

Sam Philips  
Akron-Westfield High School  
Akron, Iowa  
Madagascar, Water Scarcity

## **Madagascar: Addressing Water Scarcity Challenges**

When most Americans think of the country of Madagascar, the first thing that probably comes to their minds are the lemurs, fossas and other animals from the animated movie series “Madagascar.” While the island country off the coast of southern Africa does indeed feature amazing animals — 90 percent of wildlife in the country is found nowhere else on Earth — the people of Madagascar also face significant economic problems and even more problems with securing adequate supplies of nutritious food and clean water.

In fact, in the Global Food Security Index published by The Economist Group in 2018, Madagascar was ranked 111th out of 113 countries for affordability, availability, and quality of food supply. About 42.3 percent of the country’s population were reported to be undernourished (Global Food Security Index).

In this article, I will review information about food security and water scarcity challenges for Madagascar, the typical life of an average family in Madagascar and the problems they face in obtaining clean water, as well as a few possible solutions to the problem of water scarcity. Water scarcity affects nearly all Malagasy citizens, with special challenges depending on whether they live in large cities or in rural, farming communities.

Water scarcity affects Madagascar in a variety of ways. Direct impacts of limited water supply on food security are the health risks to families as a result of no clean water to drink and limited amounts of water to irrigate crops. Indirect impacts of limited water supply on food security and health are the health issues and disease that arise from polluted and unsafe water, which can impact labor force and ability to plant and harvest crops, as well as quality of life for Malagasy people in both rural communities and big cities.

### **Country Overview**

Madagascar is the fourth largest island in the world. It has a total land area of 226,498 square miles, which is about four times the size of the state of Iowa. However, the total population is about 25.92 million people, which is more than eight times greater than Iowa’s population of 3.12 million people. One of the largest industries in Madagascar is the fishing industry, which makes sense for an island country. The main source of income of Malagasy families is surplus they can sell after feeding themselves on subsistence agriculture farms or from their own fishing boats, where most of the production is kept for themselves (Culture of Madagascar).

The typical family on the island of Madagascar is very different from here in the United States. The average family size is 4.9 people, and in rural areas, they live in one-room houses made out of mud and wattle, which is a woven matting made of sticks and twigs. Rice is a staple of the Malagasy diet. It is usually served with kabaka, which is the main protein of the meal, such as beef, fish, or chicken, and boiled in water or coconut juice (Culture of Madagascar).

Education for families is required for children ages six to fourteen, however this is not easy to enforce in more rural areas where families need assistance with farming or fishing activities. There are hospitals in all major cities, but healthcare is not easily accessible to the majority of rural people. In cities, there are landline telephones and electricity, but most rural towns do not have access to electricity or running water

inside homes or other buildings. Unpaved roads are common all across the island, not just in small villages, making travel difficult in many situations (Culture of Madagascar).

### **Water Scarcity**

Even though it is an island nation surrounded by water, water scarcity and the lack of clean water is one of Madagascar's most significant problems. About 58 percent of the country's population do not have access to clean water or water at all, and 88 percent don't have access to good toilets or modern sewage systems (Bogenproject.org). According to WaterAid, almost 4,000 children under the age of five die from diarrhea each year, many because of poor or unsafe water quality.

One major issue also affecting water security is the country's decades of unstable political structure. There has been no effective central government to establish policy or effective infrastructure for water and other critical food supply needs. For example, within the past 30 years there have been four leaders of the county, and there were three different political systems set up by these leaders (Wildmadagascar.org). A number of international aid organizations and charities such as World Wildlife Federation (WWF), UNICEF, and others have established ongoing projects in the country (thewaterproject.org). The U.S. has been supporting the people of Madagascar for more than 30 years. In 2017, USAID provided about \$83 million in development assistance to Madagascar, with an additional \$19 million in emergency assistance (USAID). This aid included support in a number of areas that impact water supply, including health, agriculture and the environment.

