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Climate Volatility, Fiji

Trouble in Paradise

Fiji, what many know as a tropical paradise for vacationing and fun in the sun, is facing a major threat: climate change. Not only does climate change threaten the country with rising ocean levels and environmental damage, but it also threatens the people who inhabit the islands. The rising global temperature threatens the country's food security and overall livelihood. But what can be done to mitigate the effects? The country of Fiji, formally known as The Republic of Fiji, is an archipelago consisting of 850 islands. It is located in the South Pacific islands. A majority of its population, 87% of 905,502, lives on two main islands, Viti Levu and Vanua Levu, and, as stated in *World Population Review*, "More than 75% of Fijians live on the coasts of Viti Levu". According to the FAO, "A majority of the economically active population" is in the subsistence agriculture sector. Sugar is the major commercial sector for agriculture, producing \$250-300 million USD (FAO). 23.26 % of Fiji's land is used for agriculture according to *Trading Economics*. Most Fijian families will grow a mix of food and cash crops, while others get food and make an income from fishing (*New Agriculturalist*).

All of this stands to be destroyed by climate change. Climate change in its typical form is a natural cycle of the Earth: the climate slowly warms then cools yet again, causing seven glacial melting and freezing events in the past 650,000 years (NASA). The problem is the rate in which the climate is warming. Human activity is likely the culprit behind this increasing rate of warming. NASA's climate department states that since the 19th century, the Earth's surface temperature has risen 1.62 degrees Fahrenheit. This dramatic warming has been caused by the excess of carbon dioxide and other greenhouse gasses being released into the atmosphere. These gasses earned the name greenhouse gasses based on their heat-trapping powers, according to NASA, "About half the light reaching Earth's atmosphere passes through the air and clouds to the surface, where it is absorbed and then radiated upward in the form of infrared heat. About 90 percent of this heat is then absorbed by the greenhouse gases and radiated back toward the surface, which is warmed to a life-supporting average of 59 degrees Fahrenheit (15 degrees Celsius)" (NASA Climate). In excess, these gasses stop heat from escaping the atmosphere, causing the global climate to warm. Human activities, such as the use of coal, oil and fuels and deforestation, have led to this collection of gasses. Some people find themselves asking, "What's so bad about a couple of degrees?"

Well, in short, a lot. Climate change is causing rising ocean levels, shrinking ice sheets and glaciers, extreme weather events, and increased ocean temperature and acidity. This causes significant concern for the Pacific Islands, of which Fiji is a part. According to the Climate Institute, "entire populations are facing existential challenges – the very real prospect of full evacuation, dispersed resettlement, and potential cultural annihilation" (Climate Institute). Rising ocean levels threaten the very existence of some islands, thus making the sunken city of Atlantis a very real view of the future for many coastal cities.

The Smithsonian stated that the sea level has been rising at a greater rate each year, with a rate of 3.2 millimeters per year in 2000, increasing to a rate of 3.4 millimeters per year in 2016. Prior to 1900, the ocean levels had remained fairly consistent, but since then, the oceans are estimated to have risen 5 to 8 inches on average. The water is rising due to the melting of glaciers and ice sheets as well as the expansion of water as it warms. The increase in ocean temperatures and acidity has another large effect: the death of coral reefs. Coral is comprised of many tiny animals, called coral polyps, that rely on mutualistic symbiosis to maintain homeostasis. A majority of coral contains tiny algae called zooxanthellae, which use the coral's waste for photosynthesis and in turn, the coral takes advantage of the energy the algae produce to survive and grow. Due to rising ocean temperatures and acidity, coral

becomes stressed and eject the algae, causing the coral to lose its color and become what scientists call "bleached". According to the United States National Oceanic and Atmospheric Administration, bleached coral is not yet dead, but without the algae, the coral lack these major sources of food and become much more susceptible to disease, thereby increasing the likelihood of death. The death of coral has a much larger impact than one may expect. Much of marine life rely on coral reefs for habitats and food, so with the death of coral, a much larger community of life is threatened: fish, invertebrates, and even humans. Climate change has also increased the intensity and frequency of natural disasters, such as cyclones and wildfires, further stressing the environment on land as well as in the waters.

What does all this mean for Fiji? The effects of climate change pose serious threats to food security in Fiji in two main ways: through agriculture and fishing. First, agriculture is threatened by flooding, increased temperatures, extreme storms, rising temperatures, the late or early start of wet seasons, unpredictable rainfall, and droughts. These unpredictable weather conditions can destroy the livelihood of small subsistence farms on which many families rely on for nutrition. According to the Food and Agriculture Organization, FAO, climate change threatens agriculture through "heat stress on plants, changes in soil moisture and temperature, loss of soil fertility through erosion of topsoil, less water available for crop production, changes in height of water table, salinization of freshwater aquifer, and loss of land through sea level rise" (FAO). *Pacific Climate Change* also cites that it will cause land desertification, declining crop yields, the introduction of new pests and diseases, and reduced water quality and supply. Given that agriculture, particularly sugar cane and subsistence farming, is one of the major economic sectors for Fiji, climate change's effect on farming poses major economic and food security risks for the country.

