

# Seminar on **Excreta Does Matter**

**Organized by:** CSE, India & CCEC, Bangladesh; **Venue:** CSS Ava Center, Khulna

**Date:** September 8, 2013

**Welcome to the Presentation on**

**IMPORTANCE OF CONSERVATION OF WATERBODIES IN  
THE COASTAL CITIES OF BANGLADESH**

**Presented by**

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# BACKGROUND

§ The fresh water sources on land surfaces and in the ground constitute only about 1% of the total water on earth

§ The main sources of water in Bangladesh are surface waters in rivers, reservoirs, lakes, canals and ponds, and groundwater in shallow and deep aquifers

§ The protected ponds annually replenished by rainwater are a main source of water supply in the coastal area

§ The average yearly rainfall in Bangladesh varies from 2,200 to 2,800 mm, 75% of which occurs between May and September

§ Chittagong, Khulna and Barisal are mainly the coastal cities of Bangladesh

§ Conservation of waterbodies of the coastal cities can contribute to mitigate the problems of scarcity of water for drinking and other purposes; mitigate the problems of water logging; improve the urban living environment; keeping ecological balance; provide irrigation water for urban agriculture, forestry and food security; and bring other benefits

§ The presentation will mainly have focus on the conservations aspects of the waterbodies of Khulna City

## IMPORTANCE OF CONSERVATION OF WATER BODIES IN THE COASTAL CITIES

- The water bodies act as reservoirs of surface runoff
- Helps to mitigate water logging problem
- Protects the buildings and houses from damages caused by water logging
- Improves urban living environment through prevention of spreading human wastes, sludge, and solid wastes from septic tanks and pits of the latrines, drains and dustbins
- Keeps urban ecological balance acting as habitats for aquatic biodiversity
- Acts as sources of water for different purposes like drinking, bathing, washing etc.
- Provides irrigation water for urban agriculture and forestry
- Acts as routes of transport for carrying goods and even people
- Creates natural, aesthetic and beautiful scenery meeting recreational needs (riverfront park-linear park of KCC along Mayur River, lake-view park and leisure time visiting spots)
- Acts as water source for firefighting during fire hazards
- Sources of fishes and aquatic weeds

# KHULNA CITY

§Khulna is the 3rd largest industrial city of Bangladesh

§Its area is 45.65 sq. km and population is about 1.5 million

§It is a divisional city and acts as regional hub of administrative, institutional, commercial and academic affairs

§Khulna city is located on the banks of the Rupsha and the Bhairab rivers

§It lies between 22°47'16" to 22°52' north latitude and 89°03'1'36" to 89°03'4'35" east longitude

§The city is 4 m above the Mean Sea Level (MSL)

§Khulna City Corporation has 31 Wards

**Map 1: Khulna City in Context of South Asia, Bangladesh and Khulna District**

SAARC COUNTRIES



BANGLADESH

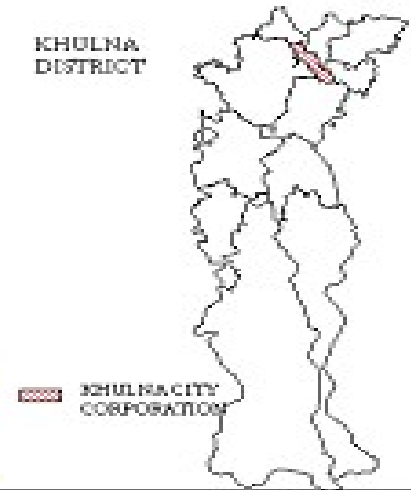


■ KHULNA DISTRICT

KHULNA CITY CORPORATION



KHULNA DISTRICT



■ KHULNA CITY CORPORATION

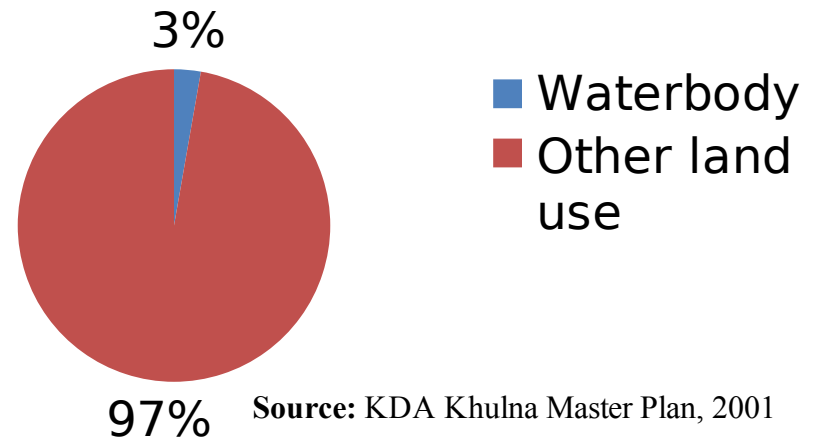
# USE OF SURFACEWATER IN KHULNA CITY

According to KDA Khulna City Master Plan 2001, land area under the use of water bodies in 1997 in Khulna City Corporation (KCC) area was only 310 acre against the total area of 11280 acre. In percentage it was 3.0%

Khulna City 47.13% of the land goes to residential use. Agriculture holds the second highest position with 13.29% acres of land. Waterbody takes 8.64% and circulation system occupies 6.85%.

The Master Plan had reported that 30 percent of the households had access to pipe water supply. The remaining 64 percent had access to hand tubewells and only 6 percent used water from secondary sources/surface water sources.

