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Bangladesh, Factor 5: Climate Volatility

## **Bangladesh: Innovative and Sustainable Agricultural Practices to Combat Climate Volatility**

The river delta peacefully laps the land of Nasrin Khatun of the Khulna District in rural Bangladesh. The Ganges echoes a resounding pit-pat-pit-pat-pit-pat. However, the river is not always this peaceful. It has been more of a fiend than a friend to Nasrin Khatun. “After the flooding we have lived here because we lost everything,” Nasrin says as she squats on the dusty floor of a hut in her village (“Home in the Delta”). “Before, we had space and land. That land dissolved and fell to the Ganges. That’s why we are forced to be here now. We are stuck here (“Home in the Delta”).” Many Americans have only observed the dangerous rivers of Bangladesh in a scene out of the Hollywood action blockbuster, *Avengers: Age of Ultron*, which features a Chittagong, Bangladesh shipyard (Ferdous). But, the rural farm families in Bangladesh witness the destruction caused by climate volatility firsthand. Many people around the world are simply not aware of what is going on in Bangladesh. Climate volatility is something we, as a global community, need to address for the sake of Bangladesh’s rural farm families. This paper will present and analyze the current situation of small-scale agriculture in Bangladesh in order to propose solutions that will make family farming more sustainable and resilient to climate change in the coming years.

### **The Typical Farm Family in Bangladesh**

Rural farming households in Bangladesh need sustainable solutions to climate volatility. Climate volatility in combination with poor nutrition, deficient health care access, and gender inequality heightens food insecurity in poor farming households. People in Bangladesh are largely dependent on rice, a commodity that Bangladesh’s people have long associated with the concept of food security. Bangladesh remains one of the highest rice consumers in the world (152 kg per person annually); wheat products, lentils (dal), and edible oils are less-popular sources of nutrients (“USAID-BEST”). The farmers operate following two main seasons for growing and harvesting their crops. Farmers grow and sow *kharif* crops (*Aman* and *Aus* rice) during the wet season and harvest the crops from September to December (“USAID-BEST”). They harvest rabi crops (*Boro* rice, pulses, wheat, potatoes and vegetables) starting from January to the end of June (“USAID-BEST”). However, the high investment in rice production has decreased crop diversity, leaving people more vulnerable to food insecurity and more prone to nutritional deficiency. The typical rural family, averaging about 4.4 people, operates small plots of land—36% of farmers operate on 0.5 acres or less, and 46% operate on 0.5 to 1.49 acres (“USAID-BEST”). Since only 7% of farmers operate on land greater than 2.5 acres, the typical farm family can only increase production if they adopt more advanced agricultural inputs (eg. improved seeds) and training.

Deficient health care access is also a major problem for the typical farm family. The country-wide health care provides 4,000 government-run health centers, but there is a limited number of doctors. Many practitioners can only work at a certain clinic 3-4 hours a day (Amin). A clinic should have a doctor on-hand 24 hours a day, especially if it is the only one available location-wise to villages of rural families. Government-run clinics, though low-cost, are often inaccessible, understaffed, crowded, and lack proper medical equipment (Amin). People in need of urgent medical care—a woman in labor or a man suffering from a heart attack—cannot schedule around a doctor’s schedule.

Gender inequality, a major barrier for women in Bangladesh, also has far-reaching consequences for a typical farm family. This is made apparent when we examine women’s opportunities for education and agricultural success. With regards to education, Bangladesh has increased funding in skills development institutes, such as its Agricultural Training Institutes, as well as primary and secondary education. There is no gender difference in primary school; however, men are more likely to attend secondary school than

women (15% versus 10%) (BDS 2011). Furthermore, gender inequality limits women, even with capital, to access necessary agricultural input. Women who are in charge of households cannot operate their land without a male's help (USA). Therefore, it is difficult for women in charge of households to adequately feed their families.

