Flood Hazards: A Case Study of the Floods in Bangladesh, Asia

Polina Lemenkova

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Flood Hazards: A Case Study of the Floods in Bangladesh, Asia Presented at the Course GEOG6023 'Physical Geography in Environmental Management'

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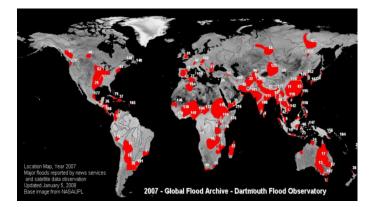
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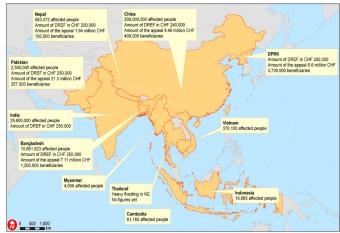
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Floods in Asia



The maps used do not imply the expression of any opinion on the part of the International Federation of the Red Cross and Red Cross end Red Cross end Red Cross end Societies or National Societies concerning the legal status of a liveritory or of its authorities. National data accross. DEVMIC EXIII, Federation

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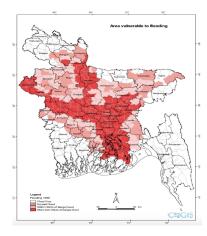
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Bangladesh



Bangladesh: areas vulnerable to flooding

Key points on Bangladesh:

- Bangladesh is among the countries that are the most affected by climate change
- Frequent natural disasters, loss of life, damage to infrastructure and economic assets, impacts on lives and livelihoods
- Floods, tropical cyclones, storm surges and droughts are likely to become more frequent and severe in the coming years
- Lies in the delta of three of the largest rivers in the world – the Brahmaputra, the Ganges and the Meghna
- Mostly low and flat topography, susceptible to river and rainwater flooding
- More than 50 million of people still live in poverty
- Many people live in remote or ecologically fragile parts of the country, such as river islands
- Approximately one quarter of the country inundated each year
- The poorest and most vulnerable living in the exposed areas suffer the most

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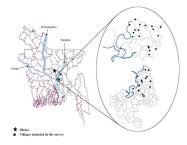
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Meghna River



Meghna river flood plain area

Meghna river flood plain area:

- Ideal case for examining relationship between the climate change, hazard and socio-economic vulnerability
- One of the highest flood hazard area in the world
- One of the poorest and the most flood-prone areas of Bangladesh
- Inhabited with more than four hundred thousand people
- Residents mostly farmers (farming rice, wheat, vegetables, oil seeds)
- Heavy monsoon rainfall generates excessive flows in the rivers and causes floods almost every year
- Suffered from devastating floods over the past 20 years in 1988, 1996, 1998 and 2004

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Bangladesh: Socio-Economic Vulnerability

- Poorer segments of society live closer to the river
- Inundation levels significantly higher for poorer households
- Impoverished face a higher risk of flooding and are more vulnerable
- The higher the exposure level and income inequality, the less access to a natural resourses
- Average damage costs and coping capacity higher for wealthier households
- Households with higher income take preventive measures and have significantly lower damage costs
- Unequal income distributions in villages with higher risk exposure
- The least well prepared both in terms of household-level and community level face the highest risk of flooding

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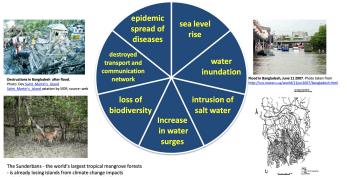
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Impacts of the Flood Hazards in Bangladesh

Impact of Event = \sum Intensity of Event * \sum Baseline Conditions * \sum Adaptive Capacity In the coastal areas of Bangladesh communities are impacted by the following factors:



Agrawala et al. (2003)

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including coastal erosion and sea level rise. The forest has a unique ecosystem and rich in biodiversity.

Likely salinity ingress in Southern Bangladesh

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Impacts of the Major Floods in Bangladesh

Impacts of Major Floods in Bangladesh during the last 50 years

Event	Impact	
1954 floods	Affected 55% of country	
1974 flood	Moderately severe, over 2,000 deaths	
	affected 58% of country	
	followed by famine with over 30,000 deaths	
1984 floods	Inundated 52,520 km²,	
	cost estimated at US\$ 378 million	
1987 floods	Inundated over 50,000 km ² , estimated damage US\$ 1.0 billion,	
	2055 deaths	
	Inundated 61% of country,	
	estimated damage US\$ 1.2 billion,	
	more than 45 million homeless,	
	between 2,000-6,500 deaths	
1998 floods	1,100 deaths,	
	inundated nearly 100,000 km² ,	
	rendered 30 million people homeless,	
	damaged 500,000 homes,	
	heavy loss to infrastructure, estimated damage US\$ 2.8 billion	
2004 floods	Inundation 38%, damage US\$ 6.6 billion, deaths 700,	
	affected people nearly 3.8 million	

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Vulnerability Factors

Factors of vulnerability in Bangladesh which make impacts of flood hazards sensible:

- Geographic location
 - Iong coast line
 - effect of saline water intrusion in the estuaries
 - vast low-lying landmass
 - extremely dynamic coastal geomorphological processes
- Socio-demographic and economic features
 - high population density
 - nature-dependant traditional agricultural practices





Flood in rural Bangladesh. Source: CNRS, Dhaka

River Bank Erosion after Flood in Bangladesh. Source: CNRS, Dhaka.

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In April 1991, a cyclone struck Bangladesh, claiming lives and leaving destruction in its path. The satellite image on top shows the eye of the catastrophic storm. The worst cyclone in recorded history on mortality count struck Bangladesh in November 1970. Image source: NOAA

Impacts of the Flood Hazards

General impacts of flood hazards on the population:

- initial economic conditions (poor or non-poor)
- Iocation (coastal or non-coastal, rural or urban)
- gender and general health condition (capacity to resist illnesses, stresses)
- reduced livelihood options (loss of agriculture, restriction of movement)

Particular impacts of flood hazards on human health:

- temperature rise
- degrading water quality as well as shortage leads to illnesses: cholera, diarrhea, dysentery, malaria and typhoid
- widespread malnutrition (due to shortage of water)
- women: increased risks of the involuntary foetus abortion in the coastal areas due to rising salinity leading to hypertension



Flood in main road of Dhaka. Source: www.poffet.net



Boats on a city road in Bangladesh. Source: CNRS, Dhaka.



Flood-prone area in Bangladesh, 1996

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Table 2. Causes of Impacts, Vulnerable Areas and Impacted Sectors in Bangladesh:

Climate and Related Elements	Critical Vulnerable Areas	Most Impacted Sectors
Sea Level Rise and Salinity Intrusion	Coastal Area Island	Agriculture (crop, fisheries, livestock) Water (water logging, drinking water) Human settlement Energy Health
Floods	Central Region North East Region Char land	Agriculture (crop, fisheries, livestock) Water (urban, industry) Infrastructure Human settlement
Temperature rise and drought	North-west	Agriculture (crop, livestock, fisheries) Water Energy Health

During the flood hazard

- the poor,
- poor-healthy,
- women will suffer much more disproportionately than the well-being and healthy men, more so in the coastal and rural areas than elsewhere.

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