

Bangladesh: a global warming “impact hotspot” - projections, perspectives, and possible responses to climate change

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INTRODUCTION

Bangladesh is one of the most vulnerable countries to climate change in the world [[1](#)].

Bangladesh is geographically located between the Himalaya massive and the Bay of Bengal, and at the bottom of a river delta comprising the three mayor rivers of the region (Ganges, Meghna, Brahmaputra) and its 57 tributaries draining into the Indian Ocean. This means that all three mayor processes of climate change come together in this region: melting of the glaciers in the Himalaya, sea level rise in the Indian Ocean, storms and cyclones in the Bay of Bengal. 80% of the land is floodplains, between 1 meter above or below sea level. This leaves a major part of the country prone to flooding. With an estimated 1000 people per square kilometre, Bangladesh is one of the most densely populated states in the world. It is also one of the poorest: almost half the population lives in poverty, according to the Worldbank-Index of 1.25 USD (PPP) per person a day.

Climate Change is already a painful reality in Bangladesh: farmers and peasants are facing losses of their harvest every year due to floods and heavy rainfalls; the seasons are changing with negative impacts on sowing and harvesting patterns; millions of people are losing their fields and homes due to cyclones, floods and river erosion. The population of Bangladesh has been used to storms and floods in the past, but now they are facing the impacts of increasingly frequent natural disasters. Therefore, the first part of this article will highlight some of these impacts already visible today and how they are forecasted for the near future.

Although Bangladesh is known as one of the main manufacturers for the world's demand in textile and clothes, it is predominantly an agricultural country. Two thirds of the population are engaged in small-scale farming and other agricultural activities to generate income or for their subsistence. The second part of this article will shed light on the impacts on the agricultural sector and possible responses by peasants and small scale farmers.

PART 1 - Climate Change Impacts in Bangladesh

According to Germanwatch's Climate Risk Index (CRI) [[2](#)], Bangladesh is the country fifth most affected by extreme weather events in the last 20 years. But the number of events (242) and the

economic losses that Bangladesh has had to bear due to these events (1.8 billion USD [3]) are higher than the respective numbers of the four “top-ranking” countries put together (Honduras, Myanmar, Haiti, Nicaragua). That means, Bangladesh is the worst hit victim of global climate change and most probably will continue being so in the future. Among the different types of natural disasters that the country experiences, the most frequent events are:

- Floods and river erosion (all along the rivers from the north to the south of the country),
- Cyclones and tropical storms (threatening the southern and south-eastern coastal area),
- Extreme temperature and drought (affecting the northern and north-western regions).

Due to river erosion coupled with floods (water from the rivers), around 1.5 million people have lost their houses, land and properties. 44% of the 407 communities along the mainland river basins have been affected. Due to tidal floods (water from the sea), 56% of the 422 communities in the coastal area have been affected and the houses, lands and properties of 2.5 million people have been destroyed, of which 1.5 million people became local climate refugees [4]. On top of that, cyclones like „Sidr“ (2007) and “Aila” (2009) caused additional displacement and destruction. “Sidr” alone 3300 dead and 9 million affected people [5], and a loss of rice production of around 2 million metric tons, which could potentially feed 10 million people.

The Climate Vulnerability Monitor (CVM) [6] states that floods and storms in the next twenty years will cause nearly a 10 fold rise in additional economic costs for Bangladesh (from 450 million USD in 2010 to 4.25 billion USD in 2030). Adding the prospected numbers for drought, Bangladesh will face 4.3 billion USD additional economic costs.

