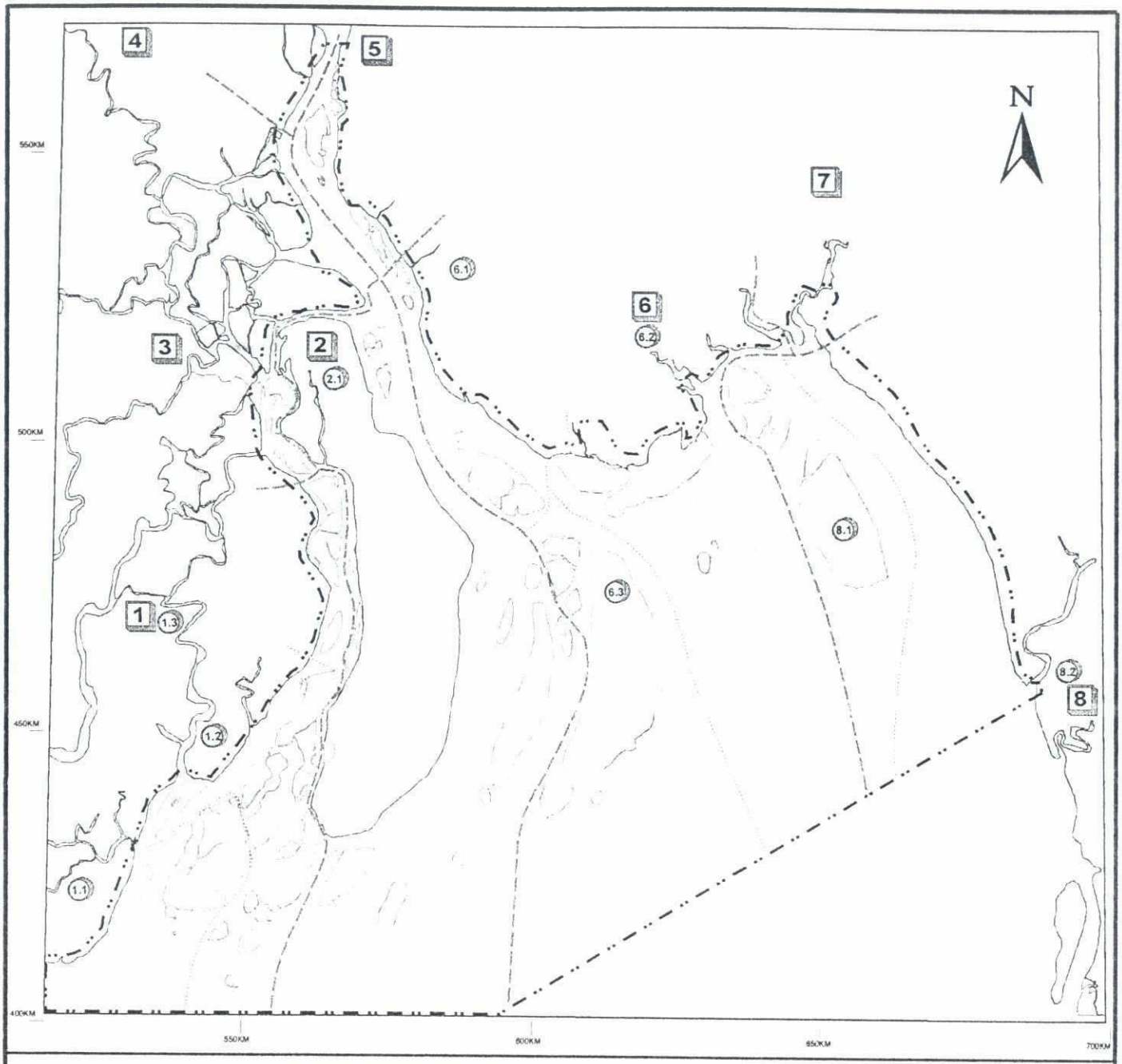
Most of the BWDB O&M compounds are outside the project area, with the exception of Hatia and Sandwip. XENs and SDEs are equipped with speed boats and cars. The latter are of limited importance in the estuary itself.

Funding

Although a start has been made under SRP to set up operation and maintenance plans little progress has been achieved so far. Project inventories are poor and outdated, maps show little detail and are of mediocre quality. Designs and studies are in most cases absent in the Divisions and difficult to trace in Dhaka Design offices.

ADPs are therefore limited to emergency maintenance, such as embankment retirements and repairs of breaches in the embankment. Broken down or disappeared sluice gates are seldom replaced. Funding is one of the constraints. Although a comprehensive inventory was not the objective of this study, it can be stated that even emergency maintenance is delayed by the lack of O&M funds and leaves considerable "protected" land of various polders exposed to floods and intrusion of saline water.

[1] SRP, Water Management in Flood Control and Drainage Systems in Bangladesh, TR 50, April 1997.



LEGEND

STUDY BOUNDARY

STUDY AREA

SUBMERGED LAND AREA

O&M DIVISION BOUNDARY

O&M SUB DIVISION BOUNDARY

O&M DIVISION HQ (1)

O&M SUB DIVISION HQ (1.3)

REMARK: BHOLA IS EXCLUDED FROM THE STUDY AREA

MEGHNA ESTUARY STUDY

BWDB O&M JURISDICTION

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1996
PRODUCED BY	MES WM, GIS/RS/CAD UNIT

10 10 20 30 40KM

SCALE

O&M DIVISIONS:

1. PATUAKHALI
2. BHOLA
3. BARISAL
4. FARIDPUR
5. CHANDPUR
6. NOAKHALI
7. FENI
8. CHITTAGONG

O&M SUB DIVISIONS:

- 1.1 KHEPUPARA
- 1.2 GALACHIPA
- 1.3 PATUAKHALI HQ
- 2.1 BHOLA HQ
- 6.1 LAKSHMIPUR
- 6.2 NOAKHALI HQ
- 6.3 HATIA
- 8.1 SANDWIP
- 8.2 CHITTAGONG HQ

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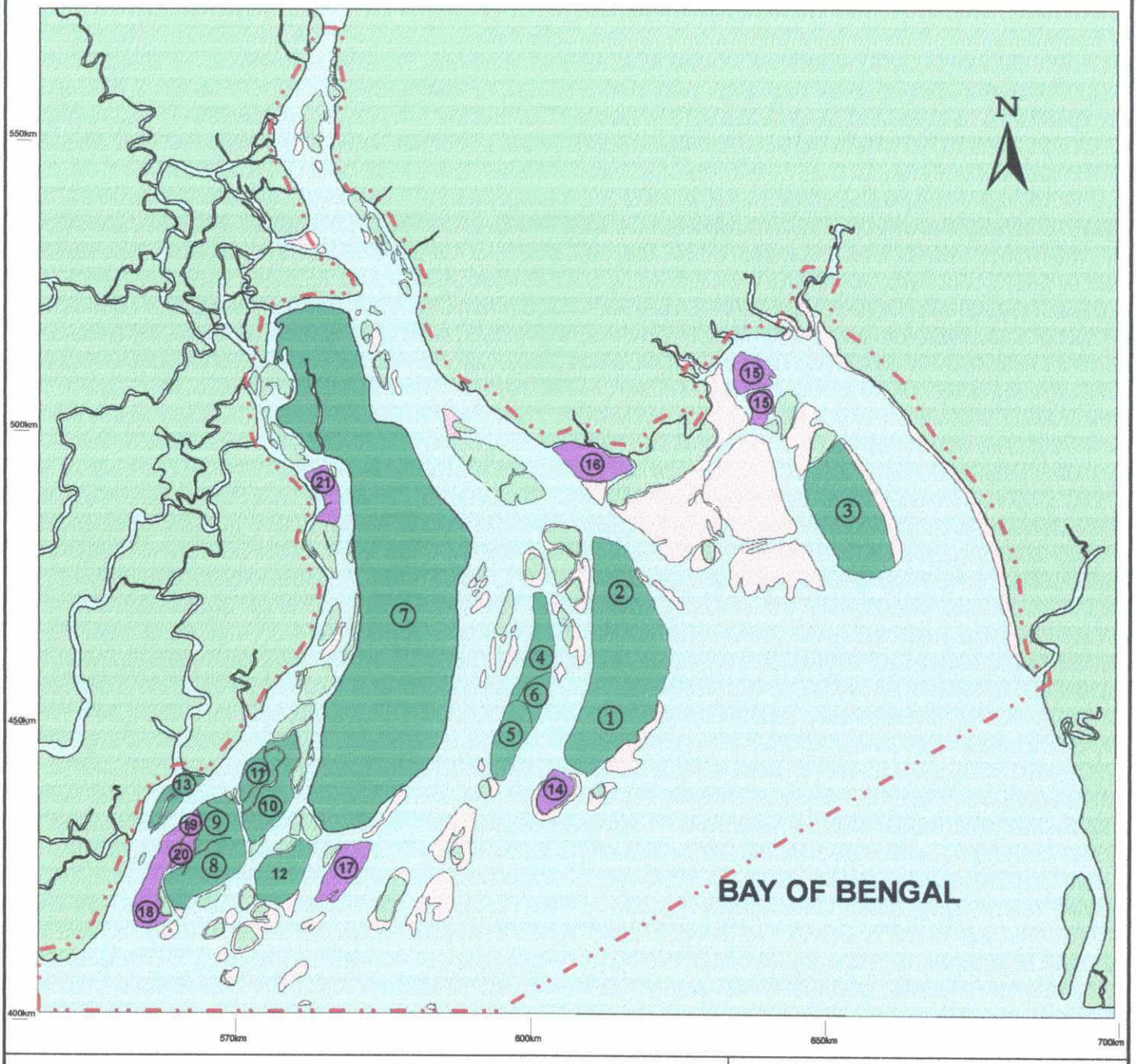
B : RESULTS OF AN INVENTORY SURVEY

List of Island

Contents Page

Location of 21 Islands for Inventory Survey



LEGEND:

- STUDY BOUNDARY
- MAIN LAND
- SUBMERGED LAND AREA
- PROTECTED ISLANDS FOR INVENTORY SURVEY
- UNPROTECTED ISLANDS FOR INVENTORY SURVEY

MEGHNA ESTUARY STUDY

Location of 21 Islands for Inventory Survey

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1996

Produced by:
GIS/RS/CAD Unit
Meghna Estuary Study

10 0 10 20 30 40KM

SCALE

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1. South Hatia

2. **Name of Thana/District:**
Hatia-Noakhali.

3. **Administrative status:**
Hatia Thana.

4. **Age of land:**
The age of land is about 200 years according to AC land.

5. **Area of land:**
The total area of the island (entire Hatia) is about 999.47 Sq. Km or 99,947 ha and the sub project is 11,239 ha.

6. **Protection:**
The island is protected by coastal embankment consisting of 3 Sub-Polders. South Hatia is under P-73/2. But the accreted land to the South of Hatia is unprotected. Length of embankment 47.93 Km. Sea & interior dyke were constructed during 1964-66. Drainage sluices 14 nos. surface sluices 6 nos. 23 nos. cyclone shelters along with 54 nos. killas have been constructed.

7. **Inhabitant:**
The total population of entire Hatia is about 2,24,000 and in South Hatia is 64,166 according to the census of 1991.

8. **Accretion/Erosion:**
Accretion is going on to the South and south-east. Severe erosion is going on to the North Coast of the island. Two Unions namely Harni and Channandi and part of Sukhchar and Nalchira Unions have already been engulfed by the Meghna.

9. **Occupation:**
People living in this island have various professions. Most of the people are farmers and fishermen both, some people are service holder, some are businessmen and some are small traders.

10. **Vegetation/Plantation:**
Accretion to the South and south-east of the island is going on, the new accreted land has not been empoldered yet. Mangrove plantation was started since 1980 by the Forest Department. Inside the Polder people planted fruits bearing trees and other kind of trees which have wood values around their homesteads.

11. **Agriculture:**
First crop cultivation was started about 175 years ago in Shunnair Char, Burir Char Union (source-DAE). At present total area under cultivation in Hatia is about 44,515 ha. Single cropped area 4,047 ha double cropped area 24,281 ha and triple cropped area 16,187 ha. The sub project covers a gross area of 11,239 ha of which about 9,477 ha are available for cultivation. Both local variety (rajashail, kajalshail) and HYV aman are cultivated in the island. Local variety aus & HYV aus are also cultivated in Hatia. Among rabi crops, they produce ground nut, potato, green papper, pulse, chichinga, karalla, cabbage, cauliflower, radish etc.

