The Economics of Early Response and Resilience: Bangladesh Country Study

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May 2013

1 Introduction

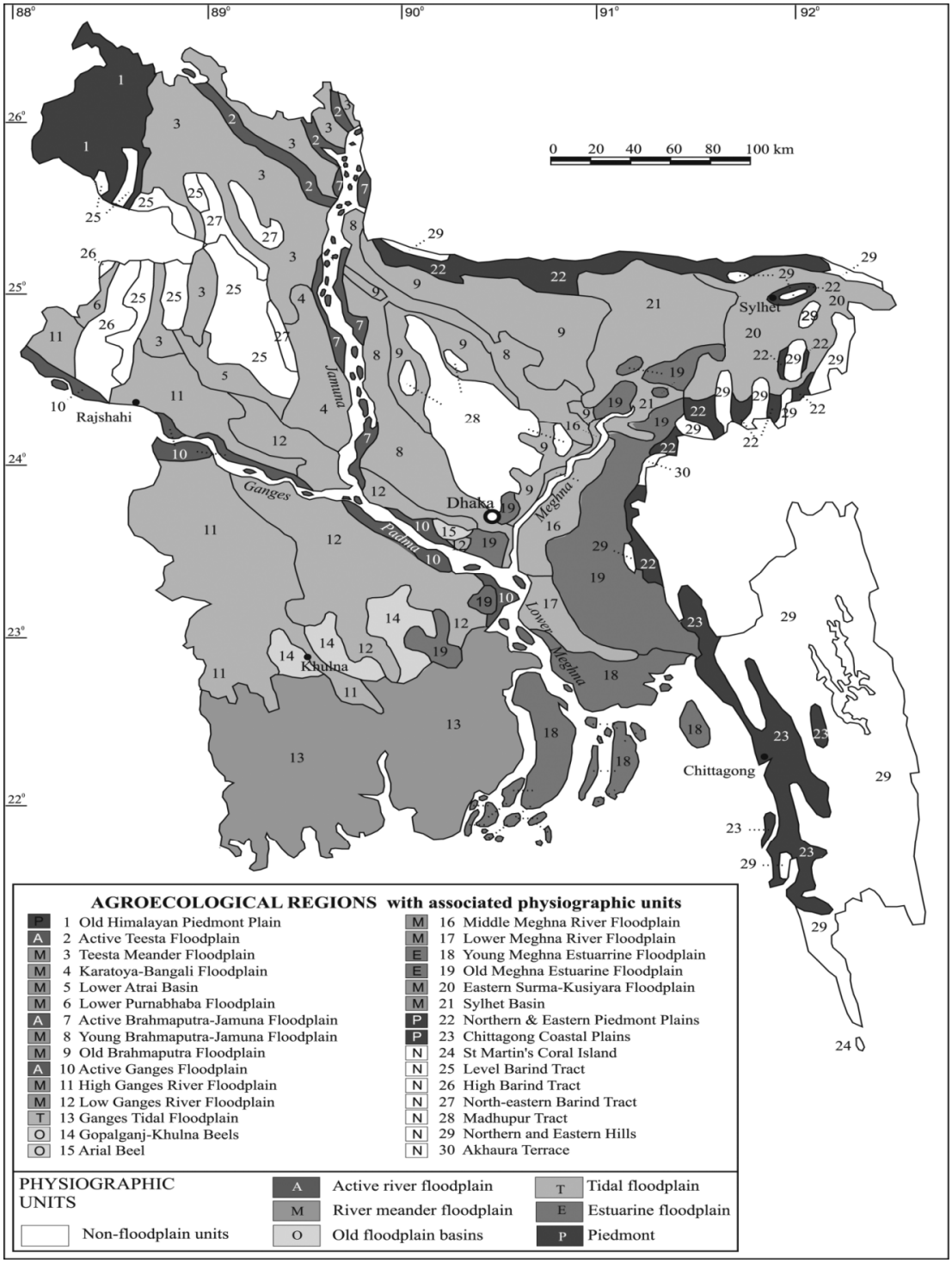
1.1 Introduction

Bangladesh is a low lying alluvial delta located between the Himalayas and the Bay of Bengal. It has a population of over 150 million, is growing at an annual rate of 1.2% and has one of the highest population densities in the world[1] placing considerable pressure on the country's natural resources. The most significant feature of the land is the extensive network of large and small rivers that are of primary importance to the socioeconomic life of the nation. Within this network, the Ganges-Padma, Brahmaputra-Jamuna, and Megna are the major rivers.

Flooding is a recurrent event in Bangladesh. The majority of its land mass consists of floodplains, and up to 30% of the country experiences annual flooding during the monsoon season, while extreme flood events tend to spread over 60% of the country (see Fig. 1 below). Almost 80% of the annual rainfall occurs during the monsoon period (between June and September) across the river basins. The monsoon rains cause the rivers to overflow and spread vital nutrient rich sediment across the low-lying agricultural and char (sediment created lands within the river systems) lands. This yearly revitalization of the soil has created one of the most fertile regions of the world and is the basis of the agricultural lands of Bangladesh.

[1] World Bank (2011) http://data.worldbank.org/data-catalog/country-profiles

Figure 1: Bangladesh Agro-ecological Regions
Source: Brammer (2004)



1.2 Disasters in Bangladesh

Bangladesh is also vulnerable to tropical cyclones that generate large wave surges due to the shallow continental shelf. Flood maps (see below) of Bangladesh show the extent of the country to flood exposure over a 24-hour period of flooding and under a future climate change scenario.

The geographic location and geo-morphological conditions of Bangladesh have made it one of the most vulnerable to climate change and variability. Two thirds of its territory is less than five metres above sea level. The combination of frequent natural disasters, high population density and growth, and low resilience to economic shocks, makes Bangladesh particularly vulnerable to these climatic risks. It is ranked as the 5th country in the World Risk Index[2] and ranked 1st (of 162) for floods, 6th (of 89) for cyclones, 3rd (of 76) for Tsunami, and 63rd (of 184) for drought. [3]

Figure 2: Flood Maps of Bangladesh

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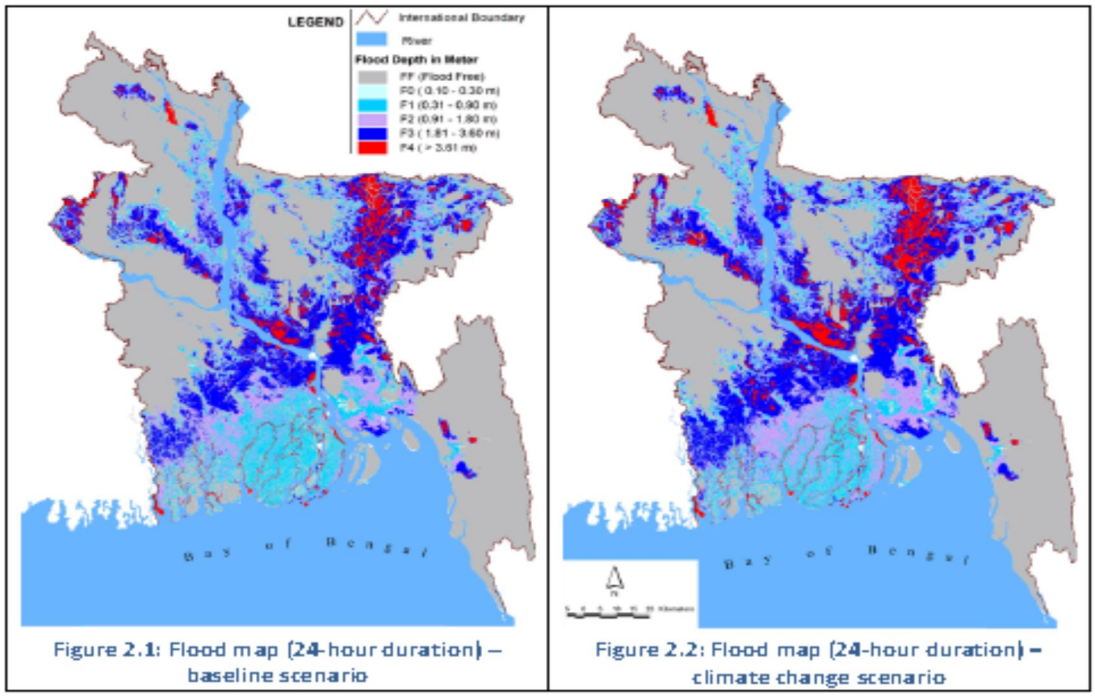


Figure 2.1: Flood map (24-hour duration) – baseline scenario

Figure 2.2: Flood map (24-hour duration) – climate change scenario

Source: Climate Proofing Infrastructure in Bangladesh The Incremental Cost of Limiting Future Inland Monsoon Flood Damage, The World Bank November 2010

[2] United Nations University (2012) *World Risk Report* http://www.worldriskreport.com/uploads/media/WRR_2012_en_online.pdf

[3] GAR (2009) http://www.preventionweb.net/english/countries/statistics/risk

Natural disasters have had an enormous impact on the lives and livelihoods of the Bangladeshi people. For the thirty year period between 1980 and 2010, approximately 191,836 people were killed and it is estimated that over 323 million people were affected by natural disasters (Table 1) -- the majority below the poverty line.