## water bodies and other land



Source: KDA Khulna Master Plan, 2001

## **Policy Documents on Conservation and preservation of water bodies of k**

KCC Ordinance 1984, KCC Drainage Master Plan
KDA Ordinance 1962 and Khulna City Master Plans- 1961 and 2001
KWASA Ordinance
Playground, Open Space, Garden and Natural Tank in Urban Areas Preservation Act, 2000 (Bengali)
Conservation of Environment Act, 1995 (Bengali)

# STATUTORY DIRECTIONS/STRATEGY/POLICY FOR CONSERVATION OF WATER BODIES OF KHULNA CITY

KDA Khulna City Structure Plan 2001 has a policy recommendation regarding exploration of new surface water:

***Policy - 03 : Exploration of new surface water to reduce dependency on ground water***

## **Justification**

Possibilities may be explored for the collection of surface water from rivers during monsoon season and transfer to the Khulna city water supply system, use of surface water from Dakatia Beel near Khulna city as a storage reservoir and transfer to the Khulna city water supply system. All these resources need further detail studies and engineering investigations and that these resources will help solve the future and ever increasing demand of the expanding city and growing population.

## **Implementing Agencies**

- Khulna City Corporation
- . Public Health Engineering Department

KDA Khulna City Structure Plan 2001 has a policy recommendation regarding creation of water front green as recreation area to conserve the water bodies:

***Policy - 01 : Creation of water front green***

To protect river / water fronts from possible encroachment and to maintain ecological balance and also to provide water front recreation, areas on selected river / water fronts will be delineated for preservation as green space, where no development except vegetation will be allowed during the initial period. Programmes may be worked out later on to make use of them as open space for recreation.

**Justifications**

- ☐ Protection of rivers/water bodies from possible encroachment,
- ☐ Promotion of river front recreation facilities,
- ☐ Promotion of urban ecological balance,
- ☐ Providing all people an access to natural endowment.

**Implementation:**

These areas will be conserved as non-built up areas where green spaces can be developed in different forms provided with attractive tourist facilities for visitors and site seers. Concerned agencies and local government bodies are to cooperate and support attainment of the policy objectives.



## **Implementing Agency**

- ☐ Khulna Development Authority.
- ☐ Khulna City Corporation
- ☐ Department of Forest
- ☐ Bangladesh Tourism Corporation
- ☐ Water Development Board.
- ☐ Khulna District Authority
- ☐ NGOs
- ☐ Local People/Civil Society
- ☐ Private Entrepreneur

## **Controls**

Strict controls should be exercised not to allow any development on the designated sites of river / water bodies till the lands are taken over for execution of open space development projects. Only agriculture or forest related activities may be allowed for the interim period. Khulna Development Authority and Khulna City Corporation can control and monitor such developments using such instrument as Khulna Master Plan, EBBC Act, 1952 and KDA Ordinance and other legal powers and executive orders.

# RIVERS-CANALS OF KHULNA CITY AND ITS DRAINAGE SYSTEM

§The old built up area of Khulna City on the natural levee having a height of 2.13 m to 4.27 m SoB above MSL along the Bhairab-Rupsha river is free from inundation and flooding

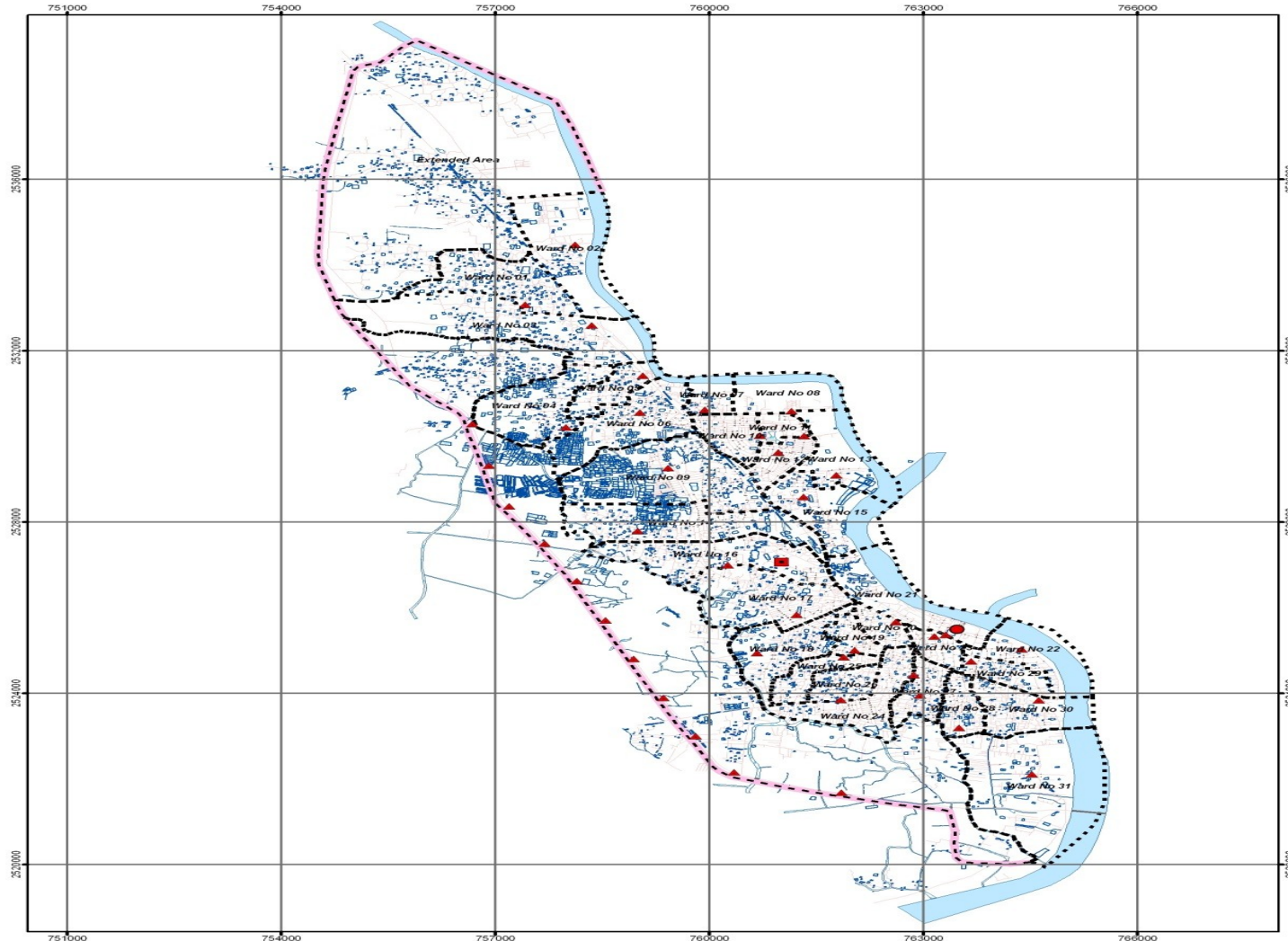
§The land surface elevation sharply decreases towards west and south-west and ends up in the flood plain and beels on the city fringe. The average height of the flood plain is about 1.22 m to 1.52 m SoB above MSL.

