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**Landscape  
Development  
Interventions**



## **Semi Annual Report**

June 1999 - December 1999

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1. Study and research reports from Cornell University Students in Beforona

## ACRONYMS

AUE	Association des Usagers de l'eau (Water Users Association)
AUP	Association des Usagers des Pistes (Road Users Association)
AGERAS	Appui à la Gestion Régionalisée et à l'Approche Spatiale
AGEX	Agence d'Execution
ANAE	Association Nationale pour les Actions Environnementales
ANGAP	Association Nationale pour la Gestion des Aires Protégées
AQUALMA	Aquaculture de Mahajamba
BEST	Bureau d'Expertise Sociale et de Diffusion Technique
CAF	Cellule d'Appui Forestier
CANFOR	Cantonement Forestier
CAP	Commercial Agricultural Promotion
CDIA	Centre de Diffusion pour l'Intensification Agricole
CE	Conservation Enterprises
CEIF	Conservation Enterprises Investment Funds
CIIFAD	Cornell International Institute for Food, Agriculture and Development
CIIFOR	Cornell International Institute for Forestry
CIM	Centre d'Interpretation de Moramanga
CIRAGRI	Circonscription de l'Agriculture
CIREL	Circonscription de l'Elevage
CIREF	Circonscription des Eaux et Forêts
CITE	Centre d'Information Technique et Economique
CJPM	Comité Jean Pain Madagascar
CLB	Comité Local de Base
CPSE	Comité de Planification et de Suivi & Evaluation
COP	Chief of Party
CTA	Cellule d'appui Technique (AGERAS)
DIREF	Direction des Eaux et Forêts
EAM	Entreprendre à Madagascar
ECOCERT	Entreprise de Certification Organique/biologique
EJ	Expert Junior
EP II	Environmental Program 2
ESSA	Ecole Supérieure des Sciences Agronomiques
FENU	Fonds d'équipements des Nations Unies
FCE	Fianarantsoa Cote Est Railroad
FID	Fonds d'intervention pour le Développement
FIEFE	Fonds d'investissement pour les entreprises favorables à l'environnement
FOFIFA	Foibe Fikarohana ho amin'ny Fampandrosoana ny eny Ambanivohitra
GELOSE	Gestion Locale Sécurisée
GIS	Geographic Information System
GPS	Global Positioning System
GTDR	Grpoe de Travail pour le Développement Régional (PADR)
IR	Intermediate Result
IRRI	International Rice Research Institute
LDI	Landscape Development Interventions
M&E	Monitoring & Evaluation
MEF	Ministère des Eaux et Forêts
MIRAY	Consortium PACT – Conservation International – WWF
NRM	Natural Resources Management
NGO	Non-Government Organization
ODAI	Opération de Développement Agricole Intégré
ODASE	Opération de Développement Agricole du Sud Est
ONE	Office National de l'Environnement
OTIV	Mutuelle d'Epargne et de Crédit
PDRAB	Projet de Développement Régional d'Ambato Boeni
PNLCP	Programme National de Lutte Contre la Pauvreté
PRA	Participatory Rural Appraisal
RFPD	Regional Forestry Plan Director
SAF/FJKM	Sampan'Asa Fampandrosoana de l'Eglise Protestante
SO3	Strategic Objective # 3
SR	Sub-Result
SRI/SRA	Système de riziculture Intensif/Système de riziculture amélioré
WWF	World Wide Fund
ZSI	Zone(s) Stratégique(s) d'Intervention

## 1. OVERVIEW: MAIN ACCOMPLISHMENTS AND CONSTRAINTS

The Chemonics team is pleased to report that during the last six months, LDI has effectively taken off in the regions and has reached a cruising speed that allowed us to meet and even exceed most of our targets. More importantly, we have been able to complete the recruitment of our staff, strengthen their common vision of LDI's objectives and approach, and create a well-motivated and highly capable team at the field, regional and central levels.

Some results deserve special attention, because they clearly demonstrate our ability to rapidly reach concrete goals, and mainly because they lay the groundwork for successful implementation of our future activities:

### IMPROVING RELATIONSHIPS WITH THE GOVERNMENT

- We have developed very good relationships with our Ministry de Tutelle, the Ministry of Environment, which considers LDI as its "battle horse", according to the Minister.
- We are the leading partner of the Ministry of Tourism for the creation and development of the "Zones d'Investissement Ecotouristiques" (ZIE) in Isalo, Montagne d'Ambre and Ankarana. The official constitution of a "Réserve Foncière" in Isalo is an unprecedented event that must be considered as a major success which will provide secure land tenure to potential investors.
- We have closely worked with the PADR and contributed to the Government's rural development strategy to better ensure a productive synergy with our conservation efforts.
- With the FoFiFa and the Ministry of "Elevage", we have signed two important memoranda of understanding that enable us to draw on their skills and resources, and create a conducive framework for joint activities.



*Signature of the memorandum of understanding between LDI and FoFiFa*

### BUILDING PRODUCTIVE PARTNERSHIPS

- In just a few months, LDI has emerged as a key partner for governmental institutions, NGOs, and private enterprises involved in EPII and rural development. We have signed more than forty sub-contracts, grants and memoranda of understanding. We have funded more than fifty studies, many through local NGO and consulting firms. More importantly, we have established high standards of accomplishment for our partners through performance based sub-contracts that require strict deliverables against each tranche of payment.
- We have started to efficiently leverage donor and private sector resources which have helped us successfully launch important initiatives, such as the Environmental Education Radio in Moramanga funded by the Swiss Cooperation and managed by LDI with the assistance of a specialized NGO.

### SUCCESS STORIES IN AGRICULTURAL INTENSIFICATION

We would like first to emphasize the rapid development and growing success of "kolo harena" farmer associations, assisted by LDI, that are committed to protect the environment and practice sustainable agriculture. In less than 4 months, 83 associations with 1,300 members, representing more than twice the targeted number, have been created and are in the process of being formalized in all three regions. We are more than ever convinced that these associations, involved in conservation and development activities, are the basis of any viable, long term attempt to change the course of environmental degradation in Madagascar. They will benefit from services of Input Supply Centers, set up with LDI's assistance that will provide, on a revolving basis and with deferred payment, needed inputs to improve their agricultural practices.

Some success stories will tell more than anything else what LDI has accomplished in the first six months of project implementation in the regions. They capture the essence of our actions and reflect the quality as well as the remarkable diversity of our interventions:

## **In Fianarantsoa**

### **Potato Production in Alatsinainy-lalamarina**

“You’ve come to take away our forests,” said an elder from the village of Ampatsy. “Yes,” said another, “unless we cultivate the rich lands of the forest corridor, famine will strike us here.” Faced with these harsh comments at a community meeting held last September to share the findings of a rapid rural appraisal (RRA) case study in the commune, LDI Fianarantsoa staff turned to the hostile gathering to ask what they felt would be appropriate actions for LDI. “Build roads, rehabilitate our irrigation systems, and introduce potato cultivation,” replied the assembly.



***Introduction of potato production as a dry-season culture and an income diversification activity in Alatsinainy-lalamarina***

With this advice in mind, LDI engaged EASTA Iboaka, a Fianarantsoa based forestry training school skilled in rural extension of potato cultivation to train farmers in the cultivation of improved varieties of potatoes. Deeply distrustful of LDI, the mayor of the commune of Alatsinainy-lalamarina agreed nevertheless to advance commune funds to buy 1.4 metric tons of potato seed from AFAFI. Transported to the commune by LDI, the potatoes were then resold at cost to 60 families. Unknown to us, these seeds were then resold to another 60 families. EASTA Iboaka, MICET, and Malagasy Mahomby were then contracted to teach more than 100 farmers methods of intensive potato production, composting techniques, and integrated pest management.

Harvests have been bountiful. Some farmers are reporting up to 40 metric tons per hectare in rice fields and 13 metric tons per hectare on tanety. Relations with LDI have warmed greatly, especially after LDI staff did not “steal” the harvest as many feared. Farmers are now making plans to greatly expand potato production because harvests come just at the time of highest labor and nutritional needs – the cultivating and planting time for rice in early November – and crop residues can be fed to livestock. Presently, LDI staff suspect that residual increases in soil fertility from heavy composting may indeed be raising rice yields on the lowland fields cultivated this past season in potatoes.

### **Fish Culture**

As LDI Fianarantsoa staff became increasingly familiar with the communities situated along the forest corridor, a common theme emerged from discussions with farmers. Farmers felt a great need to reintroduce fish culture into the agricultural systems. With farmer leaders from Kolo Harena along the western side of the forest corridor, LDI organized farmer-to-farmer visits to successful fish farmers. A highly successful farmer in Andoharanomaitso convinced easily many of the great potentiality of linking fish culture with rice farming. LDI hired the NGO Miray Mahefa to train farmers in the latest fish culture practices and to help them rehabilitate fishponds on both the eastern and western side of the corridor. Using LDI as an intermediary, farmers purchased Royal Carp fingerlings at 200 FMG each from the *Direction Régionale de l'Élevage*. LDI helped to transport the fish in oxygenated containers to farmers in all of our strategic zones of intervention (SZI). Presently over 2000-3000 fingerlings have been delivered successfully to each of the SZI. Over 10,000 Royal Carp are now growing in small fish ponds situated on both sides of the forest corridor.

## In Mahajanga

### Cashew, Mahajanga coffee

It takes a tree to save a tree: a likely adage for Madagascar's threatened forests. The large plantations of eucalyptus and pine in the high plateau region provide wood for charcoal, sparing the primary forest. And one of the key strategies to combat tavy is planting tree cash crops like coffee to stabilize the slopes and provide much needed income to farmers. In the Mahajanga of the dry dense forest, second priority ecosystem in Madagascar, there are no charcoal plantations and no coffee. But there are cashew nuts, a product with a proven market, good earning potential and well adapted to the region. Starting in October 1999, LDI launched a campaign to promote cashew as a cash crop among farmers in the peripheral zones of the major dry forest blocks (Ankarafantsika and Bongolava), and involved several development partners in the region: UNEF project in Ambato Boeni, ODAI project in Port Bergé, ANAE in Mahajamba, NGO Mikajy, and the Union of Road Users Associations Bekobay. LDI distributed 3325 kg of seed, enough to plant over 400 ha, with a goal of achieving 200 hectares.

In parallel, LDI is working with FoFiFa and a private company AQUALMA to create a Cashew Research Unit at FoFiFa Miadana to develop improved clones of cashew for higher yields and better nut quality. The principal actors in the sub-sector came together to form a Cashew Club in November 1999, to promote cashew planting, varietal improvement, and market development. Interest in cashews is rapidly gaining momentum with requests for seed coming from all sides. We expect an even larger expansion next year.

### Diffusing high yielding solutions

LDI in partnership with FoFiFa is setting up a prototype of rational land use at Miadana to serve as a adaptive research, demonstration and training center to diffuse improved farming techniques among farmers in the SZIs: the Center for Agricultural Intensification. The CAI comprises 20 hectares of land with all the features of a typical village landscape: ridges, slopes, bottomland and a wooded area.

- € On these 20 hectares of mostly degraded and infertile soil, one will find a model farmer's house on a ridge with an oxen corral next to it and surrounded with grafted fruit trees (mango, papaya, orange).
- € On the slopes (tanety) curving down to the bottoms are found alternating bands of maize, peanuts and manioc separated by contour erosion bunds. These demonstrate the yield enhancing advantages of crop rotation, soil erosion control, and use of selected seed with manure and fertilizer amendments.
- € The bottomland has been leveled and arranged in banded rice fields receiving rainwater and supplemental irrigation from a neighboring stream flowing through the wooded section. Here, improved strains of rice are transplanted early (< 21 days), in rows to facilitate weeding, and with soil amendments (manure and fertilizer).
- € Another plot on the better soils next to the woods are reserved for banana orchard and vegetable crops (peppers, tomatoes, etc).
- € On the least fertile parts trees are being planted: acacias and eucalyptus to cover the soil and provide timber and firewood or charcoal; and cashew nut trees as a cash crop that will start earning in 4 years.
- € And finally, there are small plots of the promising new crops being tested for possible introduction into the farming system if they prove their worth: Roselle or bisap (*Hibiscus sabdariffa*) a potential annual cash crop with a ready export market, and Combava (*Citrus hytrix*) a citrus fruit yielding a high value essential oil.



**Cashew plant, LDI distributed 3325 kg of seed, enough to plant over 400 hectares of tanety**

## In Moramanga

The biggest success story of the last year for the Moramanga region is the overwhelming enthusiasm for our farmer associations (*Kolo Harena*). We currently are working with 33 *Kolo Harena* (660 families) in our 4 strategic zones of intervention, and are constantly receiving demands to help form new *Kolo Harena*. For a culture, that some people say has a weak history of working together for a common good, this is an incredible success for the LDI program. Perhaps past efforts to form farmers groups were not successful in gaining the confidence of the farmers, or did not offer them benefits that made it worth their effort. Whatever the reason, it is exciting to see this initiative take hold.

### § Rural Credit Program

One of the activities that has seen the most interest and perhaps the most impact in our region is the rural credit program established for the *Kolo Harena* in our strategic zones of intervention. Working with OTIV (*Ombona Tahiry Ifampisamborana Vola*) a Malagasy NGO, we have been able to mobilize 104,000,000 Fmg (approximately 16,500 USD) that allowed 143 farmers to cultivate irrigated rice using intensified and sustainable techniques on 242 hectares of land. We have recently received the second request for credit (17,000,000 Fmg) for upland intensified bean production. This money will help 68 farmers produce upland beans on 48.3 hectares using anti-erosive and soil fertility improvement technologies that will stabilize the need for continued slash burn agriculture on the hillsides.

### § Farm Input Supply Centers

Like the Rural Credit Program, the Farm Input Supply Centers are greatly appreciated by the farmers working in our strategic zones of intervention. The unique aspect of these centers is that they are wholly owned and operated by farmers belonging to our *Kolo Harena*. Working with BEST (Bureau d'Expertise Sociale et de Diffusion Technique) a Malagasy NGO, we have provided start-up capital and management training for the creation of a Farm Input Supply Center in each of our four strategic zones of intervention. *Kolo Harena* farmers from each strategic zone of intervention now have access to farm inputs that were previously financially or logistically unavailable. The *Kolo Harena* from each zone elect a farmer representative to manage the Input Supply Center for a given period of time (usually 1 year) without pay. Rotating this position throughout the *Kolo Harena* provides excellent management experience for the farmers as well as builds social capital within the *Kolo Harena* network.

### § CDIA (Centre de Diffusion pour l'Intensification Agricole) in Beforona

After the official inauguration in October of last year, the CDIA has been functioning at 100% in its capacity as a research, demonstration, training and propagation center for the promotion of intensified agricultural techniques. This "working farm" provides a fully integrated model for intensified production techniques of each aspect of the typical Malagasy farming system. It also serves as a research center where foreign and Malagasy students can install their experiments and interact with farmers. We currently are hosting four Malagasy students (topics of research include: SRI, SRA, compost and small animal husbandry) who are working on their DEA, one Swiss student (studying improved fallow) working on her Ph.D. at Cornell University and 3 German students (working on homegarden development, lowland rice production and small animal husbandry).



**Beforona CDIA: A model of intensified agricultural techniques**

Since the inauguration the CDIA has provided training for about 200 farmers and agricultural field agents on such diverse themes as: apiculture, aquaculture, SRI/SRA and improved upland cash crop production systems. Working with a private enterprise the CDIA has also produced over 70,000

improved (bi-clonal Robusta) coffee plants for distribution to farmers in the Beforona region. Within the last week, LDI organized a workshop for the *Kolo Harena* in the Beforona strategic zone of intervention to begin the process of turning management of the CDIA over to a federation of the farmer groups working around the CDIA. Turn out for this workshop was very good and we hope to have a farmer operated management plan in place by the end of March 2000.

## **SUCCESS STORIES WITH CONSERVATION ENTERPRISES**

### **In Antsiranana**

#### **Local Approach succeeds in Ankarana**

Overcoming their initial reluctance, LDI has been able to win the confidence of the people and local authorities in Ankarana, thanks to the efforts of a socio-organisateur who explained how development of eco-tourism would directly benefit the region. They are showed their enthusiasm by donating a plot of land at Andrafiabe for the construction of village guesthouses.

#### **An Business Association to Take the Lead**

A project's success depends essentially on local stakeholders taking responsibility for its continuation. That's why LDI convinced local private tourism and eco-tourism businesses to join together and form an association to promote their interests. The members of this new association, named "*Eco-Tourisme Nord*" immediately drew up a concrete action plan to develop eco-tourism in cooperation with LDI efforts in the region.



*A giantess Pandanus in Ambre Mountain*

#### **Finally, a real prospect for reducing charcoal consumption**

VITOGAZ a French company that has secured the distribution rights for natural gas in Madagascar has a plan and the commitment to penetrate the charcoal market in Mahajanga with gas. But they need a partner, and LDI is their choice. The strategy (4 A's):

- § Affordability: To sell gas in smaller bottles (9 kg instead of 12) to reduce the unit recurrent costs to the low budget consumer.
- § Accessibility: To sell gas in neighborhood shops in Mahajanga, Marovoay and Port Bergé.
- § Availability: To guarantee a non-interrupted supply of gas, VITOGAZ will maintain adequate stocks.
- § Appliance: To provide consumers, either free of charge or at a greatly reduced price, a burner that clicks on top of the bottle.

The role of LDI will be to spearhead the communications-information-education (CIE) campaign and to design and implement a financing mechanism for neighborhood distributors and consumers, so as to accelerate the adoption of gas among current charcoal users. A fund provided by the European Investment Bank will co-finance the effort.

#### **Processing adds value to forest fruits**

The peripheral zone around the Ankarafantsika forest is literally peppered with mango and lemon trees. A large proportion of the fruit produced is sold at give-away prices to transporters from Tana and probably an even larger proportion is never harvested but left to rot. These fruit trees represent a huge potential financial resource for populations that earn their living by clearing the forest for agriculture or charcoal. But the perishable nature and seasonal availability of the fruit limits the market value and thus the bargaining position of farmers in the zone. Processing (dried fruit, conserves, and juice) can extend the shelf life of the product and increase the price received. For the past year and a half LDI has been working with a group of women in Andranofasika (VONONA Association) that is successfully producing and selling dried mangoes and bananas, and tamarind and jujube preserves. The group's achievements were recognized by the Women's World Summit Foundation (WWSF, based in Geneva) in October 1999 in awarding VONONA the annual Prize for Creativity of Women in Rural Development.

## Rehabilitation of Coastal Export Economy

The future of the tropical forest corridor stretching the length of the province of Fianarantsoa is intimately linked to the rehabilitation of the southeastern coastal economy. Environmental degradation of this biologically rich forest corridor is in part due to the collapse of the once vibrant export economy of coffee, pepper, cinnamon, and other tropical spices. Farmers are fleeing the stagnant coastal export to settle in the forest corridor to practice slash-and-burn agriculture. To respond to this massive shift in settlement patterns, LDI Fianarantsoa is launching pilot initiatives with many partners to revitalize the coastal agricultural economy. Much hinges on the rehabilitation of the former plantations once so prevalent in the region. LDI is working with the young son of a former plantation owner to rebuild the infrastructure of a 700 hectares farm still owned by the family. Through LDI's extensive network of commercial contacts, we helped the farmer and two entrepreneurs forge a partnership that has led to a considerable infusion of new capital and managerial experience into the farm. LDI currently provides technical expertise to encourage the company to export high-value "Bio" certified crops (coffee, pepper, and cinnamon) through the port of Manakara. Not only is the farm beginning to generate substantial employment for surrounding villages, but also interest is growing among villagers to produce again export crops for the emerging market.

## Silkworm Production

LDI Fianarantsoa supports a non-governmental consortium - CCD Namana and the Scottish Feedback Madagascar - to launch silkworm production around the town of Ambalavao and in the commune of Ambohimahasina. LDI works with several donors to establish a training center operated by CCD Namana in Ambalavao specialized in silkworm production and weaving, horticulture, and fruit tree propagation. Forty-five young women have already been trained through LDI financial support in mulberry tree planting techniques, silkworm husbandry, and weaving. These women have planted approximately 10,000 mulberry trees in highly degraded *lavaka* lands along the forest corridor. Soon silkworm production will flourish along the western side of the forest corridor— a promising income generation activity that also rehabilitates the land.



## Phael-Flor

In order to protect the low-altitude tropical forest at Analalava from seasonal brush and tavy fires, LDI is supporting efforts initiated by the Société Phael Flor to set up a new agro-industrial process that adds value to natural resources. On a five hectares plot, Phael Flor has demonstrated that farmers can generate extra income while protecting the young cinnamon saplings found in the guava and ravinala forests. The uncontrolled harvesting of the bark of young cinnamon saplings quickly destroys the tree. Farmers now collect and sell the leaves of the young sapling for the production of essential oil. Cinnamon bark-the traditional product- may be harvested when the trees are older. The monetary benefits from selling this new product encourage the farmers to protect their new source of income by fighting brush fires. Already ten families in the zone participate in the new system on a 20 hectares plot: brush fires in this area have been considerably reduced this year. LDI is



*Cinnamon plants after eighteen months growth*

working with Phael Flor to expand this experiment to a 500 hectares area with the participation of 50 families.

### **Bois Raméau Fragmenté (BRF)**

The conservation enterprise development that we are doing in the Ambatovy strategic zone of intervention is exciting in that we are facilitating linkages within the private sector. The Phelps-Dodge Mining Company came to us with an expressed need for 400 m<sup>3</sup> per month of chipped biomass for their reclamation process. In our negotiations with them we elicited a commitment on their behalf to buy 2 chippers from Comité Jean Pain (CJPM) in Fianarantsoa that they agreed to then loan to our *Kolo Harena* farmer associations to be paid off over a period of one year. The proposed management system for the chippers is somewhat complicated but beneficial for all involved. Phelps-Dodge as agreed to buy the BRF (chipped biomass from our Kolo Harena) at a fixed price of 25,000 Fmg per m<sup>3</sup>. Of this 25,000 Fmg, 35% is returned to PDM to pay off the chippers, 17% goes towards oil and fuel costs for producing the bio-mass, leaving the use of 47% of the revenue generated by a cubic meter of BRF to be decided on by the *Kolo Harena*. Initially the *Kolo Harena* will have to buy the raw material to generate the biomass, so some of this money will be used for that purpose, but they will soon plant leguminous species such as Tephrosia, Crotalaria and Flemingia to create their own biomass bank and off set this cost. Our *Kolo Harena* have already agreed to use the remaining money to save for the purchase of another machine, reimburse themselves for their labor and to invest in other development activities such as the purchase of seeds for the bio-mass bank.

