

Arshi Munjal
Kennedy High School
Cedar Rapids, IA
Maldives, Factor 5: Climate Volatility

Introduction

Head southwest from the southern tip of India until you reach the equator and you will encounter a lush green collection of islands known as the Maldives. After a massive tsunami in 2004, hundreds of Maldivian families were displaced from their homes. Ahmed Mohamed, the temporary head of a natural disaster relocation movement, explains that he is on a board to educate his community on the great environmental and social issues facing the country. Says Mohamed, “we are taking every opportunity to create awareness and provide information on proper management of household waste”, which is just one of the major issues impacting the Maldives today (Maldives: Ahmed’s Story).

The Republic of Maldives is an archipelago made of 1,190 coral reef islands in the Indian Ocean. Two hundred of these islands are inhabited, 89 of which are used solely for tourism purposes and the remainder of which are uninhabited and utilized for industry and agriculture (Shabau). The island nation hosts an abundance of natural resources including coral reefs, tropical ocean fish, crustaceans, turtles, seaweed and shells. These natural resources are the basis of the Maldives’ economy and are essential to the two most profitable enterprises on the islands- fishing and tourism.

Tourism is the Maldives’ primary business, accounting for 41.5% of the GDP by providing income for imports (National Geographic). Because the nation has limited land-based natural resources and the total land area suitable for agriculture is less than 10% of the landmass (115 square miles), fishing is the second largest GDP contributor. Accounting for 3-12% of the country’s GDP, fishing is also important for creating employment, as it engages about 20% of the labor force and contributes to 96% of the country’s total exports ("Maldives." *Economy: Population, GDP...*).

Currently however, there are several major problems restricting the prosperity of this developing nation. As a low-lying small island country, the average elevation of the Maldives is around four feet above sea level, and the highest point is about eight feet (Slow Travel and Tourism). The rise in sea level due to climate volatility threatens the existence of the entire nation. Climate volatility as defined by the Oxford dictionary is “liability to change rapidly and unpredictably, especially for the worse.” (Oxford Dictionary). Recently, climate change has contributed to natural disasters on the islands which in turn has decreased tourism and changed the patterns of marine life, impacting the fishing sector.

Why do the problems that native Maldivians face concern us? The Republic of Maldives is currently one of the countries contributing least towards climate change. It releases less than 1% of global emissions, and yet is incredibly vulnerable to the effects. The Maldivian government is now obliged to use its resources to deal with the climate change consequences caused by other countries (Hoffman). It is estimated that the sea level is rising approximately 0.9 cm a year, and if the current climate change trend continues, the Maldives could become uninhabitable within the next 100 years (Beach Erosion). This would result in approximately 345,000 climate refugees being displaced to nearby countries (BBC News).

Typical Family

The typical family living in the Maldives is made up of six to seven people: two parents and four to five children (Shabau). Although schooling is not governmentally compulsory, there are two stages to the education in the Republic of Maldives based on the British educational system: a five year long primary stage and ten year long secondary stage (Shabau). Malé, the capital of The Republic of Maldives offers

several pre-university courses, but to get a higher education Maldivians typically go abroad (Bryant). While enrollment in primary schools is exceptional at 98%, secondary school enrollment decreases substantially to 50% (Shabau). However, these statistics are not a result of bad governance- the government spends 17.6% of its budget on education, but children are dropping out of school to provide for their families (Shabau) This demographic discrepancy allows only the wealthy of Maldivian society access to a higher education. Currently only around 0.07% of the population (250 Maldivians) have university degrees, resulting in an immense absence of professional and skilled workers on the islands (Maldives -Working Conditions).

Healthcare isn't accessible for everyone, and mostly only the wealthy are able to afford it. However, there is evidence that the health of people living in the Republic of Maldives has greatly increased in recent years. This is largely in part to the eradication of diseases such as malaria, polio, and other communicable diseases such as tuberculosis and lymphatic filariasis. However, there are still many health related dangers, the biggest concern being noncommunicable diseases which cause around 70% of deaths in the Maldives today (Maldives- SpringerReference). The biggest healthcare problems currently are due to poor living standards, poverty, malnutrition, use of tobacco, and environmental factors. Because of climate change, diseases such as dengue and scrub typhus have also reappeared in the Maldives and are untreated, causing morbidity among the population (Maldives- SpringerReference).