The other major climate change threat to Fiji is the impact on fishing. The FOA stated, "It has recently been estimated that 50 percent of all rural households are involved in some form of subsistence fishing and that about 21,600 tons of fish are landed each year, or slightly more than half of all domestic production" (FAO). Many people in Fiji rely on fishing for income and food supply, but according to the Ministry of Health and Medical Services of Fiji, "Climate change is also causing sea surface temperatures and sea levels to rise and altering the mixing of ocean layers which reduce nutrient availability and fish supply. Rising sea surface temperatures, and increasing variability in the form of the El Nino Southern Oscillation will negatively impact coral reefs, leading to further reduction in fisheries" (Ministry of Health and Medical Services). The degradation of coral reefs, the increase in violent storms, and the rise in ocean temperatures have led to instability in the fishing sector of the economy, thus both major sources of nutrition for Fijians, fishing, and agriculture, are under serious peril due to climate change. Not to mention, another major source of income for Fiji is tourism, 17% according to *Investment Fiji*. Much of the tourism is based on Fiji's tropical weather, beautiful beaches, and underwater paradises perfect for snorkeling and diving. All of these aspects of Fiji's tourism business are under fire from climate change; more frequent violent storms, coral bleaching, and rising water levels have the possibility to cause a decline in tourism, thus furthering the negative economic effects of climate change on the island nation.

The lack of fresh food has the possibility to cause major health problems for Fijians. As supply decreases, prices will only increase, causing the majority of Fijians to be unable to afford fresh food. According to the Borgen Project, 1 in 4 Fijians already struggle with poverty to the point where it is a daily challenge to find food, and that number will only increase as climate change takes away more and more sources for nutrition. The Ministry of Health and Medical Services (MHMS) stated in 2018, "Overall, 23% of the population live on less than \$2 per day (US\$ PPP); 43% of the rural population and 18% of the urban population live below the poverty line." The Ministry of Health also stated that after violent storms in 2012, 12,000 farmers lost crops. Since then, Fiji has experienced a number of violent storms, with one in 2016 killing 42 people and one in 2018 killing four people. Some families, unable to recover from the loss caused by the storms, have had to resort to eating diets consisting of mostly canned fish and vegetables, both containing high levels of sodium and sugar, leading to higher cases of diabetes, cardiovascular diseases, and obesity. The prime minister of Fiji, Voreqe Bainimarama said, "A recent

report completed by the World Bank and Fiji officials indicated annual losses from extreme weather events could total 6.5 percent of the economy by 2050" (CBS News, 2018), thus putting much of the population at risk for poverty and hunger.

Climate change does not only pose a threat to Fiji and the other South Pacific Islands but the whole world. To stop the violent effects of climate change, the totality of Earth's people needs to contribute to a worldwide effort to reduce carbon emissions and deforestation and increase the use of renewable energy sources, such as wind, geothermal, and solar. While every tiny positive action by individuals helps, to truly make a lasting change, fragile islands such as Fiji need the attention of the world and cooperation from its leaders. According to the UN Intergovernmental Panel on Climate Change in 2018, there are an estimated twelve years until the global temperature has raised 1.5 degrees Celsius since the beginning of the industrial era, but with significant worldwide action, there is a chance of keeping the temperature below that level (UN Intergovernmental Panel on Climate Change, 2018).

On a national level, climate change preparations and actions could cost Fiji \$4.5bn USD over the next decade, according to *The Guardian*. Fiji compiled a report with the World Bank outlining costs and actions for issues caused by climate change. The report suggested that the government increases the resilience of coastal cities and farms to rising water and storms, while also encouraging the construction of new sites to house displaced populations. As stated in *The Guardian*, Fiji's Attorney General, Aiyaz Sayed-Khaiyum, said that the report, "provides a specific blueprint that quantifies the resources necessary to climate-proof Fiji, giving us a full account of the threat that climate change poses to our national development" (Guardian, 2017). In terms of Agriculture, Fiji's Ministry of Agriculture of Fiji says, "There are developing ideas to have new varieties of crops with resistance to drought, salinity, flooding, and extreme temperatures. This includes traditional varieties e.g. Cocoyams (Dalo ni tana), Yams - uvi dina (greater yam), kawai (lesser yam), tivoli (wild yams), Drought tolerant kumala, Salt tolerant root crops"(Reliefweb, 2014). It is important for Fiji to adapt its agriculture to fit the shifting rainfall patterns, such as, "In Draubuta, Navosa farmers have had to shift their whole planting seasons around as a result of the changing weather patterns. Farmers, before relied on their traditional planting calendars, passed down through the generations, now, it is not the case anymore. Farmers would now have to wait for periods of wet weather to plant their yaqona, dalo and vegetables"(Pacific Climate Change Portal, 2016).