12. **Irrigation:**
Irrigation is practically absent in the island. The main reason for non-availability of sweet water is the salinity of the surrounding rivers is high during dry period (Nov.-June) restraining irrigation from external surface water sources. There is limited surface water irrigation from the internal khals, permanent water bodies by traditional methods like lifting by basket, pitcher etc. Ground water is not used for irrigation. Ground water near the surface is saline and water from the deep aquifer at a depth of 250m–300m is used only for drinking purposes by deep hand tube well.

13. **Sources of water and utilization:**
Deep aquifer ground water and rain water are the sources of sweet water. Water in the surrounding rivers is highly saline during dry season (Dec.-Jan.) less saline in monsoon (July-Sept.). Ground water is used only for drinking purposes. Rain water stored in ponds, khals and in water bodies are utilized for fish culture in ponds, washing purposes and in a very limited areas surface water is used for irrigation.

14. **Land use:**
Land is used for agriculture mostly. Some land is used for homesteads, ponds, roads for communication, khals for drainage purposes, market and office building etc.

15. **Drainage system:**
The island is protected by Coastal Embankment. Necessary drainage sluices connected with drainage channels have been provided for efficient drainage of the area. But these sluices and drainage channels have not been properly maintained neither by BWDB nor by the beneficiaries. Thus the drainage sluice are either partially damaged or ineffective. The drainage channels have been silted up or closed by cross dam for crossing or prevent saline water intrusion as a result drainage congestion occurs in Unions namely Burirchar, Sonadia, Tamaraddi, Char Ishwar, Char King, Nalchira, Sukhchar, Jahajmara. There are 14 no. drainage sluces (1.52 x 1.83m) and 6 no. pipe sluices newly added (1.22 mϕ)

16. **NGOs :**
There are a number of NGOs working in this island. They are:

- **GUG:** Gona Unnayan Gronthagar established a library in Uchkhali.
- **ASA:** (Association for Social Advancement) undertakes motivational work for landless women in literacy, health, nutrition.
- **PROSHIKA:** Supplies credit facilities among the landless for various income generating activities.
- **Red Crescent:** Established housing estates with tube wells and sanitary latrine for landless people.
- **DUS** (Dwip Unnayan Sangstha): Supplies credit facilities to both male and female group for various income generating activities.
- **BRAC:** (Bangladesh Rural Advancement committee) has introduced Extended Programme of Immunization (EPI) and Women's Development Programme (WDP).
- **TARD:** (Technical Assistance for Rural Development) Provides training in agriculture, fisheries, poultry and livestock.
- **RIC:** (Resource Integrated Centre) Supplies credit among their group members (flood affected people).

17. **Tidel Gauge:**
Char Chenga (Automatic)

1. **North Hatia (P-73/1 A-B)**
(22°18'N 91°6'E)

2. **Name of Thana/District:**
Hatia-Noakhali.

3. **Administrative status:**
Hatia Thana.

4. **Age of land:**
The island is very old and its age may be around 400 years as reported by the old local people.

5. **Area of land:**
21,377 ha. of which 13,178 ha. is cultivable.

6. **Protected/unprotected:**
The island was protected by sea dyke by the then EPWAPDA in early 60's. There after many cyclones and tidal surge lashed over the island damaging the protection embankment. The embankment is not properly maintained leaving many places left open to the sea. The length of the embankment is about 89.80 Km (Sea dyke: 24.70 Km, Interior dyke: 4.6 Km & Marginal dyke: 60.4 Km). Side slope R/S 1:2, 1:3, 1:7 C/S 1:2 crest width 4.27m.

7. **Drainage sluices:**
There were 11 no. drainage sluices constructed during implementation and subsequently number of surface sluices were constructed and 8 nos. by DANIDA during 86-88. CMP 1.22m dia 6 nos. 0.91m dia 4 nos. RCB 1.52 x 1.83m 1 no. SS 1.22m dia 17 nos.

8. **Population:**
The total population of the island is about 2,24,000 living permanently and in North Hatia 1,59,834.

9. **Occupation:**
People of various occupation such as businessmen, service holders, farmers, fishermen, teachers, politicians, boatmen, small traders, rickshaw pullers, drivers etc. live in the island.

10. **Agriculture:**
At present the cropped area is 13178 ha. transplanted aman is generally grown in this island which is local variety (Rajashail) and the average yield is 1.82-2.01 ton/ha. Rabi crops such as khesari, potato, sweet potato, groundnut, water melon and winter vegetable like tomato, cauliflower, cabbage etc. are grown.

11. **Erosion/accretion:**
Erosion by the surrounding rivers particularly to the north resulted in the loss of the original sluices and replacement drainage and surface sluices have been constructed at various times. About 7 km from the Northern tip of island has been engulfed by the Meghna and still erosion is going on. It is estimated that over 5,800 ha has been lost from the northern end of the island. There is siltation at the southern side of the island. The landless people due to bank erosion is migrating to the south.

12. **Plantation:**
Mangrove forest was planted mostly outside the embankment of about 11,498 hac by the forest department.

13. **Irrigation:**
Irrigation is not practised in this island. The main reason is non-availability of sweet water as the water of surrounding river is saline to highly saline during dry season (Nov. to June). Ground water available at a depth of 250m - 300m is used only for drinking

purpose and irrigation is not viable by ground water due to high extraction cost and the reserve is also unknown.

14. **Source of water:**
Deep aquifer ground water and rain water are the sources of sweet water. Water in the surrounding rivers is highly saline during dry season (Nov.-June), less saline in monsoon. Ground water is used for drinking purposes. Rain water stored in ponds, khals and in water bodies are used for fish culture, washing, bathing and other uses for animals.

15. **Land use:**
Land is used for agriculture mostly. Other uses are homesteads, ponds, roads, markets, khals for drainage, office building, mangrove forest etc.

16. **Drainage system:**
The island is protected by coastal embankment with necessary drainage sluices at the outfall of existing drainage channels. But these sluices and drainage channels have not been properly maintained neither by BWDB nor by the beneficiaries. Thus the drainage sluices are either damaged or ineffective. The drainage channels are silted up, sometimes closed by cross-dam for crossing or prevent saline intrusion as a result drainage congestion occurs in different areas of the island.

17. **NGOs :**
There are a number of NGOs working in this island. They are:

- **GUG:** Gona Unnayan Gronthagar established a library in Uchkhali.
- **ASA:** (Association for Social Advancement) undertakes motivational work for landless women in literacy, health, nutrition.
- **PROSHIKA:** Supplies credit facilities among the landless for various income generating activities.
- **Red Crescent:** Established housing estates with tube wells and sanitary latrine for landless people.
- **DUS** (Dwip Unnayan Sangstha): Supplies credit facilities to both male and female group for various income generating activities.
- **BRAC:** (Bangladesh Rural Advancement committee) has introduced Extended Programme of Immunization (EPI) and Women's Development Programme (WDP).
- **TARD:** (Technical Assistance for Rural Development) Provides training in agriculture, fisheries, poultry and livestock.
- **RIC:** (Resource Integrated Centre) Supplies credit among their group members (flood affected people).

18. The roads are constructed by LGED. The type of roads FRB 19.27 Km, R_1 73.77 Km, R_2 143.23 Km & R_3 369.13 Km.

1. **Sandwip island (Polder-72)**

2. **Name of Thana/District:**
Sandwip- Chittagong.

3. **Administrative Status:**
Sandwip Thana.

4. **Area of land:**
The gross area is about 762 Sq. Km or 76,232 ha of which 51,998 ha are cultivable land.

5. **Age of land:**
The island is very old and its age may be around 400 years as reported by the people.

6. **Protected/Unprotected:**
The island was protected by sea dyke by the then EPWAPDA in early 60's. Thereafter many cyclones and tidal surge lashed over the island damaging the Protection Embankment. The length of embankment is about 58.80 Km. Crest level 7.0 PWD crest width 4.27 side slope R/S 1:7, C/S 1:3.

6.1 **Erosion/Accretion:** Severe erosion in the west and part of South Coast is going on (8.4 Km-58.48 Km) and the Protection Embankment has been engulfed by the river keeping the island open on the West. At the same time huge accretion takes place in the East and part of North Coast.

6.2 **Present situation:** The embankment was badly damaged by the cyclone of 29th April/91. Reconstruction of the embankment was taken up under Coastal Re-habilitation Project (CRP) with the assistance of World Bank. In 1st phase 37.60 Km resectioning and retired embankment (8.4 Km to 46.00 Km) was completed with expenditure Tk 400 million. In the 2nd phase resectioning and retired embankment of 14.29 Km has been taken up with estimated cost of Tk. 192.246 million.
In FY 1996-97 IDA financed Tk 6.00 million for the construction of a ring dyke along the West Coast to prevent saline water intrusion.

7. **Population:**
The total population of the island is about 2.72 lakhs according to 1991 census.

8. **Occupation:**
People of various occupations such as businessmen, service holders, farmers, fishermen, teachers, politicians, boat men, small traders, rickshawpullers live in this island.

9. **Agriculture:**
At present the cropped area is 51,998 ha, of which aus (dibbling method) 14,800 ha, transplanted 1,200 ha and aman (transplanted) 50,500 ha. Average yield is 1.82-2.01 ton/ha. Rabi crops such as khesari, sweet potato, potato, ground nut, water melon, cowpea and winter vegetable like tomato, cauliflower, cabbage etc. are grown.

10. **Irrigation:**
There is no surface sweet water reservoir in the island. Rain water is available in ponds and khals which are utilized for fish culture, washing and bathing. Irrigation is not practised in the island. Ground water is used for drinking purpose by hand deep tube well.

11. **Land use:**
The cultural land available is used for agriculture mainly and for fishery ponds are utilized. Lands are utilized for homesteads, roads, markets, educational institutions, offices etc.

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12. **Communication:**
Internal communication is only by baby taxi and rickshaw and the island is connected with other places by steamer, launch and trawler.

13. **Drainage system:**
The drainage system has been developed with the existing khals/creeks and the excavated canals connecting with the drainage sluices. In the rehabilitation works, khals are re-excavated for removing silts and repairing & remodelling of sluices are being done for efficient drainage of the island. Originally there were 14 no. drainage sluices (1.52 x 183m) of 28 vents. Surface sluices 13 no. (091 x 0.91m) of 13 vents. 161 km natural drainage channel exist.

14. **Health:**

Thana health complex, dispensaries and private practitioners are available in the island.

15. **Government Offices:**
All Government offices in the Thana level exist in the island.

16. **Cyclone shelter:**
There are 86 no. cyclone shelter in this island.

17. **Tidal gange:**
At Sandwip coast (BIWTA).

1. Manpura (Hzirhat) P-58/1

2. **Name of Thana/District:**
Manpura/Bhola.

3. **Administrative status:**
Manpura Thana.

4. **Union:**
Hazirhat, Faizuddin and Manpura.

5. **Area of land:**
3046 ha.

6. **Protection/Unprotected:**
The land is protected by coastal embankment, implemented by BWDB during 1972-73.

7. **Length of embankment:**
34.10 Km, sea and interior dyke with side slope 1:5 to 1:7, 1:3, C/S 1:2, crest width 4.27. The embankment is used for inspection as unpaved rural road.

8. **Drainage sluices:**

RCB	2-1.50 x 1.80m	2 nos.
RCB	1-1.50 x 1.80m	1 no.
RCB	1-0.90 x 0.90m	1 no.

9. **Flushing cum drainage sluice:**

RCB	1-0.90 x 0.90m	3 nos.

10. **Population:**
22,200 people live in the island permanently and 3370 people live temporarily.

11. **Occupation:**
Most of the people are farmers. They also go for fishing. Landless people engage in fishing and fishing is their main source of income.

12. **Plantation:**
Mangrove plantation out side the embankment over a length of 34.71 m & the average width of 23m have been planted by the Forest department.

13. **Agriculture:**
People grow local variety aus and aman. They also grow rabi crops like pulses green pepper, chilli, sweet potato.

14. **Source of water:**
Ground water, rain water and surface water are the main sources of sweet water. Tubewell water is used for drinking purpose. Pond water is used for washing, bathing and also for fish production. Water of surrounding rivers is saline and highly saline during dry season (Nov. to June).

15. **Land use:**
The available land is used mainly for agriculture and some land is used for home stead, communication and drainage. Land is also used for growing mangrove forest.

16. **Cyclone shelter:**
There are 11 no. Cyclone shelters and 3 no. killas in the island.

17. **Roads:**
LGED constructed about 28.2 km R2 connecting Hizirhat with Kalatali, Koralia & Manpura.