Typical farm

Due to the prevalence of poor soil, a lack of arable land, and the archipelago structure of the Republic of Maldives, traditional agriculture is difficult to perform (Maldives- Working Conditions). Subsistence farming is typical on the islands, but given that the amount of arable land is limited to around 30 sq. km, 90% of the food demand is fulfilled with imports (Shabau). Some crops, however, are grown in extremely limited amounts solely for domestic consumption including coconuts, bananas, sweet potatoes, chilies, and onions. The main source of food for Maldivians is provided by the fishing industry. The typical diet includes rice and fish, both staple foods on the islands. Fishermen use pole-and-line fishing methods to catch skipjack tuna, the main fish species consumed in the Maldives, representing 50-75% of catches (Shabau). Another fishing method known as "surface trolling" is used to catch fish such as little tuna, frigate mackerel, wahoo and jacks. Most fisherman take the majority of the fish home for personal consumption and export what remains. Fish products that get exported are usually frozen, canned or dried.

Barriers

Because of melting ice sheets and thermal expansion of the ocean due to climate change, the occurrence of natural disasters have significantly affected the tourism sector of the Maldives' economy. One of these occurrences was the flood of 1974 which caused damages amounting to US \$4.5 million to the Malé International airport (Hoffman). Another notable natural disaster affecting the Maldives was the Indian Ocean tsunami of 2004 which killed 82 people, displaced 12,000 people, destroyed buildings and infrastructure, and set the country in a state of national disaster. The tsunami caused around US \$375 million in overall damages, with a third of that being damages to resorts (Hoffman). Natural disasters are decreasing the viability and profitability of tourism through loss of beaches and decreasing marine life diversity which is directly impacting the number of tourists attracted to diving in the coral reefs resulting a loss of revenue.

Beach erosion is also a major problem in the Republic of Maldives, mainly due to human actions and coral mining- the practice of stripping coral from reef environments for domestic use (Maldives Overcoming the Challenges...). Coral is used not only because is it convenient, but also because it is highly accessible to Maldivians. Maldivians used to use coral stones and sand for the construction of

houses/buildings and to make souvenirs for tourists. However, coral mining is harming the Maldives, since mining the coral reduces coastline protection against normal tide erosion and sand movements, thus increasing water depth (Maldives Overcoming the Challenges...). Without the natural protection of the reefs, the Maldives are more susceptible to erosion, and the diversity of reef fish species ultimately declines (Maldives Overcoming the Challenges...). The erosion has also worsened due to humans clearing vegetation and constructing buildings near the beach, which has caused the soil to loosen (Beach Erosion). Due to the erosion, stronger waves have resulted in changes in current patterns near the shore, which in turn affects the fish populations that reside in coastal areas.

Population growth also poses problems for the island nation. The current population in the Maldives is 345,000 citizens (Slow Travel and Tourism) with a population growth rate of 1.9% (Maldives Overcoming the Challenges...). Although the current growth rate represents a significant decrease in the rate of growth since the 1990 census, the numbers are still increasing where they should be decreasing (Maldives Overcoming the Challenges...). Failure to address this problem rapidly will negate all other efforts to achieve sustainable development. Additionally, the population is not equally dispersed throughout the islands which is the cause for many environmental problems since it can lead to populations exceeding carrying capacity. At present approximately 116,600 people (one third of the population) live in Malé, the most populous island in the Maldives ("Maldives." *Economy: Population, GDP...*). Here, problems of overcrowding along with solid waste and sewage disposal are occurring and without population regulation it is expected that similar problems will develop on other islands as well.

