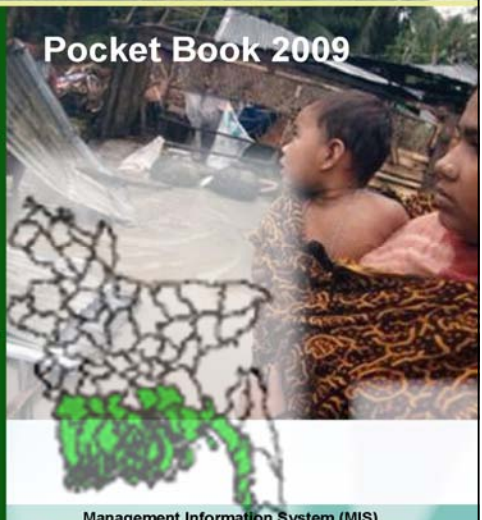
Government of the People's Republic of Bangladesh
Ministry of Health & Family Welfare

Global Climate Change

# Health Impacts on Bangladesh

## Pocket Book 2009




**Management Information System (MIS)**
**Directorate General of Health Services (DGHS)**
Mohakhali, Dhaka-1212
Tel: 8816459
Email: info@dghs.gov.bd
Web: www.dghs.gov.bd

## Credits

**Idea:** Professor A F M Ruhal Haque, MP, Honorable Minister for Health & Family Welfare, Government of the People's Republic of Bangladesh

**Script & Design:** Professor Dr Abul Kalam Azad, Director, Management Information System, DGHS, Mohakhali, Dhaka
Dr Md Mizanur Rahman, Associate Professor, Biostatistics, NIPSOM

**Cover design:** Md. Nezam Uddin Biswas, GIS Consultant, MIS, Mohakhali, Dhaka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Professor Dr Syed Modasser Ali, Honorable Adviser to Prime Minister for Health, Family Planning & Social Welfare
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# Introduction

December 7-18, 2009. The world observes the largest ever congregation on climate change called the **COP15** (Conference of the Parties– 15th event) in Copenhagen, Denmark. COPs are held to discuss progress of the **UNFCCC—United Nations Framework Convention on Climate Change.** It is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the **Earth Summit**, held in **Rio de Janeiro from 3 to 14 June 1992**. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system.

The treaty is considered legally non-binding. Instead, the treaty provides for updates (called "protocols") that would set mandatory emission limits. The principal update is the **Kyoto Protocol**, which has become much better known than the UNFCCC itself.

The UNFCCC was opened for signature on May 9, 1992. It entered into force on March 21, 1994. As of now (December 2009), 193 countries ratified the UNFCCC. These countries are

called parties.

The parties to the convention met annually from 1995 in **Conferences of the Parties (COP)** to assess progress in dealing with climate change. In 1997, the **Kyoto Protocol** was concluded and established legally binding obligations for developed countries to reduce their greenhouse gas emissions.

## UNFCCC classified the countries as:

1. Annex I countries: industrialized countries and economies in transition, which promised to reduce greenhouse gas emissions to below 1990 reference levels. They may do this by allocating reduced annual allowances to the major operators within their borders. These operators can only exceed their allocations if they buy emission allowances, or offset their excesses through a mechanism that is agreed by all the parties to UNFCCC.
2. Annex II countries: developed countries which pay for costs of developing countries. These countries are virtually a subgroup of Annex I countries and comprised of OECD members excluding those in economies in transition in 1992.
3. Developing countries. Not required to reduce emission levels unless developed countries supply enough funding and technology. These countries may volunteer to become Annex I countries when they are sufficiently developed.

## Immediate benefits of country grouping in UNFCCC

1. It avoids restrictions on their development, because emissions are strongly linked to industrial capacity;
2. They can sell emissions credits to nations whose operators have difficulty meeting their emissions targets; and
3. They get money and technologies for low-carbon investments from Annex II countries.

Some opponents of the Convention argue that the split between Annex I and developing countries is unfair, and that both developing countries and developed countries need to reduce their emissions unilaterally. Some countries claim that their costs of following the Convention requirements will stress their economy.

## How is UNFCCC organized?

- **A UN-financed Secretariat** in Bonn in Germany.
- The **Conference of the Parties (COP):** topmost agency of UNFCCC. Every member country has representatives at the annual COP conferences, which typically last about 14 days.
- The **Bureau:** agency responsible for arranging the annual COP-conferences and other meetings.
- The **Subsidiary Body for Scientific and Technological Advice (SBSTA):** advises COP on scientific and technical questions.
- The **Subsidiary Body for Implementation (SBI):** facilitates implementation of decisions made during the UNFCCC cooperation.
- **Expert groups:** work for particular aspects of the convention.
- The **Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP or COP/ MOP)**.
- **Clean Development Mechanism (CDM) Executive Board**: An agency under Kyoto Protocol that monitors Clean Development Mechanism projects, which are a part of the flexible mechanisms under the Kyoto Protocol.
- The **Joint Implementation Supervisory Committee (JISC) and** The **Compliance Committee:** agencies under the Kyoto Protocol that monitor the extent to which the countries are meeting their obligations in the protocol.