### **The Effect of Climate Volatility**

Bangladesh is a land of many faces, but the diversity of its geography makes it challenging to address the specific climate-related events (flooding, drought, soil erosion, and rising salinity levels) that plague each of Bangladesh's diverse regions. The Char, Haor, and southwest coastal region are the regions most notably affected by climate volatility. Chars, ecologically fragile river islands, are home to five million of the most poverty-stricken people. Haors, large saucer-shaped floodplains, are located in the northeastern quarter of the country ("Haors in Bangladesh"). Char and haor dwellers are exposed to annual floods with consequences that are devastating to many poor households. This is no surprise—Bangladesh ranks first in the 2014 Climate Change Vulnerability Index ("Bangladesh Climate Change Strategy"). One such instance of vulnerability occurs when poor Char dwellers who rent cows to increase income are left in heavy debt when their cow and land are washed away in annual flooding. Early floods in the Haor districts destroy crops before the opportunity of harvest, and recent heavy floods have uprooted previous flood control infrastructure, leaving Boro rice, the Haori region's main crop, damaged beyond hope. Southwest coastal zones, heavily affected by soil salinity and waterlogging, have become more suitable for shrimp cultivation than agriculture has. Shrimp rearing is simply inaccessible to the average poor household, leaving only middle income and wealthy farmers reaping benefits as the poor are forced to lease their land to shrimp producers at discouraging rates. The southwest coastal zone, the most heavily inundated by natural disasters, has suffered from river erosion and environmental degradation because of unsustainable shrimp production, which has decreased crop diversity and yield in the area. Prolonged salinization and flooding has wreaked havoc for agricultural practices, resulting in soil degradation, contamination, compaction, and an overall devastating loss in profits for the typical farm family (USA). The effects of climate change are felt most strongly by poor households, especially those headed by female figures, who are entrepreneurially disadvantaged because of Bangladesh's gender inequality ("Bangladesh Climate Change Strategy").

### **The Progress Report**

Bangladesh has made great strides in its journey to ensure food security, but there is still a large margin for improvement and development. Recently, it has reached the MDG hunger target to "halve poverty and hunger by the year 2015 through a strategy of pro-poor growth and climate resilient development" ("Bangladesh Climate Change Strategy"). Despite the incredible achievement of lifting 16 million people out of poverty, 47 million people are still living in poverty, and 26 million people still live in extreme poverty ("Social Safety Nets"). Even with the impressive growth in food security, 25 million inhabitants remain undernourished, a statistic that is not likely to improve if Bangladesh's situation stays the same (FAO).

Unfortunately, scientists predict a bleak outlook for climate change and agriculture in the future. Scientists predict that Bangladesh will suffer more from climate-related events than any other country in 2025 (Magnani). Bangladesh is projected to face increased flooding due to glacial melting and more powerful monsoons. The rising sea level will result in increased swamping of southern and western coastal areas. Other possible impacts include a more unpredictable monsoon season, more frequent rains and flooding, and higher climatic variability ("Bangladesh's CLP"). Areas are expected to experience an increase of drought outside of the monsoon season. As a result, crop production may be reduced by 30% by the end of the century, and rice production could fall by 8%; wheat production may decrease by 32% by 2050 (Magnani). By 2050, river erosion and saltwater intrusion will reduce farming land by 40%. Poverty already appears to be greater in coastal areas as erosion damage affects infrastructure, and the threat of erosion and flooding discourages investment ("Bangladesh's CLP"). Scientists predict 14% more

of the country will be heavily inundated by floods by 2030 (Magnani). Farm families will have less land and less investment opportunities if erosion and flooding continue their harmful path undeterred.

### **Improvements for the Future**

A villager in Choto Jaliakhali, Muhammad Moktar Ali gestures to his village neighbors and huts and says, “We don’t know how to support ourselves if we lost this. It is God who will help us survive” (Harris). Muhammad Moktar Ali is not alone, and, hopefully, he and his village will learn in the future exactly how to survive after a natural disaster.