To deal with the problem of sustainable protein, Fiji should increase an emphasis on aquaculture and outplanting of coral that is better able to withstand heat. While open water fishing may become less reliable with changing water patterns, investment in aquaculture and inland fisheries could give Fiji a more reliable source for protein. In terms of bettering the reliability of open water fishing, out-planting coral could assist in rebuilding and strengthening the community of fish in the region. Another option could be the creation of artificial reefs to attract the same fish, but without the fickle coral. There are many global scientific organizations focused on the creation of more stable coral species and these same organizations are using technology to study the ultimate impact when these types of coral are introduced. In addition, the government of Fiji, or even international organizations, could offer incentives to Fijian farms, whether commercial or subsistence, for switching to more sustainable and resilient farming techniques. This would not only encourage farmers to make the leap but also help them afford the process.

Additionally, Fiji must consider ways to maintain a supply of fresh, drinkable water with the continued threat of contamination of fresh water sources due to flooding and increasing sea levels. According to Relief Web, "Some of the other areas that the Ministry is undertaking to mitigate climate change include the desalting of farm drains, watershed management irrigation, river dredging, embankments programs and breeds that are disease tolerant and have high adaptability to Fiji's climate" (Relief Web, 2014).

Finally, numerous islands in the Pacific face similar challenges as Fiji including an at-risk population reliant on limited natural resources under stress due to climate change. Through a convening of all Pacific island nations' leadership, along with experts in climate change, a Climate Change and Food Impact Conference could help the entire region in terms of visibility, focus, and actions. In fact, this is the very essence of Borlaug's mission - convening people with a focus on saving lives. By focusing on climate change and its impact on at-risk populations, such an effort will no doubt save lives.

Certainly, there is a cost associated with these types of programs. Given Fiji's role as an epicenter of tourism in the region, the Fijian government could consider a tourism fee specifically to address climate change and its impact on the country. A tourism surcharge or tax levied on visitors and tour companies accessing Fiji could provide significant environmental funding for these important projects. The creation of a Global Fund for Fiji would also allow for these fees and taxes to grow in an investment account, compounded by annual returns, eventually paying dividends to maintain the projects and focus for future generations. Additionally, the government could use a percentage of these funds to offer incentives to the citizens of Fiji for sustainability efforts in the villages and homes. While less significant than the larger climate efforts, small steps taken by many can lead to a solid impact, especially related to climate change, water, and food security. Additionally, the development and use of technology for both water management and climate change impact could greatly enhance Fiji's ability to understand actions and associated results in real-time. Through the development of a technology competition, NGOs, technology companies and even individuals could compete to win the Fijian Technology Prize for Climate Change and Water Stewardship. The award would be funded through a percentage of the tourism surcharge. The technology developed could be tested in the country with results shared globally. It is important to note that funding for infrastructure, incentives, and technology is needed to ensure Fiji can move forward with these important projects and efforts, ultimately sharing their knowledge and expertise with the world.

Overall, climate change is a global issue that Fiji cannot stop, but they can work to find solutions and elevate the issue on the global stage, and work to find solutions including adaptation and increasing resilience to the impact of climate change on their nation.

From my own experience traveling to Fiji for a service trip in 2018, I witnessed firsthand the effects that climate change had on the community of the Nadi Bay area. As I was arriving in Fiji, a cyclone was also arriving. The cyclone ended up killing four people and causing extreme flooding. This flooding closed down most roads and trapped us in a small hotel near the airport. When we were finally able to go to our base camp, you could see the damage that the cyclone had caused in the surrounding community, with many fields flooding and roads were almost impassable in many areas. Later that week, we spent time building a house for a family who had lost their house to a fire during a dry period. Since their house had burned down, they had been living in a poorly constructed shack. Our group also spent time building structures out of driftwood on the beach in a national park to create a barrier to erosion. Seeing all this after spending only eleven days in the country opened my eyes to the impact that climate change was really having on what is often viewed as a beach paradise, but may really be an inescapable collection of islands under extreme risk.

Many in the world choose to ignore the scientific research and the growing call to action surrounding climate change. If one doesn't experience its effects firsthand, it's easy to ignore the looming disaster that climate change will create for this planet. But when you have the opportunity to experience it on one of the most fragile and ecologically sensitive islands in the world, you cannot help to feel compelled to use your voice and take action to make a difference. Like so many places, the people of Fiji need our help and we can't ignore their plight anymore.