§This area is intersected by numerous khals and their branches. Storm and waste water drainage of this land flows into the Bhairab-Rupsha through BWDB sluice gates and regulators established on the embankment-cum-road on the Bhairab-Rupsha.

§ The drainage catchment area western part of Khulna City Corporation area, east of the Mayur river and Khudir khal extends from Daulatpur up to the Kazibachha river.

§Storm and waste water of this vast area is drained through the Mayur river and the Khudir Khal and passing through a BWDB regulator (10 vent) at Alutala finally discharged into the Rupsha and the Kazibachha river.

# NATURAL WATERBODIES IN THE PLANNING AREA



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**SHELTECH (PVT.) LTD.**  
 Sheltech Panthokunjo  
 14B, 17 West Panthapath,  
 Dhaka-1207, Bangladesh

**SCALE**  
 1:95,000 or 1 cm = 0.95 km or 1 inch = 1.5 miles  
 0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 5,500 6,000  
 0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000  
 Feet Meters

## LEGEND

KCC Boundary  
 Ward Boundary  
 Project Boundary  
 Road

Ditch  
 Pond/Lake/Khal/Irrigation Canal  
 Beel/Marshland/Dighi  
 River

Khulna City Corporation  
 District Headquarter  
 BM Pillar  
 Drainage\_outfall  
 Bridge\_Culvert

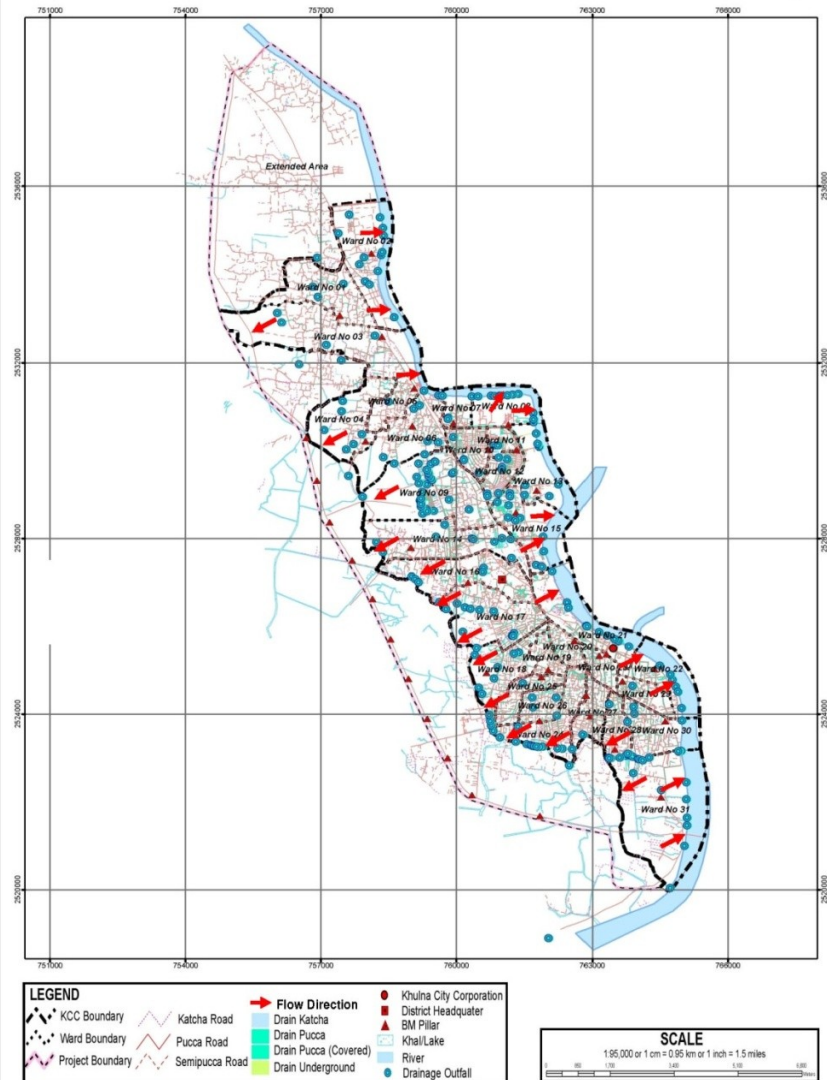
**SURVEY TO MITIGATE WATER LOGGING PROBLEM OF KHULNA CITY**  
 Khulna City Corporation, Khulna District



