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Protecting Bangladesh's Food Supply From the Impact of Climatic Variation

Introduction

Food insecurity in Bangladesh is a major problem driven largely by climate change. Rising sea levels, stronger floods, and frequent cyclones damage farmland, reduce crop yields, and contaminate soil with salt. These challenges make it difficult for farmers to grow enough food, directly threatening national food security. Climate change also increases poverty and limits access to nutritious food for vulnerable communities. Urgent action needs to be taken to fix these issues. The implementation of floating gardens, which allow crops to grow during floods, and genetically modified crops that are more resistant to flooding and salinity can help Bangladesh adapt to climate change and improve long-term food security.

Country & Family

An average family in Bangladesh has approximately 4 people per household. (Brittanica, Gorlinski) A typical Bangladeshi family diet centers on rice, vegetables, and often small amounts of fish, eggs and meat with a general deficit in dairy and micronutrients. The most nutritious foods are greens, fish, eggs, and meat (World Bank, Mehra). Families in Bangladesh have easy access to education, but the price of healthcare is steep. (NHL, Fahim) The average person in Bangladesh makes around 49,500 BTD per year, equating to around $270 (Britannica, Gorlinski). The price of healthcare can make it more difficult for families in Bangladesh to have adequate access to food. The average size of a farm in Bangladesh is 1.29 acres. Rice is a main crop and most of the country works in agriculture. Local markets are where people in Bangladesh mainly purchase food. (Britannica, Gorlinski) Frequent floods and droughts due to climate change severely impact the food Bangladesh has access to (NHL, Fahim). The impacts of climate change appear to be the most significant factor affecting the average family's access to food in Bangladesh.

Challenge & Impact

Climate change ties directly into food accessibility. The harsh monsoon climate paired with the fact that Bangladesh is one of the world's most disaster-prone countries causes immense strain on available food. Seventy percent of its land, which is low-lying, faces significant immediate and future impacts from climate change (World Food Prize). This affects the daily existence and wellbeing of millions of families. Severe climatic shocks like floods and cyclones affect an estimated 30% to 50% of the country annually, leading to livelihood loss for the 80% of the population dependent on agriculture (World Food Prize). Increased climate-sensitive diseases, economic strain, and projected displacement of millions due to territorial and agricultural land loss all place a burden on Bangladesh's access to food.

For the typical Bangladeshi family, climate change is not a distant threat but a daily economic and physical struggle. Agriculture, which accounts for over half of the nation's jobs, is highly affected by this crisis (Britannica, Gorlinski). In coastal regions, salinity intrusion, the movement of salty water into fresh water aquifers has already degraded roughly one million hectares of land, making it nearly impossible to grow traditional crops (Harvard, Tarikul). For a farming family, this translates to a total loss of livelihood, forcing them to sell assets or livestock to survive.

The wellbeing of these families is further compromised by the health impacts of climate change. Rising temperatures and intense rainfall have led to an increase in climate-sensitive diseases. When disasters like cyclones or floods occur, water sources become contaminated. This leads to outbreaks of cholera and diarrhea (IWA, Rahman). Cholera in Bangladesh is responsible for 143,000 deaths each year. (World

Health Organization). The future for these communities is also threatened by the danger of displacement. Over the next 30 years, it is estimated that 13.3 million people may become migrants due to water scarcity and rising sea levels. (IWA, Rahman) By 2050, as much as 17% of Bangladesh's territory could be lost to rising sea levels. This could potentially displace one in every seven people (IWA, Rahman). This mass migration places immense pressure on urban centers, where migrants often settle, with limited access to clean water, education, or healthcare. Rohingya refugees have increased the population by 1.1 million people (World Food Prize). The more people in Bangladesh, the harder it is to have easy access to food. The impact on the community is equally drastic. Climate-induced migration normally breaks down traditional family structures. This leads directly to the formation of nuclear families in urban areas where parents must work long hours, leaving children without proper supervision.

The economic burden is equally as staggering. Climate change is predicted to cost Bangladesh about 2% of its annual GDP growth (IWA, Rahman). Without significant global action and local adaptation, nearly 19 million children will be threatened by the intensifying cycle of floods and cyclones. Organizations like the WFP are currently implementing anticipatory actions, such as cash transfers provided before a disaster hits. This is to help families prepare rather than just react (World Food Prize). However, the effect that climate change has on the people of Bangladesh still seems to be a dangerous challenge as millions of families remain at great risk of losing their homes and lives to a shifting climate. The typical family in Bangladesh faces a future where their very survival depends on their ability to adapt to a landscape that is shifting beneath their feet.