### **Amazing breakthrough at a large international mining company**

A very interesting issue has come up at the corporate level of Phelps Dodge. The work that Phelps Dodge is doing together with LDI in Madagascar, plus other recent examples of Phelps Dodge partnerships with diverse organizations has caught the attention of upper management. They are so impressed by the potential synergies of working with conservation groups, not only on startup projects but also at existing facilities, that they have formally challenged the entire Environmental Services function to identify the organizations that have specific conservation experience/expertise and take steps to learn from them and partner with them, when it makes sense to do so. This challenge has been issued worldwide. It opens up such issues as working with operating mines to plan land use, reclamation, development of post-mining jobs in local communities, implementation of resource conservation plans and programs throughout all of the world-wide holdings of PDC. Industry has spent a lot of time and resources walling themselves off from this kind of participation in the past, but it is clear that it is in everyone's best interest to rethink that strategy and take advantage of the amazing expertise that NGOs offer. There is a tremendous need for it in the mining industry, both in the US and abroad.

### **STRENGTHENING LOCAL CAPACITIES**

Another major achievement of LDI has been the successful implementation of the Scholarship Program, through which seven Malagasy working in different NGOs and governmental institutions have a chance to attend some of the best US universities to pursue their Masters degree in various environment-related fields of studies. This program has been qualified as "ideal" by the head of Chemonics' Division for International Training and Education.



***Malagasy participant for The Scholarship Program***

### **CONSTRAINTS AND OUTLOOK**

On the negative side, however, we must admit that our credit component had a slow start up, mainly due to administrative and regulatory constraints, which have delayed the launching of our Conservation Enterprise Fund (FIEFE). Fortunately, rural credit activities, targeting association members, had an impressive beginning in the Lac Alaotra area, boding well of future performances.

Our main challenges ahead will be to deepen our eco-regional vision, through further research and planning in cooperation with our partners, and at the same time, build up a solid relationship with

farmers, at the field level, through concrete and rapid achievements. We must never lose sight of our core goal, which is to help rural communities manage natural resources in a sustainable way and reverse the downward spiral of expanding poverty. To do so, we must continue to ensure strong thematic and geographic linkages between our development activities and the effective protection of priority ecosystems in all three regions.

There is no doubt that we have started to successfully implement our activities under the various components of our work plan. It is also clear that we will be able, in the short or mid term, to significantly help farmers increase agricultural production in our ZSI, expand the number of conservation enterprises and reinforce local capacities. However, it will take more time to demonstrate the fundamental change in behavior and attitude among targeted communities that will lead to a drastic reduction of agricultural extensification. We are just at the beginning of a very promising and exciting process.

## Conclusions: an eco-regional approach to better protect priority ecosystems.

This first semi-annual report, particularly the success stories, concretely illustrates the fundamental elements of the eco-regional approach and demonstrates the thematic and spatial links between development activities and LDI's objective of biodiversity conservation. Having undertaken a detailed eco-regional analysis which identified the underlying socio-economic causes of priority eco-system degradation, we were able to identify both the strategic intervention zones and the key actions likely to effectively reduce the most critical pressures on them.

In essence, it is through this regional approach that one can best understand the links between the success stories presented in this chapter and protection of eco-systems. For example:

- A resurgence in exports of coffee, pepper, and litchi from the Fianarantsoa region will encourage farmers close to the forest corridor to abandon *tavy* and turn to production of these cash crops. Studies undertaken by LDI clearly indicate that a drop in coffee production has significantly decreased farmer incomes. To compensate, farmers turn to cutting trees in order to make up for lost revenue. To remedy the situation, LDI is operating at several levels in order to revive coffee production on the eastern flank of the corridor between Ranomafana and Andringtra: supporting the rehabilitation of a 700 hectare plantation, which will make it the largest organic farm in the country; reinforcing links between research and the private sector; and contributing to the maintenance of vital farm-to-market road and rail links.

- In the Moramanga region, a similar action to promote cultivation and processing of cinnamon has already resulted in a reduced incidence of the fires which threaten the remaining vestiges of low-altitude humid forests in the Brickaville area. Working with the Phael-Flor company, which started this venture, LDI helps local farmers to gain more secure land title, to appreciably improve their standard of living, and especially to better appreciate the importance of the forests that shelter the cinnamon trees, which are source of their income.



***Deforestation, main reason of the vegetation cover reduction***

- In Mahajanga, fires and cutting trees for charcoal production destroy thousands of hectares of dry forest every year. To combat these practices, LDI promotes both improved rice-growing practices and community reforestation with cashew nut trees. The reforestation program establishes a substantial buffer zone, which is in the farmers' best interests to protect, around the dry forest of Ankarafantsika. LDI has been able to bring together the private sector, NGOs, government, and international donors to set up a extensive program to revive cashew production in the most sensitive ecological zones of the Mahajanga region.
- The Centers for Agricultural Intensification are regional hubs for training rural communities. They disseminate techniques meant to eliminate specific pressures on priority ecosystems, specifically *tavy* at Beforona and bush fires at Miadana.
- LDI has developed income generating activities which are environmentally friendly in the sense that they significantly reduce pressures on surrounding ecosystems. For example:
  - € The VONONA women's association in Mahajanga produces dried mangos and bananas, which are abundantly available in the Ankarafantsika peripheral zones. Selling these

products both gives them a new source of income and increases their revenues. Previously their livelihood was based on cutting wood for either fuel or charcoal production.

- € The 45 women who raise silkworms in the Ambalavao region gain significant income by selling silk and silk products, and the mulberry trees they planted to feed the silkworms stabilize degraded *tanety* soils along the forest corridor.
  
- € In the Fianarantsoa region, pisciculture is a medium-scale activity that permits farmer associations in the region to develop their water resources and, in the case of paddy pisciculture, to improve rice paddy soils. This minimizes the risk of a purely agricultural activity.

The above examples allow better understanding as to how LDI's eco-regional approach essentially differs from those adopted by integrated conservation and development projects. Note also that in a given eco-region, LDI operates in several zones that are strategically important for bio-diversity conservation, not only those next to National Parks or protected areas.

In addition, LDI works with a total of more than 30 carefully selected partner organizations in all regions. Each one holds a comparative advantage in its field of expertise and will help to maintain the knowledge and experience gained through our activities.

Unfortunately, support from LDI and USAID aside, these partners are not always able to find the means to increase their self-sufficiency and financial independence. Of particular importance are the formally constituted farmers' associations—the "Kolo Harena"—which have renounced destructive practices such as *tavy*.

They are the base of our actions and the principal target of our efforts. They are the ones who will continue our work to further improve rural standards of living while ensuring a more sustainable management of their communities' natural resources.

Obviously the number of ZSIs is far too low, considering the size of ecosystems to protect and the strength of threats to them. The next step, to be analyzed in detail in next year's workplan, will be to find the means to set up new ZSIs while continuing our support in zones where we presently work, while remaining within budget limits. We must concurrently devote the necessary time and resources to strengthen kolo harena in the present ZSIs, further the expansion of these associations in their localities, and begin to work in new and relatively distant zones if we hope to make a large-scale impact. This is our challenge for the coming years.



***The peripheral zone of Ankarafantsika, populated by mangoes, banana, raphia, managed rationally, are supplementary income source and factor for ecosystem pressures reduction***

## 2. KEY ACCOMPLISHMENTS OF THE JUNE 1999-DECEMBER 1999 SEMESTER

### 2.1 Antananarivo Office

The central office in Tana provides administrative and technical support to the regional offices. It also coordinates the different elements of the program and maintains relations with the USAID mission, the EP II execution agencies (AGEX), and other partners. The Tana office supports the following activities.

#### 2.1.1 Ecotourism in Antsiranana

LDI supports the development of ecotourism in the Antsiranana region. This area boasts an interesting and diverse list of attractions such as the Montagne d'Ambre complex and «Karst » peak, the Ankarana reserve, dry forests and rain forests, and spectacular caves. It is a region of outstanding natural beauty and varied fauna.

Three types of activities are underway in Antsiranana:

##### € **Creation of «Ecotourism Investment Zones » (ZIE) in Ankarana and at Joffreville's Montagne d'Ambre**

Ecotourism investment zones have been identified at Montagne d'Ambre in Joffreville, and in Mahamasina Est, Ankarana. With support from the local community, a property survey has been done as the first step to legally establish these ZIE as reserves for ecotourism investment. Technical studies based on environmental evaluations of these ZIE were undertaken to identify elements which must be addressed to (1) facilitate development of ecolodges and other ecotourism activities, (2) minimize negative impact on the surrounding environment, and (3) maximize benefit to the local population. Based on these studies, an initial draft of the management plan has been drawn up. These zones have been created to facilitate private investment in ecotourism in the region.



*Brookesia tuberculata, 3-4 cm sized, an endemic chameleon in the Ambre Mountain*



*A very remarkable bracken in the Ambre Mountain*

##### € **Capacity reinforcement of local ecotourism businesses.**

Local tourism businesses in Antsiranana have created a trade association to develop ecotourism. Drawing on the services of a specialist American architect, LDI organized a «round table» training for members of this association on the development of ecolodges in Antsiranana.

The Montagne d'Ambre Nature Lodge project envisages construction of ecolodges near the southern boundary of the Montagne d'Ambre Park. LDI assisted this business to commission a study of appropriate architectural norms and is currently working with it to undertake necessary environmental impact studies.

## € **Involvement of local communities in ecotourism activities**

LDI assists three associations involved in ecotourism activities. These are:

- € Village Ecotourism Association (AVE) to build village guesthouses. A temporary community organizer hired by LDI introduced the project to the local population and public authorities in Ambatoharanana and Andrafiabe. Studies for construction of wells in the village of Ambatoharanana and village guesthouses in Andrafiabe have been finished, but these cannot be built until the next dry season.
- € Association for the Development of Ambohitra (ADA) to establish a restaurant and bungalows in the future ZIE in Joffreville. The feasibility study for this project has been done. LDI's support will be focused on reinforcing the administrative and financial management capacity of this association and assisting it to find financing for this project.
- € Women and Development Association (AFED) to develop handicraft production and marketing. In coordination with ANGAP and PAIQ/AFDI, LDI will help the Association to draw up the business plan and set up a kiosk to sell handicrafts in the peripheral zone of the Montagne d'Ambre national park.

### 2.1.2 **Expert Junior Program**

Under the Junior Experts (« Experts Juniors ») program to work with partners, LDI provides new university graduates to environmentally favorable enterprises and Kolo Harena (farmers) associations. This program benefits both the young graduates, in that it establishes a good foundation for their professional careers; and LDI partners, in that they can benefit from the EJ's technical expertise.

During the past six months, seven Junior Experts have been working in the fields of:

- € Ecotourism to backstop the implementation of the ZIE and to draw up the development plan for the Andringitra National Park near Fianarantsoa
- € Community management of natural resources in the forests of Amboromaika and Ambatovy and to prioritize activities for forest development in the Fianarantsoa area
- € Management of provisioning centers for Kolo Harena input supplies and seed production centers in partnership with SAF/FJKM in Mahajanga
- € Transfer mango trees from Mangatsa to the Miadana CDIA. Under this contract, the EJ salvaged, grafted, transferred mango trees from Mangatsa to the Research Station, and finally distribute them to farmers
- € Dried fruits processing with Vonona Association in Andranofasika



***Ambroise, an Expert Junior, is working with Vonona Association in Andranofasika***

### 2.1.3 **Intervention Fund**

#### LDI Contract changes affecting the Intervention Fund

**Training activities removed from IF:** Due to the need to comply with US tax laws, funds for the Training component of the Intervention Fund have been set up as a separate line in the program

budget. This is a technical modification only; we continue to track training expenditures as part of the IF.

**Grant making approved for Chemonics under LDI.** A waiver and contract modification was required to allow Chemonics, as a for-profit firm, to make grants under LDI. This has been done, which permits greater flexibility in financing activities and is essential to carry out approved credit programs through local financial institutions.

#### Financial Instruments used to implement Intervention Fund activities

Following the pre-workplan “shakedown” period, during which LDI undertook a number of “fast-track” activities, a range of contractual and grant instruments have been put in place. These are (1) sub-contracts, (2) grants, and (3) purchase orders.

**Subcontracts:** Using a standard contract format drawn up to comply with both Malagasy contract law and USAID regulations, most LDI activities with partner organizations, including NGOs, are financed through fixed-price contracts. Activities are defined in terms of defined tasks, or “deliverables” to be accomplished. Payments are tied to deliverables, and partners are not paid until the defined tasks have been completed to the satisfaction of LDI. Although this approach was at first unfamiliar to many NGOs, both local and international, who were accustomed to receiving grants, most have been able to adapt without too much difficulty. Use of sub-contracts imposes a greater rigor on partners’ work—if they don’t deliver, they don’t get paid-- and makes it easier for LDI to maintain quality control.

**Grants:** The LDI contract has been amended to allow Chemonics to make grants and the grant manual has been approved by USAID. However, given the restrictions and administrative burdens imposed by grants procedures, use of this instrument will be very limited. But it has permitted LDI to work with local banks and financial institutions to carry out credit programs, as detailed in the workplan. These institutions will receive grants for immediate on lending to approved borrowers.

**Purchase orders:** Many activities financed through the IF are most easily carried out by direct purchase of goods or services by LDI. We use standard purchase orders in this case, following the same procedures as for any other purchase by LDI.

#### **Streamlining IF procedures**

Within LDI, we have refined our procedures and delegated more authority to the regional directors in order to more quickly take advantage of partnering opportunities. Regional offices may draw up contracts and purchase orders for short-term services for any amount up to \$5000. Contracts for larger amounts are largely negotiated at the regional level, but are verified by staff at the TNR office and must be signed by the COP.

This delegation of responsibility has been accompanied by expanded training and TA for both LDI staff and partners. Following a workshop in October on use of the various IF financial instruments for LDI senior staff from the regional offices, we have established a program of regular regional visits by the Grants and Contracts Manager. The Grants and Contracts Manager, hired in October, spends up to 80% of his time at the three regional offices, working with regional staff and NGO partners to negotiate contracts, grants, and maintain an on-going technical assistance to LDI staff and partner organizations.

## Accomplishments to date

As of 31 December 1999, LDI had signed 31 sub-contracts and five Grant Agreements, of which 11 sub-contracts and three Grant Agreements had been completed. A further seven sub-contracts were under negotiation as of this date. In addition, considerable sums have been spent directly by LDI for procurement of goods and services under the IF. An analysis of year 2 IF disbursements by budget and activity category may be found in the table and charts below.

LDI Year 2 to date: May 99 Dec-99

Activity Types		Budget Categories					Total by type of activity	percent of budget expended
		Technical Assistance	Credit	Direct Material Support	Training	Research		
Agricultural Intensification	Budgeted	\$ 108,380	\$ 110,422	\$ 142,803	\$ 6,816	\$ 77,334	\$ 445,755	
	Spent	\$ 68,235		\$ 51,159	\$ 22,170	\$ 23,933	\$ 165,498	37.1%
Gelose/GCRN	Budgeted	\$ 56,414	\$ -	\$ 300	\$ 2,450	\$ 19,000	\$ 78,164	
	Spent	\$ 2,556		\$ -	\$ 639	\$ 5,000	\$ 8,195	10.5%
Environmental Education	Budgeted	\$ 20,604	\$ -	\$ 6,082	\$ 21,055	\$ 3,000	\$ 50,741	
	Spent	\$ 31,384		\$ 182	\$ 4,426	\$ -	\$ 35,992	70.9%
EFE Promotion (includes eco-	Budgeted	\$ 126,349	\$ 253,977	\$ 35,340	\$ 30,075	\$ 26,100	\$ 471,841	
	Spent	\$ 30,836		\$ 1,203	\$ 6,633	\$ 72	\$ 38,744	8.2%
Reinforcement of partner	Budgeted	\$ 150,254	\$ 5,682	\$ 18,220	\$ 268,728	\$ -	\$ 442,884	
	Spent	\$ 25,632		\$ 124	\$ 118,767	\$ -	\$ 144,523	32.6%
Total budget category	Budgeted	\$ 462,001	\$ 370,081	\$ 202,745	\$ 329,124	\$ 125,434	\$ 1,489,385	
	Spent	\$ 158,644	\$ -	\$ 52,668	\$ 152,636	\$ 29,005	\$ 392,953	26.4%
	% budget expended	34.3%	0.0%	26.0%	46.4%	23.1%	26.4%	

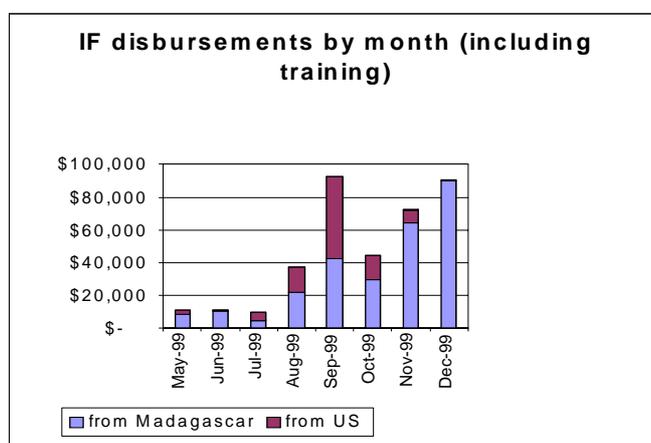
NB: 1. includes HO disbursements from the Intervention Fund through Nov 1999 only.

2. Although "Training" is no longer part of the IF, it is included in order to be consistent with the workplan.

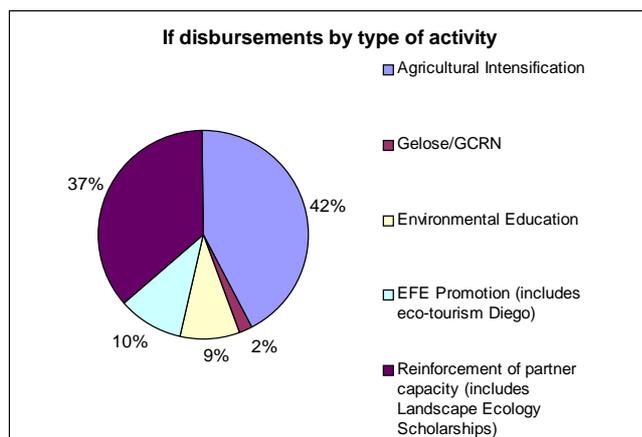
To date, LDI has spent just over 26% of funds budgeted for year two. We expect that this will increase sharply as the credit programs go on stream in early 2000. Note that there were IF had approximately \$545,000 in outstanding sub-contract and grant obligations and an added \$125,000 in sub-contracts under negotiation as of 31 Dec.

The following chart shows the pattern of the rate of spending thus far for year 2.

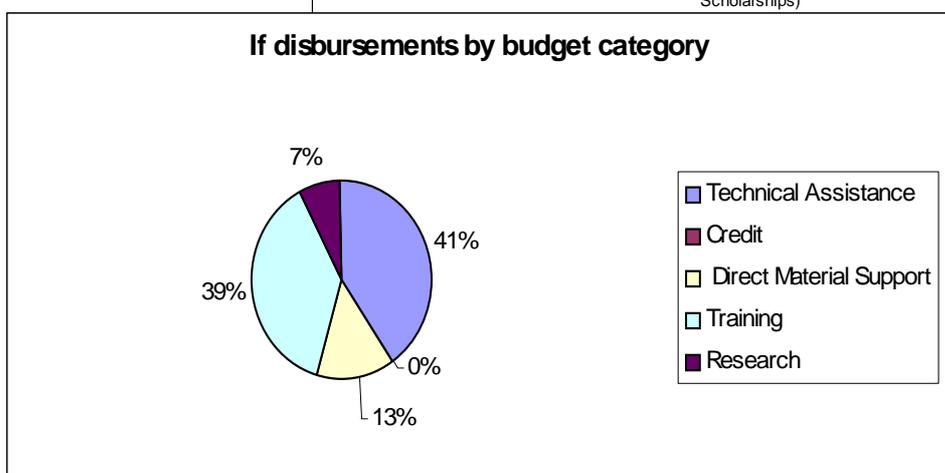
After a slow start, disbursements, from Madagascar have been steadily increasing. IF disbursements from the US are mostly for the scholarship program.



The following chart breaks down IF spending during year 2 by type of activity. Nearly 80% has gone to Agricultural Intensification and Reinforcement of Partner Capacity, which includes the Landscape Ecology scholarships in the US. Spending for EFE promotion and Environmental Education has been rather less. Little has been spent on GELOSE/GCRN, due to the continuing lack of clarity as regards the GELOSE process.



Finally, a quick analysis of IF spending by budget category shows that most funds have been used for TA and for Training, largely Landscape Ecology scholarships in the US. There had been no expenditure for credit activities as of 31 December, but we expect to make considerable disbursements in this area during the first quarter of 2000.



#### 2.1.4 FIEFE and Micro-credit

##### Investment Fund for environmentally favorable enterprises (FIEFE)

The objective of the FIEFE is to support access to credit by environmentally favorable enterprises (EFE) found to meet LDI criteria. Once found eligible, LDI may assist in one or both of the following ways:

- § Loan refinancing through local financial institutions
- § Technical assistance for the EFE to develop a business plan and credit applications

In accordance with workplan objectives, LDI aims, through FIEFE, to finance two (2) new investment projects in each of the three LDI regions with an average total investment of about \$50,000 per region. The FIEFE Life-of-Project budget is \$750,000.

During the last six months LDI has been negotiating with participating financial institutions concerning procedures and financial instruments necessary to implement the FIEFE.