**KHULNA CITY CORPORATION**

Government of the People's Republic of Bangladesh  
 Ministry of Local Government, Rural Development and Cooperatives  
 Local Government Division

**Khulna Development Authority**  
**Preparation of Detailed Area Development Plan for Khulna Master Plan (2001) Area**  
**Existing Drainage Flow and Outfalls**



Source: Constructed With Data from KCC and Field Visit, 2012.

§There is about 667.07 kilometers of drainage network in KCC area, of this about 638.73 km is pucca including the covered drains, and 28.33 km katcha

§The existing drains in KCC areas discharge water into the nearby khals, rivers, low-lying areas and beels. There is no underground storm water drainage system in Khulna City. Concrete box and pipe culverts are used for road crossing only. The existing drainage facilities in the fringe and semi-core areas are inadequate and unsatisfactory. The major part of the KCC areas in the town is not subject to direct flooding from the Bhairab-Rupsha River, but the low-lying areas situated on the western and southern part are flooded during heavy rain and tidal effect during monsoon season.

§According to the drainage Master Plan of (Survey to Mitigate Water Logging Problem of Khulna City, 2011, Khulna City Corporation) KCC the man made drains have width ranging from less than 0.1 meter to 9.0 meter. Within city 155 km pucca drains have width less than 0.5 meter. About 1.16 km of pucca drains have width greater than 5 meters.

§In KCC area the existing drainage network is not adequate to meet the present need of the city. Most of Wards have less than the desired drainage length.

§According to KCC Drainage Master Plan (2011), Ward No. 26, 27 and 28 have maximum drainage coverage. Ward No. 2 has no man-made drains. In most of the other Wards the drainage coverage is very low.

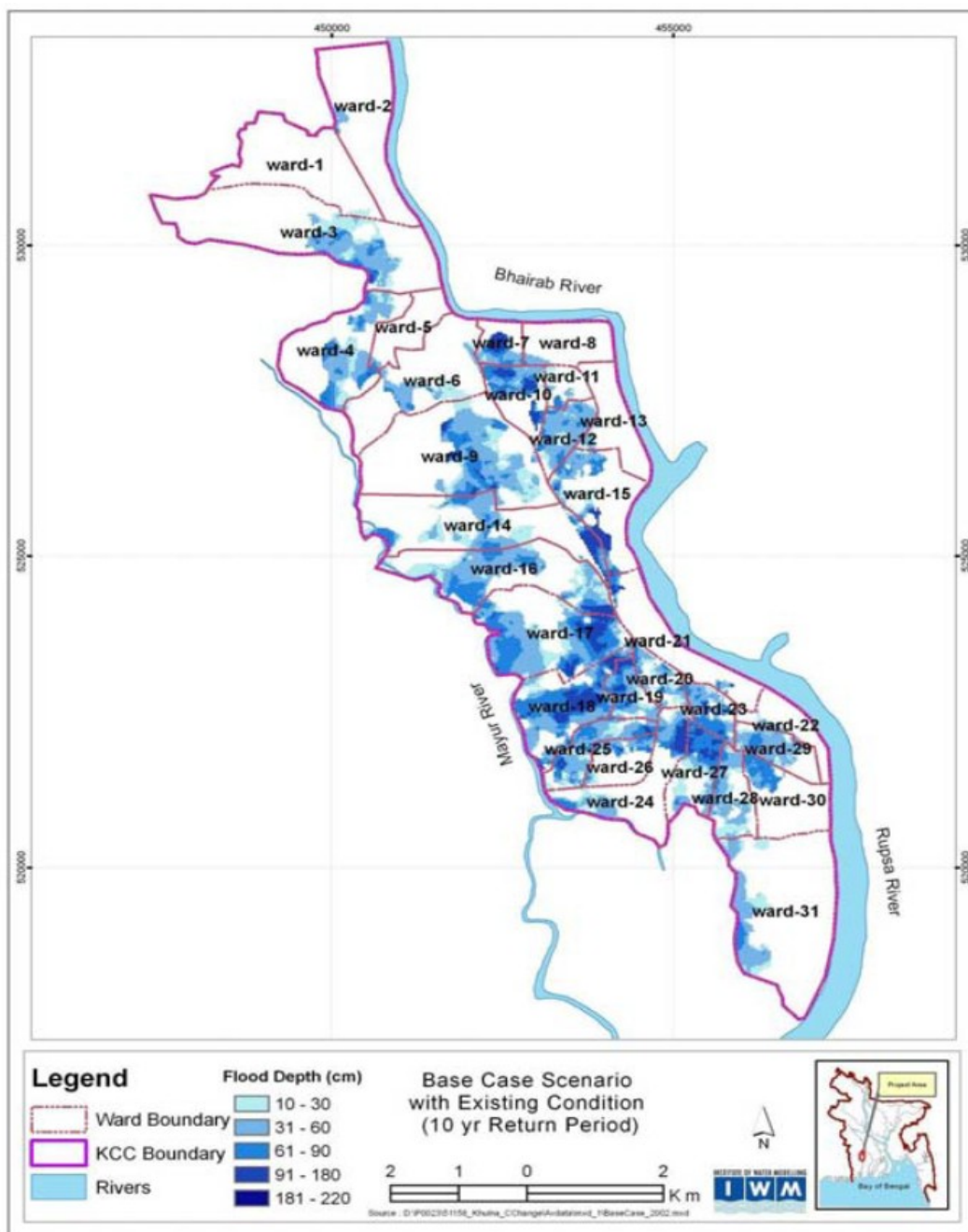
§It has been identified in the KCC Drainage Master Plan that the capacity and gravity of most existing drainage channels is not sufficient to carry out the excessive rainwater. In natural khals the flow of water is hampered due to inadequate drainage section, absence of inlets and outlets and lack of proper maintenance of drainage structures. Water logging occurs at many places. There are katcha drains in KCC area that have no outlets.

