Hannah Grantz

Central DeWitt High School

DeWitt, IA, USA

Madagascar, Sustainable Agriculture

**Madagascar: The Solution to Harmful Soil Practices**

Madagascar is a beautiful island located off the coast of Africa. It is known for its unique wildlife, such as the iconic lemurs, and its incredible landscapes that are home to the country's famous Baobab trees. Within the lush rainforests and towering mountains, you can find the unique culture of the Madagascan people. Locals call their island the “Giant Red Island” due to the reddish tint of the ground (The European Space Agency).

The current population of Madagascar is 30,778,859. 39.88% of the population is urban which leaves 60.12% of the population to be rural (Worldometer). 84.06% of the population is employed and of that, 73.9% is employed in an agricultural field (Global Edge). This shows that agriculture is very important to the Madagascan people. Madagascar is the fourth largest island in the world. About 71% of the island is agricultural land and 21% of it is forest. Madagascar also has hundreds of little lakes and streams with four major rivers called the Betsiboka, Tsiribihina, Mangoky, and Onilahy rivers (Landlinks).

The average farm size in Madagascar is 446 acres which is very similar to the average farm size in the United States which is 445 (Borgen Project.) About 71% of Madagascar is cultivated. 68% of the land is savannah which can have its strengths and weaknesses when trying to grow crops. Many areas are also used for animal grazing (Interactive Country Fiches). The most popular crop grown in Madagascar is rice which is grown in the irrigated and lowland areas of the country. Cassava, maize, and sweet potatoes are also grown in the country (Global Yield Gap Atlas).

Madagascar has a tropical maritime climate because of its altitude (Natural Habitat Adventures). Because of this climate, the country gets monsoons and other tropical storms all throughout the year. The winter months are April through September. Within these months there are warm days and chilly nights. Though it is a dryer time of the year there is usually some rainfall. The summer months are late September through April. In these months it is warmer out and there is still some rainfall.

Madagascar is divided into five different regions. These regions are the East Coast, the Central Highlands, the Tsaratanana Massif, the West Coast, and the Southwest (Go Way). The East Coast is a very popular spot for travelers. This is where the beaches and steep bluffs are located. This is also where lots of fishing and exporting happens. Volcanoes, plains, and marshes are all found in the Central Highlands of Madagascar. The Tsaratanana Massif is a small area around the volcanoes that is hilly and rocky. The West Coast has areas of mangrove swamps that are still unexplored, is not very heavily populated, and has high agricultural potential. The last region is the southwest part of the country. In this area, it is very dry and is known as the desert region.

The average family size in Madagascar is 4.18 people (World Population Review). These families live in rectangular houses and steeply angled roofs. Some of the people who live in rural areas make their homes out of mud or woven matting supported by poles (Brittanica). In the forests, the people use resources like bamboo and create wooden planks out of the trees for walls. Since rice is the main product grown in Madagascar, most families eat approximately 0.66 pounds of rice per person. With rice, they also eat many types of starchy foods such as cassava, yam, sweet potato, and taro. Corn and green vegetables are also eaten regularly (National Library of Medicine). Many of these families grow their own food, and if they don’t, most of their diet is produced in Madagascar.

Madagascar’s average yearly income is $133,013.40. For people working in a non-agricultural field their monthly income is $767.40. For people working in an agricultural field, it is $674.60 (Minimum Wage). Agriculture, mineral resources, fishing, and forestry are the most popular areas of employment on this island (CA Global). Over 70 percent of the country's employment is related to an agricultural field. The country is also known for its sapphire mining. It currently provides half of the world's sapphires. Madagascar’s biodiversity, tropical beaches, and low tourism costs also catch the eyes of many tourists. A large amount of people who live there work for tourism-related purposes (World Atlas).

In Madagascar, education is a small problem they have been dealing with. Out of 10 children entering primary school, only four complete primary school, two complete middle school, and one complete secondary school (UNICEF). More than 7.1 million children on the island, have not completed school. Kids from rural areas have the greatest disadvantage because their parents are unable to afford to send them to school. Madagascar sees education as very important, but the poverty levels do not allow some kids to go.

Only 60-70% of Madagascar’s population has access to primary healthcare. Many people have to walk to a healthcare facility, but there have been more mobile clinics arriving in areas of need. Drug and medical supplies are unavailable in some places that are more rural and harder to get to. The government sees healthcare as very important so they are working to improve as much as they can. They have been working on preventing and treating malaria, improving infant health, preventing sexually transmitted diseases, and increasing the availability of voluntary family planning and reproductive health services (USAID).

