# Geography of Bangladesh

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- Bangladeshis a densely populated, low-lying, mainly riverine country located in South Asia with a coastline of 580 km on the northern littoral of the Bay of Bengal.
- The delta plain of the Ganges (Padma), Brahmaputra (Jamuna), and Meghna Rivers and their tributaries occupy 79 percent of the country.
- Four uplifted blocks (including the Madhupur and Barind Tracts in the centre and northwest) occupy 9 percent.
- Steep hill ranges up to approximately 1,000 m high occupy 12 percent in the southeast (the Chittagong Hill Tracts) and in the northeast.

- Straddling the Tropic of Cancer, Bangladesh has a tropical monsoon climate characterized by heavy seasonal rainfall, high temperatures, and high humidity.
- Natural disasters such as floods and cyclones accompanied by storm surges periodically affect the country.
- Most of the country is intensively farmed, with rice the main crop, grown in three seasons.
- Rapid urbanization is taking place with associated industrial and commercial development.
- Exports of garments and shrimp plus remittances from Bangladeshis working abroad provide the country's three main sources of foreign exchange income.

# Physical geography of Bangladesh

- The physical geography of Bangladesh is varied and has an area characterized by two distinctive features: a broad deltaic plain subject to frequent flooding, and a small hilly region crossed by swiftly flowing rivers.
- The country has an area of 147,570 sq km (according to BBS 2020) or 148,460 sq km (according to CIA World factbook 2021)
- Extends 820 km north to south and 600 km east to west.
- Bangladesh is bordered on the west, north, and east by a 4,095 km land frontier with India and, in the southeast, by a short land and water frontier 193 km with Myanmar.

- On the south is a highly irregular deltaic coastline of about 580 km, fissured by many rivers and streams flowing into the Bay of Bengal.
- The territorial waters of Bangladesh extend 12 nautical miles (22 km), and the exclusive economic zone of the country is 200 nautical miles (370 km).
- Roughly 80% of the landmass is made up of fertile alluvial lowland called the Bangladesh Plain.
- The plain is part of the larger Plain of Bengal, which is sometimes called the Lower Gangetic Plain.

A nautical mile is a unit of length used in air, marine, and space navigation, and for the definition of territorial waters. Today the international nautical mile is defined as exactly 1,852 metres (6,076 ft; 1.151 mi). The derived unit of speed is the knot, one nautical mile per hour.

- Although altitudes up to 105 m above sea level occur in the northern part of the plain, most elevations are less than 10 metres (33 ft) above sea level; elevations decrease in the coastal south, where the terrain is generally at sea level.
- With such low elevations and numerous rivers, water—and concomitant flooding—is a predominant physical feature.
- About 10,000 sq km of the total area of Bangladesh is covered with water, larger areas are routinely flooded during the monsoon season.
- The only exceptions to Bangladesh's low elevations are the Chattogram Hills in the southeast, the Low Hills of Sylhet in the northeast, and highlands in the north and northwest.

- The Chattogram Hills constitute the only significant hill system in the country
- The Chattogram Hills rise steeply to narrow ridgelines, generally no wider than 36 metres, with altitudes from 600 to 900 m.
- At 1,052 m altitude, the highest elevation in Bangladesh is found at **Saka Haphong**, in the southeastern part of the hills.
- Fertile valleys lie between the hill lines, which generally run north–south. West of the Chattogram Hills is a broad plain, cut by rivers draining into the Bay of Bengal, that rises to a final chain of low coastal hills, mostly below 200 metres, that attain a maximum elevation of 350 metres.
- West of these hills is a narrow, wet coastal plain located between the cities of Chattogram in the north and Cox's Bazar in the south.