Exploring Existing Solutions & Recommendation

In Bangladesh, a country highly vulnerable to climate change, the introduction of climate resilient crops has been vital. These crops have been genetically engineered or bred to survive salinity, flooding, and drought. Salt-tolerant rice developed by the International Rice Research Institute (IRRI) has shown potential in coastal areas where salinity threatens agriculture (CGIAR, Humaira). Tolerant rice varieties have been deployed to areas prone to flooding, protecting farmers from crop loss during monsoon seasons (International Rice Research Institute). According to the IRRI, these varieties have allowed farmers to maintain their rice production despite climatic conditions.

As climate change accelerates, disaster-induced migration may become a major challenge for the country. Millions of people are forced to migrate due to loss of agricultural livelihoods (Harvard, Tarikul). In response, the Bangladesh government has created early warning systems, disaster preparedness training, and evacuation plans in coastal areas (WBB, Kazi).

In China, the government has heavily invested in climate-resilient agriculture through initiatives like creating drought resistant wheat and rice varieties (EAF, Sheng). China’s National Climate Adaptation Strategy emphasizes the adoption of these technologies across the country, improving food production despite climate extremes. The country's experience highlights the importance of early adoption of new crop varieties and their role in ensuring stable food production (EAF, Sheng). China’s water management system, which includes large-scale irrigation infrastructure, has also proven essential for mitigating the impacts of droughts (EAF, Sheng). Initiatives backed by the Chinese government reflect the importance of water efficiency technologies in adapting to the changing climate.

Cross-breeding crops and developing floating or higher-altitude farming plots could play an important role in increasing food security in Bangladesh, while also addressing the country’s vulnerability to climate change. Cross-breeding crops allows scientists and farmers to develop plant varieties that are more tolerant to these stresses, such as flood resistant and salt-tolerant rice, wheat, and vegetables. These improved crops can survive longer periods underwater and maintain productivity despite the harsh climate. This makes it so farmers are less likely to lose harvests during extreme weather events. This ensures a more stable food supply and income. Scuba rice is grown in Southeast Asia. This form of rice is

genetically engineered to survive floods that would wipe out regular varieties (Adkins, Share America). If implemented in Bangladesh, this variety of rice would prevent this important crop from being destroyed.

Floating agriculture and higher-altitude farming plots also offer innovative ways to adapt to changing landscapes due to climate change. Floating gardens utilize rafts made from water hyacinth and organic matter to grow vegetables on flooded land (Ohio State News). Similarly, raised beds and higher altitude plots protect crops from floodwaters, improve drainage, and reduce soil erosion during heavy rains. Stacking soil and dirt allow for the creation of these raised beds. These methods allow farming to continue year round, even during prolonged flooding, and expand cultivable land in areas previously considered unusable. Together, climate-resilient crops and adaptive farming systems reduce dependence on a single growing season and strengthen local resilience to climate shocks.

Implementing floating gardens requires accessible materials and basic training. Farmers can acquire the knowledge to construct and manage these systems through community knowledge sharing, government agricultural extension services, and training programs. The Department of Agricultural Extension and research institutions such as the Bangladesh Agricultural Research Institute (BARI) support farmers through demonstrations and technical guidance (FAO, ARGIS). These groups, backed through funding from government and other institutions, such as the Coca Cola foundation, would change the lives of the thousands of people in Bangladesh that rely on agriculture as their livelihood.

Groups such as the Sustainable Agriculture Foundation, or the SAF have already made tremendous strides in increasing farmers income by providing education and training that displayed drip irrigation techniques (SAF). This is known as the Water-Efficient Technologies in the Barind Tract Project and is sponsored by the Coca Cola foundation (SAF). This heavily funded and experienced organization would easily be able to implement training and provide farmers with the knowledge and skills needed to cultivate flood resistant crops as well as the ability and materials to create floating gardens.

In Bangladesh, Madaipur has implemented floating gardens (Mujibul, War on Want). The coastal regions of Bangladesh experience intense salinity and flooding. Most areas have taken the initiative to build these life saving fixtures. The Sundarbans have also been placed under pressure due to flooding and are in desperate need of the implementation of floating gardens.

Certain crops are particularly well-suited to floating and raised-bed systems, including leafy vegetables like spinach and amaranth, as well as okra, gourds, cucumbers, eggplant, and some spices (Ohio State News). These crops grow quickly, tolerate wet conditions, and can be harvested multiple times per season. With support from organizations such as local NGOs and development agencies, floating agriculture can be used as a low cost strategy to strengthen food security and climate resilience in flood prone regions of Bangladesh.

Conclusion

Bangladesh can reduce food insecurity by adapting its agricultural practices to climate change. Floating gardens and genetically modified crops offer effective ways to protect food production from floods, soil salinity, and extreme weather. These solutions can help farmers grow more reliable crops, improve access to food, and strengthen the country's economy. Future action should focus on expanding these technologies, supporting farmers, and investing in research to develop crops that are even more climate resilient. Continued research and government support can improve long term food security and help Bangladesh better prepare for future climate challenges.

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