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1. **Manpura (Shakuchia) P-58/2.**

2. **Name of Thana/District:**
Lalmohan/ Bhola.

3. **Administrative status:**
A Union of Lalmohan.

4. **Area of land:**
3246 ha.

5. **Protected/unprotected:**
The land is protected by coastal embankment, implemented by BWDB during the year 1979-80.

6. **Length of embankment:**
26 Km sea dyke, side slope R/S 1:7 & C/S 1:2 with crest width 4.27m.

7. **Drainage sluice:**

RCB	2-1.50 x 1.80m	4 nos.
RCB	1-1.50 x 1.80m	1 no.

8. **Population:**
About 20,000 people live permanently and 2,115 people live temporarily in this island.

9. **Occupation:**
Most of the people are farmers and agriculture is their main source of income. Fishing is the alternative source of income and main source of income landless people depend mainly on it.

10. **Agriculture:**
People grow local variety aus and aman and cultivation of aus is limited. They also grow rabi crops like pulses, chilli, sweet potato etc.

11. **Source of water:**
Ground water, rain water and surface water are the sources of sweet water. Tubewell water is used for drinking purposes. Pond water is used for washing bathing and also for fish production. Water of surrounding rivers are saline and highly saline during dry period (Nov. to June).

12. **Land use:**
The available land is used mainly for agriculture and some land is used for homestead, communication and drainage purposes. Land is also used for growing forest.

13. **Cyclone shelter:**
There are 12 no. Cyclone shelters and 2 no. Killas in the island.

14. **Roads:**
LGED constructed 12.48 Km of R_1 road from Thana head quarter to launch ghat and local market. There are 16.97 Km R_2 road connecting launchghat & other business centre and 33.41 Km road connecting cyclone shelters and other places.

1. **Manpura (Faizuddin) P-58/3**

2. **Name of Thana/District:**
Manpura/ Bhola.

3. **Administrative status:**
A Union of Manpura.

4. **Area of land:**
987 ha.

5. **Protected/unprotected:**
The land is protected by coastal embankment, implemented by BWDB during the year 1981-82.

6. **Length of embankment:**
14.15 Km.
Sea dyke, Side slope R/S 1:7, C/S 1:2, crest width 4.27m.

7. **Drainage sluice:**

RCB	2-1.50 x 1.80m	1 no.
RCB	1-1.50 x 1.80m	1 no.

8. **Population:**
About 7,000 people live permanently and 1,192 people live temporarily in this island.

9. **Occupation:**
Agriculture is the main source of income of inhabitants and fishing is additional source of income of the farmers. But landless people depend mainly on fishing.

10. **Agriculture:**
People grow mainly local variety aman and also aus but limited. Rabi crop like pulses grown but limited.

11. **Source of water:**
Ground water, rain water and surface water are the source of sweet water. Tubewell water is used for drinking purposes, pond water is used for washing, bathing and for fish culture. Water of surrounding rivers is saline and highly saline during dry period (Nov. to June).

12. **Land use:**
The available land is used mainly for agriculture production and some land is used for homestead, communication and drainage purposes.

13. **Cyclone shelter:**
There are 3 no. Cyclone shelters and 2 no. Killas in the island.

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1. **Bhola Island (Polder 56/57)**
(Bhola is excluded from the study area but bank erosion is included).

2. **Name of Thana/District:**
Bhola district.

3. **Administrative status:**
District.

4. **Age of land:**
It is a very old island of the estuary and its age is about 600 years as reported by the people.

5. **Area of land:**
3,403 sq. Km.

6. **Protected/Unprotected:**
It is protected by a coastal embankment by the then EPWAPDA in early 60s.

7. **Settlement:**

7.1 **Permanent:** The population of the island is about 16.46 lakhs according to '91 census projected to the year 1995.

8. **Irrigation and drainage:**
Irrigation is practised in this island by LLP. Water is taken from the surrounding rivers through khals during high tides with gated hydraulic structures. ADB assisted the implementation of the Project. The 1st Phase of the Project was completed and the 2nd Phase is under implementation. Drainage is done through existing big and small khals. Re-excavation of the khals have been done by ADB assistance.

9. **Erosion/Accretion:**
Bank erosion is a problem of this island. People lost productive and valuable land due to bank erosion. The people demand to check the bank erosion is very high. In ADB assisted Project checking of bank erosion has not been included. Visited the bank erosion area in three locations such as Ilisha to Kachia the affected length is about 4 Km (from 3 Km to 8 Km), Saydpur to Guptar char the affected length is about 4.25 Km (from 34 Km to 29 Km) and Gangapur to Koralia, the affected length is about 6 Km (from 203 Km to 209 Km). People interviewed in all three locations wanted the solution of bank erosion. They said the bank erosion started as soon as the new chars formed in the channel opposite to the bank. When people was asked to have a best solution, "Shifting the deep channel now flowing along the toe of the bank to the mid stream of the river is the best solution" they replied.

10. **Observation:**
MES may consider for study one of the options by laying Geo-Textile in the eroding place and discharging the dredging sludge in front of the Geo-Textile, the sludge will be taken from the newly formed chars opposite to the eroding bank so that the deep channel may be shifted to the mid stream of the river from the toe of the bank, thus removing the possibility of further erosion and filling the gully with sludge a new bank may be built.

1. **Rangabali (Polder-52/53 B):**
($21^0$54'N, $90^0$26'E)

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
Rangabali union.

3.1 **Total no. of Mouza:**
13. (Baherchar, Kazir haula, Char Jamuna, Char Kankuni, Uttaripara, Gangipara, Samudafat, Rangabali, Char Kashem, Senerhoula, Jugirhaula, Amlibaria and Modarbunia.)

4. **Age of land:**
The age of land is about 125 years as reported by the local people.

5. **Area of land :**
49.36 sq. Km or 4936 ha.

6. **Protected/Unprotected:**
The area is protected by sea embankment & Interior embankment, implemented during 1988-92 side slope R/S 1:7 to 1:3, C/S 1:2.5 crest width 4.27m.

- Length of embankment: 30.20 Km.

- Drainage sluices: 4 nos. RCC box : 3-1.52 x 1.83m 2 nos.
2-1.52 x 1.83m 1 no.
1-1.52 x 1.83m 1 no.

- Erosion/accretion:
There is no erosion but slow accretion on south and East side of the island.

7. **Population:**
People settled permanently in this island. Total population is appxly 24,000. Settlement in this islands started 115 years ago as reported by the settlers. The cyclonic surge of 1970, about 3.65 to 3.96m high from the ground washed away around 10500 people from this island alone.

8. **Occupation:**
Most of the settlers are farmers. Some people have big trading and some are small traders. In monsoon some people go for fishing. Nowadays Prawn fry catching is very much increasing in these islands and people are entering in this trade in large number.

9. **Vegetation/Plantation:**
Mangrove plantations outside the embankment exist. In Chars, such as Char Tofazzal, Char Jamuna, Char Kashem and Char Kankuni; mangrove planted by the Forest Department.

10. **Agriculture:**
Crop production was started by Mogh tribes about 115 years ago. People grow local varieties aus and aman and not the coastal salt tolerant common variety rajashail because there is no salinity inside the Polder. They grow rabi crops like pulses, green pepper, mugh pulse etc.

11. **Sources of Water:**
Ground water, rain water and surface water are the main sources of sweet water. Tube well water is used for drinking purposes. Pond water is used for washing, bathing and also for fish production. People use pond water for making tea and some time cooking also. Boring depth of drinking ground water is 250m-300m. Irrigation is not practised in this island.

12. **Drainage System:**
The existing khals/creeks are used for drainage purpose. There are 4 drainage sluices in the island. These khals/creeks are not well connected with other small drains/khals. Moreover, the inside roads, foot-paths have not provided opening with culverts and the minor khals/drains have not been re-excavated or connected with the main drains. So, during heavy rainfall acute drainage congestion prevails inside the Polder.

13. **Salinity:**
Inside these two polders soil salinity is not harmful and people can grow aus and rabi crops in addition to aman. River water salinity is high in dry season and beyond the limit of crop cultivation and in monsoon (from July to September) it becomes sweet.

14. **Land Use:**
The available land is mainly used for crop production and some land is used for homesteads, communication, drainage etc.

15. **Education:**
In Rangabali there are 14 Govt. Primary schools, 4 nos. Non-Govt. Primary schools, 2 private high schools, 2 Senior Madrasas and 1 Dakhil Madrasa.

16. **Cyclone Shelter:**
There are 7 cyclone shelters and 4 Killas in this island.

17. **Health Complex:**
One Paramedical Doctor is in Rangabali.

18. **NGOs:**
Two NGOs namely Service Civil International (SCI) Which helps their target group for various income generating activities, CODEC which distributes loan among the fishermen.

19. **Government Offices:**
In Rangabali there are Forest Office, Police Station, Wireless Station, Veterinary Sub Centre, Post Office, Bank.

20. **LGED:**
Constracted 34.5 km R_3 road connecting Rangabali to Baherchar, Gugir Haola, Kazir Haola, Amli Baria.

1. **Chhota Baishdia (Polder-52/53 A).**
(90°27' to 90°31'E, 21°59' to 22°4'N)

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
Chhota Baishdia union.

3.1 **Total no. of mouza :**
11. (Phulkhali, Chatakhali, Nayabhanguni, Tilla, Haridrakhali, Chhota Baishdia, Kaukhali, Bhuiyarhaula, Char Emerson, Char Nazir and Char Tozammal).

4. **Age of land:**
The age of the lands are about 150 years as reported by the local people.

5. **Area of land :**
30.93 sq. km or 3,093 ha.

6. **Protected/Unprotected:**
The area is protected by sea embankment & Interior embankment, implemented during 1988 to 1992, side slope R/S 1:3 to 1:7, C/S 1:2.5 crest width 2.44 to 4.27m.

- Length of embankment: 24.04 Km.
- Drainage sluices: 3 nos. RCC box 2-1.52 x 1.83m 3 nso.
- Erosion/accretion: There is major erosion to the north and medium to the west of the area. At present there is no accretion.

7. **Population:**
People settled permanently in this island. Total population is appxly 18,000. Settlement in this island started 135 years ago as reported by the settlers.

8. **Occupation:**
Most of the settlers are farmers. There are a few traders and fishermen. Nowadays Prawn fry catching is very much increasing in this island and people are entering in this trade in large number.

9. **Vegetation/Plantation:**
There is only mangrove plantations to the east side outside the embankment. Plantation work was started by the Forest Department.

10. **Agriculture:**
Crop production was started by Mogh tribes about 135 years ago. People grow local varieties aus and aman. Haitta and halai local varieties of aus are grown here in very limited area. Kajalshail here grows both inside and outside the embankment. But rajashail grows only outside the embankment. They grow rabi crops like pulses, green papper, mugh pulse etc.

11. **Sources of Water:**
Ground water, rain water and surface water are the main sources of sweet water. Tube well water is used for drinking purposes, Pond water is used for washing, bathing and also for fish production. People use pond water for making tea and some time cooking also. Boring depth of drinking ground water is 250m-300m. Irrigation is not practised in this island.

12. **Drainage System:**
The existing khals/creeks are used for drainage purpose. There are 3 drainage sluices in Chhota Baishdia. These khals/creeks are not well connected with other small drains/areas. Moreover, the inside roads, village-paths have not provided opening with culverts and the minor khals/drains have not been re-excavated or connected with the main drains. So, during heavy rainfall acute drainage congestion prevails inside the polder.

13. **Salinity:**
Inside the polder soil salinity is not harmful and people can grow aus and rabi crops in addition to aman. River water salinity is high in dry season and beyond the limit of crop cultivation and in monsoon (from July to September) it becomes sweet.

14. **Land Use:**
The available land is mainly used for crop production, some land is used for homesteads, communication, drainage etc.

15. **Education:**
There are 8 nos. Govt. Primary schools, 4 nos. Non-Govt. Primary schools, 1 no. senior Madrasa and 2 nos. Hafizia Madrasas in this island.

16. **Cyclone Shelter:**
There are 6 cyclone shelters and 2 killas in this island.

17. **Health Complex:**
There is one health complex in this island.

18. **NGOs:**
Two NGOs namely Service Civil International (SCI) which helps their target group for various income generating activities and CODEC which distributes loan among the fishermen.

19. **Government Offices:**
One Post Office is in this island.

20. **LGED**
Constracted 30.5 Km R3 road connecting Choto Bishdia with Chaltakhali, Nayabhanga, Kawkhali, Char Toazammel.

