

Bdst 2 topic 4: Environmental Challenges

What is meant by the term severe drought

- absence of water / not enough water for a long period of time

What are the main causes of drought

- lack of rainfall / transpiration and evaporation > precipitation
- lack of surface water flow / India dams restrict flow
- excessive water extraction
- deforestation
- Global Warming / climate change

Effects of droughts

- crops fail
- famine/malnutrition/lack of food
- lack of fodder
- livestock die
- loss of income/livelihood
- price of food rises/high prices
- scarcity of drinking water
- arsenicosis (deeper wells for groundwater)
- irrigation less effective

Droughts cause problems for rural areas of Bangladesh

- crops fail
- famine / malnutrition / lack of food
- lack of fodder
- livestock die
- loss of income / livelihood
- price of food rises / high prices
- scarcity of drinking water
- arsenicosis (deeper wells for groundwater) irrigation less effective

Explain why the floods were so severe two weeks after the week of heavy rain

- lag time after rains
- ground saturated
- water unable to drain away
- many rivers overflow their banks
- above average rainfall
- intense rainfall in one week
- could also be snow melt/increased flow of water from Himalayas
- embankments collapse
- increased sedimentation of/deposition in rivers – hold less water

Explain how floods affect the people and the economy of Bangladesh

People:

- loss of homes/property/homeless
- loss of land/fertile soil/river bank erosion
- death/illness/disease
- loss of food/crops/livestock
- loss of income
- cannot (travel to) work
- lack of clean water

Economy:

- transport links disrupted – affects trade/products to market
- factories stop work – flooded
- loss of labour/sick so cannot work
- extra money needed to repair infrastructure
- agriculture affected by loss of income/exports farmers' loss of income
- food shortage – need to import
- increased food prices
- cost of health care because of waterborne diseases

Describe the effects of such floods on the lives of the people.

- loss of life
- houses destroyed/homeless crops destroyed
- livestock killed

- poverty/famine
- loss of jobs
- lack of clean water/contamination
- disease - cholera, etc
- communications disrupted
- difficult for aid to be distributed

Apart from the monsoon rains, name two other natural causes of floods in Bangladesh.

- flash floods
- storm surges
- tidal floods
- melting snow from Himalayas
- tsunami
- Deforestation

Factors causing floods

- Cyclones, drive up water level, storm surge
- Low-lying land, water overflows easily
- Melt water from the Himalayas, increased run off
- Heavy / monsoon rains, rain reaches channel quickly
- Increasing urban areas, less interception

Explain how coastal floods are caused

- cyclones/tropical storms
- storm surges
- strong/fast winds
- coincide with high tides
- raise waves to great heights
- wall of water sweeps over land
- funnels through Bay of Bengal
- water shallower towards coast
- tsunami
- high temperatures – water expands

What can people and organisations do to limit the damage caused by coastal floods?

- evacuation
- warning system
- education/awareness re. cyclone risk
- cyclone shelters
- plant mangroves
- earth embankments/flood bank/barrages/sluice gates
- raise buildings
- supply of clean water to prevent disease
- medical teams/mobile hospitals

Use of flood aids and purification tablets in the short term

- Short-term needs must be met to save lives
- People need clean water to survive
- People need food to survive
- Flooding leads to waterborne diseases
- Emergency relief is needed immediately

Long term plans to combat floods

- Investment in longer term plans would reduce frequent spending on short-term measures.
- Building dams would mean the flow could be controlled, so prevent flooding.
- More flood warnings would enable evacuation and prevent loss of life

Short-term vs. long-term gain

- Bangladesh does not have much money to spend on flood defences / dams
- Most people in Bangladesh do not earn enough to pay for insurance against flooding, so when there are floods, they risk losing everything
- Dams take a long time to build
- Flood warnings are not always successful and do not always help enough people
- In 2007, flooding made 9 million people homeless and approximately 1000 people died from drowning and from waterborne diseases

Short-term responses:

- Food aid from the Government and other countries
- Water purification tablets

- People repaired embankments and helped to rescue people
- Free seed given to farmers

Long-term responses:

- Building embankments
- Building raised flood shelters Introducing flood warning systems
- Emergency planning
- Dams planned
- Reducing deforestation

Describe possible flood control measures.