Another important aspect of climate change is the rising sea level. If the sea level in the Bay of Bengal rises by 1 meter (as is projected by the 2090s), Bangladesh could lose 17,000 square km of land and 15 million people could suffer losses of home and land [7]. This would be triple the number of today’s climate refugees in Bangladesh [8]. Such a sea level rise will also contribute to worsening the effects of cyclones: “A 27 cm sea-level rise, projected for the 2040s, in combination with storm surges from an average 10-year return period cyclone, such as “Sidr”, could inundate an area more than 80-percent larger than the area inundated at present by a similar event.” [9] (World Bank, 2013)

The issue of climate refugees will become a major problem in the next decades in Bangladesh. “Global climate refugees” (that migrate by crossing state borders) will face more and more protected borders, as in the case of India, which is militarizing its border with Bangladesh, so that already today there are deaths reported every month. “Local climate refugees” (that migrate internally in the country) will put a lot of pressure on the urban infrastructure, especially in the capital Dhaka. The urban infrastructure of Dhaka, which has nearly 16 million inhabitants and is the most densely populated mega city in the world [10], is near to collapse. In Bangladesh, around 40% of the urban population lives in slums and squatter settlements of the mayor cities (Dhaka, Chittagong, Barisal, Khulna). This makes another part of the population highly prone to disaster risk during flooding.

PART 2 - Possible Responses by the Agricultural Sector

Floods and river erosion, storms and cyclones, drought and extreme temperature. Not only do all of these events have negative impacts on the regional level where they occur, but also more generally on the food production for the whole population. In many parts of the country, the quality of

agricultural fields and soil is deteriorating, crop yields are declining. This is reducing the output of the most important staple crops, like rice and wheat [11]. What is destroying the arable land is the salinity intrusion, which is increasing alarmingly:

"Water brings salt to the main land. The salinization of agricultural land is alarming and poses a threat to agriculture. Normally Bangladesh's crops grow in land free of salt, but now, the salt destroys the crops. This is a threat to food sovereignty in Bangladesh, and is a big problem for the peasants' survival and sustenance. The whole food system is threatened by floods, salinization and cyclones." (Quoting Badrul Alam, president of Bangladesh Krishok Federation, interview held January 20th, 2014)

The government is actively taking up the climate change issue and is running programs, like the Bangladesh Climate Change Strategy and Action Plan (2009) and the Bangladesh Climate Resilience Fund (2010) [12]. Hundreds of "cyclone centers" have been built, simple houses constructed on pillars of 5 meters height out of concrete. Throughout the year, they serve as schools for children and as meeting spaces for assemblies of the communities. During the last cyclone "Mahasen" in May 2013, the early warning system enabled around 1 million people along the coast to be evacuated and find shelter in these centers. This meant that the number of dead was a "moderate" 14 bodies.

However, apart from early warning systems and cyclone centers, the government's climate change resilience and mitigation policy faces a lot of limitations:

"The problem is, that they do not deal efficiently with the things. They don't have much power and measures to confront the threat of climate change and to help the victims in the own country." (Quoting Badrul Alam, president of Bangladesh Krishok Federation, interview held January 20th, 2014)

Especially the victims in the agricultural sector do not get any compensation for losses of fields or harvest. Instead of protecting the peasants and securing the subsistence-farming, the government promotes higher investment in seeds, fertilizers and machinery.

The government calls this strategy "food security". By this, it means optimizing the farming output by industrializing the agriculture sector, primarily the use of high-yielding varieties and genetically modified organisms. In order to make these artificial seeds grow, the input of chemical additives, like fertilizers and pesticides, is needed. The interest of the government is to export farming products and to gain foreign currency. This strategy is backed by multilateral funds provided from the World Bank and international donors, which offer grants to introduce these seeds and chemicals in the farming sector. Their interest behind this strategy is to enable the multinational seed and chemical companies to access the agricultural market in Bangladesh.

Millions of peasants share the same negative experience of this concept of "food security". The seeds are expensive and have to be bought every year, because the sterile seeds can't be used again in the next sowing period. Fertilizers and pesticides are expensive, too, and destroy the fertility of the soil. After a maximum of two years of higher output, the crop yield is declining constantly, and has to be balanced by more chemical input, which means that farmers need to take up more loans. In the context of climate change, this is a risky strategy for farming, because when the peasants suffer losses after a natural disaster, they can't pay back their loans. The debt urges them to sell their land and migrate to the urban areas or to work as landless laborers on the fields of big farmers.

