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Bangladesh, Factor 5: Climate Volatility

### **Improving Protection and Awareness of Bangladesh Agriculture from Invasive Climate Conditions**

The country of Bangladesh lies in South Asia on the coast of the Bay of Bengal. It is the eighth most populous country in the world. Bangladesh is one of the poorest countries on Earth. Most of its people live on less than \$1 per day, creating a great mass of poverty. This country is overpopulated as well with 1,000 people per square kilometer. The majority of the population are considered subsistence farmers. Bangladesh grows many different types of crops including wheat and rice which is a staple for their nation. Their climate allows for multiple growing seasons too. They also rely on the deltas and tidal rivers for their commodity supply of fish as well. Bangladesh families work very hard through difficult conditions to survive. Agriculture is what keeps the nation of Bangladesh running, but unfortunately climate volatility can adversely affect the yields for these rural families and diminish their supply of food. A typical family in Bangladesh includes a married couple with about 3-4 children along with extended family most of the time. The average number of people in one single household consists of 5 or more people. The sons of families are expected to help look after their elders. Grandparents are responsible to look after children when parents are away. The Bangladesh society is male dominated, in which they are protective of their female relatives. Women normally have a low status in society and are discouraged from being outside the home, except for the upper class. Even though Bangladesh has many agricultural methods and practices to help feed their nation, climate volatility is one of the major obstacles in food stability. (National Geographic, Bangladesh Facts)

In villages or rural areas, families normally live in humble homes in clusters of bamboo or mud huts, while in urban areas, people lived in apartments. They consume three daily meals with water being the most common beverage. Rice and fish are the main foundation of the diet. Fish, meats, poultry, and vegetables are often cooked in spices. A typical meal consists of a large bowl of rice where small portions of fish and vegetable curries are added. Food is eaten with the right hand by mixing the curry with the rice and then gathering portions using fingertips. When it comes to education, most children begin school at the age of five or six. However, attendance tends to drop off as children become more productive within the household and with the farming tasks. The higher a family's socioeconomic status, the more likely a boy or girl in Bangladesh will finish their primary education. Only a few families are can afford to send their children to college after that. Access to quality healthcare in Bangladesh is limited. In many places, because of cost and availability, a patient consults a homeopath or a nonprofessional doctor who is familiar with local remedies. Commonly, people pursue alternative treatments simultaneously using methods such as visiting a fakir for an amulet, an imam for blessed oils, and a physician for medicine. Professional physicians are consulted by the more affluent and educated people and by those who have not received any relief from other sources. Bangladesh does have a nationally run system of public hospitals provides people free health services, however, prescriptions along with some medical supplies are the responsibilities of patients and their families. (Countries and their Cultures, Bangladesh)

A majority of the population of Bangladesh lives in rural areas on farms which they rely on to supply their families and locals with the food they need to survive. Farms can come in many different shapes and sizes. A small farm is less than 2.5 acres, medium is 2.5-5.0 acres, and large is 5.0 acres or more. Many crops are grown including rice, jute, pulses, tea, wheat, and vegetables. Under ideal conditions, these rich soils and moderate temperatures can yield about three harvests of rice a year and supply some food to the area. However, it may be challenging to grow these crops sometimes due to climate volatility. Unpredictable extreme climate events such as floods, droughts, and seasonal storms can devastate a harvest. Many types of livestock are also raised on the farms. Examples include: sheep, goats, poultry,

and bovine (buffalo, cattle, horses) which are all important to the economy. If crops do not reach full development for harvest, this can negatively affect raising livestock towards full maturity.

Bangladesh is a low-lying country formed by the alluvial plain of the Ganges-Brahmaputra, which is also the largest delta in the world. The Ganges River meets up and connects with the Jamuna and then with Meghna and their tributaries. Bangladesh has a total of 57 trans-boundary rivers, which makes water issues politically complicated to resolve. The rivers create annual floods which distribute silt to renew farmland fertility, which often creates new islands in the delta that are quickly claimed as pieces of farmland. About one fourth of citizens live by coastal areas too. The rise of sea-level up to one meter only and Bangladesh can lose up to 15% of its land area under the sea water, this means dangerous climate conditions can result in millions of refugees. (NCDO, Climate Change and its Impacts on Bangladesh) The majority of the land is barely above sea level. Lying close to the Tropic of Cancer, Bangladesh climate is tropical with a mild winter from October to March along with a hot and humid summer from March to June. From June to October, the season is warmer and lasts from June to October. Monsoon winds approach Bangladesh in summer from June to September which bring heavy rainfalls and cyclones. These storms can cause great destruction to the country as well as devastation to the human population. Cyclones can cause major storms that can sweep away crops, livestock, and even people. These destructive cyclones cause devastation that can be hard to recover from. In 1970, a cyclone killed more than 300,000 people along the coast and destroyed vast amounts of farmland. Then 37 years later, Cyclone Sidr caused more than 3,400 deaths along with great damage to the country's infrastructure. According to the Bangladesh Ministry of Food and Disaster Management, some nine million people were affected by Cyclone Sidr in 30 of Bangladesh's 64 districts. Damage to property, livestock, and crops was estimated at \$1.7 billion dollars in U.S. money. (IRIN News, Cyclone Challenges)

