River, river system & Management

- A river is part of the hydrological cycle.
- Water within a river is generally collected from precipitation through surface runoff, groundwater recharge, springs, and the release of stored water in natural ice and snow packs (e.g., from glaciers).
- A river system consists of a main channel and all of the tributaries and distributaries that flow into it or joining the main stream.

A RIVER SYSTEM CAN BE DIVIDED INTO THREE SUBSYSTEMS:

- ***collecting system*** (branches) -- consisting of a network of tributaries in the headwater region, collects and funnels water and sediment to the main stream;

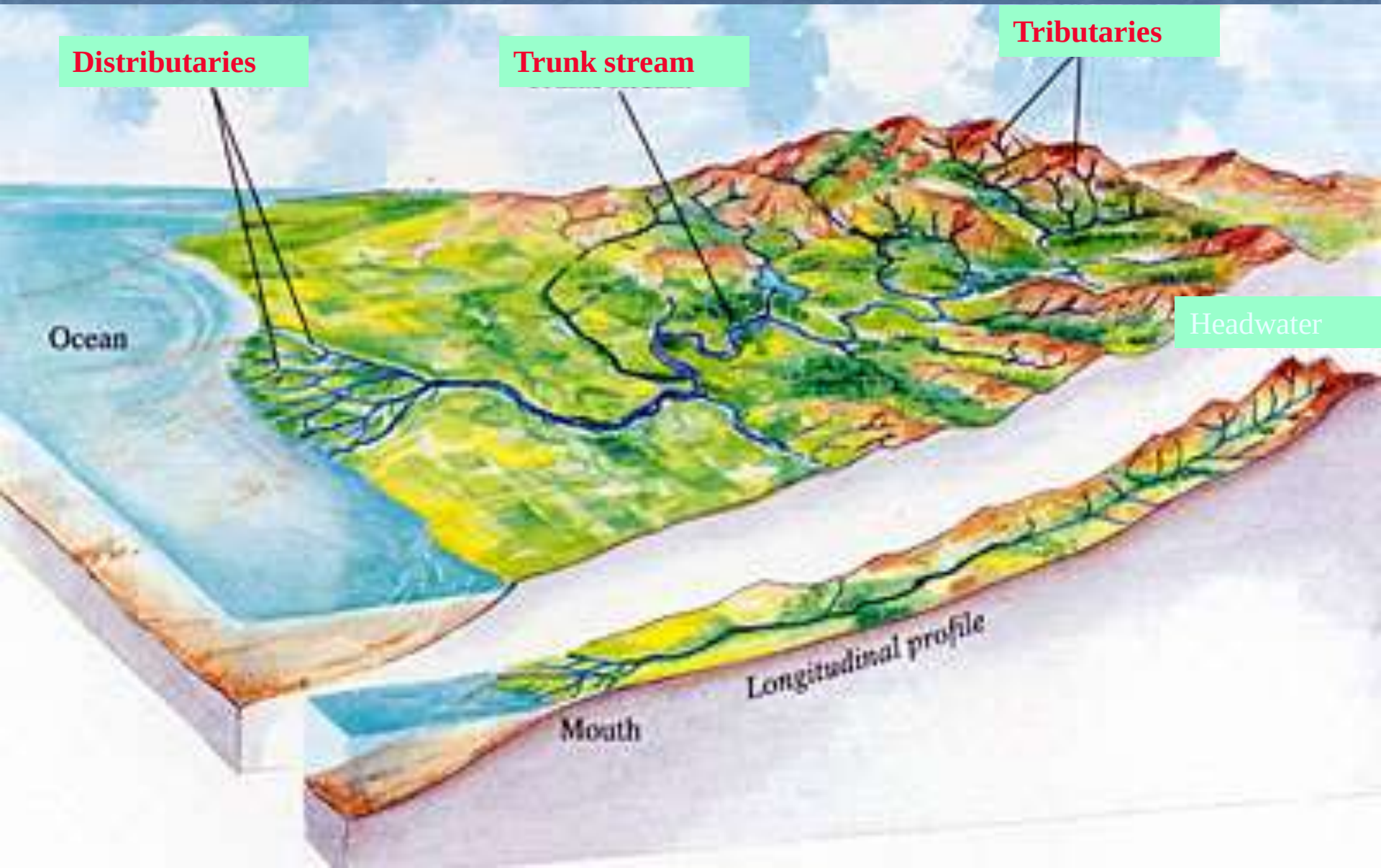
- ***dispersing system*** (roots) -- consists of a network of distributaries at the mouth of a river (delta), where sediment and water are dispersed into an ocean, a lake, or a dry basin;

- ***transporting system*** (trunk) -- the main trunk stream, which functions as a channel way through which water and sediment move from the collecting area toward the ocean. Erosion and deposition also occur in a river's transporting system.