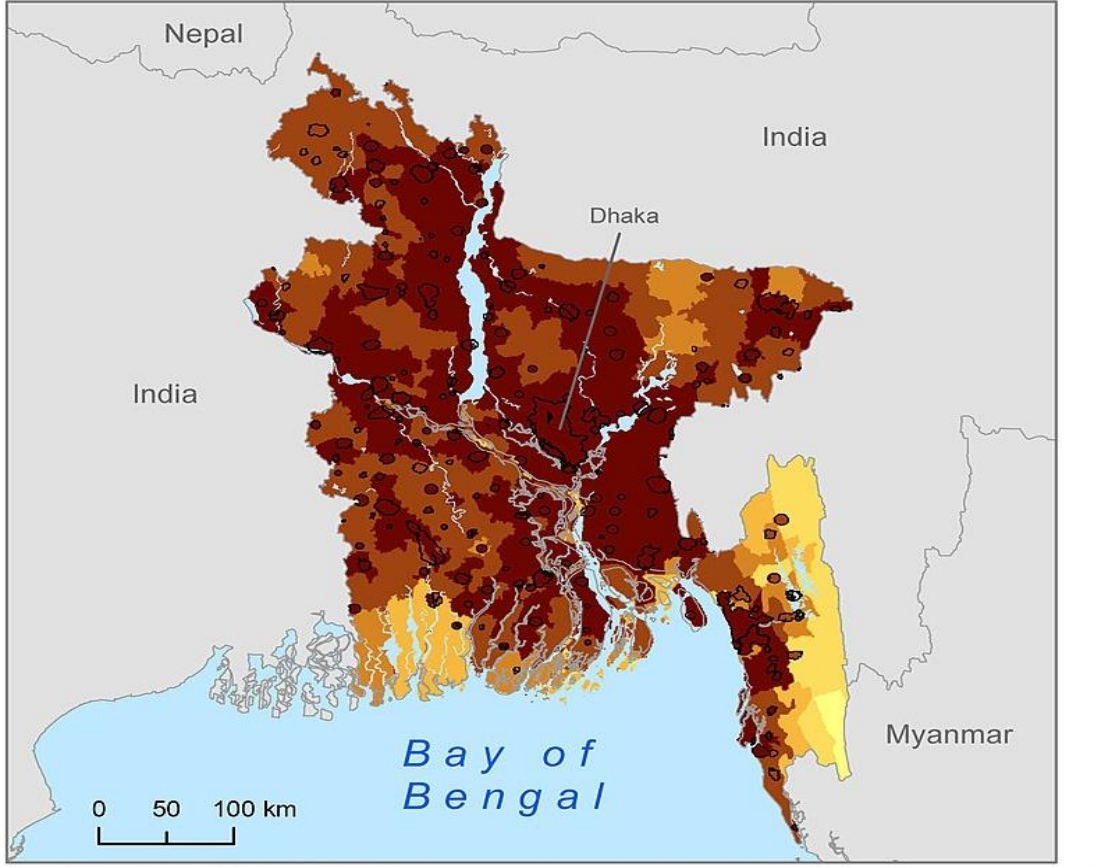
- About 67% of Bangladesh's nonurban land is arable.
- Permanent crops cover only 2%, meadows and pastures cover 4%, and forests and woodland cover about 16%.
- The country produces large quantities of quality timber, bamboo, and sugarcane.
- Rubber planting in the hilly regions of the country was undertaken in the 1980s, and rubber extraction had started by the end of the decade.
- A variety of wild animals are found in the forest areas, mainly in Sundarbans on the southwest coast, which is the home of the royal Bengal tiger.
- The alluvial soils in Bangladesh Plain are generally fertile and are enriched with heavy silt deposits carried downstream during the rainy season.


N
Rangpur
Mymensingh
Sylhet
Rajshahi
Dhaka
Khulna
Barisal
Chittagong
0 50 100 km
Legend (Land cover 2017)
Cropland
Built-up area
Barren area
Waterbodies
Grassland
Rural settlement and orchard
Hill forest
Mangrove forest
Madhupur forest

# Human geography

- Urbanization is proceeding rapidly, and it is estimated that only 30% of the population entering the labor force in the future will be absorbed into agriculture, although many will likely find other kinds of work in rural areas.
- The areas around Dhaka and Cumilla are the most densely settled.
- The Sundarbans and the Chittagong Hill Tracts are the least densely populated.