## COPs: When and Where?

COP stands for Conference of the Parties. The countries which have signed the UNFCCC are the parties of COP. The December 2009 COP in Copenhagen is the 15th COP and so named as COP15. Following list shows year and venue of different COPs:

1995 - COP 1: Spring. Berlin, Germany. Known for The Berlin Mandate.
1996 - COP 2: July. Geneva, Switzerland.
1997 - COP 3: December. Kyoto, Japan. Known for The Kyoto Protocol on Climate Change.
1998 - COP 4: November. Buenos Aires, Argentina.
1999 - COP 5: Oct-Nov. Bonn, Germany.
2000 - COP 6: November. The Hague, Netherlands.
2001 - COP 6: July. bis, Bonn, Germany.
2001 - COP 7: Oct-Nov. Marrakech, Morocco.
2002 - COP 8: Oct-Nov. New Delhi, India.
2003 - COP 9: December. Milan, Italy.
2004 - COP 10: December. Buenos Aires, Argentina.
2005 - COP 11: Nov-Dec. Montreal, Canada.
2006 - COP 12: November. Nairobi, Kenya.
2007 - COP 13: December. Bali, Indonesia.
2008 - COP 14: December. Poznań, Poland.
2009 - COP 15: December. Copenhagen, Denmark.

## Copenhagen 2009

# GLOBAL CLIMATE RISK INDEX 2009 by GERMANWATCH hits the Copenhagen Conference

GlobalWatch is a German organization, which works for monitoring the global climate change impacts and countries' responses. It has published a report on the vulnerable countries most affected by global warming. The report drew attention of the attendees of the Copenhagen 2009 Climate Conference.

**The report shows that Bangladesh has the worst effect of global climate change. However, Bangladesh has also the outstanding climate change mitigation responses.**

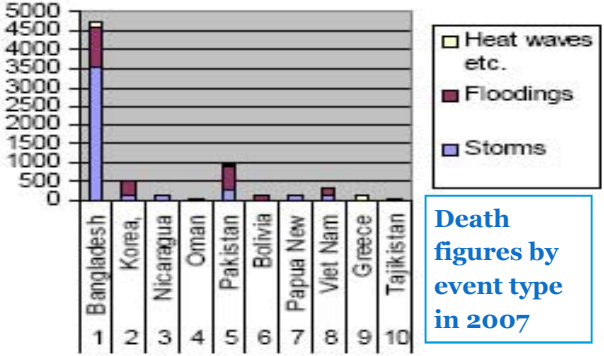
| Global Climate Risk Ranking 2007 | |
|---|---|
| 1 | Bangladesh |
| 2 | Korea, DPR |
| 3 | Nicaragua |
| 4 | Oman |
| 5 | Pakistan |
| 6 | Bolivia |
| 7 | Papua New Guinea |
| 8 | Vietnam |
| 9 | Greece |
| 10 | Tajikistan |

**No. of deaths occurred due to extreme weather events in 10 most vulnerable countries in 2007**

| Country | No. of deaths |
|---|---|
| Bangladesh | 4729 |
| Korea, DPR | 554 |
| Nicaragua | 111 |
| Oman | 49 |
| Pakistan | 928 |
| Bolivia | 131 |
| Papua New Ginea | 172 |
| Vietnam | 346 |
| Greece | 99 |
| Tajikistan | 34 |

| Country | Deaths/100,000 inhabitants |
|---|---|
| Bangladesh | 2.98 |
| Pakistan | 2.72 |
| Korea, DPR | 2.33 |
| Vietnam | 1.98 |
| Papua New Guinea | 1.89 |
| Bolivia | 1.38 |
| Nicaragua | 0.89 |
| Tajikistan | 0.57 |
| Greece | 0.50 |
| Oman | 0.40 |

| One year's economic loss due to climate change estimated on the basis of year 2007 events | |
|---|---|
| **Country** | **Absolute losses (million US$ PPP*)** |
| Bangladesh | 10774 |
| Papua New Guinea | 4269 |
| Tajikistan | 2539 |
| Oman | 1639 |
| Nicaragua | 1235 |
| Greece | 1235 |
| Bolivia | 646 |
| Korea, DPR | 623 |
| Vietnam | 509 |
| Pakistan | 135 |
| *PPP = Purchasing Power Parity | |