While efforts by developed countries to tap into groundwater underneath the surface are helping this major problem, these efforts affect rural populations much more than urban, as cities have wells that they can access clean water. Water and Sanitation for the Urban Poor (WSUP) is working in Madagascar, specifically in cities like Antananarivo, Mahajanga, and Toliara, to improve water quality and waste disposal systems. Most people in rural areas have to walk to a lake or other body of water so they can get their water for the day (thewaterproject.org).

The small amounts of clean water often get polluted due to poor wastewater management in the larger cities. The capital city of Antananarivo has a population of more than 1.3 million people; however, all of the waste water is not treated, and only a small portion of the city has a sewer system at all (bogenproject.org).

In conclusion, clean, safe water in Madagascar is not easy to find and this scarcity poses tremendous health and safety issues in addition to limiting food production.

### **Possible Solutions to Water Challenges**

After gaining understanding of basic water challenges facing Madagascar, I researched potential solutions.

A possible solution to the problem of the lack of clean water is to tap into the largest source of water on the planet: the ocean. One option is to build **desalination** plants on the island's coast that could break down salt water using the process of reverse osmosis. The water would be separated from the salt by being forced through a semi-permeable membrane and would leave cool, healthy water. The waste product could be refined down into salt and sold as a natural resource to the people or to other countries in need of salt (puretecwater.com).

The resulting clean water could then be used for drinking, sewage management, personal hygiene, or any other necessities of life. There are already more than 18,000 desalination plants in operation around the

world today, and technology has improved over the years to make these plants more efficient (allafrica.com).

One place in Madagascar where desalination was introduced as a solution is in the coastal village of Beheloke. World Wildlife Fund (WWF) Switzerland, WWF Madagascar, and the Swiss Solar Spar Foundation teamed up to design and build a solar powered desalination plant. Before the plant was built, the closest place the residents of Beheloke could access clean water was five- and one-half miles away, and five gallons would cost about 700 Ariary (.19 USD). The water from the desalination plant is much cheaper — only 250 Ariary for the same amount of water — but more importantly, it is much closer and saves citizens the time and energy it would take to walk more than 10 miles round trip each day (Drinking water for Beheloke).

The plant was built by the Swiss company Trunz. An important part of the process implemented by the organizations involved was to create a community association, training local technicians and creating a water committee to ensure the sustainability of the well. Beheloke residents were trained how to use and maintain the plant and how to keep it running smoothly and efficiently (Drinking water for Beheloke).

One of the advantages of this solution is that, as an island nation, nearly every area of the country has relatively easy access to the coast and seawater. In fact, the furthest from the ocean you can be on Madagascar is 150 miles, only about twenty miles further than it is driving from Des Moines to Omaha. Building these large desalination plants would likely create many jobs for the country, and even more would be created in order to keep the plants clean, maintained and efficient. Because both the lack of food and water supplies and lack of jobs are key reasons for instability of government, this new industry could help bring relief to citizens and stabilize government.

Disadvantages to desalination plants would be the significant investment of money and technology that would be required to build them. It would require investment and support from both large aid organizations such as USAID or United Nations and well as local charities to carry out the work. These organizations would also have to partner with companies to design and provide the equipment needed to build and operate desalination plants. The government would have to also make a commitment to provide money and infrastructure support. With the unstable history of the Madagascar government, this may be difficult to accomplish.

With international support, technical innovation and assistance, the ocean does present a promising solution to Madagascar's ever-growing problem of water scarcity.

Another solution could be tapping into the resources underneath the surface of the earth by **digging wells in rural villages**. Many of these remote towns do not have easy access to any types of water, often having to walk long distances to get two buckets of dirty water that their whole family uses for the day (Rural and Urban Water issues in Africa). Digging a clean, working well in or near the town's limits would provide a clean water supply and eliminate the need for families to spend a significant portion of their day gathering and hauling water.

A good example of how wells are helping the water scarcity issue in Madagascar is through the Madagascar Water Project. Since 2015, this organization has dug 71 wells in 41 remote villages to serve more than 40,000 Malagasy people. Digging the well is just one piece of the six-phase approach to projects. The program starts with establishing a local Well Management Committee to oversee construction. They also trained local people on how to keep the new wells running properly. The program includes training in health, hygiene and sanitation issues. As a result of new water supply and updated hygiene practices, water borne illnesses have dropped to almost zero in most of these remote villages (Madagascar Water Project Overview).