Only 54.4% of the island's population has access to basic water services (Carbon Credits Consulting). Many of these people live in rural areas and rely on lakes and streams that are untreated, which can cause disease. The southern regions of Madagascar are much drier and are more susceptible to drought which makes finding water even harder for the residents. Around a quarter of the population has access to electricity and only 1.5% has access to clean cooking facilities (lea50).

There have been many things that have caused problems for the people over the years in Madagascar. Food insecurity has increased a lot over the past years which has affected the population. Madagascar is also very vulnerable to many different extreme weather events. Heavy rains, strong winds, landslides, and floods have caused a lot of damage to many different cities on the island. They also deal with major droughts that can cause harm to different crops that are grown. This also attracts many different insects that can possibly spread disease (IMF eLibrary).

Mosquitos, ticks, and fleas are three of the main harmful insects in the country. These pests carry diseases to humans from one place to another. In Madagascar, malaria is caused by the ubiquitous species *Plasmodium falciparum* which is transmitted to humans by the bite of an infected female anopheles mosquito (Wild Madagascar). Malaria is a sickness with symptoms of fever, chills, and headache. It is said to be very much like influenza. Mosquitos are usually out between dusk and dawn, which creates a great risk for the Madagascan people. In most pictures of people in Madagascar, some may notice that even with the hot and dry climates, most of the people are wearing clothing that completely covers their bodies. This is to help prevent them from getting mosquito bites.

Madagascar is located near the Indian and African tectonic plates. Since they are so close to the plate edges they are more susceptible to these conditions (Climate Policy Watcher). Madagascar’s number one problem right now is the loss of good soil and habitat (Science Direct). This is caused by things like deforestation and slash-and-burn practices. Slash-and-burn agriculture is a practice used by farmers. They burn off any weeds, brush, or trees in places where they want to plant crops or graze animals. The ash is supposed to provide fertilization and leave the plot free of weeds. This works for a few years but after many years of burning the ground fertility declines and the weeds increase. This can cause greenhouse gases to enter the atmosphere. Trees and plants take up carbon dioxide from the atmosphere. When the trees and plants are burned they release carbon as carbon dioxide back into the air, which creates greenhouse gases. This is one reason why our Earth gets warmer every year (Brittanica).

One way that could help prevent this slash-and-burn agriculture, is the use of livestock. Waste from livestock is a good, natural fertilizer for soil. When the soil is burned many important nutrients are also burned away from the soil (Socratic). Waste from animals can help maintain these important nutrients and also add more to make the crops grow even better. The waste can also make the soil stronger than slash-and-burn can. Madagascar gets many different types of severe weather that can damage the soil. This animal waste can help maintain the soil better than burning it.

Many people in Madagascar are suffering from food insecurity. After these animals graze on the farmland for a few years, they can be butchered and used for food in the country. One problem with this idea is that it will take time to develop the soil. Many acres of land have already been burned more than once in the past few years. It will take another few years for the animals to create a better planting environment. Even with these few setbacks, this practice will still be better than using slash and burn.

One of the main problems with the slash-and-burn method is that it usually involves burning trees. Trees are a very important part of the world and the soil. Without them, the air we breathe would not be healthy. A solution to this is agroforestry. Agroforestry is a type of agriculture that involves planting crops in forests instead of clearing them. This allows plants to grow but can keep the trees too. Madagascar is famous for its Baobab trees. Most of the time these trees are grown in open areas. Tree roots help soil erosion and also absorb water (Austin Texas). Madagascar has many different dry seasons where plants are in need of water.

These roots hold in water and nutrients that the plants can use while growing. The leaves of the trees can also help shelter the crops from Madagascar’s bad weather conditions. Cyclones are a big problem in on the island. Madagascar has about three major cyclones per year (World Bank Climate Change Knowledge

Portal). When these cyclones come through the farms, the farmers are likely to loose their entire crop. This has led to some parts of the country to be poorer than others because they simply can not make the money because their crops get damaged so easily. For example, during the last cyclone 29% of farmers lost less than a quarter of their crops to the cyclone, while 10% lost more than 75% of their crops (National Library of Medicine)

The island has a history of very bad soil because of erosion. Tree roots hold the soil together and keep it from eroding over the years. Many farmers have had to stop their farming operations because they simply can’t grow anything because of erosion. This would help those farmers get back on their feet and help them start earning money again.

Many may think that technology is what should be brought in to make farming in the country better. This is definitely easier said than done. Because of the low income of the country, it is hard for people, especially farmers, to be able to pay for technologies. That is why finding more natural ways to solve these problems is a much better solution. This does not mean that technology could not help though. People from other countries who are concerned about the country of Madagascar could possibly raise money to get some technology to the island to better crop production. But first, we have to tell the world how they can help.

