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Madagascar, Factor 6
Sustainability in Progress

As of 1995, the standard of living for the Malagasy people was steadily decreasing for 25 years, with 68.7% of the island's inhabitants living under the poverty threshold (Enabling) and more than three quarters of its 12 million inhabitants working as peasants (Pesticide). The majority of the population depends on subsistence farming of rice and cattle. Madagascar is brutally suffering in most areas from soil erosion because of deforestation and overgrazing, desertification, and contamination of surface water. The poor in Madagascar are basically members of farming families in rural areas. Agriculture is the basis of the economy providing approximately 80% of the country's exports in 1993 making up 33% of its GDP (Colburn). With eighty percent of the labor force employed in the agricultural sector (Colburn), it is becoming increasingly more difficult to keep the rain forests safe while still providing enough resources for the farmers to make a living off of. Fields are being placed closer and closer together, leaving very little room in between for old trees to give birth to new ones, let alone continue the diversity that once was. In fact, more than 80% of the flora and fauna found in Madagascar are native plants and animals that are found nowhere else on Earth (Erosion). Some ecologists even refer to Madagascar as the "eight continent" because of their unique mix of plants and animals developed because of their long isolation from neighboring continents (Tyson). All of the native animals and plants are disappearing before we can even start conservation for them. Only 10% of the island's forests remain and 1-2% are disappearing yearly (Earle). This rapid decline puts Madagascar rainforests on lists everywhere as one of the top ten places in the world to see before it disappears.

As one of the world's poorest nations, the Malagasy people suffer malnutrition, low life expectancies, disease, and surface water contamination. For a country with 80% of the population as subsistence farmers who do not participate in the cash economy, they cannot afford to be destroyed by little problems farmers and herdsman have made over time adding to the desertification and fluctuating climate already in place, which results in massive soil erosion and pollution of rivers and streams (Earle). This runoff of 400 tons/ha of red lateritic soil causes rivers in "the Great Red Island" to run blood-red which in turn stains the surrounding Indian Ocean. For a country with grave environmental degradation and a downward turned agricultural economy dependent on soil for farming practices, it is fitting that astronauts have remarked: it looks like Madagascar is bleeding to death (Butler).

Fertile topsoil takes years and years to form, but within a few seasons, it can be quickly washed or blown away. As the eroded soil flows down creeks and rivers, hydroelectric projects and irrigation systems lose productivity from the silt suspended in the water while industrial installations have to suspend operations with the lack of clear water. All of the silt also raises water beds so that floods are much more severe and frequent as well as creating unmapped sandbars making it hard to travel down rivers. It kills fish eggs and clouds the water in oceans causing death of ancient coral reefs which affect fisheries. Messing with the balance of a coral reef messes with millions of ecosystems currently in harmony. Mangrove forests, home to many unique creatures are being decimated as well as roads and highways that cross through the forest. This is a great burden to the government because they must repeatedly rebuild them, wasting tens of billions of dollars (Butler).

The poor in Madagascar are basically members of farming families in rural areas. Almost 80 percent of the country's inhabitants are living in the countryside with 76.7 percent of those rural people being poor, a big difference from the 52.1 percent of urban poor (Enabling).

A typical Madagascar subsistence farm family lives off of rice. Their entire diet consists of rice, normally accompanied by some sort of protein whether it be fish, meat, chicken or beans. Breakfast is normally rice and tea with water being the main beverage for every other meal (Colburn). Various vegetables and fruits are available year round and seasonally even more abundantly with the improved transportation, though they are getting more unaffordable. So even though there is quite a variety of food at their fingertips, many people remain undernourished. In fact, half of Malagasy children now show signs of chronic malnutrition (Enabling).

The basic nuclear family has the male and female head as we as any children they may have had or have fostered. These families sometimes include grandparents as well. Many extended families live in fenced compounds or clustered housing arrangements for many families (Colburn).