Table 1: Natural Disasters in Bangladesh from 1980-2010

Natural Disasters from 1980 - 2010	
No of events:	234
No of people killed:	191,836
Average killed per year:	6,188
No of people affected:	323,480,264
Average affected per year:	10,434,847
Economic Damage (US$ X 1,000):	17,072,500
Economic Damage per year (US$ X 1,000):	550,726

Source: Prevention Web

Table 2 provides details on the most devastating natural disasters in Bangladesh, in terms of loss of life, since 1965.[4] Floods and cyclones not only have had a devastating impact in terms of lives lost, but also in terms of adverse economic impact.

Table 2: Details on Major Events

Date	Year	Hazard	Death toll	Main affected districts
11 May	1965	Cyclone	19,279	Barisal
15 December	1965	Cyclone	873	Cox's Bazar
01 October	1966	Cyclone	850	Noakhali
12 November	1970	Cyclone Bhola	300,000 to 500,000	Bhola
25 May	1985	Cyclone	11,069	Noakhali
August -September	1988	Flood	1,378	
29 April	1991	Cyclone Gorky	140,000	Cox's Bazar, Chittagong
19 May	1997	Cyclone	155	Cox's Bazar, Chittagong
July -September	1998	Flood	1,100	
July -August	2004	Flood	747	
15 November	2007	Cyclone Sidr	4,000	Bagerhat, Pirojpur,Barguna, Pathuakhali
25 May	2009	Cyclone Aila	190	Sathkira, Khulna

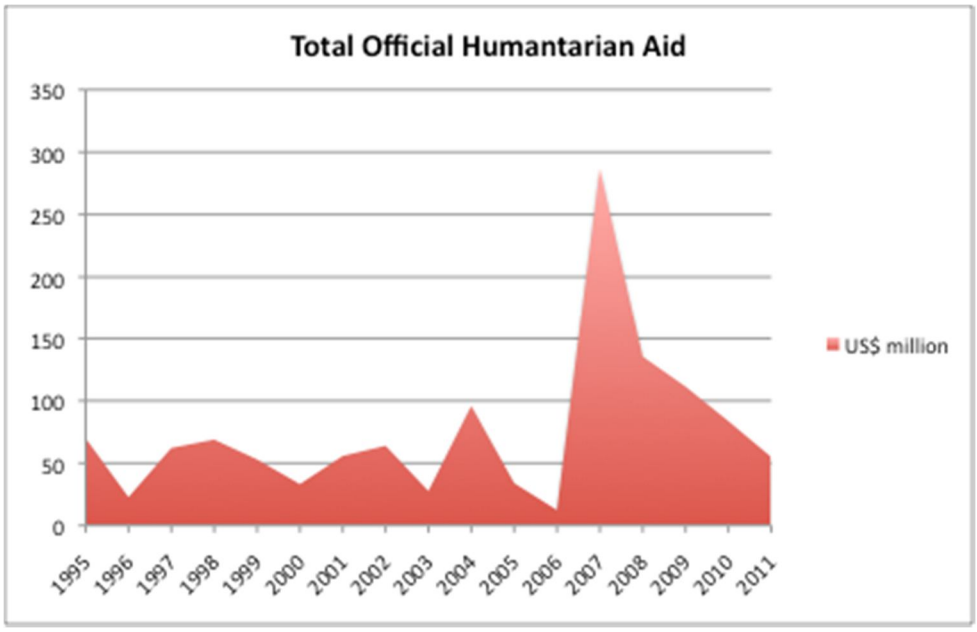
[4] UNDP (2012) *Review of Development Partners' Response to Cyclone Aila*

The direct annual cost to the national economy of natural disasters over the last 10 years (damage and lost production) is estimated to be between 0.5% and 1% of GDP.[5] As the economy grows, these costs are likely to increase in absolute terms and also as a proportion of GDP, if climate change is not factored into long-term economic planning.[6] The focus on floods and cyclones is based on the sheer number of people affected by these disasters and the frequency of them, as compared with other natural phenomenon.

1.3 Humanitarian Aid

Bangladesh was the 22nd largest recipient of official humanitarian aid in 2010 at US$84 million (of total aid US$1.4 billion).[7] From the year 2000 to March of 2013, Bangladesh received $678m in humanitarian aid for flood and cyclone related disasters.[8] Humanitarian aid for the most recent disaster, the 2012 prolonged floods in the north and south of Bangladesh, totalled $5,848,778.[9] The Statistical Yearbook for 2010 shows a breakdown of foreign aid to Bangladesh from the years 2000-2009 (See Annex 1). Committed food aid for the year 2008-2009 was $180 million and of that amount $52 million was dispersed.

Figure 3: GHA Estimate of Humanitarian Aid to Bangladesh (1995-2011)



Source: Global Humanitarian Assistance
http://www.globalhumanitarianassistance.org/countryprofile/bangladesh

[5] World Bank (2010) *The Economics of Adaptation to Climate Change: Bangladesh*
[6] Planning Commission Ministry of Planning, Government of the People's Republic of Bangladesh (2011) *Bangladesh Sixth Five Year Plan FY2011-FY2015 Accelerating Growth and Reducing Poverty*
[7] Global Humanitarian Assistance www.globalhumanitarianassistance.org/countryprofile/bangladesh
[8] Financial Tracking Service http://fts.unocha.org/
[9] Ibid

1.4 Economic Resilience

Bangladesh is still struggling to emerge from poverty. Bangladesh ranks 146th among nations on the Human Development Index (HDI).[10] The HDI is a multidimensional measure of poverty for developing countries; it takes into account social exclusion, lack of economic opportunities, and deprivations in survival, livelihood, and knowledge. Countries in South Asia that are close to Bangladesh in its 2013 HDI rank and population size are Pakistan and Nepal, which rank 146th and 157th on the HDI, respectively.

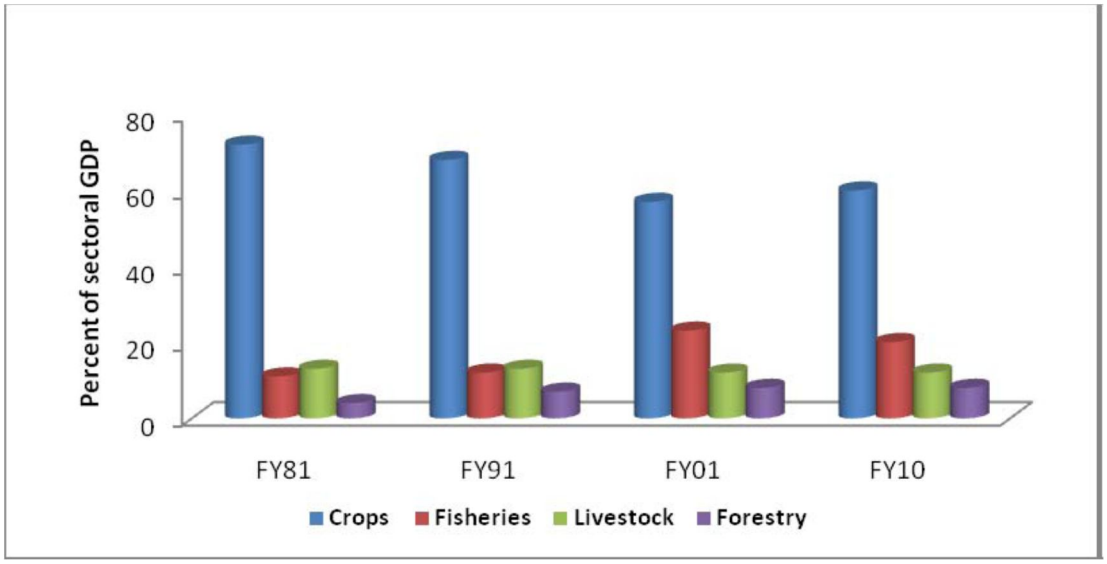
However, Bangladesh has made significant economic and social progress in the past decade. Despite frequent natural disasters and external shocks, poverty decreased from 57% of the population in 1990 to 40% in 2005[11]. It is now well positioned to achieve most of its Millennium Development Goals, but it remains a low-income country with substantial poverty, inequality and deprivation. Despite these successes, Bangladesh faces considerable development challenges including inadequate power supplies constraining growth, inadequate infrastructure, slow implementation of economic reforms, migration to urban centres and a rapidly growing labour force that cannot be absorbed by agriculture. [12]