Monsoon rains cause frequent flooding, especially in the lowlands. On average, about one-third of the country floods during the raining season. Earthquakes, landslides, and droughts may also occur greatly affecting the food security of Bangladesh. Even though water may not be as scarce due to the country's many waterways, the quantities of it can greatly affect agriculture. Thousands of people have lost their homes and crops due to river erosion, which is identified as a sign of climate change. These events can destroy a community making many people homeless and left without the necessities to survive. River erosion can be very severe causing the over-watering of croplands. The high excesses of water causes plants to shrink and eventually die. Up to 77 million people are exposed to toxic drinking water that contains the element of arsenic, which is contained in the soils. Last but not least, flooding waters can move soil that can further damage crops. Erosion washes the fertile layer of topsoil away, increasing input costs and reducing yields in the future as well. Pollutants and toxic elements soil deposition can also smother an existing crop. Natural materials such as sand and gravel can be deposited onto cropland by flooding necessitating the removal or spreading out and mixing of these deposits, which are not as fertile as existing soil. It is believed that invasive climate conditions and the rising sea levels will lead to the formation of 20 million climate refugees. (Embassy of Bangladesh, Washington D.C., Geography and Climate) Bangladesh is a country who is extremely challenged with natural floods, tornados and cyclones. These problems still exist today and more caution and awareness is needed for this issue. (Flooding on the Farm, Paul D. Mitchell, Unknown Date)

Agriculture plays a major role in the economy making it the biggest sector. It introduces about 30% of the country's GDP and employees 60% of the total labor. The country of Bangladesh is also home to many resources which helps the country prosper as well. Some crops used in their agriculture include rice, jute, wheat, tea. Some common products that were processed in their industry include cotton textiles, jute, garments, as well as processed tea. Animal wise, they receive beef from their cattle and receive fish from their many various water sources. Some exports they trade include: garments, jute and jute goods, leather, frozen fish and other forms of sea food. Bangladesh is home to a wide diversity of ecosystems including the mangrove forests. One example of a known forest is the Sundarbans, which is the largest Mangrove

forest in the world. 425 species have been identified there including the Royal Bengal Tiger. Climate change greatly affects the ecosystems of the forests in Bangladesh. (NCDO, Climate Change and Its Impacts on Bangladesh, 2012) The many waterways are a great contribution to many of these resources supporting the human population. Even though weather conditions may occur, Bangladesh uses flood control and irrigation, more efficient use of fertilizers, and an establishment of better distribution methods and rural credit networks. Pollution from wastes around the country such as trash and sewage can greatly affect the climate too and can cause global warming. When this polluted water is evaporated, it is precipitated onto the land in return. A safe and healthy environment is needed to sustain the proper food and nutrition for the human and animal population. Population is increasing which increases pressure on productive capacity of food, creating a food deficit. Foreign help and commercial imports fill this factor. Underemployment is also a serious problem. A growing concern for Bangladesh's agricultural sector will be its ability to take in extra manpower. Finding alternative sources of employment will be a massive challenge for future governments, particularly with the increasing numbers of landless peasants who already account for about half or the rural labor in Bangladesh. (Countries and their Cultures, Bangladesh)

Bangladesh is a country that faces many challenges to feed their existing and future growing population. In order to overcome this challenge, the people of Bangladesh must work together to find solutions to their problems. New innovative farming techniques must be developed and implemented in order insure food security. A solution to help control waterways needs to be implemented because of the unpredictable winds and rain. The population is growing and land is being greatly affected by the invasive climate which leads to poverty and development. It is up to the world, national government, communities, and the people to make an impact.

