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Madagascar, Water Scarcity, and its impact on food security in Madagascar

Rainfall Roulette: How Unpredictable Water Shapes Food Security in Madagascar

Every year, millions of people in Madagascar wake up not knowing whether the rain will come. For most of the world, rain is a problem. For the 80 percent of individuals in Madagascar that rely upon farming to provide for their communities, rain is essential for agriculture and survival (World Bank Group "Madagascar"). Madagascar is an island nation located off the southeastern coast of Africa and is among the most biodiverse and resource-rich nations on the planet. Despite the wealth of resources that the country possesses, Madagascar is among the poorest nations on the planet. Much of the country suffers from water scarcity due to the unpredictable rainfall that falls on the nation and the lack of irrigation fields that most farmers have access to. The lack of water impacts the ability of farmers to grow the crops that feed the nation's farmers and children, leading to further impacts on the country's population of individuals who live in poverty. In order to understand the issue of water scarcity in Madagascar and potential solutions to the issue, it is important to gain an understanding of the geography of the nation, the individuals who live in the nation, and the lives of its people.

Background

Madagascar is the world's fourth-largest island. It's about 587,000 square kilometers, which is a bit smaller than Texas (Kent and Covell). About 32 to 33 million people live in this country, and most of them, around 80 percent, are in the countryside (UNFPA; Worldometer). Most people in Madagascar are directly connected to the land. If their land doesn't work out, they're in trouble. Madagascar is run like a presidential republic, which means it has a president who is the head of the country, and a prime minister who handles the government's work (Editors of Encyclopaedia Britannica). Even though the country has a working government and natural resources like vanilla, coffee, cloves, and gemstones, it's still considered a low-income nation, according to the African Studies Center. It's been tough for them to turn their resources into real improvements for people, mainly because of corruption, bad infrastructure, and years of political trouble.

Agriculture is at the center of Madagascar's economy. About five percent of the country's land is farmed, even though far more could be used (FAO). Rice is the most important crop and is used at nearly every meal. Cassava, maize, and legumes round out the average diet. Madagascar is also one of the world's top producers of vanilla, and exports of spices and coffee bring in income, though that money rarely reaches the rural families doing the farming (World Bank Group "Madagascar"). The average farm size is about one hectare, roughly two to three acres, not much bigger than a couple of football fields, while the average American farm is hundreds of acres. Most Malagasy farms are operated to grow just enough to feed themselves, with little or nothing left to sell (IFAD).

Geography

Madagascar's geography is one of its stunning features throughout the country. The island is divided into several distinct regions: the central highlands and mountain ranges, the narrow and rainforest-covered eastern coast, the broader western plains, and the dry, semi-arid south (Kent and Covell; Encyclopædia Britannica, Inc.). The eastern coast gets lots of rain throughout the year, the central highlands are cooler and chill, and the southern region is heavily affected by drought. The country also sits in the path of

tropical cyclones, which hit the eastern coast and can cause floods and crop destruction, while the south has some of the longest droughts in the region (World Food Programme “Madagascar”).

Deforestation has made the situation worse. Madagascar has lost huge portions of its original forest cover due to slash-and-burn farming and illegal logging. Without tree roots to hold soil in place, rain washes it away, and the land’s ability to absorb water is horrible. This makes a bad cycle: less forest means less water retention, which means harsher droughts, which means less food production (World Bank Group “Greening the Great South”).

Society and Culture

Life in rural Madagascar is shaped by the land, seasons, and families. A typical family has four to five people; in rural areas, family members often share the same home (Abela). Homes are generally structures made from mud, wood, or brick, and in many rural areas lack running water, electricity, or proper sanitation (World Bank Group “Social Safety Nets”).

To put a face on these numbers, picture a farming family in the Malagasy countryside. A household of four or five people works a section of land about one hectare in size, barely bigger than a couple of football fields, growing rice as the main crop along with cassava, maize, and beans to round out the diet (IFAD). Most of what they grow gets eaten, not sold, so there's rarely extra income to fall back on when a harvest comes up short. Education is usually inconsistent for kids in these households; many start school but drop out early to help with farm work, or simply because the nearest school is too far away to get to reliably. Health care faces the same problem. Clinics are often hours away over roads that are barely passable, so when someone gets sick or a child needs a vaccination, it can mean losing an entire day of work just to get there (World Bank Group "Social Safety Nets"). These families face several barriers stacked on top of each other: farming methods are basic and depend entirely on whatever rain happens to fall, access to credit or better seed varieties is limited, and when there is a surplus to sell, bad roads make it hard to reach a market before the crops spoil (IFAD; FAO). Every one of these barriers traces back to water. Without a way to keep fields watered outside of the rainy season, a family like this is never more than one bad season away from not having enough to eat.

Rice is not just a food in Madagascar; it is a cultural necessity. Meals usually consist of rice alongside vegetables, beans, or leafy greens, with meat or fish eaten occasionally since it is expensive for the average income. In the southern part of the country, families sometimes go days without nutritious food during the worst drought seasons (World Food Programme “How Drought”). Children are malnutrition-affected: nearly half of children under five suffer from stunted growth caused by chronic food insecurity (Abela).

The average annual income per person in Madagascar is roughly $500 to $600, one of the lowest in the world (World Bank Group “Madagascar Overview”). Most jobs are in agriculture, with small fishing and market trading equaling it out. With incomes this low and food prices that can spike dramatically during droughts, many families are never more than one bad harvest away from a life-threatening crisis. Roads are usually bad or nonexistent in rural areas, making it hard to reach markets or healthcare facilities, which just adds to every other challenge the country faces (World Bank Group “Social Safety Nets”).

