

Andrew Zhang
Norman, Oklahoma, USA
Tuvalu, Climate Change

Tuvalu: The First Nation to Fall to Climate Change

Introduction

Tuvalu is an island nation in the Pacific. It is made out of nine islands and its capital is Funafuti. Tuvalu is the fourth smallest nation in the world with around 11,000 residents (Almond). Tuvalu's governmental structure is a constitutional monarchy with a parliamentary democracy (GlobalEdge). The people are generally content with their governmental structure. Tuvalu is a largely agricultural nation, with 60% of their land used for agricultural purposes (Trading Economics). Their major exports are non-fillet frozen fish, recreational boats, computers, integrated circuits, and nitrile compounds (OEC). The average size for a farm in Tuvalu is not a readily available number due to the country's small size and unique geography. For the sake of comparison, the size of a farm in the Pacific island nations is 0.6 hectares to 3.6 hectares (FAO). Due to the island nature and geographic location of Tuvalu, their climate and geography is tropical and rainy with many coral reefs around the area (World Bank). Tuvalu is known for having some of the most carefree and happy people on the face of the planet, and keeping their culture on our Earth is of extreme importance. Unfortunately, this may not be true by 2100. Research predicts that by 2050 Tuvalu may not be habitable due to climate change induced tidal forces, and a complete relocation of their population will happen (Brennan). A solution must be found urgently to mitigate the impacts of climate change on the sea level to avoid the destruction of a culture and tradition.

Country and Family

The average family size in Tuvalu is around 7 people. The reason for this is because adoption is very common (Global Data Lab). Families often adopt their child's best friend, who would live and learn with their new family. Although this adoption may only happen if the child is above 12, it is a very common way in Tuvalu, which explains why the average family is on the larger side (United Nations). Tuvaluan dwellings consist of a post and beam with a thatched roof and coral-rock foundation. This house ranges from 2.5m x 5m to 5m x 10m with supporting posts made from the trunk of coconut trees (Yarina and Niuataui). Tuvalu cuisine consists of coconuts, bananas, taro, and fish. Some popular dishes are Palusami (taro leaf, onions and fish) and Lau (taro leaf in coconut cream) (A Year Cooking The World). Unfortunately, food is becoming more scarce in Tuvalu due to climate change. Climate change has made the environment more extreme in Tuvalu. This means that droughts and floods happen more frequently and last longer. The average salary in Tuvalu is amazingly high: the average employee earns around \$100,000 a year, meaning that on average employees earn around \$50 an hour (Salary.com). There are a total of around 4,000 employees, most of which are in agriculture (International Labour Organization). While education is provided for free in Tuvalu, the quality of education is not particularly high and the government is aiming for higher education (Humanium). Healthcare is similarly free, but the quality is not particularly good. Accessibility is another problem as hospitals are spread throughout the nine islands (Borgelt et al.). Tuvaluans deal with hardships such as extremely rare access to service and resources. For example, the only source of freshwater comes from wells (ADB). On the bright side, there are functional roads and thriving markets. The main problems that families face in Tuvalu are due to the climate. A long period of drought causes decline in agricultural output, resulting in economic insecurity for families.

Impact

Global sea levels have been on the rise, and over the past few years the problem has only accelerated. When climate change moves our earth up in temperature, glaciers and ice sheets melt in the Arctic. This

surplus of water in the ocean goes to other areas of the earth, causing sea level rise. In addition, climate change has caused more climate extremes, i.e. longer drought seasons and downpours. It has been predicted that by 2050 many islands near sea level will be completely submerged or uninhabitable due to sea level rise and tidal waves. If no action is taken to mitigate the immediate effects of climate change on these pieces of land, disaster could strike for traditional cultures and populations (Lindsey). But we must not stop there. The world has to look at the root cause of the problem: climate change. We must collaborate together to fight carbon emissions, the fundamental cause of sea level rise and many other disasters. As of late, sea level has been on a steady upward trend. This affects the rural and urban populations of Tuvalu by exacerbating food insecurity, forcing families to relocate, and causing natural disasters. Most of these problems affect the entire population of Tuvalu regardless of gender. For example, men, generally, are committed to construction, but natural disasters could cause damage to buildings, while women, generally, are committed to gardening, but natural disasters could hurt these efforts as well. The rise of sea level will first affect families closest to the coast, as they will face the loss of their homes and be forced to relocate (Almond). This topic affects the environment because the only quick solutions to the rise in sea level will likely cause some sort of environmental harm to the ecosystems near Tuvalu.

Solutions and Recommendations

There are a few potential solutions to Tuvalu's climate crisis. First is Tuvalu's current plan. Its current plan is the L-TAP (Long-term Adaptation Plan) in Funafuti, Tuvalu's capital, and Nanumaga, an outer rural island. Funded by the Australian government and the Green Climate Fund, these plans aim to reclaim 3.6 square kilometers of land and establish guidelines for the safe relocation of people as well as the rebuilding of infrastructure. Tuvalu predicts that the raised land will remain above sea levels up until 2100, and that it will be able to withstand storms in the context of higher sea levels. Looking into the future, Tuvalu aims to create a sustainable supply of water, greater food and energy security, and an increase of government offices and hospitals (World Economic Forum).