1. **Char Biswas (Polder - 55/3)**
(22°5'N, 90°34'E)

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A union of Galachipa thana (once it was part of Char Kazal union). No. of mouza 7 (North Char Biswas, South Char Biswas, Char Augusti, Char Mohiuddin, Char Bangla, Char Bara Maiya, Char Chota Maiya).

4. **Age of land:**
The age of the land is about 100 years. according to the old inhabitants of the island.

5. **Area of land:**
About 52 Sq. Km.

6. **Protected/Unprotected:**
It is protected by coastal embankment, implemented during 1987 to 91. The length of embankment is 25 Km side slop R/S 1:5 C/S 1:2, crest width 4.27m.

7. **Inhabitants:**
About 16,000 people live permanently in this island.

8. **Settlement:**
Settlement in this island started about 90-100 years ago at Char Augusti mouza according to the old people of the island. The settlers migrated mostly from Bauphal thana. Some settlers came from Galachipa thana and Bakergonj thana.

9. **Occupation:**
Most of the people are farmers and fishermen and small portions are traders.

10. **Vegetation/Plantation:**
Mangrove plantation by Forest Department was being started since 1980. They grew plants at Char Bangla, Char Maiya, south Char Biswas (west side) and Char Augusti. They also planted about 2 Km on both sides of the embankment width about 4.5m in the C/S and 7.5m in the R/S.

11. **Cultivation/Agriculture:**
First cultivation of salt tolerant aman crop started at char augusti mouza about 80-90 years ago according to the old people of the island. Kazalshail, a local variety of aman is cultivated extensively in this island, in addition to this people also cultivate kalakora, lutormota, shailgirmi, kalabhog, sakkarkhora, chitrashail, kalazira, rajashail, gabrashail etc. in limited areas. gorihaitta, halai, kalihaitta, manikmuri, matichak etc. all local varieties of aus are cultivated here of which gorihaitta is cultivated extensively. Lal boro and kalo boro, local varieties of boro are cultivated here in limited areas. Various kinds of rabi crops like mugh, khesari & green pepper are grown in large areas.

12. **Fishery:**
Fish is grown in ponds only in shallow depth (1.25m - 1.50m) and in deep ponds (2.50m above).

12.1 **Fishing:** The people of the island catch fishes throughout the year in and around the rivers of the island. They also go to the sea to catch Hilsha fish in monsoon.

12.2 **Prawn fry catch:** Prawn fry catch is increasing day by day. A large number of population of this island of different age group including the children engage in catching the fry and they sell it locally. Trading in this line attracts the local people who collect the fry and transport it to Khulna & Satkhira.

13. **Source of water & quality:**

13.1 Ground water and rain water are the sources of water for different kind of uses. Ground water quality is good but its boring depth varies 250m - 315m.

13.2 **Use of Water:** About 70-75% people used ground water for drinking purposes, the rest used surface water from ponds. Pond water is also used for washing, bathing & fish cultivation.

13.3 **Salinity of water** : River water is generally saline. It is high in dry season (Nov.-May) and less in monsoon (July to Sept.).

14. **Irrigation:**

Irrigation in this island is not practised as the river water around the island is highly saline in dry season when they need irrigation in pre-monsoon crop. Deep tubewell ground water is costly for irrigation so it is used only for drinking purpose.

15. **Drainage/water logging:**

There is drainage congestion at north and south Char Biswas mouza. Water logging also occurs in Char Augusti mouza. The total affected area is about 1,000 ha. The causes of drainage congestion are due to drainage sluice no. 2 located middle of north & south Char Biswas and sluice no. 3 located at Char Augusti are out of order for 3 years and can not drain out water timely. Drainage channel in east side of south Char Biswas has been closed by cross-dam for crossing the channel. There are 7 no. RCC box sluices, 4-1.52 x 1.83m-1-no., 3-1.52 x 1.83m - 2 nos., 2-1.52 x 1.83m - 4 nos. and pipe sluices 20 nos.

16. **Erosion/Accretion:**

Accretion is going on to the south-west and minor erosion is visible to the east of this island.

17. **Cyclone Shelter:**

There are two cyclone shelters constructed by Red Crescent.

18. **Education:**

There are 4 nos. Govt. Primary School, 3 nos. non-Govt. Primary school, 1 no. non-Govt. High school, 1 no. Dakhil Madrasa, 3 nos. Ebtedaee Madrasa.

19. **Govt. Office:**

There is one Forest beat office, two Post offices, one Health complex, one wireless station.

20. **NGOs:**

There are activities of one NGO in the island namely Association for Realisation of Basic Needs (ARBAN) involved in human - economic & ecological development activities.

21. **Infrastructure:**

There are coastal embankment, drainage sluice 4 nos., pipe sluices/inlets 20 nos. (0.60m dia), tubewell 92 nos., bazar 7 nos., ferry ghat/kheya ghat 7 nos., launch ghat 3 nos., LGED's existing road R1 15.94 Km, R2 7.06 Km, R3 16.67 Km, culvert 7 nos. (box & pipe), bridge 4 nos. (RCC).

22. **Communication:**

Internal communication is small country boat. People go different places on foot also. The external communication with other islands is made through launches. There are 3 established launch ghats in the island.

1. **Char Kajal**
(22°5'N, 90°34'E)

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A union of Galachipa thana, mouza 6 (Chhota char Kazal, Nutan chhota char Kazal, Baro char Kazal, Chhota Shiva, Baro Shiva and char Kapalbera).

4. **Age of land:**
The age of land is more than 200 years according to the old people of the area.

5. **Area of land:**
About 66 Sq. Km or 6,600 ha.

6. **Protected/unprotected:**
The island is protected by a coastal embankment of BWDB, implemented during 1987 to 91. The length of embankment is 30.5 km, side slope R/S 1:5, C/S 1:2 crest width 4.27m.

7. **Inhabitants:**
About 19,000 people live permanently in this island.

8. **Settlement:**
Settlement started about 200 years ago as reported by the local people. They migrated from Bauphal & Dasmina thana of Patuakhali district.

9. **Occupation:**
Most of the people are farmers. Some people are fishermen, service holders, business-men & small traders.

10. **Vegetation/Plantation:**
Mangrove forest in chhota char Kazal and Nutan char Kazal were grown by Forest Department since 1989.

11. **Agriculture:**
First cultivation was started in Bora char Kazal Mouza. Now sadamota, a local variety of aman is cultivated in large scale. Other aman varieties like lutormota, kalakora, chengai, kazalshail, rajashail, sakkarkhora, kalazira etc. are also cultivated in small areas. Among rabi crops, mugh, khesari, green pepper are grown in high land.

12. **Fishery:**

12.1 Fish is cultured in ponds of shallow depth (1.83m - 2.10m) and deep ponds are above 2.50m. Source of water in the pond is ground and rain water. There is no fish firm in the island.

12.2 Fishing: Most of the fishermen of this island catch fishes in rivers around the island through out the year. But during monsoon fishermen of this island and fishermen of other areas/island come to this island to catch "Hilsha fish & Harina shrimp".

12.3 Prawn fry catch: Prawn fry catching on the onset of monsoon is very much attractive to the people and they are involved in catching or trading of this business.

13. **Sources of water:**
Rain and ground water is the only source of sweet water. Ground water is used for drinking purposes. Pond water is used for fish culture, washing and bathing purposes. The boring depth of ground water is 250m - 330m. Pond water is also used in tea making.

14. **Irrigation:**
There is no irrigation in this island because the river water around this island is saline in dry season and there is no sweet water reserve on the surface. Ground water is costly for irrigation. The traditional salt tolerant rainfed aman rice is grown by the people.

15. **Salinity:**
The water in the river around the island is saline in dry season (Nov. to May) and less saline in monsoon (July-Oct.).

16. **Drainage:**
There are drainage problems in chhota char kazal and north - east side of the island. The total affected area is about 1,000 ha from July to September. Causes of drainage congestion are - the area is comparatively low, two shutters of sluice no. 1 is not working properly and people say inadequate capacity of sluice.

17. **Erosion/Accretion:**
Accretion is going on to the south-west and south side. Minor erosion is visible to the north - west of this island.

18. **Education:**
There are several institutions at this island. Such as: Government primary school 4, non Govt. primary school 8, non Govt. high school 1, non Govt. junior School 2, Dakhil Madrasa 2, Hafezia madrasha 1.

19. **Cyclone Shelter:**
There are 5 nos. Cyclone shelters and 2 nos. Killas.

20. **Govt. Offices:**
Post office 2, Bank (Krishi) 1, Food godown 1, Wireless station 1,
Veterinary sub-centre 1.

21. **NGOs :**
There are activities of ARBN (Association for Realisation of Basic Needs), an NGO in this is island.

22. **LGED's Infrastructure:**
The road R_1 is 10.176 Km, road R_2 is 8.0 Km and road R_3 is 3.9 Km. There are 6 nos. Culverts.

Note :
R_1 - High way to Ferry ghat, road to road, high way to bazar. R_2 - Bazar to Bazar, Bazar to Union council
R_3 - Para to para, house to road.

1. **Char Montaz(Polder 55/4)**
(21°56'N 90°34'E)

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A union of Galachipa thana.

4 **Age of land:**
The age of the embanked portion (main land) is about 75 years and age of Char Prasanna/Char Anda is about 120-125 years according to the old people of Char Montaz union.

5. **Area of land:**
Around 52.30 Sq. Km or 5230 ha.

6. **Protected/unprotected:**
The main land is protected by a coastal embankment (P-55/4) of 32.53 Km. length. implemented during 1988 to 91. Side slope R/S 1:5, C/S 1:2 crest width 4.27m.

7. **Inhabitants:**
About 15,500 people (main land - about 13,500 and Char Prasanna - about 2,000) live permanently in this union.

8. **No. of Mouza:**
Total no. of mouzas are 9. (Char Montaz, Char Lakshmi, Char Bastin, Char Margaret, Char Prasanna, Sonar Char, Ruper Char, Char Tapsee, Khalifar Char.

9. **Settlement:**
Settlement in this union started about 60-65 years ago in embanked portion (mainland) and about 110-115 years ago at Char Prasanna / Char Anda according to the old people of this union. Among settlers, about 50% migrated from Ulania union, Galachipa thana. And rest migrated from Galachipa union (about 10%), Panpattin union (about 10%), Rangopaldi union (about 6%), Dakua union (about 8%) of Galachipa thana and Bhola district (about 10% and other districts (about 6%).

10. **Occupation:**
Most of the inhabitants/settlers are farmers. Traders and fishermen are in second and third position respectively among inhabitants.

11. **Vegetation/Plantation:**
There are plantations by Forest Department at Nayar Char, Char Lakshmi, char Bastin, all embanked parts of the union and the Sonar Char, Ruper Char and isolated Chars from the mainland. Area of plantation is about 1070 hac out side the embankment.

At present the total area under plantation (mainly mangrove) at different Chars (accreted land) in Char Montaz union is 5,263 ha (source: Range office, Char Montaz). Plantation was started by Forest Department in char Montaz since 1976.

12. **Agriculture/Cultivation:**
First cultivation of Aman paddy started about 100-115 years ago at Char Prasanna/Char Anda, the oldest part of the union and about 60-65 years ago at Char Montaz mouza according to the opinion of old people of this union.

Girmi, a local variety of aman paddy is cultivated in large area. Others local varieties are BR-11, BR-12, BR-22, all HYV of aman paddy are also grown here.

Kalihaitta, gorihaitta and halai, all local varieties of aus paddy are also grown here in very limited area. Rabi crops are cultivated here in limited area (10% of the total cultivated land). Green pepper, khesari pulse, lentil are important among rabi corps.

13. **Fishery:**
Fish are grown in less deep ponds (1.50m or less) and deep ponds (2.50m or above) are dependent on rain water and ground water respectively.

13.1 **Fishing:**
Laitta, Chawa, Bata, Ghungra, Poa, Boal, Aair, Shrimp, etc. are caught from rivers throughout the year and Hilsha fish are caught from rivers and sea in monsoon by the fishermen.

13.2 **Prawn fry catch:**
A large number of people are involved either in prawn fry catching or prawn fry trading. Local price of a single fry is Tk. 0.5. All fry are exported to Rampal, Khulna by traders at the rate of Tk. 1500 per 1000 fry.

14. **Source of water & quality:**
Ground water, rain water and surface water (khal/pond water) are the sources for various activities in this union. Ground water quality of some tube well is slightly saline and boring depths of tube well is 235m-315m.

14.1 **Use of Water:**
About 75-80% people use tubewell water for drinking. Rest of the people use pond water for drinking. Pond or khal water is used for washing, bathing etc. Rain water is used for agriculture. River water is also used for agriculture from June to September when the salinity of river water is the lowest in that period.