Despite scientists’ forecasts, Bangladeshis can take action. Climate volatility and food security are inextricably linked. Providing peer-to-peer, community based solutions to combat the ill-effects of climate change will increase gender equality and ensure equal access to agricultural inputs and training for poor farm farmers like Ali. 65% of Bangladesh’s labor force is dependent on agriculture (“Sustainability at IFC”). This statistic includes the millions of households below the poverty line in Bangladesh. If governments and NGOs nurture the progress of existing programs and communities of poor farming families in Bangladesh, poor farming households will be able to absorb the shocks of future natural disasters and work together to escape poverty and food insecurity. If Bangladesh’s poor families and women are given opportunities for education and empowerment, there will be greater resilience among communities, increased food security, more advanced education and skills-based training, and steady progress towards gender equality.

### **Effects of Other Major Factors**

Major factors, such as population growth, water scarcity, urbanization, and pollution, will magnify the already monumental effects of climate volatility. Rural families will likely continue to lose land because of urban encroachment and population growth. Scientists predict that moisture stress, a factor that greatly reduces the water in a plant’s cell, will force farmers to decrease rice cultivation in order to concentrate irrigation on smaller plots of land, decreasing the overall size of their yield (Magnani). Climate scientists have concluded that the burning of fossil fuels releases heat-trapping gas, which is making the planet warmer and melting Earth’s ice (Harris). As a result, sea levels will likely rise and flood coastal regions (Harris). At this point in time, Bangladesh is simply not prepared to deal with the predicted rising sea levels and floods, which are far more dire than the natural disasters they currently face. Bangladesh is, in fact, only responsible for 0.3% of total greenhouse gas emissions, which are largely caused by developed countries (Harris). Yet, Bangladesh, one of the most densely-populated countries and the most vulnerable to climate volatility, will be hit the hardest by pollution. Furthermore, scientists believe rising temperatures will lead to more extreme weather, including an increased number of cyclones in the Bay of Bengal. The danger of flooding in conjunction with rising sea levels can worsen annual storms, resulting in greater mass migration to the slums of big cities such as Dhaka and Chittagong. Farmers have already been forced to move to slums because of salinization and land erosion.

“Not one of us actually wants to live here,” says Noakhali, a 30-year old forced to move to the slums of Chittagong, the second-largest city in Bangladesh, after watching erosion and salinization violently destroy the land of her childhood. “All of us came here because of erosions and cyclones, she explains (Harris). Noakhali is not alone. She is among millions who have been displaced by Bangladesh’s climate changes.

### **Recommendations**

The consequences of climate volatility are far-reaching. For this reason, it is crucial to tackle both short-term and long-term solutions. One effective short-term solution involves cash-for-work programs, which are generally implemented in regions affected by devastating natural disasters (Mascie-Taylor). Each year, every mid-September to mid-November in the northwestern Chars, flash floods and tropical storms wash away farmland, damage households, and disrupt crucial agricultural practices (Mascie-Taylor). The

subsequent dates, referred to as the *monga*, are synonymous with widespread food insecurity (Mascie-Taylor). Indicators of *monga* include reduction in size and number of meals consumed in a day, sale of households assets, such as land, livestock, and furniture, and loans from microfinanciers or from village moneylenders at extremely high interest rates ("Social Safety Nets"). The *monga* mostly affects unemployment and income, then food security and nutrition ("Social Safety Nets"). The affected poor families usually decrease food consumption and take out crippling loans. If we address unemployment and income, we can preserve food security post-natural disaster. Therefore, Bangladesh needs a safety-net program that provides stipends to poor farming families to purchase agricultural inputs and materials to rebuild or flood-proof their homes.