1.5 Agriculture

Bangladesh's economy depends predominantly on agriculture (with rice as the dominant crop), although many people are landless and are forced to live on, and cultivate, flood-prone land also susceptible to saline intrusion. Fishing is also an important part of the economy and local diet. Despite growth being a steady five percent for the past several years, Bangladesh remains poor and overpopulated.[13] Agriculture is the dominant employment sector in Bangladesh with approximately 47% of the labor force.[14] Agriculture is also the most important sector of the Bangladesh economy due to its role in food security, employment and livelihoods. The current share of agriculture to GDP is around 20%. The agriculture of Bangladesh is dominated by crops, which account for about half of total agricultural GDP (see Figure 4).

[10] UNDP (2013) *Human Development Report*
[11] Climate Investment Funds (2010) *Strategic Program for Climate Resilience, Bangladesh*
[12] http://emi.pdc.org/cities/CP_Dhaka-July2006.pdf
[13] http://emi.pdc.org/cities/CP_Dhaka-July2006.pdf
[14] Bangladesh Bureau of Statistics (2010) *Statistical Yearbook of Bangladesh 2010*

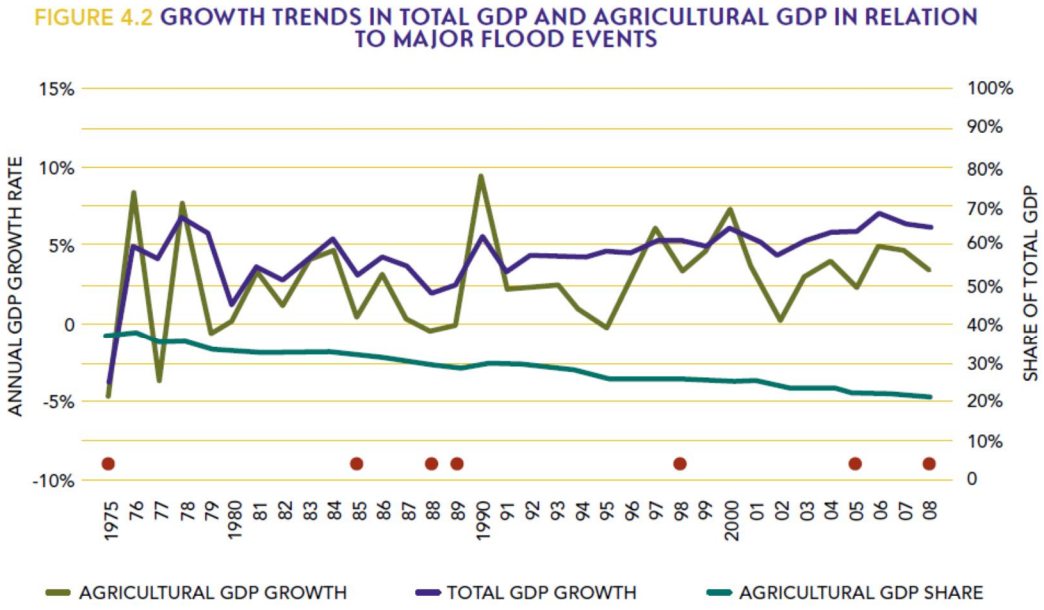
Figure 4: Bangladesh: Structure of Agriculture, FY81-FY10



Source: Bangladesh Bureau of Statistics. Sectoral shares are in current prices.

There are, however, substantial year-to-year fluctuations in these rates and it is most pronounced in the case of crops. These fluctuations are the result of a loss of production in both food and cash crops due to natural calamities like floods, cyclones, and drought. The negative economic impact of major flood events in relation to GDP is shown below where the flood events are depicted by the red dots. Up to the mid-1990s, agricultural growth rates are shown to have declined immediately after these flood events. Agriculture as a whole has seen a progressive decline in its share of GDP since 1975. However, an overall trend in resilience is evidenced by the growth in both GDP and agricultural GDP since the mid-1990s, despite the occurrence of major flood events.

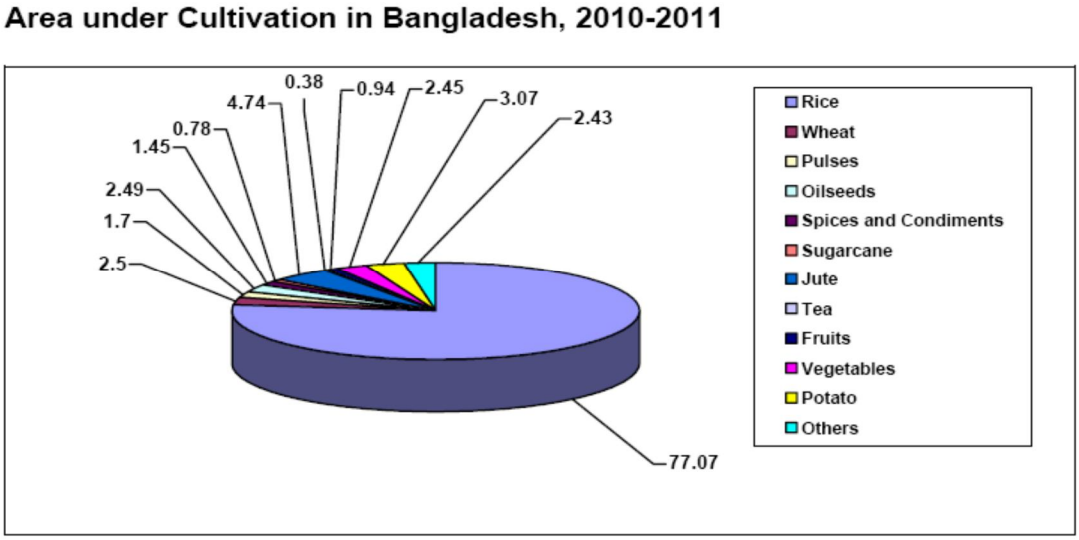
Figure 5: Growth Trends in Total GDP and Agricultural GDP in Relation to Major Flood Events



Source: Yu, W.H. et al. (2010)

Within crop production, rice is dominant (around 60% of crop sector value-added). In many ways Bangladesh can still be regarded as a rice economy. It is the major staple in the diet of Bangladesh and because of its role in food security, it also plays a major role in domestic policy. Although approximately 77% of total cropped area is devoted to rice production, the country is still suffering from a chronic shortage of food/grain (BBS, 2011). Rice contributes more than 80% to the total food supply. More than 95% of the population consumes rice and it alone provides 76% of calories and 66% of total protein requirements of daily food intake (Bhuiyan *et al.*, 2002).

Figure 6: Area under Cultivation in Bangladesh, 2010-2011



Source: Bangladesh Bureau of Statistics

Rice production has itself seen tremendous changes in terms of agricultural inputs, use of modern rice production machinery, and high yield and hybrid rice seeds. In Bangladesh, rice is grown in the Boro, Aman, and Aus seasons and covers approximately 11.5 million hectares of land. The Boro season ranges from November to May and is grown under mainly irrigated conditions. The Aus season covers April to August and the Aman rice crop follows the monsoon rains from July through November. The average yields of these seasons are approximately 3.8, 1.9, and 2.3 tons/hectare, respectively.

Loss of production of rice attributed to natural disasters has caused an estimate 398 million USD for the year 2007-2008 (Table 4).