The following have been expressed interest in participating:

Southern Investment Bancorp (INVESTCO), a local investment bank, to manage the FIEFE, The BMOI, the BNI/CL and the BTM-BOA, commercial banks, as participating banks, FIARO, a venture capital investment firm

The process is simple and will work as follows. The FIEFE may be used to refinance a percentage of:

- § Commercial bank loans to approved EFE
- § Capital investment in an approved EFE by a venture capital firm.

Refinancing conditions are as follows:

- § fee paid to the managing institution: a flat 3% of the amount refinanced
- § maximum amount which may be refinanced: bank loans: 80%, invested capital: 20%

- § annual simple interest rate on the amount refinanced:
  - without loan guarantee: 1/3 of the central bank indicative rate (taux directeur)
  - with loan guarantee option (max 60%): ½ the Central Bank indicative rate

### Micro-credit funds

The primary objective under agricultural intensification is to increase farmer income by raising agricultural yields of the member families of the Kolo Harena Associations in the LDI ZSIs. Better access to credit for these farmer associations is one part of the input package LDI offers. During the past six months, LDI has finalized agreements with two financial institutions—OTIV and BTM-BOA — both of which have extensive experience with micro-credit in Madagascar. These institutions manage credit funds under grant agreements drawn up with LDI.

- with OTIV for \$25,000 in the Moramanga and Lac Alaotra region
- with BTM-BOA for \$50,000 in the Mahajanga and Fianarantsoa regions.

In the Lac Alaotra region, the grant to OTIV has made it possible to provide credit for the current rice growing season to nine Associations. As these Associations also benefit from LDI technical support as regards improved farming techniques, we expect to see an increase in yields at the end of the season.

### 2.1.5 Communication

Communication and education activities aim to inform and educate individuals and groups to understand how they can benefit from sustainable agriculture and conservation of natural resources. For Antananarivo office support to the three LDI regional offices, our communication strategy as well as the regional communication strategy with our partner MIRAY can be summarized as follows:

#### LDI Communication and Environmental Education activities

##### Fianarantsoa

- § A 26-minute film made by SOCOFIMA (a local film production firm) is currently undergoing final editing. It demonstrates the relation between cash crops and deforestation pressures, and includes LDI's recommendations.
- § LDI Fianarantsoa works closely with MICET to educate the members of eight "Young Naturalists Clubs" in practices which respect the environment such as agroforestry and market gardening.
- § Environmental information messages for radio broadcast are being drawn up in cooperation with local private radio stations.



*Signature of the environmental education contract with MICET*

##### Mahajanga

- § LDI Mahajanga has contracted with the NGO "Ressources Vertes" to educate villagers in the ZSIs on environmental issues. This NGO also supports the CCEE in its environmental education efforts with pupils and teachers in the local schools.

## Moramanga

- § The Moramanga Information Center is operational, thanks to the joint efforts of LDI, PACT, and CITE.
- § Radio Beforona : with funding from the Swiss Intercooperation, LDI has purchased an FM radio transmitter and contracted with the NGO Médiascope to set up a mobile radio station to broadcast environmental information messages throughout the Beforona area.
- § Environmental information messages are being drawn up for broadcast by local private radio stations in the Lac Alaotra region.
- § The CDIA in Beforona educates local farmers in sustainable agricultural techniques, and serves to spread this information throughout the region.

## Antananarivo

- § The LDI central office puts out a bi-monthly e-mail newsletter summarizing major accomplishments and important events. This newsletter is sent to all financial and technical partners in order to stimulate discussion and create synergies in the field.
- § A four-color brochure is being prepared which will publicize the LDI's objectives, strategies, activities, and strategic intervention zones. It will be widely distributed to partners, environmentally favorable enterprises, and producers associations that work with LDI.

## Regional Communication Plan - MIRAY/LDI

LDI and MIRAY have agreed, in cooperation with other institutions, to undertake technical support, training, capacity building activities in the Moramanga, Mahajanga, Fianarantsoa and Antsiranana regions. Following regional workshops organized by LDI and MIRAY, the action plan and budget have been drawn up and relevant partners identified.

Actions identified respond to the pressures found in each region: brush fires and erosion in Mahajanga; tavy and unsustainable use of forest resources in Moramanga; and brush fires, tavy, irrational use of secondary forest products and of the marine and coastal environment in Fianarantsoa.

### 2.1.6 Administration

Main accomplishments during this past six months are described below.

#### Personnel

- Staff: with the recruitment of a communications specialist and a subcontract/grant specialist, we are now fully staffed except for one position in each of the CDIA's at Beforona and Miadana. LDI now has 116 long-term staff members.
- Procedures Manual: our procedures manual has been published and is now available on-line to all staff through the network servers at each office. We are in the process of publishing an addendum to reorganize scheduling for drivers in order to keep overtime expenses within reasonable and legal limits. Other procedural changes will help to keep communication expenses within budget.



*Team Building in Andasibe*

#### Office space

- Following the CAP project closeout, the layout of the main office in Antananarivo has been

reorganized to use only 1 ½ floors of the building for LDI. At the Fianarantsoa office, we have rented additional office space adjacent to the existing building that we are still sharing with the MIRAY team. This was a priority due overcrowding in the existing office. The computer network was extended to the new office and, after some glitches, is now working well. In addition, the sub-regional offices in Ambatondrazaka and Tsarahasina are fully operational as well as those at the CDIAs in Beforona and Miadana.

### Procurement

- Procurement is now complete with the arrival of camping equipment for the field agents, except for some specific communication and environmental education material.

### Training

- A one-day training session regarding contracts, agreements with partners, and purchase order procedures for the regional offices was held on October 13, 1999 by the intervention fund and administration staff.
- Computer training for LDI staff in use of Word, Excel and Power Point software was held in Antananarivo and at the regional offices.
- Our first teambuilding was held in Andasibe on October 27-29, 1999. It was a great success, providing the opportunity for most of our field staff to meet each other and come to a common vision of the challenges facing LDI.

### Semi-Annual financial information

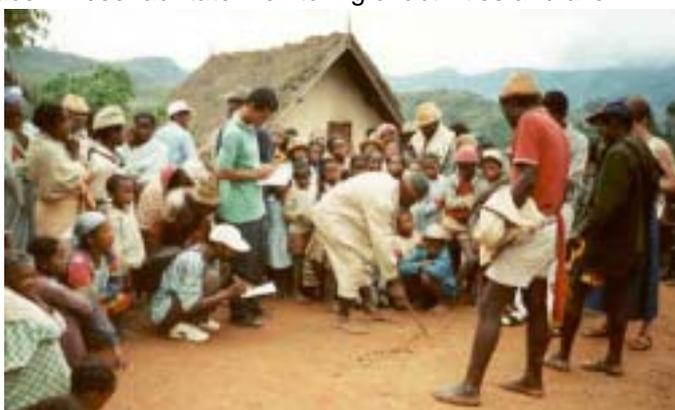
Here is the financial information as of December 31, 1999:

Project budget	\$13,395,149.00
Amount invoiced as of December 31, 1999	\$ 4,080,220.75
Funds remaining	\$ 9,314,928.25
Current obligated amount	\$ 6,600,000.00
Obligated funds remaining	\$ 2,519,779.00

#### 2.1.7 Monitoring and Evaluation

LDI started to set up the monitoring and evaluation system during the program planning period in the first six months of 1999. The system operates as follows:

- The monitoring and evaluation process began with a series of base-line studies to be used as reference for the evaluation of future impacts and changes. The analysis of this baseline source data will be available early in the year 2000.
- The system of monthly reports is well in place. These facilitate monitoring of activities and allow for timely decision-making.
- Sustainability of the M&E system has been established by encouraging the beneficiary farmers themselves to keep detailed records of their expenses and revenues. This data is used to assess LDI contractual indicators
- Systematic environmental impact evaluation of activities financed by LDI
- Acquisition, interpretation and analysis of satellite images and aerial photographs for monitoring tavy and vegetation cover in the LDI intervention zones are done in collaboration with PACT and PAGE.



*Discussion group : carrying out PRA/RRA in Fianarantsoa*



## 2.2 Fianarantsoa Region

### 2.2.1 Introduction

The regional strategy for LDI Fianarantsoa consists primarily of promoting the reduction of pressures on the forest corridor emanating from both the eastern and western sides of the approximately 160 km forest block reaching from the northern borders of the Ranomafana National Park to the southern tip of the Pic d'Ivohibé. To promote ecoregion-based conservation and development in this low-, mid-, and highland tropical forest ecoregion, LDI Fianarantsoa selected three representative SZIs: the northern corridor (Ranomafana National Park buffer zone), the central corridor composed of four sites (communes of Alatsinainy-lalamarina, Tolongoina, Ambohimahasina, Ikongo) and the southern corridor (communes of Sendrisoa and Miarinarivo).

LDI Fianarantsoa launched in cooperation with non-governmental associations like Tefy Saina, Malagasy Mahomby, MICET, CCD Namana many agricultural intensification, agroforestry, environmental education and community forest management activities in all SZI to reduce pressure on the forest corridor. While LDI Fianarantsoa is working with multiple partners to put in place effective forest management regimes, agricultural intensification activities, and conservation-based enterprises tremendous demographic pressures of roughly 3.1 % per year risk undermining in the long term many of our program activities. The initial case studies using rapid rural appraisal research methods conducted by LDI in the central corridor conclude that increased yields will not be able to keep pace with the increased demands for forest land caused by increases in family size unless some type of community-level reproductive health program is launched in each SZI. For this reason, LDI Fianarantsoa supports actively the USAID-funded Ministry of Health program to institute public health and reproductive health programs in our respective SZI. Through funding to MICET, the SO3 contractor JSI finances MICET, a LDI partner organization, to build community reproductive health programs in many of the remote villages served by LDI.

A range of improved agricultural technologies (SRI/SRA training accompanied by introduction of new rice varieties and composting, potato production, fish culture and beekeeping) has been introduced to increase agricultural productivity in various micro-ecologies within village territories. Packages of agricultural support activities, like a rural credit scheme, new centers for agricultural inputs, and initiatives to build and rehabilitate agricultural infrastructures like small dams and canals are being undertaken collaboratively with various donor funded projects (Japanese, UNDP/FAO, FID) and NGOs. Often LDI Fianarantsoa works with the AGERAS process to catalyze financial contributions from other donors in our strategic zones of intervention.



**Isalo : Infrastructure d'accueil, The Relais de la Reine Hotel**

LDI Fianarantsoa is working to establish community based resource management regimes in the buffer zone around Ranomafana National Park and in the central corridor through contracts and partnerships with CIFOR, the WWF Dette Nature/CAF project, and CCD Namana. Instituting new management arrangements for the forest corridor, a de facto open access regime, complements our strategy to promote the *gestion de terroir* orientation at the community level. Valuable pine and eucalyptus plantations are often situated within these village territories. Working with EASTA Iboaka and Peace Corps, training programs for sustainable harvesting of eucalyptus

plantations have been launched as a way to generate supplemental income from tree harvesting for rural communities. LDI Fianarantsoa also works closely with the regional forestry service (DIREF and

CIREF), the Swiss Cooperation and the InterCoopération Suisse to institute new management arrangements for the 34,000 hectares of pine plantations that parallel the forest corridor and to institute a participatory process for designing the government's regional forestry action plan.

LDI Fianarantsoa is working with the private sector to promote ecotourism around the Forêts de Zafimaniry and the National Parks of Ranomafana, Andringitra and Isalo through technical assistance to hotel owners and tour operators with the intention of increasing the quality and capacity of ecolodges and associated tourist activities.

Consultancies were carried out to plan hotel infrastructure development in the *zones d'investissements écotouristiques* of the Isalo National Park and at a site near Andringitra National Park. An in-depth socio-economic analysis of the ecotourism potential of the Sanahambo valley on the western flanks of Andringitra National Park was launched as a precursor to future interventions planned by LDI in this area of very high tourism potential. An expert-junior was seconded to WWF Andringitra to help a planning committee promote community-based ecotourism at the park. The conservation enterprise strategy at the village level is closely linked with the agricultural intensification component. For example, CCD Namana, a key partner in LDI's site Ambohimahasina, has trained 45 women in silkworm production; a very promising conservation based enterprise. LDI is currently investing considerable efforts with technical partners to provide training to rural associations interested in setting up honey production.



***Sericiculture, a very promising conservation enterprise activities. LDI has trained 45 women in silk production***

The environmental education and communication program for LDI Fianarantsoa is integrated into the regional communication plan conceived by a consortium of environmental and development organizations. LDI works closely with MICET to set up young people's Nature Clubs engaged in very practical environmental activities in LDI Fianarantsoa SZI. Films and theatrical representations are communication tools used to transmit messages about agricultural innovation, promising conservation enterprise activities, and sustainable resource management system and to raise public education. Through applied field research using rapid rural appraisal tools, LDI Fianarantsoa has also played a key role within the region to help articulate options and strategies of response to resource degradation in and along the forest corridor. The results of this applied research widely disseminated through our publications, posters, and seminars are being used by regional policy making actors to devise and articulate new resource management regimes and environmentally sound food production systems for communities living in and along the forest corridor.

LDI Fianarantsoa has very actively participated in reinforcing the institutional capacity building of key government and non-governmental partners. Classroom and practical training in PRA/RRA tools were conducted with staff from partner organizations to collect and analyze information in our SZI for use in planning and implementation of LDI programs. LDI worked closely with MIRAY, DIREF, ANGAP, WWF, MICET/ICTE to launch a rapid biological inventory of the forest corridor to generate biological information needed by policy makers to inform policy and planning decisions for the extensive forest resources reaching from Ranomafana National Park to the Pic d'Ivohibé. Several innovative protocols have been set up with government technical agencies like CIRAGRI, the *Service de Pêche*, and the *Service d'Élevage* to provide on-going technical assistance to LDI field staff and NGO partners. These protocols assure synergies between LDI program interventions and government policy and technical orientations.

This short overview describes briefly project interventions of the past 6 months. The program has successfully moved forward on a number of activities identified in the LDI work plan although technical and institutional constraints have been encountered in launching village level interventions. At the outset, our staff of 8 field agents encountered tremendous mistrust from rural communities long suspicious of external interventions. But with the introduction of small-scale and immediate interventions such as potato cultivation or training in bee keeping and pisciculture, our staffs are

rapidly building the confidence and support of rural communities. Negotiating performance-based contracts with non-governmental partners destined to carry out agricultural intensification and conservation-based enterprises has admittedly taken considerable time and effort. Above all, LDI Fianarantsoa and its partners have found that the greatest stresses on areas of high biodiversity are in those remote and peripheral areas of strategic zones of intervention far from roads and large villages. Working with very small villages in these remote areas is absolutely essential yet this taxes heavily the courageous and motivated staff of LDI Fianarantsoa and its partners. Villagers living in and along the forest corridor appreciate greatly the early initiatives launched by LDI and its partners through the AGERAS process, but even until now, considerable reticence and suspicions about the true intent of LDI Fianarantsoa remain.

## 2.2.2 Accomplishments within each Strategic Zone of Intervention (SZI)

The results achieved in each SZI in Fianarantsoa region are summarized in the following tables:

<b>SZI</b>	<b>Accomplishments</b>	<b>Partners</b>
<b>SZI North Corridor</b> Ranomafana	<b>Agricultural Intensification</b> Negotiation and signing of contract to provide extension services in SRI and <i>gestion de terroir</i> in 15 terroirs (750 villages) for 21 months	Association Tefy Saina
	<b>CBNRM</b> - Analysis of production system and commercialization of 4 medicinal and aromatic plants at Sahavoemba - Research studies on community-based forest management regimes conducted by 3 students	CIFOR  CIFOR, ESSA Forêt, Law Faculty in Fianarantsoa
	<b>Environmental Education</b> Creation and training on agricultural and environmental techniques of 3 Young Naturalist Clubs in Androy, Vohimena and Tsaratanana	MICET
	<b>Conservation enterprises</b> - <b>Domaine Nature</b> : Technical and Financial support to help build 20 new bungalows and improve existing facilities for this ecolodge located in the Ranomafana National Park - <b>Hotel Thermal</b> : In-depth discussions on rehabilitation and improvement of hotel leading to presentation of proposal for LDI interventions.	Cabinet JARY and Bureau d'étude Mamokatra
	<b>Capacity building</b> - Creation of an Environmental and Social Development Committee in Tsaratanana	MICET

<b>SZI Central Corridor</b> Alatsinainy-lalamarina Tolongoina Ambohimahamasina Ikongo	<b>Agricultural Intensification</b> <ul style="list-style-type: none"> <li>- Technical assistance of 68 villagers from 6 villages in potato cultivation and composting at Alatsinainy-lalamarina</li> <li>- SRA/SRI: Technical training and supplying of improved seeds, agricultural tools and organic and inorganic fertilizer to 85 families owning 3 ha of rice fields in 14 villages of Tolongoina, Ikongo and Alatsinainy-lalamarina.</li> <li>- Pisciculture training with 33 villagers from 7 villages of Tolongoina, Manampatrana, Alatsinainy-lalamarina.</li> <li>- Identification of support for reviving coffee by a consultant in 10 villages of Tolongoina.</li> <li>- Establishment of an agricultural inputs center at Alatsinainy-lalamarina</li> <li>- Feasibility study commenced for 2 small dams providing water to 330 ha of rice fields for almost 200 families in Ambohimahamasina and Alatsinainy-lalamarina.</li> <li>- Identification and preliminary study of activities and infrastructures to be financed by FID/PNUD/FAO: 4 roads and 10 small dams</li> </ul>	Malagasy Mahomby, MICET, EASTA Iboaka  DIREL Service Pêche, ONG Miraimahefa ODASE,  GRP  ANAE/FORAGE, AGERAS, CCD Namana FID, PNUD-MAG 97/008
	<b>CBNRM</b> <ul style="list-style-type: none"> <li>- Improved management of collective and individual eucalyptus plantations. Feasibility study in 3 villages of Ambohimahamasina.</li> <li>- Establishment of eucalyptus nurseries for collective reforestation of Tanety (almost 200ha) with 330 families in 11 villages of Alatsinainy-lalamarina, Tolongoina and Manakara.</li> </ul>	EASTA Iboaka, Peace Corps
	<b>Environmental Education</b> <ul style="list-style-type: none"> <li>- Training oriented on environmental themes and agricultural techniques for the 5 Young Naturalist Clubs (24 members) of the zone.</li> <li>- Identification of environmental fady (taboos)</li> <li>- Puppet show on agricultural intensification and forest protection themes in Alatsinainy-lalamarina</li> </ul>	MICET  AGECO
	<b>Conservation enterprises</b> <ul style="list-style-type: none"> <li>- Financial and material support for an apiculture extension project by 2 Kolo Harena of 69 families at Alatsinainy-lalamarina and Manakara.</li> <li>- Financial support for large-scale production and commercialization of essential oil extracted from 22000 ravintsara and cinnamon plants in Ikongo.</li> <li>- Training of 45 Ambohimahamasina women in silkworm production</li> </ul>	DIREL Service Apiculture  EPAM  CCD Namana
	<b>Capacity building</b> <ul style="list-style-type: none"> <li>- Organizational support of a group of apiculturists in Alatsinainy-lalamarina</li> <li>- Organizational reinforcement and formalization of 6 Kolo Harena</li> <li>- Creation of an Environment and Social Development Committee in Alatsinainy-lalamarina</li> </ul>	MICET  MICET

<b>SZI South Corridor</b> Sendrisoa Miarinarivo	<b>Agricultural Intensification</b> <ul style="list-style-type: none"> <li>- Training in compost preparation for 187 villagers of 19 Kolo Harena</li> <li>- Technical assistance in bean production totaling 2 ha with Kolo Harena associations in Sendrisoa</li> <li>- SRA/SRI: Training and supplying of improved seed and small materials to 45 villagers cultivators of 8.65 ha of rice fields in 9 villages</li> <li>- Cultivation of potatoes: variety test, technical assistance and supplying of seeds (for 60 are) to one Kolo Harena of Sendrisoa</li> <li>- Creation of coffee nurseries in view of a transplanting of 6000 seedlings</li> <li>- Establishing of an agricultural inputs center in Sendrisoa</li> <li>- Identification of activities and infrastructures to be financed by FID/PNUD/FAO: 5 small dams and one potable water duct</li> </ul>	FoFiFa, IRRI, Association Fanarenana CIRAGRI GRP FID, PNUD-MAG 97/008
	<b>CBNRM</b> <ul style="list-style-type: none"> <li>- Identification of natural forests areas to be managed by the MIORA association at Sendrisoa in collaboration with WWF and the Minister of Water and Forests.</li> <li>- Training and establishment of Eucalyptus plantations with 7 Kolo Harena in 8 villages.</li> </ul>	WWF and forestry service of Ambalavao
	<b>Environmental Education</b> Most environmental education activities in these sites have been launched previously by WWF and ANAE. The field agent carries out activities recommended through the regional communication plan.	
	<b>Conservation enterprises</b> <ul style="list-style-type: none"> <li>- Training in apiculture and construction of 36 improved hives with 2 Kolo Harena of Sendrisoa</li> </ul>	Tantely Soa
	<b>Capacity building</b> <ul style="list-style-type: none"> <li>- Creation and legal establishment of 14 Kolo Harena of 100 members</li> <li>- Organizational support for the establishment and reinforcement of the newly established <i>Comité de Développement Communal</i> (CDC) designed to link village development initiatives with plans designed at the commune level</li> </ul>	AGERAS

### 2.2.3 Accomplishments at the regional level

Regional level accomplishments in Fianarantsoa are presented in the following table:

<b>Regional Support</b>	<b>Agricultural Intensification</b> <ul style="list-style-type: none"> <li>- <b>TSM/OFIFA/CIRAGRI/FIFAMANOR/PNUD/ANAE/AFAFI:</b> Feasibility study for a certified potato seed bank</li> <li>- <b>GRP/EAM:</b> Elaboration of credit mechanisms and of contractual agreement for agricultural inputs supply center in the SZIs</li> <li>- <b>Cornell University/Association Tefy Saina:</b> Research on obstacles to adopting SRI by the villagers at a large scale by Chris Moser</li> <li>- <b>CIFAD/FOFIFA:</b> Applied research on agro-forestry and permaculture systems of the region by Leslie Ackerman</li> <li>- <b>Association Tefy Saina:</b> Negotiation for the establishment of an agora-forestry seed bank (indigenous trees)</li> <li>- <b>AUP Manakara:</b> Technical and material assistance in apiculture, pisciculture and reforestation of tanety.</li> <li>- <b>Rose de Bulgarie:</b> Discussions with exporters of Bulgarian Roses from Turkey to introduce the high value plant for production by Mac &amp; Frères on an experimental basis</li> </ul>
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<b>Regional Support (cont.)</b>	<p><b><u>Conservation Enterprises</u></b></p> <ul style="list-style-type: none"> <li>- <b>Relais de la Reine in Isalo:</b> Study on the extension of room capacity by 40 rooms</li> <li>- <b>Ecolodge Norms:</b> Initiation of hotel operators to the principles of ecolodge construction and ecotourism by Peter Ozolins</li> <li>- <b>Camp CATTa Tsaranoro:</b> Landscaping plan carried out by LDI consultant. Classroom training in RRA and field research focused on the analysis of socioeconomic impacts of ecotourism conducted by Karen Schoonmaker Freudenberger and a team in 2 fokontany around Camp Catta.</li> <li>- <b>FCE:</b> Research on the history of the FCE within the framework of an elaboration of ecotourism promotion tools along the railroad. Establishment of a FCE unit within LDI Fianarantsoa for 6 months to support the privatization of the railroad.</li> <li>- <b>Boisson:</b> Financial support for the elaboration of a credit demand for the launching of coffee, pepper, banana and pepper cultivation on 60 ha and exportation under the Bio label. The HB cabinet did the feasibility study and the environmental impact study of the project.</li> <li>- <b>Louvet:</b> Search for a partnership with Mr. Louvet for the exploitation of the coffee and banana of the Boisson plantation near Manakara and to promote ecotourism near the FoFiFa station at Kianjavato and in Anjilaila.</li> <li>- <b>Litchi nuts:</b> Engagement of a consultant to assist commercial operators involved in harvesting, conditioning, and exporting. Not totally successful due to severe drought in the coastal region</li> </ul>
	<p><b><u>Capacity building</u></b></p> <ul style="list-style-type: none"> <li>- <b>COPIL/RFPD (Regional Forestry Plan Director):</b> Material and institutional support including the secondment of an <i>expert-junior</i> for the accomplishment of the RFPD to transfer the managing of the Haute Matsiatra reforestation area to a new entity.</li> <li>- <b>RIR:</b> Establishment of a regional information network to aid the regional actors in acquiring information and data for decision making.</li> <li>- <b>AGERAS/CMP:</b> Elaboration of an agreement protocol on the harmonization of development projects in the region, on the institutional reinforcement of the CDCs and on the continual exchange of information.</li> <li>- <b>COPIL/WWF/MICET/ANGAP/MIRAY:</b> Financial and technical support for the rapid biological inventory in the corridor to furnish a scientific basis to sustainable resource management. The studies of two sites among 8 are completed.</li> <li>- <b>Applied research and professional training:</b> offered small stipends to students of the <b>EASTA Iboaka</b> (training villagers in agricultural techniques), the <b>ISTE</b> (study of the tourist guiding system in Andringitra), the <b>ESSA</b> (research on community management of forests and the bean-geranium culture association), <b>Cornell University</b> (study of SRI and the regional agroforestry system).</li> </ul>
	<p><b><u>Environmental Education/Communication</u></b></p> <ul style="list-style-type: none"> <li>- Regional IEC workshop: elaboration of common messages and regional communication action plan.</li> <li>- Filming of 2 films on the corridor and coffee cultivation; as well as on apiculture, pisciculture, and sericulture. Final edit of films being completed.</li> <li>- RRA/PRA case studies in 3 sites of the central corridor SZI with assistance to Peace Corps for conduct of a 4<sup>th</sup> case study in Sendrisoa</li> <li>- Large diffusion of the results of the Ikongo-Ambohimahamasina corridor crossing through publications and a poster, several workshops in Fianarantsoa and Antananarivo on the “<i>Corridor Coincé</i>” and numerous meetings on the implications of the research for rural development and conservation strategies.</li> <li>- Conference on aromatic plants, arboriculture and the management of natural resources with CHEF/SECALINE/PNLCP</li> <li>- Conference-debate on <i>gestion du terroir</i></li> <li>- Seminar in Fort Dauphin hosted by Lutheran missionaries on the role of rural pastors and churches in environment and development issues</li> </ul>

<b>Regional Support (cont.)</b>	<b>Isalo:</b> Support of the creation of the land reserve with the Cabinet JARY. Cabinet Performance conducted study on the ecological dynamics of the <i>Zone d'Investissement Écotouristique</i> as part of an environmental impact statement. Lalana NGO carried out for ANGAP a technical and organizational study prerequisite to the rehabilitation of the access routes towards the East of the park to be financed by the Japanese foreign assistance agency.
	<b>Andringitra:</b> Secondement of an <i>expert-junior</i> to assist the ecotouristic development steering committee of the zone. Meetings with the local community on deciding the zones to establish the lodgings and conducting ecotouristic activities around the Namoly valley.
	<b>Zafimaniry Forests:</b> Financial and technical support for the pre-identification of the limits of a planned community forest associated with the development of ecotourism activities in collaboration with the <i>Eaux et Forêts</i> service and private enterprises.

## CARTE Mahajanga

## 2.3 Mahajanga Region

### 2.3.1 Introduction

Although the Mahajanga region has only recently attracted attention regarding its biological resources, the region is rich in its biodiversity. The greatest part of the Malagasy dry forest is found here. In terms of biodiversity, one might cite the example of the Ankarafantsika protected forest complex, internationally renowned for its birds. 117 bird species have been identified, including several species of water birds, of which 66 are endemic. The fresh water turtle *Erymnochelys madagascariensis* has not been found outside the lakes of Ankarafantsika.

The Bongolava classified forest is also known for its wealth of floral species. The forest plays an important role in maintaining the ecological, and particularly the hydrological, balance between the dry Bongolava plateau and the neighboring agricultural lowlands in the Bemarivo River valley.

These 2 forest blocks are covering and protecting important water basins that capture rainwater, and promote infiltration, flows and distribution of water to the peripheral zones. Various hydrological studies have demonstrated their importance as water sources for the Mahajanga region. The advanced state of degradation in plant cover is a current concern. Deforestation also implies a loss of habitat and the loss of endemic plant and animal species. These forest systems are devastated annually by uncontrolled bush fires, many of which are started within the forest. The result is a discontinuous forest cover interrupted by numerous clearings created by repeated fires. Every year the clearings, populated by savanna grasses, are made larger by the fire, increasing the surface directly exposed to the forces of rain and soil erosion.

The deforestation of the water basins will have catastrophic consequences for the surrounding low-lying zones, which are among the most important agricultural regions in Madagascar (Marovoay Plain, Ambato-Boeni and the baibohos along the Bemarivo River from Mampikony to Port Bergé). The results to be expected include flooding in the rainy season dried up water sources in the dry season and silting up of dams, irrigation canals and rice paddies. As the dry forest disappears, the ever-growing demand for charcoal and lumber will force increased pressures on the mangroves that have been mostly spared so far.

LDI-Mahajanga in collaboration with various partners is focusing on activities that combat the fire pressure, illegal lumber exploitation, charcoal making and the clearing of forests for agricultural land, and in ways that will alleviate poverty, which is a primary cause for the degradation of the priority ecosystems in the region. These activities include: supporting key sub-sectors such as cashew nuts and fruit processing; intensification, diversification and integration of crop and livestock production systems; and creating formal village associations to assure the sustainability of the activities. The expected results are increased agricultural productivity and incomes, and reduced poverty and human pressures on the forest.

In addition to these activities, the initiation of environmental education and creation of fire control committees together with our development partners, village leaders and administrative institutions in the SZIs gives reason for hope that the fire threat can be reduced in the short and long term.

Nevertheless, in spite of the willingness of the target population to work with us, the continuing arrival of new immigrants, and the failure to apply existing laws, regulations and sanctions by responsible government agencies can compromise any and all efforts if not soon remedied. The return of the locusts of 1999 could also spell disaster if early and effective measures are not taken by the CNLA (national committee to combat locusts).



**Locusts descending on rice fields in Bevary village - Tsararano SZI in mid 1999**

### 2.3.2 Accomplishments within each Strategic Zone of Intervention (SZI)

The results achieved in each SZI in Mahajanga region are summarized in the following tables:

<b>SZI</b>	<b>Achievement</b>	<b>Partners</b>
<b>Tsararano</b> - Area : 300 Km2 - Population : 7810 - Density : 26 inhab./km2 - #Villages/hamlets : 60+ - #Fokontany : 7 - Ethnic composition: 15 groups with Antaisaka dominant.	<b><u>Agricultural Intensification</u></b> - Completed a study of the demand for agricultural mechanization in the villages of Betaramahamay, Bekalila and Bevary. - Completed technical and feasibility studies for a dam in Betaramahamay. - Identified 9 families from 5 Kolo Harena who will plant 225 ares as demonstration plots of improved varieties and practices for rice, peanuts, and cassava. - Identified and supplied seed to 70 families from 3 Kolo Harena who will plant cashew nut trees on a total of 52 ha, and who have already prepared 228 planting holes. - Identified and responded to the request of 60 families from 7 Kolo Harena for production input/equipment on credit, including : 1600 kg of rice seed, 375 kg of peanut seed, 100 kg of fertilizer, 11 plows, 14 metal harrows, 1 mechanical weeder, and 4 sets of cart wheels - Helped 7 interested women to form a Kolo Harena for vegetable production. - Prepared the application of manure on 3 ha of rice paddy. - Built a community granary with 60 tons rice storage capacity in the village of Bekalila. - Negotiated a contract with the NGO IPNR for the promotion of an adapted form of SRI called « maroanaka » in the SZI of Tsararano. - Began rehabilitation of an agricultural production input and equipment center in Tsararano village.	UFP student  NGO Lalana           IPNR   SAF/FJKM
	<b><u>CBNRM</u></b> - Sensitized the local population to create a Dina re: the management of fire and cutting of trees.	
	<b><u>Environmental Education</u></b> - Identified two schools volunteering to do reforestation this year.	
	<b><u>Reinforcement of partner capacity</u></b> - Created 7 Kolo Harena in 4 villages - Elaborated et pre-validated the statute and internal operating procedures and prepared the dossiers for formalization of the Kolo Harena - Signed a contract with EAM for training of Kolo Harena Bekalila members in management of a Community Granary.	EAM
<b>Ankazomborona</b> - Area : 1950 Km2 - Population : 22731 - Density : 11.6 inhab/km2 - #Villages/hamlets : 50+ - #Fokontany : 10 - Ethnic Composition: 17 groups with Tsimihety and Bara dominant.	<b><u>Agricultural Intensification</u></b> - Provided technical support for the plowing of 8 ha of rice paddies. - Identified 6 families from 3 Kolo Harena and 1 school who will plant 43 ares in demonstration plots of improved varieties and practices for rice. - Identified and responded to the request of 76 families from 5 Kolo Harena for production inputs on credit including 6366 kg of rice seed. - Negotiated a contract with IPNR to promote the adapted SRI system (maroanaka) in the village of Ambolodia. - Identified and supplied seed to families from 7 Kolo Harena who will plant 33 ha to cashew nut trees. - Contracted with the NGO MIKAJY to promote cashew nut tree planting in 3 other villages in the SZI of Ankazomborona, with a guarantee of 50 ha.	IPNR           ONG MIKAJY

<b>Ankazomborona (cont.)</b>	<b>CBNRM</b> <ul style="list-style-type: none"> <li>- Worked with 6 villages to elaborate an inter-community Dina to combat bush fires.</li> <li>- Submitted a dossier comprising internal operating rules and specifications approved by the general assembly to the Commune authorities.</li> </ul>	CI CI
	<b>Reinforcement of partner capacity</b> <ul style="list-style-type: none"> <li>- Created 7 Kolo Harena in 7 villages</li> <li>- Elaborated et pre-validated the statute and internal operating procedures and prepared the dossiers for formalization of the Kolo Harena</li> <li>- Trained the Kolo Harena on the internal operating rules of an association, and roles and responsibilities of officers.</li> </ul>	BEST
<b>Ankijabe</b> - Area : 600 Km2 - Population : 6618 - Density : 11 inhab/km2 - #Villages/hamlets : 47+ - #Fokontany : 8 - Ethnic Composition: 9 groups with Sakalava dominant.	<b>Agricultural Intensification</b> <ul style="list-style-type: none"> <li>- Identified 9 families who will plant 225 ares in demonstration plots of improved varieties and practices for rice, maize and peanuts.</li> <li>- Set up a demonstration plot to multiply azola and show its soil fertilizing effects.</li> <li>- Recorded the number of traction animals (oxen) in 8 villages.</li> <li>- Identified and supplied seed to 70 families from 3 Kolo Harena and a school who will plant 49 ha to cashew nut trees.</li> <li>- Pegged out 750 meters of contour lines that will be planted to vetiver when the rains start to control soil erosion.</li> <li>- Supplied seed and training to FENU/PDRAB agents who will assist members of their associations to plant 32 ha of cashew nut trees.</li> <li>- Identified and responded to the requests of 52 families from 8 Kolo Harena for agricultural input/equipment on credit, including: 510 kg of rice seed, 750 kg of peanut seed, 20 plows, 5 metal harrows, 1 mechanical weeder, 10 sets of ox-cart wheels, 1 ox-cart bed, and 2 backpack sprayers.</li> <li>- Created an Agricultural Input and Equipment Supply Center at Andranofasika.</li> </ul>	FENU SAF/FJKM SAF/FJKM
	<b>CBNRM</b> <ul style="list-style-type: none"> <li>- Helped 4 village communities to elaborate a Dina for the rational management of 24 ha of raffia</li> <li>- Created a committee to combat bush fires.</li> </ul>	CI CI
	<b>Environmental Education</b> <ul style="list-style-type: none"> <li>- Organized periodic consciousness raising meetings of associations in the zone on the destructive effects of uncontrolled fires, under the leadership of the committee to combat bush fires.</li> <li>- Trained teachers and students at 2 schools on reforestation.</li> <li>- Distributed 100 copies of the book « Ny Voaary » in the schools.</li> <li>- Organized 8 video projection sessions in the 2 schools on the themes « bush fires, charcoal making, slash and burn agriculture and reforestation »</li> </ul>	CCEE CCEE CCEE
	<b>Conservation enterprises</b> <ul style="list-style-type: none"> <li>- Provided technical assistance to the Vonona women's fruit drying Association increasing production from 80 to 200 kg/month.</li> <li>- Created a Kolo Harena for bee keeping.</li> </ul>	CI
	<b>Reinforcement of partner capacity</b> <ul style="list-style-type: none"> <li>- Trained 5 FENU agents, 3 MIKAJY agents, 1 E&amp;F agent and PLAE agent, and unnumbered Kolo Harena members in cashew nut planting techniques.</li> <li>- Created 10 Kolo Harena in 10 villages.</li> </ul>	FoFiFa

<b>Tsarahasina</b> - Area : 922 Km2 - Population : 13.165 - Density : 14,3 inhab/km2 - <b>#Villages/hamlets : 47</b> - #Fokontany : 7 - Ethnic Composition : 15 groups with Tsimihety dominant	<b><u>Agricultural Intensification</u></b> - Identified 88 families who will plant 62 ha of cashew nut trees. - Identified 9 families from 4 Kolo Harena who will plant 193 ares in demonstration plots of improved varieties and practices for rice, peanuts, maize and cassava. - Completed a technical feasibility study for the rehabilitation of a dam and canals in the village of Bemololo. - Transmitted the results of the study and a request for funding to FID. - Collected and forwarded requests for funding of various infrastructure development (wells, dams, etc) from 5 villages to FID.	GENIE RURAL  FID
	<b><u>CBNRM</u></b> - Organized a sensitization session on GELOSE. - Helped the community of Marosely to elaborate the internal operating rules for the CLB. - Created a CLB at Marosely. - Demarcated the forest to be managed under a GPF contract. - Re-activated the committee to combat bush fires in the village of Bemololo	CANFORET MIRAY ODAI
	<b><u>Conservation enterprises</u></b> - Completed a study on the potential for tilapia production and fishing in lakes in the commune of Tsarahasina	CABINET EDEN
	<b><u>Reinforcement of partner capacity</u></b> - Created 6 Kolo Harena. - Participated in the GTDR workshop for the Sofia region. - Participated in the regional planning workshop for Sofia. - Participated in the ODAI workshop on the creation of relay structures to assure sustainability of development activities initiated by ODAI. - Trained ODAI agents in GELOSE - Trained the Kolo Harena on the internal operating rules of an association, and roles and responsibilities of officers.	ODAI ANAE ODAI  BEST

### 2.3.3 Accomplishments at the regional level

Regional level accomplishments in Mahajanga region are presented in the following table:

Regional support	<b><u>Agricultural Intensification</u></b>	
	<ul style="list-style-type: none"> <li>- Signed a cooperative agreement with FENU/PDRAB</li> <li>- Signed a cooperative agreement with ODAI</li> <li>- Prepared a draft cooperative agreement that is being finalized for signature.</li> <li>- Signed an agreement with FoFiFa for the creation of a 20 ha Center for Agricultural Intensification (CDIA) on the FOFIFA-Miadana Research Station.</li> <li>- Prepared and implemented a development plan for the CDIA including: construction of 2 wells, restoration of 4 buildings, construction of a model farmer's hut and oxen stable, installation of a tree nursery, preparation land for rice paddies, and rain-fed crops (maize, cassava, peanuts, hibiscus, combava, cashew nuts, and fruit trees) and for a wooded area (eucalyptus and a variety of acacias).</li> <li>- Collaborated with the Ministry of Livestock in carrying out a diagnostic study of linkages between livestock intensification and reduction of fire pressures on the dry forest. This was followed by a workshop at the CDIA on the results of the study attended by development partners and herders from the SZI's</li> <li>- Completed a study of effective methods for diffusing new agricultural practices among farmers in SZIs, followed by a workshop on the same theme attended by partners from other LDI regions</li> <li>- Completed a study of agricultural intensification and the identification of promising conservation enterprise themes.</li> <li>- Collaborated with ANAE in creating 2 Reference Sites for agricultural intensification practices for upland (tanety) crops.</li> <li>- <u>Credit</u>: Signed a cooperative agreement and a sub-grant with the NGO SAF/FJKM for the creation of 2 Agricultural input/equipment supply stores to provide production inputs and equipment to Kolo Harena on credit.</li> </ul>	<p>FENU ODAI CI</p> <p>FoFiFa</p> <p>FoFiFa</p> <p>MINISTRY OF LIVESTOCK</p> <p>ESSA/AGRO</p> <p>ESSA/AGRO</p> <p>ANAE</p> <p>SAF/FJKM</p>
	<p><b><u>CBNRM</u></b></p> <ul style="list-style-type: none"> <li>- Supported a training workshop in GELOSE for all regional organizations interested in CBNRM activities</li> <li>- Provided technical support in the elaboration of the dossiers to transfer management of 200 ha of the Anosimijoro forest to 2 associations of charcoal makers.</li> </ul>	<p>ONE</p> <p>DIREF</p>
	<p><b><u>Environmental Education</u></b></p> <ul style="list-style-type: none"> <li>- Elaborated a budget with MIRAY for the implementation of the activities planned as part of the Mahajanga regional environmental communications strategy during a workshop held in August.</li> <li>- Signed a 9-month contract with Ressources Vertes for the environmental education of Kolo Harena in all 4 SZIs.</li> </ul>	<p>MIRAY</p> <p>RESSOURCE VERTE</p>

<b>Regional support (cont.)</b>	<p><b><u>Conservation enterprises</u></b></p> <p><b><u>Cashew nuts :</u></b></p> <ul style="list-style-type: none"> <li>- Organized a round table on intensification of cashew production in the region.</li> <li>- Organized a second round table to report progress on activities planned during the 1st round table, and to create a «Cashew Club» of interested players in the sub-sector.</li> <li>- Coordinated the participation of Malagasy players in a USAID organized cashew study tour to Mozambique and Tanzania.</li> <li>- Imported seed of improved cashew varieties from Tanzania and Mozambique and set up evaluation trials at FOFIFA-Miadana.</li> <li>- Distributed 200 kg of cashew seed to ANAE for planting by members of 19 farmer associations in Mahajamba.</li> </ul> <p><b><u>Tilapia :</u></b></p> <ul style="list-style-type: none"> <li>- Completed a study of tilapia production potential of lakes in Tsarahasina SZI, done by the consulting firm BCPA.</li> </ul> <p><b><u>Fruit :</u></b></p> <ul style="list-style-type: none"> <li>- Completed a study on location, quantity and timing of fruit supplies in Mahajanga region, done by the consulting firm EDEN.</li> <li>- Started a study of local (national) demand for fruit juices, being done by the consulting firm IDC.</li> </ul> <p><b><u>Raphia :</u></b></p> <ul style="list-style-type: none"> <li>- Prepared Terms of Reference and identified a consulting firm (Rconseil) for a study to analyze the raphia sub-sector and define a strategy for LDI.</li> </ul> <p><b><u>Energy :</u></b></p> <ul style="list-style-type: none"> <li>- Prepared the terms of reference, and in the process of selecting a consultant/firm to carry out a study of potential urban consumers of gas and kerosene and to propose an LDI strategy for the promotion of one or both of these alternative energy sources to charcoal.</li> </ul> <p><b><u>Ecotourism :</u></b></p> <p>Completed a study of the potential of the Anjohibe caves as an eco-tourism attraction, done by the consulting firm GLW Conseil.</p>	<p>FoFiFa, AQUALMA, MUST FoFiFa, AQUALMA FoFiFa, AQUALMA FoFiFa, AQUALMA</p> <p>ANAE</p> <p>MALAGASY SEAFOOD TRADING COMPANY KARMALY/KAL FANE</p> <p>EXOFRUITMAD</p> <p>GIT-BOINA</p>
	<p><b><u>Reinforcement of partner capacity</u></b></p> <ul style="list-style-type: none"> <li>- Provided material and organizational support to the Inter-Regional Director for the Environment.</li> <li>- Provided organizational support for the installation of the AGERAS CTA for Mahajanga.</li> <li>- Co-sponsored the organization of the regional communications strategy workshop (12-13 August).</li> <li>- Participated in the International Day of the Environment in Mahajanga.</li> <li>- Trained SAF/FJKM in accounting and management of an agricultural input supply store.</li> <li>- Provided Experts Juniors to : <ul style="list-style-type: none"> <li>- TransExport : to manage a mango orchard and transfer the mango variety collection to CDIA Miadana</li> <li>- SAF/FJKM: to manage 2 agricultural input supply stores.</li> <li>- SAF/FJKM: to manage a seed multiplication farm.</li> <li>- Charcoal maker association in Amboromaika on the Bekobay Road : to provide technical assistance in agricultural intensification and in acquiring management rights to a part of the Anosimijoro forest</li> <li>- Vonona: to provide technical assistance in managing a fruit drying operation.</li> </ul> </li> </ul>	<p>CI MIRAY GIT</p> <p>SAF/FJKM</p> <p>SOA-TEG</p>

## 2.4 Moramanga Région

### 2.4.1 Introduction

Whether working within peripheral zones around protected areas or on a larger landscape scale, the strategies are similar—to create economic incentives and social dynamics that will reverse present trends toward deforestation and loss of biodiversity. It is essential to raise productivity in the lowland areas that have more fertile land and more economic possibilities, while at the same time stopping the spread of shifting agriculture and the use of burning in upland areas.

