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Bangladesh, Climate Change

Bangladesh's Battle with Climate Change and Food Insecurity

Climate change. From melting glaciers, to forest fires, this is a problem that many countries are going through, yet Bangladesh is facing some of the harshest outcomes. Every year, millions in Bangladesh watch helplessly as floods swallow entire communities, and crops are destroyed by unpredictable rainfall. Despite having fertile land, the country faces a crisis where food insecurity and climate change threaten the livelihoods of its people. With agriculture and garment manufacturing being the backbone of the economy, Bangladesh is particularly vulnerable to these challenges.

Bangladesh is a small, very underdeveloped country in South Asia on the Bay of Bengal. With 50,259 square miles making up the country, 60.52% is arable land. That is about 30,416 acres of arable land, with farms averaging 7.5 acres. Yet there are still many in the country who are malnourished from climate change and overpopulation. Bangladesh is a vast delta plain formed by the Ganges and Meghna rivers. With the Bay of Bengal to the south, and hilly regions in the northeast and southeast, Bangladesh has a tropical monsoon climate (World Factbook, n.d.). They have hot and humid summers, and cool dry winters that allow for warm temperatures year round. Rice is a staple grown throughout the country, and they also grow wheat, maize, potato, and jute. Bangladesh mainly exports clothing and jute products because of their low labor costs and large workforce. They export tea which is mainly shipped to the United Arab Emirates, United States, Pakistan, Kuwait, and Saudi Arabia. They have a prime minister who is head of the government and holds the majority of executive authority, and their national assembly elects a president every 5 years (Tinker, 2025). The president is the head of the state, filling in ceremonial duties, and is the commander-in-chief of the Bangladesh armed forces. There are more than 175,000,000 people living in Bangladesh as of March, 2025, with 23.6 million people facing major food insecurity (World Food Program, 2025).

Compared to their population, families in Bangladesh are surprisingly small with about 4.3 people per household (Esri, 2022). A typical household includes the mother, father and their children. The father typically would work in agriculture or in manufacturing such as the garment industry, or having a small business. The mother normally is a caregiver in the household and does agriculture work or garment and factory work like the father. So with an average family with these jobs, the mother, father, and children combined average monthly household income of Tk (Taka) 32,422 which is approximately $300.20 USD. Now compare that with the average income of one person in the United States: $4,457.50 USD monthly. A typical meal for a family in Bangladesh often includes rice, fish, various curries, vegetables, and lentils. With breakfast commonly featuring paratha, bhaji, and egg fry, followed by tea. They get their food from farming, fishing, and purchasing from local markets. Many Bangladeshi farmers, use wood-burning stoves to cook food in their homes, causing harmful pollutants to be released into the air, including fine particles (PM2.5), carbon monoxide, and other hazardous chemicals, which can negatively impact respiratory and cardiovascular health, cause lung diseases, and contribute to climate change. (Cumming, 2015). There are 0.8 beds/1,000 population (2016) in Bangladesh, with 0.72 physicians/1,000 population (2023). This presents the problem of overpopulation and not enough healthcare for their people. They often average about 12 years of education in total, per person (World Factbook, 2020). 98.9% of the population has improved drinking water, and 99.4% (2022 est.) of the population has access to electricity.

Phone subscriptions per 100 inhabitants is 105 proving that they have adequate communication and their total roadways paved and unpaved: 369,105 km (World Factbook, 2022).

The irregular rainfall is caused by climate change and is hurting the food security that Bangladesh has. Due to climate change, increased rainfall and melting Himalayan glaciers contribute to more frequent and severe floods (Climate Expert, 2015). The rainfall in Bangladesh is causing floods that are damaging buildings and infrastructure, wrecking the cities. With the cities continuously getting wrecked, their main economy that comes from making and producing clothes will suffer, causing people to become poor and preventing them from being able to buy and produce good food. Recently, climate change is getting worse in Bangladesh and is in danger of losing more than 1/7 of its land to flooding and water (World Bank, 2022). Flooding in Bangladesh is putting a large area of their farm land in trouble, making farmers trying to live off of the little to none that they have left. The floods destroy farmland and crops, which causes food security to decrease, for their livelihood depends on the crops that they grow and produce. A large factor of the harsh climate change in Bangladesh is the irregular rainfall patterns that are affecting their food sources greatly.

Since they cook their food with wood stoves and there is more increased use of cars, the gases they emit contribute to global warming, which in turn exacerbates extreme weather patterns, including heavier rainfall and stronger storms. (Handwerk, 2011). Storms and heavy rainfall create devastated crops, forcing the people along with the livestock to have very little to eat. There are many studies of the causes of air pollution and irregular rainfall on how they are correlated, like, "Francis Zwiers and colleagues studied half a century's worth of rainfall data (1951 to 1999) from a large swath of the Northern Hemisphere, including the United States, Europe, and Asia. In about two-thirds of the weather stations represented, greenhouse gases—which have risen over the same period—correlate with intensification of heavy precipitation events," (Handwerk, 2011, page 1). This study shows that as the greenhouse gasses being released in the air rises, so does the rainfall, leading to excessive rain, which is creating the flooding and storms in Bangladesh today. The heavy rainfall affects the crops because with not enough oxygen in the roots of the plant, it gets waterlogged and the roots essentially rot out, allowing less nutrients to get into the plant, stunted growth, and the crop potentially dying. Air pollution is a big factor in the climate change crisis and flooding in Bangladesh, while contributing to the low food security.