Solving Bangladesh's food insecurity problems will involve addressing each issue with unique growing solutions. Advanced irrigation systems can help solve the problem of drought and excessive heat conditions. Irrigation systems can be used to efficiently distribute water to crop fields. These methods have been used successfully in agriculture for thousands of years. A man-made reservoir can be constructed to store extra water to be eventually used during a dry season. Another alternative irrigation system that could be used is a hydroponic wick system. In this system, a basin of water is stored and wicks absorb the water which is transported to the growing medium. The medium will then supply the plants with nutrients and absorb more water with later use. To address flooding, another challenge in Bangladesh's agriculture in its low-lying lands, the plant beds need to be raised. Bangladesh now is experimenting with "floating gardens." This is a new innovation used to combat the floods that sweep away the land. (Practical Action, Floating gardens) The floating gardens solution uses water hiasis to construct a raft. This raft then covered with soil and cow dung that vegetables can be planted on. One more innovative project that can be done is the construction of rain gardens in the local areas. Rain gardens are more than just a garden, they help tackle many issues when it comes to this harsh climate. The rain garden effectively collects runoff rainwater that spreads pollutants and chemicals including nitrogen and phosphorus on impervious surfaces. They are placed on surfaces where great amounts of runoff are received, including hills with low elevation, and will reduce water flow. The rain garden will absorb the runoff which will slow down the flow of rainwater and prevent damaging plants and wildlife. The garden is made up of plants and organic material as well which will supply nutrients and oxygen. Rain gardens also supply a habitat to animals such as pollinators which are essential to help plants reproduce. Bangladesh rain gardens are aesthetically pleasing to look at too, therefore beautifying Bangladesh. In order to perform the construction, a few elements are needed. First, you need to find a low-elevated area and dig up a permeable surface. Bangladesh has lots of silty and sandy soil which will be perfect enough to drain the rainwater. Next, plants have to be carefully selected for the garden. Plants that are able to tolerate wet and moist soil are strongly recommended. Last but not least, the final touches are put on it to make sure that it is aesthetically pleasing and hardy enough to withstand storms. (Low Impact Development Center, What is a Rain Garden?) Bangladesh has actively been implementing these

solutions for over half a decade. Approximately 482 small, medium, and large water embankment projects were implemented between 1959 and 1993. The embankments total expanded more than 8,200 kilometers. Some other systems included are more than 4,700 kilometers of irrigation canals, 3,400 kilometers of drainage channels, more than 9,000 hydraulic structures, 4,300 bridges and culverts, and 96 houses and two barrages. (Saha, Manik Kumar, Planned Decentralization: Aspired Development) If Bangladesh can continue to implement solutions like these and others, the outcome will positively impact food security and pollution reduction. Bangladesh's landscape will be beautified, rain water becomes sustainably managed, and runoff pollution will be reduced.

The underemployment situation is another serious problem in Bangladesh. Finding alternative sources of employment will be a massive challenge for future governments, particularly with the increasing numbers of landless peasants who already account for about half of the rural labor in Bangladesh. The proposed solutions will need workers to implement them. Bangladesh Ministry of Agriculture could hire workers and pay them for their efforts which could help stimulate the economy. Families can partake in implementing these solutions which will help stabilize their food supply and protect their communities. The national government could take a helpful approach to fund this project and give more employment opportunities to citizens. They can distribute funds to areas that face the most intensive climate conditions. Bangladesh is home to permeable materials and soils and plants, therefore some man power will help get the job done. Everyone including women and children can take part in this project. Education in these alternative solutions will be essential to make them successful. Communities can work together with the gathering of resources, construction, and maintenance of the gardens. Residents will be able to take pride in these gardens and community morale will improve. Organizations in developed countries such as the United States can contribute funds and send supplies and workers to help Bangladesh develop climate resistant agriculture. For example, the USAID Organization works with and supports the economy in Bangladesh. Their programs improve food security, economic growth and nutrition to address hunger issues and end poverty. They train farmers to use high quality seeds, adopt efficient fertilizer practices, and demonstrate improved irrigation practices to increase yields. In addition, USAID supports research in biotechnology. They partner with various institutions to develop varieties of rice that are higher yielding and more resistant to floods and droughts. These efforts help farmers increase their yields and improves their lifestyle. In terms of financial support, crop insurance organizations, such as the Asian Development Bank, can provide farmers with compensation for crop damage in the event of a natural disaster. (Embassy of Bangladesh, Washington D.C., Geography and Climate) New farming practices and improved early warning systems will keep the farmers aware of upcoming conditions. Overall, partnerships with various organizations can supply farmers with new technology and literacy about the environment.

In conclusion, Bangladesh faces many challenges and obstacles before they can achieve food security. Unpredictable climate conditions, inadequate farming methods, and lack of financial support have created a situation where it's difficult for Bangladesh to feed its growing population. In order to overcome these obstacles, Bangladesh must change its farming methods and implement new technologies. Emerging technologies need to be employed and research has to continue. Bangladesh is home to various water sources and fertile soil with potential in leading to agricultural prosperity. Development, innovation, support, and hope is vital to overcome climate effects. I am optimistic that Bangladesh can work together and with determination and innovation, they can solve their problems and become a stable developed country.

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