

Ian Pierson
Hoover High School
Des Moines, IA
Madagascar, Factor 6

Sustainable Agriculture in Madagascar

Madagascar, the island home of more than 21 million Malagasy people, faces many challenges as the 21st century unfolds. Political instability, the negative effects of global warming, and grinding poverty for a majority of the country are a few of these challenges. However, through appropriate use and management of land, the Malagasy people can begin to confront these issues, particularly their issue of poverty. The average rural Malagasy family's largest issue is their poverty: nearly 77% of the rural population is considered poor ("Rural Poverty in Madagascar"). The British Broadcasting Corporation (BBC) reports that 70% of all of Madagascar lives on less than one United States dollar each day. There are several reasons for this widespread poverty, but chief among them are the small average farm size and large average family size. These two indicators make it difficult for an average rural family to produce enough food to meet their sizeable need. According to figures released by the International Fund for Agricultural Development (IFAD), the average family farm size is a mere 1.3 hectares, or less than 3.5 acres. For a subsistence farmer just attempting to meet his own family's needs, enough food must be produced to provide for an average of more than five children, his wife, and himself ("The World Factbook"). Frequently, this challenge is not met with success. Half of the children of Madagascar are malnourished ("Rural Poverty in Madagascar"). Small children are often the most affected class, with 55% of Malagasy children under the age of 5 exhibiting signs of stunted growth due to lack of proper nutrition and inadequate access to healthcare (Madagascar: Health Profile). Even if rural families are able to produce enough to begin to climb out of poverty, access to skilled medical healthcare is another issue. The World Health Organization estimates that there are only 1.6 physicians and just 3.2 nurses and midwives per 10,000 Malagasy. Given these low numbers, the fact that a mere 40% of rural births are attended by skilled health personnel is not surprising. The figures for those in the poorest 20% of the population, the extremely poor that are almost exclusively rural, are even worse: just 30% of births are attended by a skilled medical professional. The children that do make it through infancy cannot look forward to an easy life. With education spending comprising only 3.1% of Madagascar's gross domestic product, earning it a rank of 144th in the world, literacy rates hover around 75% for males and 62% for females. Comparatively, the United States spends 5.3% of its considerably larger gross domestic product on education ("The World Factbook"). With the average female and male spending nine and ten years in school, respectively, there is little hope for the Malagasy of breaking out of their poverty ("The World Factbook").

Rice is the staple crop of Madagascar. According to ABC-CLIO, rice is the country's main subsistence crop and the largest overall crop in number of acres grown. Because of this, rice is the staple of nearly every meal eaten by rural Malagasy, often supplemented with various dressings of vegetables, fish, and meat. Typically, fish are raised in irrigated rice fields to supplement the food supply. In addition, cassava is grown throughout the island and potatoes and yams are grown in the highlands. Other cash crops include coffee, bananas, and, most popularly, vanilla. Madagascar produces half of the world's vanilla, though the crop is risky and takes three years to produce its product.

Perhaps one of the largest problems for Malagasy farmers is their current agricultural practices. Tavy, or slash-and-burn, is the most common agricultural practice in Madagascar (ABC-CLIO). Tavy involves clear cutting a section of forest, then burning the underlying brush to clear the land for agricultural use (Bergen). The use of slash-and-burn techniques leads to a degradation of soil quality, reducing yields in tavy fields and injuring the environment (Styger). In addition, other crops are grown among the rice for more seasonal harvest, most commonly cucumber, melons, sesame, and a variety of beans (Styger).

These additional crops supplement the available food supply (Styger). Unfortunately, the practice of tavy is a major barrier to improving agricultural productivity by lowering yields and forcing families to continually move further into forests to obtain usable land.

Slash-and-burn agriculture is a practice deeply rooted in Malagasy history and tradition, according to researcher Erika Styger. The practice of deforestation to provide land for agricultural use began more than two thousand years ago when the first of the island's residents arrived. As these new residents pushed further to the east and expanded across the island, they cut forests to suit their needs, encroaching upon the forest limits as they progressed. Since then, their ancestors have carried this destructive agricultural practice into the present, where it has become part of the Malagasy traditions and culture.

Currently, the practice of slash-and-burn techniques allow Malagasy people to produce food for themselves merely as a means of subsistence, using the land until it can no longer be farmed, then moving on to continue their destructive practices. By using slash-and-burn techniques, the people of Madagascar are living for the moment, dependent upon their destructive technique to provide them with just enough food, or in many cases, less than enough food, to survive. In fact, it is estimated that only 15% of the potential for rice is currently being grown in Madagascar (Gaffikin). Sustainable agricultural techniques, though currently present in small amounts, must be encouraged to flourish if the Malagasy people are to have any hope of breaking out of their current poverty and malnutrition.

