

Land use and disturbance in Madagascar's forests

Overview of land use

- Only 5.2 percent (3 million hectares) of the country's total land area of 58.2 million ha (=582,000 km²) is under cultivation; of this hectarage, less than 2 million ha are permanently cultivated.
- Only 484,000 ha are irrigated in the entire country.
- 50.7% (300,000 km²) of the total landmass is in pasture, used for cattle.
- Agriculture provides nearly 80% of exports, constitutes 33% of GDP in 1993, and employs almost 80% of the labor force.
- Average farm size is 1.2 hectares.

1. Primary food crops

- Malagasy rice growers can produce ~2.38 million tons/year, but annual need is between 2.8 - 3.0 million tons. Despite Ratsiraka's (socialist former head of state) efforts to make Madagascar self-sufficient, rice imports continue.
- In 1992 rice production occupied about two-thirds of Madagascar's cultivated area and produced 40% of total agricultural income.
- Cassava is also planted throughout the island, and is the other major food crop for the Malagasy.
- Corn, sweet potatoes and bananas are all relatively minor but still important food crops.

Rice cultivation: two types

1. ***Intensive, permanent rice cultivation*** is done by the Merina and Betsileo in rice paddies in the haut plateau, where population density is highest. This makes highly efficient use of slopes, as terraces are built to hold in water. Rice paddies are irrigated, and may cover only a few square meters each. Group trampling of land replaces plowing in some cases, and provides an excuse for a party.
2. ***Tavy (slash and burn)*** is practiced in eastern rainforests by the Betsimisaraka. *Tavy* is officially illegal, because it destroys forest cover and promotes erosion. Even where irrigated rice paddies are maintained, *tavy* is often practiced as well, for 3 reasons:
 1. the crop cycle is shorter for *tavy*
 2. *tavy* is the best insurance against famine during droughts (when irrigation fails)
 3. maintaining irrigation on steep eastern slopes is difficult

In the North (Andapa region, near Tsaratanana nature reserve), *tavy* farmers are known to supplement with:

What the people's leaders are saying

"Our ancestors have been farming here for generations, then one day they come and tell us, 'You can't plant there' and, 'You can't cut those trees'. We no longer have the right to burn the forest and plant rice but they never said what else we could do. The government wants to protect the forest, but nobody cares about protecting the peasants who live here."

-Dimanche Dimasy, 55 year old chief elder from near Andasibe.

What the government is saying

"The challenge is to teach people the value of biodiversity. When people are poor they are only thinking of day-to-day life. Government officials believe the country's flourishing eco-tourism sector will soon generate the much-needed income. Madagascar's exceptional biodiversity is its main attraction to tourists. As tourism grows in the newly created areas, we hope opportunities for income will also grow."

-Charles Rabotoarison, Madagascar's Environment Minister, speaking about the outlawing of *tavy* in and around Andasibe

What the people are saying

"There are always tourists here but we never see any money. Not everyone can be a guide or work in a resort — the rest of us live on agriculture. Now they tell us we can't even do that."

-Lalao Ravoniharisoa, a subsistence rice farmer near Andasibe, responding to the outlawing of *tavy*. (All quotes from Dec 24, 2004 Reuters story)

2. Edible forest products

- Of 61 named, extant lemur species, most are threatened by habitat destruction and hunting pressure.
- Wild rodents are also eaten, sometimes.
- Fruit tends to be a sustainable forest product, since eating it disperses the seeds. Fruits that are eaten by the Malagasy include mangoes, guava, jackfruit, breadfruit, bananas, and coconut.

3a. Low-impact agriculture for export: Vanilla

- The fruit ("bean") of an orchid (the largest family of flowering plants), that has been cured for months, to produce a pungent flavor used in desserts and liquors. Vanilla (*Vanilla fragrans*) is the only orchid species used in human cuisine. The plant is a light-loving vine, is native to Mexico, and the Aztecs first discovered how to make it edible.
- Today it is grown in Mexico, Madagascar, and Indonesia, primarily for export to the developed world. Until 1836, it could only be cultivated in its native Mexico—why?
- Vanilla has become culinarily important in many European traditions, and is therefore economically important in Madagascar. Synthetic *vanillin*, a dominant chemical found in vanilla, supplies 95% of the world's demand for vanilla flavor, but it does not have the complexity of real vanilla.
- Total global demand (largely from U.S., France and Germany) for vanilla was 2200 metric tons / year in 2000.
- In 2000, cyclone Hudah destroyed 35% of Madagascar's vanilla crop, about 20% of world supplies. Prices rose from \$25 - \$40/kg in 1999 to \$200-\$230/kg.

