

Appendix 1

Rare Forests and Food Insecurity *

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As the world's fourth largest island, located in the Indian Ocean just about 400 km from the eastern coast of Africa, it's not surprising that Madagascar is one of the most biologically diverse places on Earth. The island was largely forested until approximately 2000 years ago, when the first humans came from distant Borneo, and later from Eastern and Southern Africa, Arabia and Europe to settle here. Over the past two millennia, it's believed more than 90 percent of the forests¹ have been turned into fields and settlements. Today, with one of the world's fastest growing populations, the Malagasy people are now more than ever dependent on their fragile natural resources and biodiversity for survival².

The spiny forest is like no other forest on Earth and is among the last remaining extensive forests on Madagascar. Satellite images show that over the last 20 years the spiny forest is also the most threatened forest on Madagascar. Harboring plant endemism at the highest level on Madagascar- with 48 percent of the species and 95 percent of the genera unique to the southwest, the forest is a unique and vital community asset.

Ranobe: An Oasis in the Dry Territory

At the heart of this unique forest is the region named Ranobe. The name means 'big waters' in the Malagasy language, after the emergence of a series of shallow lakes, surfacing unexpectedly in a small pocket of this dry spiny forest. The lakes around Ranobe create a distinct micro-climate flourishing with unmatched heterogeneity of insects, plants, birds, amphibians and reptiles, within the 6.6 million hectare spiny forest. Preliminary findings of ancient pottery shards along with the bones of now extinct fauna in the fields surrounding these lakes indicate that people came here around the 9th century (and perhaps earlier) to cultivate the fertile alluvial soils.

In recent decades, the river that once flooded the low fields around the lakes has been dammed and as the climate becomes drier, rainy seasons have become shorter and less predictable, making agricultural cultivation increasingly difficult. Rather than their

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traditional farming livelihoods³, locals are left with few choices other than to plunder this one-of-a-kind forest to feed their families and the ever growing charcoal demand in the provincial capital, Toliara.

The rate of deforestation and the absence of any alternative to charcoal seriously compromise the Ranobe forests, lakes, wildlife and way of life for almost no benefit to the people. Deforestation continues at an alarming rate in this arid region of Madagascar, widely impacting species survival and leading to significant biodiversity losses. At the same time, if what remains is able to be conserved, the Ranobe forest harbors unprecedented diversity and suggests a high potential for future species discoveries.

The Masikoro: Farmers of the Southwest

People who settled in the Ranobe region are predominantly Masikoro⁴, an ethnic group of inland cultivators and cattle herders, likely having roots back to East Africa, living on the outskirts of the forests.

Traditionally, the Masikoro cultivate rice (*vary*) on the shallow lake edges and surrounding fertile alluvial soils where water gets redirected by a system of manually dug channels to low pockets in the landscape. This results in a variety of interesting phenomena. One remarkable species that frequents the rice fields is weedy *Azolla spp.* *Azolla* is a small-leaf floating fern, which contains in its leaves a system of blue-green algae *Anabaena azollae* and a bacteria *Arthrobacter sp.* that fixes nitrogen, adding naturally organic fertilizer to the rice fields⁵.

On the banks of the Lake Ranobe, people have cultivated fruit plants for generations. Amongst these are bananas, papayas, guavas, citrus and mango trees, planted in narrow belts between the lake and the village. On the drier soils further from the lake shore where ground water levels are still high (1-2 m), they grow sugar cane (*fitsiki*). Historically, cotton has also been cultivated here.

Maize (*tsako*), manioc (*balahazo*), sweet potatoes (*bele*), several kinds of beans (*tsara maso*, *luijdi*, *cabaro*), squash (*taboara*), and melons (*voamanga*) are grown in mixed cultures on drier land where forest once stood. All crops are rain-fed and yields have underperformed under the recent drought conditions. During these times, when food production isn't enough for survival, people respond with further slashing and burning forest areas to produce charcoal, sell it, and buy food and crop seeds to cultivate the burned land. However it never works out in their favor or the favor of the forest.