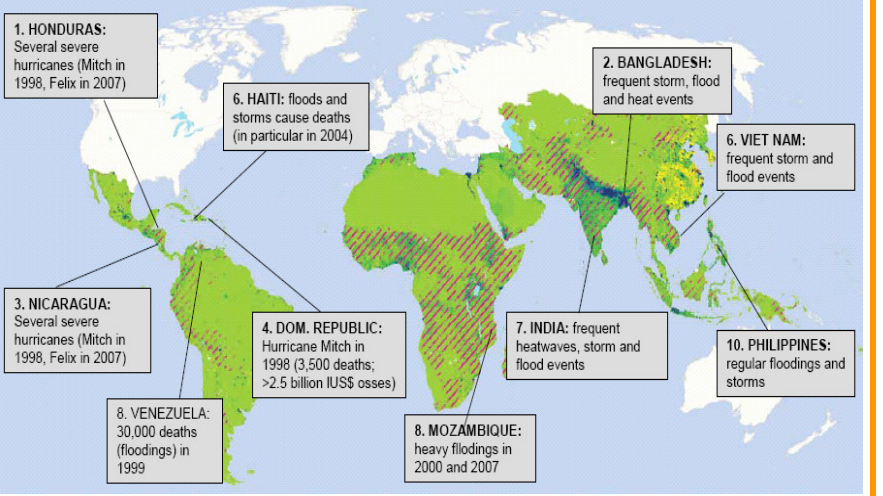


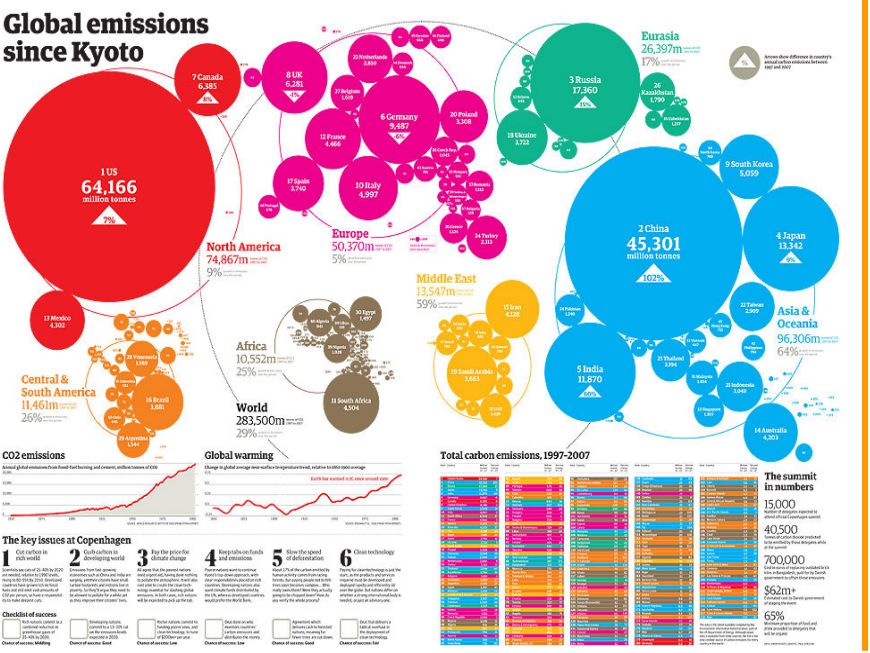

**Death figures by event type in 2007**

# Decadal Climate Risk Index and Results of Specific Indicators (1998-2007)

| CRI ('98-'07) | Country | Average deaths/yr | Average deaths/ 100,000 inhabitants | Average total loss (million US$ PPP) | Average GDP loss% |
|---|---|---|---|---|---|
| 1 | Honduras | 579 | 8.5 | 1166 | 5.15 |
| 2 | Bangladesh | 1093 | 0.7 | 4426 | 3.02 |
| 3 | Nicaragua | 308 | 5.7 | 528 | 4.3 |
| 4 | Dominican Republic | 414 | 5 | 503 | 0.98 |
| 5 | Haiti | 402 | 5.1 | 232 | 2.42 |
| 6 | Vietnam | 406 | 0.5 | 2152 | 1.47 |
| 7 | India | 4532 | 0.4 | 12047 | 0.62 |
| 8 | Mozambique | 121 | 0.6 | 228 | 1.98 |
| 9 | Venezuela | 3012 | 11.9 | 433 | 0.18 |
| 10 | Philippines | 472 | 0.6 | 698 | 0.33 |

