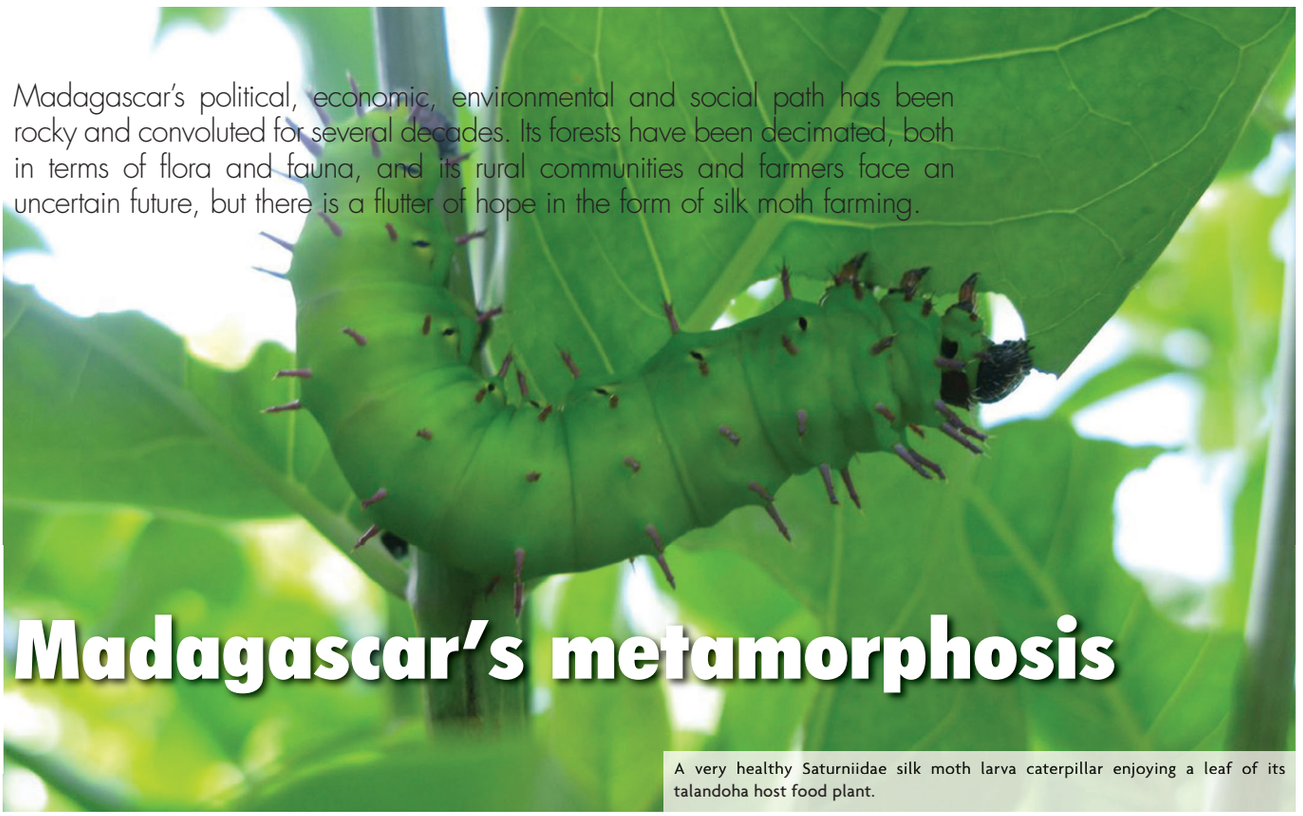

Madagascar's political, economic, environmental and social path has been rocky and convoluted for several decades. Its forests have been decimated, both in terms of flora and fauna, and its rural communities and farmers face an uncertain future, but there is a flutter of hope in the form of silk moth farming.

Madagascar's metamorphosis

A very healthy Saturniidae silk moth larva caterpillar enjoying a leaf of its talandoha host food plant.

A FLUTTER OF hope, in the form of silk moth farming, offers a new and creative means of income generation through textile production, but one that brings with it the added possibility of providing a sustainable and nutritious source of protein from moth pupae. And by encouraging local communities to farm silk moths to produce unique and marketable high-quality textile, the protein by-product may also help them move away from the practice of bush meat hunting, thereby conserving their unique environment in the process.