14.2 **Salinity of Water:**
River water salinity is high in dry season (Nov.-May) and less in monsoon (July-September).

15. **Irrigation:**
Irrigation is not practised by the people in this island as the river water around the island is highly saline in dry season when farmers need irrigation in pre-monsoon period. Ground water by means of deep tubewell is very costly and so it is used only for drinking.

16. **Drainage/ Water logging:**
There is water logging/drainage problem at Char Bastin mouza (north - east), Char Lakshmi mouza (west) and north Char Montaz mouza. Total affected land is about 2,000 acre/ 800 ha according to the opinion of Mr. Kader Khalifa, sluice operator of P-55-4 and P-55/3.

17. **Erosion/Accretion:**
Accretion process is visible to the south-east of this land. Also slight accretion is visible to the north-west. Erosion is going on to the south-west. Also medium/slight erosion is going on to the north-east.

18. **Cyclone Shelter:**
There are five cyclone shelters. Two built by RIDP, an NGO and the remaining by Red Crescent.

19. **Education/ Educational Institution:**
There are 1 Govt. primary school, 6 nos. Govt (registered) primary school, 4 non-Govt. (unregistered) primary school, 2 satellite school (class-I & II), 1 non-Govt. junior school and 1 dakhil madrasha.

20. **Govt. Offices:**
One post office and 4 Forest office (Range office - 1, Beat office - 3) are in the island.

21. **NGOs :**
Only one NGO "Remote Island Development Project" - a project of South Asia Partnership (Donor: CANADA).

22. **Infrastructure:**
Protected by coastal embankment (P-55/4), drainage sluices 4 nos., pipe sluice/inlet pipes 15 nos. (dia: 060m), tubewell 83 nos., bazar 5 nos., ferry ghat 2 nos., launch ghat 3 nos., LGED's existing road R_1 8.94 Km, R_2 9.32 Km, R_3 2.40 Km culvert 3 nos. (box and pipe), bridge 2 nos. (RCC slipper).

23. **Communication:**
People have to move on foot inside the polder. The external communication with other islands is made through trawlers and launches. There are three established launchghat in this island.

1. **Chalita Bunia**

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A Union under Galachipa thana.

4 **Age of land:**
The island is very old one & the age of land around 300 years according to the people. Previously it was a part of Bara Baishdia separated by a small khal (degri khal) & at present this khal became a big river called Digri river.

5. **Area of land:**
The area of land is about 950 ha.

6. **Protected/unprotected:**
The island is unprotected but a protection embankment is being implemented by LGED with provision of drainage system under Thana Irrigation Programme (TIP) as Small Scale Water Resources Development (SSWRD) Project.

7. **Inhabitant:**
People settled in the island permanently.

8. **Occupation:**
Most of the people in the island are farmers and fishermen. Some people are service holders and some are small traders.

9. **Vegetation/Plantation:**
No mangrove plantation exists in this island but tress and plants are grown around homesteads.

10. **Agriculture/Cultivation:**
Local variety of aman is cultivated in the island, grow rabi crops in medium & high land, the yield is moderately high compare to other unprotected island if it is not damaged by saline water intrusion according to people. Aus is also cultivated in area of high land.

11. **Land & water use:**
The land is used for agriculture and some percentage is used for homesteads , ponds, and communication. Irrigation in not practised in this island as the surface water in the surrounding rivers is highly saline during dry season (Nov.-May) and less saline in monsoon (July - Sept.).

12. **Sources and uses of water:**
Ground and rain water are the sources of sweet water and the surface water in the surrounding rivers is saline. Ground water is used only for drinking purpose by deep hand tubewell. Rain water stored in ponds is used for washing, bathing & fish culture.

13. **Drainage:**
Natural drainage system through the existing creeks/khals exists in the island. Saline water intrusion is the problem so long it remains unprotected.

14. **Erosion/ Accretion:**
At present there is no erosion and accretion in the island.

15. **Plan under Implementation (LGED):**
Protection embankment of length 14,725m with two drainage regulators (2-1.5m x 1.8 m & 1-1.5 x 1.8 m) are being implemented. The average height of embankment is 2.92m with crest width 3.66 m and side slopes 1:1.5 & 1:2.5. The benefited area is 730 ha and the estimated cost is Tk. 161 lakhs.

16. **Guidelines (LGED):**
LGED is implementing the small scale water resources development schemes through water management co-operative association. Members are the beneficiaries of the schemes.

1. **Nijhum Dwip.**

2. **Name of Thana/District:**
Hatia-Noakhali.

3. **Administrative status:**
It is a ward under Jahajmara union.

4. **Age of land:**
The age of land is about 50 years, when it reached the level suitable for habitation and cultivation.

5. **Area of land:**
The area of land is about 4,047 ha.

6. **Protected/Unprotected:**
The island is unprotected.

7. **Inhabitant:**
The total inhabitant is about 6,640.

8. **Settlement:**

8.1 **Permanent:**
The settlers mostly migrated from Hatia affected by bank erosion. They are now permanently settled in the island, but all of them did not get land through DCR. As many as 300 families newly migrated from Hatia do not get allotment of land.

8.2 **Temporary:**
In monsoon the island becomes crowded by hundreds and thousands of fishermen, fish traders, fish exporters of the neighbouring islands of Hatia, Sandwip, Monpura, Bhola for fishing and far from big towns for fish trading.

9. **Occupation:**
Most of the settlers are farmers & fishermen by profession. Some people are small traders.

10. **Vegetation/Plantation:**
Mangrove forest was planted by the Forest Department appxly in 2,340 ha since 1970 which is about 60% of the available land.

11. **Agriculture:**
Only salt tolerant local variety of aman (rajashail) is being cultivated since 1968. Since the island is unprotected, other crops can not be grown due to salinity in the soil.

12. **Land and water use:**
The land is mostly used for agriculture and some percentage (say 10%) is used for homesteads, ponds & communications. Irrigation is not possible in this island because the surface water in the surrounding rivers is highly saline during dry season (Nov.-June) and unsuitable for crop cultivation. Salinity becomes less in monsoon (July - Sept.).

13. **Source of water and use:**
Ground water and rain water are the sources of sweet water and river water is saline. Ground water is used only for drinking purposes by deep hand tubewell. Rain water is stored in ponds and used for washing, bathing & fish culture (limited).

14. **Drainage:**
Natural drainage system through existing creeks/khals exists in the island. Drainage is not the problem rather saline water inundation is the main problem.

15. **Erosion/Accretion:**
Accretion is going on to the north, east and south. Minor erosion is to the west by wave action.

16. **Cyclone Shelter:**
There are 4 cyclone shelters and one killa in Nijhum Dwip.

17. **Govt. Offices:**
Only one forest office exists in the island.

18. **NGOs:**
There is a branch office of Dwip Unnyan Sangstha in the island and involved in income generating activities among the landless people. PROSHIKA has recently established a Health Centre in the island.

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1. **Urir Char North and South**

2. **Name of Thana/District:**
Sandwip-Chittagong.

3. **Administrative status:**
Urir Char Union

4. **Age of land:**
The age of land may be 30-35 years.

5. **Area of land:**
70.47 sq. Km appxly.

5.1 **Vegetation:**
Appxly 30 sq. Km mangrove forest has been grown by the Forest Department.

5.2 **Settlement:**
Appxly in 30.00 sq. Km is occupied by the population.

6. **Protected/unprotected:**
Both the islands are unprotected.

6.2 **Erosion/accretion:**
Accretion is going on to the east of south Urir char and to the north of north Urir char. Erosion takes place to the south & west of south Urir char.

7. **Population:**

7.1 Permanent: Permanent settlement is about 17,000 people in both islands.

7.2 Occasional: People from nearer area like Sandwip, Hatia, Noakhali come occasionally for fishing, transplanting & harvesting crops.

7.3 Settlement: The settlement in this Char began in early 70's. Almost all the inhabitants got the settlement through DCR. Some 360 families in south Urir char don't get the settlement yet.

8. **Occupation:**
Most of the settlers are farmers, some are traders. In monsoon people gather for fishing.

9. **Agriculture:**
Crop cultivation, the traditional salt tolerant low yield rajashail variety grown in the island. They produce beans in raised land and export to Sandwip, Chittagong. As it is unprotected they cannot grow other crops due to salinity. About 2,428 ha is now under cultivation.

10. **Land use:**
The available land is mostly used for the production of crop and homestead.

11. **Drainage system:**
There is no planned drainage system in the island as the island is unprotected. The drainage is effective through the existing khals/creeks.

12. **Irrigation:**
There is no irrigation practised in this island. No sweet water source, water in the surrounding rivers is highly saline in dry season and less in monsoon. Farmers depend on rain water for their agriculture.

13. **Water use & sources:**
Ground water and rain water are the sources of sweet water. Ground water is used for drinking purposes. It is lifted by deep hand tubewell. The boring depth is 250m-300m. Pond water is used for bathing, washing. Some people, where tubewell is not available, use pond water for drinking purposes.

14. **Education:**
One primary school in cyclone shelter of each island has been established. Children go to mosque for religious education.

15. **Health:**
No Health Centre exists in the island.

16. **Communication:**
The communication system with other islands is established by trawler. No communication system developed inside the island except foot-paths.

17. **Cyclone shelter:**
After the cyclone of 1985 in which about 1,385 people died alone in Urir char North and South, many shelters, killas and raised platform houses were constructed. But due to the bank erosion many cyclone shelters including houses went into the river.

18. **Govt. Office:**
One Forest office & one police camp office exist in South Urir char.

1. **Char Buoya**

2. **Name of Thana/District:**
Hatia-Noakhali.

3. **Administrative status:**
Nil.

4. **Age of land:**
The land came up above the surface around 10-12 years ago.

5. **Area of land:**
3,194 ha according to settlement office.

6. **Vegetation:**
There is natural vegetation in the Char and also mangrove plantation by Forest Department. About 50% of the area is covered by mangrove plantation and the rest is covered by reeds.

7. **Settlement:**
There is no settlement in this island.

8. **Population:**
No population in the island.

9. **Agriculture:**
Agriculture has not yet started in this island.

10. **Erosion/Accretion:**
There is no erosion in this island. Only accretion to the north, south and east is taking place.

1. **Char Kukri Mukri**

2. **Name of Thana/District:**
Char Fasson–Bhola.

3. **Administrative status:**
A ward of Kachchapia Union.

4. **Age of land:**
The age of land is around 400 years as reported by the people.

5. **Area of land:**

6. **Protected/Unprotected:**
The island is unprotected.

7. **Inhabitant:**
The population is around 6,000 who settled permanently.

7.1 **Temporary settlers:**
In monsoon, people of neighbouring islands/chars come here for temporary stay for fishing.

8. **Occupation:**
Most of the people are farmers and fishermen by profession. Some are small traders.

9. **Vegetation/Plantation:**
Mangrove forest has been grown by the Forest Department in the central portion of the island. People grow Coconut tree and other fruit bearing trees around their homesteads.

10. **Agriculture:**
People grow only single salt tolerant aman crop (rajashail) in monsoon, but they are not sure to harvest every year due to saline water inundation. They can't grow rabi crops due to salinity in soil. Vegetable and pulses like khesari, mugh are grown in high land around the homesteads.

11. **Fishery:**
There is no fish farm in the island. People culture fishes in their ponds but very small quantity.

12. **Fishing:**
Fishing is the main source of income of the people living in this island. In monsoon people go to the sea with mechanized boats and catch fishes.

13. **Source of water:**
Ground water and rain water are the only sources of sweet water. Ground water is used for drinking purposes by deep hand tube well (depth 210m-300m) and rain water stored in ponds is used for washing, bathing and fish culture.

14. **Salinity:**
The salinity of river water is high in dry season (Nov.-May) and low in monsoon (July-Sept.). Soil salinity is high in dry season and becomes less in monsoon.

15. **Irrigation:**
Irrigation is not practised in this island as the river water around the island is saline. People grow rainfed Aman crop in monsoon.

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16. **Drainage:**
The island is unprotected as such drain is effective through existing creeks/khals. No drainage problem in this unprotected condition but saline water intrusion is the problem.

17. **Erosion/Accretion:**
No erosion is visible in this island and accretion to south and west is going on.

18. **Cyclone Shelter:**
A cyclone shelter was constructed earlier which is now unfit for habitation. A new one is planning to be constructed by the Government.

19. **NGOs:**
No NGO is working in the island.

20. **Education:**
Religious teaching is given to the children in the mosque. No educational institution in the island.