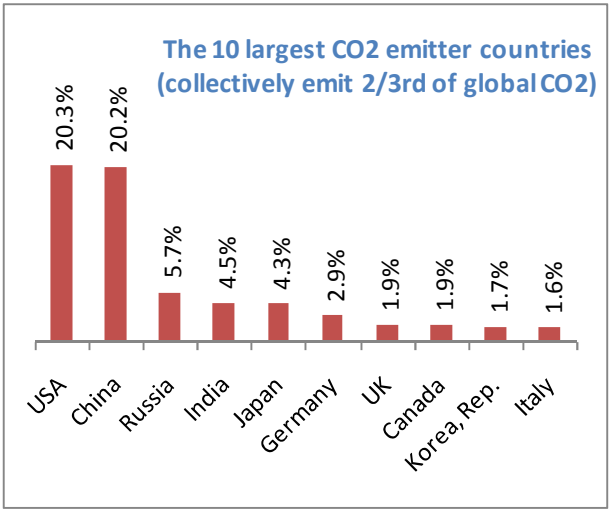
# World map of hazard hotspots and countries most affected from 1998-2007 according to the Climate Risk Index




Global emissions since Kyoto
1 US 64,166 million tonnes 7%
7 Canada 6,385
8 UK 6,281
6 Germany 9,487
10 Italy 4,997
17 Spain 3,740
12 France 4,466
20 Poland 3,308
North America 74,867m 9%
Europe 50,370m 5%
3 Russia 17,360
18 Ukraine 3,722
Eurasia 26,397m 17%
2 China 45,301 million tonnes 102%
5 India 11,870
4 Japan 13,342
9 South Korea 5,059
Asia & Oceania 96,306m 64%
Middle East 13,547m 59%
19 Saudi Arabia 3,663
Africa 10,552m 25%
11 South Africa 4,504
Central & South America 11,461m 26%
16 Brazil 3,881
World 283,500m 29%
CO2 emissions
Global warming
Total carbon emissions, 1997-2007
The key issues at Copenhagen
1 Cut carbon in rich world
2 Curb carbon in developing world
3 Put the price for climate change
4 Keep rules on funds and emissions
5 Slow the speed of deforestation
6 Clean technology
Checklist of success
The summit in numbers
15,000
40,500
700,000
$62tn+
65%

## Land area, population and population density of climate change vulnerable countries

| Country | Population | Area | Population density/sq. km. |
|---|---|---|---|
| Bangladesh | 162,221,000 | 143,998 | 1,126.55 |
| Maldives | 309,000 | 298 | 1,036.913 |
| South Korea | 48,456,369 | 99,538 | 486.813 |
| Haiti | 10,033,000 | 27,750 | 361.55 |
| India | 1,173,731,589 | 3,287,263 | 357.054 |
| Sri Lanka | 20,238,000 | 65,610 | 308.459 |
| Philippines | 92,226,600 | 300,076 | 307.344 |
| Vietnam | 85,789,573 | 331,689 | 258.645 |
| Pakistan | 168,186,000 | 803,940 | 209.202 |
| Dominican Republic | 10,090,000 | 48,671 | 207.31 |
| Greece | 11,260,402 | 131,957 | 85.334 |
| *Myanmar (Burma)* | 50,020,000 | 676,578 | 73.931 |
| Honduras | 7,466,000 | 112,492 | 66.369 |
| Tajikistan | 6,952,000 | 143,100 | 48.581 |
| Nicaragua | 5,743,000 | 130,000 | 44.177 |
| Venezuela | 28,583,554 | 916,445 | 31.19 |
| Mozambique | 22,894,000 | 801,590 | 28.561 |
| Papua New Guinea | 6,732,000 | 462,840 | 14.545 |




## Bangladesh hailed for outstanding Climate Change Mitigation Response

Bangladesh faces the most adverse impacts of climate change, such as rising sea levels, more intense cyclones, flooding and heat waves, which increasingly confront the country challenge for development progress. Yet, Bangladesh is recognized as an example for action on adaptation. Government, civil society

and international donors have undertaken a number of activities in the last 30 years. These include:

- *flood management schemes to raise agricultural productivity of many thousands of km of low-lying rural areas [...];*
- *coastal embankment projects, involving over 6,000 km of embankments and polder schemes, designed to raise agricultural productivity in coastal areas by preventing tidal flooding and incursion of saline water;*
- *over 2,000 cyclone shelters to provide refuges for communities from storm surges caused by tropical cyclones and 200 shelters from river floods;*
- *comprehensive disaster management projects, involving community-based programs and early warning systems for floods and cyclones.*

Initial investments necessary to implement the most urgent activities in response to different climate change threats of this 10-year-strategy amount to US$ 500 million in the first two years. Bangladesh is moving much faster and more comprehensively towards a long-term adaptation strategy than many other developing and developed countries around the world. The country takes action to address the threat of climate challenge for the sake of its own people, almost having no alternative, **although it has contributed almost nothing to the cause of climate change**. This is one of many examples of action taken by vulnerable countries that clearly deserves the support from the international community and the post-2012 climate change regime.

