Case Study

The Vetiver System, a Biological Solution for Development and Conservation in Madagascar

Yoann Coppin
CEO La Plantation Bemasoandro, SUARL, Madagascar
TVNI Representative Madagascar
Email: plantation.bemasoandro@yahoo.fr

EXTENDED ABSTRACT

The Vetiver System for Sustainable Agriculture and Forest Conservation in Madagascar

Madagascar has an exceptional biodiversity, with an average 75% of endemic mixed fauna and flora population (the highest in the world), and with a very large range of ecosystems: from rainforests with 3 500mm/year rainfall in the North-East to the arid areas under less than 250mm/year on the South, and an altitude between 0 and 2 876m. Moreover this wealth is far from being fully discovered, and every year some new species of lemurs, reptiles, amphibians or orchids have been discovered.

In spite of this background the agro-environmental degradation is catastrophic: according to a World Bank's study, almost 300 000ha of forest disappear each year, and there is only 10% of the rainforest left. Also according to the World Bank, Madagascar is one the most eroded country in the world. From space, the astronauts can see two land marks made by human on the Earth: one is the impressive Great Wall of China, and one is, from December to March, the spread of the red sediments to the Sea from erosion derived from rivers around Madagascar. They said « The Red Island is bleeding ».

The traditional agricultural practices, particularly the tavy (slash and burn cropping practice during the rainy season) is not adapted to the topography, soil types, climate, and especially regarding to the demographic growth : 50% of the 17 millions inhabitants are less than 18 years old and 80% are living in the rural areas. In the long term, the lands could tolerate this if they are properly managed and especially if the density of population does not exceed 10 persons/km² (presently 30 persons/km²). This practice is, by far, the first reason for the land degradation. The other reasons are precious timber exploitation, fire in the Western plain (for fodder, also political intervention and old custom), charcoal making and secondary products (firewood, construction materials and orchids etc).

After slash and burn the land is bare and farmers sow upland rice just before the big rain falls. Nothing is done to take care of soil erosion, and a large part of the nutrients are washed away, so much that, to grow upland rice again, the farmers will have to clear another parcel of land for the next year crop, they can only grow cassava or sweet potatoes in the second year on the first parcel of land. In the third year no crop is able to grow on this severely deteriorated land. According to a World Food Program study, on the average the cultivable layers of Madagascar soil is 3.000T/ha, while 400T/ha/year are taken away by the erosion. The sediments end up on the rice fields (many disappear each year under this sediments), rivers and finally on the sea and its coral reefs.

In the central plateau and the West plain, even if there is no forest left, people still burning for fodder (surprising because the fire deteriorate the fodder quality of the re-growth), often by custom and sometimes by political intervention. The result is a very large savanna with a very poor and acid soil, developing massive landslip, locally known as Lavaka .

Many projects, GO or NGO, often with very big budgets, try to bring solutions, but only very few are effective, and until now the degradation of the lands continues and becoming worse and worse every year.

The government wants the Green revolution by using chemical fertilizers, pesticides, mechanical inputs, new seed varieties, new sophisticated techniques… but poverty prevents the major

part of the farmers to have access to those, and while the soil fertility is taken away during every rainy season.

The Vetiver System can offer several perfect solutions and is well adapted to the economical and agro-environmental contexts:

- easy to promote the technique and to propagate the grass by farmers
- simple and cheap to apply by the farmers themselves on their cultivation
- adaptable to all conditions in Madagascar (fire, soil, climate,…)
- fast, sustainable and efficient technique for water and soil conservation,
- promote sustainable farming: farmers can cultivate the same part of land year after year with improved yield, they do not have to move their farms every year, conserve their soil and protect the forests, as well as rice fields, rivers etc.

To achieve that, farmers must understand that they have to change their traditional agricultural practices for their benefit, even if that will change their ancestral techniques. First the local authorities, traditional and administrative, must be introduced to the VS and its finality. Then a campaign to spread, to train and to set up many demonstration sites of VS on some farmer's fields first, following the demonstration results, introduce VS to the country slowly, under a snowball effect. But that represents a cost and must be sponsored by an aid agency, banker or private enterprises.

Applications of the Vetiver System in Madagascar

1. Infrastructure protection

A good example is the railway FCE rehabilitated with VS, and more recently the mining project at Fort Dauphin (Refer to Roley Noffke presentation). Many projects, like mines, roads, property, should use VS, moreover that represent a nice opportunity to incorporate local communities. For the farmers, selling planting materials is another opportunity. In this way, the company in charge of VS application participate not only to protect infrastructure, but also to improve environmental, social and poverty alleviation impacts.

2. Local communities development

The use of the VS will bring direct benefits to farmers and their crops must be promoted by a project financed by an aid agency, like it was explained previously.

Then the farmers can get many opportunities to use the by-products: handicraft, fodder, mulching, construction material, and to sell the slips or the clumps on the market.

When a big project using Vetiver, the best way is to mobilize the local communities: the nurseries can be set up near and along the end user site, and the propagation and maintenance works are delegated to the local farmers (Refer to Roley Noffke presentation).