21. **Govt. Offices:**
No govt. office exists in the island except a forest beat office.

1. Bara Baishdia.

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A Union of Galachipa Thana.

3.1 **Total no. of mouza:**
16 nos. and village is 38 nos.

4. **Age of land:**
The age of land is more than 175 years as reported by the local old people.

5. **Area of land:**
The appxly area is 105 Sq. Km (including Char Ganga and Char Halim).

6. **Protected / unprotected:**
The area is unprotected. Saline inundation damages crops and property of the inhabitant.

7. **Inhabitant:**
Total population is about 25,000 (including Char Ganga & Char Halim).

8. **Settlement:**
Permanent: The people of this island settled permanently migrating from Barisal, Patuakhali, Faridpur, Bhola and Noakhali.

9. **Occupation:**
Most of the people are farmers and fishermen. Some people are small traders.

10. **Vegetation/Plantation:**
People grow trees around their homesteads. Mangrove plantation at Char Hara, Ashabaria, Char Tufania & Talukdarer char by Forest Department.

11. **Agriculture:**
First cultivation started about 160 years ago by Mogh tribes in Bara Baishdia (Moudubi mouza). Now people grow salt tolerant coastal variety rajashail, sadamota, kajalshail etc. The cultivable area is about 7,500 ha. including char Ganga & char Halim. Rabi crops grow in very limited area due to saline intrusion.

12. **Fishery:**

12.1 There is fish culture in the ponds. Rain water & ground water are the sources of sweet water.

12.2 Fishing: In monsoon people go to sea for catching Hilsa fish which is their earning source. Prawn fry catching is very much popular and profitable also. A huge number of people of all ages engage in catching or trading of prawn fry on the onset of monsoon.

13. **Source of sweet water:**
Ground water and rain water are the sources of sweet water. Almost all inhabitants use tubewell water for drinking purposes. Ponds water is used for washing and bathing. Boring depth of tubewell for ground water is 250m- 315m. In some tubewell, water is slightly saline (90-240 ppm) as reported by PHE, Galachipa. Pond water is used extensively in coastal area for making tea. People in coastal belt think tea became black due to the presence of minerals in tube well water.

14. **Salinity:**
The salinity of river water is high during dry season (Nov.-May) and less during monsoon (July-Oct.).

15. **Irrigation:**
Irrigation is not practised in this island because the surface water of the river surrounding the island is saline and deep tubewell water is not economically feasible.

16. **Drainage:**
Bara Baishdia, Char Ganga, Char Halim is unprotected condition. Drainage is effective through existing khals/creeks. No drainage congestion is reported by the local people interviewed.

17. **Erosion/Accretion:**
Accretion is going on to the south-west, minor erosion is observed to the north-west of this island.

18. **Education:**
Government primary school 9, Non Govt primary school 5, non Govt. high school 3, non Govt. Senior Madrasha 1, non Govt. Hafezia Madrasha 1, Ebtedaee Madrasha 5.

19. **Cyclone shelter:**
There are 6 cyclone shelters, 5 killas, one community centre, in the island.

20. **Govt. Offices:**
There are one post office, two food godowns one Red Crescent office in the island.

21. **NGOs:**
There are two NGOs working in this island

- **SCI:** Service Civil International, supplies credit among their target group for various income generating activities.
- **BAWPA:** Bangladesh Agricultural Working People Association gives training on agriculture and distributes loans among their target groups

22. **LGED's Information:**
Road R_1 21'25 Km, R_2 7.55 Km, R_3 17.75 Km, culverts 10 nos and bridges 8 nos.

1. **Char Halim**

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A mouza of Bara Baishdia Union

4 **Age of land:**
The age of land is about 24 years according to the people.

5. **Area of land:**
The area of land is about 400 ha.

6. **Protected / unprotected:**
The island is unprotected.

7. **Population:**
The total population is about 700.

8. **Settlement:**
The settlement process began around 1975 and the settlers got the allotment for one year through DCR which is to be renewed every year.

9. **Occupation:**

Most of the people in the island are farmers and fishermen.

10. **Vegetation/Plantation:**
There is no mangrove plantation in this island and no natural vegetation.

11. **Agriculture/Cultivation:**
Cultivation of salt tolerant aman paddy started around 1975 as reported by people. Due to salinity in the soil (saline water inundation) rabi crops and aus (pre-monsoon crop) can not be grown.

12. **Irrigation:**
Irrigation is not practised in this island as the surface water in the surrounding river is saline in dry season (Nov.-June) and less saline in monsoon (July - Sept.). The ground water in shallow acquifer is saline and in deep acquifer (depth 210m - 315m) sweet water is available which is not economically viable for irrigation.

13. **Sources and uses of water:**
Ground water, surface water and rain water are the sources of water for various activities in this island. The surface water is in the surrounding rivers is saline in dry season (Nov. - July) and not suitable for crop cultivation. In monsoon (July - Sept.) the salinity becomes less and suitable for agricultural use. Ground water is used July for drinking purposes by deep hand tubewell (depth 210m-315m). Ground water is not used for irrigation as its lifting cost is high & economically not viable. Rain water stored in ponds (a few) is used for washing, bathing and fish culture.

14. **Fishing:**
Various types of fish are caught in surrounding rivers through out the year. Large quantity of Hilsha fish is caught in and around and in sea during monsoon. Many inhabitants including children are involved in catching prawn fry. The local price of each fry is Tk. 0.50 which gives the landless people financial support.

15. **Fishery:**
There is no fish firm in this island. People grow fishes in ponds which is limited.

16. **Drainage:**
The island is unprotected and natural drainage is effective through existing khals. There is no drainage problem as reported by the people.

17. **Erosion/ Accretion:**
At present there is no erosion and accretion in the island.

18 **NGOs :**
No NGOs office or activities exist in this island.

1. Char Ganga

2. **Name of Thana/District:**
Galachipa - Patuakhali.

3. **Administrative status:**
A mouza of Bara Baishdia Union.

4 **Age of land:**
The middle of the island came to the surface around 1960 and the rest cameup around 1975.

5. **Area of land:**
The area of the island is about 500 ha.

6. **Protected/unprotected:**
The island is unprotected.

7. **Inhabitants:**
The total population is now about 1,400.

8. **Settlement:**
Settlement process began around 1975 and people got temporary allotment through DCR only for cultivation of crops. Landless people mostly from Bara Baishdia and Patuakhali region came in this island for settlement.

9. **Occupation:**
Most of the people in the island are farmers and fishermen. There are a few small traders also.

10. **Vegetation/Plantation:**
There is no mangrove plantation in this island and no natural vegetation.

11. **Agriculture/Cultivation:**
Cultivation of salt tolerant aman paddy started around 1975 as reported by people. Kalakora a local variety of aman paddy is cultivated largely and other varieties like sadamota, kazalshail are also cultivated. Due to salinity rabi crops are not grown but in high lands very limited rabi crops like chilli, sweet potato, pulses are grown.

12. **Irrigation:**
Irrigation is not possible in this island as the surface water in the surrounding rivers is saline during dry season and less saline in monsoon.

13. **Sources and uses of water:**
Ground water, surface water and rain water are the sources of water for various activities in this island. The surface water is saline in dry season (Nov.-May) and not suitable for crop cultivation. Salinity becomes less in monsoon (July-Sept.) and not harmful to crop. Ground water is used only for drinking purposes by deep hand tube well (depth 210m-315m). People of the island is conscious regarding drinking water and collect tubewell water from far away by boat even because there is no health centre in this island. Rain water stored in the ponds is used for washing, bathing, fish culture.

14. **Fishing:**
Various types of fish are caught in surrounding rivers through out the year. Hilsha fish is caught in monsoon. Most of the inhabitants including children are involved in prawn fry catch.

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15. **Fishery:**
There in no fish firm in this island. People grow fishes in ponds which is limited.

16. **Drainage:**
The island is unprotected and natural drainage is affective through existing khals. There is no drainage problem as reported by the people.

17. **NGOs :**
No NGOs office or activities exist in this island.

1. **Char Yunus**

2. **Name of Thana/District:**
Bauphal - Patuakhali.

3. **Administrative status:**
A ward (no. 3 ward) of Nazirpur Union.

4 **Age of land:**
The age of the land is more than 100 years according to the old people of the area.

5. **Area of land:**
20.88 sq. Km or 2,088 ha.

6. **Protected/unprotected:**
The island is unprotected.

7. **Inhabitants:**
The total inhabitants are about 3,850. 3,692 were in 1991 (B.B.S)

8. **No. of Mouza:**
Total no. Of mouzas are 8 (Char Kachua, Char Wadel, Char Barret, Kismat Panch Khajuria, Aligi, Char Miajan, Char Nimdi and Char Ray Saheb)

9. **Settlement:**
Settlement in this land started about 85-90 years ago according to old people of this land. Most of the settlers migrated from Nazirpur union (main land) and rest from Mehendigonj thana, Barisal district.

10. **Occupation:**
Most of the inhabitants/settlers are farmers. Number of fishermen and traders are very negligible.

11. **Vegetation/Plantation:**
There is neither natural vegetation nor any plantation by Forest Department in this land.

12. **Agriculture/Cultivation:**
First cultivation of aman paddy started about 100 years ago according to old people of Char Younus. Among local varieties of aman & aus, sadamota and gorihaitta are cultivated in large area. Rabi crops are grown here in about 75-80% land of the total cultivated area because of less salinity in soil and in river water.

13. **Land use:**
Most of the lands are used for agriculture and some small percentages (at best 5%) are used for homesteads. A small percentages are covered by natural khals also.

14. **Sources of water:**
Ground water, rain water and surface water in kahls are the sources of water for various activities. 80-85% people drink water from khals and the rest use ground water by hand tubewell (boring depth 245m - 295m). Rain water stored in khals is used for agriculture. River water is also used (low salinity mid Nov.- mid March) in agriculture.

15. **Irrigation:**
People of this land do not practise irrigation, although surface water irrigation is almost possible as the river water salinity is the lowest in most of the time of the years.

16. **Drainage:**
Natural drainage system through existing natural khals exists in this island. The island is unprotected, therefore, there is no drainage problem.

17. **Erosion/Accretion:**
Minor erosion is visible at east-south corner (Char Wadel mouza) of this island. Accretion is going on to the west, north and north-east sides of this land.

18. **Education:**
There are only two Non -Govt. Primary Schools in the island.

19. **Cyclone Shelter:**
There is neither cyclone shelter nor killa in the island.

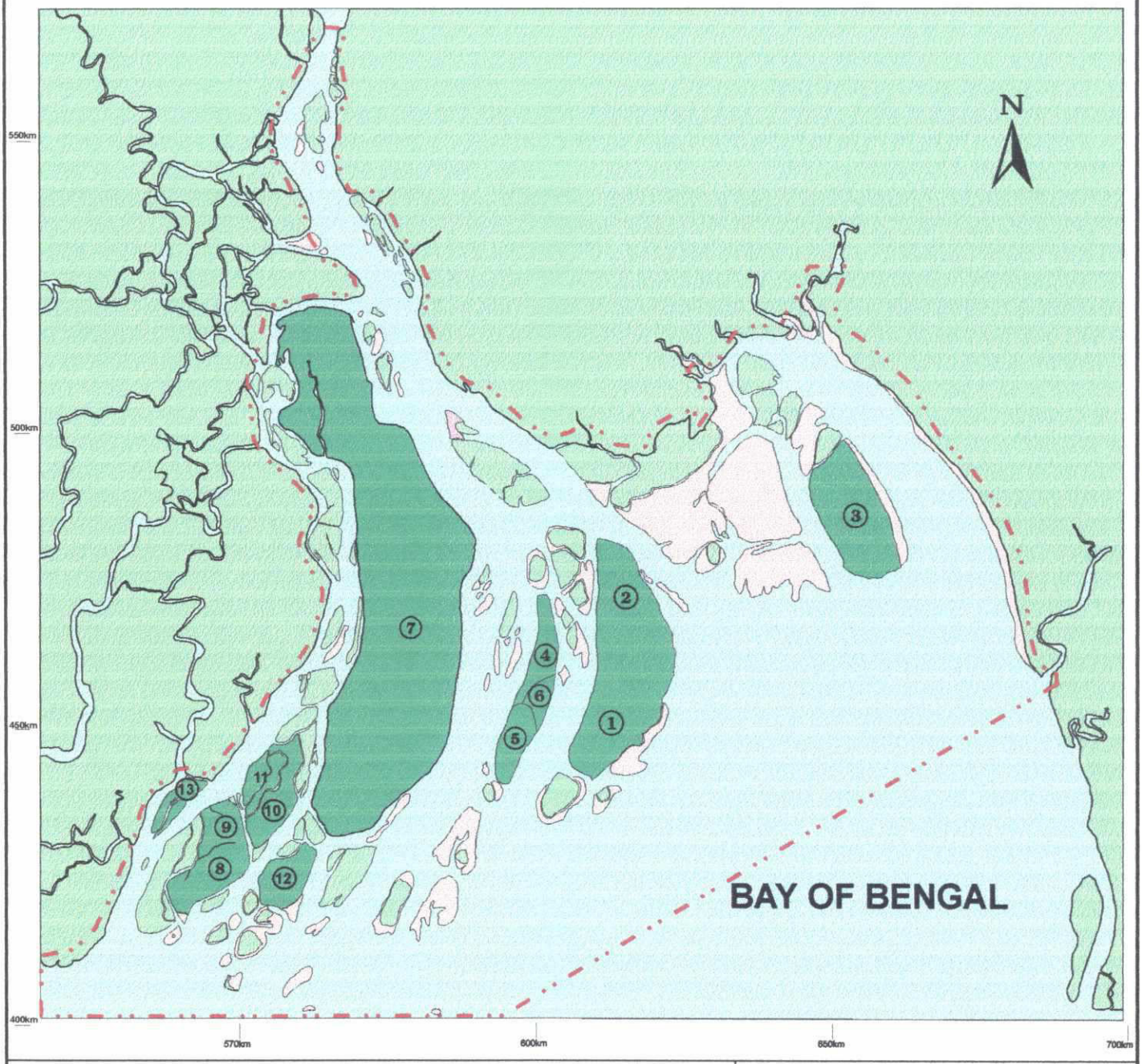
20. **Govt. Offices:**
No Govt. office here.