Between the years of 1970 and 1995, the population doubled in size to over 18 million, while the per capita income fell 40 percent. Per capita income in 2004 was $250 US dollars in 1997 (Colburn) and was barely $266 US dollars in 2004 according to IFAD, an "international financial institution and a specialized United Nations agency dedicated to eradicating poverty and hunger in rural areas of developing countries" (Enabling).

There is no crop more important to the Malagasy than rice. Composing most of the diet and profit of any subsistence farm family, 2 million tonnes are grown a year on 1.1 million hectares of land (Pesticide) in plots averaging 1.3 ha (Enabling). Most of this rice does not go towards the national GDP, but is instead consumed locally along with crops like cassava, sweet potatoes, and corn (Pesticide). Because of the fact that subsistence farm families grow most, if not all, of their food to feed themselves, 96 percent of the labor force does not receive money wages.

Caste systems have been in existence since the beginning of time, and things are no different in Madagascar. The privileged get things like social welfare programs and education while 35 percent of the population, i.e. the poor farmers, don't have adequate access to health resources according to UNICEF in 1993. Seeing as, as of 1994, only 2 percent of the national budget was going towards health care however, this does not come as a surprise. There is one major government hospital and at least one private hospital in each of the main cities, as well as health clinics in rural areas, but the average distance to a health clinic in 1993 was over three miles making them very hard to reach for the poor who can't afford cars. Education is also something that is in need and hard to access. It began back in imperial times back in the time of nobles and slaves. Preferred placement in education was established where the upper and upper middle class had access to education, becoming doctors or lawyers, while the less privileged weren't permitted to attend. A very similar form of education system is in place today with few exceptions. Reform is coming however as an uprising in 1972 started a reform of the educational system (Colburn).

Entire sections of countries have become unproductive by erosion. Approximately 10% of Madagascar's land area is devoid of vegetation up on the high central plateau. The land contains erosive gully furrows over 50 meters deep and a kilometer wide (Earle). This is mostly because Madagascar is a country where most of the farmers participate in some sort of shifting cultivation farming system, most often slash and burn.

The original Malagasy people came over to the fourth largest island in the world, bringing with them a practice of "tavy," where a farmer cuts and burns a portion of the forest and planting rice irrigated by only rainfall. After harvesting the rice, the field is left fallow for up to 20 years and when it grows back it can be slashed again. This only works, however, when they keep the fields small and let the field re-grow, which doesn't often happen with the population increasing and little forest left to provide seedlings (Kremen).

The practice of tavy also has both spiritual and cultural ties that transcend the price and nutrition of rice as a crop (Threats), so the changing of this tradition will be nearly impossible. When it comes to religion, most cultures are unwavering in their belief that what they are doing is correct. This poses a huge problem when other countries want them to be more efficient, because doing so would destroy their customs and traditions, ultimately throwing their culture into chaos. It is a competition for farmers too, not just a way of life. If one farmer decides not to use a plot of land for moral reasons, he gets rid of his claim on in so any other farmer can come in and snatch it up. In their eyes, as long as there is more forest land freely available for clearing, they might as well use the land before a neighbor does. Gaining a profit from being a farmer is also difficult when that farmer refuses to change his ways. At the current state, most Malagasy farmers produce just enough food to feed their families, therefore there is not much to sell to local or cross-continental markets for a profit. The Malagasy understand the benefits of conservation, but they must put more pressing matters ahead of it such as famine, disease, and poverty. Short term yields from marginal soils are not the way to do this, however.

A minority of land areas have good soil left, including those that have re-grown. After clearing an area, good soil is often washed away by heavy rainfall. The loss of trees in the area that anchor the soil into the ground with their roots is rapidly increasing this widespread erosion. The rate of soil lose is getting ridiculous in the tropics with forested slopes losing only 0.03 tons of soil per hectare per year, with cultivated slopes losing 90 tons and bare slopes losing even more at 138 tons (How)! Currently annual soil losses are approaching 250 tons per hectare in some regions which is the largest abount recorded anywhere in the world (Threats). So even if farmers let a field lie fallow for a couple of years to replenish the soil, it is a waste of time because it is being run off faster than it can be created. The lack of good soil decreases crop yields, forcing farmers to either import expensive foreign fertilizers or clear even more land.