Training is very important and must de done first, with demonstration and technical brochures, materials and tools acquisition, and then the supervision must be done regularly and frequently until the job proceeds properly. Nurseries should be regularly inspected to assure that plant material is being properly managed and to verify plant numbers. The payment must be adapted to the poverty level, it cannot wait until the plants in pots are ready, but it must be spread out according to the work progress (a weekly payment is necessary). The quality of the job depends on the farmers and on the supervision.

3. Antananarivo, agricultural and industrial capital: The Vetiver System for town planning

Antananarivo is the capital of Madagascar with 2 millions inhabitants, but without proper water treatment facilities. Thus, the water quality of the important network (canals, drains, lakes, swamps, rice fields etc) is very contaminated and highly polluted. Moreover during the rainy season, many problems developed: floods, erosion, sediments… and sometimes the drinking water is not drinkable. However Antananarivo is also an agricultural town, with a lot of rice fields, vegetables and cattle farming, fishing etc

That's why this town needs a system to improve water quality, but also to prevent erosion, floods and sediments, easy to reproduce in a big scale and to maintain, sustainable and efficient. The objective is first to show how the VS works: riverbanks stabilisation (that can also filter water coming

into the swamp and its effluents) and floats to improve water quality and reduce pollutions, including the town planning. Another technique, planting on small dikes into shallow drain is now on the way. The site was a swamp previously, converted to a retention lake of 100ha area, for flood mitigation during the rainy season.

The lake water is highly polluted with the average following levels:

- Nitrates 11mg/L
- Phosphates 3.7mg/L
- Oils 78mg/L
- Cr 79mg/Kg of dry matter (mud)
- Zn 217mg/Kg of dry matter, etc…

So the quality of the water is dangerous for the health. There are a lot of activities around this lake: fishing, vegetable farming, cattle farming and many households living near the polluted site.

4. Constraints to expansion of Vetiver System in Madagascar

- Customs, mentality, the major part of the farmers doesn't want to change their traditional and ancestral practices
- Wrong and incorrect applications by some: the erosion is still taking away the soil and the people who see that think that Vetiver is not efficient, the worst thing for VS promotion!
- Prejudice about the grass: if eucalyptus, a big tree, cannot stabilize this slope, how this simple grass can?
- Corruption and method of awarding contracts (it's often the same companies, which have long association with the authority, will get the contract, even after call for new tender). The VS is much cheaper than mechanical systems, resulting in lower kickback to officials.
- Slowness to act from GO and administrations
- Hesitation to use a new system:
    - *For revegetation*, normally bamboo and common turf grassing;
    - *For land stabilization*, normally concrete or other mechanical systems;
    - *For water quality improvement*, normally chemical systems or…nothing, etc…)

References

Coppin, Yoann, (2005): "Rapport intermédiaire d'activités du programme de soutien au développement agricole de Vohimana" and "Conservation de la forêt de Vohimana grâce au reboisement, alternative de rente pour un développement durable", Project Report for on 2004-2005

Knoll, Carol (2008). Erosion control and vegetation restoration: http://www.vetiver.org/Graphics_Images/MAD-sandunetxt.pdf

Truong, P.N. (1998). Vetiver Grass Technology: Potential Applications and Benefits in the Protection of the Environment, Agricultural Lands and Infrastructure in Madagascar. Special paper prepared for a series of seminars presented in Madagascar in June 1998. www.vetiver.org Archive

Truong, P.N. (1998). Vetiver Grass Technology: Potential Applications and Benefits in the Protection of the Environment, Agricultural Lands and Infrastructure in Madagascar. Report to the United States Agency for International Development (USAID) and the United Nations Development Program (UNDP). Consultancy Project No. 623-0510. www.vetiver.org Archive

Links to well-illustrated websites:

La Plantation Bemasoandro website: http://plantation-bemasoandro.alter-forum.com/
Picasa album: http://picasaweb.google.fr/Yoannmada/VetiverSystemMadagascar
News letter n°1: http://www.vetiver.org/MAD-NL11_08pdf.pdf
Project on 2003 : www.**vetiver.org**/MAD_conservation.pdf

Brief Introduction to the Speaker

Yoann Coppin is a Forestry Management Engineer from France, he went to Madagascar the first time on 2001, to study the rainforest on the East Coast. He heard some NGO using a grass for soil stabilization, and discovered the Vetiver on the Internet and thought that Vetiver is the perfect solution for the environmental problems at Madagascar, even he has never saw any Vetiver plant. He submitted a small project using Vetiver grass to be financed by the Ministry of the Youth and Research to rehabilitate the lands degraded by the traditional agricultural practices. The project was undertaken successfully, 20 000 slips were planted on slopes burnt, combined with crops, and 5.000 on a nursery to insure the long term if needed.

Then he worked almost 2 years as an agricultural coordinator for a NGO and, out of many activities, set up a large program against erosion: After that he worked for HYDROMULCH, responsible for the propagation through community's nurseries. In total, 2 millions plants were propagated in pots through 36 nurseries.

Since begin of 2008 he has established his own company, the only one at Madagascar that making business with **only** the Vetiver System, including a large promotion of the Vetiver Grass Technology.