- Flood Action Plan dredging embankments barrages
- sluice gates
- drainage systems
- land management
- afforestation/re-afforestation
- plant flood resistant crops
- Allow elaboration

In your opinion, how effective are the measures mentioned in (c) (i) in reducing the devastating effects of floods

- Allow both negative and positive points on the effectiveness of the measures to control floods
- Allow elaboration – how the measures work, e.g.
- embankments allow river to hold more water

Controlling the flooding of rivers in Bangladesh is almost impossible

- many rivers flow through Bangladesh
- heavy rain, particularly monsoons
- expensive/lack of funding
- no control over upper reaches of rivers
- deforestation in Himalayas
- high cost of flood prevention measures

It is impossible to stop all river flooding in Bangladesh

- Many rivers flow through Bangladesh
- Heavy rain / monsoons / flash floods / exacerbated by climate change Lack of funding
- No control over upper reaches of rivers / head waters in India
- Deforestation in Himalayas
- High cost of flood prevention measures
- Majority of land is floodplain / delta / low-lying
- Variation in flow
- River shifting

How rivers can be controlled

- agreements with India/Nepal
- embankments/sluice gates/flood barriers barrages built/strengthened
- dredge/deepen river channels
- afforestation, reforestation

Methods used to reduce river flooding

- Agreements with India /Nepal
- Embankments / sluice gates / flood barriers / dams / barrages built or strengthened
- Dredge / deepen river channels
- Afforestation / reforestation

Flooding causes many problems for the country

- loss of life
- loss of land or crops and animals
- spread of disease
- stops communications
- economy damaged by costs of repairing damage and or breaks in communications etc

Flooding brings many benefits to the country

- silt deposited with flooding
- makes land very fertile
- allows intensive cultivation
- without floods the country couldn't feed itself
- crops grow well under waterlogged land

How can the state help to protect its farmers from the effects of cyclones

- Prediction / monitoring
- Better warning system
- Evacuation
- Cyclone shelters
- Sluice gates / barrages / dams
- Better drainage systems / flood protection measures
- Construction of stronger housing
- Planting trees along coast / shelter belts
- Encourage flood resistant crops

Why is deforestation taking place in Bangladesh

- Wood for domestic use or e.g. fuel / cooking Timber or e.g. making furniture / house construction
- Land for:
- Houses / settlements Agriculture
- Shrimp culture Industries / factories Roads
- Mining

Why are the forested areas decreasing

- population increase - land required for agriculture homes
- industry jhum/shifting cultivation
- increased shrimp culture
- increased salinity - Farraka Barrage - Sundarbans illegal/irresponsible logging

Explain why Bangladesh is losing its forests

- timber
- building
- housing
- paper
- rising sea levels
- shrimp farming
- population pressure leads to people cutting trees to create more space for farming

- flooding can expose roots and cause loss of trees
- firewood is a major source of energy for many in rural areas
- illegal logging or destruction by tribal groups in the Chittagong Hill Tracts.

Describe the problems that can be caused by deforestation

- soil erosion
- leaching
- desertification or drought
- loss of species
- release of carbon or reference to global warming
- worsen effects of cyclones
- lowering of water table
- decreased evapotranspiration
- flooding linked to soil erosion

Explain how deforestation causes flooding

- Deforestation reduces interception
- Less vegetation to take up water
- Less transpiration
- Fewer roots to stabilise soil
- Less infiltration
- Increased overland flow / surface run off
- Soil erodes into channel
- Channel becomes shallower / sedimentation

Describe the challenges created by deforestation for

farming:

- Increased run-off
- Increased wind erosion / soil erosion
- Less rainfall / drier climate reduces crop production

climate:

- Increase in CO₂
- Global warming / increase temperature
- Reduced rainfall / less transpiration / increase drought / decrease humidity

urban areas:

- More air pollution / haze
- breathing problems
- Animals losing habitat moving into urban areas etc.