The Masikoro keep animals including cattle (local zebu), goats, pigs, chicken, ducks and turkeys. They also fish in the lake and opportunistically hunt for wild pigs, birds and mouse lemurs in the forest. They go to the forest to collect honey from wild bee hives in the crown of the majestic baobab trees, along with medicinal plants, edible fruits (e.g. *lamoty*, *ampeny*, *hazomafio*), seeds (baobab, andramahy), and very tasty wild yams (*Dioscorea spp.*), known as *babo* and *balo*.

Ho Avy: An organization designed for Ranobe

Intrigued by spiraling poverty and environmental degradation, our organization, Ho Avy (meaning: 'The Future or What's to come' in the Malagasy language), began scouting the forest and meeting the people in Ranobe since 2007.

Our mission was clear: to safeguard biodiversity and enhance local livelihoods through the grassroots empowerment of communities and more sustainable use of available resources. Recognizing the opportunities for locally suitable improvements in the traditional farming methods and connecting current practices to more integrated techniques, Ho Avy has begun to harness the tremendous potential of this bright and sometimes described as 'photo shopped' region, developing our base into the landscape and setting up amongst many things, a diverse permaculture demonstration site.

We aim to diversify and improve food abundance and access to clean drinking water (the latter a tremendous confidence building opportunity with the majority of the inhabitants of Ranobe). Beginning step by step, Ho Avy has introduced to Ranobe a system of rice intensification SRI ⁶, which originated in Madagascar in the early 1980s and has since demonstrated increased yields (50-100 percent), healthier soil and plants supported by greater root growth and the nurturing of soil microbial abundance and diversity, in 40 different countries. In Ranobe, this method has been adopted quickly and enthusiastically, has demonstrated some increase of yields, but is yet to be tested for improvements.

Another important intervention with the villagers has been the introduction of agroforestry; using combination planting of fruit trees and other native plants and useful trees on their land. This includes cultivation of the *Moringa oleifera* ^{7,8}, a rapidly resprouting tree that was adopted in the local diet for its nutritious green leaves, flower and young fruits. Till now, Ho Avy and our local partners have planted well over 10,000 trees, including nearly 40 native species and more than 25 species of fruit and multipurpose fast-growing trees, in the last two years on edges of forest, in agroforestry polyculture plots and in live fences/hedges. These efforts, i.e. planting target indigenous species on disturbed forest edges and reforesting in belts, aim to assist ecological forest recovery. We aim to create 'ecotones' (transitional habitats) favoring wildlife colonization and assisting seed dispersal. The local people in Ranobe are open to tree planting and introducing new crops to diversify their traditional farming, but patience and continual involvement is required to evaluate yields and progress. In community meetings, the villagers have told us, "Slowly, our lives have been improving and we are ready to go on."

In exchange for sustainable development interventions offering alternative livelihoods, we closely collaborate with the community association FIMPAHARA (an association of farmers dedicated to propagating and planting trees and protecting the forest) along with an ever growing contingency of the Ranobe village. Ho Avy has secured the authorization necessary to establish the first community managed forest reserve in the Spiny Forest. This will optimize our potential to create ecotone corridors (conserving biodiversity),

agroforestry polycultures (diversifying and creating agriculture abundance) and direct forest conservation incentive opportunities (guides, forest guardians, reforestation research monitors) to the local people further enhancing their livelihoods.

Becoming the 'bread basket' of the region

Ranobe, due to its oasis character in the arid region, has vast potential to become one of the most productive farmlands in Southwestern Madagascar. The opportunity exists to become the leading area for food self-sufficiency in the region. Ho Avy's long-term goal is self-sustainability through improved livelihoods and long-term community involvement in forest research and monitoring.

We count on the awareness and participation by local people in these efforts: raising the potential for new opportunities and developing a sense of ownership over forest health linked to agricultural productivity, promoting conservation and restoration, and improving crop production. With these target concerns, Ranobe has the potential to be a pioneering model and a strong example to inspire other communities, where it might be reproduced and adopted. Potentially an interesting trade can open between the coastal (fishing) and inland (farming) villages. Furthermore, the surplus farming products can be brought to the nearest villages and towns, replacing the current imported items. Literally, the Ranobe region can become the bread, or rice and fruit basket of the region.

Notes

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7. <http://agroforestry.net/scps/>
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