While I was researching solutions for climate change in Bangladesh, I found one called the Sundrop system, using a new sustainable and innovative way of farming without soil. Installing the Sundrop system along the coastal areas of Bangladesh will provide flood resistant crops and not be affected by climate change. At Sundrop Farms, they have created a new way of farming that does not use finite resources like fossil fuels, and they have spread it all across Australia helping countries grow better. "We use the sun's energy to produce freshwater for irrigation. And we turn it into electricity to power our greenhouse to heat and cool our crops," (Sundrop Farms, 2016, page 1). The Sundrop system is a big step in cleaner agriculture. Also, since they use desalination to transform the coastal salt water into freshwater, it will help water quality for the crops because of the rising sea level that is contaminating freshwater with salt. This will allow for more access to freshwater coastally and grow more healthy and plentiful food. Although it might be expensive initially, it is very sustainable and does not need to be replaced often. Also, the World Bank funds many large scale projects to help make developing countries better and has helped Bangladesh before with creating better drainage systems. The Sundrop system uses greenhouses to grow the crops, because the greenhouses provide ideal growing environments to produce high quality food and the freshwater produced on site and supplemented with town water is combined with nutrients to irrigate our crops (Sundrop Farms, 2016). This is particularly useful in flood-prone areas, as the system doesn't rely on traditional soil-based farming, it uses a nutrient-rich water solution. Since it doesn't require soil, waterlogging from floods won't damage crops, providing resilience in their agricultural production. Since the Sundrop system helps prevent waterlogging, floods won't have as much of an impact on the crops and it will be easier to grow food and not have it be damaged by the floods. The greenhouses would also provide some shelter from the harsh winds and other elements. This system is feasible because we would start building the greenhouses around the coast of Bangladesh, and start educating the farmers on how it all works. We would need to tell them how to do the proper maintenance to take care of these greenhouses to keep a steady food supply. To support the adoption of the Sundrop system in Bangladesh, we could partner with local farmers through financial assistance programs that help them transition to sustainable agriculture—contributing to a shared vision for a better future, rather than leaving them to bear the cost of innovation alone. The Sundrop system would benefit Bangladesh in many ways—by making the most of finite resources, avoiding air and water pollution, and promoting sustainable farming techniques.

While the Sundrop system would make a big impact on coastal areas of Bangladesh, Agroforestry would work better in more inland areas. Agroforestry is where you turn a farm field into a forest by planting trees in the field. Forests help protect the land by reducing erosion and the amount of sediment that gets carried away. This is really important for reducing the effects of natural disasters like floods. Less sediment means less chance of flooding and lower costs for cleaning water that people use from rivers and streams. (World Bank, 2017). Implementing agroforestry in the fields of Bangladesh will help by temporarily storing water and allowing it to soak into the ground. This reduces the speed at which rainwater flows into rivers, which helps lower the risk of flooding. Agroforestry on the flat landscape of Bangladesh can be estimated to reduce flooding by 20-50% by having more water soak into the roots of the trees, instead of running off the land, which causes less crops to be waterlogged and more farmland salvaged. Also, research in Germany demonstrates that alley cropping agroforestry systems, which integrate tree strips with crops, can reduce wind speed by 17-67% and decrease potential wind erosion by 24-97% (Ramshorst, 2022). The World Bank has funded many projects worldwide, and could provide funding for putting agroforestry in Bangladesh. The trees in agroforestry protect crops against harsh winds from storms caused by climate change, and trees also provide shelter from downpours during the monsoon season. Which in turn, boosts the chance for healthier, better crops and reduces threats to the land and people. Agroforestry would help flooding subside, storms have less effects on crops, and provide a safer, steady food supply.

Bangladesh's vulnerability to climate change, irregular rainfall, and natural disasters presents significant challenges to its food security and economic stability. However, sustainable agricultural practices like the Sundrop system and agroforestry hold the potential to reduce these issues by providing flood-resistant crops, improving water management, and protecting the land from erosion and storm damage. While the initial costs of these solutions may be high, their long-term benefits, including reduced flooding, better crop yields, and a more resilient agricultural system, can significantly improve the livelihoods of the people of Bangladesh. With support from global organizations like the World Bank and innovative technologies, Bangladesh can work towards a more sustainable and prosperous future. In Bangladesh, climate change threatens millions, but with strategic investment in renewable energy, infrastructure, and education, the country can chart a path toward resilience and self-reliance.

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