Choose some measures taken to slow down the decrease in forested land. Discuss how effective you think they have been

- No marks for the measures - look for the effectiveness of such measures.
- afforestation
- re- afforestation
- strip plantations - along roads, railways, canals,etc
- rehabilitation of tribal groups in Chittagong Hill Tracts
- education/awareness
- Department of Forest
- Allow description of how the measures work but look for their effectiveness. E.g. 'cut one plant two' means more trees.

Effects of agriculture on the environment

- Creating more land for agriculture leads to deforestation
- Over-irrigation contributes to arsenic contamination
- Excessive amounts of chemical fertilizers are creating environmental and health hazards

Effect of agriculture on the mangrove forests

- deforestation / land cleared for farming
- pesticide use
- fertiliser use

Name two 'greenhouse gases'.

- Methane, Carbon Dioxide, Nitrous Oxide

Name the two main greenhouse gases

- methane
- carbon dioxide

Explain how human activities cause the increased production of these gases

- burning fossil fuels/gas/coal/oil
- for industry/heating/cooking
- transport use – cars/planes
- deforestation
- agriculture – livestock and methane gas
- paddy fields and decomposition

Explain how greenhouse gases contribute to global warming

- SW radiation / light / heat from sun
- Passes through atmosphere
- Sun's rays absorbed by earth / heat earth
- LW radiation from earth
- Earth heats atmosphere
- Greenhouse gases added to atmosphere
- Greenhouse gases 'trap' heat / prevent heat escaping / LW radiation trapped
- So, atmosphere warms

Explain how the greenhouse effect causes global warming

- Credit will be given for use of a relevant diagram.
- sun's rays heat earth's surface
- long wave radiation passes through gases in atmosphere heat radiated back from earth (in short waves)
- this radiation cannot pass through carbon/greenhouse gases heat is trapped
- earth becomes warmer

Explain how greenhouse gases contribute to global warming

- Sun's rays heat earth
- earth heats atmosphere
- greenhouse gases added to atmosphere
- greenhouse gases 'trap' heat
- prevent it from escaping so atmosphere warms
- Do not credit references to CFCs and their role in damaging ozone layer

Why is the temperature predicted to rise faster between 2000 and 2050 than it did between 1950 and 2000?

- More countries become industrialised
- more traffic or air flights etc
- development means using more energy which could mean more CO₂
- Ice melts revealing plants beneath which give off CO₂
- likewise if permafrost melts.
- No credit for 'growing population' unless it is developed.

In what way does global warming affect sea level

- melting of ice caps and glaciers
- (more) water carried by rivers
- more water discharged into ocean
- water expands as it warms up

Explain the ways that Bangladesh is at risk from global warming

Temperature rise:

- polar and Himalayan ice caps to melt
- rise in sea level
- + effects

Rising sea level:

- low lying delta regions submerged
- + effects of flooding

Increase in sea temperature:

- aids in the formation of cyclones
- + effects of cyclones

Changing pattern of rainfall:

- more rain – flooding of farmland / removes soil fertility
- less rain – more drought – lower yields
- leads to food shortages / increased famine, malnutrition

Effects such as:

- loss of homes
- greater pressure on land / living space injury / death
- diseases like malaria and cholera
- less land for crops / damages crops lower harvests
- increase in pests
- more saline soil
- loss of income (from fishing / farming) etc.

Effects of global warming on Bangladesh

- rising sea level
- increased frequency of cyclones
- due to water in Bay of Bengal being warmer increased droughts
- due to unpredictability of rainfall
- migration of people to areas less prone to flooding increase temperature

How may Bangladesh be affected by global warming?