Parts of River

- **tributary** : a stream flowing into or joining a larger stream
- **distributary :** numerous stream branches into which a river divides where it reaches its mouth
- **upstream** : moves toward headwater (up the regional slope of erosion)
- **downstream :** moves toward mouth of river (delta)
- **Delta :** a large, roughly triangular body of sediment deposited at the mouth of a river
- **Braided :** river is divided into multiple channels by alluvial islands. Braided rivers tend to have steeper gradients
- **Meander :** a broad, looping bend in a river

River system



Classification of River System

Youthful river

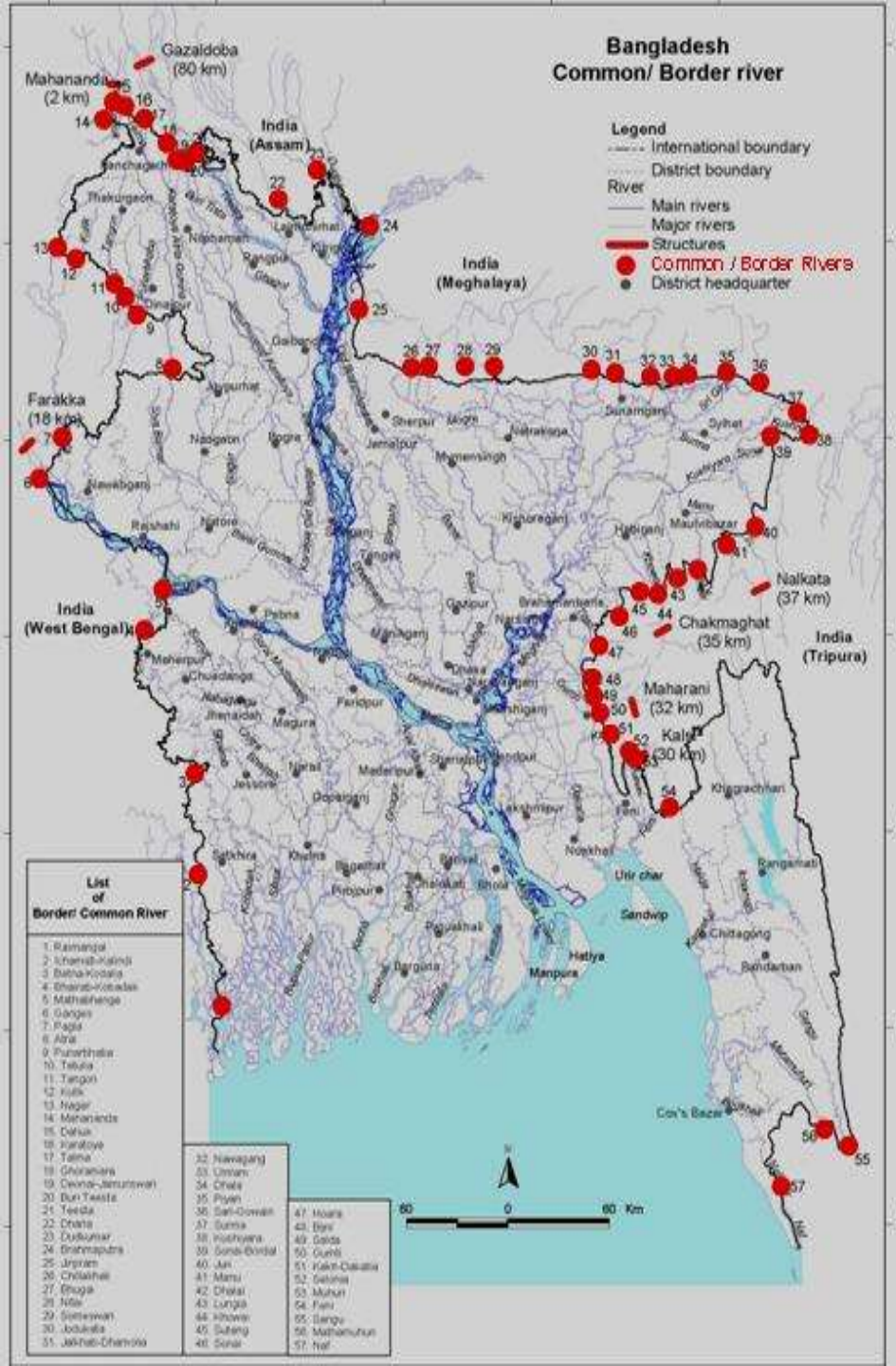
- A river with a steep gradient that has very few tributaries and flows quickly. Its channels erode deeper rather than wider.