The severity of the situation involving sustainable agricultural techniques in Madagascar is alarming. With a population growth rate around 3% per year, the 12th highest in the entire world (World Factbook), Malagasy people must continually expand further and further into their disappearing rainforests (Styger). In addition, as the highlands are degraded by tavy practice, more of the population moves closer to the rainforests, resulting in higher population densities around the edge of the forest (Styger). This in turn puts additional pressure on the remaining land and promotes the expansion of tavy to clear rainforest and produce arable land. As farmers push further into rainforests, they also begin to push towards the highlands where yields are lowered by the appreciably cooler climate (Styger). In the past, tavy was an acceptable form of agriculture due to the ability of the land to deal with the population. In tavy agriculture, fields are allowed to lay fallow for a period of time, typically 2 or 3 years, in order to allow nutrients to return to the soil (Styger). This fallow period allows nutrients to return to the soil. After the fallow period, a good rice crop, given as about 1.5 tons/hectare by Styger, can be obtained after three years. However, after the third deforestation cycle, this period increases to five years, then eight years after the fourth cycle, twelve years after five cycles, and a whopping twenty years after six cycles. This mandatory fallow period is rarely followed; population pressures cause farmers to replant too quickly (Bergen). However, the results of re-deforestation too soon are soil depletion and rapidly lowered yields with each new cycle, further jeopardizing food security for these farmers. In addition to tavy practices hurting crop yields, they also seriously injure the unique environment of Madagascar.

Environmental issues in Madagascar owe much of their creation to the practice of tavy. The most immediate and obvious effect of the deforestation caused by tavy is the loss of habitat for natural fauna (ABC-CLIO). Madagascar is listed among the top 25 most critical global biodiversity hotspots (Styger). Large numbers of Madagascar's rare animals are in danger of extinction due to their rapid habitat loss (ABC-CLIO). However, this immediate effect is neither the only nor the most worrisome negative consequence. Desertification, the process of turning arable land into desert, and soil erosion have become large issues for Madagascar (ABC-CLIO). Desertification and soil erosion lead to less arable land available to Malagasy farmers, increasing their poverty and hunger woes. Still, these problems are not the only two. Perhaps the largest environmental issue for Madagascar caused by slash-and-burn techniques is the rapid loss of biodiversity (Styger). Within 5-7 fallow-cropping cycles, the progression from native trees to shrubbery is typically complete, and it is not uncommon to see entire fallow plots dominated by a single species of shrubbery (Styger). These shrubs, in addition, are often nonnative invasive species.

With fewer limits on their growth, these shrubs will frequently outcompete the native tree species, especially after several fallow-cropping cycles (Styger). This means that tavy deforestation does not only remove natural forests; its continued practice also prevents the natural reappearance of these forests and limits biodiversity. Finally, the appearance of shrubs and grasses after many cycles also means the land is unusable for agriculture for a long period of time (Styger). By continuing the practice of tavy, the Malagasy not only hurt their environment but they also begin to hurt their agricultural attempts and their food security.

The rural poor are especially at risk to feel the negative effects of their agricultural practices. While those in urban settings do not feel the pressure to expand their property holdings in order to survive, those in rural areas feel they must either expand or die. This attitude, and their rapidly growing population, put pressure on the rural poor and easily make them the most affected group by unsustainable agriculture.

The trends for agriculture are relatively easy to measure: average crop yields over time indicate whether the amount of food being produced is enough to meet the needs of the population. At first glance, the statistics from the country profile from EarthTrends for Madagascar appear promising. From 1979 to 2003, a ten percent increase is shown in average crop yields of cereal grains, measured in kilograms per hectare, meaning that the average farm produced ten percent more cereal grains per unit of land in 2003 than it did in 1979. However, this statistic, though positive, reflects a much lower gain than the rest of the world, which averaged a gain of 41% during the same time period. Madagascar experienced gain, but only at one fourth the rate of the rest of the world. Another statistic shows the true trend of food security. During this same time period, per capita production, the amount of food produced for each person, declined by one third while the world average declined by only four percent. The amount of food available to each Malagasy resident is decreasing, mostly due to an expanding population and depletion of soil quality present from their continued use of unsustainable agricultural techniques.