# Population density per square km




# Climate of Bangladesh

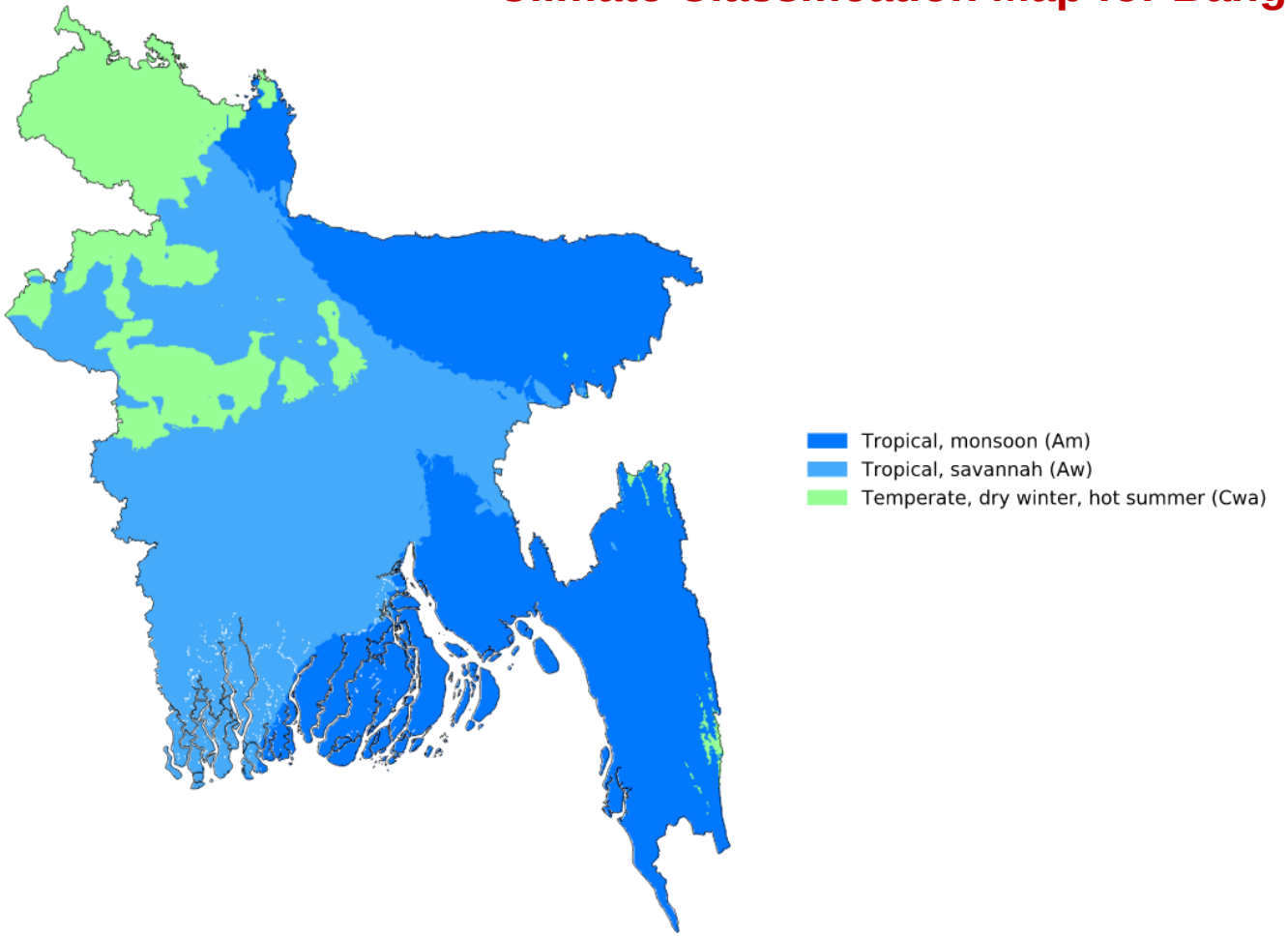
- Bangladesh has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and high humidity.
- Regional climatic differences in this flat country are minor, though some variations can be seen between the weather pattern of the Northern and southern region.
- According to Bangladesh Meteorological Department, there are four seasons depending on the temperature, rainfall and direction of wind:
- Mild and cool Winter from December to February,
- Hot and sunny Summer or pre Monsoon season from March to May,
- Somewhat cooler and very wet Monsoon season from June to September.
- Pleasant, shorter and cooler Autumn season in October–November.