# Climate Change Impacts on Bangladesh

Bangladesh is facing and will have to face all the direct and indirect impacts of greenhouse effects . These are:

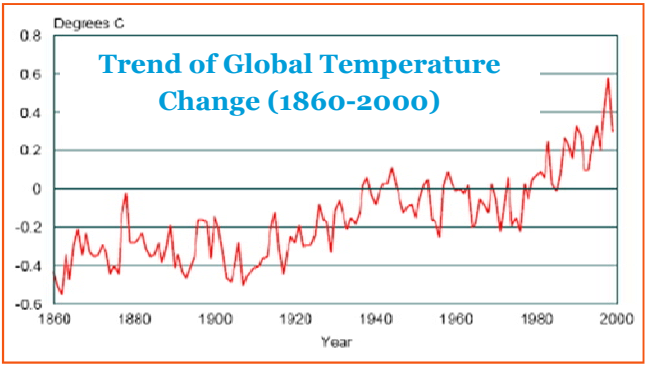
- Impacts of Global Warming
- Impacts of Sea Level Rise
- Impacts of Melting of Mountain Glaciers

## Bangladesh Faces the Impacts Faster

**The facts are here:**

- Temperature change is faster in high altitude countries.
- More environmental temperature causes more sea level change.
- Himalayan glaciers are shrinking more rapidly than anywhere else on the globe.

Being a high altitude country, Bangladesh suffers faster rise of climatic temperature with consequent sea level rise. Bangladesh being also in the Himalayan basin, is more vulnerable to glacier melting effects, such as, frequent flooding.




## Global Warming Impacts on Climate

- More extreme weather events: storms, cyclones
- Heat waves: more frequent, more intense, and longer

- Air pollution: increase in levels of ground ozone, more allergens
- Rapid glacier melting: landslides, flash floods, and reduced water availability
- Disturbed rainfall patterns: more droughts, more extreme precipitation events, floods, and disrupted water supply
- Warmer temperatures: warmer minima
- Sea-level rise: inundation, saltwater intrusion, loss of land, environmental refugees

## Climate Change Impacts on Health

- Injuries, disability, drowning
- Heat and cold stress
- Water and food-borne diseases
- Malnutrition
- Vector-borne diseases: Malaria, Dengue, Kala azar, Plague, Nipah, Swine flu, Bird flu, SARS, Chikungunya
- Psychological stress

Injuries, disabilities and drowning increase.

Vector-borne diseases increase.

# Health service needs more money to control climate related diseases

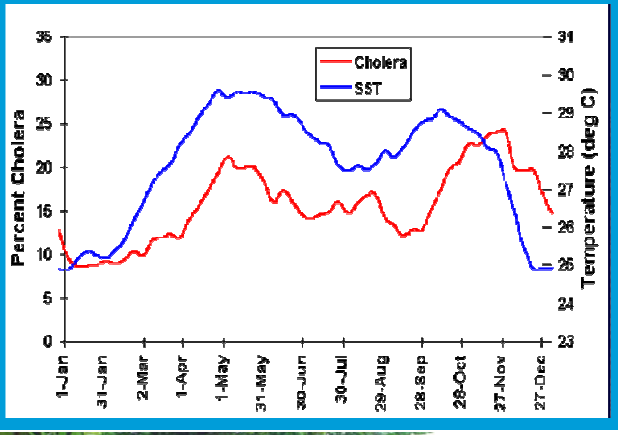
In Andhra Pradesh of India, heat waves with temperatures of up to 54°C, took a toll of at least 3,000 lives in 2003.

Greater use of fossil fuels increases ground ozone levels and allergens causing respiratory diseases like asthma.

Draught causes scarcity of food leading to malnutrition.

Water-borne diseases like diarrhoea, cholera, typhoid fever, gastroenteritis, dysentery, etc. increase.

## Scientists have shown that there is a link of temperature rise with rise of cholera rates

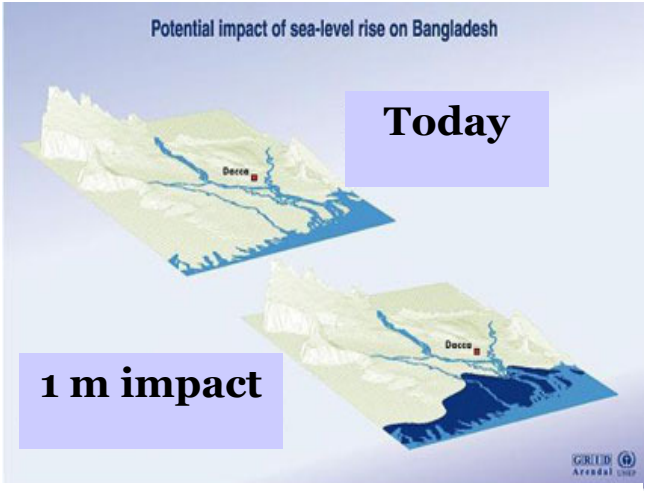



A child is seen to drive the banana tree boat to transport family and livestock during flood of Bangladesh.