Change in Madagascar has, for decades, been of a destructive kind with the decimation of animal populations through bush meat trading and local consumption, destruction of habitat through deforestation by both industrial logging and through mainly endemic slash-and-burn agriculture practices called 'tavy'. Although millions of dollars in conservation aid reaches the country each year, it seems that the Malagasy people are aware positive change is needed.

Thankfully, a focussed band of NGOs are making it their business to make a difference. African Farming decided to take a look at the work of one such NGO, CPALI, whose out-of-the-box creative thinking is introducing silk-moth farming as a means of income generation through silk textile production. It is also exploring the viability and popularity of 'pupae-as-protein', to replace the need for bushmeat hunting and deliver a much-needed source of nutrients and protein to a seriously malnourished population.

CPALI and SEPALIM

CPALI, headed by Dr Catherine Craig, is a small Harvard-University-based US NGO funded by private donors and grants. CPALI has founded SEPALIM, the Malagasy NGO on the ground and implementing the silk-moth programme. SEPALIM is headed by President and CEO, Mamy Ratsimbazafy, responsible for all on-the-ground operations conducted by a small but dedicated team of seven, conducting such activities as: women's programmes, farmer recruitment, textile and field training.

The textile project began in 2009 as wild silk production, to help farmers displaced from the Makira Protected Area, or MPA in the NE of the country. The pupae-for-protein project has emerged from this and is currently being researched, including the sampling of leaves of the Talandoa host plant, aimed at understanding how the plant grows in different types of soils, and how pupae feeding on the leaves in different growing environments differ for nutritional content.

Wild silk moth pupae and caterpillars have been a traditional food in Madagascar for centuries - 60 per cent of Saturniidae caterpillar dry mass is protein, with the remainder high in fat and mineral content - so, the project is not introducing something unfamiliar, it's simply taking a scientific understanding to the communities who, armed with fresh knowledge, can conduct a viable agri-business model delivering regular and sustainable working income and generating food in the process – and aiding conservation, too.

Farmers are currently raising the endemic Saturniidae species, Antherina suraka, and ensuring the caterpillar stage has its native food plant, Polycias bakeriana (Araliaceae), in sufficient quantity to sustain it. Unlike most projects that gather caterpillars and pupae, the moths' host plants are also being farmed and farmers intercrop host trees on existing farms and recover degraded sites. SEPALIM breeders produce chrysalides from which adults emerge and the females are then put on the host trees to lay their eggs. Pupae and cocoons are harvested twice a year. The team trains these rural communities, including members of farmers' families, to make the cocoons into a unique, non-spun textile, which can increase a single-family income by US$90-200, which is significant, considering annual incomes average US$70/yr. The non-spun, patent-pending, silk textile is currently marketed in Australia, Europe and the US (visit: www.source4style.com; www.habutextil.com). Only a percentage of pupae are required to maintain the silk producing element of the project, with a large number of pupae being a by-product offering a protein alternative to lemurs and other species targeted by bush meat hunters.

From the horse's 'moth'

African Farming spoke with Harvard University-based CPALI President, Catherine Craig PhD, to tell us more.

AF: How is the project addressing the needs of farmers in and around the MPA and other regions, and how many types of pupae/moth are being farmed?

Several silk moth farmers and the women's group leader whose lives have changed as a result of the silk moth programme.

CC: Currently only our target silk producer, Antherina suraka – but in the future we hope to add at least three species. We are initiating research on the protein content of those in the coming two years, depending on funding, and hope to extend the project to other communities. Our aim is to create jobs where there are none, and to introduce new means of sustainable protein production that is accessible to even the poorest farmers.

AF: Where does a farmer begin the process, and how difficult is it to undertake?

CC: The project is simple and inexpensive to implement. Farmers need to plant the host plants for two years before they can raise a full crop of larvae. We start them off with seedlings. The only expensive part is maintaining a staff and the costs involved in training farmers and textile producers, which requires a great deal of dedication, because these farmers have not raised larvae previously, nor have they had much education. Hence, they need to learn 'how to learn'.

AF: How much can farmers earn from silk production and what interest is there?