- Bangladesh’s historical climate has experienced average temperatures around 26ºC, but range between 15ºC and 36ºC throughout the year.
- In general, maximum summer temperatures range between 38 and 41 °C . April is the hottest month in most parts of the country.
- January is the coolest month, when the average temperature for most of the country is 16–20 °C during the day and around 10 °C at night.
- The country has never recorded an air temperature below 0 °C, with a record low of 1.1 °C in the north west city of Dinajpur on 3 February 1905.
- Winds are mostly from the north and northwest in the winter, blowing gently at 1 to 3 km/hour in northern and central areas and 3 to 6 km/hour near the coast.

- From March to May, violent thunderstorms, called northwesters  produce winds of up to 60 km/hour.
- During the intense storms of the early summer and late monsoon season, southerly winds of more than 160 km/hour cause waves to crest as high as 6 m in the Bay of Bengal, which brings disastrous flooding to coastal areas.
- Heavy rainfall is characteristic of Bangladesh causing it to flood every year.
- Except for the relatively dry western region of Rajshahi, where the annual rainfall is about 1,600 mm (63.0 in), most parts of the country receive at least 2,300 mm (90.6 in) of rainfall per year

- The region of Sylhet in northeastern Bangladesh receives the greatest average precipitation.
- From 1977 to 1986, annual rainfall in that region ranged between 3,280 and 4,780 mm (129.1 and 188.2 in) per year.
- Average daily humidity ranged from March lows of between 55 and 81% to July highs of between 94 and 100%, based on readings taken at selected stations nationwide in 1986.
- About 80% of Bangladesh's rain falls during the monsoon season.
- Rainfall is driven by the Southwest monsoon, which originates over the Indian Ocean and carries warm, moist, and unstable air.

# Climate Classification Map for Bangladesh (1980 – 2016)



- Natural calamities, such as floods, tropical cyclones, tornadoes, and tidal bores—destructive waves or floods caused by flood tides rushing up the country, particularly the coastal belt, almost every year.
- Between 1947 and 1988, 13 severe cyclones hit Bangladesh, causing enormous loss of life and property.
- In May 1985, for example, a severe cyclonic storm packing 154-km/hour winds and waves 4 meters high swept into southeastern and southern Bangladesh, killing more than 11,000 persons, damaging more than 94,000 houses, killing some 135,000 head of livestock, and damaging nearly 400 km of critically needed embankments.

- Annual monsoon flooding results in the loss of human life, damage to property and communication systems, and a shortage of drinking water, which leads to the spread of disease.
- For example, in 1988 two-thirds of Bangladesh's 64 districts experienced extensive flood damage in the wake of unusually heavy rains that flooded the river systems.
- Millions were left homeless and without potable water.
- Half of Dhaka, including the runway at the Shahjalal International Airport—important transit point for disaster relief supplies—was flooded.
- About 2,000,000 tonnes of crops were reported destroyed, and relief work was more challenging because the flood made transportation difficult.

- A tornado in April 1989 killed more than 600 people, possibly many more.
- There are no precautions against cyclones and tidal bores except giving advance warning and providing safe public buildings where people may take shelter.
- Adequate infrastructure and air transport facilities that would ease the suffering of the affected people had not been established by the late 1980s.
- Efforts by the government under the Third Five-Year Plan (1985–90) were directed toward accurate and timely forecast capability through agrometeorology, marine meteorology, oceanography, hydrometeorology, and seismology.