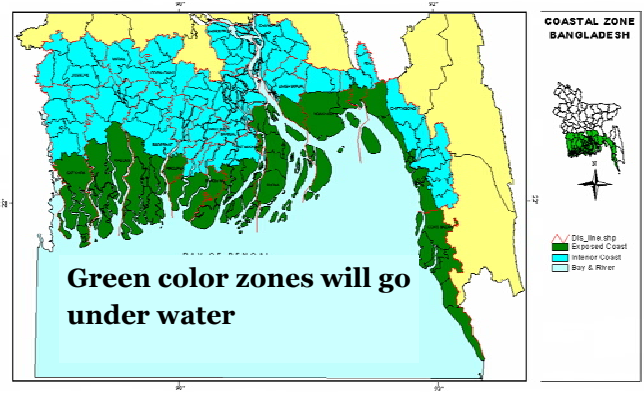
# Rise of Sea Level: Impacts on Bangladesh

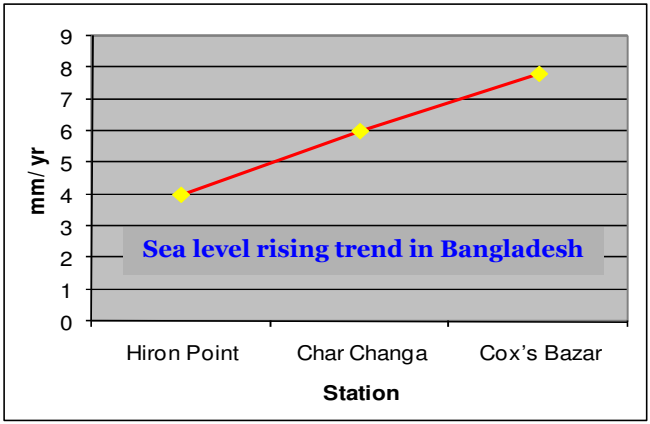
Bangladeshi children have imagined situation when a part of the country will go under water. They drew pictures in an art competition. One of the pictures is shown here, which rightly reflects the scenario.

Environmental experts shows conservative estimates of the consequence of sea level rise. They say that by 2020, there may be 10 centimeter rise of the sea level, which will cause 2% of the land area of Bangladesh to go under water along the coastal belt.




The northern part of the country, being high from the sea level, will not face the inundation problem in any near future. The environmental scientists estimate that by 2050, there will be 25 centimeter rise of sea level to inundate 4% of the land area. By 2100, 17% of the land area of the country will go under water through 1 m rise of sea level. The rise of sea level will have differential potential from zone to zone, more being at Cox's bazar than at Hiron point. A projection has been made based on the available data (please see table in page 25) on the number of


COASTAL ZONE
BANGLADESH
Dis_line.shp
Exposed Coast
Interior Coast
Bay & River
Green color zones will go under water


9
8
7
6
5
4
3
2
1
0
mm/ yr
Sea level rising trend in Bangladesh
Hiron Point
Char Changa
Cox's Bazar
Station

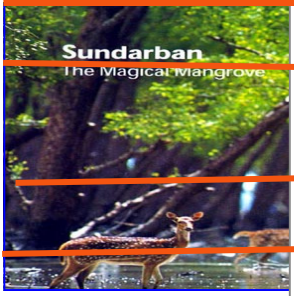
**Year-wise projection of climate change related affected population, affected land area, inhabitable land area and population density of Bangladesh**

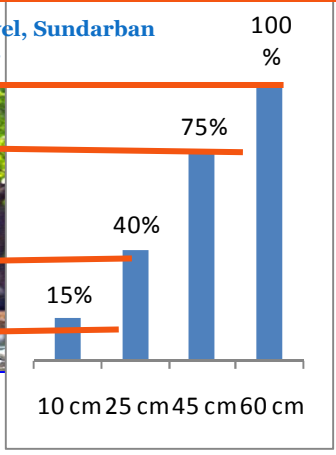
| Year | Cumulative population (million) | | Land area (sq. km.) | | | Pop density/ sq. km. | |
|---|---|---|---|---|---|---|---|
| | Total | Affected | Current | Affected | Inhabitable | Without inundation | If inundated |
| 2020 | 170.2 | 3.40 | 147,570 | 2951 | 144,619 | 1,153 | 1,177 |
| 2025 | 178.8 | 4.17 | | 3443 | 144,127 | 1,211 | 1,240 |
| 2030 | 187.2 | 4.99 | | 3935 | 143,635 | 1,268 | 1,303 |
| 2035 | 195.0 | 5.85 | | 4427 | 143,143 | 1,322 | 1,362 |
| 2040 | 201.9 | 6.73 | | 4919 | 142,651 | 1,368 | 1,415 |
| 2045 | 207.7 | 7.61 | | 5411 | 142,159 | 1,407 | 1,461 |
| 2050 | 212.5 | 8.50 | | 5903 | 141,667 | 1,440 | 1,500 |
| 2100 | 212.5 | 36.13 | | 25087 | 122,483 | 1,440 | 1,735 |