One long term solution to the rising sea level issue in Tuvalu is the use of dredging. "Dredging is the process of removing sedimentary and debris from the bottom of bodies of water. The sediment is brought to the surface and used to fill large sandbags, which are layered to construct land" (Auge). Once the land is reclaimed, the people who were displaced from past tides will be able to return to their original land. This plan has multiple benefits. First, the new land formed from dredging will act as a semi-long term solution to sea level rises. It will act as a buffer zone between urgent displacement and change. More importantly, the increase of land mass will create a solution to the current salt water intrusion on Tuvaluian crops. Currently, salt water that rises to flood Tuvaluian crops destroys these farms, resulting in food insecurity. Through land reclamation, Tuvalu can decrease food insecurity and create sustainable sources of food. One potential weakness to this strategy is that it may affect ecosystems. Creating more land damages the ocean below. Dredging may hurt coral reef ecosystems and food sources in the area.

Another solution for Tuvalu's climate crisis is the strengthening of mangrove forests, one of Tuvalu's natural environmental aspects. The growing of mangrove trees has been proven to have the capacity to counter sea level rises in New Zealand, because "mangroves are likely to widen from erosion and more water will encroach inwards, whereas mangrove regions prevent this effect -- which is likely due to soil building up around their mesh-like roots and acting to reduce energy from waves and tidal currents" (University of Southampton). Furthermore, it was reported that "the ability of mangrove forest to gradually create a buffer between sea and land occurs even when the area is subjected to potential sea level rises of up to 0.5mm per year" (University of Southampton). This solution has a few benefits. First, the ability of mangrove trees to stop sea level rising does not come with all of the negative effects on the ecosystem that dredging will have, as mangrove trees are already an existing part of the ecosystem. Thus, an increase of mangrove trees will have a lesser effect on the ecosystem compared with dredging.

Moreover, growing mangrove trees will be a longer term solution to sea level rises as their effectiveness will likely last longer than dredging. One potential negative aspect of this solution is its effects on biodiversity in ecosystems. Too many mangrove trees can outcompete other forms of plant species that perform similar tasks in the same ecosystem, changing the structure of the ecosystem. Consequently, growing many mangrove trees may lead to limited biodiversity in the area.

Fortunately, both of these solutions would benefit all of the citizens of Tuvalu, and are likely to be funded by the Australian government and the Green Climate Fund. In fact, Tuvalu and the Australian government have recently come to an agreement: the Australian government will send 75 million dollars to Tuvalu for climate support efforts among other endeavors. In a separate tentative deal, Australia has promised Tuvalu that they will provide assistance in the case of a natural disaster (Nikkei Asia). Unfortunately, emergency response will likely be delayed due to the long distance between Tuvalu and Australia. This issue may be resolved by setting up emergency resources on an island closer to Tuvalu. In addition to Australian assistance, the Green Climate Fund has donated 36 million dollars to Tuvalu (Green Climate Fund). The dredging and mangrove tree plans will be executed by Tuvalu's citizens with additional labor help provided by the United Nations (UN). Most of the Tuvaluian workforce is expected to come from Tuvaluian farmers and various other community members who want to recover lost land and property. If Tuvalu wants to reclaim land, they must work with each other and large international organizations such as the United Nations and the Green Climate Fund. However, support for Tuvalu is not limited to these organizations, everyone can help. By voting and pushing for local representatives to take a more active role in cutting carbon emissions and expressing the need for the UN to stay in the Paris Climate Accords, anyone can help Tuvalu. The culture and traditions of Tuvalu are all at stake. If the proposed plans do not go successfully, we may see the first nation to be completely eliminated as a consequence of climate change. In carrying out these plans, it is vital to be conscious of native ecosystems, as studying ecosystems and the effects of the plans on them will be integral to keeping these plans sustainable.

Conclusion

To conclude, the situation is dire in Tuvalu. Climate change induced sea level rise is worsening and, unfortunately, signs of stopping are not here. Thus, there must be plans to immediately mitigate the effects. Two ways of mitigating these effects are dredging, the movement of sediment to create land, and planting mangrove trees, which creates a layer of soil to reclaim land. However, to be effective, both plans need to be conscious of the effects they will have on the ecosystem.