Even with the growing concern across the planet for the conservation of our rainforests, they still continue to be destroyed at a pace exceeding 32,00 hectares per day (Butler). Governments in poor countries where residents must put their lives before biodiversity and ecosystems of the country are in a sticky situation. They must balance the well-being of the poor along with interests of industries, foreign demands, and conservation. For a government with a plate this big, it is often better to push aside the "what if" question of conservation and focus on the concrete profit, which has the opportunity cost of an ecologically sustainable world. To gain success in such an unnerving idea of addressing environmental reform would require breaking the conflict between what the local people need now and the benefits in the long run that conservation can generate on a sustainable ongoing basis. Most often, if the end result is not currently tangible, it is uncertain and therefore a waste of money that could be carrying people in need out of poverty.

Ninety percent of Madagascar's previously biologically productive lands have been affected by deforestation, resulting desertification, water resource degradation, and soil loss and Madagascar is currently unavailable to provide adequate food, fresh water, and sanitation for its population (Earle).

To add to the rapid decimation of the habitats of Madagascar, their current population is expected to more than double to 46 million by 2050 and more than triple to 62 million by 2100 (World). If there is not enough land to produce food for the country the way it is seeing as arable land per person is shrinking, I fear for future generations. This rapid population growth is causing most of the environmental problems.

For the last century, extensive logging has been decimating Madagascar's rainforests and coastal mangroves. Authorities in Madagascar are having a very hard time enforcing the ban on illegal logging of precious wood. The ban created in April 2010 prohibits logging, transporting, trading, and exporting precious woods, yet it is still going on (Rabary). The high value for illegally logged Malagasy hardwoods makes it very difficult to stop perpetrators. Endemic spiny forests of Madagascar are being cut at an

alarming rate for the production of charcoal. To make a profit to be able to live off of, local people turn towards nearby trees to sell as small piles of charcoal along roadsides. With few ways to make a living, Malagasy people do whatever they can to help their families, even if it is illegal. What makes catching the people who do this most difficult is that it is done in the middle of dense forests in the dark of night. There is little protection for any police officer and may go missing if they meddle too deeply (Threats). The introduction of alien species has also doomed many of Madagascar's endemic species.

Programs such as the National Environmental Action Plan used by groups putting into effect eco-regional initiatives help support and create innovative forms of ecoregional conservation and development that contributes to national goals made in plans and goals set about by Madagascar and the government. The Ecoregional Alliance, USAID and DAI are all working to construct a responsible management of the new protected areas (Our). Eden Reforestation Projects and many others have also made great progress in Madagascar. In fact, since 2006, ERP had planted over 4.5 million endemic trees on this island and are sending steady incomes to people protecting the mangroves on the northwest coast (Projects).

Arable land per person in the world is shrinking, and this is especially true in the case of Madagascar. This threatens food security and triggers humanitarian and economic crises. Because of this trigger, new coastal developments can be seen. Companies such as the Mahajanga Aquaculture Development Project are increasing the ecosystems out in the coastal waters of fisheries and coral reefs (Threats). Conservation groups also provide a cause and hope for protecting the countries remaining jungles and threatened species. Conservation efforts are becoming more and more tied to human welfare. Malagasy are increasingly earning a living from jobs that are centered around protected areas such as guides, drivers, innkeepers, researchers, artists, and market gardeners (Earle).