Table 3: Loss of Rice Production due to Natural Disaster

Year	Ton	Estimated Value (million $)
2003-04	75,660	1.932
2004-05	1,602,310	430.66
2005-06	35,129	9.68
2006-07	11,601	4.16
2007-08	1,023,236	398.11

Source: Yearbook of Agricultural Statistics 2009, Bangladesh Bureau of Statistics

Despite policies designed to increase rice production to assure self-sufficiency, food insecurity at the household level remains widespread, although there are considerable regional variations. Half of the population have incomes below a calorie-based poverty line.[15] Even when aggregate food supplies are adequate, a number of factors in Bangladesh prevent poor households from accessing food. These include: i) low income; ii) lack of land ownership; iii) shortage of assets or access to credit; iv) inability to access outside public assistance or in-kind or cash transfer programmes to supplement food acquisition capacity; and v) rising food prices.[16] Food security in Bangladesh has been significantly and adversely affected by both disasters and recent escalating food prices. The country's food insecure (<2122 kcals/person/day) population is now estimated at 65 million (nearly half or 45% of the population) and nearly one quarter are deemed severely food insecure (<1805 kcals/person/day).[17] Half of all rural children are reported as chronically malnourished and 14% suffer from acute malnutrition.[18]

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[15] Del Ninno, Dorosh, Subbarao (2005) *Food Aid and Food Security in the Short and Long Run Country Experience from Asia and sub-Saharan Africa*
http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Safety-Nets-DP/0538.pdf

[16] World Food Program http://www.foodsecurityatlas.org/bgd/country/food-security-at-a-glance

[17] Ibid

[18] IFAD (2012) *Rural Poverty in Bangladesh* http://www.ruralpovertyportal.org/country/home

1.6 Government Disaster Response

The Government of Bangladesh has several social protection programs or social safety nets in place in the event of a disaster to provide food security in the event of a disaster. Some of these programs, such as the Vulnerable Group Development program, are implemented over a period of 2 years. Immediate disaster assistance is provided through the Vulnerable Group Feeding program. However, this program is focused on the poor and not necessarily those most adversely affected by the disaster.

Vulnerable Group Development (VGD)

The VGD program focus is developing marketable skills and efficiency of women through training, formation of capital by motivating savings and providing scope for future micro credit. Another important goal of the program is to build social awareness on disaster management and nutrition through training in groups. The beneficiaries get 30kg of wheat monthly (per household) and approximately 150 hours of training for 24 months. The targeting criteria for the program includes i) households with not more than 15 acres of land; ii) monthly household income less than 300 Taka (Tk); iii) dependent upon seasonal wage employment; iv) women of reproductive (18-49) age; v) day labour or temporary worker; and vi) lack access to productive assets.

Vulnerable Group Feeding (VGF)

This program is aimed at extending assistance in the form of food and basic necessities to selected households in the months following a disaster when agricultural production has been severely disrupted. VGF began in the mid-1990s and has continued since then through supplementary food aid from the WFP. Under the programme, a person gets 10kg of food grain per month for three months following the disaster.

Social Safety Nets in Bangladesh

The Government of Bangladesh (GoB) allocated 15% of the total national budget for social protection programs, roughly 2.5% of GDP in 2011-12. The following programs are included with the social safety nets:

- Test Relief (TR), is a food transfer program for those of working age to create employment for the poor in the rainy season to construct, develop and maintain rural infrastructure which has considerably lighter labour requirements compared to Food for Work Programmes (FFW). Under the program, a beneficiary gets 8kg of food grain per day for a maximum of 30 days.

- Gratuitous Relief (GR) provides emergency food and other necessities to the victims of natural calamities. The programme is short-term in nature and has a provision to transfer 10kg of food grains per person per month. Additionally, under the programme cash can be distributed as well.

Impacts of Social safety Nets

Safety net programs in Bangladesh have also become successful to a certain extent in Disaster Risk Reduction (DRR). The majority of the households benefiting from the safety net programs based on cash transfer have been able to increase household income and recover their livelihood.[19] Programs targeted at women have (a) increased women's participation in household decision-making; (b) improved health conditions of women and their family members; (c) encouraged small investment for income generation in the future; and (d) revived the traditional system of in-family care.[20]

1.7 Coping Strategies of Farmers

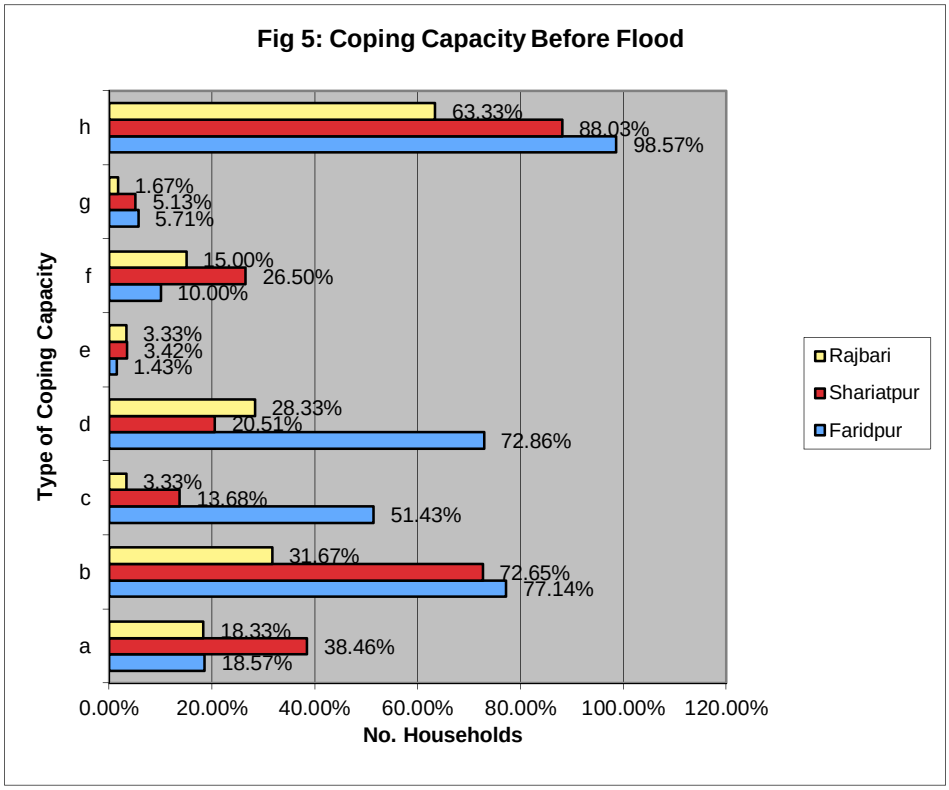
Various measures are taken by households (HH) before the occurrence of a flood to reduce risks. These measures include raising the plinth level of the home, storage of food and other essential HH goods, harvesting crops, storing dry food and drinking water, collecting fuel, repairing shelter, keeping livestock/poultry in a safe place, and fodder preservation etc. A baseline survey of affected households showed the following coping strategies: 64% of HH raised their homestead, 28% raised their plinth level of dwelling house, 22% stored food and other essential HH items, 22% stored dry food and drinking water, 85% collected fuel and cooking ovens, 37% kept fodder, 3% hold cash and another 19% takes 'other' steps (such as keeping bamboo and ropes ready) as measures to face risk of impending flood.[21]

[19] Chowdhury, Md Munir *Research Report On A Comparative Study Of Disaster Risk Reduction And Post Disaster Livelihood Recovery Program In Japan And Bangladesh,* March 2012

[20] Ibid

[21] European Commission Humanitarian Aid (2009) *Baseline Survey Report for the Project Building Community Resilience to Floods in the Central Region of Bangladesh, Fifth DIPECHO Action Plan*

Figure 7: Coping Mechanisms before Flood Onset



a = Number of households with raised homesteads
b = Number of households who repair house
c = Number of households who store dry food
d = Number of households who store food
e = Number of households with cash reserves
f = Number of households which stock ropes and bamboo for S&R purpose
g = Number of households who plant trees
h = Number of households which stock a movable oven and fuel

1.8 Floods

The recurring floods in Bangladesh have had an enormous impact on its land, people and economy. While investments in early warning systems and flood prevention have definitely decreased the loss of lives associated with flood events, the economic impact has been increasing. The economic impact of floods does not appear to be in direct correlation to the severity of the floods. The two worst floods of the past 30 years in Bangladesh were those in 1988 and 1998. The 1998 flood has been termed "the flood of the century". However, these events had a combined estimated economic impact of $2.3 billion. Yet the lesser flood events of 2004 and 2007 had a combined estimated loss of $3.26 billion, an increase of nearly $1 billion in losses (see table below).