The advantage to this solution is that individual wells are less expensive than large facilities and do not require pipelines or other large infrastructure. Wells can be built and maintained in each town instead of requiring large scale participation or oversight from the government.

A drawback of this solution is the upfront cost and amount of labor needed to put in all these wells. With the hundreds of remote villages around the island, getting to every single one would be virtually impossible. Plus, well digging is not an exact science. While it sounds simple to dig a hole and get clean water, in fact, each well needs to be designed to specifications for the area's soils, water table and other needs. That will require technical expertise and assistance that will need to be provided by international charities and aid organizations. However, an underground hydrogeology map is starting to be built of Madagascar's aquifers, providing a better idea of where and how to drill these wells.

Another challenge is the different terrains and soil conditions that make moving digging equipment difficult throughout the various regions of the country. But due to training programs put on by foundations like the United Nations Children's Fund (UNICEF), drilling has become more readily available in Madagascar. The training course that UNICEF Madagascar put on was about drilling boreholes to make wells. Fifty-four Malagasy involved in the drilling sector of the country were educated on how to make well drilling more accurate and more cost-effective. This course covered five major points: Professionalization of the drilling sector, methods of borehole sittings, construction of boreholes, and management of drilling data. The attendees were all from major drilling companies in Madagascar, consulting firms for drilling wells, and government departments.

If effective partnerships could be developed between aid organizations such as UNICEF and Madagascar's own Water Sanitation and Hygiene (WASH) that bring technical expertise and equipment and with local community leaders that provide manpower for digging wells and commitment to maintaining them, many rural communities could benefit. Without those resources, well digging would be not possible and inefficient to the country's economy as a whole.

The final solution that I researched is **cleaning up the water** that is already available to Madagascar. Lots of water is so polluted by human waste or other pollutants that it is unusable for people. Investing in water treatment or purification plants in the larger cities like Antananarivo and Toamasina for the water that is badly polluted would allow cleaned or treated water to be distributed to people in need.

The biggest advantage of this solution is that, like desalination plants, water treatment plants will be an investment that pays off for many years to come (Desalination? Africa should rather manage its water resources better). It will also create jobs and provide opportunities for Malagasy people to become trained for skilled jobs, and take their skills to smaller cities or rural areas to expand water treatment infrastructure. The dirty water will never run out as long as humans are using the clean water. It could start a cycle like on the International Space Station where they drink their own purified urine.

The biggest challenge is the upfront cost to design and build the plants as well as needed infrastructure for sewage systems, and delivery of water to homes and businesses. After facilities are built, it will require significant investment and commitment from Madagascar government and local officials to keep them maintained and running effectively.

## **Conclusion**

Although all of the solutions I mentioned could make some impact on the problem of water scarcity in Madagascar, it will take a combination of many different solutions that must come together to fix the problem. City and local officials must work together with international charities, aid associations, and technology providers to create plans that work best for each region and town. In addition, the

Madagascar government must be committed to funding infrastructure projects, training workers and maintaining projects for years to come.

In doing research for this paper, I learned about a typical family in Madagascar, the major problem of water scarcity, and a few possible solutions to this problem. Madagascar is a developing country with amazing wildlife and plant life, and even though it is surrounded by water, the lack of clean water for drinking and raising crops is a huge challenge to Malagasy families' daily life and to the country as a whole. It was eye-opening to learn about a place and culture so different from my own and learn about problems that other cultures have. So many of us take for granted all the things that we are given, and don't realize how lucky we really are.

Effective partnerships between local community leaders, national government officials, local charities and international aid organizations could lead to significant improvements that will lead to better health, improved sanitation and better food security across the country and better standard of living for its millions of residents. It was interesting to learn about the various partnerships that have been formed and the efforts to bring local residents into the work to design, build and sustain projects to ensure water supplies into the future.

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