affected population, extent of affected area and population density of the inhabitable part of the country. The table shows that in the year 2100, only 122,483 square kilometers land area of Bangladesh out of current 147,570 square kilometers will remain inhabitable. Without inundation considering the usual population growth trend, population density would be about 1440 per square kilometer. But, inhabitable land area will be reduced, and 1735 people will have to be accommodated per square kilometer land area.

## Sundarban will be destroyed due to sea level rise

**For 1 meter rise of sea level, Sundarban will be destroyed for ever**



# Impacts on Sundarban

The chart in page 26 shows how much of Sundarban will go under water in relation to growing rise of sea level. For 10 cm of sea level rise, 15% of the forest will go under water; for 25 cm, 45 cm and 60 cm of sea level rise, 40%, 75%, and 100% respectively of the forest will go under water. For 1 meter rise of sea level, Sundarban will be destroyed for ever.

Will this small high land will be able to accommodate all?

# Economic loss of Bangladesh due to sea level rise

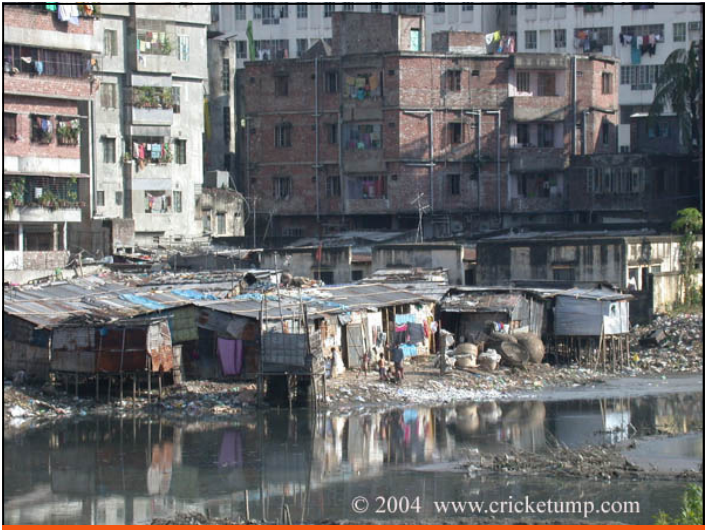
The current per capita income and annual growth rate of per capita income in Bangladesh (as of December 2009) are estimated at US$ 621 (BBS 2009) and US$ 62 respectively. Taking conservative estimate of constant growth rate of per capita annual income in all years until 2100, the per capita income of Bangladeshi people will be US$ 1241 in 2020, US$ 3101 in 2050 and US$ 6201 in 2100. The average per capita income from year 2020 to year 2100 will be US$ 3721. In page 25, year-wise number of affected population has been shown,

**Table-A. Total per capita income loss of affected people of Bangladesh due to sea level rise only**

| Year | Per capita annual income | Annual per capita income & affected people (Year 2020 to 2100) | Cumulative per capita income loss (Year 2020 to 2100) |
|---|---|---|---|
| 2020 | US$ 1241 | Average income: US$ 3721<br>Average number of affected people: 4.1 million | US$ 3540 billion (if 50% of the affected people remain unemployed) |
| 2050 | US$ 3101 | | |
| 2100 | US$ 6201 | | |

which stands at 3.4 million in year 2020 and at a cumulative figure of 36.13 million in year 2100. Average annual increment of affected people is 0.41 million. We estimated total per capita income loss year to year from 2020 to 2100, and this gives a

total per capita income loss of US$ 7080 billion if all people remain unemployed. We considered that 50% of the affected people will remain unemployed or will be living only on marginal amount of income. Therefore, country's total per capita income loss will be at least US$ 3540 billion (50% of US$ 7080 (Table-A).