Table 4: Estimated Loss Due to Floods (USD)

Year	1988	1998	2004	2007
Loss of Income / Assets	330 million	2 billion	2.2 billion	1.06 billion

Source: National Strategy for Accelerated Poverty Reduction II General Economics Division, Planning Commission Government of Peoples Republic of Bangladesh, October 2008

The 1988 flood caused over 2,300 deaths and damages variously estimated at about US$1,200m. The decrease in lives lost during the 1998 flood (1,100) is generally accorded to the improvements in early warning systems and flood preparedness. This trend can be seen when comparing the flood events of 1988, 1998, and 2004 (see table below). The number of deaths in the 2004 flood was under 800.

The 1988 flood affected over 45 million people while the 1998 flood affected roughly 31 million people. Rice production lost was relatively similar in the two events at approximately 2 million tons. The 1998 flood had a wide ranging impact on the infrastructure of Bangladesh with 16,000 km of roads and 4,500 km of embankments damaged, and over 6,800 bridges and culverts damaged (see table below).

Table 5: Estimates of Losses and Damage in the Bangladesh Floods of 1988 and 1998

	1988	1998
Area flooded (km2)	89,970	100,250
Average duration of floods (days)	34	59
Number of affected people	45,000,000	30,916,351
Number of deaths	2,379	918
Rice production lost (million tons)	2.00	2.04
Number of cattle lost	172,000a	26,564
Roads damaged (km)	13,000	15,927
Embankments damaged (km)	1,990	4,528
Number of bridges and culverts damaged	1,160	6,890
Number of affected houses	7,200,000	980,571
Number of schools damaged	19,000	1,718
Number of displaced people	n.a.	1,049,525

Sources: Grameen Trust flood website: hhtp://www.bangladeshonline.com/gob/flood98/

Table 1.1: Comparison of Losses Resulting from the 1988, 1998 and 2004 Floods

Loss	1988	1998	2004
No. Livestock killed	172,000	26,564	8,318
Crops damaged (m. ha.)	2.12	1.74	1.30
Deaths	2,300	1,100	747
Rice production losses (million metric tones)	1.65	2.06	1.00
No. of people affected	45 million	31 million	36 million
Roads damaged (km)	13,000	15,927	27,970
Percent of land inundated	60	68	38
No. of homes damaged/destroyed	7.2 million	980,000	4 million
Total losses	**Tk 82.6 billion** (US$1.4 billion)	**Tk 118 billion** (US$2 billion)	**Tk 134 billion** (US$2.3 billion)

Sources: Ministry of Fisheries and Livestock; Papers from the *National Workshop on Options for Flood Risk and Damage Reduction in Bangladesh*, September 7-9, 2004; ADB and World Bank Staff estimates.

1.9 Cyclones

The impacts of cyclones on the coastal regions of Bangladesh are widespread. In November 2007, Cyclone Sidr, a category 4 cyclone, hit the southern region of Bangladesh affecting 33 districts with an economic impact of $1.7 billion. The death toll was nearly 4,000 as buildings collapsed in the 240 km per hour winds and were drowned in tidal surges over 15 feet high. According to the report by the Food and Disaster Management Ministry, nearly 1.6 million families were affected by the cyclone and some 1.2 million houses were damaged completely or partially. Approximately 2.5 million acres of agricultural land were damaged, including approximately 1 million tons of rice, and 350,000 trees were uprooted by the storm.

Cyclone Aila, a category 1 cyclone, struck the southwest coast of Bangladesh on May 25, 2009. Aila caused 190 deaths, damage to over 6,000 Km of roads and the collapse of over 1,700 Km of embankments, destruction of 275 primary schools. Aila affected nearly 4 million people and over 350,000 acres of crop land were destroyed.

Both cyclones also caused considerable damage to infrastructure and coastal embankments and altered not only the landscape but also the salinity of the water and land.

2 Humanitarian Response/Late Response

Typical late humanitarian response to flooding and cyclones includes food aid, cash transfers for food, shelter (tents, tarps, polysheeting), and WASH. In many cases this only occurs after the government has declared a disaster and local and international agencies can participate in the recovery efforts. The following section describes the main components of late humanitarian response to floods and droughts, as evidenced by:

- WFP operations
- Oxfam operations; and

- International Federation of Red Cross and Red Crescent Societies (IFRC) and Bangladesh Red Crescent Society (BDRCS)

World Food Program: Based on personal communication with Ally Qureshi, Deputy Country Director

The figures presented below are based on the World Food Program's (WFP) Chittagong 2012 flood response. It is considered late humanitarian response because the humanitarian interventions in these regions were very limited prior to emergency action and the area already had significant levels of food security and income generation opportunities.

The WFP assessment of the area identified 6,500 households as critically food insecure and in need of immediate food and nutritional assistance. Food and cash were noted to be the priority needs over the lean season (May-September) where little food is available and income prospects are limited. WFP implemented a six month intervention comprised of three components. The first component was a one-off cash transfer of 2,000 Tk for the purchase of seeds. This assisted households in re-establishing crops thereby averting a prolonged lean season and restoring livelihoods. The second component consisted of a monthly food and cash ration to meet food needs. Fifty kg of rice, 3 litres of oil, and 1,200 Tk were distributed to each household per month. WFP noted that although rice was available in the village markets, prices were considerably higher (20-52%) than in the main markets (farther away). The monthly cash distribution allowed households to purchase additional food commodities to complement the food ration. Rice and vegetable oil provide approximately 1,380 kcal per day. The recipient households were expected to spend a considerable portion of the cash grant on preferred food items like *nappi* (fish paste) to provide nutritional benefits and contribute to the 2,100 kcal/person/day calorie requirement. The final component was a supplementary food ration for pregnant and lactating women (PLW) and children under the age of 5 within identified households to address specific nutritional needs. A daily ration of 200g (6kg/month) Supercereal (micronutrient fortified wheat-soya-blend) was provided to PLWs and children<5.

The total cost for the late humanitarian response was calculated to be US$49/beneficiary for the food and cash assistance and US$52/beneficiary for nutritional support.

Oxfam: Based on personal communication with Kaiser Rejve, Humanitarian Program Manager and M.B. Akhter, Program Manager, May 12, 2013

Oxfam is pre-dominantly in favor of alternatives to food aid and promoting cash based responses where the market is functioning. In the case of Bangladesh, the standard humanitarian response for Oxfam is WASH (including clean water, sanitation facilities and NFI), cash (for food and environmental cleaning in 1st phase and livelihood recovery in 2nd phase) and temporary and transitional shelter. The breakdown of these items is in Table 7 below. Oxfam normally pre-positions some items such as plastic sheeting and sanitary facilities, but it is typically 20% of total requirements. According to Oxfam, it isn't cost

effective to pre-position a large quantity when most items are readily available in local markets and can be supplied with short notice.

Table 6: Costs for Oxfam Standard Humanitarian Relief

	Phase I	**Phase II**
	0-30 Days	**Extended >30 Days – 3 months**
Cash program	3000tk/month	
WASH	6000tk/hh or	
	18,000tk/cluster	
Temporary Shelter	2000tk	
Total	Avg of 200 USD	300 USD

IFRC and BDRCS: Northern Bangladesh Floods Recovery Assessment November 2012 Kurigram, Gaibandha And Jamalpur Districts, December 2012

The floods of June 2012 significantly affected 10 districts in the country's northern and south-eastern parts. Government statistics on 31 July 2012 reported 131 deaths. The government's Disaster Relief and Rehabilitation Office (DRRO) reported that a total of 1,029,695 families were affected across 74 upazilas (subdistricts). The IFRC and BDRCS conducted an assessment of the situation and provided late humanitarian response according to need. According to the report, interviews conducted with shop owners and communities indicated that the flood had not had a long term effect on the market. The food retailers reported purchasing goods from a number of suppliers in district centres and further afield.

As a result, the BDRCS response included three components based on market costs of available items. It included a minimum monthly food basket, based on the WFP recommended survival ration per person per day for an average family of five members, calculated to be 3,954 Tk. Cost for non-food items of 175 Tk/household. And an amount intended for either shelter repair or livelihood asset protection (such as preventing loss or sale of further assets such as livestock) or income generation purposes (replanting gardens etc) calculated at 5,500 Tk. See the tables below for detailed contents of the food basket and non-food items. The total one off cash grant amount distributed by BDRCS totaled 13,758 Tk/household or $170 for a two-month intervention.

Table 7: Calculating the Cost of Minimum Food Basket (MFB) for the Household:
Cost of Minimum food basket for FAMILY

Item Name	Quantity (kg)	Unit Price (BDT)	Total Price (BDT)
Rice	60	30	1800
Lentil (Mushur)	9	130	1170
Soybean Oil	3.75	140	525
Wheat flour	7.5	37	278
Sugar	2.25	50	113
Salt	2.25	30	68
		Total	**3954**

Note: This basket is based on the WFP recommended survival ration per person per day for an average family size of 5 members for one month. It is very important to note that this is a **Survival** ration only that is adequate for short to medium term basis only and is calculated for an average **Family** of 5. The average family size in Northern districts varies only very slightly (5.29), and therefore this rate is considered acceptable for this region.