Works Cited

- Allen, Myles. "Why Protesters Should Be Wary of '12 Years to Climate Breakdown' Rhetoric." *The Conversation*, 18 Apr. 2019, theconversation.com/why-protesters-should-be-wary-of-12-years-to-climate-breakdown-rhetoric-115489.
- "Bleaching Impacts." *Reef Resilience*, reefresilience.org/coral-reefs/stressors/bleaching/bleaching-impacts/.
- Borgen, Clint. "Five Facts About Hunger in Fiji." *The Borgen Project*, Clint Borgen
[Http://Borgenproject.org/Wp-Content/Uploads/The_Borgen_Project_Logo_small.Jpg](http://Borgenproject.org/Wp-Content/Uploads/The_Borgen_Project_Logo_small.Jpg), 26 Mar. 2018, borgenproject.org/five-facts-about-hunger-in-fiji/.
- CBS/AP. "Fiji in 'Fight for Our Very Survival' amid Climate Change, Prime Minister Says." *CBS News*, CBS Interactive, 3 Apr. 2018, www.cbsnews.com/news/fiji-in-a-fight-for-survival-amid-climate-change-prime-minister-says/.
- Clarke, Hilary. "Hunger Rising with Global Temperatures, UN Report Says." *CNN*, Cable News Network, 11 Sept. 2018, www.cnn.com/2018/09/11/health/un-hunger-report-2018-intl/index.html.
- "Climate Change a Threat to Fiji's Food Security - Fiji." *ReliefWeb*, reliefweb.int/report/fiji/climate-change-threat-fiji-s-food-security.
- "Climate Change Causes: A Blanket around the Earth." *NASA*, NASA, 11 Apr. 2019, climate.nasa.gov/causes/.
- "Climate Change Evidence: How Do We Know?" *NASA*, NASA, 26 Mar. 2019, climate.nasa.gov/evidence/.
- "Climate Change Impact on Agriculture and Food Security." *FAO Subregional Office for the Pacific Islands*, 3 October 2012
https://unfccc.int/sites/default/files/leg_2012_pacific_workshop_fao_presentation.pdf
- "Economic Impact of Climate Change and Climate Change Adaptation Strategies for Fisheries Sector in Fiji." *Marine Policy*, Pergamon, 20 Jan. 2016, www.sciencedirect.com/science/article/pii/S0308597X15003930.

“Economic Impact of Climate Change and Climate Change Adaptation Strategies for Fisheries Sector in Fiji.” *Marine Policy*, Pergamon, 20 Jan. 2016,

www.sciencedirect.com/science/article/pii/S0308597X15003930.

“Fiji - Agricultural Land (% of Land Area).” *Fiji Agricultural Land Percent Of Land Area*,

tradingeconomics.com/fiji/agricultural-land-percent-of-land-area-wb-data.html.

“Fiji Population 2019.” *Fiji Population 2019 (Demographics, Maps, Graphs)*,

worldpopulationreview.com/countries/fiji-population/.

Guide, New Zealand Tourism. “About Fiji.” *Fiji General Information, About Fiji Islands South Pacific Islands*, www.pacifictourism.travel/pacific-islands/about/fiji.

“Human Health Vulnerability to Climate Change in Fiji.” *Ministry of Health and Medical Services*, 2018.

<https://www.health.gov.fj/wp-content/uploads/2018/03/Human-Health-Vulnerability-to-Climate-Change-in-Fiji.pdf>

“Impacts of Climate Change on Agriculture in Fiji.” *Pacific Climate Change*, 29 Feb. 2016,

[\[Fiji_Impacts%20of%20Climate%20Change%20on%20Agriculture%20Brochure.pdf\]\(https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Impacts%20of%20Climate%20Change%20on%20Agriculture%20Brochure.pdf\)](https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-</p></div><div data-bbox=)

“New Agriculturist.” *New Agriculturist: Country Profile - Fiji*, [www.new-](http://www.new-ag.info/en/country/profile.php?a=867)

[ag.info/en/country/profile.php?a=867](http://www.new-ag.info/en/country/profile.php?a=867).

“Sea Level Rise.” *Smithsonian Ocean*, 18 Dec. 2018, ocean.si.edu/through-time/ancient-seas/sea-level-rise.

Slezak, Michael. “Fiji Told It Must Spend Billions to Adapt to Climate Change.” *The Guardian*, Guardian

News and Media, 9 Nov. 2017, www.theguardian.com/environment/2017/nov/10/fiji-told-it-must-spend-billions-to-adapt-to-climate-change.

“Submerging Paradise: Climate Change in the Pacific Islands.” *Climate Institute*, 1 Feb. 2019,

climate.org/submerging-paradise-climate-change-in-the-pacific-islands/.