Environmental refugees challenge city lives

# Adaptation costs for Health Impacts for Bangladesh

| Construction of new health facilities | Unit cost (USD) | For 1 mill pop | | For 36 mill pop |
|---|---|---|---|---|
| | | No. | Million USD | Total |
| **Construction** | | | | |
| 250-bed district hosp | 22,058,823.53 | 1 | 22.06 | 794.12 |
| 50-bed upazila hospital | 10,294,117.65 | 5 | 51.47 | 1,852.94 |
| HFWC | 2,205,882.35 | 50 | 110.29 | 3,970.59 |
| Community clinics | 44,117.65 | 170 | 7.50 | 270.00 |
| | | Sub-Total= | 191.32 | 6,887.65 |
| **Equipment cost** | | | | |
| 250-bed district hosp | 22,058,823.53 | 1 | 22.06 | 794.12 |
| 50-bed upazila hospital | 10,294,117.65 | 5 | 51.47 | 1,852.94 |
| HFWC | 2,205,882.35 | 50 | 110.29 | 3,970.59 |
| Community clinics | 44,117.65 | 170 | 7.50 | 270.00 |
| | | Sub-Total= | 191.32 | 6,887.65 |
| | | Total= | 382.65 | 13,775.29 |

## Annual Recurrent Costs for New Health Facilities

| Heads | Unit cost (USD) | For 1 mill pop | | For 36 mi pop |
|---|---|---|---|---|
| | | No. | Million USD | Total |
| Medical & surgical supplies | | | | |
| 250-bed district hosp | 80,882.35 | 1 | 0.08 | 2.91 |
| 50-bed upazila hospital | 16,176.47 | 5 | 0.08 | 2.91 |
| HFWC | 1,470.59 | 50 | 0.07 | 2.65 |
| Community clinics | 294.12 | 170 | 0.05 | 1.80 |
| | | Sub-Total= | 0.29 | 10.27 |
| Repair & Maintenance cost | | | | |
| 250-bed district hosp | 14,705.88 | 1 | 0.01 | 0.53 |
| 50-bed upazila hospital | 7,352.94 | 5 | 0.04 | 1.32 |
| HFWC | 1,470.59 | 50 | 0.07 | 2.65 |
| Community c clinics | 147.06 | 170 | 0.03 | 0.90 |
| | | Sub-Total= | 0.15 | 5.40 |
| Salary & allowances | | | | |
| 250-bed district hosp | 117,647.06 | 1 | 0.12 | 4.24 |
| 50-bed upazila hospital | 51,470.59 | 5 | 0.26 | 9.26 |
| HFWC | 7,352.94 | 50 | 0.37 | 13.24 |
| Community clinics | 1,470.59 | 170 | 0.25 | 9.00 |
| Sub-Total= | | | 0.99 | 35.74 |
| | | Total= | 1.43 | 51.41 |

# Elimination and Control of Diseases caused by Climate Change (Years 2010-2021)

| Disease | USD (million) |
|---|---|
| Diarrhea<br>(3.5 episode/person/yr @BDT 50 per episode) | 102.94 |
| Kala azar | 161.76 |
| Filariasis | 51.47 |
| Dengue, malaria, chikungunya, etc. | 308.82 |
| COPD | 617.65 |
| Injuries, drowning, etc. | 602.94 |
| Malnutrition | 735.29 |
| Miscellaneous | 220.59 |
| Total= | 2,801.47 |

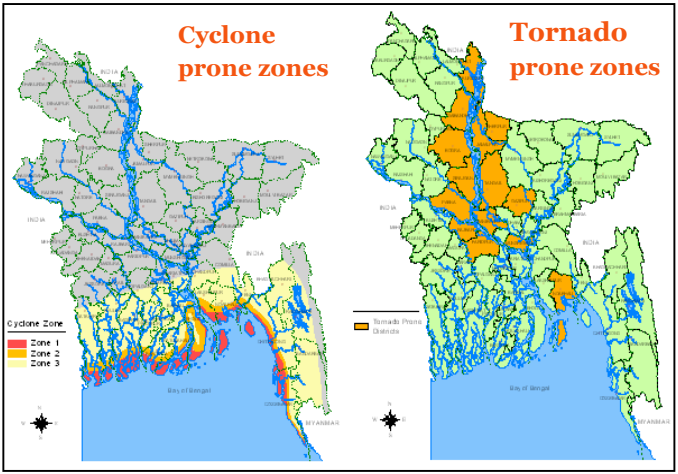
## Nothing will be left in affected areas

Eight million homes, their assets, their arable lands, their live stocks will go for ever.

Thousands of health facilities and hundreds of hospitals will go under water

Roads, vehicles, schools and industries nothing will be escaped

Forests, wild lives, floras and faunas will be lost




# Climate change keeps vulnerable the entire country

**Vulnerable people cluster in and around cities of Bangladesh and cause the cities to go under water through water logging**

**Bangladesh**
**Wants**
**International Climate Justice**

**Thank you for reading**