21. **NGOs :**
No NGOs office or activities here.

C : EXISTING POLDERS IN THE ESTUARY

List of Polders

Location of Polders



LEGEND:

- STUDY BOUNDARY
- MAIN LAND
- SUBMERGED LAND AREA
- ISLANDS WITH POLDERS

MEGHNA ESTUARY STUDY

Location of Polders

PROJECTION	BANGLADESH TRANSVERSE MERCATOR
SOURCE	LANDSAT IMAGERY FEBRUARY 1996

Produced by:
GIS/RS/CAD Unit
Meghna Estuary Study

10 0 10 20 30 40KM

SCALE

File- (GIS01) D:\Bhuiyan\Protected.cdr

3.2.1 Polder Characteristics

Prior to any human intervention the area located in the coastal plains suffers from flooding during spring tides and on top of that during the dry season from salt water intrusion. Consequently the yields are very low. In order to increase crop security the initial intervention is to control floods from the sea. The intervention opted for is the construction of peripheral embankment, which isolate the area from the source of flooding. The area has become a FC system and is called polder. Although an embankment solves one problem, it creates another, as it obstructs the drainage of accumulated rain water inside the flood protected area. To solve this problem, the intervention is to create drainage opening in the embankment to relieve the area of accumulated water. The engineering solution to this problem is the construction of drainage regulator (usually implemented with the construction of embankment) in the embankment where the main drainage channels (khals) enter the river or sea.

The construction of embankment and main regulators in the initial stage of polder construction protect the area against the tidal flooding, but creates new problems, particularly drainage problem during the post monsoon. In post monsoon, drainage efficiency reduces due to continuos high river stages. Rain water and run off accumulates behind the embankment and floods the polder areas. After completion of the flood control intervention, drainage is confied to only the main drainage arteries equipped with regulators. But the number of regulators and its vantages in most cases, in the initial stage of creating polder are insufficient. Moreover many khals (except the main khals) are often closed by the peripheral embankment. This results in many locations water gets trapped in low pockets behind the embankments. To evacuate the water trapped in low pockets, people have often resorted to cutting the embankment in the beginning but at a later stage small regulators or surface drainage outlets are constructed to relieve the flooding from low pockets behind the embankments.

The above interventions takecare of the most pressing drainage and flooding problems and with lower flood risks and secure harvests people expand the cropping patterns into the dry period. So the demand for water outside the rainy season becomes stronger which leads to retain water with in the system at the end of the rainy season rather than allow all the water to drain off. So the regulators equipped with flap gates in order to automatically drain the system are modified by adding vertical lift gates on the country side of the structures. For the increased volume to be stored in the system, khals are deepened and widened to increase the storage capacity as much as possible. The need for devices to lift the water from the channels on to the field develops and traditional lifting devises are used, but this is also the moment when the low-lift pump (LLP) makes its entry into the system. The possibility to use the retained water in the system rapidly leads to the demand to allow water to enter into the system as long as it is not saline, when the retained water is depleted. To facilitate the entry of water the engineering intervention is to provide hoists (pullies) for the flap gates. Since regulators was initially designed to facilitate the out flow of water only, modifications are required with regard to protective works on the country side of the structure for flushing. Another concept of special structures with the sole purpose to let water in, called flushing sluices, are sometime constructed in the peripheral embankment of a polder. In the last stage, the development of other infrastructures such as roads, culverts and bridges increases, once the area becomes economically important.

Usually aus and aman are rainfed crops in coastal polders of which aman is the main crop. Aus cannot be cultivated in newly empoldered land due to the existence of soil salinity and at least 10 to 12 years, depending upon the soil characteristics and the deep drainage, is required to remove the salinity. The FCD system (coastal polders) have the following objectives from an agricultural perspective.

- To protect standing crops against saline floods.
- To expand the area under aman cultivation by removing timely excess rainfall run-off from the system.
- To retain water in the system during the post monsoon period.

The performance of FCD system has often been below expectations and that it has several major negative impacts, such as loss of fisheries, navigation and acute drainage problem. Moreover, water management in FCD system, (polders) is extremely complex and fundamentally different from water management in irrigation systems. FCD systems are characterised by a great diversity of stakeholders each with different, often conflicting water management demands. So forums (institution) are required for stakeholders to discuss their water management objectives and requirements and to take decisions on water management planning. In absence of such forums and appropriate management models, the operation of FCD systems will remain under the control of small powerful groups serving their own interests rather than the common interest.

General description of polders

Poder 73/2

Name	District	Thana	O&M Division	Estimated age of land	Completion date	Protected area (in ha)	Population
South Hatia	Noakhali	Hatia	Noakhali O&M Division	About 200 years old	1966	11,239	64,166

Embankments: Length 47.93 Km, Sea dyke and marginal dyke, side slop R/S 1:2, 1:7 C/S 1:2, crest width 4.27m & 2.44 m.

Sluices: SRP has rehabilitated the subpolder and constructed 6 nos. new pipe sluices of dia 1.22m. There are 14 no. drainage sluices, RCB (1.52 x 1.83m), total vantage 19.

Drainage: Drainage is done by the existing main khals and cracks about 84.67 km length equipped with drainage regulators where the khals enter the river or sea. SRP has constructed 6 no. Pipe sluices to increase the efficiency of the drainage system of this sub polder.

Salinity: Soil salinity exists in the polder due to resalinisation by saline water intrusion through breaches in the embankment and through damaged sluices or broken sluice gates.

Water use:

- Surface water: Water in the surrounding rivers is highly saline during dry season (Nov.-June) and less saline in monsoon Rain water stored in ponds, khals and water bodies are used for fish culture, washing, bathing and other uses for domestic animals.
- Ground water: Ground water in deep acquirer, depth 250m to 300m, is utilised for drinking purposes by hand tube well.
- Irrigation: No irrigation is practised in this subpolder due to non availability of sweet water.
- Water supply: No water supply system has been implemented in this island Ground water is mainly used for drinking purposes by hand tubewell.
- Land use: The cultural land about 9,477 hac is under cultivation, other uses of land are homesteads, ponds, roads, markets, educational institution, offices etc. No mangrove plantation in and outside the embankment is grown but in the accreted land outside the embankment to the south east and south west coast, mangrove plantation of about 4037 ha has been planted by the forest department.
- Protection: Sea embankment was built around the island for the protection of life & property. Moreover, 23 no. cyclone shelters and 54 no. killas have been constructed.

Polder 73/1A-B

Name	District	Thana	O&M Division	Estimated age of land	Completion date	Protected area (in ha)	Population
North Hatia	Noakhali	Hatia	Noakhali O&M Division	Around 400 years old	1966	21377	1,59,834

Embankment: Sea dyke, interior dyke and marginal dyke were constructed, the total length is about 89.80 km with side slope R/S 1:2, 1:3, 1:7, C/S 1:2, crest width 4.27 to 2.46m. The

embankment is also used for inspection as unpaved rural road. Rever bank erosion engulfed about 7 Km from the north tip of the island resulting in losing about 5,800 ha of land & keeping the island open to the sea.

Sluices: There are 11 no. drainage sluices constructed during implementation and subsequently number of surface sluices were constructed.
Size - CMP 1.22m dia 6 nos. 0.91 m dia 4 nos. RCB 1.52 x 1.83m 1 no. SS 1.22mϕ 17 nos.

Drainage: Existing natural khals and creeks equipped with drainage regulators & surface sluices in the ring dyke where these khals enter into the river or sea. But the sluices & the drainage channels have not been maintained properly as a result the drainage system became ineffective resulting in drainage congestion in the polder and also intrusion of saline water inside the polder.

Salinity: The land of the polder is very old. Soil salinity is not the problem for crop production. People grow aus, aman & rabi crops but due to bank erosion and broken sluices through which saline water enters in the polder, make the soil resalinisation.

Water use:

- Surface water: Rain water stored in ponds, khals, water bodies is the source of surface water which is used for fish culture, washing, bathing and other uses for domestic animals.
- Ground water: Ground water available at a depth of 250 to 300m below the ground surface is used mainly for drinking, by hand tubewell. Water in the surrounding rivers is saline and high during dry season (Nov. - June).
- Irrigation: Irrigation is not practised in the island as no sweet surface water is available for irrigation.
- Water supply: No water supply system exists in the island and people use ground water by hand tubewel for drinking.
- Land use: The land is mainly used for crop production. Other uses are homesteads, roads, educational institution, offices, drainage etc. Moreover land is also used for plantation. Mangrove plantation of 373 ha out side the embankment has been grown by the forest department.
- Protection: Ring dyke was constructed around the island to protect life and property. Moreover 66 cyclone shelters & 19 no. killas have been constructed.

Polder : 72

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Sandwip	Chittagong	Sandwip	Chittagong O&M Division 2	About 400 years old	1963	76,232	2,72,000

Embankments: The island was protected by sea-dyke by the then EPWAPDA. The length of embankment is about 58.8 km, side slope R/S 1:7, C/S 1:3, crest width 4.27m.

Sluices: 14 nos. drainage sluices were constructed of which 3 nos. have been abandoned.
Size - RCB 1.52 x 1.83m, total vents 23 no. (existing).
There were 13 no. surface sluices with 13 vents of which 3 nos. are abandoned.
Size - .91 x .91mϕ

Drainage: Drainage is done through the existing khals equipped with drainage sluices having flap gates on the river side, put in the peripheral embankment where the khals enter the river or sea.

Salinity: The land of this island is very old and soil salinity was not a problem of the farmers. They grow Aus, Aman and rabi crop. But after the construction of he polder many cyclones and tidal surges damaged the protection embankment with intrusion of saline water resulting in resalinisation of soil. At present severe erosion in the west and part of south coast is going on, the peripheral embankment has been engulfed by the river keeping the island open on the west. Accretion is taking place in the east and part of north coast.

Water use:

- Surface water: Rain water stored in ponds, khals and water bodies are the sources of surface water. The water from these sources are used for fish production, washing, bathing household uses and other uses for domestic animals.
- Ground water: Ground water is mainly used for drinking purposes by deep hand tubewell at a depth of 250 to 325m.
- Irrigation: No irrigation is practised by the farmers in this island as the source of sweet water is not available. The surrounding river water is saline through out the year and highly saline during dry season (Nov.-June), ground water is not economically viable for irrigation.
- Water Supply: No water supply system has been established and ground water by hand tubewell is used for drinking purpose.
- Land use: The cultural land available is used for agriculture. Some land is used for homesteads, ponds, roads, markets, educational institution, offices etc. No mangrove forest inside and out side the embankment of this island is grown. In accreted land mangrove forest of 603 hac have been planted by the forest department.
- Protection: Sea embankment was built around the island for the protection of life and property. Moreover 86 no. cyclone shelter and 60 no. killas have been constructed.