Eradicating the problems in Madagascar isn't something that can just happen overnight, but after a few years of reforms, everyone will see the drop in the decline of forests and biodiversity as well as an increase in crop yield for the farmers. While at first this might hurt the government and global economy by cutting down on production by decreasing the slash and burn going on, it is well worth the investment to increase it exponentially in the future for greater supply of goods and profit for the farmers and the country which will benefit the entire country because they will have more money to start new reforms. Thousands of plant species and millions of dollars can be saved yearly by ending the illegal logging, overgrazing, and tavy practices.

Climate change would not have a huge effect on the production of crops. Madagascar has two seasons: a hot rainy season, and a cooler, dry season. There is great variation in climate however due to the large devience of elevation in the country and position due to dominant winds. It occasionally experiences the impact of cylclones which regularly cause flooding in low lying coastal regions (Bonn). Tropical storms bring severe rainfall, greatly accelerating the rate of erosion with heavy coastal flooding. Drought would increase the amount of desertification, but it would not bring about wholly new problems that the country hasn't yet dealt with.

Most major issues won't phase a country like Madagascar. You can't rationally throw a climate change at it that it hasn't experienced before, the population can't grow much faster than it already is, and pollution is already a problem seeing as the silt and clay is suspended in all of the water sources. Water scarcity would be difficult however seeing as almost all locally owned farms in Madagascar are irrigated by natural springs and aquifers instead of high-tech irrigation systems. If the water tables were to drop, the growth of rice, their main crop and a water dependent one, would drop horrifically and their entire yield, meals, and profit would be destroyed. That would not be a pretty picture and it would take a miracle to bring them out of the economic depression they would be in. Were the country to be urbanized an almost identical problem would occur. Madagascar would lose 33 percent of its GDP because of a shift away from an agrarian society which would crash their entire economy (Colburn).

Seeing as regulating illegal practices would be the most impossible task, I believe that can't be changed much. Funds going toward further research of other resources for the same use as the illegal ones would be beneficial so that the price of the illegal goods would decrease. Education is key. Current generations can be helped, but it will take a LOT of work. It would be much better to start with the younger generations in getting them a proper education and access to health care and during their education, they must be taught the proper way to grow rice and raise cows so as to not hurt the environment. Currently the only education they are getting on it is the information they gain through their parents and they won't know any better if they are not educated. Subsidies that go toward businesses who help the economy and the environment are also a great idea.

Implementing an integrated pest management system is very important for any agrarian society. Madagascar has already started one and I am very happy with the progress of it. By 2015 it will be completely functional and have helped millions of farms. When the younger generations are educated on ideas such as crop rotation or intercropping as well as a no-till agricultural practice, there will be no need for tavy or any other slash and burn method because the fields will never need to be left fallow. The nutrients will be properly recycled and no further forests will need to be destroyed.

National support programs and international research and extension networks are critical to furthering efforts such as these. Cooperation with scientists and agricultural research centers is importand and conducting meetings and workshops with farmers should be put into practice in local places. In Madagascar they have also run informational campaigns on the radio and on key "Action Days" as well as holding forums to encourage farmers to share their experiences with one another. They help improve the quality, quantity, and diversity of food (Farmers).

Madagascar's economy is massively subsistence agriculture based, with 80% of the labor force employed in the agricultural sector alone (Colburn). With problems such as the massive slash and burning of the country's most valuable resource, their rainforests, biodiversity starts plummeting, there is widespread deforestation (which is also because of the illegal logging practices), desertification, erosion, and soil depletion. The best way to eradicate these problems is with a very simple solution: education. The more farmers and the next generation learn, the more they can put into practice. They need to talk with each other to see who is using what methods and what works best for each person's fields. Farmers are more apt to listen to people like them than officials from federal or global governments telling them that what they are doing is wrong. If local people tried a new agricultural practice such as no-till, crop rotation, integration, or integrated pest management and it showed amazing results, the other farmers would be able to physically see that that was working and producing better than their fields are and they would be pushed to improve their fields. Encouragement is a huge key. Conservation efforts in Madagascar up until now have been wonderful. People have been stepping up and creating jobs and funds and educational centers. My favorite and what I believe will bring about the most good is providing jobs that help conservational efforts and also provide for the local economy. I think everyone benefits from those jobs, it boosts the economy and brings more and more people out of poverty. Subsidies similar to this should be and hopefully will be given to companies providing wonderful opportunities like these. I firmly believe that Madagascar is on the right track to be more environmentally friendly and educated by 2015 with regards to sustainable agricultural practices.