The third solution to this problem is simply getting the word out about the problems that Madagascar is having with their agriculture. There are people all over the world who have these problems and many people don’t know about it. Many different organizations help with these problems. Global Giving and Food Tank are two examples of organizations that help. It is so important for people to know about the impact that the slash-and-burn method has on agriculture and the environment around them.

To start this we can spread the word by using social media. Some examples of platforms that could be used is FaceBook, Instagram, Snapchat, YouTube, and many more. Social media posts and informational videos can be made to spread the word. Social media is a great tool that would help spread awareness. Different communities can also hold different workshops about how they can help. They can get together and brainstorm more ways they can help, or more ways they can donate to organizations that already are helping. Something as little as a school fundraiser can go a long way on the island. The World Food Prize Foundation for instance is a great way to get the younger generation thinking about how they can help countries and their issues. Creating organizations like this around the United States and around the world will potentially spark an interest in more people who simply want to make the world a better place.

Farmers in the United States, and especially the Midwest, are very fortunate to have good soil to raise their crops. They would love to help find practical solutions that will also inspire people to talk about it more. There are also many groups such as ministries that take trips to different countries and help them out by bringing in supplies and helping with the planting and harvesting of crops. This can be a great learning experience for people who are willing to put in their time and effort, while also helping change the world for the better.

In conclusion, it is crucial to fix the ways of harmful soil practices like slash-and-burn agriculture in Madagascar. By using animal waste as fertilizer, we can make soil fertility better and reduce the need for these harmful practices. Agroforestry can also be used to help restore the soil and keep it from being harmed more and more over the years. Lastly, spreading awareness about the situation is key Through education and advertising, we can inspire others to help protect the soil in Madagascar. By doing all of these things, we can protect the soil and keep the island of Madagascar thriving!

**Works Cited**

#### Author links open overlay panelAmanda Suzzi-Simmons, and AbstractSeveral studies have reported tree cover loss at an unprecedented rate in Madagascar because of human population expansion which affects biodiversity. “Status of Deforestation of Madagascar.” *Global Ecology and Conservation*, Elsevier, 2023, www.sciencedirect.com/science/article/pii/S2351989423000240#:~:text=In%20the%20past%2020%20years,practice%20for%20pasture%20and%20agriculture. Accessed 29 Feb. 2024.

#### “Earth from Space: ‘Great Red Island.’” *ESA*, www.esa.int/Applications/Observing\_the\_Earth/Earth\_from\_Space\_Great\_Red\_Island2#:~:text=Due%20to%20the%20permanently%20reddish,the%20Mozambique%20Channel%20(left). Accessed 15 Feb. 2024.

#### *Family Size by Country 2024*, worldpopulationreview.com/country-rankings/family-size-by-country. Accessed 28 Feb. 2024.

#### Fayad, Dominique. “Food Insecurity and Climate Shocks in Madagascar.” *IMF eLibrary*, International Monetary Fund, 5 June 2023, www.elibrary.imf.org/view/journals/018/2023/037/article-A001-en.xml. Accessed 29 Feb. 2024.

Golden, Christopher D, et al. “Seasonal Trends of Nutrient Intake in Rainforest Communities of North-Eastern Madagascar.” *Public Health Nutrition*, U.S. National Library of Medicine, 1 Aug. 2019, www.ncbi.nlm.nih.gov/pmc/articles/PMC10260550/#:~:text=Malagasy%20people%20eat%20approximately%20300,of%20greens%20and%20other%20vegetables. Accessed 28 Feb. 2024.

#### Harvey, C. A., Rakotobe, Z. L., Rao, N. S., Dave, R., Razafimahatratra, H., Rabarijohn, R. H., … Mackinnon, J. L. (2014). Extreme vulnerability of smallholder farmers to agricultural risks and climate change in Madagascar. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3928894/

#### “How Tree Roots Work Part II: Digging Deeper.” *AustinTexas.Gov*, www.austintexas.gov/blog/how-tree-roots-work-part-ii-digging-deeper#:~:text=Roots%20support%20trees%20and%20help,make%20food%20and%20other%20resources. Accessed 01 Mar. 2024.

#### Iea. “Madagascar - Countries & Regions.” *IEA*, www.iea.org/countries/madagascar. Accessed 28 Feb. 2024.

#### Kiprop, Joseph. “The Biggest Industries In Madagascar.” *WorldAtlas*, 21 May 2018, www.worldatlas.com/articles/the-biggest-industries-in-madagascar.html#:~:text=The%20biggest%20industries%20in%20the,pillars%20of%20the%20Malagasy%20economy. Accessed 28 Feb. 2024.