"The government has now approved the BT Brindel. The expectation is first to go for BT Brindel eggplant, then for BT Cotton. But we know the consequences of BT Cotton from India, where 250.000 farmers have lost everything and committed suicide. So we are against BT Brindel, BT

Cotton and all the GMO seeds. But the government is not listening to us. In the moment, we are going through a difficult time, the threats of climate change on one hand and new efforts of the multinational companies to promote their products and of the government to introduce high technology in agriculture.” (Quoting Badrul Alam, president of Bangladesh Krishok Federation, interview held January 20th, 2014)

Because of these experiences, peasants and small-scale farmers demand another strategy: “food sovereignty”. Food sovereignty means the right to own land, the right to own seeds, and to produce for their own consumption and the local market. In the context of climate change, this seems to be an important alternative to the current agricultural policy of Bangladesh: keep the investment low in farming, so that natural disasters do not leave the peasants in debt; guarantee first and foremost the supply of food for the local market, which also helps to balance losses of harvest within the country, without being dependent on external food supply. An agricultural policy that focuses primarily on the local farming sector and the local market would be better prepared for the adaptation, which will be needed due to the probable natural disasters in the next decades.

This article wants to widen the discussion on climate change mitigation and adaptation: Food sovereignty as a response of the farming sector to the challenges of climate change could be a viable option, an option that seems not considered seriously by scientists and politicians working in the fields of adaptation and resilience to climate change.

Jürgen Kraus, February 3rd, 2014

P.S.

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Footnotes

[1] World Bank press release June 19th, 2013: “Bangladesh will be among the most affected countries in South Asia by an expected 2°C rise in the world’s average temperature...”, and “the report cited Bangladesh as one of more “potential impact hotspots” threatened by extreme river floods, more intense tropical cyclones, rising sea level and very high temperatures”.
(www.worldbank.org/en/new/press-release/2013/06/19/warming-climate-to-hit-bangladesh-hard-with-sea-level-rise-more-floods-and-cyclones-world-bank-report-says)

[2] The latest Global Climate Risk Index 2014 is available on:
www.germanwatch.org/en/download/8551.pdf

[3] USD = US-Dollars, this and all the following counting always in PPP = Purchasing Power Parities

[4] Data from Kayly Ober: www.towardsrecognition.org/2010/06/climate-refugees-in-bangladesh

(posted on June 12th, 2010, accessed January 31st, 2014)

[5] According to the International Federation of Red Cross:
www.ifrc.org/docs/appeals/07/mdrbd003fr.pdf (accessed January 31st, 2014)

[6] Data from the Climate Vulnerability Monitor, DARA, can be obtained on:
www.daraint.org/climate-vulnerability-monitor-2012/report.

[7] 7 million people are considered as climate refugees in Bangladesh, (according to Kayly Ober's (link: see note 4.)

[8] See map on UNEP-webpage: www.unep.org/dewa/vitalwater/article146.html

[9] The full report "4° - Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case of Resilience" is available:
[http://documents.worldbank.org/curated/en/2013/06/17862361/turn-down-heat-climate-extremes-regional-impacts-](http://documents.worldbank.org/curated/en/2013/06/17862361/turn-down-heat-climate-extremes-regional-impacts-case-resilience-full-report) case-resilience-full-report

[10] Total population of Dhaka (in 2012): 15,414,000, land area: 347 square km = density of 44,400 people on 1 square km (data from:
www.newgeography.com/content/002808-world-urban-areas-population-and-density-a-2012-update, accessed January 31st, 2014)

[11] By 2030, South Asia probably lose 10-20% of the total rice and wheat yields, with countries like Bangladesh and Pakistan experiencing nearly 50% reduction of crop yields, says Wikipedia:
http://en.wikipedia.org/wiki/Climate_change_in_Bangladesh

[12] For the former: www.moef.gov.bd/climate_change_strategy2009.pdf, and for the latter:
www.bccrf-bd.org or
www.worldbank.org/en/news/feature/2012/05/22/bangladesh-climate-change-resilience-fund-bccrf
(accessed January 31st, 2014)