In the Moramanga region, there is need to raise the yields of rice grown in lowland areas that have water control and to promote other forms of intensified agriculture and conservation enterprises. In upland areas, agroforestry that integrates trees and other perennials with annual crops can offer good alternatives to slash-and-burn, stabilizing both the soils and the area cultivated. Farmer-centered research and extension methods and community-based land use planning and management are key means for promoting these changes in agriculture and natural resource management. Institutional and infrastructure improvements are also part of this strategy.



***Burning primary tavy, located at the edge of the corridor in the East Fenerive area***

The enthusiasm of farmers in our strategic zones of intervention to be part of our Kolo Harena farmer associations has been overwhelming and may even prove to be an obstacle for our field agent. In fact, Kolo Harena membership is four to five times greater than expected, and our field agents are operating at their maximum to support these farmers as best they can. Due to this, we have been trying to collaborate with the public sectors technical services as much as possible, but have found considerable resistance on their behalf because of remunerative issues.

Up to this point, due to a lack of agricultural extension and infrastructure, we have been orienting our support towards technical training and material assistance but this is alone will not a guarantee sustainable adoption of intensified agricultural techniques, or poverty reduction. For the future, our intention is to capitalize on and promote social capital in rural areas, helping farmers develop a sense of ownership and responsibility for the protection of their natural resource base.



***SRI: potential technique to increase rice production***

The most notable activity in this area is the farmer managed farm supply centers that are operating in all four strategic zones of intervention. Farmers have congratulated us on this initiative that allows them access to previously unavailable farm inputs. They also are very excited about our collaborative effort with OTIV to provide them with rural credit. Both of these activities, for the first time in many years, allow them the economic freedom to choose agricultural intensification rather than the traditional itinerant agricultural system.

## 2.4.2 Accomplishments within each Strategic Zone of Interventions (SZI)

The results achieved in each SZI in Moramanga region are summarized in the following tables

Strategic Zone of Intervention	Achievement	Partners
<b>Beforona</b>	<p><b><u>Agricultural Intensification</u></b></p> <ul style="list-style-type: none"> <li>- Financial and technical support provided to 4 Kolo Harena for the construction of 4 Community Granaries.</li> <li>- Provided market garden technical training to 28 families.</li> <li>- Provided training to 31 families on fishpond construction and management technique</li> <li>- Provided training on beekeeping techniques and hive construction for LDI field staff and 3 Kolo Harena.</li> <li>- Provided training on pork animal husbandry for LDI field agents, SAF/FJKM field agents and 20 families.</li> <li>- Provided technical and financial support for the creation of 2 village propagation centers.</li> <li>- Provided training on designing and managing an improved Tanimboly system for 35 families</li> <li>- Provided training on SRA techniques for 2 KH</li> <li>- Provided training on the system of organic production of Ginger as cash crop for 9 KH.</li> <li>- Acquired and distributed 6001 Kg of improved ginger seed for KH.</li> <li>- Installed a 1.85 Ha on farm demonstration for organic ginger production.</li> <li>- Installed 5 on farm demonstration and test sites for SRI with 5 Kolo Harena.</li> <li>- Helped Kolo Harena acquire 6 tons of manure for organic ginger production.</li> <li>- Negotiated and signed a contract for the supply of 100,000 Robusta coffee plants and training for 17 Kolo Harena.</li> </ul>	<p>ONG Ramilamina</p> <p>CIRAGRI BEMA</p> <p>EEOM</p> <p>Exploitation Agricole d'Ambalambe</p>
	<p><b><u>CBNRM</u></b></p> <ul style="list-style-type: none"> <li>- Provided financial and technical support for a PRA done in collaboration for community based management of a 20 Ha forest.</li> <li>- Provided financial and technical support to Phael Flor in setting up a community based management scheme for 500 Ha of lowland rainforest.</li> </ul>	<p>MIRAY, AGERAS, CRD ONG Lalana</p>
	<p><b><u>Environmental Education</u></b></p> <ul style="list-style-type: none"> <li>- Organized periodic consciousness raising meetings of Kolo Harena in the zone on the destructiveness of Tavy.</li> <li>- Provided training to 32 families in Ambatoharanana on the water cycle and how it relates to forest cover.</li> <li>- Designed in collaboration with farmers groups and partners a Rural Radio program for the Zone.</li> <li>- Acquired the necessary radio equipment to put in to place the rural radio studio for the zone.</li> <li>- Created with the help of farmers a reforestation nursery and provided management training for the KH in Maromitety.</li> <li>- Provided training for 10 Kolo Harena on anti-erosive and fertilization techniques using leguminous plants.</li> </ul>	<p>BEMA, Médiastop Swiss Cooperation BEMA ADRA</p>

<b>Beforona (cont.)</b>	<u><b>Conservation enterprises</b></u> <ul style="list-style-type: none"> <li>- Completed a study on the potential for streamlining the marketing chain for bananas in the zone.</li> <li>- Technical support provided to <b>FITAMIHAVO</b> for improvement of their fruit drying operation.</li> <li>- Conducted meetings with <b>BIOSAVE</b> to look at the possibility of collaborating with them on the regeneration of Ravensara.</li> <li>- Provided technical support to <b>Phael Flor</b> for the preparation of financial documents, feasibility and environmental impact studies and business plan for cinnamon production.</li> </ul>	Cartier FITAMIHAVO
	<u><b>Reinforcement of Partner Capacity</b></u> <ul style="list-style-type: none"> <li>- Organized and participated in a feasibility study tour for the construction of an earthen dams for 1 KH.</li> <li>- Provided financial and technical support for the creation of a farmer owned and operated agricultural input and supply center at the CDIA in Beforona.</li> <li>- Held monthly steering committee meetings for the CDIA in Beforona.</li> <li>- Organized a PRA in Ambatoharanana and produced a final report.</li> <li>- Held LDI information sessions in 16 villages in the zone.</li> <li>- Elaborated and pre-validated the statutes and internal operating procedures and helped prepare the documents for the formalization for 17 Kolo Harena.</li> <li>- Assisted 2 Kolo Harena in the preparation of documents to submit to FID for financial assistance with construction of local infrastructures.</li> <li>- Provided management training for the farmer operated agricultural supply center.</li> <li>- Organized information sessions for access to rural credit.</li> </ul>	MIRAY, AGERAS, SAF/FJKM BEST  BEST  OTIV
<b>Lac Alaotra</b>	<u><b>Agricultural Intensification</b></u> <ul style="list-style-type: none"> <li>- Provided market garden technical training for 57 families.</li> <li>- Provided SRI/SRA training to 128 families who are practicing either SRI or SRA on 143.5 Ha in the zone.</li> <li>- Conducted soil fertility analysis for the zone.</li> <li>- Conducted small animal husbandry survey for the zone.</li> <li>- Installed with 83 farmers 9 propagation centers for forest tree species and established a management plan for the production of 16,000 forest and fruit trees.</li> <li>- Provided training and technical advise in the construction and management of fishponds for the 2 Kolo Harena.</li> <li>- Helped 1 KH construct a demonstration fishpond</li> </ul>	IRRI  FoFiFa
	<u><b>CBNRM</b></u> <ul style="list-style-type: none"> <li>- Organized a 3-day GELOSE workshop for representatives of the lakeside communities, local authorities and decentralized public services to foster a better understanding of the process.</li> <li>- Negotiated with local authorities for 5 Kolo Harena to have the right to manage their lake based natural resources.</li> <li>- Negotiated a contract with CIREF for assistance to the Kolo Harena in elaborating their individual NR management plans and development of their management skills.</li> <li>- Assisted in replanting 1.75 Ha of marsh with the 5 Kolo Harena.</li> </ul>	ONE/GELOSE  CIRPECHE, CIREF, TOPO DURRELL, DOMAINE CIREF
	<u><b>Environmental Education</b></u> <ul style="list-style-type: none"> <li>- Financially and technically supported “Fety ny Zetra” celebrations (40 primary and secondary schools).</li> <li>- Organized periodic consciousness raising meetings of Kolo Harena in the zone on the destructive effects of burning the marshes</li> </ul>	DURELL

<b>Lac Alaotra (cont.)</b>	<b><u>Conservation enterprises</u></b> - Contacted potential buyer for traditional weavers and sent examples of product for evaluation and possible purchase to La Réunion	
	<b><u>Reinforcement of partners capacity</u></b> - Organized and participated in a PRA analysis for the zone and produced a final report. - Elaborated and pre-validated the statutes and internal operating procedures and helped prepare the documents for the formalization for 5 Kolo Harena. - Formalized 5 Kolo Harena in the zone. - Provided financial and technical support for the creation of a farmer owned and operated agricultural input and supply center. - Provided management training for the farmer operated agricultural supply center. - Identified and responded to an expressed need of a KH for household record keeping and budgeting training. - Assisted to 2 Kolo Harena in the preparation of documents to submit to FID for financial assistance with construction of local infrastructures. - Organized information sessions for access to rural credit and facilitated access to 83.337.500 Fmg for 100 beneficiaries.	AGERAS, ANAE BEST  BEST  OTIV
<b>Antanandava</b>	<b><u>Agricultural Intensification</u></b> - Provided market garden training to 35 families. - Collected field soil samples for fertility analysis in the zone. - Collected livestock data to be used in planning future interventions with Kolo Harena. - Provided training on compost production and utilization for 69 families that produced 9,800 m <sup>3</sup> of improved compost. - Provided agroforestry seed-bank management and plant propagation training for Kolo Harena. - Provided technical and financial support to a KH for the creation of 1 village propagation center.	FoFiFa  SNGF
	<b><u>CBNRM</u></b>	
	<b><u>Environmental Education</u></b> - Organized periodic consciousness raising meetings of Kolo Harena in the zone on the destructiveness of burning for pasture regeneration. - Provide formal training to Kolo Harena on water cycle, causes of soil erosion and ways to prevent it.	
	<b><u>Conservation enterprises</u></b> - Provided financial and technical support for 2 training to improve the capacity of women's groups to manage community campgrounds and the Zahamena National Park.	C.I. Zahamena, Peace Corps

<b>Antanandava (cont.)</b>	<u><b>Reinforcement of partners capacity</b></u> <ul style="list-style-type: none"> <li>- Organized and participated in a PRA analysis for the zone and produced a final report.</li> <li>- Elaborated and pre-validated the statutes and internal operating procedures and helped prepare the documents for the formalization for 6 Kolo Harena.</li> <li>- Provided financial and technical support for the creation of a farmer owned and operated agricultural input and supply center.</li> <li>- Provided management training for the farmer operated agricultural supply center.</li> <li>- Identified and responded to an expressed need of a KH for household record keeping and budgeting training.</li> <li>- Assisted to 2 Kolo Harena in the preparation of documents to submit to FID for financial assistance with construction of local infrastructures.</li> <li>- Organized information sessions for access to rural credit and facilitated access to 27.500.000 Fmg for 43 beneficiaries</li> <li>- Organized and participated in workshop designed to strengthen collaborative efforts in the zone concerning upland agricultural intensification.</li> <li>- Organized and participated in fields visit with MINENV and partners in the zone.</li> </ul>	<p>BEST</p> <p>OTIV</p> <p>ANAE, TAFA</p> <p>MINENV</p>
<b>Ambatovy</b>	<u><b>Agricultural Intensification</b></u> <ul style="list-style-type: none"> <li>- Provided technical assistance in setting up a demonstration for an “étable fumière”.</li> <li>- Provided technical assistance in setting up compost demonstration and production of 2m<sup>3</sup> of improved compost.</li> <li>- Provided market garden training to 25 families.</li> <li>- Provided technical assistance and training for construction and management of improved beehives for 7 families.</li> <li>- Provide technical assistance and training on SRA techniques for 65 families cultivating 11.5 Ha.</li> <li>- Provided technical assistance in setting up 1 on-farm demonstration plot of SRI techniques.</li> <li>- Creation of a non-formal farmers association for the revival of coffee production in the zone.</li> <li>- Negotiated and signed a contract for the supply of 100,000 Arabica coffee plants and training for Kolo Harena in the zone.</li> <li>- Installed a plant propagation center in Ampitambe and provided training on management techniques for the KH.</li> <li>- Provided training on improved manioc cultivation techniques for 16 families on 4 Ha.</li> <li>- Collected field soil samples for fertility analysis in the zone.</li> <li>- Conducted feasibility study for the rehabilitation of 2 irrigation systems benefiting 50 families in the zone.</li> <li>- Negotiated with Phelps Dodge Madagascar a Memorandum of Understanding for financing \$ 23,000 of LDI's work in the zone.</li> <li>- Provided training on the BRF production and utilization techniques for 1 KH.</li> <li>- Provided training on improved upland cultivation techniques for Kolo Harena in the zone.</li> <li>- Provided training on small animal husbandry techniques to Kolo Harena in the zone.</li> </ul> <u><b>CBNRM</b></u> <ul style="list-style-type: none"> <li>- Provide technical assistance and training for the creation of a <i>Prunus Africanum</i> propagation center to produce 3,000 seedlings for creation of a community managed buffer zone.</li> </ul>	<p>CIRAGRI</p> <p>FoFiFa</p> <p>CJPM</p> <p>ONG Ramilamina</p> <p>PRONATEX</p>

<b>Ambatovy (cont.)</b>	<b><u>Environmental Education</u></b> <ul style="list-style-type: none"> <li>- Designed with school directors a program of environmental education to be integrated into the primary and private schools systems in the zone.</li> </ul>	
	<b><u>Conservation enterprises</u></b> <ul style="list-style-type: none"> <li>- Technical support and training for 1 KH and 1 NGO for the creation of 2 BRF production micro-enterprises</li> </ul>	VOLISOA
	<b><u>Reinforcement of partner capacity</u></b> <ul style="list-style-type: none"> <li>- Organized and participated in a PRA analysis for the zone and produced a final report.</li> <li>- Elaborated and pre-validated the statutes and internal operating procedures and helped prepare documents and formalize 6 Kolo Harena (51 members).</li> <li>- Provided financial and technical support for the creation of a farmer owned and operated agricultural input and supply center.</li> <li>- Provided management training for the farmer operated agricultural supply center.</li> <li>- Identified and responded to an expressed need of a KH for household record keeping and budgeting training.</li> <li>- Assisted to 2 Kolo Harena in the preparation of documents to submit to FID for financial assistance with construction of local infrastructures.</li> </ul>	BEST

### 2.4.3 Accomplishments at the regional level

Regional level accomplishments in Moramanga region are presented in the following table:

<b>Regional support</b>	<b><u>Agricultural Intensification</u></b> <ul style="list-style-type: none"> <li>- Signed a cooperative agreement with MINAGRI</li> <li>- Signed a cooperative agreement with MPE</li> <li>- Signed a cooperative agreement with MINEL</li> <li>- Signed a cooperative agreement with FoFiFa</li> <li>- Signed a cooperative agreement with FoFiFa for the creation of a 10 Ha Center for the Diffusion of Agricultural Intensification (CDIA) on the FoFiFa Beforona research station.</li> <li>- Prepared and implemented a rehabilitation plan for the CDIA including: rehabilitation of 7 buildings, rehabilitation of 1.5 Km of access road for the CDIA, construction of a training room (50 person capacity), construction of model oxen stable, fishpond and fruit tree nursery, installation of bio-intensive market garden, intensive feed garden, pork and chicken production systems, improved Tanimboly, SRI, SRA, off-season cropping and compost demonstrations.</li> <li>- Completed a study of regional agricultural intensification potential and organized a workshop for LDI partners in the region.</li> <li>- Established a network farmer owned and operated farm supply centers in the region.</li> <li>- Created a network of 60 farmer associations in the region totaling over 650 members.</li> <li>- Created a system of rural credit acquisition for farmer associations in LDI's strategic zones of intervention.</li> </ul>	MINAGRI MPE MINEL FoFiFa FoFiFa,BEMA
	<b><u>CBNRM</u></b> <ul style="list-style-type: none"> <li>- Financially supported and organized a GELOSE training workshop for all regional organizations interested in CBNRM activities.</li> </ul>	BEST BEST OTIV  ONE/GELOSE

<b>Regional support (cont.)</b>	<b><u>Environmental Education</u></b> <ul style="list-style-type: none"> <li>- Financially supported and organized a regional IEC workshop.</li> <li>- Elaborated a budget with MIRAY for the implementation of the regional IEC activities.</li> <li>- Financial and technical support to the creation and implementation of an environmental and development information center in Moramanga (CIM).</li> <li>- Assisted in planning of activities of PE II actors for the CPSE Moramanga.</li> <li>- Provided financially support to environmental education training of 200 teachers.</li> </ul>	MIRAY, ADRA, AGERAS, CIM MIRAY  MIRAY, CITE   DURRELL
	<b><u>Conservation enterprises</u></b> <ul style="list-style-type: none"> <li>- Financially supported and organized a series of sub-regional workshops and a regional workshop to define a regional vision for the development of ecotourism.</li> <li>- Organized a regional visit for the Herb Research Foundation to examine essential oil production potentials in the region.</li> <li>- Negotiated and signed a contract with MacDo/Exploitation Agricole d' Analabe for the re-introduction of coffee production in the region.</li> </ul>	MIRAY, CI   Exploitation agricole d'Ambalabe
	<b><u>Reinforcement of partner capacity</u></b> <ul style="list-style-type: none"> <li>- Participated in the International Day for the Environment.</li> <li>- Provided an Expert Junior to Phelps-Dodge.</li> <li>- Participated in Regional Development Committee (CRD) meetings to strengthen collaboration and better organize development activities in the region.</li> <li>- Financially and technically supported research by 4 graduate students from Cornell University (see annex 1 for description and conclusions of research)</li> <li>- Financially and technically supported research and thesis production for 4 Malagasy university students on the following themes: SRI, small-scale animal husbandry and compost production.</li> <li>- Recruited and technically advised a team to do a forest use study for Phelps-Dodge.</li> </ul>	SOATEG AGERAS  Cornell University  ESSA/AGRO  MICET

### **Collaborative research efforts with Cornell University**

Four graduate students from Cornell University carried out research in the following areas relevant to environmental pressures in the Moramanga region. Please see Annex 1 for summary results of these studies.

- § Evaluation of the domestication potential of useful woody rainforest species in the Eastern region of Madagascar - Erika Styger
- § The potential for the future propagation work via the Center for Propagation in Beforona - Ben Niemark
- § Preservation and Propagation of *Prunus Africana* (Pygeum) - Bryan Dailey
- § Constraints to adoption of the system of rice intensification – Christine Moser



***The Center for Propagation in Beforona :  
Aménagement de terroir »***

### 3. PERFORMANCE ANALYSIS

#### 3.1 Region Qualitative Analysis of Results

##### Fianarantsoa

##### **SOUTHERN CORRIDOR: Ranomafana national park buffer zone**

During the fast-track phase, the Association Tefy Saina conducted research to determine yields and rates of adoption of SRI in 17 villages. This applied research, along with the master's degree field research led by Chris Moser of Cornell University, showed that rates of adoption of SRI are intimately associated with such factors as water control, labor availability, and access to soil fertility amendments. This research suggests that wealthier members of rural communities are more likely to adopt SRI than poorer social categories.



***Working with entrepreneurs to improve the quality of ecotourism facilities like ecolodges***

These implications have profound and disturbing ramifications for LDI agricultural intensification strategies. Even though the long contractual negotiations with our partners delayed the commencement of project activities in this zone, the new partnership agreements with Tefy Saina and FFF Malagasy Mahomby will create the foundations for promoting agricultural intensification in the buffer zone communities around Ranomafana National Park. Our partners will accomplish this by concentrating a package of agricultural

intensification and conservation-based enterprise activities in zones exerting high pressure on the corridor and the eastern and western flanks of the national park.

The LDI Fianarantsoa program works closely with CIFOR to build upon a series of aromatic and medicinal plants initiatives launched initially during PE1. CIFOR is working with CANARPS, medicinal plant entrepreneurs and the local communities to develop new market opportunities for medicinal plants found in the buffer zones of Ranomafana National Park but also for medicinal plants grown in fallow fields. To complement this initiative LDI is financing a consultancy to determine the economic costs and benefits of medicinal plant development around four species.

The LDI regional programs seek to rehabilitate existing hotels around Ranomafana National Park. For example, the program financed two technical studies for the Hotel Domaine Nature and others are planned for other hotels. LDI continues to encourage future investors, local promoters in particular, to practice an ecotourism sensitive to the well being of the physical environment and the communities of the region.

