



# CLIMATE CHANGE & WATER



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# Climate Change & Water

Bangladesh is situated in a low-lying floodplain washed by three large rivers: the Ganges, the Brahmaputra and the Meghna. This makes Bangladesh highly rich in water resources. While the resources are generally a blessing for its people, they can also be a curse. Peoples' lives, livelihoods, culture are all highly influenced by water in this land of water. The huge water mass in rivers and heavy local rainfall during the monsoon significantly contribute towards enhancing the high diversity of fish and other aquatic resources. Water also contributes to sustaining the heritage and social customs in this country. Our aquatic resources and their type are highly dependant on the climate of this region.

The increasing temperature, due global warming (likely to intensify in the future), is influencing the lives, livelihoods and heritage of the people, and the biodiversity. The higher temperature is ruining lives, raising poverty and creating unsuitable overall conditions for living. It is high time to build the knowledge base about our water resources, their uses and the likely impacts of climate change.

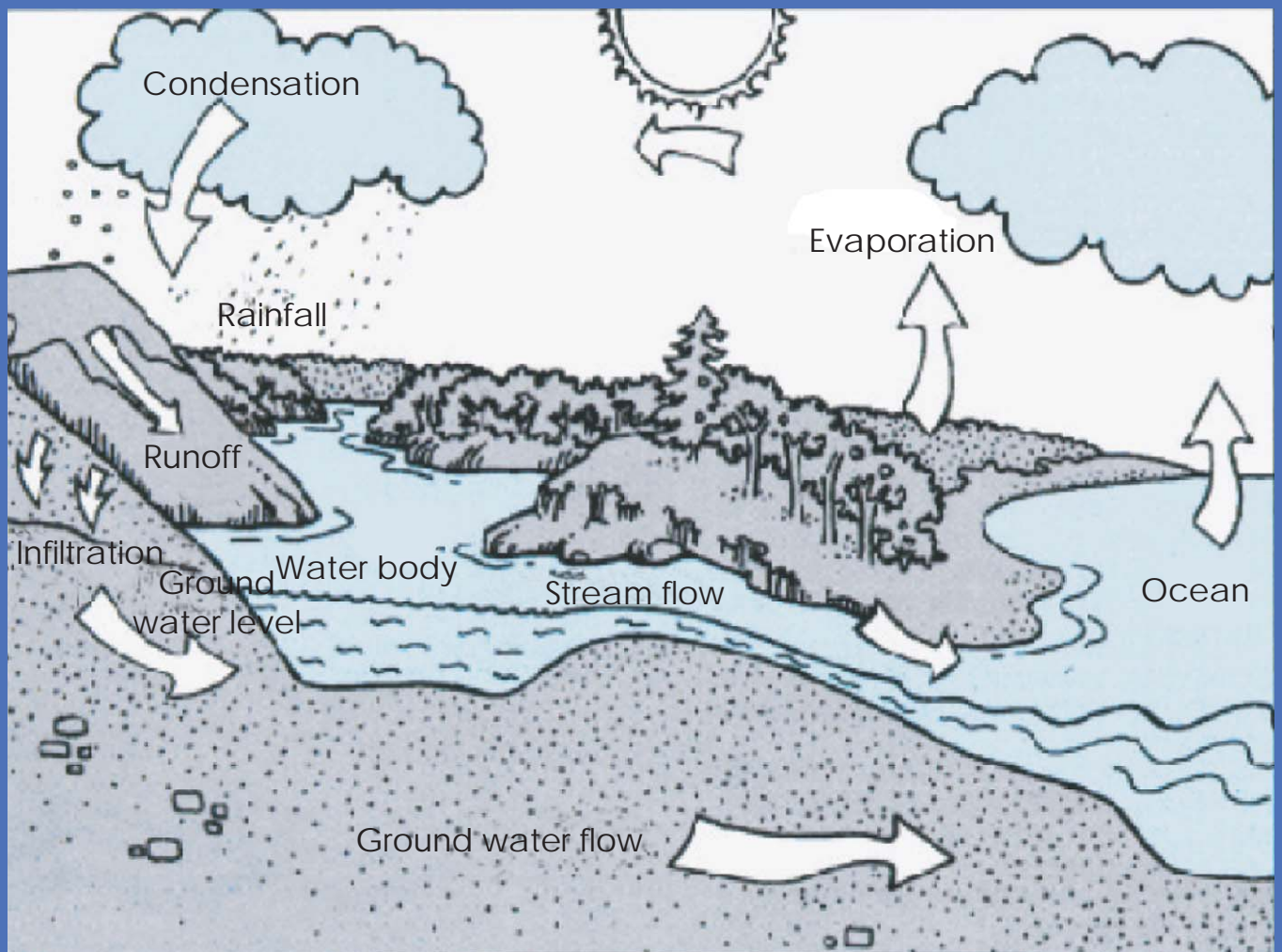


# Water Resources of Bangladesh

## Rivers

Bangladesh is located in the floodplain of three of the largest rivers of Asia. These rivers flow through Bangladesh to the Bay of Bengal. They carry a large mass of water from vast areas of land to the Bay of Bengal. Besides these, about 350 large and small rivers are scattered all over the country with numerous distributaries and tributaries. There are also numerous canals and ditches.