High-density human population also has a direct influence on the availability of freshwater for Maldivians. People on the islands rely on groundwater from aquifers for freshwater because of limited freshwater sources. The high populations affect the aquifers by increasing the amount of daily water removal and restricting the recharging of the aquifers (Hoffman). Changes to aquifer resources also affect the carrying capacity of the island with respect to vegetation, including both natural and agricultural crops. The water availability depends on the rate of abstraction and recharge by rain. But over extraction has created problems and during the dry season 25% of households report water shortages (Hoffman). The water is also highly susceptible to pollution due to poor waste and sewerage which has resulted in a high incidence of cholera and shigella with major outbreaks in 1978 and 1982 (Hoffman). People used to depend on wells to access freshwater but today 90% of households use rainwater as their main source of drinking water (Population Growth).

Solutions

One solution cannot solve all the problems the Republic of Maldives is facing. A combination of solutions will have to occur to implement a change and reduce the effects of climate volatility.

Solutions:

- Mangroves
- Scaling up smaller projects
- Man made islands
- Renewable energy sources

Mangroves are salt tolerant trees that grow on shores and coastlines and have adapted to harsh coastal conditions. The planting of mangroves is environmentally beneficial because of their ability to make deep roots systems that facilitate the source of groundwater and hold the soil together, thus stopping coastal erosion (Mangroves). Mangroves are highly adaptable and are able to adjust to both saltwater and freshwater conditions around the islands. Once established, their roots build their own environments facilitating a unique ecosystem supporting organisms such as algae, oysters, sponges, and crabs (Mangroves). The upscaling of local efforts to sustain the existing mangroves in the Maldives is extremely important for Maldivians because the growth of the mangroves cuts back on erosion.

Mangroves for the future (MFF) is a program aimed at promoting investment in the coastal ecosystems for countries recovering from the Indian Ocean tsunami of 2004 (Mangroves for the Future). MFF works to strengthen the environmental sustainability of coastal development, and promote investment of funds and other resources in coastal ecosystem management for sustainable development. In 2013, MFF assisted the Maldives in adopting a national Integrated Coastal Management approach that fully responds to and advances the Maldives National Adaptation Programme of Action on climate change (Mangroves for the Future). MFF is raising awareness of climate change on the islands and promoting activities such as climate adapted agricultural practices that minimize soil and water use. The success of this organization comes from the fact that it integrates its changes in the community, teaching locals how to change their lifestyles and adapt to the climate change (Mangroves for the Future). Ensuring a safe environment is another MFF priority, particularly by improving waste management practices and by educating island residents about the importance of environmental protection. (Population Growth). Recently the program has been inactive but if the Maldives' problems could be brought to the attention of the organization again and the project could be upscaled, erosion effects could be greatly reduced. Another organization, Bluepeace, works towards educating locals about dangers concerning the area's declining ecosystem (Bluepeace Environmental NGO Maldives). If MFF and Bluepeace work together, these organizations can make a big impact on saving the ecosystem of the Republic of Maldives.

Hulhumale is a man-made flood resistant island that was implemented into the Maldives in 2004 by President Gayoom to overcome the overpopulation in Male, the capital of the Maldives (Environmental Changes in the Maldives). President Gayoom created the island to ensure a safe place to live with the impending threats of climate change in mind. His goal was to attract 50,000 people to the island by 2020 to meet the existing and future housing, industrial, and commercial development demands (Khaleel). The island was created at a higher elevation to address sea-level rise. Although very effective and innovative, creating an island is costly. But, there is hope in receiving help from other nation's governments and private organizations to fund these endeavors. The possibility of creating more flood resistant islands like Hulhumale ensures security and safety for island families. Many locals don't mind the idea of man-made islands because they are clean, cheap, and can result in growth of the tourism sector, thus boosting local economies (Khaleel).

Renewable energy would also benefit the Maldivian economy. In the Maldives, 25% of GDP goes towards paying for fossil fuel and gas. Annually, residents pay \$0.30 to \$0.40 per kWh for electricity (Hoium). The cost of electricity generation is relatively high compared to the costs in other developing countries in the region due to transportation costs, small-scale generating systems, scattered low-density populations, and dependence on imported expensive fossil fuels (Hoium). Switching to renewable energy would be beneficial in the long run because it is sustainable, energy efficient, and environmentally conscious. But for many Maldivians wanting to receive immediate benefits, the renewable energy doesn't seem cost effective. It is necessary to educate Maldivians on the benefits of renewable energy (Shabau).