Table 8: Calculating the cost of the Non-Food items:
Cost of Basic Non Food items for a FAMILY

Item Name	Quantity (kg)	Unit Price (BDT)	Total Price (BDT)
Kerosene	1	65	65
Laundry Powder	1	70	70
Bar of Soap (body)	1	28	28
Candles	1	5	5
Matches	1	2	7
		TOTAL	175

3 Early Response

Having been affected by severe cyclones in the past decades, the Bangladesh government has gradually shifted its disaster management strategy from a disaster response approach to a greater focus on disaster preparedness, developing key mechanisms and tools (such as the Cyclone Preparedness Programme or the building of cyclone shelters) in order to reduce the vulnerabilities of the population in the coastal zone.

During the 1990s, Bangladesh was hit by five large cyclones. Up to 140,000 people died, most of them during one storm. Before the cyclones made landfall, over 2.5 million people were evacuated which almost certainly saved lives. This was largely thanks to the Cyclone Preparedness Programme (CPP) initiated in the early 1970s by the International Federation, the Bangladesh Red Crescent Society (BDRCS) and the government of Bangladesh.

The CPP was started after almost 500,000 people died during a cyclone in November 1970. In the cyclone of 1991, about 140,000 people died – but 350,000 were safely evacuated. In May of 1997, a similar cyclone claimed less than 200 lives, while a million people were

evacuated into shelters, in 2007 only 3400 died and in 2009 only 113 died. Over the same period, the CPP was progressively extending its shelters and communications systems. Clearly the investment paid off. The CPP can now alert around 8 million people across the whole coastal region, of whom it can assist around 4 million to evacuate. The warning system uses Asia's largest radio network, linking the CPP's Dhaka headquarters with 143 radio stations. Radio warnings are then relayed by 33,000 village-based volunteers using megaphones and hand operated sirens. The volunteers are also trained to rescue people and evacuate them to shelters, administer first aid and assist in post-cyclone damage assessment and relief.

The total operating costs of the CPP were estimated at $460,000 in 2001: the Bangladeshi government contributes 56 per cent and the International Federation covers the remainder. Local communities do not contribute to CPP's running costs, but raise funds to manage and maintain cyclone shelters. In total, there are 1,600 shelters across the coastal region, 149 of them built by the BDRCS. Each BDRCS shelter can accommodate up to 1,500 people and costs around US$ 78,000 to build, plus an annual maintenance fee of about US$ 780. Assuming the shelters last approximately ten years, that amounts to a cost of less than US$ 6 per head for each year of protection.[22]

Additionally, with technical support from the joint Government of Bangladesh-UNDP Comprehensive Disaster Management Program, Bangladesh's Disaster Management Bureau has piloted the use of an early warning system for communities at risk from floods and cyclones. Information about water levels and 72-hour forecasting are collected from the Flood Forecasting and Warning Centre and the Bangladesh Meteorological Department. Warnings are then broadcast through the mobile phone network to areas at risk. These early warning systems are strengthening disaster response and contributing to national disaster management capacity and coordination and have in the process saved countless lives.

While early warning systems have clearly prevented the loss of life during disasters, the reality of humanitarian aid is to target the number of people affected. While the loss of life has trended downward, the number of people affected by natural disasters remains high as a large proportion of the population is vulnerable. Food aid, cash transfers, non-food items (NFI), and medical treatments represent the bulk of humanitarian assistance efforts. Due to the frequency of disasters affecting the country, the markets in Bangladesh have managed to remain resilient in times of disasters with commodities and supplies available almost immediately. Many assessments of flood and cyclone situations have documented the availability of food and materials in local markets immediately after a disaster has occurred. While markets are functioning, there has been a documented increased in the price of these items during the peak times and immediately after disaster events. The IFRC has

[22] International Federation of Red Cross and Red Crescent Societies (2002) *World Disasters Report 2002*

documented the market costs in several assessments.[23] In the 2011 Flood Assessment, the IFRC noted the following increases in the market price of key recovery items such as salt and lentils (45% and 14%), blankets (13%), roofing materials (CGI 23%, straw 43%, bamboo 22%), shelter timber (bamboo poles 18%), and tools (16-20%).

Table 9: Commodity Prices before and after Floods, 2011

Commodity Prices	Before	During flood	Current price	% Increase
Flood 2011				
Coarse rice	33	37	28	12%
Atta	18	25	24	39%
Potato	N.A	28	12	
Masurdal/lentil	78	96	65	23%
Soybean oil	113	124	116	10%
Small fish	86	73	69	-15%
Source: IFRC Current assessment/December 2011		Avg % Increase for all Commodities		**14%**

Based on these figures, the average spike across all commodities is approximately 14%, with individual items reaching 39%. For non-food items, the average price spike during a disaster is 5.3%, not including fodder.[24] Fodder prices spiked an average of 36% and shelter repair items averaged 14% with individual items spiking as high as 43%.

Most of the response agencies in Bangladesh already have pipelines in place where supplies are pre-positioned and stored. In the case of floods and cyclones, the sheer numbers of non-food items and food aid necessary to aid the vulnerable population ultimately requires that they are purchased from the local markets. Oxfam, for instance, normally pre-positions some items such as plastic sheeting and sanitary facilities but it is approximately 20% of the needs they aim to meet. Due to the resilience of markets and their ability to supply most items with short notice, Oxfam doesn't realize a cost benefit to pre-position a large quantity. Oxfam and other relief organizations are pre-dominantly in favour of alternatives to food aid and promoting cash based response where the markets are functioning. The standard response package for Oxfam is WASH (including clean water, sanitation facilities and NFI), cash (for food and environmental cleaning in the 1st phase and livelihood recovery in 2nd phase), and temporary and transitional shelter.

Even by pre-positioning approximately 20% of the needs, a cost saving is evident. The amount of saving for early response activities such as prepositioning and early procurement

[23] IFRC and BDRCS (2012) *Northern Bangladesh Floods Recovery Assessment November 2012 Kurigram, Gaibandha And Jamalpur Districts*
[24] Ibid

can be estimated from the data above to show a considerable number when applied to the number of people affected in each disaster. According to Prevention Web statistics, from 1980 to 2010, an average of 10 million people were affected by natural disasters per year in Bangladesh. Assuming a household size of 6 people, this translates to 1.7 million households affected.

For food market basket and non-food items, the cost for one month per household is 4129 Tk.[25] A 14% savings due to early procurement and/or positioning translates to 578 Tk per household. At 1.7 million households affected per disaster, on average, the estimated gross cost savings if total needs are pre-positioned would amount to 982 million Tk per natural disaster or $12,275,000, at the current exchange rate of 80 Tk/ 1 USD. However, based on the reality of market resilience in Bangladesh and the assumption that pre-positioning 20% of needs is a cost-effective model, the estimated saving of early response on average is $2,455,000.

4 Resilience

One of the main resilience building measures for flood and cyclone affected agricultural populations is the research and production of alternative rice varieties to address the loss of rice production during flood and cyclonic events. After a cyclone, tidal surges inundate affected areas with saline water, altering the line at which salt water and freshwater differentiate. Generally, salt water pushes from the sea into the river systems while freshwater flowing down through the river systems counteracts this, creating a line of salinity that varies according to season and with tidal surges associated with cyclones. A draft 2009 World Bank report, "Implications of Climate Change Risks on Food Security in Bangladesh", indicates that during June to September, saltwater intrudes more than 70km landward in the western part of the Sundarbans, whereas comparatively higher freshwater flows (during the monsoons) through the primary Ganges waterways help to push or counter this saline front towards the sea. In contrast, during the dry season (December to March), saltwater intrusion stretches more than 90km landward at the western part of the coastal area in the Sundarbans due to the lack of volume of freshwater flow pushing it towards the sea. Due to the counteracting forces of freshwater and saltwater, during the monsoon season, about 12 per cent of the total area is under high salinity levels, which increases to 29 per cent during the dry season. With predicted sea level rise due to climate change, this drainage gradient may shift causing far greater seawater intrusion inland.