## Water Cycle



# Surface water resources

Rivers, canals and local rainfall are the sources of surface water in Bangladesh. The average annual rainfall is 2300 mm which is a volume of 276 million acre-ft. Rivers carry about 818 million acre-ft water. This means about 1094 million acre-ft or 1350 billion m<sup>3</sup> water flows through Bangladesh in an average year. River water mainly originates from rainfall in India, Bhutan and Nepal or from snow-melting in the Himalayas. This huge quantity of water is essential to maintain the people, ecology, biodiversity, transportation, industries and agriculture of the country. To sustain navigability of the rivers and the characteristics of the brackish water in the coastal zone, flow of water is essential. In fact, the production system, livelihood and heritage have developed based on the flow-system in this country.

Rivers, beels, haors, canals, coastal ponds and water bodies contain large amounts of resources. Some of the data regarding the water resources of Bangladesh are listed below:

Table 1 : Open Water Bodies

Open Water Bodies	Area (hectare)
Rivers, coastal areas	1,032,000
Beels, haors	114,000
Kaptai lake	68,000
Floodplain	2,833,000
Total	4,047,000

Table 2 : Closed Water Bodies

Closed Water Bodies	Area (hectare)
Ponds	215,000
Baors	5,000
Coastal low-land	141,000
Total	351,000

# Groundwater



Because of its land formation and huge surface water resource, the country is rich in groundwater resources as well. Water resources extend from a depth of only few meters to 2500 meters in three main layers. Every year, huge volume of ground water is withdrawn for agricultural, domestic and industrial purposes which gets recharged by surface water.

# Coastal water resources

Hundreds of rivers, including the large ones, carry large volumes of water into the Bay of Bengal. Coastal wetlands consist of the areas where freshwater meets the saline water. These areas are very important in terms of their high biological productivities and aquatic resources. People's living standards, lives and livelihoods are highly dependent on the productivity of these wetlands, which in turn depends on the upstream flow. However, years of low-flow have led to higher saline intrusion that interrupts the productivity of the area.

Coastal embankments are highly vulnerable due to the lack of proper maintenance. Heights of most of the embankment are not sufficient to confront a disaster; in fact, in many places, they are causing serious congestion.



# Changes in water resources due to the climate change

Climate change will have serious impact on water resources, including:

1. Irregular rainfall, excessive rainfall, no rainfall and untimely rain
2. Snow melting water from the Himalayas
3. Increased evaporation
4. Droughts
5. Sea-level rise
6. Increasing water temperature



These changes interrupt the existing water cycle resulting in situations as below:

1. Massive floods and flashfloods making more areas vulnerable
2. Increased congestion
3. Decreased navigability
4. Increased droughts (mainly the drought prone areas)
5. Due to the snow-melting, water flows in the rivers will decrease in the dry season
6. The whole seasonal cycle will collapse
7. Natural calamities will be more frequent
8. Saline intrusion will advance inland further

# Socio-economic Impacts



Changing natural conditions and the resulting increase in natural calamities will severely interrupt peoples live and livelihoods. The lives of this dense and poverty-stricken population, highly dependent on ecological resources, will be at risk; nature will become imbalanced. Impacts include :

1. Loss of lives
2. Crop-loss
3. Loss of property
4. Damaged health-infrastructure
5. Decreased cultivable land and interrupted agriculture
6. Loss of biodiversity
7. Fisheries hampered (open and culture fisheries)
8. Adverse impact on livestock
9. Increased drainage congestion
10. High intensity rainfall disrupting city-life

## What to be done?

The climate-dependent ecology and the livelihood of the people will be disrupted by climate change which will be beyond the limit of the natural adaptation capability of man and nature. An understanding of the changing conditions and the taking of measures accordingly is needed urgently.





## Measures to be taken

1. Undertaking water resource management policies and planning to adapt to the changing climate
2. Campaigning to raise mass awareness among people, professionals and policy-makers about the possible changes
3. Dredging rivers or connectors to prevent drainage congestion
4. Renovating urban drainage facilities
5. Establishing disaster alert systems
6. Collecting and conserving rainwater
7. Re-using water
8. Maintaining, reforming and increasing the height of coastal embankments where necessary
9. Undertaking integrated management of water in the coastal region
10. Using water more economically





11. The following techniques can be used :
  - a. Short-term, profitable crops can be grown before the floods arrive
  - b. Crop diversification
  - c. Cropping practices should be adjusted to the shifting hydrological cycle; e.g. bayra
  - d. Growing crops suitable for drought areas e.g. drought-tolerant rice varieties and other crops
  - e. Growing salt-tolerant crops in the saline areas
12. Research into innovative technologies should be funded and strengthened to adapt to the changing hydrologic cycles
13. All the stakeholders, locals, disaster management committees at Union and Upazila level, government officials and NGOs should be incorporated into the process.



## Awareness Materials of Climate Change Cell, Department of Environment

### Booklets

1. Climate change and the vulnerability of Bangladesh
2. Climate change and water
3. Climate change and agriculture
4. Climate change and rice
5. Climate change and fisheries
6. Climate change and wetlands
7. Climate change and mangrove
8. Role of the local level to reduce the climate risk
9. Climate change and the role of local government
10. Role of government employees to climate change and disaster management

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### Fact sheets

1. Physiography of Bangladesh
2. Classification of lands in Bangladesh
3. Agro-ecological region of Bangladesh
4. Floods in Bangladesh
5. Drought in Bangladesh
6. Impact of global warming and climate change
7. Climate risks and vulnerable sectors
8. Climate change and sea level rise
9. Climate change and water
10. Climate change and public health
11. Climate change and agriculture
12. Climate change and women
13. Climate change and children
14. Climate change and food security
15. Climate change and poor
16. Climate change and development
17. Climate risk assessment and action plan development