One effective short-term solution that should be continued is the Chars Livelihood program. The Chars Livelihood Program (CLP) is a cash-for-work program located in the northwestern Chars that, in its first phase, has directly provided support to 55,000 households and has also provided flood protection, raised latrines and tubes, and opportunities for people to open savings accounts and establish credit ("Social Safety Nets"). CLP offers poor Char households the labor-intensive work of flood-proofing houses using raised earthen plinths (Mascie-Taylor). The program resulted in positive effects for the majority of the 2.6 million men and women integrated into the project. Nutritional diversity and weight gain were observed in participating households (Mascie-Taylor). The participatory households were able to spend a significantly larger amount of income on the consumption of eggs, meat, fish, milk, pulses, and green leafy vegetables—healthy foods that poor households cannot regularly access. There is room for improvement and follow-up—74% of the core CLP Phase 1 participants still reside on the plinths, while 26% do not because of erosion ("Bangladesh's CLP"). The program has discovered that establishing safety-net programs can directly benefit households, who have, in the past, panicked after natural shocks and given away assets such as land and taken out large, stifling loans ("Bangladesh's CLP"). CLP centers around the principle to protect, prevent, promote, and transform to achieve livelihood security. Among these goals is to educate farmers on improved agricultural techniques, a project that should be expanded to more regions in Bangladesh. In fact, the Chars Livelihood Programme, if expanded by government funding and NGO support, has the ability to help each region in Bangladesh suffering from climate-related disasters. These steps and more are crucial in the light of climate resilience, a goal which can only be achieved when poor households have the ability to absorb devastating natural shocks without lasting hardships on the family.

Safety-net programs that ultimately create jobs, not micro-finance schemes that result in crippling loans, are an integral part of providing stability to farming families in Bangladesh post-climate-related disaster. The government has spent more than 2% of its GDP yearly to sponsor safety-net programs for poor families; however, 70% of poor people in Bangladesh do not receive any safety net benefits, mainly because of shortcomings in program administration ("Social Safety Nets"). The majority of rural households in poverty and extreme poverty need access to safety-net programs to empower them to save money in banks, take out conservative, soft loans, and retain valuable assets post-disaster when they would usually sell their assets or take out staggering loans to buy food.

Many believe that microfinance is a tenable short-term solution for rural families looking to escape poverty; however, microfinance schemes do not reach the extremely impoverished inhabitants of a developing country and will therefore not be useful for the family farmers in Bangladesh. Characteristically, microfinance loans are more suitable for those living above the poverty line than for those who live below (Karnani). Clients of microfinanciers with more income are more motivated to take risks with their money, for example, investing in new seed technology or education, whereas poor borrowers mainly concentrate on the immediate goal of provide food security for their families (Karnani). Furthermore, micro-credit loans charge high-interest (Acleda, a Cambodian bank, charges interest rates of 2 percent to 4.5 percent each month, while some microlenders charge more, totalling annual rates of between 30 and 60 percent) (Karnani). Micro-credit loaners argue that their prices are lower than

conventional moneylenders, but if households cannot pay back their loans after a flood or drought hits their region and their harvest is damaged beyond repair, then the microcredit leaves them more destitute than before. People propose microfinance schemes in good faith, but the idea is fundamentally flawed. Microfinance would leave the typical farm family in ruins in the wake of an annual flood, monsoon, or drought.

Safety programs and cash-for-work are all viable short-term solutions, but there is a pressing need for an effective long-term solution. The soft loans, monthly stipends, and access to digital cash should be used to purchase improved seeds. In the long-term, the solution to climate resiliency centers around the seed. The process of developing flood-resistant rice strains has already proven beneficial in Bangladesh and flood-prone areas in Asia. The flood resistant SUB1 gene, when integrated into popular rice strains, allows the rice to retain its flood resistant qualities. This pivotal research has led to the dissemination of flood-resistant rice varieties across Asia. The identification of the SUB1 gene enabled the production of “Sub1 mega varieties,” complete with favorable characteristics such as high yield and good grain quality, as well as local pest and disease resistance. This particular strain of rice, “scuba rice,” has the impressive ability to withstand 17 days completely submerged in flood conditions (U.K.). The International Rice Research Institute’s Stress Tolerant Rice for Africa and South Asia program intends to raise yields by 50% over the next ten years through the dissemination of its SUB1 variety as well as salt and drought resistant strains (U.K.). Many farmers, however, are unaware that such technology exists. Currently, there is no organized system to disseminate these seeds and train farmers how to use this improved seed. However, this organized system is within our reach.