3b. Other spice crops for export

All spice crops exported from Madagascar are labor intensive, which brings a high market price, and is optimal for economies with a small resource base and a large labor pool. Examples include:

4a. Non-agricultural anthropogenic disturbances

4b. Mining propaganda from an industry website (mininglife.com): "The mining of an orebody represents the highest value use to which a hectare of land can be put:

- Mining - \$150,000 per hectare
- Forestry - \$5,700 per hectare
- Agriculture - \$1,400 per hectare
- Parks - \$42 per hectare"

What is wrong with this analysis?

In preparation for building a mine, mining companies act as verificationists, by hiring biologists to do environmental impact statements which predict no evidence of ecological harm. Environmental impact statements, done in good faith, are required because of the precautionary principle.

4c. Precautionary Principle

Free-marketeers (as opposed to capitalists who believe in some regulations) argue that we should act whenever we can, if the costs that will result from that action cannot currently be positively identified. Put another way, the burden of proof is on the people who are claiming that some action will cause a problem. Until and unless they can prove so, the action can proceed.

(What kinds of actions are we talking about here?)

The Precautionary Principle, on the other hand, suggests that, when both

- degree of risk, and
- level of scientific uncertainty (with regard to causation),

are high, we ought to wait until more data is forthcoming.

Does anyone actually abide by the Precautionary Principle?

- Europeans and their governments do.
- American government agencies used to, but things have changed. After much corporate lobbying, the FDA now uses the "innocent until proven guilty" standard (which sounds patriotic and American, so it must be good).
- Corporations rarely do. (And why should they, unless there are regulations that force them to? If they act to reduce costs to society, but none of their competitors are doing the same, ultimately they will go bankrupt.)

5. Local knowledge: Traditional ways of doing and of knowing (e.g. swidden agriculture, hunting of charismatic animals) made sense in their environment, else they wouldn't have persisted.

- (That's not to say that the world was Panglossian, just that what worked had done so for millennia, and since nothing much was changing, it should have continued to work.)
- But rainforests are disappearing. If traditional ways of knowing and doing used to be sustainable and appropriate to their environment, why are those ecosystems at risk today?

Freedom at the cost of Justice

- Freedom to pick what you like from once cohesive world-views, and abandon the rest, may compromise the utility of those views.
- If we all feel at liberty to do what we want, there is decreasing sense of responsibility to the whole (community, culture, environment), and the vast majority of individuals (including “corporate individuals”) are going to act in purely selfish ways.
- This brings us back to (from last quarter):
 - **Group selection:** do not expect individuals to work in the best interest of a group, unless that action also benefits them. And...

6. The Tragedy of the Commons

- Proposes keeping self-interest at bay by regulating the actions of would-be selfish individuals.
- Assumption: All resources are limited in scope
- Scenario: In a pasture open to all, herdsmen who graze their cattle on that pasture may recognize that it offers limited resources, but are unlikely to limit their own use of resources, because they will not gain from doing so. Others will graze if they don't, and the commons will get “used up” regardless of individual sacrifice.
- Take-home message: Use of common (public) space must be restricted by legislation. Complete freedom (to pollute, to log, etc.), as touted by “free marketeers”, will result in the destruction of commons.
- Source: Hardin, G. 1968. The Tragedy of the Commons. *Science*, **162**, 1243-1248.

7. Workshop

- Analamerina is an invented town of 15,000 in Fianarantsoa province (1 of 6 provinces in Madagascar), which represents the southern part of the eastern rainforest region, and was until recently entirely forested. Analamerina abuts some intact rainforest, but exists in a relatively densely populated region.
- Analamerina villagers have traditionally relied on two sources of sustenance: *tavy* rice cultivation, and forest products like fruit and lemur meat. Population pressure is making both of these activities less sustainable, however, and people are beginning to be hungry.

You will break up into six groups (see below). Each group should decide how best to deal with the fact that traditional ways of collecting and cultivating food are becoming less effective for Analamerina villagers.

- If you're Analamerina villagers, what do you do? Why?
- If you're members of another group: What would you like the villagers to do? Why? Can you enforce your decision? What would be the most effective way to enforce your decision? For instance, if you conclude that restricting fire would be beneficial to the region, despite a long tradition of burning, how would you go about effecting this change? Be creative in coming up with solutions, but keep within the confines of what is possible.

1. Analamerina villagers (group 1 of 2)
2. Analamerina villagers (group 2 of 2)
3. Villagers from the next town over
4. Government officials in the province of Fianarantsoa
5. Federal (Malagasy) government officials
6. NGO for conservation (WWF, WCS, CI...)