Mature river

- A river with a gradient that is less steep than those of youthful rivers and flows more slowly. A mature river is fed by many tributaries and has more discharge than a youthful river. Its channels erode wider rather than deeper.

Old river

- A river with a low gradient and low erosive energy. Old rivers are characterized by flood plains.



Location of Internationa Rivers in Bangladesh

There are about 700 rivers in Bangladesh of which 57 are transboundary rivers.

Out of the 57 transboundary rivers, 54 are common with India and remaining 3 with Myanmar.

The rivers of Bangladesh can be divided into five major networks

1. The Brahmaputra-Jamuna is 292 kilometers long and extends from northern Bangladesh to its confluence with the Padma. At the point where the Brahmaputra meets the Tista River in Bangladesh, it becomes known as the Jamuna.

The Jamuna is notorious for its shifting sub-channels and for the formation of fertile silt islands (chars). No permanent settlements can exist along its banks.

Five major networks…….

2 The second system is the Ganges-Padma, which is divided into two sections: a 258-kilometer segment, the Ganges, which extends from the western border with India to its confluence with the Jamuna some 72 kilometers west of Dhaka, and a 126-kilometer segment, the Padma, which runs from the Ganges-Jamuna confluence to where it joins the Meghna River at Chandpur.

The Ganges-Padma is the central part of a deltaic river system with hundreds of rivers and streams—some 2,100 kilometers in length—flowing generally east or west into the Padma.

Five major networks……

3. The third network is the Surma-Meghna River System, which courses from the northeastern border with India to Chandpur, where it joins the Padma. The Surma-Meghna, 669 kilometers by itself the longest river in Bangladesh, is formed by the union of six lesser rivers.

Five major network……

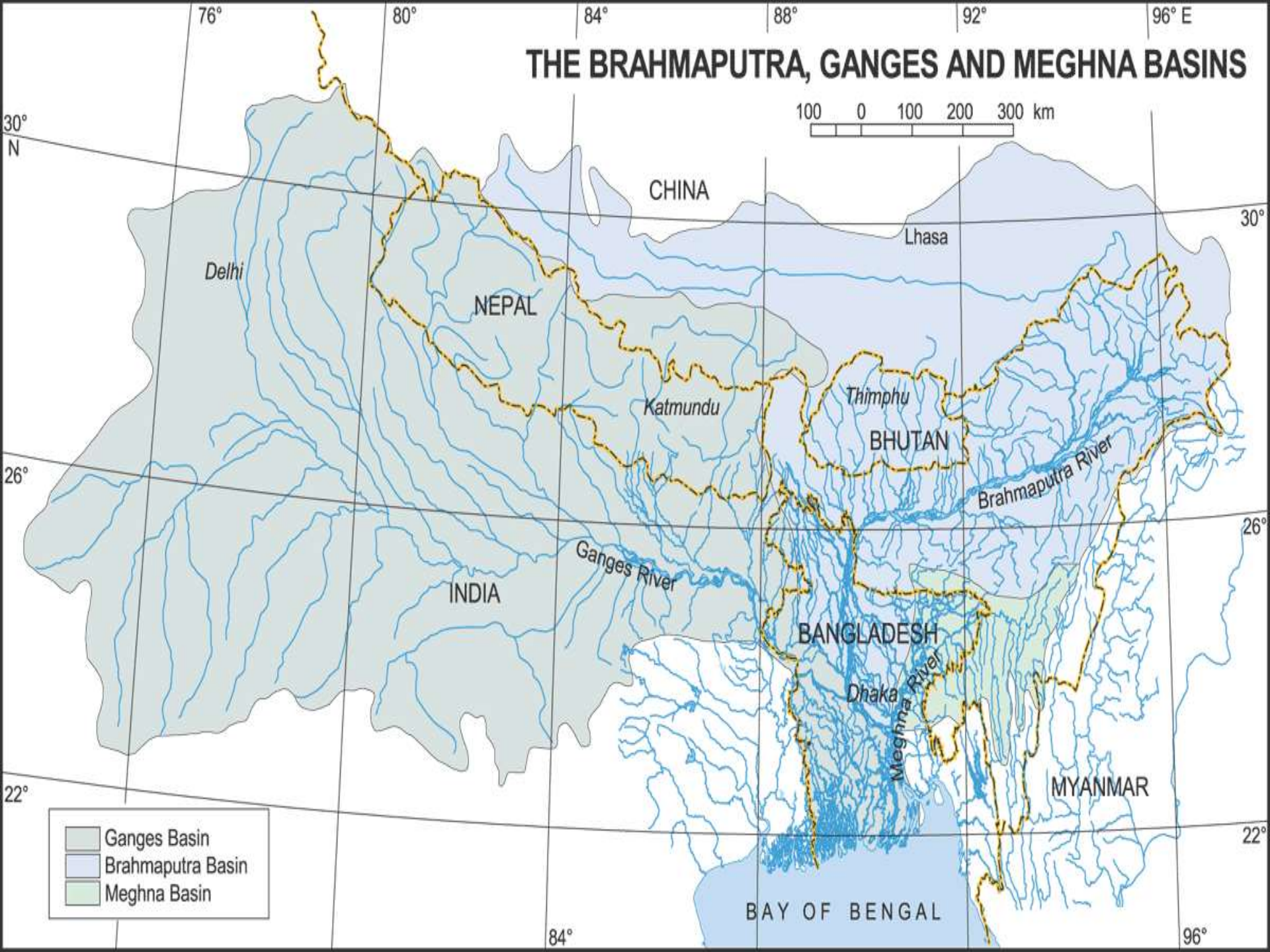
4. When the Padma and Meghna join together, they form the fourth river system—the Meghna—which flows 145 kilometers to the Bay of Bengal.