# Climate change in Bangladesh

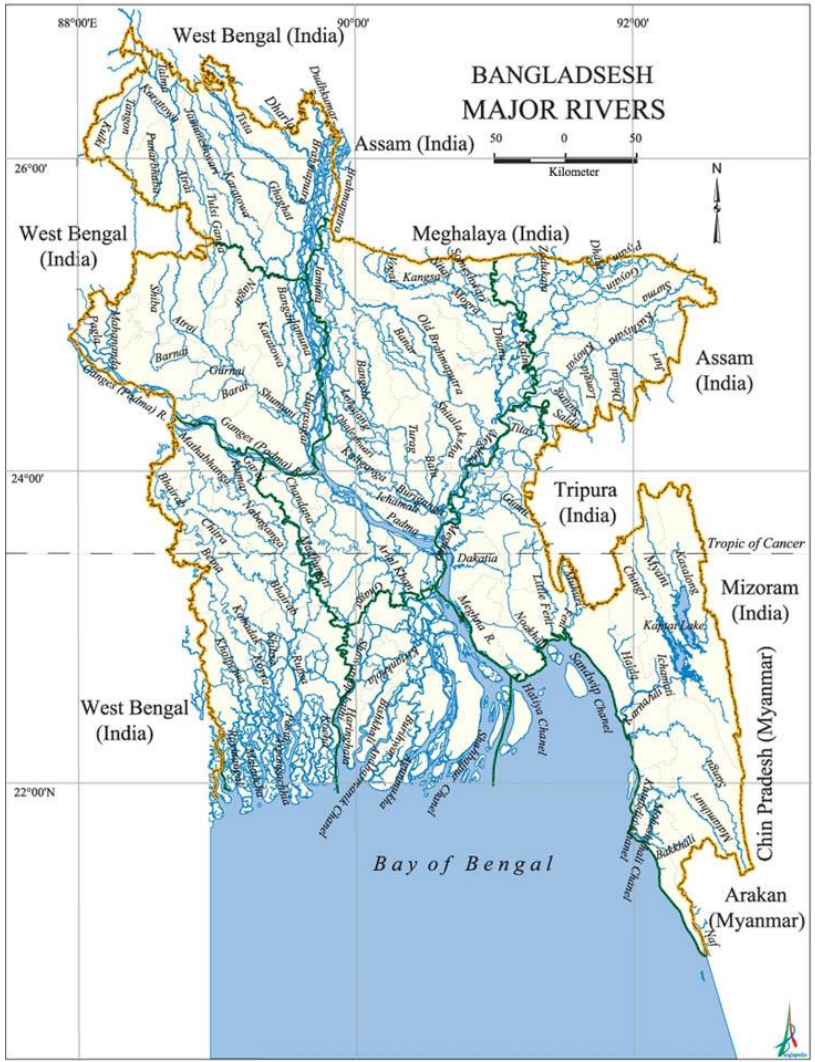
- **Climate change in Bangladesh** is a critical issue as the country is one of the most vulnerable to the effects of climate change.
- In the 2020 edition of German watch's *Climate Risk Index*, it ranked seventh in the list of countries most affected by climate calamities during the period 1999–2018.
- Bangladesh's vulnerability to climate change impacts is due to a combination of geographical factors, such as its flat, low-lying, and delta-exposed topography, and socio-economic factors, including its high population density, levels of poverty, and dependence on agriculture.
- Factors such as frequent natural disasters, lack of infrastructure, high population density ,an extractives economy and social disparities are increasing the vulnerability of the country in facing the current changing climatic conditions.

- Almost every year large regions of Bangladesh suffer from more intense events like cyclones, floods and erosion.
- The mentioned adverse events are slowing the development of the country by bringing socio-economical and environmental systems to almost collapse.
- Natural hazards that come from increased rainfall, rising sea levels, and tropical cyclones are expected to increase as the climate changes, each seriously affecting agriculture, water and food security, human health, and shelter.
- Over the course of a century, 508 cyclones have affected the Bay of Bengal region, 17 percent of which are believed to have caused landfall in Bangladesh.
- Sea levels in Bangladesh are predicted to rise by up to 0.30 metres by 2050, resulting in the displacement of 0.9 million people, and by up to 0.74 metres by 2100, resulting in the displacement of 2.1 million people.

- To address the sea level rise threat in Bangladesh, the Bangladesh Delta Plan 2100 was launched in 2018. The government of Bangladesh is working on a range of specific climate change adaptation strategies.
- Climate Change adaptation plays a crucial role in fostering the country's development. This is already being considered as a synergic urgent action together with other pressing factors which impede higher growth rates (such as the permanent threat of shocks – natural, economic or political – the uncertain impact of globalization, and an imbalanced world trade).
- As of 2020, it was seen falling short of most of its initial targets, still leaving 80 million people at risk of flooding where it should have been reduced to 60 million people. The progress is being monitored.