### **The Role of Community, Government, Corporations, and Organizations**

Though the order (expanding cash-for-work programs and disseminating flood-resistant seeds) seems tall, we can use crop research and technology to directly affect the lives of rural farming families. In order to do this, we need communities and farmers to take action. We have to begin by initiating progress and education at the community level. Farmers’ organizations (FOs) must have the opportunity to become active players in the establishment of food security, not simply beneficiaries. Existing farmers’ organizations are very small, running between 20-25 farmers and remaining simply at a community level (Williamson-Noble). An external group cannot impose its will on an FO if it wishes the FO to be sustainable. A strong FO will instead educate beginning FOs through a “peer-to-peer” learning system. If the growing FO observes the many benefits of the established FO, it will have the determination and resources to begin to establish itself. An opportunity exists to work with the Agricultural Training Institutes around Bangladesh, as well as to collaborate and receive instruction and aid from programs like CLP. Because external groups still see farmers as passive beneficiaries and not direct players, the obvious solution is to empower the farmers through education. Every organization needs a leader. Therefore, each village or region in Bangladesh will elect a leader who will enroll in the Agricultural Training Institute to learn about farming techniques and advanced seed technology to benefit their village. Then, the graduated farmers will return to their villages and educate their fellow peers about innovative flood-resistant seeds and improved methods of plant crops to avoid flood, drought, or soil erosion. The CLP and Bangladeshi government will work together with farming organizations to execute a stipend program to give farmers access to the capital they need to buy agricultural equipment and improved seeds. The leader of this process will meet with nearby leaders in their specific regions (different regions will have different needs, naturally) to either form or strengthen existing Farmers’ organizations. There is strength in numbers and strength in peer-to-peer farming. With the farmers themselves at latter stages commandeering education and organization, villages, themselves, will begin to direct progress. The movement will certainly spread if it is done with the intention of empowering farmers.

Noahkhali and Mohammed Moktar Ali are not alone. They are two among millions devastated by climate volatility in Bangladesh. Now, poor farming families are not alone. Programs such as the Chars Livelihood Programme have been designed to support these families and lift them up out of the stubborn

grasps of extreme poverty. Farming families in Bangladesh will not be alone when climate change in the future continues to wreak havoc on their farming land. We, as a global community, will support and empower poor households to establish farming organizations, access education and skills-based training, and utilize advanced agricultural technology. The pivotal step for our global community will be to continue the established momentum Bangladesh has achieved in the last decade to surpass the 2015 MDG Hunger Goal.

Bablu Gazi's story is similar to Noakhali's and Mohammed Moktar Ali's. Mr. Gazi and his wife gave up on farming after two hunger-filled years and moved to the city to find work as day laborers. "I don't want to stay here for too long," Mr. Gazi says, inspiring understanding nods from surrounding crowds (Harris). "If we can save some money, then we'll go back. I'll work on a piece of land again and try to make it fertile" (Harris). Mr. Gazi has hope that he will return to his land and find it fertile. The sad truth is that, without agricultural technology and education, he will not be able to grow crops on the damaged land to support his family. We all have a duty as a global community to help people like Bablu Gazi. We have a duty to free young children like Nasrin Khatun from their misery. We have a moral imperative to help Bangladesh's people reach food security. Dr. Norman Borlaug wisely said that, "Food is the moral right of all who are born into this world." No other words have rung truer for the farm families in Bangladesh, who pray for solutions to their food troubles every day. One day, Bangladesh will eradicate the food insecurity caused by climate volatility, and its people will never feel alone or "stuck" like Ms. Khatun, but surrounded by other farming households working hand-in-hand and side-by-side to feed their people and their families. This outlook is a vision that Mr. Gazi, Noakhali, Mohammed Moktar Ali, and Nasrin Khatun all have in common. We simply cannot leave poor farmers without the proper technology and means to make their dreams and goals come true. After all, food is their moral right.

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