Water Scarcity and Its Impact on Food Security

The most direct threat to food security in Madagascar today is water scarcity, particularly in the southern and southwestern regions. In parts of southern Madagascar, communities have experienced many years of below-average rainfall, leading to what humanitarian organizations have called one of the worst food crises in the country’s history (World Food Programme “How Drought”). The World Food Programme

has reported that hundreds of thousands of people in the south have faced serious hunger, with some people pushed to the edge of famine (World Food Programme "Madagascar"). The cause is straightforward: Madagascar's farmers are largely dependent on rain-fed agriculture with no backup plan, and less than five percent of the used land is irrigated with water(FAO; IFAD).

Climate change has made rainfall patterns less predictable. Rainy seasons that used to arrive on schedule are now shifting, and when rain does come, bad things follow. When it comes later in intense bursts, it causes flooding rather than steady, crop-benefiting moisture. Dry seasons are getting longer (UNICEF USA). The ripple effects affect well beyond the fields. When crops fail, families lose their food supply and primary income as well. Women sometimes walk several hours a day to reach a functioning water source. Time that cannot be spent farming or caring for children (UNICEF USA). Livestock die during long droughts, wiping out years of gained assets (World Food Programme "How Drought"). In the most drought-affected regions, desertification is a genuine concern nowadays. This relates to where drought leads to land degradation, which leads to worse drought outcomes (World Bank Group "Greening the Great South"). It keeps spiraling down a path of negatives that continuously gets harder to get out of.

Possible Solutions

Several possibilities to try and fix this have been proposed and partially put into place to address water scarcity in Madagascar. The first is the expansion of irrigation infrastructure. The World Bank committed $100 million in 2021, specifically aimed at protecting lives and improving food security in southern Madagascar (World Bank Group "$100 Million"). Countries like India have used irrigation networks to stabilize food production in similar dry regions, showing the model to be used when funded. The challenge is cost: Infrastructure is expensive to build, and maintaining it in these rural communities requires a big investment. Currently, irrigated farmland is only a tiny fraction of what is needed (IFAD).

The second solution is rainwater harvesting, which involves capturing rain during the wet season and storing it in tanks or community reservoirs for use during dry periods. UNICEF has already used these programs in southern Madagascar with good results, helping communities build pipelines and storage systems that give clean water year-round (UNICEF). These programs have minimized the hours women and children spend walking to collect water, freeing up time for farming and school. The only limitation is that it depends on having enough rain to collect, which is not guaranteed during year-long droughts (UNICEF USA).

The third solution is the idea of drought-resistant crop varieties. In the Sahel region of West Africa, farmers have transitioned to drought-tolerant sorghum and millet that survive on a fraction of the water that traditional crops require. In East Africa, drought-resistant cassava and maize have helped farmers have harvests through dry seasons that would have wiped out the more basic/traditional crops entirely (FAO). Introducing these varieties in Madagascar could let farmers keep producing food even when it doesn't rain for long periods. The barrier needed to cross is the access to seeds and education on how to grow them, but organizations like the IFAD and the FAO already run seed distribution programs across Africa that could grow here (IFAD).

A fourth approach is reforestation and soil conservation. Planting trees and restoring heavily used land would help the soil hold moisture longer and reduce erosion. The World Bank's Greening the Great South initiative has already begun funding community-led reforestation in southern Madagascar, with results showing improved soil health (World Bank Group "Greening the Great South"). Although this is a long-term solution, it helps fix the root environmental cause of worsening droughts.

Recommendation

The most realistic and impactful path is a combination of small-scale irrigation with community-level rainwater harvesting, being supported by drought-resistant crops. Irrigation gives a consistent water source during dry seasons, rainwater harvesting stretches that further, and drought-resistant crops decrease how much water is needed in the first place. Together, they greatly reduce a farmer's dependence on the unpredictable rainfall.

The plan should center around building community-managed drip irrigation systems in the most drought-affected regions with affordable water storage tanks and family training on maintenance. Drip irrigation allows the flow of water directly to crop roots with minimal evaporation and has proven effective in water-scarce environments worldwide (FAO; World Bank Group "Greening the Great South"). Seed distribution programs should also be made to get drought-resistant varieties to rural farmers with proper training (IFAD). A possible funding source should be led by a coalition of the Malagasy government, the FAO, the World Food Programme, UNICEF, and IFAD, funded through World Bank development programs and international climate adaptation funds (IFAD; World Bank Group "$100 Million").

For the project to be sustainable, communities must be at the center of attention. Farmers should be trained to operate their own systems and maintain their farms, and local leaders and women's groups should be involved in planning since they have the most direct knowledge of how water is used (World Bank Group "Social Safety Nets"). One community member in southern Madagascar described that after they gained access to a new water system, the change meant children could stay in school, and women could spend their time farming instead of searching for water (Abela). That kind of impact is exactly what this aims to try and replicate at a larger scale.

Conclusion

Water scarcity is not a little problem in Madagascar; it is the reason many children go hungry, farms fail, and families fall deeper into poverty. It sits at the root of the country's food insecurity, and it is getting worse as climate change makes rainfall less predictable and droughts throughout the year more severe. The technology and knowledge needed to build these irrigation systems, harvest rainwater, and introduce drought-resistant crops exist in other areas today. What is needed is the political will, funding, and organizational commitment to bring those solutions to the communities that need them most. Madagascar has lots of natural potential, like fertile land, a large agricultural population, and a growing community of climate-resilient farming knowledge (World Bank Group "Greening the Great South"). Giving those farmers great access to water is the most important step the international community and the Malagasy government can take to secure the country's food future for years to come.

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