Work Cited

- Almond, K. "Rising sea levels are threatening this pacific paradise." CNN, n.d.,
<https://www.cnn.com/interactive/2019/05/world/tuvalu-climate-change-cnnphotos/>.
- Arthur Webb, Dr Arthur Webb, Yusuke Taishi, Srilata Kammila, & Pradeep Kurukulasuriya.
 "Notes from Tuvalu: Leading the way in adapting to sea-level rise." UNDP, 19 July 2023,
<https://www.undp.org/blog/notes-tuvalu-leading-way-adapting-sea-level-rise>.
- Augé, J. "Rising tides, rising solutions: Tuvalu's innovative climate adaptation strategies." The Diplomat, 30 November 2023,
<https://thediplomat.com/2023/11/rising-tides-rising-solutions-tuvalus-innovative-climate-adaptation-strategies/>.
- Borgelt, K., Siose, T. K., Taape, I. V., Nunan, M., Beek, K., & Craig, A. T. "The impact of digital communication and data exchange on Primary Health Service Delivery in a small island developing state setting." PLOS Digital Health, 7 October 2022,
<https://journals.plos.org/digitalhealth/article?id=10.1371%2Fjournal.pdig.0000109#:~:text=Tuvalu%20has%20a%20true%20universal, facilities%20located%20across%20the%20atolls>.
- CIA.gov. "Tuvalu." Central Intelligence Agency, 20 March 2024,
<https://www.cia.gov/the-world-factbook/countries/tuvalu/#geography>.
- "FP015: Tuvalu Coastal Adaptation Project (TCAP)." FP015, Green Climate Fund, 30 June 2016,
www.greenclimate.fund/project/fp015.
- GlobalEdge. "Tuvalu: Government." globalEDGE, n.d.,
<https://globaledge.msu.edu/countries/tuvalu/government>.
- Humanium. "Children of Tuvalu." Humanium, 3 April 2019,
<https://www.humanium.org/en/tuvalu/>.
- International Labour Organization. "Tuvalu." Tuvalu The Employment - Environment - Climate Nexus, 1 November 2022,
https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_862816.pdf.
- Lab, G. D. "Area database (V4.2.1)." Global Data Lab, n.d.,
<https://globaldatalab.org/areadata/table/hhsize/TUV/>.
- Lindsey, R. "Climate change: Global sea level." NOAA Climate.gov, 19 April 2022,
<https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level>.

Yarina, Lizzie, and Lomiata Niuatui. "Fluid Vernacular." Fluid Vernacular, Site, www.thesitemagazine.com/read/fluid-vernacular.

NOAA. "Is sea level rising?" NOAA's National Ocean Service, n.d., <https://oceanservice.noaa.gov/facts/sealevel.html>.

OECD.world. "Tuvalu (TUV) exports, imports, and trade partners." The Observatory of Economic Complexity, 1 January 2022, <https://oec.world/en/profile/country/tuv>.

Priorities of the People. "Priorities of the people: Hardship in Tuvalu." Hardship in Tuvalu - asian, 1 December 2003, <https://www.adb.org/sites/default/files/publication/29742/hardship-tuvalu.pdf>.

Small farmers in Agricultural Census in Asia and Pacific. "Small farmers in agricultural census in Asia and Pacific." Small Farmers In Agricultural Census In Asia And The Pacific, 8 September 2009, https://www.fao.org/fileadmin/templates/ess/documents/meetings_and_workshops/RAP2009/STAT-EMPOWER-4.pdf.

Southampton University. "Mangroves help protect against sea level rise." ScienceDaily, 23 July 2015, <https://www.sciencedaily.com/releases/2015/07/150723083855.htm#:~:text=They%20found%20areas%20without%20mangroves,from%20waves%20and%20tidal%20currents>.

Trading Economics. "Tuvalu - Agricultural Land (% of Land Area) 2024 data 2025 forecast 1961-2021 historical." Tuvalu - Agricultural Land (% Of Land Area), 1 March 2024, [https://tradingeconomics.com/tuvalu/agricultural-land-percent-of-land-area-wb-data.html#:~:text=Agricultural%20land%20\(%25%20of%20land%20area\)%20in%20Tuvalu%20was%20reported,compiled%20from%20officially%20recognized%20sources](https://tradingeconomics.com/tuvalu/agricultural-land-percent-of-land-area-wb-data.html#:~:text=Agricultural%20land%20(%25%20of%20land%20area)%20in%20Tuvalu%20was%20reported,compiled%20from%20officially%20recognized%20sources).

Turton, Shaun. Australia Unveils \$75m in Tuvalu Funding amid China Push in Region, Nikkei Asia, 9

May 2024, asia.nikkei.com/Politics/International-relations/Australia-unveils-75m-in-Tuvalu-funding-amid-China-push-in-region#:~:text=SYDNEY%20%2D%2D%20Australia%20on%20Thursdays,country's%20National%20Security%20Coordination%20Center.

United Nations. "Initial report of states parties due in 1997 - OHCHR." Convention on the Rights of the Child, 16 February 2012, <http://docstore.ohchr.org/SelfServices/FilesHandler.ashx?enc=6QkG1d/PPRiCAqhKb7yhs4mxnfc1aVVrBQdL+VsmzBhKnu+fk3EteFqpqOOPUBpmpE7jfJfFq18quJ0pqdDSw3CJJfPmeLUFWVDMAUkfFq4iD+GfjWh3rRUTJwIhiXP>.

World Bank. "Climatology | Climate Change Knowledge Portal." World Bank Climate Change

Knowledge Portal, n.d.,

<https://climateknowledgeportal.worldbank.org/country/tuvalu/climate-data-historical>.

World Economic Forum. "How Tuvalu is using technology to adapt to rising sea levels." World Economic Forum, 25 July 2023,

<https://www.weforum.org/agenda/2023/07/tuvalu-l-tap-technology-sea-level-rise-undp/>.