CC: US$30 can be earned producing 4,000 cocoons, which weigh about one kilo; textile producers earn about US$18 for the production of a 1m x 1m piece of textile. As for food by-product, we don't have data yet, but we know that about 25 per cent of farmers in the community are interested in silk production. But by adding pupae, we are increasing the value of silk production to the farmer who can either eat the pupae or sell them, once 250 have been set aside for the next year's 'seed' crop. We plan to introduce consumption of pupae after the cocoon has been produced, so we have two products from a single agricultural product and two markets: local market – food, and international market - textile.

AF: How does the nutritional analysis and silk differ between species?

CC: We suspect that nutritional content will vary depending on the host plant. Different species of caterpillars feed on different host plants, so that will likely influence species differences. Different silk producers also spin different colours of silk with different molecular, structural and morphological qualities that give them different uses.

AF: What are the main challenges to overcome?

CC: The main challenges are unusual weather conditions with longer than usual rainy seasons, or a rainy season that starts late, and very hot temperatures. The insects must be reared on shaded trees, but when the trees are young they do not produce enough foliage. The temperature affects when the adult emerges from the chrysalis and, hence, the initiation of rearing season. Currently we have two major rearing seasons in our area with our target species. The new species we are working on and hope to introduce have one lifecycle per year, but they produce a much larger cocoon. The goal is to have a mix of silk producers that feed on host plants representing a forest succession: open field, secondary forest, and primary forest, with the farmers inter-cropping host plants on existing farms.

AF: How many communities are involved and how easy is it to conduct your operations?

CC: The latest data show there are 271 farmers and 51 SEPALI Members involved – you have to plant 250 trees to be a member. There are 54 trained breeders and 27 current, practicing breeders, as well as 16 producers – these are famers who have deposited cocoons into the cocoon bank. There are 11 farmer groups across 13 communities, and six women's groups making textile. Only women are involved in textile production and only those who produce cocoons can make textile, due to its high value.

Communication and contact are very tough, with personnel, equipment, cocoons and pupae transported by boat on the river. We use cell phones and written messages sent by canoe up river, and sometimes via radio broadcasts, but there is no cell coverage in the villages. The team communicates to the wider world via internet from Maroantsetra.

AF: In relation to other forms of income generation, how viable is pupae farming?

CC: For subsistence farmers, few opportunities to earn money exist and that is why the CPALI programme was conceived. The beauty of our project is that it creates many different types of jobs for different skill sets: arborists, cocoon producers, cocoon processors, textile producers and product producers. Farmers can deposit cocoons into our cocoon bank and build up cash returns, for withdrawal at any time. If farmers produce two kilos (8,000), the target number, they double their income. 8,000 cocoons can be made into about 5 sq m of textile, making about US$70. We don't yet know what the selling price per pound of pupae will be but in the capital, Antananarivo, the cost of Borocera pupae is US$2-4 (4,000-8,000Ariary) per kg. The cost of zebu or beef is US$4-5. 4,000 cocoons is 4-8 kg of protein, so profits double if pupae are sold.

AF: What is the potential long-term Impact of the project in Makira, Madagascar and Africa as a whole, and what outside support does CEPALI need?

CC: Silkworms are found all over the world and could be developed as a 'conservation industry' generating two different income streams – food and cash. Our goal is to build up a valuable barrier forest around the MPA and give people the means to be able to respect the protected area. We also want to focus on Malagasy flora and fauna and emphasise the development of endemic species of silk producers over non-native species.

CPALI needs continued outside financial support to enable SEPALIM project expansion to new areas and to make use of new species of silk producers. In particular, we need to grow the SEPALIM staff so that we can implement the programme throughout the Makira Area. Our long-term goal is to establish a farm school in our new demonstration site where we can train lead farmers from other sites bordering parks and protected areas on how to raise silkworms for food and silk production. We also hope that the CPALI/SEPALIM programme will be introduced into mainland Africa. We are particularly interested in adapting it to border forests that surround those forests serving as important, primate sanctuaries, where local communities need new sources of protein to replace bush meat, as well as jobs. To get involved please contact: ccraig@cpali.org, or mamycpali@gmail.com.

AF: Thank you.