§There are 6 regulators and 8 sluice gates to drain out storm water from KCC area. At Alutala a 10-vent sluice gate serves as major drainage function of the Khulna City. There are four regulators that drain out storm water into the Rupsha River and the other two regulators drain water into the Khudir Khal, the upstream part of the Mayur River.

## **Mayur River**

The Mayur River is situated on the south-western boundary of the Khulna City corporation area and connects the Rupsha River on the south through Motiakhali Khal and Kajibacha River. This is major collector river of the city's waste and storm water. This river is the outfall of the largest number of khals/drains that serve as the primary drains. The Mayur River is a major drainage channel of Khulna City that carry a large volume of waste and storm water, both, from urban Khulna and adjacent Beel Pabla and Beel Dakatia areas. It is the main drainage channel for the eastern part of Polder 28/2, via a 10-vent sluice at Alutola. The Mayour river discharges its flow into the river Rupsha. The Mayur river is becoming dumping ground of city waste. It is also being filled up as sediments carried by drains are being piled up at outfall points.

# Map: Waterlogging Scenario in Khulna City







**Water logging in Royal Hotel Moar/intersection  
(intersection of KDA avenue & Khan Jahan Ali road),  
August 2013**

**Table: Major Water-logging Areas**

Ward No	Location
Ward No 03	Mahersharpasha
Ward No 04	Deayna Pashim Para
Ward No 09	Mijgunni Housing, Bastuhara
Ward No 16	Choto Boyra, Rayer Mohal
Ward No 22	Natun Bazar, Rupsha Bari Badh area
Ward No 24	Gollamari
Ward No 27	Nodal Point of Khan Jahan Ali and KDA Avenue (nearby and surrounding Royal Hotel), Tutpara, West Tutpara, Tutpara Monirbari khal Par, East Bania Khamar
Ward No 31	Rupsha Shipyard area, Labanchara

**Source:** *Survey to Mitigate Water Logging Problem of Khulna City project, KCC*

## **SOME REPRESENTATIVE PHOTOGRAPHS ON CONDITIONS OF WATERBODIES OF KHULNA CITY**



**Protection of Bhairab River by  
City Protection Embankment**



**Encroachment on Rupsha River  
by construction**





Conservation work of the pond adjacent to Shahid Hadis park by KCC is progressing



-tank in KCC Solar Park has added its beauty and recreation needs of ci



**A broad view of Nirala lake,  
Nirala R/A, Ward 24, KCC**



**Unprotected northern boundary  
of Nirala lake, Nirala R/A, Ward  
24, KCC**





**Existing ponds/tanks near PTI moar (Ward 23), lake near Joragate KCC kitchen market and near Joragate rail crossing, and at the back side of Krishi bank and Shilpa bank (Ward 21)**





**Mayur River under the Gollamari Bridge**



**Floating wastes and stagnation on  
Mayur river**



**Encroachment on Mayur River**





**Bangladesh Railway has filled up a big lake near its existing Khulna Railway station.**





**rowly constructed culvert, encroachment and siltation of the Harintana**



**Accumulation of floating solid wastes in Bagmara Khal, Ward 27, KCC**



**Bagmara Khal is filling up with water hyacinth, Ward 27, KCC**





**Wastes of Kitchen Market of Mistripara Bazaar is disposed of on its adjacent pond/waterbody for its filling up**



## Reasons of Disappearance and Shrinking of Surface Water Bodies in Cities



**Private ponds are being filled up for construction of buildings,  
Ward 28 & 27; September 2013**



**ed the waterbody by solid waste and builds kitchen market at Jo**





**Open pit latrines on and adjacent the ponds in urban slums-Rupsha slum and Montu**

## **RECOMMENDATIONS FOR CONSERVATION OF WATER BODIES OF THE CITIES**

- §Ponds, lakes and rivers under the private and public ownership need to be conserved through application of concerned rules and regulations
- §Ponds under the private and public ownership need to be conserved through taking conservation projects