The situation for a rural Malagasy family is getting worse due to depletion of soil caused by their slash-and-burn agricultural techniques. Their methods of agriculture hurt their environment and hurt themselves by lowering their crop yields and reducing the ability of the forest to regenerate itself after multiple fallow-cropping cycles. In essence, there is a lack of sustainable agriculture that is hurting the Malagasy. Improving agricultural techniques to make them more sustainable would benefit the Malagasy three fold. First, it would enable them to produce more food from the land they have, easing the grip of poverty and hunger on their lives. Second, it would allow for more permanent settlements and greater possession of land, as they would no longer be forced to move further into the forests after exhausting their current land. And third, it would enable them to slow or stop their destruction of rainforest and Madagascar's unique, struggling wildlife. Sustainable agricultural techniques would improve the lives of Malagasy by beginning to guide them towards greater food security and giving them the ability to begin the long and arduous climb out of poverty.

Under the pressure of population, the tavy system of agriculture in Madagascar is collapsing; sustainable agriculture must be implemented soon (Styger). In confronting the challenge of spreading sustainable agriculture, subsistence farmers should be involved as the key players. Only by teaching new techniques to these farmers can they begin to progress into the modern world and out of poverty. The obvious course of action is to immediately begin to stop the practice of slash-and-burn agriculture, for the benefit of the poor and the environment. Many methods of sustainable agriculture exist that will result in higher crop yields and prolonged opportunity for land use. One method that is already beginning to catch on in Madagascar is a program developed at Cornell University to replace slash-and-burn techniques, termed the System for Rice Intensification, or SRI ("System"). SRI differs from the typical production of rice by requiring only compost fertilizers and only damp, as opposed to flooded, fields ("System"). In addition, the rice plants are planted further apart ("System"). This program not only reduces the amount of seed needed, from 100 kilograms per hectare to 7 kilograms per hectare, but also increases yields from around

2 tons per hectare to up to 15 tons per hectare (“Portraits”). In addition, this process reduces the amount of fertilizer and pesticide needed for farmers (“Portraits”). SRI also enhances soil nutrition, a strong and extremely important difference from tavy. Other, more traditional sustainable techniques, such as crop rotation and cover-cropping, are also shown to improve yields while maintaining soil quality, an important contrast to the tavy system (“Portraits”). Crop rotation involves planting different crops each year to maintain soil quality and high yields (“Portraits”). Cover-cropping means planting other plants among the crop to control weeds with less effort and herbicide (“Portraits”). These, and many other, methods of sustainable agriculture will provide the path to a thriving Madagascar.

In order for sustainable agriculture to spread in Madagascar, farmers must be convinced of its effectiveness. The tavy system is a remnant of traditional practices that have been used by the Malagasy for nearly two millennia; Malagasy farmers will be reluctant to give it up when it currently provides them with some food, even though this food is often not enough to sustain them or their environment. The SRI, even with its obvious benefits, has failed to expand wildly. Instead, disbelief in its results is widespread for the simple reason that they are so amazing (“Portraits”). For sustainable agriculture to take root in Madagascar, education, instruction, and implementation must be the goals of all organizations involved. The United Nations has the ability to be a leader in all of these areas. One of the United Nation’s Millennial Goals is to end poverty; by contributing to the education of farmers and implementation of systems such as SRI, the UN would surely be working towards this goal. In addition the Malagasy government must be called upon to help its own people without simply relying on aid from outside sources. This, unfortunately, looks to be difficult as the government is currently still reeling from a political change of power tantamount to a coup (ABC-CLIO). Still other organizations, such as Cornell University, have been vital in helping Madagascar move towards sustainability thus far. Other organizations supporting research on sustainable agriculture, like the United States Agency for International Development (USAID), will be vital in developing even more techniques for use in Madagascar. Yet as much as these organizations can help Madagascar, the country cannot move towards food security without the hard work and involvement of its own people. The Malagasy must see the crisis ahead of them and move swiftly to implement plans to stop it. Although international organizations and the national government can provide education and instruction, the last step towards sustainability, that of implementation, lies entirely with the Malagasy themselves. Sustainability cannot work if the Malagasy do not believe in it. Madagascar cannot continue to survive with widespread use of traditional agriculture; in order to move into the modern world and out of poverty, sustainable agriculture is needed. By adopting these practices, with the help and guidance of the international community, the world will begin to see how bright the future can be for Madagascar and its growing, resilient population.

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