This mighty network of four river systems flowing through the Bangladesh Plain drains an area of some 1.5 million square kilometers.

Five major networks….

5. A fifth river system, unconnected to the other four, is the Karnaphuli. Flowing through the region of Chittagong and the Chittagong Hills, it cuts across the hills and runs rapidly downhill to the west and southwest and then to the sea. The Feni, Karnaphuli, Sangu, and Matamuhari—an aggregate of some 420 kilometers—are the main rivers in the region.

The port of Chittagong is situated on the banks of the Karnaphuli. The Karnaphuli Reservoir and Karnaphuli Dam are located in this area. The dam holds the Karnaphuli River's waters in the reservoir for the generation of hydroelectric power.


THE BRAHMAPUTRA, GANGES AND MEGHNA BASINS
100 0 100 200 300 km
76°
80°
84°
88°
92°
96° E
30° N
30°
26°
22°
CHINA
Lhasa
Delhi
NEPAL
Katmundu
Thimphu
BHUTAN
Brahmaputra River
Ganges River
INDIA
BANGLADESH
Dhaka
Meghna River
MYANMAR
BAY OF BENGAL
Ganges Basin
Brahmaputra Basin
Meghna Basin

River Management

Rivers are often managed or controlled to make them more useful or less disruptive to human activity.

- Dams or weirs may be built to control the flow, store water, or extract energy.
- Levees, known as dikes in Europe, may be built to prevent river water from flowing on floodplains or floodways.
- Canals connect rivers to one another for water transfer or navigation.
- River courses may be modified to improve navigation, or straightened to increase the flow rate.
- Rivers are increasingly managed for habitat conservation, as they are critical for many aquatic and riparian plants, resident and migratory fishes, waterfowl, birds of prey, migrating birds, and many mammals.

Riverbank Erosion

Riverbank Erosion

- **Riverbank Erosion** a recurrent natural hazard in Bangladesh. When rivers enter the mature stage (as in the case with the three mighty rivers, ganges, brahmaputra and meghna) they become sluggish and meander or braid. These oscillations cause massive riverbank erosion;
- Every year, millions of people are affected by erosion that destroys standing crops, farmland and homestead land;