##### **CENTRAL CORRIDOR**

##### **Site 1: Alatsinainy-lalamarina**

Following rapid rural appraisals in the commune of Alatsinainy-lalamarina, LDI Fianarantsoa adopted a strategy to gain the confidence of the local populations deeply suspicious of the intentions of the

development and environmental actors working in the area. As a way to convince local communities that LDI's intentions are not to expropriate lands and turn the corridor into a national park, LDI worked with EASTA Iboaka, MICET, and FF Malagasy Mahomby to introduce dry season potato cultivation, market-gardening, eucalyptus nurseries, and environmental education activities through Nature Clubs. LDI Fianarantsoa worked through the AGERAS process to conduct feasibility studies for small-scale irrigation infrastructures that will be eventually financed by LDI, PNUD/FAO and ANAE/FORAGE.

While it is difficult at this stage to achieve widespread increases in yields and revenues from the demonstration plots, the introduction of dry season potato production convinced farmers of the high yield and revenue generating potential of this culture. Much more rapid rates of adoption are expected during the next season. On the other hand, deep-seated contradictions remain. The case study research published in "Coveted Corridor" shows that increasing agricultural yields might not reduce the expansion of tavy unless effective resource management regimes are put in place in the forest corridor.

Through our environmental education work, villagers are now coming to LDI field agents complaining of the illicit exploitation of the forest corridor by economic interests external to the community. Demands are growing to institute measures to create community management of natural resources.

### **Site 2: Ambohimahasina**

LDI program interventions at this site are channeled through two NGOs, CCD Namana and Feedback Madagascar, both of whom receive financial support from a number of donors. LDI's interventions consist primarily of providing punctual support like training and feasibility studies for actions carried out by about twenty associations set up by CCD Namana. For example, at the request of villagers, LDI is contributing to a technical and institutional study of two small dams and irrigation channels needed to increase yields of 80 ha of rice fields. LDI provided encouragement, advice, and some financial support to EASTA Iboaka and a Peace Corps volunteer to launch an initiative to manage on a sustainable basis extensive community and privately owned eucalyptus plantations for lumber and charcoal. This initiative illustrated how LDI often catalyzes important initiatives among partners with very minimal investment of financial time and financial resources.



***Construction of small-dams to improve water management and agricultural production***

From such experiences we learn that local populations are highly motivated to institute community management of eucalyptus plantation schemes but land tenure issues remain serious and complex. Following the "fast track" investment of LDI funds for training women in silkworm production, women have returned to Ambohimahasina commune to begin planting mulberry trees in eroded wastelands in preparation for launching silk worm production. CCD Namana is currently preparing a long-term funding request from LDI.

### Site 3: Tolongoina

LDI Fianarantsoa works closely through the CAF/Dette Nature project in the Tolongoina commune. With the arrival of new NGOs in the area supported by LDI (MICET, Malagasy Mahomby), coordination at the commune level among partner organizations has emerged as a complex problem due to divergent development philosophies and practices of the NGO actors. Through the Comité de Développement Communal structure set up by AGERAS/CDC, LDI has sought to assure coordination among the NGO partners in order to achieve better results. As in other SZI, LDI seeks to encourage other donors and projects to work with communities located in and along the corridor. LDI, FAO/PNUD, and FID are jointly planning for the construction and rehabilitation of basic agricultural infrastructures (small dams, roads, and water ducts). Working with CAF staff, LDI has provided training in SRI/SRA rice production to a number of associations.



***A more effective community-base resource management to reduce expansion into the forest corridor***

Local communities are interested in rehabilitating coffee plantations and hence a consultancy was conducted to identify ways to revitalize this important sector. Thanks the work of the CAF/Dette Nature project, local communities are interested in setting up community management of natural forest along the corridor at a number of sites. The institutional climate is appropriate for promoting CBNRM, though the delays in implementing the GELOSE law at the national level create some hesitations regarding strategies to move forward to set up lasting community forest resource management arrangements.

### Site 4: Ikongo

The LDI Fianarantsoa program confronted in the Ikongo site many of the same suspicious and reservations from local communities as in other village sites along the corridor. The field agent in this site has bravely tackled many deeply rooted problems - the remoteness and isolation of the area, the initial limited cooperation from villagers, resistance from traditional authorities, vicious rumors generated during the electoral campaign, the steep terrain and narrow valleys limiting possibilities for introducing new SRA/SRI techniques... Yet, the enthusiasm and dynamism of the villagers working with the field agent greatly encourages LDI to encourage NGO partners to set up programs in this commune. The opportunities to promote agricultural intensification based on tree crops and perennial plants is illustrated by the investment of resources by LDI to assist an entrepreneur to plant 20,000 cinnamon and ravintsara plants in the area. Following the completion of the submersible bridge constructed by the CAP Project, new economic opportunities will arise in the Ikongo area. LDI has successfully positioned itself in the commune to continue its agricultural and conservation enterprise activities.

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### **Sendrisoa and Miarinarivo**

LDI Fianarantsoa commenced a wide variety of agricultural intensification and conservation based enterprise activities in these two sites though not without some institutional challenges. The presence of ANAE and WWF in Miarinarivo did not always ease the commencement of LDI activities.

Extensive negotiations and coordination among all the parties has gradually led to the emergence of agricultural intensification activities and the establishment of Kolo Harena out of informal but dynamic village groups. In the Sendrisoa commune the potato variety tests conducted through FoFiFa and IRRI led to the expansion in the use of compost by Kolo Harena on tanety lands. LDI is finding much enthusiasm among Kolo Harena interested in promoting small revenue generating activities like apiculture, duck and chicken raising, and pisciculture. LDI in this commune works with



***Training in tree nursery growing and reforestation in all SZIs for community-based tree plantations***

dynamic associations linked to the AUP set up by the CAP project along the rehabilitated Namoly-Ambalavao road, but also with more distant villages situated along the forest corridor. Considerable opportunities exist for expanding credit and the agricultural input centers.

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Ecoregion-based conservation and development requires LDI Fianarantsoa to invest in complementary interventions at multiple scales. LDI is engaged in a number of activities of region-wide importance that have impacts on the implementation of project activities at the local level. The program actively participates in all AGERAS-CMP consultative activities such as the coordination of all environmental programs in the region, the institution of Comités de Développement Communal, the implementation of a regional environmental communication plan and contributions to rapid biological inventory of the forest corridor. Always true to supporting complementary activities at the local level, the LDI conservation enterprise component has identified excellent opportunities for promoting the growth of regional ecotourism poles around the Fort de Zafimaniry near Ambositra, the Isalo, Andringitra, and Ranomafana National Parks and along the FCE railway stations. LDI Fianarantsoa is moving forward through various consultancies and environmental studies to promote ecologically and socially viable ecotourism activities in fragile environmental settings.

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***Opportunities to develop new ecotourism niches need to be taken***

LDI Fianarantsoa has started to support private initiatives seeking to rehabilitate and expand plantations of coffee, pepper, and banana. Indeed, the degree of LDI's interventions in the Manakara area with the AUP will more limited than in our SZI; rather, LDI is engaged in very focused yet decisive actions to contribute to the rehabilitation of the coastal economy and to reduce pressures of out-migration from the coastal zone toward the forest corridor.

## Mahajanga

### Agricultural intensification

LDI is currently working with an average 55 families per SZI, members of 30 Kolo Harena associations in 25 villages.

The crops being focused on vary little from SZI to SZI in response to the interest expressed by Kolo Harena members, with rice topping the list, and peanuts of special interest in Tsarahasina and Ankijabe, cassava in Tsarahasina and Tsararano, and maize in Tsarahasina.

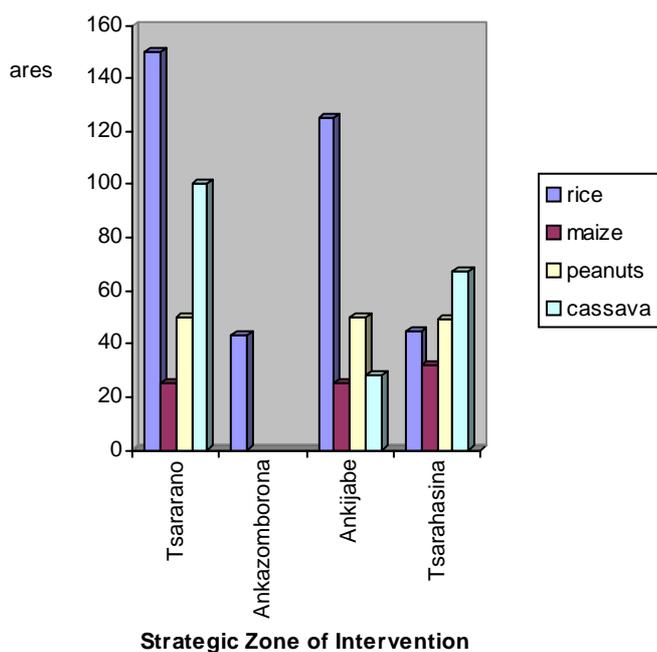
During the asara (rainy) season, LDI-Mahajanga is concentrating on these food crops, and collaborating with IPNR to promote an adapted SRI system, and with CARE/PAPAT to promote improved cassava varieties. The total area in demonstration plots for the 4 crops in each SZI is shown in figure 1. Figure 2 shows the areas to be planted by seed obtained on credit from the LDI-SAF input supply centers. [There is no input supply center for Tsarahasina yet.]

In way of comparison between SZIs, 90% of Kolo Harena members in SZI Ankazomborona are convinced of the advantage of improved rice seed, a crop that serves as both food and cash crop. Ten per cent (10%) of the members are planting a total 43 ares in rice demonstration plots. Rice is of first importance in three of the SZIs. In the SZI Tsarahasina, the sudden departure of the LDI field staff had an adverse effect on the preparations for the cropping season, such that, at this writing, information on the number and areas of demonstration plots has not yet been finalized. The new supervisor and field agents are only now in place and working diligently to recover the situation. The planned rehabilitation of a dam and irrigation canal of Betambonoana during the next dry season will contribute significantly to rice intensification in the village of Bemololo.

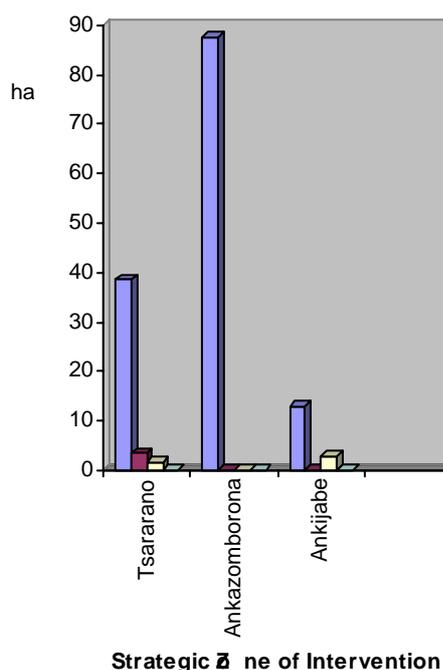
Two expert juniors have been recruited to strengthen the capacity of NGO partner SAF/FJKM in setting up 2 agricultural supply stores and a seed multiplication farm.

The goal of these activities is to increase crop production, improve food security, and augment household incomes, and thereby reduce poverty and the need to engage in pressure activities such as charcoal making, timber harvesting and clearing forest for crop production.

**Fig. 1 To be planted with demonstration plots**



**Fig. 2 To be planted with seed on credit**



## The Center for Agricultural Intensification (CA)

Following the signature of a cooperative agreement with FoFiFa in April for the creation of the center on 20 ha at the FOFIFA-Miadana Research Station, LDI began rehabilitating 4 buildings and preparing land for a model farm that will demonstrate improved production techniques for a variety of food and cash crops and reforestation.

The center is to serve four roles, including training, demonstration of improved practices, seed multiplication and adaptive research. At this writing contour erosion control lines have been laid out to be planted with various forage species; 45 ares of bottom land plowed for rice paddies; a rice nursery installed; 2.7 ha plowed for a maize-peanut-cassava rotation; 50 ares plowed for Hibiscus sabdariffa, 50 ares set aside for vegetable crops and bananas, two ha for local cashew trees, four ha for reforestation, and a tree nursery installed and planted with seedlings that will be ready for planting in January. Another 12 ha are being prepared (plowed and holes dug) for an evaluation orchard of 12 improved cashew varieties from Tanzania and Mozambique.



*CDIA of Miadana: forestry and fruit nursery*

A village style house and oxen stable was built on a hillside overlooking the model farm, that will be surrounded by fruit trees. The house will serve as a field office for the CDIA research assistant and a center for training of farmers.

## Community Based Natural Resource Management (CBNRM)

The putting in place of local structures to manage renewable natural resources is progressing steadily. Although the application texts for GELOSE are yet to be published, LDI responded to the request of the village of Marosely in Tsarahasina SZI to help them create a CLB (the local management structure for GELOSE) to which local forest management rights are to be transferred. The dossier is currently awaiting approval at the Commune level.

In the absence of the GELOSE option, the strategy being implemented in collaboration with MIRAY and CANFORET, is to apply for a simple contract between the CLB, Eaux-et-Forêts and the Commune: a procedure referred to as Participatory Forest Management.

In Ankijabe SZI, LDI collaborated with CI to help local communities define and apply a dina (mutually agreed upon rules and sanctions) for the management of 20 ha of raphia. The dina disallows harvesting of raphia from the flowering stage through maturation of the seed to promote regeneration of the raphia galleries. The 8 villages around the raphia zone known as Ambalafombo have prepared a set of specific rules for the management of the raphia in the zone.



*Charcoal production which is the main pressure in Mahajanga region*

Along the CAP rehabilitated Bekobay Road, LDI is collaborating with E&F to transfer management of a part of the Anosimijoro forest (approx. 200 ha) near Angidrobe to a group of charcoal makers in the village of Ambodiala. Another part of the same forest is being demarcated for transfer of management rights to a second group of charcoal makers in the village of Mahetsadava. An « expert junior » has been recruited to assist the 2 groups in the transfer process, and to provide technical assistance in intensifying their crop production and tree planting.

The inter-community dina established in Ankazomborona SZI in close collaboration with CI relates to the control of bush fires and managing pastureland.

## Conservation Enterprise

The fruit sub-sector continues to develop in the region. Vonona women's association signed a contract with Sam Chan-Kan in Antananarivo for the purchase of its dried fruit and fruit jams.

With LDI technical support, Vonona's monthly production grew from 80 to 200 kg. The 36-member association was nominated for and won a prize for "creativity of rural women", awarded by the World Foundation Summit of Women with headquarters in Switzerland. They were one of only 34 groups and individual women world-wide and 9 in Africa awarded the prize in 1999.

A study of fruit production and supply sources in the Mahajanga region was commissioned by LDI in November, and another study on the local (national) demand for fruit juices is currently under way, in support of an initiative to build a fruit juice factory in Mahajanga. The factory will procure fresh fruit (lemons, mangoes, etc) on a priority basis from villages around the Ankarafantsika forest.

LDI collaborated with PPIM (a World Bank funded project to develop a strategy for assuring the fuel wood supply for Mahajanga) during its preliminary planning stage. With the PPIM implementation stage in temporary suspense, LDI is working with other private sector actors in the energy sub-sector (e.g. VITOGAZ) to prepare a strategy for the promotion of alternative fuels to charcoal, starting with a demand study for natural gas and kerosene.

## Environmental Education

On the regional level, activities were planned and budgeted for year 2000 in collaboration with 2 organizations specializing in environmental education. For the education of teachers and school children in the SZIs, a contract was signed with CCEE (Centre Culturel Educatif à l'Environnement) of Mahajanga. The consulting firm Ressources Vertes will be responsible for raising the consciousness and knowledge of environmental issues among members of the Kolo Harena, and the preparation of training materials (including videotapes).

## Reinforcing partner capacity

Training, both theoretical and technical, on a variety of themes was organized at the CDIA-Miadana for development partners and members of Kolo Harena. Training of Kolo Harena members by field agents on improved cropping practices, erosion control, composting, tree planting, etc, is a continuing process in the SZIs. A long-term program of regular training courses at the CDIA will be prepared and implemented during the next six months.



*Demonstrating direct seeding of cashews to agents of partner organizations*

## Moramanga

### Agricultural Intensification

LDI is currently working with an average of 165 farmers per strategic zone of intervention. This represents 32 Kolo Harena farmer associations in 19 villages in our four strategic zones. The activities we are focusing on depend on expressed demand of the farmers and vary little from strategic zone to strategic zone. Rice, the staple crop of all of Madagascar, is rural farmers first and foremost concern. Crops produced for sale to supplement farm income vary somewhat from strategic zone to strategic zone. In Beforona we are concentrating on organic ginger, coffee and banana production. In Ambatovy small-scale animal husbandry and BRF top the list of our on farm revenue generating activities. For the Lac Alaotra region, fish culture and market gardens are viewed by the farmers as excellent opportunities to add to their household income.

For the most part, the farmers we are working with are very receptive to new ideas. In fact one might say they are starved for knowledge of improved agricultural techniques. And who could blame them with such a weak agricultural extension service in the region. Farmers in the Beforona region report not have seen or heard from an extension agent since 1962.

Adoption of SRI and SRA rice production techniques is somewhat slower than one would like because farmers in the region have little or no experience with either of these techniques, and are somewhat reluctant to adopt a new technique for cultivating rice. This is not to say that there isn't hope for these techniques, but only a word of caution to not read too much into the low numbers of adopters of these methods of producing such an important subsistence crop after only one year of exposure to them.

On the other hand, farmer associations have readily accepted plant propagation techniques and access to new germplasm. Farmers in both Beforona and Ambatovy have already begun preparing their fields to receive the new coffee plants that are being produced for outplanting this year.



*Compost production and use for organic farming*

### The Center for Diffusion of Agricultural Intensification

Following the signature of a cooperative agreement with FoFiFa for the creation of this center on ten hectares at the FoFiFa Beforona Research Center, LDI began the arduous process of rehabilitating the existing infrastructure and adding a training room with a capacity of 50 participants. At the time of signing the center was in complete disrepair and non-functional, so it was essential to also spend a considerable amount of effort in putting into place a model farm that will serve as a demonstration for improved integrated production techniques for subsistence and cash crops.

The CDIA is 100 percent operational with a fully integrated model farm demonstration. We have to date provided training sessions for over 180 farmers on SRI/SRA techniques, improved Tanimboly management practices, hive construction and beekeeping techniques, PRA methodology, how to work in a group and organic ginger production techniques.

The center has supported and is supporting the research initiatives of 4 Malagasy students and 2 Cornell graduate students.

An attestation of the potential of the CDIA as a means of introducing farmers to agricultural intensification can be seen as one walks up the valley in which it is located. Several farmers along the way are now devoting small parts of their lowland rice fields to on-farm experimentation with SRI and SRA techniques. For the most part these farmers were not introduced to these techniques through our formal training on this subject matter, and when questioned about why they decided to try these techniques, they responded that they saw them while walking past the CDIA.



*CDIA Consultative Committee meeting with partner in Beforona*

### **Community Based Natural Resource Management (CBNRM )**

Although the application texts for the GELOSE are yet to be ratified, CBNRM activities are steadily progressing. LDI has responded to an expressed desire of communities in our Lac Alaotra strategic zone to help them create a local management structure for their lake resources. Working with the 5 villages concerned, CIRPECH and CIREF, we have designed a management plan that the local authorities have approved, transferring management directly to the communities concerned. In Brickaville and Ranomafana EST, LDI is working with the private sector to establish similar types of simple contracts to transfer management rights for 500 Ha and 300 Ha of lowland rainforest to local populations.

In the absence of an official GELOSE option, we have opted for the strategy of a direct contract between local populations, government services and the commune. This option in our opinion is perhaps the simplest and most participatory method to quickly transfer management rights to local populations.

### **Conservation Enterprise Promotion**

Currently LDI is handling seven conservation enterprise promotion dossiers throughout the region. Ecotourism, essential oils dried fruit and organic production of cash crops continue to develop in the region. Of special interest is private sector collaboration, most notably Phael Flor and the Herb Research Foundation in the United States.



*Farmers selling cinnamom bark and leaves they gathered at Phael Flor*

In collaboration with Phael Flor, LDI has initiated a project to produce cinnamom essential oil that has the potential to provide supplemental income for 8 villages in the Brickaville area while reducing pressure on 500 Ha of lowland rainforest on the eastern edge of the forest corridor. In April 2000, LDI at the request of the Herb Research Foundation will be organizing a regional study tour (financed by the Herb Research Foundation) for prospective essential oil and organic spice buyers.

### **Environmental Education**

At the regional level, environmental communication activities have been planned and budgeted for the year 2000 in collaboration with MIRAY, AGERAS and the CRD. A large portion of this work will be contracted to the Centre de Information de Moramanga (CIM) which LDI in collaboration with PACT and CITE helped create. CIM serves the region in two capacities: as a center for information it will house agricultural and economic databases that farmers in the region can access to find buyers and better price their products, as a communication center it will provide farmers and businesses with access to internet, fax and telephone communication to improve efficiency of their operations as well as produce communication materials for agricultural and environmental extension. LDI is currently helping CIM producing a business plan that will help them by auto financing as soon as possible.

In collaboration with the Swiss Cooperation, BEMA and MEDIASCOPE, LDI has acquired materials funded by a grant from Swiss Cooperation, to set up a farmer-operated radio station in Beforona and will soon be broadcasting a weekly program to provide a forum for information exchange in the strategic zone. Farmer enthusiasm for this initiative has been overwhelming. When asked to propose a name for their radio station, 120 farmers responded with their suggestions. The name that was finally chosen is Radio Akon'Ambanivolo (echo of the countryside). Working with SAF/FJKM, LDI has been able to create a federation of 5 farmer associations that will be directly responsible for the management of the station.

This radio station coupled with LDI agricultural and environmental broadcast programs on existing radio stations in Moramanga and Ambatondrazaka, will provide coverage of all LDI's strategic zones of intervention.

### **Reinforcement of Partner Capacity**

All be it time consuming the process of reinforcing partner capacity is of utmost importance. LDI has been working closely with AGERAS to help them take a lead role in developing the regional communication strategy and assuring a platform of exchange at the regional level for improvement of collaborative development efforts.