# CHITTAGONG CITY

- § Chittagong is the 2nd largest city in Bangladesh, lies on the north bank of the Karnaphuli River and the west bank of its tributary, the Halda.
- § The core of the city is about 15km upstream of the river mouth here the Karnaphuli meets the Bay of Bengal
- § The city covers an area of small hills and narrow valleys, bounded by the Karnaphuli to the South, the coastal plain to the West and the flood plain of the Halda to the East
- § The highest ground level within the city area is about 60m while at Patenga, on the peninsula to the South between the river and the sea, the level drops to about 2m above MSL
- § Chittagong experiences about 3000mm of mean annual rainfall, of which about 2400mm falls during the normal monsoon period



- §The primary khals (canals) are mainly based on natural channels which existed before the city was built
- §In the central city area development extends in many places right up to the edge of the channel thus preventing access for maintenance
- §In general, khals have not been planned in advance of building development, nor has land for khals been allocated alongside the new road construction
- §Khals originating in eroding hilly areas carry a high silt load, a phenomenon that is seriously aggravated by the practice of hill cutting
- §When the flow reaches the foot of the hills the velocity is reduced and the larger-grained material is deposited on the bed of the khal
- §Unfortunately, access to existing silt traps for the purpose of silt removal is often difficult



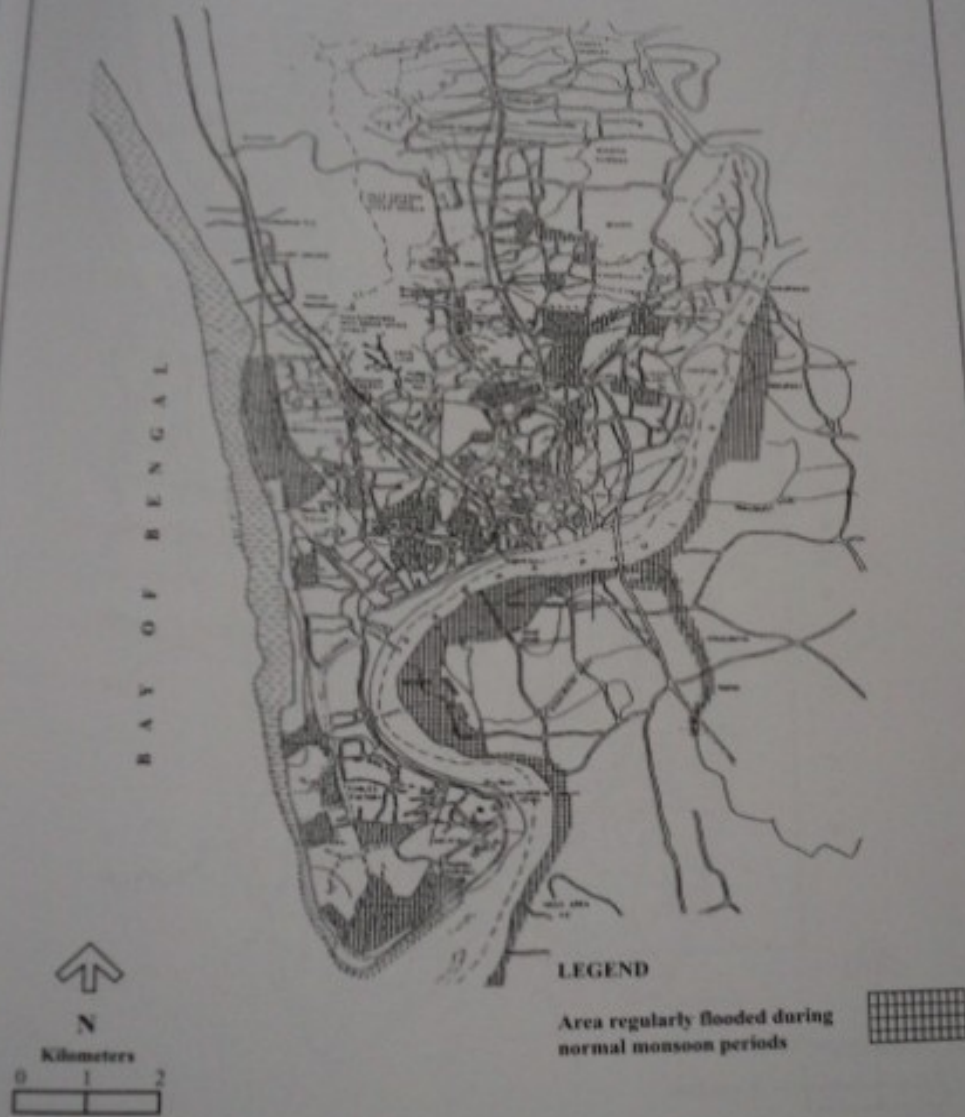
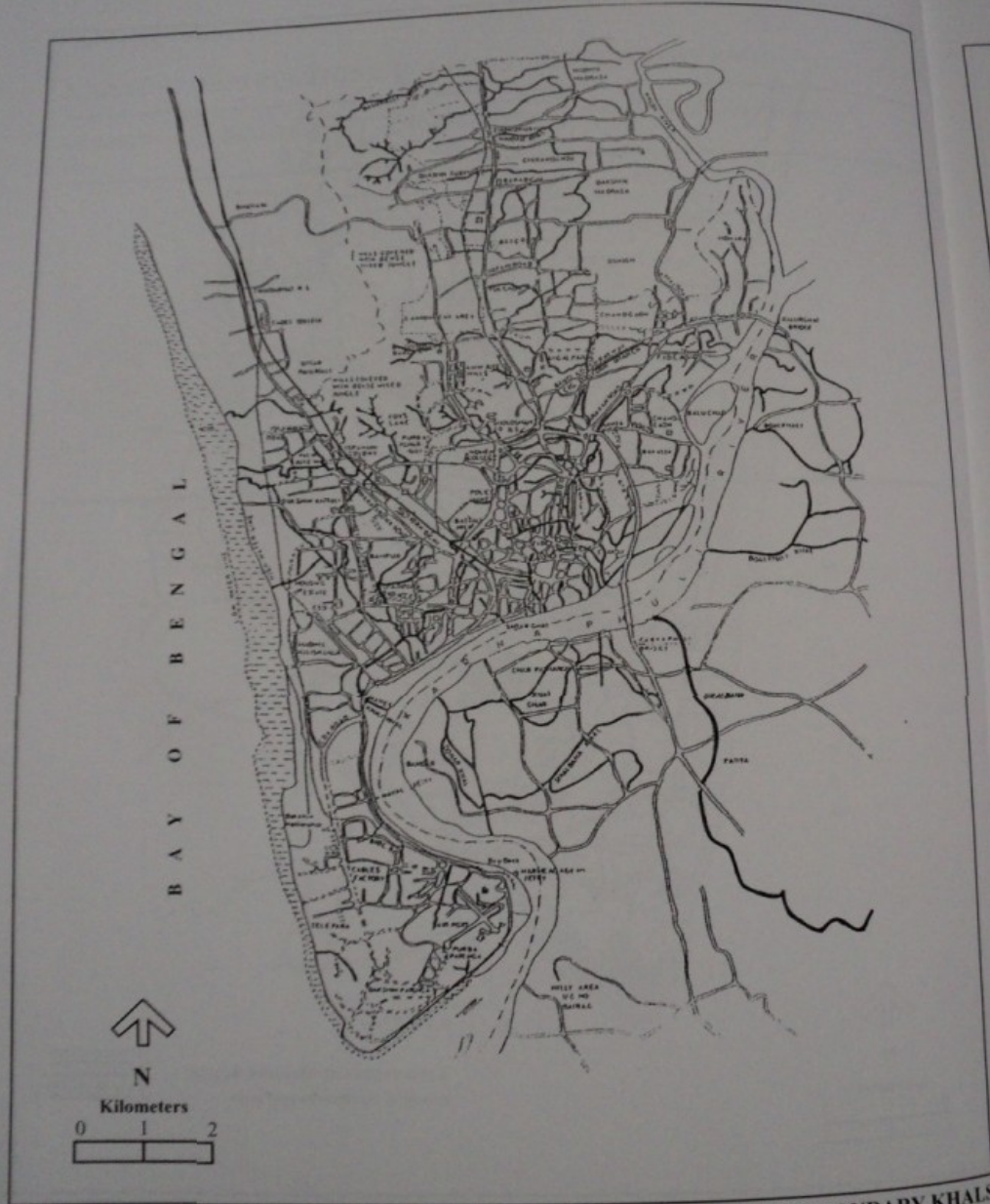