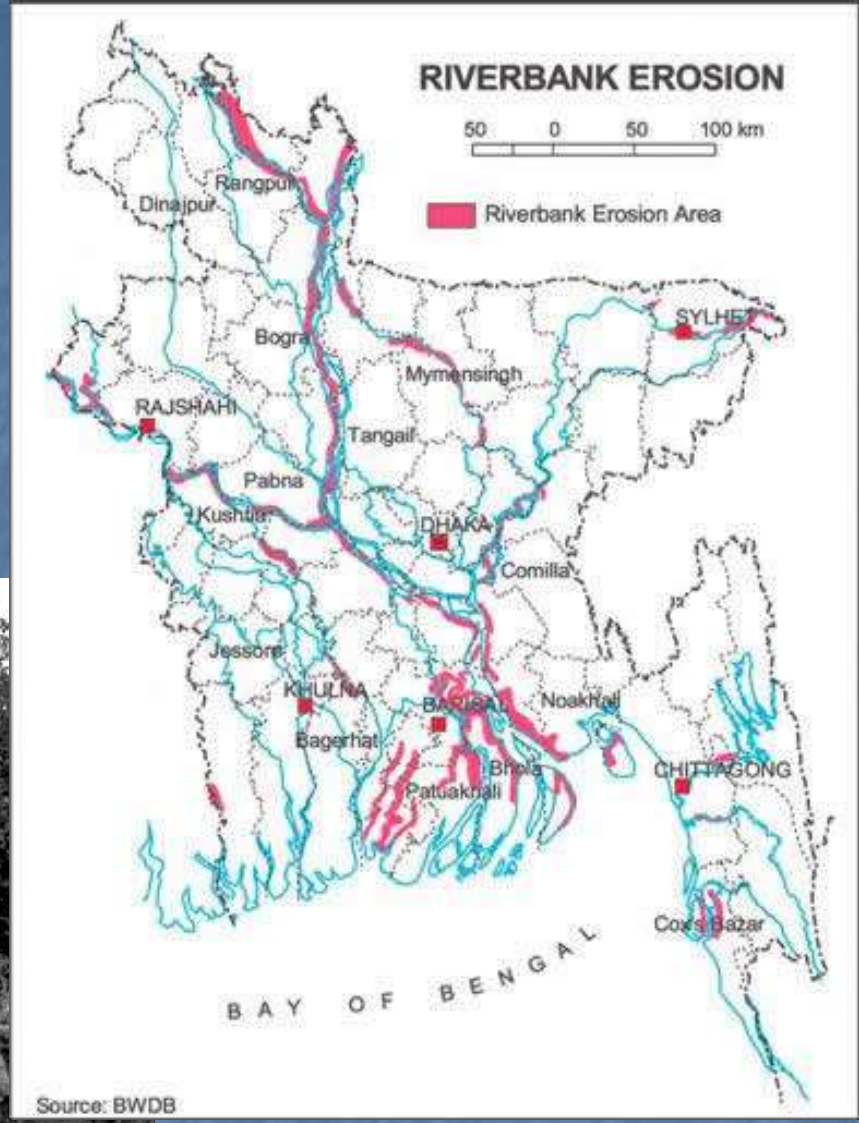
Riverbank Erosion….

- The unpredictable shifting behaviour of the rivers and their encroachments not only affect the rural floodplain population but also urban growth centres and infrastructures;
- No systemic pattern has yet been observed of the erosion hazards because of the involvement of a large number of variables in the process;
- The intensity of bank erosion varies widely from river to river as it depends on such characteristics as *bank material, water level variations, near-bank flow velocities, landform of the river and the supply of water and sediment into the river, etc.*

Riverbank Erosion….

- For example, loosely packed, recently deposited bank materials, consisting of silt and fine sand, are highly susceptible to erosion. Rapid recession of floods accelerates the rates of bank erosion in such materials.
- At least five million people in 20% of Bangladesh's upazilas are at risk of losing land and home and village from riverbank erosion at any one time. Among them, at least 100,000 are forcibly displaced each year.

Norman Buchignani & Doreen Indra



Major reasons of erosion

- The intensity of tidal waves causes erosion in the south-western coast of Bangladesh.
- Lack of planned and necessary embankment along with the coast.
- Due to combined sudden flood, heavy rain, and downwards freshwaters causes collision to the riverbank and cause erosion to the coastal areas

Major reasons of erosion….

- Due to heavy siltation in the south-western part of Bangladesh and newly formed charland the flows of rivers get changed to another direction. As a result the bank of rivers are facing newly stress and expose to erosion.
- Deforestation and lack of mangrove plantation in the coastal areas.
- Unseen change in the tidal surge due to the climate change.

Socio-economic impact

- Riverbank erosion has disastrous socio-economic effects;
- The majority of the affected people perceive riverbank erosion as a natural phenomenon but in many cases the people believe erosion to be the 'will of God';
- Riverbank erosion is also seen as one of the major causes for national poverty;
- Researchers found that the land lost is much more than the land that rises out of riverbed through accretion;

Socio-economic impact…

- In erosion-prone areas, most families have witnessed a displacement in their lifetime. This involuntary movement can go up to 10 times or even more;
- A large proportion of the victims remain unemployed due to lack of work opportunities;
- The female-headed households displaced by riverbank erosion and residing on embankments are the most deprived group.