The coastal belt of Bangladesh already suffers from high levels of salinity as a result of saltwater intrusion. Under a moderate climate change scenario, the crop loss due to salinity

[25] IFRC and BDRCS (2012) *Northern Bangladesh Floods Recovery Assessment November 2012 Kurigram, Gaibandha And Jamalpur Districts*

intrusion (as a result of sea level rise) could be about 0.2 million metric tonnes (Habibullah et al. 1999).[26]

Alternative rice varieties in Bangladesh already include various saline tolerant strains. Further, flood tolerant varieties were introduced in 2010. BRRI dhan51 is an alternative rice variety that has proved effective for flash flood prone areas in the Aman planting season. This submergence tolerant rice variety can produce 4.0 t/ha grain yield despite 10-16 days of flash flooding. BRRI dhan52 is also designed for flash flood prone areas in the Aman season. This submergence tolerant rice variety can produce 4.5-5.0 t/ha grain yield despite 10-14 days of flash flooding.

BRRI dhan53 is designed for salinity prone areas (8-10 dS/m) in Aman. It is 20-25 days earlier and 15 cm shorter than BRRI dhan41 with similar yield, which is suitable for cultivation in brackish shrimp field culture. The benefit being improved rice production in the saline prone coastal areas. BRRI dhan54 is also for salinity prone areas (8-10 dS/m) in Aman. This variety is 10-15 days earlier and can produce 0.5-1.0 t/ha higher yield than BRRI dhan41. This variety is also suitable for cultivation in brackish shrimp fields in the coastal regions.

According to the study, "Planning and costing agriculture's adaptation to climate change in the salinity-prone cropping system of Bangladesh"[27], the cost of production per decimal (1/100 of an acre) of traditional rice varieties ranges from 85 to 173 Tk and the cost of production per decimal of saline-resistant varieties ranges from 135 to 259 Tk while yields per decimal range from 9.7kg to 18.2kg and 14kg to 24.2kg, respectively. The higher costs for the saline-resistant varieties is due to the necessary inputs, such as fertilizer. Although the cost of production for saline resistant varieties is greater than traditional rice varieties, the net profit per decimal of saline resistant varieties is 157 to 278 Tk versus 88 to 219 Tk for traditional varieties (see tables below). This study shows that not only are alternative rice varieties comparable in price and production cost to traditional varieties, the profit margins are greater. Taking this into account, the use of alternative rice varieties, specifically saline resistant, is a cost effective way to build resilience in areas of saline intrusion in Bangladesh. No studies have been found to date on the cost comparison for the recently introduced flood resistant rice varieties.

5 Treatment of Acute Malnutrition

Save the Children USA (SCUS) has been working in the Barisal Division in southern Bangladesh since June 2004 and between 2004 and 2010 implemented a six-year

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[26] Mainuddin, K., Rahman, A., Islam, N. and Quasem, S. 2011. *Planning and costing agriculture's adaptation to climate change in the salinity-prone cropping system of Bangladesh.* International Institute for Environment and Development (IIED), London, UK.

[27] Ibid

development assistance program named Jibo o Jibika (Life and Livelihoods) in three districts. Barisal has a population of approximately 8 million people and is among the poorest regions in the country with high rates of acute malnutrition according to the Demographic and Health Survey 2007. SCUS piloted community case management (CCM) of Severe Acute Malnutrition (SAM) in Burhanuddin Upazila where the SAM rate was 3.4%. 724 children over 6 months were identified with SAM. Of these 11 cases had complications but all 724 cases received outpatient treatment. Table 10 presents the findings from the study, demonstrating the significant cost efficiencies that can be achieved through early treatment of SAM using a community based care approach.

Table 10: Cost Effectiveness of the Management of SAM in the Interventions and Comparison Upazila

Table 11: Cost effectiveness of the management of SAM in the intervention and the comparison Upazila

	Intervention Upazila CCM of SAM	Comparison Upazila Inpatient care
Total cost USD	$119,697	$82,324
Cost per child treated USD	$165	$1,344
Cost per child recovered USD	$180	$9,149
Number of DALYs averted (95% CI)	4,683 (3,913; 5,501)	67 (0; 172)
Cost per DALY averted USD (95% CI)	$26 ($21; $31)	$1,344 ($445; $3,788,726)

Table 11 above presents the main cost effectiveness outcomes for this study: cost per child treated, cost per child recovered from SAM, number of DALYs averted, and cost per DALY averted.

A comparison of the cost for the SAM intervention versus other countries is shown in Table 11.

Table 11: Comparison of cost-effectiveness results for CMAM

Cost outcome	**Bhola**	**Bangladesh**	**Ethiopia**	**Malawi**	**Zambia**
	(this study)				
Per recovery	$180	$29*	$145		
Per treated case	$165				$203
Per DALY	$26			$42	$53

In partnership with the International Centre for Diarrhoeal Disease Research, Bangladesh, (ICDDR, B) WFP is developing culturally acceptable, locally produced, and cost-effective

complementary food supplements for children 6-23 months. The effectiveness of these complementary food supplements is being tested against more 'traditional' WFP supplementary feeding products; the tests are being conducted in partnership with Johns Hopkins University and DSM. If successful, this will provide an entry point for local procurement of supplementary feeding products as well as facilitate the integration of nutrition products into government safety nets.

WFP makes available a fortified blended-food for supplementary feeding of children 6-23 months during the two agricultural lean seasons in targeted areas of Bangladesh. Children 6-59 months and pregnant and lactating women identified with moderate acute undernutrition are provided with curative supplementary feeding.

In addition to the delivery of awareness messages on preparation of the supplementary food, WFP is also engaged in behavioural change communication strategies, involving the training of targeted programme participants and influential family and community members with the aim of promoting positive nutrition behaviours (for example appropriate breast feeding, complementary feeding and hygiene practices), and addressing gender discrimination in food allocation.

The EU is in the process of determining its nutrition strategy and has already indicated that funds will be made available for nutrition programmes. Furthermore, preliminary discussions with the EU have revealed that food security and nutrition will be featured elements of the new EU Country Strategy for Bangladesh and are major components of the current EU strategy, in focal and non-focal areas as well as through the Food Security Thematic Programme. The programme estimates a yearly cost per beneficiary of US$46.

ANNEX 1: Foreign Economic Assistance to Bangladesh

9.23 Summary of Commitment and Disbursement of Foreign Economic Assistance to Bangladesh

(Million U.S. Dollar)

Itmes	Commitment								
	2000-2001	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-2008	2008-09
Food Aid									
Grants	245	51	9	6	6	15	**112**	**92**	**180**
Loan	-	-	-	-	-	-	-	-	-
Total	254	51	9	6	6	15	112	92	180
Commodity Aid									
Grants	222	144	123	-	22	-	-		-
Loan	-	-	-	-	-	-	-		-
Total	222	144	123	-	22	-	-		-
Project Aid									
Grants	442	207	249	880	276	643	614	866	243
Loan	1117	488	1311	1036	1277	1130	1527	1881	2021
Total	1559	695	1560	1916	1553	1773	2141	2747	2264
Food Aid	245	51	9	6	6	15	112	92	180
Commodity Aid	222	144	123	-	22	-	-	-	-
Project Aid	1559	695	1560	1916	1553	1773	2141	2747	2264
Gran Total	**2026**	**890**	**1692**	**1922**	**1581**	**1788**	**2253**	**2839**	**2444**
Grants									
Food Aid	245	51	9	6	6	15	112	92	180
Commodity Aid	222	144	123	-	22	-	-	-	-
Project Aid	442	207	249	880	276	643	614	866	243
Total Grants	909	402	381	886	304	658	726	958	423
Loans									
Food Aid	-	-	-	-	-	-	-	-	-
Commodity Aid	-	-	-	-	-	-	-	-	-
Project Aid	1117	488	1311	1036	1277	1130	1527	1881	2021
Total Loan	1117	488	1311	1036	1277	1130	1527	1881	2021
Total Grants & loans	**2026**	**890**	**1692**	**1922**	**1581**	**1788**	**2253**	**2839**	**2444**

Source : Flow of External Resources into Bangladesh, June 30, 2007.