Figure 2.1 FLOODED AREAS-MONSOON PERIODS





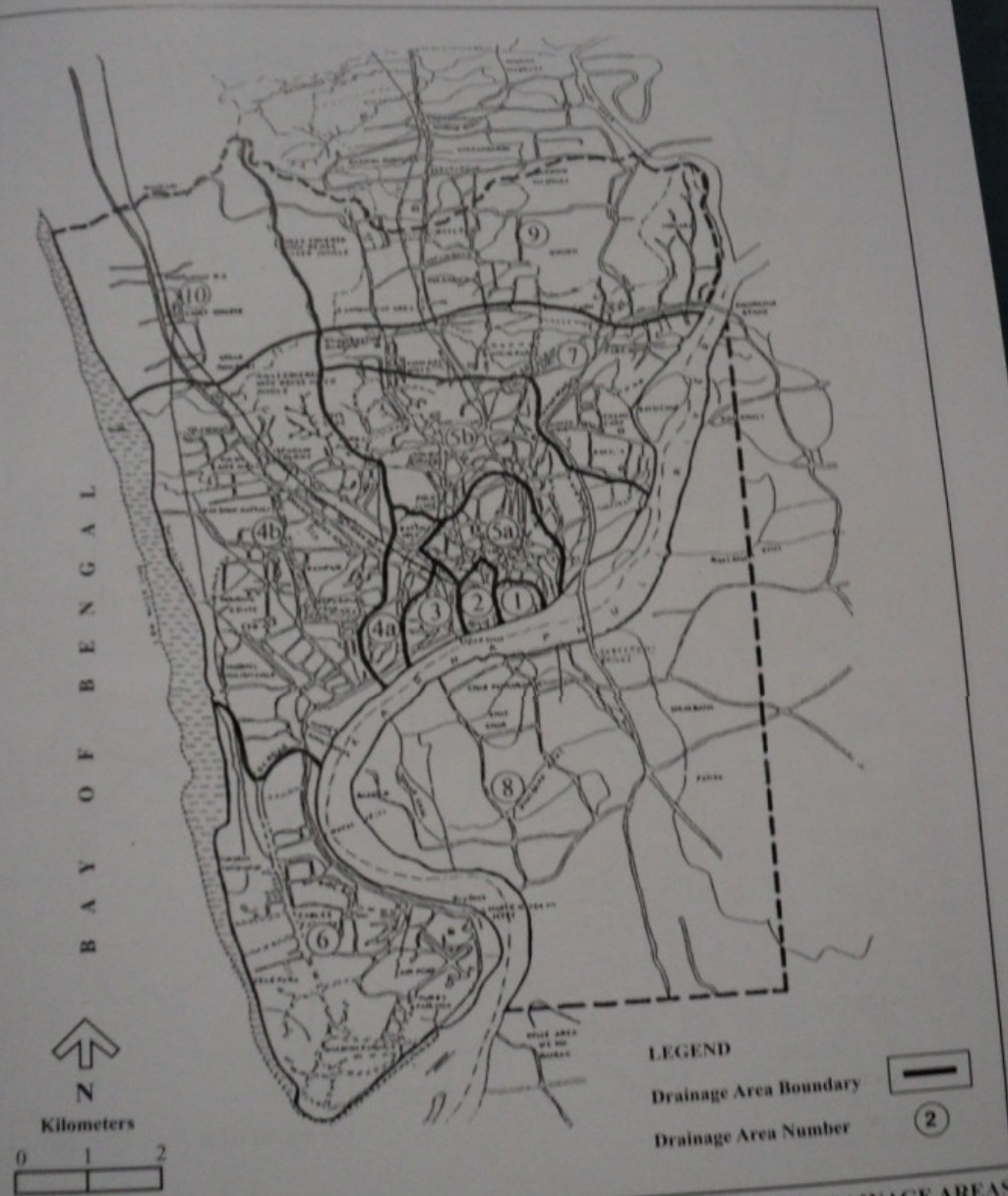


Figure 2.3 DRAINAGE AREAS



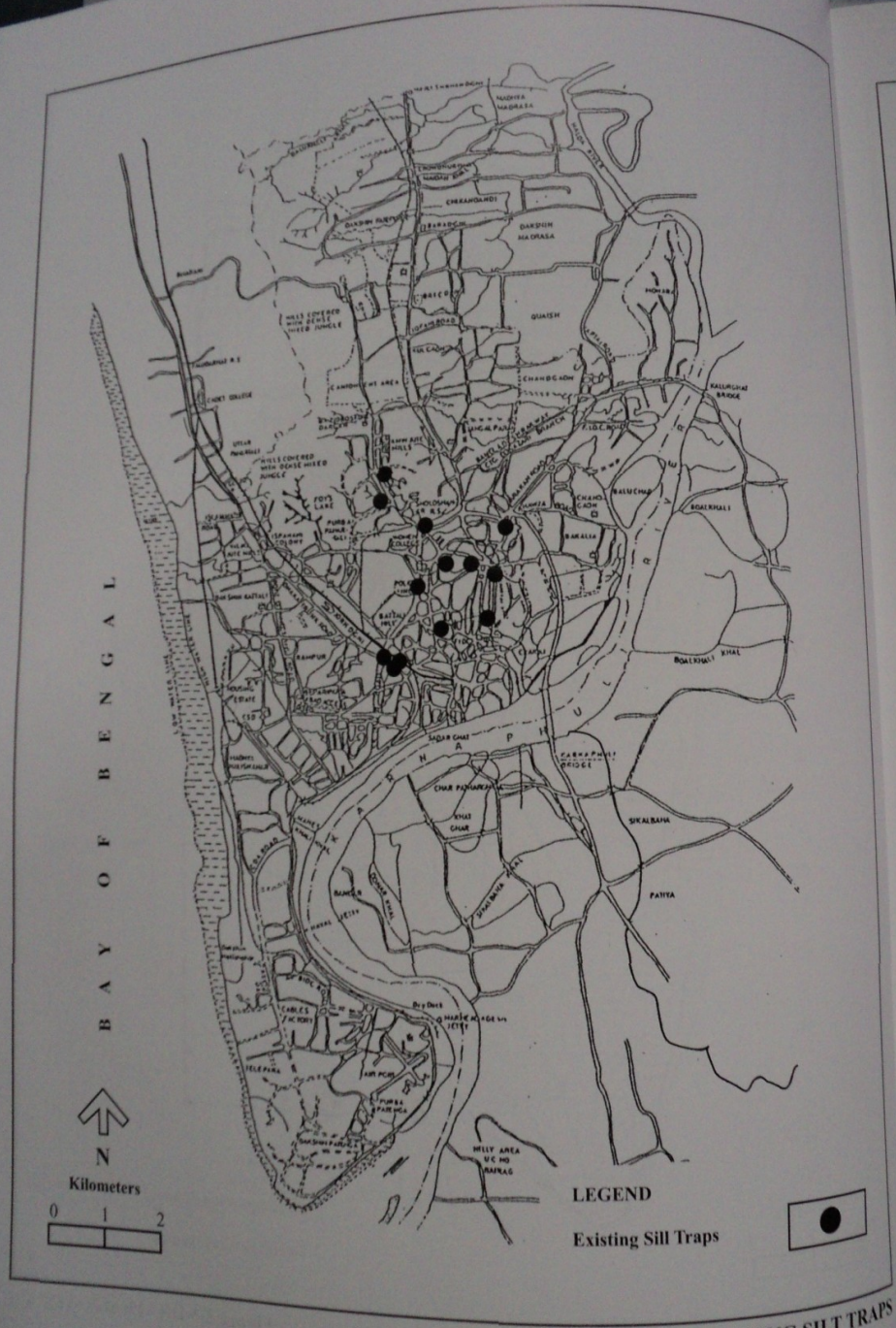


Figure 2.4 EXISTING SILT TRAPS

Thanks