Polder 58/1, 58/2, 58/3
(Nazirhat, Faizuddin and Shakuchia)

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Manpura	Bhola	Manpura	Bhola O&M Division 2	About 75 years old	1973 1980	About 7279	About 55,877

Embankment: Sea dyke, interior dyke have been constructed for three subpolders, total length is about 74.25 km (34.18 km + 26 km + 14.15 km) with side slope R/S 1:3, 1:5, 1:7, C/S 1:2, crest width 4.27. The embankment is also used for inspection as unpaved rural road.

Sluices: There are 14 no. drainage sluices having 21 vents in three sub-polders (9+9+3) constructed during implementation.
Size : RCB -1.50 x 1.80m, RCB - 0.90 x 0.9m, RCB - 0.90 x 1.20m.

Drainage: Existing natural khals and creeks with drainage sluices & drainage cum flushing sluices were constructed in the ring dyke where these khals enter into the river or sea. The sluice capacity is not sufficient (average 182 hac/m^2) and drainage congestion sometime at high intensity of rainfall, occurs as reported by the farmers.

Salinity: Soil salinity exists but not so high as reported by the farmers and they grow aus, aman and rabi crops.

Water use:

- Surface water: Rain water stored in ponds, khals, water bodies is the source of surface water which is used for fishi culture, washing, bathing and other uses for domestic animals.

- Ground water: Ground water available at a depth of 250 m to 300 m below the ground surface is used mainly for drinking, by had tubewell. Water in the surrounding rivers is saline and high during dry season (Nov. - June).

- Irrigation: Irrigation is not possible and farmers don't practise due to non availability of sweet water.

- Water supply: No water supply system exists in the island and people use ground water by hand tubewell for drinking.

- Land use: The land is mainly used for crop production. Other uses are homesteads, roads, educational institution, offices, drainage etc. Moreover land is also used for plantation. The island has mangrove plantation of 382 ha by the forest department out side the embankment .

- Protection: Ring dyke was constructed around the island to protect life and property. Moreover 26 cyclone shelters & 7 no. killas in these three sub polders have been constructed.

Polder 56/57
(The polder is excluded from the study area but bank erosion is included).

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Bhola	Bhola	Daulatkhan, Burhanuddin, Tazumuddin and Char Fesson	Bhola O&M Division 1 & 2	About 600 years old as reported by people	1982	11,800	16.46 lakh according to 91 consus

Embankment: Sea and interior dyke were constructed around the island with side slope R/S 1:3, 1:5, C/S 1:2, crest width 4.27m. The embankment is also used for inspection as unpaved rural road.

Drainage: Existing khals and creeks are used for drainage equipped with drainage regulators.

Salinity: The soil is free from salinity. Farmers grow HYV aus & aman and also rabi crops.

Water use:

- Surface water: Surface water is taken from the surrounding rivers through khals and creeks during high tides with gated hydraulic structures and utilized for crop production. Rain water stored in ponds, water bodies are used for fishi culture, washing, bathing and other uses for domestic animals.

- Ground water: Ground water available at a depth of 250 to 300m below the ground surface is used mainly for drinking.

- Irrigation: A Irrigation project has been implemented by ADB Assistance in the island. Water is taken from the surrounding rivers through khals or creeks during high tides with gated hydraulic structures and lifted to the field by using LLP.

- Water supply: Ground water extracted by deep tubewell is supplied to the house hold for drinking and other uses.

- Erosion/Accretion: Bank erosion is a problem of this island. People lost productive and valuable land due to erosion. Serious bank erosion is going on in three locations, Ilisha to Kachia (about 4 km), Saydpur to Guptarchar (about 4.25 km) and Gangapur to Koralia (about 6 km), experimental bank protective work is being done at Khorki by MES.

- Land use: Land is mainly used for agriculture. Other uses are homestead, roads, educational institutions, offices, drainage etc. Moreover land is also used for plantation. The island has mangrove plantation of 382 ha by the forest department out side the embankment .

Polder 52/53B

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Rangabali	Patuakhali	Galachipa	Patuakhli O&M Division	About 125 years old as reported by people	1992	4936	24,000

Embankment: Sea and Interior embankment were constructed. Length of embankment is 30.20 km with side slope R/S 1:3 to 1:7, C/S 1:2.5, crest width 2.44 to 4.27m.

Sluices: There are 4 no. RCB sluices.
Size - 1.52 x 1.83m total no. of vents 9.

Drainage: The existing khals with drainage sluices constructed at the out fall of the khals where they enter the river or sea are used for drainage purposes. No drainage plan has been implemented in the polder as such drainage problem exist.

Salinity: The soil salinity is less and not a problem to the farmers as reported by them and they grow local varieties of aus & aman and not the coastal solt tolerant variety "Raja shail". They also grow rabi crops.

Water use:

- Surface water: The source of surface water is the rainfall stored in ponds, khals, water bodies which is utilised for fishi culture, washing, bathing, household uses and other uses for domestic animals.

- Ground water: Ground water is mainly used for drinking purposes by deep hand tubewell. It is available at a depth of 250 to 300m below the ground surface.

- Irrigation: The source of sweet water for irrigation is not enough and the farmers donot irrigate their crops. HYV has not been introduced and they grow local variety of rice.

- Water Supply: No water supply system exits in the island, people used ground water for drinking.

- Land use: The land is mainly used for crop production, some percentage is used for homesteads, roads, educational institution offices, drainage etc. Mangrove plantation in front of the embankment of about 16 ha has been grown by the forest department.

- Protection: Sea and interior dyke were built for the protection of life and property. Moreover 7 no. cyclone shelters and 4 no. killas were also constructed.

Polder 52/53A

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Choto Baishdia	Patuakhali	Galachipa	Patuakhali O&M Division	About 150 years old as reported by people	1992	About 3,093	18,000

Embankment: Sea and Interior dyke were constructed. Length of embankment 24.04 km with side slope R/S 1:3 to 1:7, C/S 1:2.5, crest width 2.44 to 4.27m.

Sluices: Drainage sluices 3 no. RCB 1.52 x 1.83m with total vent 6.

Drainage: The existing natural khals are used for drainage with regulators in the embankment where the khals enter into the river or sea. Improvement and modification of drainage system inside the polder have not been done, so drainage congestion exist.

Salinity: Less soil salinity exists which is not harmful to the crop. The farmers grow aus, aman of local variety. They also grow rabi crop.

Water use:

- Surface water: Source of surface water is the pond, khals and water bodies of rain water. The water is utilised for fish culture, washing, bathing, household uses and for the use of domestic animals.
- Ground water: Ground water is mainly used for drinking purposes by deep hand tubewell at a depth of 250 to 300m.
- Irrigation: Sweet water for irrigation is not available in the island and ground water is not economically viable for irrigation.
- Water Supply: No water supply system has been established and ground water by hand tubewell is used for drinking purpose.
- Land use: The land is mainly used for agriculture. Other uses are homesteads, roads, educational institution office, drainage etc. Mangrove plantation of about 6 ha. outside the embankment is planted by the forest department.
- Protection: Sea and interior dyke ware built to protect life and property. Moreover there are 6 no. Cyclone shelters and 2 no. killas.

Polder 55/3

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Char Biswas Char Kajal	Patuakhali	Galachipa	Patuakhali O&M Division	About 100 years old as reported by people	1991	11,800	About 35,877

Embankment: Sea embankment of length 55.5m was constructed with side slope R/S 1:5, C/S 1:2, crest width 4.27m. The embankment is also used for inspection as unpaved rural road.

Sluices: There are 7 no. RCB drainage sluices.
Size - 1.52 x 1.83m, total no. of vents 18.
There are 20 no. pipe sluices but most of them is not functioning. 3 no. sluices are affected by bank erosion.

Drainage: Dense natural khals are used for drainage equipped with drainage regulators in the main khals. Drainage congestion at different locations have been reported. This may be the cause of non existence of any draainage plan and lack of institutional arrangement for operating the sluices.

Salinity: Soil salinity is decreasing with the construction of ring dyke as reported by the people. The existing salinity is not harmful for aman crop and the farmers express their hope to grow aus within 4-5 years if re-sealinisation due to breach in the embankment or broken gates does not occur.

Water use:

- Surface water: Rain water stored in ponds, khals, water bodies is the source of surface water which is used for fishi culture, washing, bathing and other use for domestic animals.
- Ground water: Ground water available at a depth of 250 to 315m from ground surface is used mainly for drinking, by hand tubewell. Water in the surrounding rivers is saline and high during dry season (Nov. - June).
- Irrigation: Irrigation is not practised in this island as sweet water for irrigation is not available. Ground water available in deep acquifer is not economically viable for irrigation.
- Water supply: No water supply system exists in the island and people use ground water by hand tubewell for drinking.
- Land use: The land is mainly used for crop production. Other uses are homesteads, roads, educational institution, offices, drainage etc. Moreover land is also used for plantation. The island has mangrove plantation 382 ha by the forest department out side the embankment .
- Protection: Sea dyke was constructed for the protection of life and properly. Moreover 2 no. cyclone shelters have been constructed by Red Crescent.

Polder 55/4

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Char Montaz	Patuakhali	Galachipa	Patuakhali O&M Division	About 75 years old as reported by people	1991	6,610	About 13,500

Embankment: Sea embankment of length 32.53 km with side slope R/S 1:5, C/S 1:2, crest width 4.27m was constructed around the island. The embankment is also used for inspection as unpaved rural road.

Sluices: There are 4 no. RCB drainage. Sluices size - 1.52 x 1.83m, total no. of vents 10. There were 15 no. small flushing sluices but all are out of operation.

Drainage: Existing natural khals equipped with drainage regulators are used for draining the polder . No drainage plan has been prepared or implemented by BWDB to improve the drainage situation. Mondaler khal at km 21-22 was closed by ring embankment and planned sluice over

Char Bestine khal was not implemented as such drainage congestion is reported in these locations.

Salinity: Soil salinity low in this polder. According to farmers, soil salinity is decreasing and they hope to start aus & rabi cultivation at a large scale within three to four years.

Water use:

- Surface water: Rain water stored in ponds, khals, water bodies is the source of surface water which is used for fishi culture, washing, bathing and other uses for domestic animals.
- Ground water: Ground water available at a depth of 235 to 315m below the ground surface is used mainly for drinking, by hand tubewell. Water in the surrounding rivers is saline and high during dry season (Nov. - June).
- Irrigation: The farmers don't use any irrigation to their crops as there is no source of sweet water for irrigation. They grow rainfed local variety aman.
- Water supply: No water supply system exists in the island and people use ground water by hand tubewell for drinking.
- Land use: The land is mainly used for crop production. Other uses are homesteads, roads, educational institution, offices, drainage etc. Moreover land is also used for plantation. The island has mangrove plantation of 382 ha by the forest department out side the embankment .
- Protection: Sea dyke was constructed for the protection of life and properly. Moreover 5 cyclone shelters were constructed by RIDP & Red Crescent.

SSWRD Scheme (LGED)

Name	District	Thana	O&M Division	Estimated age of land	Comple-tion date	Protected area (in ha)	Population
Chalita Bunia	Patuakhali	Galachipa	LGED Patuakhali Division	Around 300 years	On going	950	Not Khown

Embankment: LGED's small scale water resources development scheme which is on going. The length of embankment is 14.725 km, marginal dyke with side slope R/S 1:2.5, C/S 1:1.5 and crest width 3.66m.

Sluices: Two drainage sluices is under implementation.
RCB 2-1.5 x 1.8m & 1-1.5 x 1.8m.

Drainage: Existing natural khals equipped with drainage sluices constructed in the ring dyke at the mouth of the khals will be used for drainage.

Salinity: Soil salinity is not the problem to the farmers as it is a very old island. Saline water intrusion is the problem so long it remains unprotected. People grow local variety of aus, aman and rabi crop but with risk of saline intrusion.

Water use:

- Surface water: Rain water stored in ponds, khals, water bodies is the source of surface water which is used for fishi culture, washing, bathing and other uses for domestic animals.

- Ground water: Ground water available at a depth of 250 to 300m is mainly used for drinking by hand tubewell.

- Irrigation: Sweet water is not available for irrigation, water in the surrounding rivers is saline and highly during dry season (Nov.-June), ground water is not economically viable for irrigation.

- Water supply: No water supply system exists in the island and people use ground water by hand tubewell for drinking.

- Land use: The land is mainly used for crop production. Other uses are homesteads, roads, educational institution, offices, drainage etc. No mangrove forest has been grown in this island.

- Protection: Marginal dyke is being implemented around the island by LGED. LGED is implementing the small scale water resources development schemes through water management co-operative association. Members of this association are the beneficiaries of the scheme.