# Rivers of Bangladesh

- The rivers of Bangladesh mark both the physiography of the nation and the life of the people.
- About 700 in number, these rivers generally flow south.
- The larger rivers serve as the main source of water for cultivation and as the principal arteries of commercial transportation.
- Rivers also provide fish, an important source of protein.
- Flooding of the rivers during the monsoon season causes enormous hardship, but fresh deposits of rich silt replenish the fertile soil.
- The rivers also drain excess monsoon rainfall into the Bay of Bengal.
- Thus, the rivers are at the same time the country's principal resource and its greatest hazard.


BANGLADSESH
MAJOR RIVERS
88°00'E
90°00'
92°00'
26°00'
24°00'
22°00'N
West Bengal (India)
Assam (India)
Meghalaya (India)
Tripura (India)
Mizoram (India)
Chin Pradesh (Myanmar)
Arakan (Myanmar)
West Bengal (India)
Tropic of Cancer
Bay of Bengal
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Kilometer
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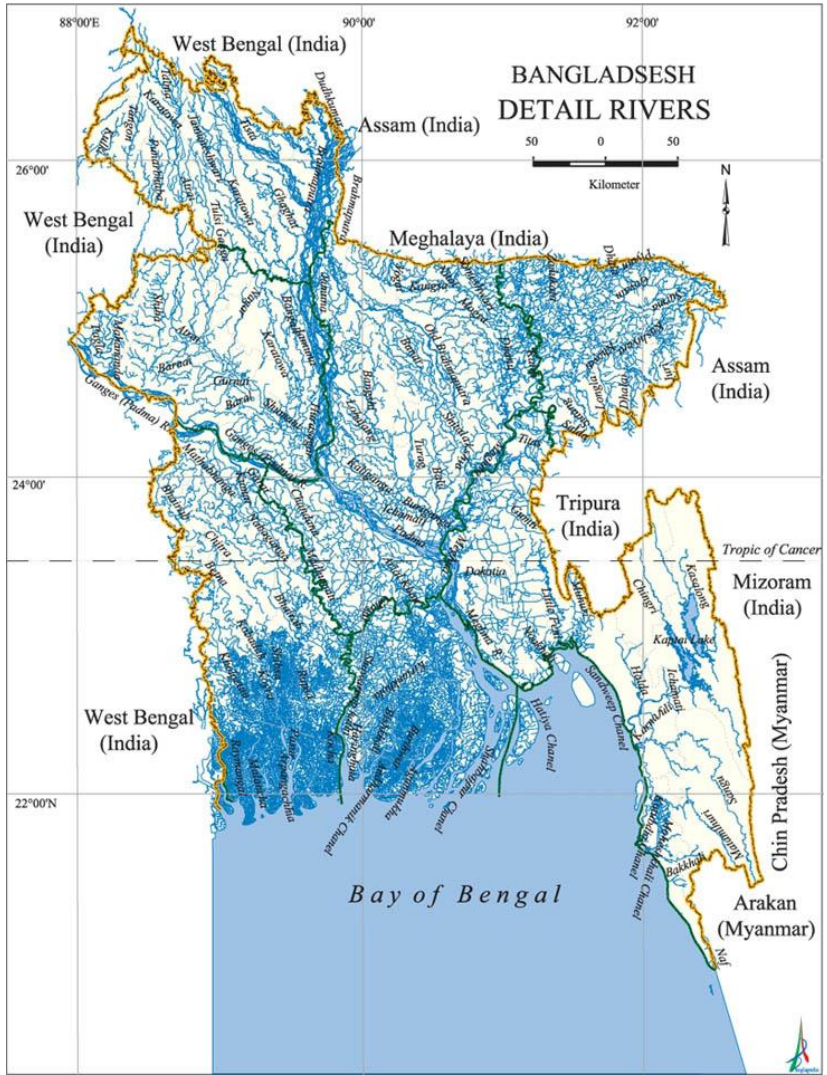
BANGLADSESH
DETAIL RIVERS
88°00'E
90°00'
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26°00'
24°00'
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West Bengal (India)
Assam (India)
Meghalaya (India)
Tripura (India)
Mizoram (India)
Chin Pradesh (Myanmar)
Arakan (Myanmar)
West Bengal (India)
Tropic of Cancer
Bay of Bengal
50 0 50
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N