Hope for The Republic of Maldives does exist. Although there are many barriers that if not addressed will lead to the disappearance of the nation, there are many solutions as well. By expanding existing small-scale projects, planting mangroves, using renewable energy, and utilizing new technologies to make islands, erosion can be stopped and fish populations replenished.

Works Cited

- "Beach Erosion; A Vulnerable Scenario in the Maldives." ECO CARE Maldives. ECO CARE Maldives, 04 Mar. 2011. Web. 10 Mar. 2016.
- "Bluepeace Environmental NGO Maldives." Bluepeace Environmental NGO Maldives. N.p., n.d. Web. 08 Aug. 2016.
- Bryant, Nick. "Maldives: Paradise Soon to Be Lost." BBC News. BBC, 28 July 2004. Web. 09 Mar. 2016.
- CORAL REEF MINING, HARVESTING AND TRADE: (n.d.): n. pag. Icran.org. Coral Reef Mining, 2005. Web. 2016.
- Energy, Ministry Of Environment And. (n.d.): n. pag. World bank. The World Bank, Nov. 2014. Web. 14 Mar. 2016.
- Hoffman, Justin. "The Maldives and Rising Sea Levels." The Maldives and Rising Sea Levels. N.p., n.d. Web. 08 Aug. 2016.
- Hoiium, Travis. "Countries Who Want Renewable Energy To Replace Fossil Fuels." The Motley Fool. N.p., n.d. Web. 08 Aug. 2016.
- Khaleel, Mohamed. "Environmental Changes in the Maldives: Current Issues for Management." Paper 8: Environmental Changes in the Maldives: Current Issues for Management - Ministry of Planning Human Resources and Environment, Ghazee Building Malé, Republic of Maldives. N.p., n.d. Web. 09 Mar. 2016.
- "Maldives: Ahmed's Story." Maldives: Ahmed's Story. N.p., n.d. Web. 09 Mar. 2016.
- "Maldives." Culture of Maldives. Maldivian Encyclopedia, 2016. Web. 18 Mar. 2016.
- "Maldives: Economy." Asian Development Bank. Asian Development Bank, 04 Sept. 2014. Web. 07 Mar. 2016.
- "Maldives." Economy: Population, GDP, Inflation, Business, Trade, FDI, Corruption. N.p., n.d. Web. 08 Aug. 2016.
- "Maldives." Maldives. Mangroves for the Future, 2007-2016. Web. 08 Mar. 2016.
- Maldives Overcoming the Challenges of a Small Island State. Mandaluyong City: Asian Development Bank, 2015. Adb.org. Asian Development Bank, 2015. Web. 12 Mar. 2016.
- "Maldives." SpringerReference (2014): n. pag. Www.who.int. Microsoft, May 2014. Web. 12 Mar. 2016.
- "Maldives- Working Conditions." Maldives-Working Conditions. N.p., 2016. Web. 09 Mar. 2016.
- "Mangroves for the Future." UNDP in Maldives. Mangroves for the Future, n.d. Web. 08 Mar. 2016.
- "Mangroves." - National Geographic Magazine. N.p., n.d. Web. 08 Aug. 2016.

"New Maldives Island Rises From The Depths." New Maldives Island Rises From The Depths. Rense, 14 Apr. 2012. Web. 18 Mar. 2016.

Oxford Dictionary. Oxford Dictionary, n.d. Web. 12 Mar. 2016.

"Population Growth (annual %)." Population Growth (annual %). The World Bank, 2016. Web. 10 Mar. 2016.

Shabau, Ibrahim. Climate Change and Food Security in Maldives. Rep. no. S404. N.p., n.d. Web. 14 Mar. 2016.

"Slow Travel and Tourism." (2010): n. pag. Www.wttc.org. 2015. Web. 07 Mar. 2016.

"South Asia: Maldives." Central Intelligence Agency. Central Intelligence Agency, 25 Feb. 2016. Web. 12 Mar. 2016.