Theoretical and hands-on training at the CDIA in Beforona has been very effective in bringing development partners and farmers in the region together to discuss agricultural intensification, environmental issues and ways to improve adoption of improved sustainable production techniques.

Work with CIM has been challenging as we are trying to put in place a platform for regional information collection and exchange. The key to making this work is the development of a realistic business plan that incorporates a thoughtful analysis of market potential for services provided by CIM. We already have commitments from AGERAS, ADRA, MIRAY and several economic operators in the area for future contracts with CIM.

### **Water Accomplishments in regional level**

- Start of the environmental center activities in Moramanga (C.I.M). With the financial support of LDI In collaboration with CITE Ambatonakanga - Antananarivo, MIRAY Moramanga, this place is a point of environmental data centralization, information, communication, and is destined to break the environmental and development news at the regional level.
- IEC: Holding of coordination meeting in Moramanga with the taking part of local partners as MIRAY, AGERAS, ANGAP, ADRA, the CRD (the regional committee for development) to determine the constitution of IEC and also to characterize the environmental reports to spread at a local aim.
- Restoration of CDIA (Centre de diffusion pour l'intensification agricole) in Beforona.
- Creation of about sixty Kolo Harena association gathering up to 650 families members, in the four SZI of Moramanga region.
- Financial and technical support of Phael Flor company in Brickaville region which produce essential oil from cinnamon exploitation and involve local communities for the manufacture in raw material collection from near a cinnamon forest. This company then helps local farmers and encourages them to manage the forest in a sustainable manner.
- Establishment of farming supply center administered and managed by local farmers and allocation of collective fund OTIV for Kolo Harena members in all LDI SZI.
- Contract Signature between LDI Moramanga and Erick MAC DONALD for coffee production and technical aspect, in Ambatovy and Beforona zones.
- Financial support for Kolo Harena members in acquisition of ginger seeds and training in biological cultivation of the product.
- GCRN / GELOSE : Transitory management of Lac Alaotra marshes natural resources agreed by administrative authorities and gendarmerie for 5 Kolo Harena associations



***Coffe nurseries set up by MacDonald . these nurseries supply 100,000 Robusta coffee plants to 17 Kolo Harena in Ambatovy and Beforona***

### 3. PERFORMANCE ANALYSIS

#### 3.1 Region Qualitative Analysis of Results

##### Fianarantsoa

##### **SOUTHERN CORRIDOR: Ranomafana national park buffer zone**

During the fast-track phase, the Association Tefy Saina conducted research to determine yields and rates of adoption of SRI in 17 villages. This applied research, along with the master's degree field research led by Chris Moser of Cornell University, showed that rates of adoption of SRI are intimately associated with such factors as water control, labor availability, and access to soil fertility amendments. This research suggests that wealthier members of rural communities are more likely to adopt SRI than poorer social categories.



***Working with entrepreneurs to improve the quality of ecotourism facilities like ecolodges***

These implications have profound and disturbing ramifications for LDI agricultural intensification strategies. Even though the long contractual negotiations with our partners delayed the commencement of project activities in this zone, the new partnership agreements with Tefy Saina and FFF Malagasy Mahomby will create the foundations for promoting agricultural intensification in the buffer zone communities around Ranomafana National Park. Our partners will accomplish this by concentrating a package of agricultural

intensification and conservation-based enterprise activities in zones exerting high pressure on the corridor and the eastern and western flanks of the national park.

The LDI Fianarantsoa program works closely with CIFOR to build upon a series of aromatic and medicinal plants initiatives launched initially during PE1. CIFOR is working with CANARPS, medicinal plant entrepreneurs and the local communities to develop new market opportunities for medicinal plants found in the buffer zones of Ranomafana National Park but also for medicinal plants grown in fallow fields. To complement this initiative LDI is financing a consultancy to determine the economic costs and benefits of medicinal plant development around four species.

The LDI regional programs seek to rehabilitate existing hotels around Ranomafana National Park. For example, the program financed two technical studies for the Hotel Domaine Nature and others are planned for other hotels. LDI continues to encourage future investors, local promoters in particular, to practice an ecotourism sensitive to the well being of the physical environment and the communities of the region.

##### **CENTRAL CORRIDOR**

##### **Site 1: Alatsinainy-lalamarina**

Following rapid rural appraisals in the commune of Alatsinainy-lalamarina, LDI Fianarantsoa adopted a strategy to gain the confidence of the local populations deeply suspicious of the intentions of the

development and environmental actors working in the area. As a way to convince local communities that LDI's intentions are not to expropriate lands and turn the corridor into a national park, LDI worked with EASTA Iboaka, MICET, and FF Malagasy Mahomby to introduce dry season potato cultivation, market-gardening, eucalyptus nurseries, and environmental education activities through Nature Clubs. LDI Fianarantsoa worked through the AGERAS process to conduct feasibility studies for small-scale irrigation infrastructures that will be eventually financed by LDI, PNUD/FAO and ANAE/FORAGE.

While it is difficult at this stage to achieve widespread increases in yields and revenues from the demonstration plots, the introduction of dry season potato production convinced farmers of the high yield and revenue generating potential of this culture. Much more rapid rates of adoption are expected during the next season. On the other hand, deep-seated contradictions remain. The case study research published in "Coveted Corridor" shows that increasing agricultural yields might not reduce the expansion of tavy unless effective resource management regimes are put in place in the forest corridor.

Through our environmental education work, villagers are now coming to LDI field agents complaining of the illicit exploitation of the forest corridor by economic interests external to the community. Demands are growing to institute measures to create community management of natural resources.

## **Site 2: Ambohimahasina**

LDI program interventions at this site are channeled through two NGOs, CCD Namana and Feedback Madagascar, both of whom receive financial support from a number of donors. LDI's interventions consist primarily of providing punctual support like training and feasibility studies for actions carried out by about twenty associations set up by CCD Namana. For example, at the request of villagers, LDI is contributing to a technical and institutional study of two small dams and irrigation channels needed to increase yields of 80 ha of rice fields. LDI provided encouragement, advice, and some financial support to EASTA Iboaka and a Peace Corps volunteer to launch an initiative to manage on a sustainable basis extensive community and privately owned eucalyptus plantations for lumber and charcoal. This initiative illustrated how LDI often catalyzes important initiatives among partners with very minimal investment of financial time and financial resources.



***Construction of small-dams to improve water management and agricultural production***

From such experiences we learn that local populations are highly motivated to institute community management of eucalyptus plantation schemes but land tenure issues remain serious and complex. Following the "fast track" investment of LDI funds for training women in silkworm production, women have returned to Ambohimahasina commune to begin planting mulberry trees in eroded wastelands in preparation for launching silk worm production. CCD Namana is currently preparing a long-term funding request from LDI.

### Site 3: Tolongoina

LDI Fianarantsoa works closely through the CAF/Dette Nature project in the Tolongoina commune. With the arrival of new NGOs in the area supported by LDI (MICET, Malagasy Mahomby), coordination at the commune level among partner organizations has emerged as a complex problem due to divergent development philosophies and practices of the NGO actors. Through the Comité de Développement Communal structure set up by AGERAS/CDC, LDI has sought to assure coordination among the NGO partners in order to achieve better results. As in other SZI, LDI seeks to encourage other donors and projects to work with communities located in and along the corridor. LDI, FAO/PNUD, and FID are jointly planning for the construction and rehabilitation of basic agricultural infrastructures (small dams, roads, and water ducts). Working with CAF staff, LDI has provided training in SRI/SRA rice production to a number of associations.



***A more effective community-base resource management to reduce expansion into the forest corridor***

Local communities are interested in rehabilitating coffee plantations and hence a consultancy was conducted to identify ways to revitalize this important sector. Thanks the work of the CAF/Dette Nature project, local communities are interested in setting up community management of natural forest along the corridor at a number of sites. The institutional climate is appropriate for promoting CBNRM, though the delays in implementing the GELOSE law at the national level create some hesitations regarding strategies to move forward to set up lasting community forest resource management arrangements.

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The LDI Fianarantsoa program confronted in the Ikongo site many of the same suspicious and reservations from local communities as in other village sites along the corridor. The field agent in this site has bravely tackled many deeply rooted problems - the remoteness and isolation of the area, the initial limited cooperation from villagers, resistance from traditional authorities, vicious rumors generated during the electoral campaign, the steep terrain and narrow valleys limiting possibilities for introducing new SRA/SRI techniques... Yet, the enthusiasm and dynamism of the villagers working with the field agent greatly encourages LDI to encourage NGO partners to set up programs in this commune. The opportunities to promote agricultural intensification based on tree crops and perennial plants is illustrated by the investment of resources by LDI to assist an entrepreneur to plant 20,000 cinnamon and ravintsara plants in the area. Following the completion of the submersible bridge constructed by the CAP Project, new economic opportunities will arise in the Ikongo area. LDI has successfully positioned itself in the commune to continue its agricultural and conservation enterprise activities.

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LDI is currently working with an average 55 families per SZI, members of 30 Kolo Harena associations in 25 villages.

The crops being focused on vary little from SZI to SZI in response to the interest expressed by Kolo Harena members, with rice topping the list, and peanuts of special interest in Tsarahasina and Ankijabe, cassava in Tsarahasina and Tsararano, and maize in Tsarahasina.

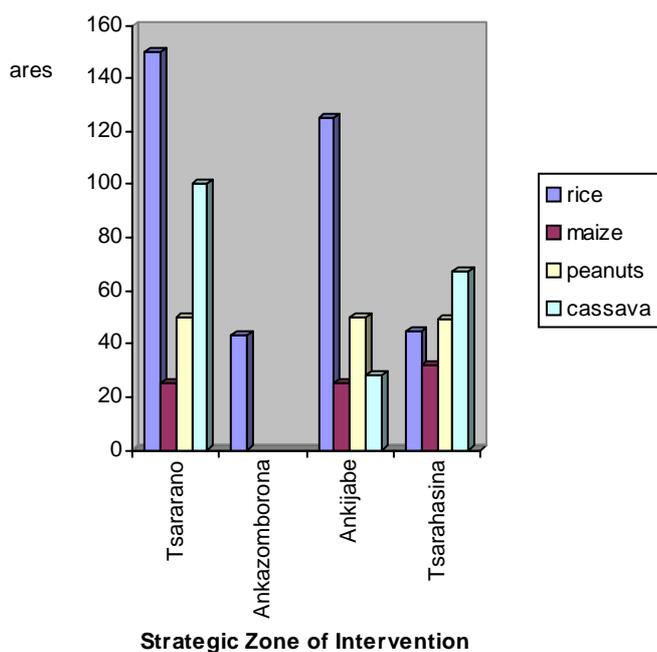
During the asara (rainy) season, LDI-Mahajanga is concentrating on these food crops, and collaborating with IPNR to promote an adapted SRI system, and with CARE/PAPAT to promote improved cassava varieties. The total area in demonstration plots for the 4 crops in each SZI is shown in figure 1. Figure 2 shows the areas to be planted by seed obtained on credit from the LDI-SAF input supply centers. [There is no input supply center for Tsarahasina yet.]

In way of comparison between SZIs, 90% of Kolo Harena members in SZI Ankazomborona are convinced of the advantage of improved rice seed, a crop that serves as both food and cash crop. Ten per cent (10%) of the members are planting a total 43 ares in rice demonstration plots. Rice is of first importance in three of the SZIs. In the SZI Tsarahasina, the sudden departure of the LDI field staff had an adverse effect on the preparations for the cropping season, such that, at this writing, information on the number and areas of demonstration plots has not yet been finalized. The new supervisor and field agents are only now in place and working diligently to recover the situation. The planned rehabilitation of a dam and irrigation canal of Betambonoana during the next dry season will contribute significantly to rice intensification in the village of Bemololo.

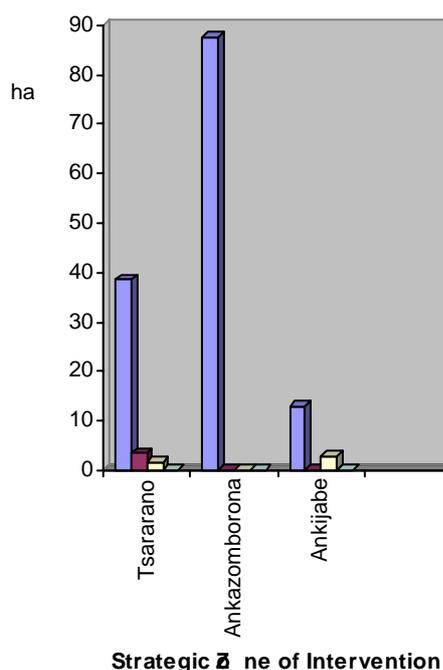
Two expert juniors have been recruited to strengthen the capacity of NGO partner SAF/FJKM in setting up 2 agricultural supply stores and a seed multiplication farm.

The goal of these activities is to increase crop production, improve food security, and augment household incomes, and thereby reduce poverty and the need to engage in pressure activities such as charcoal making, timber harvesting and clearing forest for crop production.

**Fig. 1 To be planted with demonstration plots**



**Fig. 2 To be planted with seed on credit**



## The Center for Agricultural Intensification (CA)

Following the signature of a cooperative agreement with FoFiFa in April for the creation of the center on 20 ha at the FOFIFA-Miadana Research Station, LDI began rehabilitating 4 buildings and preparing land for a model farm that will demonstrate improved production techniques for a variety of food and cash crops and reforestation.

The center is to serve four roles, including training, demonstration of improved practices, seed multiplication and adaptive research. At this writing contour erosion control lines have been laid out to be planted with various forage species; 45 ares of bottom land plowed for rice paddies; a rice nursery installed; 2.7 ha plowed for a maize-peanut-cassava rotation; 50 ares plowed for Hibiscus sabdariffa, 50 ares set aside for vegetable crops and bananas, two ha for local cashew trees, four ha for reforestation, and a tree nursery installed and planted with seedlings that will be ready for planting in January. Another 12 ha are being prepared (plowed and holes dug) for an evaluation orchard of 12 improved cashew varieties from Tanzania and Mozambique.



*CDIA of Miadana: forestry and fruit nursery*

A village style house and oxen stable was built on a hillside overlooking the model farm, that will be surrounded by fruit trees. The house will serve as a field office for the CDIA research assistant and a center for training of farmers.

## Community Based Natural Resource Management (CBNRM)

The putting in place of local structures to manage renewable natural resources is progressing steadily. Although the application texts for GELOSE are yet to be published, LDI responded to the request of the village of Marosely in Tsarahasina SZI to help them create a CLB (the local management structure for GELOSE) to which local forest management rights are to be transferred. The dossier is currently awaiting approval at the Commune level.

In the absence of the GELOSE option, the strategy being implemented in collaboration with MIRAY and CANFORET, is to apply for a simple contract between the CLB, Eaux-et-Forêts and the Commune: a procedure referred to as Participatory Forest Management.

In Ankijabe SZI, LDI collaborated with CI to help local communities define and apply a dina (mutually agreed upon rules and sanctions) for the management of 20 ha of raphia. The dina disallows harvesting of raphia from the flowering stage through maturation of the seed to promote regeneration of the raphia galleries. The 8 villages around the raphia zone known as Ambalafombo have prepared a set of specific rules for the management of the raphia in the zone.



*Charcoal production which is the main pressure in Mahajanga region*

Along the CAP rehabilitated Bekobay Road, LDI is collaborating with E&F to transfer management of a part of the Anosimijoro forest (approx. 200 ha) near Angidrobe to a group of charcoal makers in the village of Ambodiala. Another part of the same forest is being demarcated for transfer of management rights to a second group of charcoal makers in the village of Mahetsadava. An « expert junior » has been recruited to assist the 2 groups in the transfer process, and to provide technical assistance in intensifying their crop production and tree planting.

The inter-community dina established in Ankazomborona SZI in close collaboration with CI relates to the control of bush fires and managing pastureland.

## Conservation Enterprise

The fruit sub-sector continues to develop in the region. Vonona women's association signed a contract with Sam Chan-Kan in Antananarivo for the purchase of its dried fruit and fruit jams.

With LDI technical support, Vonona's monthly production grew from 80 to 200 kg. The 36-member association was nominated for and won a prize for "creativity of rural women", awarded by the World Foundation Summit of Women with headquarters in Switzerland. They were one of only 34 groups and individual women world-wide and 9 in Africa awarded the prize in 1999.

A study of fruit production and supply sources in the Mahajanga region was commissioned by LDI in November, and another study on the local (national) demand for fruit juices is currently under way, in support of an initiative to build a fruit juice factory in Mahajanga. The factory will procure fresh fruit (lemons, mangoes, etc) on a priority basis from villages around the Ankarafantsika forest.

LDI collaborated with PPIM (a World Bank funded project to develop a strategy for assuring the fuel wood supply for Mahajanga) during its preliminary planning stage. With the PPIM implementation stage in temporary suspense, LDI is working with other private sector actors in the energy sub-sector (e.g. VITOGAZ) to prepare a strategy for the promotion of alternative fuels to charcoal, starting with a demand study for natural gas and kerosene.

## Environmental Education

On the regional level, activities were planned and budgeted for year 2000 in collaboration with 2 organizations specializing in environmental education. For the education of teachers and school children in the SZIs, a contract was signed with CCEE (Centre Culturel Educatif à l'Environnement) of Mahajanga. The consulting firm Ressources Vertes will be responsible for raising the consciousness and knowledge of environmental issues among members of the Kolo Harena, and the preparation of training materials (including videotapes).

## Reinforcing partner capacity

Training, both theoretical and technical, on a variety of themes was organized at the CDIA-Miadana for development partners and members of Kolo Harena. Training of Kolo Harena members by field agents on improved cropping practices, erosion control, composting, tree planting, etc, is a continuing process in the SZIs. A long-term program of regular training courses at the CDIA will be prepared and implemented during the next six months.



*Demonstrating direct seeding of cashews to agents of partner organizations*

## Moramanga

### Agricultural Intensification

LDI is currently working with an average of 165 farmers per strategic zone of intervention. This represents 32 Kolo Harena farmer associations in 19 villages in our four strategic zones. The activities we are focusing on depend on expressed demand of the farmers and vary little from strategic zone to strategic zone. Rice, the staple crop of all of Madagascar, is rural farmers first and foremost concern. Crops produced for sale to supplement farm income vary somewhat from strategic zone to strategic zone. In Beforona we are concentrating on organic ginger, coffee and banana production. In Ambatovy small-scale animal husbandry and BRF top the list of our on farm revenue generating activities. For the Lac Alaotra region, fish culture and market gardens are viewed by the farmers as excellent opportunities to add to their household income.

For the most part, the farmers we are working with are very receptive to new ideas. In fact one might say they are starved for knowledge of improved agricultural techniques. And who could blame them with such a weak agricultural extension service in the region. Farmers in the Beforona region report not have seen or heard from an extension agent since 1962.

Adoption of SRI and SRA rice production techniques is somewhat slower than one would like because farmers in the region have little or no experience with either of these techniques, and are somewhat reluctant to adopt a new technique for cultivating rice. This is not to say that there isn't hope for these techniques, but only a word of caution to not read too much into the low numbers of adopters of these methods of producing such an important subsistence crop after only one year of exposure to them.

On the other hand, farmer associations have readily accepted plant propagation techniques and access to new germplasm. Farmers in both Beforona and Ambatovy have already begun preparing their fields to receive the new coffee plants that are being produced for outplanting this year.



*Compost production and use for organic farming*

### The Center for Diffusion of Agricultural Intensification

Following the signature of a cooperative agreement with FoFiFa for the creation of this center on ten hectares at the FoFiFa Beforona Research Center, LDI began the arduous process of rehabilitating the existing infrastructure and adding a training room with a capacity of 50 participants. At the time of signing the center was in complete disrepair and non-functional, so it was essential to also spend a considerable amount of effort in putting into place a model farm that will serve as a demonstration for improved integrated production techniques for subsistence and cash crops.

The CDIA is 100 percent operational with a fully integrated model farm demonstration. We have to date provided training sessions for over 180 farmers on SRI/SRA techniques, improved Tanimboly management practices, hive construction and beekeeping techniques, PRA methodology, how to work in a group and organic ginger production techniques.

The center has supported and is supporting the research initiatives of 4 Malagasy students and 2 Cornell graduate students.

An attestation of the potential of the CDIA as a means of introducing farmers to agricultural intensification can be seen as one walks up the valley in which it is located. Several farmers along the way are now devoting small parts of their lowland rice fields to on-farm experimentation with SRI and SRA techniques. For the most part these farmers were not introduced to these techniques through our formal training on this subject matter, and when questioned about why they decided to try these techniques, they responded that they saw them while walking past the CDIA.



*CDIA Consultative Committee meeting with partner in Beforona*

### **Community Based Natural Resource Management (CBNRM )**

Although the application texts for the GELOSE are yet to be ratified, CBNRM activities are steadily progressing. LDI has responded to an expressed desire of communities in our Lac Alaotra strategic zone to help them create a local management structure for their lake resources. Working with the 5 villages concerned, CIRPECH and CIREF, we have designed a management plan that the local authorities have approved, transferring management directly to the communities concerned. In Brickaville and Ranomafana EST, LDI is working with the private sector to establish similar types of simple contracts to transfer management rights for 500 Ha and 300 Ha of lowland rainforest to local populations.

In the absence of an official GELOSE option, we have opted for the strategy of a direct contract between local populations, government services and the commune. This option in our opinion is perhaps the simplest and most participatory method to quickly transfer management rights to local populations.

### **Conservation Enterprise Promotion**

Currently LDI is handling seven conservation enterprise promotion dossiers throughout the region. Ecotourism, essential oils dried fruit and organic production of cash crops continue to develop in the region. Of special interest is private sector collaboration, most notably Phael Flor and the Herb Research Foundation in the United States.



*Farmers selling cinnamom bark and leaves they gathered at Phael Flor*

In collaboration with Phael Flor, LDI has initiated a project to produce cinnamom essential oil that has the potential to provide supplemental income for 8 villages in the Brickaville area while reducing pressure on 500 Ha of lowland rainforest on the eastern edge of the forest corridor. In April 2000, LDI at the request of the Herb Research Foundation will be organizing a regional study tour (financed by the Herb Research Foundation) for prospective essential oil and organic spice buyers.