- Sea level rises
- flooding of coastal areas
- seas will be warmer
- typhoon season will last longer
- more flooding inland due to higher rainfall
- damage to crops, animals and people
- food supply problems due to floods or drought as climate changes
- many other possible changes

How to cope with Global Warming

- raised buildings 0.5 m above flood level
- buildings not swept away in floods
- raised gardens and orchards
- continue to grow food during floods
- solar panel provides (free) electricity reducing greenhouse gases without contributing carbon to atmosphere
- health clinic to overcome problems of disease/flood
- raised tubewells to keep water clean

Global warming has nothing to do with Bangladesh and therefore the country should not do anything

- Most greenhouse gases are from developed countries
- little from Bangladesh
- no major use of fossil fuels in BD
- very expensive to try and stop flooding.

Bangladesh must have a plan to deal with global warming

- Bangladesh will be badly affected even if doesn't contribute
- could re-afforest more land to help slow down flooding
- as country develops it would produce more greenhouse gases
- needs to work with other countries to limit gases and or their impact
- Credit mention of the many things that could be done e.g. using renewable energy

It is up to governments to reduce greenhouse gas emissions in order to stop global warming

- Governments have the resources, legal powers, international relations to effect change.
- It is an international problem that requires international / national strategies.
- Examples of how Governments can reduce greenhouse gas emissions include:
 - Reforestation
 - International treaties
 - Renewable energy

Thinking globally but acting locally would enable Bangladesh to cope with global warming

- people can do things for themselves/local projects or example
- floating gardens enable crops to survive floods
- solar energy reduces carbon emissions
- other examples of reducing production of carbon gases e.g. bio digesters world/global problem
- developed countries responsible

It is up to all of us to stop global warming

- Global warming affects people at local, national and international level.
- It is individuals' responsibility to effect change.
- Every little helps. Lots of small actions can have a big result.
- Grass roots action is more effective. Bottom up versus top down approach.
- Accept any appropriate examples of the 5 R's to reduce our carbon footprint:
- Refuse Reduce Reuse Recycle Repurpose
- Don't cut down trees / deforestation
- Don't fly
- Stop open burning / burning rubbish
- Switch to green power
- Walk / bike / use public transport Car pool
- Fuel efficient / electric car
- Plant trees
- Eat less meat
- Use a cloth bag
- Have only two children
- Use recycled paper
- Buy fresh not frozen food
- Buy local food
- Energy efficient light bulbs / appliances
- Solar water heater
- Turn off appliances

A major investment is needed if Bangladesh is to cope with global warming

- local action cannot deal with major projects/need for funding of even local changes e.g. infrastructure, flood warnings, cyclone shelters
- afforestation
- putting pressure on other countries to reduce carbon emissions
- building vehicles that do not use fossil fuels/reduce emissions
- national campaigns to support people trying to take local action

Climate change is causing heavier and more erratic rainfall

- increasing frequency of tropical storms
- heavier monsoons
- late arrival of rains
- more floods

- changing temperatures cause rainfall patterns to alter/become erratic
- increased heating – increased evaporation – increased rainfall

Climate change is causing less rainfall

- increasing drought/water shortage
- changing temperatures cause rainfall patterns to alter
- higher temperatures reduce condensation – less rainfall

Explain the effect climate change will have on agriculture and the food supply of Bangladesh

- rising sea level – flood agricultural lowlands – less land for crops/damage crops
- greater pressure on land/living space
- more saline soil
- higher temperatures – lower harvests in cereals
- more rain – flooding of farm land/remove soil fertility
- less rain/drought – lower yields
- increase in cyclones + effect(s)
- increase in pests – affect crops
- lead to food shortages/increase famine, malnutrition

Effects of climate change on the mangrove forests

- increase temperature / Global Warming
- more cyclones
- rising sea levels
- 2–3m by 2050
- Sundarbans submerged