- The profusion of rivers can be divided into **five major networks**.
- The first one **Jamuna-Brahmaputra network** is 292 km long and extends from northern Bangladesh to its confluence with the Padma.
- Originating as the Yarlung Tsangpo River in Tibet and flowing through India's state of Arunachal Pradesh, where it becomes known as the Brahmaputra ("Son of Brahma").
- it receives waters from five major tributaries that total 740 km in length.
- 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 subchannels and for the formation of fertile silt islands (chars).

- **The second system is the Padma-Ganges**, which is divided into two sections:
- A 258 km segment, the Ganges, which extends from the western border with India to its confluence with the Jamuna some 72 km west of Dhaka.
- And a 126 km segment, the Padma, which runs from the Ganges-Jamuna confluence to where it joins the Meghna River at Chandpur.
- The Padma-Ganges is the central part of a deltaic river system with hundreds of rivers and streams—some 2,100 km in length—flowing generally east or west into the Padma.

- 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, at 669 km by itself the longest river in Bangladesh, is formed by the union of six lesser rivers.
- Below the city of Kalipur it is known as the Meghna. When the Padma and Meghna join, they form the **fourth river system—the Padma-Meghna**—which flows 145 km to the Bay of Bengal.

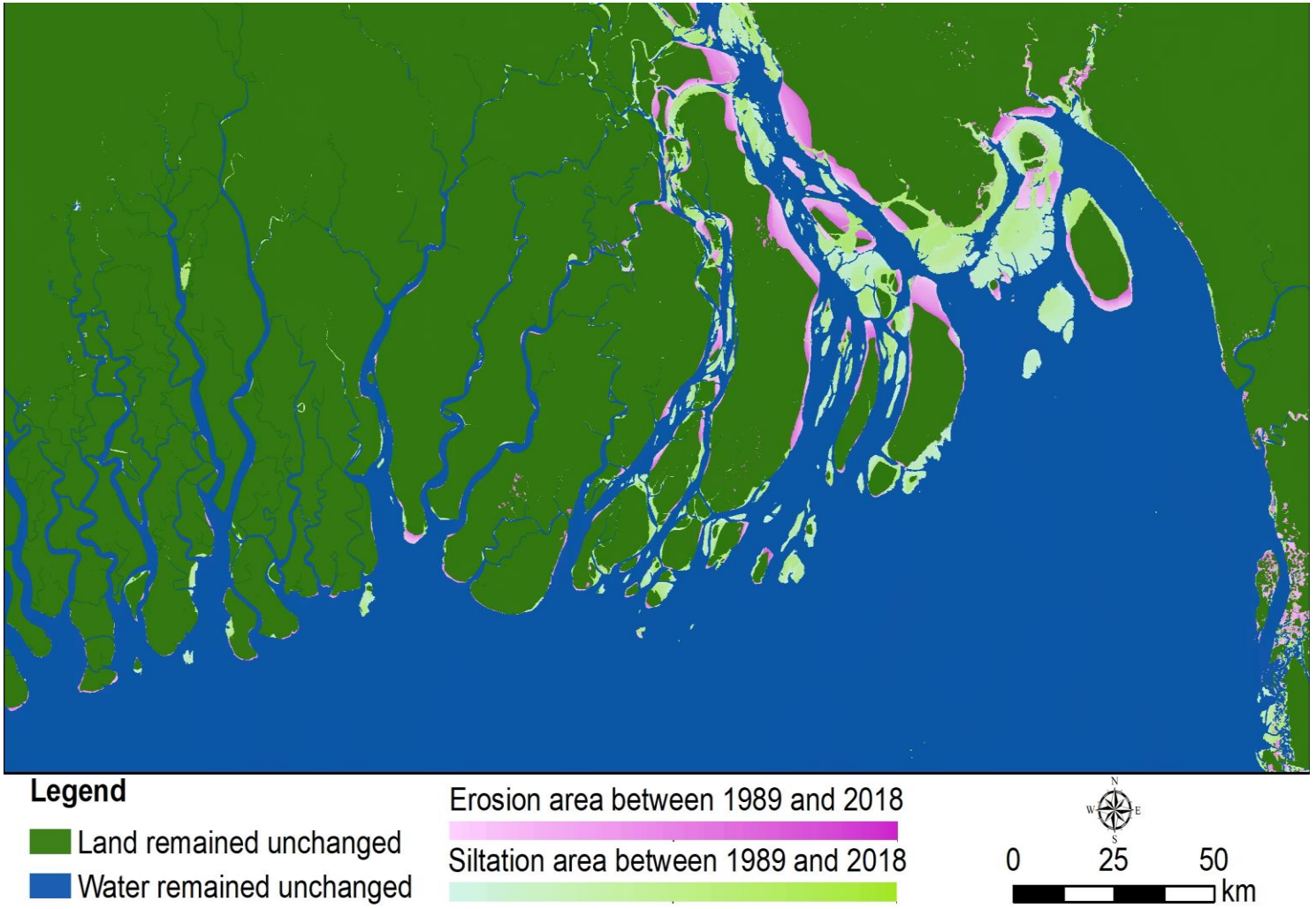
- A **fifth river system**, unconnected to the other four, is **the Karnaphuli.**
- Flowing through the region of Chittagong and the Chittagong Hills, it cuts across the hills and runs rapidly downhill to the west and southwest and then to the sea.
- The Feni, Karnaphuli, Sangu, and Matamuhari—an aggregate of some 420 km 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 impounds the Karnaphuli River's waters in the reservoir for the generation of hydroelectric power.