Works Cited

"Enabling the Rural Poor to Overcome Poverty in Madagascar." *IFAD*. IFAD, July 2007. Web. 14 Sept. 2011. <http://www.ifad.org/operations/projects/regions/Pf/factsheets/madagascar_e.pdf>.

"Erosion in Madagascar." *Wild Madagascar*. Rhett Bultler, 2009. Web. 14 Sept. 2011. <http://www.wildmadagascar.org/conservation/erosion.html>.

"Farmers Fostering Crop Rotation." *Farming First*. Farming First, 9 Feb. 2011. Web. 14 Sept. 2011. <http://www.farmingfirst.org/2011/02/farmers-fostering-crop-rotation/>.

"How to Save Tropical Rainforests." *Monga Bay Rainforests*. Rhett Bulter, 2011. Web. 14 Sept. 2011. <http://rainforests.mongabay.com/1001.htm>.

"Our Work: Projects." *DAI*. DAI, 2011. Web. 14 Sept. 2011. <http://www.dai.com/work/project_detail.php?pid=31>.

"Pesticide Problems and IPM- Implementation in Madagascar." *Pesticide News* Sept. 1994: 12-13. *Pan-UK*. Web. 14 Sept. 2011. <http://www.pan-uk.org/pestnews/Issue/pn25/pn25p12.htm>.

"Projects." *Eden Reforestation Projects*. Eden Reforestation Projects, 2010. Web. 14 Sept. 2011. <http://edenprojects.org/eden/projects/madagascar/>.

"Threats to Madagascar's Biodiversity and Ecosystems." *Wild Madagascar*. Rhett Butler, 2009. Web. 14 Sept. 2011. <http://www.wildmadagascar.org/conservation/threats.html#defor>.

"World Population to 2300." *UN Population Division*. United Nations Dept. of Economic and Social Affairs/Population Div., n.d. Web. 14 Sept. 2011. <http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf>.

Bonn. "Desertification Costs $42 Billion per Year." *Monga Bay*. UN Convention to Combat Desertification, 2004. Web. 14 Sept. 2011. <http://www.mongabay.com/external/desertification_2004.htm>.

Butler, Rhett A. “Erosion and its Effects.” *Mongabay.com / A Place Out of Time: Tropical Rainforests and the Perils They Face*. 9 January 2006. 14 Sept. 2011. <http://rainforests.mongabay.com/0903.htm.>

Colburn, Lisa L. "Madagascar." *Countries and Their Cultures*. Advameg, Inc., 2011. Web. 14 Sept. 2011. <http://www.everyculture.com/Ja-Ma/Madagascar.html>.

Earle, Teresa. "Madagascar." Editorial. *Earle*. N.p., n.d. Web. 14 Sept. 2011. <http://www.earle.ca/pdffiles/madagascar_show.pdf>.

Kremen, Claire. "Traditions That Threaten." *PBS*. PBS, n.d. Web. 14 Sept. 2011. <http://www.pbs.org/edens/madagascar/paradise.htm>.

Tyson, Peter. *The Eighth Continent: Life, Death, and Discovery in the Lost World of Madagascar*.

Rabary-Rakotondravony, Lovasoa. "Illegal Logging Spreading in Madagascar." *IPS News*. IPS-Inter Press Service, 2011. Web. 14 Sept. 2011. <http://ipsnews.net/news.asp?idnews=55703>.