Bangladesh is not a major contributor to climate change

- not a major industrial power/mainly MEDC
- low per capita output of greenhouse gases
- not a major oil producer
- agricultural country

Bangladesh will be one of the countries worst affected by climate change

- low lying country – easily affected by rising sea levels
- many people homeless/have to move
- high/dense population
- dependent on agriculture
- changing climate patterns – more cyclones/heavy rain/drought

Environmental laws are the only way to control pollution

- Sustainable approach alters behaviour
- Ensures people understand consequences
- Leads to correct use of fertilisers / pesticides
- Ensures correct use of existing waste disposal facilities

Education and monitoring are the only sustainable ways to control pollution

- Sustainable approach alters behaviour
- Ensures people understand consequences
- Leads to correct use of fertilisers / pesticides
- Ensures correct use of existing waste disposal facilities

Explain how the government is trying to reduce air pollution in Bangladesh

- air monitoring stations
- phasing out of 2-stroke rickshaws/introduce 4-stroke
- clean air project funded by World Bank
- clean and energy efficient brick kiln technology – zig-zag kilns
- improved safe pedestrian mobility – footpath construction – to reduce car use
- bus rapid transit route completed
- strengthen environmental legislation/fines for industries breaking pollution rules
- ban burning (manure in open)
- purification units on factory chimneys
- encourage catalytic converters on vehicles
- ban leaded petrol/encourage unleaded petrol
- afforestation

Continuing to control air quality remains the main priority for Bangladesh

- Air pollution causes health problems
- Vehicles throughout the country contribute to air pollution, especially two- stroke engines
- The use of leaded petrol has led to a huge amount of lead building up in the streets. Dhaka has a very high concentration of lead, about 463 nanograms per cubic metre of air. Affects brain development in children
- Increase of acid rain
- Could look at problems caused by air pollution, e.g. asthma, lung disease, etc.

What effects can water pollution have on people and the environment

- unclean drinking water/dirty
- water no use in home water borne diseases
- bad odours/air pollution
- poor quality water for irrigation
- blocks irrigation canals
- insects/pests attracted – attack crops
- block waterways and hinder boats
- unhealthy to travel by river/canal
- kills fish/aquatic life

Describe how the problem of water can be remedied

- pollution could be reduced
- laws/regulations/rules
- to be enforced
- no corruption
- water treatment/purification facilities sand filters
- fines/punishments
- sewage plants
- sanitation facilities for every home limit use of fertilisers education/awareness

Providing clean water for everybody remains the main priority for Bangladesh

- Polluted water causes health problems
- Surface water is polluted by household and industrial waste, as well as by chemicals used in agriculture

- When acid rain falls, it pollutes the water bodies
- Arsenic contamination is thought to be one of the largest sources of water pollution in Bangladesh
- Water pollution leads to many health problems such as diarrhoea and arsenicosis

Explain how groundwater becomes polluted with arsenic

- withdrawal from tubewells for irrigation lowered water level
- oxygen moves into space
- reacts with arsenic in rocks
- enter water system

What effects does arsenic pollution have on the people who drink the water

- arsenicosis
- dark/white patches
- hard patches on skin
- cancer of liver/kidneys
- death/fatal

What can be done to reduce the effects of arsenic pollution

- Arsenic removal plants in cities
- store rain water for use
- develop deep ground wells below 150M or below level of arsenic
- or shallow wells above the arsenic rocks
- treat surface water
- provide households with filters
- install sand filters for ponds.

Explain how the development of power stations can cause pollution

air pollution:

- from burning fossil fuels e.g. coal
- harmful gases / greenhouse gases emitted into the atmosphere
- e.g. CO₂ / SO₂ / NO_x / named gas
- cause acid rain

noise pollution:

- from construction / transport of fuel
- from machines

water pollution:

- from hot water / waste

land pollution:

- from ugly buildings / solid waste