- The Ganga–Brahmaputra rivers contribute nearly 1000 million tons/yr of sediment.
- The sediment contributed from these two rivers forms the Bengal Delta and Submarine fan, a vast structure that extends from Bangladesh to the south of the Equator which is up to 16.5 km thick, and contains at least 1130 trillion tons of sediment accumulating over the last 17 million years at an average rate of 665 million tons/yr.

- During the annual monsoon period, the rivers of Bangladesh flow at about 140,000 cu-m/s , but during the dry period they diminish to 7,000 cu-m/s.
- Because water is so vital to agriculture, more than 60% of the net arable land, some 91,000 sq km, is cultivated in the rainy season despite the possibility of severe flooding, and nearly 40% of the land is cultivated during the dry winter months.
- Water resources development has responded to this "dual water regime" by providing flood protection, drainage to prevent over flooding and waterlogging, and irrigation facilities for the expansion of winter cultivation.

# Coastal Area of Bangladesh

- Bangladesh coastal areas are covering the south part of Bangladesh.
- The main rivers of Bangladesh derived from the Himalayas carry a high level of sediment and deposit it across the Bay of Bengal.
- This has led to major changes in the coastal region between 1989 and 2018.
- Over 30 years of morphological changes many islands are losing land area.
- However, there has been an overall net gain in the land area due to the regular acceleration process in other parts of those islands.
- In the west, new islands were found, but no significant changes were observed.
- At the mouth of the Meghna estuary, noticeable variable changes have been observed with the formation of many new islands.


Legend
Land remained unchanged
Water remained unchanged
Erosion area between 1989 and 2018
Siltation area between 1989 and 2018
N
W
E
S
0
25
50
km

- In 1989, the land area was only 28835 $km^2$ (56.06%), while the water area was 22600 $km^2$ (43.94%).
- In 2018, the land area increased to 29426 $km^2$ (57.21%); an increase of 590 $km^2$ (1.15%).
- The land area in 1999 and 2009 was 56.49% and 56.68%, respectively, with a total increase of 0.19%.
- The island reformation tendency showed that the new land area increased every year by an average of 20 $km^2$ (0.038) along the coastal region.
- Plant growth has been observed in these new islands over a period of 30 y.
- In the early stages, the islands are usually muddy waste areas that gradually changed into grasslands and Trees.