#### “Land / Madagascar: Interactive Country Fiches.” *Land / Madagascar | Interactive Country Fiches*, dicf.unepgrid.ch/madagascar/land#:~:text=About%2071%20%25%20of%20Madagascar%20is,of%20the%20island%20%5B120%5D. Accessed 27 Feb. 2024.

#### Lemmons, Richard. “Tectonics Of Madagascar - Plate Tectonics.” *Climate Policy Watcher*, 25 Sept. 2023, www.climate-policy-watcher.org/plate-tectonics/tectonics-of-madagascar.html. Accessed 29 Feb. 2024.

#### “Local Government.” *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., www.britannica.com/place/Madagascar/Local-government. Accessed 28 Feb. 2024.

#### “Madagascar - CA Global Madagascar Jobs: Africa Recruitment.” *CA Global*, 26 May 2022, www.caglobalint.com/madagascar/#:~:text=Agriculture%2C%20mineral%20resources%2C%20fishing%2C,the%20world’s%20supply%20of%20sapphires. Accessed 28 Feb. 2024.

#### “Madagascar: Economy.” *>> globalEDGE: Your Source for Global Business Knowledge*, globaledge.msu.edu/countries/madagascar/economy. Accessed 15 Feb. 2024.

#### “Madagascar Geography and Maps.” *Madagascar Geography and Maps | Goway Travel*, www.goway.com/travel-information/africa-middle-east/madagascar/geography-and-maps/#:~:text=It%20is%20located%20in%20the,West%20Coast%20and%20the%20Southwest. Accessed 27 Feb. 2024.

#### *Madagascar - Global Yield Gap Atlas*, www.yieldgap.org/madagascar. Accessed 27 Feb. 2024.

#### *Weather & Climate in Madagascar*, www.nathab.com/know-before-you-go/african-safaris/madagascar/weather-climate/#:~:text=Madagascar%20has%20a%20tropical%20maritime,from%20May%20to%20early%20September. Accessed 27 Feb. 2024.

#### “Madagascar.” *LandLinks*, 5 Nov. 2020, www.land-links.org/country-profile/madagascar/. Accessed 15 Feb. 2024.

#### “Madagascar Minimum Wage Rate 2024.” *Federal and State Minimum Wage Rates for 2024*, www.minimum-wage.org/international/madagascar. Accessed 28 Feb. 2024.

#### “Madagascar Population (LIVE).” *Worldometer*, www.worldometers.info/world-population/madagascar-population/. Accessed 15 Feb. 2024.

#### Malaria in Madagascar. (n.d.). Retrieved from https://www.wildmadagascar.com/en/malaria-madagascar#:~:text=In%20Madagascar%2C%20malaria%20is%20caused,an%20infected%20female%20anopheles%20mosquito.

#### “Mila Rano - Safe Water Access for Madagascar.” *Carbon Credits Consulting*, 7 Sept. 2023, carboncreditsconsulting.com/mila-rano-clean-water/#:~:text=In%20Madagascar%20half%20of%20the,access%20to%20essential%20sanitation%20services. Accessed 28 Feb. 2024.

#### “Slash-and-Burn Agriculture.” *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., www.britannica.com/topic/slash-and-burn-agriculture. Accessed 29 Feb. 2024.

#### Thelwell, Kim. “10 Facts About Agriculture in Madagascar.” *The Borgen Project*, Kim Thelwell Https://Borgenproject.Org/Wp-Content/Uploads/Logo.Jpg, 6 Aug. 2020, borgenproject.org/10-facts-about-agriculture-in-madagascar/#:~:text=Because%20Madagascar’s%20terrain%20is%20mountainous,farm%20size%20is%201.3%20hectares.%E2%80%9D. Accessed 23 Feb. 2024.

#### “What Are Some Alternatives to Slash and Burn Agriculture?: Socratic.” *Socratic.Org*, 10 Apr. 2017, socratic.org/questions/what-are-some-alternatives-to-slash-and-burn-agriculture#:~:text=Another%20option%20is%20to%20combine,in%20the%20forest%20for%20agriculture. Accessed 29 Feb. 2024.

#### World Bank Climate Change Knowledge Portal. (n.d.). Retrieved from https://climateknowledgeportal.worldbank.org/country/madagascar#:~:text=Madagascar%20is%20one%20of%20the,of%20three%20cyclones%20per%20year.

#### www.unicef.org/esa/sites/unicef.org.esa/files/2019-04/Investment-Case-for-Education-in-Madagascar-Summary-%282016%29.pdf. Accessed 28 Feb. 2024.

####