9.23 Summary of Commitment and Disbursement of Foreign Economic Assistance to Bangladesh (Contd.)

(Million U.S. Dollar)

Itmes	Disbursement								
	2000-2001	2001-02	2002-2003	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Food Aid									
Grants	51	36	48	32	33	98	59	110	52
Loan	-	-	-	-	-	-	-	-	-
Total	51	36	48	32	33	98	59	110	52
Commodity Aid								-	-
Grants	145	155	175	-	22	-	-	-	-
Loan	39	-	-	-	-	-	-	-	-
- Total	184	155	175	-	22	-	-	-	-
Project Aid									
Grants	335	289	287	306	189	403	531	550	607
Loan	825	944	1075	694	1205	1065	1041	1403	1188
Total	11160	1233	1362	1000	1394	1468	1572	1953	1795
Food Aid	51	36	48	32	33	98	59	110	52
Commodity Aid	184	155	175	-	22	-	-	-	-
Project Aid	11160	1233	1362	1000	1394	1468	1572	1953	1795
Grant Total	**11395**	**1424**	**1585**	**1032**	**1449**	**1566**	**1631**	**2063**	**1847**
Grants									
Food Aid	51	36	48	32	33	98	59	110	52
Commodity Aid	145	155	175	-	22	-	-	-	-
Project Aid	335	289	287	306	189	403	531	550	607
Total Grants	531	480	510	338	244	501	590	660	659
Loans									
Food Aid	-	-	-	-	-	-	-	-	-
Commodity Aid	39	-	-	-	-	-	-	-	-
Project Aid	825	944	1075	694	1205	1065	1041	1403	1188
Total Loan	864	944	1075	694	1205	1065	1041	1403	1188
Total Grants & **Loans**	**11395**	**1424**	**1585**	**1032**	**1449**	**1566**	**1631**	**2063**	**1847**

Source : Flow of External Resources into Bangladesh, June 30, 2009.

ANNEX 2: Detailed Resilience Programs

Programs:

Oxfam GB, Bangladesh: Resilience through Economic Empowerment, Climate Adaptation, Learning and Leadership (REE_CALL)

Project Area

6 Upazillas of 4 Districts: Barisal, Borguna, Pataukhali, Pirojpur

Partner NGOs

DakDiye Jai, JagoNari, WAVE Foundation.

Target

10,500 Beneficiary Households (BHHs)

Years to graduate

3 years

Budget and Cost per BHH

The total budget is BDT 235,750,000
cost per BHH is BDT 22,452
of which direct delivery cost per BHH is BDT 13,908.

Key Aspects

The project operates by developing Community Based Organisations (CBO) to engage target households in livelihood initiatives. These CBOS become the hubs of change which drive the resilient communities. They are provided with skills training, information and confidence building so that:

- The communities are capable to anticipate the risk associated with climate changes and disaster and respond accordingly
- Households are able to engage in alternative livelihood activities adaptive to climate variability.
- Producer group emerge from targeted communities develop wider markets linkage and able to gain fair price for their products
- CBO representatives are able to negotiate with service providers for improve access of their entitlements.
- Communities with enhance social capital enable for effective use of local recourses and opportunities and influence local power structure
- Communities are aware about disaster risk reduction (DRR), disaster preparedness and are able to manage and adapt with climate variability.
- Women leadership emerged and they are active in family, community and public sector decision making with recognition.
- Incidence of violence against women is reduced and women emerge as leaders to engage in livelihood options and can represent in their households and communities.

OxFam is currently working with farmers growing chili peppers as an alternative crop in areas affected by the early season rains. The farmers are harvesting the peppers early to prevent loss and crop damage. In order to prevent selling the unripe peppers at a substantial discount, OxFam is providing the farmers with plastic sheets to ripen and keep the peppers dry—in effect preserving market prices and reducing the impact of environmental shock to households.OxFam has created a marketing arm for the farmers who sell their produce directly to large national retailers at wholesale prices. By combining the assets of the group, they are able to supply a larger amount at one sale and receive a better price.

Practical Action Bangladesh: Pathways from Poverty - Building Economic Empowerment and Resilience for Extreme Poor Households in Riverine areas of Bangladesh

Project Area
4 vulnerable districts namely Rangpur, Gaibandha, Lalmonirhat and Nilphamari
Target
16,850 Beneficiary Households (BHH)
Years to Graduate
3 years
Budget & Cost per BHH
Total Budget is BDT 365,871,079
cost per BHH is BDT 21,713
of which direct cost per BHH is BDT 11,330
Key Aspects

- Generating employment opportunities for 8,000 extreme poor households through the utilisation of sand-bars, under-utilised lands and water resources;
- Providing operational access to sandbar cropping in char and fallow lands;
- Provide skills training to the beneficiaries in different fields of farm and non-farm activities;
- Adopting participatory market development approaches to link the extreme poor to markets to create income opportunities;
- Creating opportunities for the extreme poor through various on and off farm livelihood options to cope with risks and ensure year round livelihood security;
- Capacity building for protecting assets during climate variability induced disaster;
- Female-headed extreme poor households will be given priority for grants and asset transfers;
- Empowering the extreme poor by building links, awareness and enhancing their ability to increase their access to services from the local institutions, government and the private sector;
- Works in partnership with local NGOs, various stakeholders, service providers etc.;
- Partners are particularly responsible for sensitisation, motivation, organisation and group formation, assessment and the development of needs-based programmes;
- 2 strategic partners of PFP shiree project one is responsible for mainstreaming the Peoples With Disability (PWD) and another one is responsible for measure the poverty graduation and advocacy.
- Strengthening Community Based Fisheries Management (CBFM), which need access to common water bodies;
- Developing 600 Rural Service Providers (RSP)
- Focus on remote and vulnerable embankment dwellers;

Concern Worldwide (Scale Fund): Economic and Social Empowerment of the Extreme Poor (ESEP)

Project Area
Sunamgonj and Habigonj districts of Sylhet Division; Kishoregonj district of Dhaka Division.

Partner NGOs
Voluntary Association for Rural Development (VARD), PallyBikash Kendra (PBK) and Friends in Village Development, Bangladesh (FIVDB).

Target
22,500 Beneficiary Households (BHHs)

Years to graduate
3 years

Budget and Cost per BHH
The total budget is BDT 333,621,846
cost per BHH is BDT 14,828
of which direct delivery cost per BHH is BDT 9,243

Key Aspects

- Brings together proven interventions for synergy in addressing irregular income, weak asset-base, marginalization and sustainability.
- Supports extreme-poor to lease land and introduce two crops based on proven pilot (with Bangladesh Agriculture University) of shorter-maturing rice (BR28) plus Challisa Potato/vegetables with inputs/technology, doubling income with 'group-marketing approach'.
- Supports extreme-poor for collective leasing of water-bodies for fishing with market-linkage.
- Supports alternative/additional income opportunities, e.g. livestock-rearing (duck, geese) in monsoon and specific handicraft production proven appropriate for haor with market-linkage.
- Addresses marginalization, promotes asset accumulation, protection and sustainability via formation of proven gender and economically empowering Self-Help-Group(SHG)/apex-body platforms (CBOs) using savings for re-investment and risk reduction, adopting proven model for bank-loan access and accessing government services, unifying groups to negotiate with officials/elites for accessing safety-net schemes for vulnerable (physically challenged/elderly) and to common-resources.
- Encourages creativity via youth involvement in SHG/CBOs, introducing ICT for market and value-chain access and pricing/business-planning decisions.

Helen Keller International (HKI): Resilience to health shocks through improved agricultural production and market access

Project title

Making Markets Work for Women (M2W2)

Project Area

Laksmichhari, Upazila, Khagrachhari

Target

450 Beneficiary Households (BHH)

Years to Graduate

3 years

Budget (BDT)

Total budget 31,165,286

Cost per BHH 69,256

direct delivery cost per BHH 25,399

Key Aspects

- This project addresses the critical issues of participating in markets and accessing services while simultaneously building human, social, and physical capital to allow the extreme-poor greater resilience to livelihood shocks and more equitable participation in household and community decisions;
- Transfers training and tools for contour farming to beneficiaries with a general orientation on contour farming,erosion control and resource management techniques for the entire community;
- Develop contour farming demonstration plots by introducing a few high-value crop varieties, such as long grain sticky rice, sesame, olives, blackberries, orange trees, pineapples, grapes, and intercropped maize;
- Formation of Marketing Committees (MC) for group training and distribution of contour farming, improved agriculture production, post-harvest processing, as well as business skills(numeracy, business management, pricing, negotiation, and book-keeping skills);
- Technical advice to improve yield through raised bed technology, intercropping, trough irrigation, integrated pest management, and use of organic fertiliser;
- Introduction of simple, low-cost post-harvest storage and processing technologiesand set up demonstration sites for solar driers, spice grinders, canning, and packaging;
- Each MC will be provided with a group-managed transportation asset for transporting bulk produce to local markets;
- Strengthening long-term income and livelihood security by improving household nutrition and access to health services.