### **Environmental Education**

At the regional level, environmental communication activities have been planned and budgeted for the year 2000 in collaboration with MIRAY, AGERAS and the CRD. A large portion of this work will be contracted to the Centre de Information de Moramanga (CIM) which LDI in collaboration with PACT and CITE helped create. CIM serves the region in two capacities: as a center for information it will house agricultural and economic databases that farmers in the region can access to find buyers and better price their products, as a communication center it will provide farmers and businesses with access to internet, fax and telephone communication to improve efficiency of their operations as well as produce communication materials for agricultural and environmental extension. LDI is currently helping CIM producing a business plan that will help them by auto financing as soon as possible.

In collaboration with the Swiss Cooperation, BEMA and MEDIASCOPE, LDI has acquired materials funded by a grant from Swiss Cooperation, to set up a farmer-operated radio station in Beforona and will soon be broadcasting a weekly program to provide a forum for information exchange in the strategic zone. Farmer enthusiasm for this initiative has been overwhelming. When asked to propose a name for their radio station, 120 farmers responded with their suggestions. The name that was finally chosen is Radio Akon'Ambanivolo (echo of the countryside). Working with SAF/FJKM, LDI has been able to create a federation of 5 farmer associations that will be directly responsible for the management of the station.

This radio station coupled with LDI agricultural and environmental broadcast programs on existing radio stations in Moramanga and Ambatondrazaka, will provide coverage of all LDI's strategic zones of intervention.

### **Reinforcement of Partner Capacity**

All be it time consuming the process of reinforcing partner capacity is of utmost importance. LDI has been working closely with AGERAS to help them take a lead role in developing the regional communication strategy and assuring a platform of exchange at the regional level for improvement of collaborative development efforts.

Theoretical and hands-on training at the CDIA in Beforona has been very effective in bringing development partners and farmers in the region together to discuss agricultural intensification, environmental issues and ways to improve adoption of improved sustainable production techniques.

Work with CIM has been challenging as we are trying to put in place a platform for regional information collection and exchange. The key to making this work is the development of a realistic business plan that incorporates a thoughtful analysis of market potential for services provided by CIM. We already have commitments from AGERAS, ADRA, MIRAY and several economic operators in the area for future contracts with CIM.

### **Water Accomplishments in regional level**

- Start of the environmental center activities in Moramanga (C.I.M). With the financial support of LDI In collaboration with CITE Ambatonakanga - Antananarivo, MIRAY Moramanga, this place is a point of environmental data centralization, information, communication, and is destined to break the environmental and development news at the regional level.
- IEC: Holding of coordination meeting in Moramanga with the taking part of local partners as MIRAY, AGERAS, ANGAP, ADRA, the CRD (the regional committee for development) to determine the constitution of IEC and also to characterize the environmental reports to spread at a local aim.
- Restoration of CDIA (Centre de diffusion pour l'intensification agricole) in Beforona.
- Creation of about sixty Kolo Harena association gathering up to 650 families members, in the four SZI of Moramanga region.
- Financial and technical support of Phael Flor company in Brickaville region which produce essential oil from cinnamon exploitation and involve local communities for the manufacture in raw material collection from near a cinnamon forest. This company then helps local farmers and encourages them to manage the forest in a sustainable manner.
- Establishment of farming supply center administered and managed by local farmers and allocation of collective fund OTIV for Kolo Harena members in all LDI SZI.
- Contract Signature between LDI Moramanga and Erick MAC DONALD for coffee production and technical aspect, in Ambatovy and Beforona zones.
- Financial support for Kolo Harena members in acquisition of ginger seeds and training in biological cultivation of the product.
- GCRN / GELOSE : Transitory management of Lac Alaotra marshes natural resources agreed by administrative authorities and gendarmerie for 5 Kolo Harena associations



***Coffe nurseries set up by MacDonald . these nurseries supply 100,000 Robusta coffee plants to 17 Kolo Harena in Ambatovy and Beforona***

### 3.2 PERFORMANCE ANALYSIS COMPARED TO FIRST YEAR OBJECTIVES

First year objectives July 1999 - June 2000	Fianarantsoa	Mahajanga	Moramanga	Antsiranana	LD	Observations
1. 50 households assisted by SZI (5 associations of 10 members) <b>in total 6 households</b>	<ul style="list-style-type: none"> <li>- SZI north corridor: no Kolo Harena associations</li> <li>- SZI central corridor: 6 associations of 74 members in total</li> <li>- SZI south corridor: 14 associations of 160 members in total</li> </ul>	- 221 households from 30 Kolo Harena in 25 villages	- 660 households of 33 Kolo Harena association	N/A	- <b>1 115 households</b> from 83 Kolo Harena	The contract with Tefy Saina concerning SRI and other agricultural intensification activities has just begun. It will touch 750 villagers of 15 terroirs in the region of the Ranomafana national park.
2. <b>6 %</b> of targeted families have adopted improved practices. <b>in total 30 households</b>	<ul style="list-style-type: none"> <li>- Potato cultivation: 53% adoption</li> <li>- SRA/SRI: 30 to 55% adoption depending on the SZIs</li> <li>- Market-gardening: 80% adoption</li> </ul>	- 112 households from 30 Kolo Harena from 25 villages	- Variable according to the field intervention (agriculture, breeding, basketry,)	N/A	- Variable : <b>30 10 %</b> according to the field intervention	The other activities introduced (pisciculture, composting ...) are in a stage of the training where it is difficult to estimate their level of adoption
3. <b>10% augmentation of yields and revenues</b>	50 to 200% augmentation of potato yields and beans planted with the improved seed techniques	Crops under vegetation	Crops under vegetation	<b>NA</b>	Crops under vegetation	The plantations are mostly at a small scale and in trial (0.5-1 are). The produce is mostly destined for consumption

### 3.2 PERFORMANCE ANALYSIS COMPARED TO FIRST YEAR OBJECTIVES

<p>4. 5 villages per SZI doing community conservation activities <b>in total 6 villages</b></p>	<ul style="list-style-type: none"> <li>- <i>SZI North corridor</i>: 2 villages are engaged in a community management of local aromatic and medicinal plants</li> <li>- <i>SZI Central corridor</i>: 9 villages concerned in the community management of eucalyptus plantations, the villagers of Ambohimahamasina have received a training in sericulture</li> <li>- <i>SZI South corridor</i>: 6 villages are putting into place eucalyptus nurseries for collective reforestation areas.</li> </ul>	<ul style="list-style-type: none"> <li>- 20 ha of raphia with 8 villages, 200 ha of forest with 2 villages, management of fire and grassland</li> </ul>	<ul style="list-style-type: none"> <li>- 5 villages in Lac Alaotra for lake resources management</li> <li>- 4 villages for cinnamon valorization</li> </ul>	<p><b>NA</b></p>	<ul style="list-style-type: none"> <li>- <b>36 villages</b> These villages are concerned for Gelose or GPF activities. But, <b>123 villages</b> are involved in sustainable use of natural resources.</li> </ul>	<p>The Haute Matsiatra pine plantations and the tourist sites of the west of Andringitra are potential zones to establish community resource management. The site studies and the different preparations are in progress to establish the resource exploitation strategies.</p>
<p>5. A GELOSE contract per region (a surface of 100 ha) <b>in total 3 GELOSE contracts</b></p>	<p>4 sites identified to start the CBRNM process alternative to the GELOSE around Ranomafana, Ambohimahamasina, Ikongo and the Zafimaniry forest.</p>	<p>Participative management of the Marosely, Amboromaika and Anosimijoro forest</p>	<p>Assistance of 500 ha community-based management for collective land tenure in Brickaville and lake based natural resources management in Lac Alaotra</p>	<p>N/A</p>	<p><b>9 identified sites.</b> LDI support GELOSE process and others management transfer contracts (GPF, immatriculation collective)</p>	<p>LDI continues to support the elaboration of GELOSE contracts in Tolongoina with the CAF project. LDI participates actively in the COPIL to make Haute Matsiatra community management test actions.</p>

### 3.2 PERFORMANCE ANALYSIS COMPARED TO FIRST YEAR OBJECTIVES

<p>6. 3 environmental education/communication activities per region <b>h total 9EE activities</b></p>	<ul style="list-style-type: none"> <li>- 2 Films on the corridor dealing with apiculture, pisciculture and sericulture are being finalized</li> <li>- Training of 4 Young Naturalist Clubs in north and central corridor SZIs</li> <li>- 4 conference-debates on medicinal plants, management of natural resources, the “coveted corridor” and the management of terroirs</li> <li>- RRA studies in 3 central corridor SZI sites</li> <li>- Wide diffusion of RRA results (500 copies of report, posters and Powerpoint presentations)</li> <li>- Puppet show on agricultural intensification and forest protection themes</li> </ul>	<ul style="list-style-type: none"> <li>- 3 activities in progress : reboisement scolaire, education of schoolchildren/teachers, education of Kolo Harena with CCEE and Ressources Vertes participation</li> </ul>	<p>2 on going activities Radiobroadcast in Beforona, CIM in Moramanga. 3 finalized activities: MARP session completed in all villages of interventions Financial support to Durell in achievement of fetin’ny zetra (12 villages et 3 schools) and in environmental learning of 200 primary school teachers and in 40 educational institutions.</p>	<p>N/A</p>	<p><b>18 environmental education activities</b></p>	<p>LDI has always incited the active participation of partners (MIRAY, AGERAS, AGEX, NGO, ministries, etc...) in conferences and workshops to look for a common vision of sustainable management of the corridor.</p>
<p>7. 5 Conservation Enterprises (CE) supported per region <b>h total 15CE</b></p>	<p>11 CE supported with 7 investing in ecotourism around parks and natural reserves</p>	<p>5 CE supported in the dried fruit and fruit juice sector, fish processing and ecotourism</p>	<p>6 CE in dried fruit, essential oil production, ecotourism and mulch/BRF production</p>	<p>4 CE in ecotourism, well and village guesthouses construction</p>	<p><b>26 conservation enterprises.</b> In addition 7 CE have attended an essential oil roundtable with Herb Research Foundation</p>	<p>The EPAM in Ikongo received financial support for the production of essential oil taken from the 22000 cinnamon and ravintsara plants.</p>
<p>8. 2 new CE investment projects <b>h total 6CE</b></p>	<p>1 new investment project in Manakara to launch coffee cultures, pepper, banana and red peppers exported under the bio label, 2 new ecotourism projects (relais de la reine et Domaine Nature)</p>	<p>- 2 CE in Fruit juice and Tilapia filiere</p>	<p>2 new projects in Brickaville and Ampangabe</p>	<p>1 new project with Nature Lodge</p>	<p><b>8 new projects</b> at the beginning stage of implementation</p>	

### 3.2 PERFORMANCE ANALYSIS COMPARED TO FIRST YEAR OBJECTIVES

<p>9. Total investment of \$50,000 in the EFEs <b>Actual total \$50,000</b></p>	<p>The <i>Boisson</i> document is still in study and negotiation to be eligible in the FIEFE frame.</p>	<p>2 CE are still in study for an amount of investment of \$700,000</p>	<p>2 new projects in Brickaville and Ampangabe. Still in study and negotiation to be eligible in the FIEFE frame</p>	<p>1 ecotourism project still in study</p>	<p><b>6 Projects still in study</b></p>	<p>Waiting for the establishment of the FIEFE</p>
<p>10. 25 villagers supported by LDI having commercial relations with the EFEs</p>	<p>None</p>	<p>15 villagers</p>	<p>3 farmers performing in BRF production and 21 farmers participating in raw material for essential oil production in Brickaville</p>		<p><b>39 villagers</b> supported by LDI having commercial relations with the EFE</p>	<p>The commercial opportunities given to the villagers are not yet important in this stage where most of the support for the development of the region's CE's have just begun.</p>
<p>11. 10 local/regional governmental organizations, partners, projects participating in the regional planning process <b>Actual total 30 organizations</b></p>	<p>20 organizations that participate actively in eco-regional planning process in collaboration with LDI, AGERAS and the CMP</p>	<p>6 stakeholder organizations</p>	<p>8 stakeholders organizations (Comité de Planification et de Suivi-Evaluation), 10 for communication and 15 for Regional information system</p>	<p>N/A</p>	<p><b>9 organizations</b></p>	<p>To give scientific basis to lasting management, LDI contributes technically and financially to the biological inventory. LDI provided professional training for the EASTA Iboaka and ISTE students in the SZIs: a minimal cost investment yet profitable when seen through the technical contributions of these trainees to the LDI staff and the experiences gathered during the training.</p>

### 3.2 PERFORMANCE ANALYSIS COMPARED TO FIRST YEAR OBJECTIVES

<p>12. 5 Kolo Harena associations organized by SZI <b>h total 6 associations</b></p>	<ul style="list-style-type: none"> <li>- <i>SZI North corridor</i>: no formalized associations</li> <li>- <i>SZI Central corridor</i>: 6 associations of 74 members in total</li> <li>- <i>SZI South corridor</i>: 14 associations of 160 members in total</li> </ul>	<ul style="list-style-type: none"> <li>- 30 Kolo Harena associations of 496 members</li> </ul>	<ul style="list-style-type: none"> <li>- 33 Kolo Harena of 660 members</li> </ul>	<ul style="list-style-type: none"> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- <b>8 Kolo Harena associations</b> of 1 390 members</li> </ul>	<p>The resumption of MICET and Tefy Saina's activities in the north corridor will rapidly increase the number of Kolo Harena in this SZI. LDI is working with 3 COBA associations established by the CAF project in Tolongoina.</p>
<p>13. Ecotourism in Antsiranana</p> <ul style="list-style-type: none"> <li>- One "Zone d'investissement écotouristique" established in Joffreville</li> <li>- Two simple lodges installed by the village associations (AVE)</li> <li>- One ecolodge built by potential investors in Joffreville or Ankarana</li> <li>- Five capacity building activities for local operators</li> </ul>	<p>- N/A</p>	<p>- N/A</p>	<p>- N/A</p>	<ul style="list-style-type: none"> <li>- on progress</li> <li>- Completed studies for construction of wells and village guesthouses, and restaurant and bungalows in Ambohitra</li> <li>- Nature Lodge has completed architectural and environmental impact studies for the new ecolodge</li> <li>- Support to ANGAP for training guides on Speleology</li> </ul>	<ul style="list-style-type: none"> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- The JARY Cabinet is still working in establishing the "Plan d'Aménagement" which will be review after Isalo ZIE completion</li> <li>- Construction will start the next dry season</li> </ul>

#### 4. PLANS FOR THE NEXT SIX MONTHS

##### Antananarivo Office

###### Ecotourism in Antsiranana

- € Finalize the establishment of the ZIEs. The next major task is to set up the entity, which will manage the ZIEs at Ankarana and Montagne d'Ambre.
- € Hire a full-time community organizer to help set up and monitor the setting up of village guesthouses to be managed by the Village Ecotourism Association (AVE) in Ankarana.
- € Develop a regular training program for ecotourism businesses in Antsiranana.
- € Complete the environmental impact study for Montagne d'Ambre Nature Lodge.

###### Micro credit and FIEFE

###### FIEFE

This forecast is based on four EFE projects identified to date, which may be able to benefit from the FIEFE, as follows:

- Total amount of the four projects: 2328 billion FMG (USD \$363,750)
- Bank loans requested: 1762 billion FMG (USD \$275,313)
- Amount potentially refinanced through FIEFE: 1410 billion FMG (USD \$220,250)

###### Micro-credit

Estimates for borrowing are based on previous results and on plan drawn up for each region. LDI has also been in contact with other micro-credit institutions who may eventually become partners as are OTIV and BTM.

Region	Activity	Number of Associations	Amount of credit (millions of Fmg)	Total by region (millions of Fmg)	Financial Institution
<b>Moramanga</b>	Rice		0	200	OTIV (Savings and Credit Union)
	Contre saison		0		
	GCV	15	200		
	other		0		
<b>Mahajanga</b>	Rice (jeby)	10	120	320	BOA ( Bank of Africa)
	Contre saison		0		
	GCV	10	200		
	Other		0		
<b>Fianarantsoa</b>	Riz		0	320	BOA
	Contre saison	10	120		
	GCV	20	200		
	Other		0		
<b>TOTAL</b>	Riz		120	840	
	Contre saison		120		
	GCV		600		
	Other		0		

###### Administration

Main goals for coming six months

- We are now in the process of creating a database of all reports published by LDI. These will be transferred to CD-ROM and distributed to the regional offices and all partners in order to make this information easily available.
- The used equipment transferred from the CAP project will soon be available for use at the regional and subregional offices.

- During the first months of 2000, we will work together with USAID and the Ministry of Environment to set up the new tax exoneration procedures.

## **Fianarantsoa**

### **Agricultural intensification**

- Technical assistance of villagers in SRI/SRA, cash crop cultures, market-gardening and pisciculture in all the SZIs
  - Application and follow up of contract with the Association Tefy Saina in Ranomafana
  - Study of agroforestry system by Cornell University student Leslie Ackerman
  - Testing of a "hache paille" machine for making compost
  - Organization of the off- season horticultural campaign
  - Programming of activities of NGO partners: FFF Malagasy Mahomby (north and central corridor), ATS (Andringitra), Soafaniry and Fanarenana (South corridor)
  - Consolidation of the "gestion de terroir" approach in the SZIs
  - Technical studies along with social and institutional organization of water users for small dams constructions in Alatsinainy-lalamarina and Ambohimahasina.
  - Technical and financial feasibility analysis of small dams and routes identified with PNUD/FAO/FID
  - Study of the rehabilitation of the agricultural center of Kianjavato with the partnership of FOFIFA
- Establishment of 5 agricultural inputs centers and recruitment of *expert-juniors*.

### **CBNRM**

- Workshop on community-based management of the 4 aromatic and medicinal plants in Sahavoemba
- Elaboration of ecotouristic plan and local and medicinal plants preparation plan in Bevoahazo
- Technical assistance of community eucalyptus reforestation in the SZIs
- Expansion charcoal and wood exploitation scheme in Ambohimahasina eucalyptus plantations with the EASTA Iboaka, Peace Corps and CCD Namana
- Preliminary studies of a community-based management of forest sites identified in Ambohimahasina, Ikongo, Sendrisoa, Tsaranoro and Miarinarivo

### **Conservation Enterprises**

**Hotel Thermal and RAVINALA** in Ranomafana: study of documents requesting support for the rehabilitation and extension of its hotels.

**Camp Catta Tsaranoro**: Establishment of an ecotourism strategy in the zone

**FCE**: Establishment of a FCE unit to pursue the privatization and rehabilitation of train activities. Transfer of an individual to the elaboration of ecotouristic promotion tools

**M. LOUVET**: Feasibility study of a banana plantation and the commercialization of its products. Support of ecotouristic development activities in the Southeast region of the island.

**M. DIDIER**: support for a study of an ecotouristic exploitation in Tolongoina

**EPAM Sahakondro**: Study of the amount of labor needed for the maintenance of the cinnamon and ravintsara plantations and of the exploitation of essential oil extracts and their cultures

**Sericulture**: establishment and execution of a contract with CCD Namana to support the trained women

**Apiculture**: Financial and technical support to the Kolo Harena for production and commercialization of honey and wax

**Improved woodstoves**: promotion of these improved woodstoves with ANAE

- **Herb Research Foundation**: support for partner operators in ravintsara, cinnamon, ginger and *niaouli*

### **Environmental education/Communication**

- Establishment of a financial support strategy for the *Fanoitsa* bulletin
- Starting of the regional communication plan by integrating into it LDI communication activities (plays, films, exchange visits...)
- Elaboration of environmental education plans with MICET for 2000-2001
- Talks with pastoral and religious training centers

### Capacity building

- **RFDP (Regional Forest Director Plan):** Assistance and exploitation plan of the Haute-Matsiatra pine plantation in collaboration with the Cooperation Suisse, Intércoopération Suisse, and the COPIL of the DIREF
- **Rapid biological inventory:** organization of a seminary for the restitution of data; search for financing of the year 2000 program
- **RIN (regional information network):** in collaboration with the SIE/ONE concerning the monitoring of the environmental state, establishment of an environmental *tableau de bord* at time zero.
- **DUP project (Data User Program):** Creation of a technical commission to monitor fires and deforestation on the basis of radar images supplied by SARMAP
- Training and organizational reinforcement of the Kolo Harena, the Environment and Social Development Committee and the *Comité de Développement Communal* in the SZIs

### Ecotourism in the ZIEs

**Zafimaniry Forests:** study of forest community management of the rural *commune* of Ambohimombo (delimitation of sites, biological inventory, and ethno-botanic study...) for the establishment of a local ecotouristic forest management.

**Isalo:** establishment of financing mechanisms with the environment ministry and ANGAP to rehabilitate the routes towards the West of the park. Rehabilitation of the park in collaboration with ANGAP and WWF

**Andringitra:** Reinforcement of the role of the steering committee before the local community and the investors concerning the occupation of tourist zones; follow-up to Tsaranoro case study on ecotourism potential.

## **Mahajanga**

During the next six months, two agricultural seasons will succeed one another: asara (Dec-April) and jebly (May-August). The same crop intensification activities started in asara will be repeated, with the addition of special jebly season crops (e.g. vegetables).

Cashew tree planting, already started, will continue through the end of January. The land preparation and planting of all crops and trees at the CDIA will be completed.

For conservation enterprises, much attention will be directed toward finalizing the choice of the alternative fuels to charcoal and the specific stove models to be promoted by LDI. The results of the study of ecotouristic potential of the Anjohibe Caves will be used to support a move to have the statute changed. LDI will continue to support the installation of a fruit juice factory by EXOFRUIMAD. And depending on the decision of the Malagasy Seafood Company investors to continue in light of the Tilapia resources study results, LDI will support any activities that can be linked to environmentally friendly economic development in the SZIs. The anticipated investments are \$500,000 for the Malagasy Seafood Company and \$200,000 for EXOFRUIMAD.

The regional environmental communications strategy for Mahajanga will be implemented in collaboration with MIRAY, and the environmental education activities of CCEE (in schools) and Ressources Vertes (for Kolo Harena) will continue.

The transfer of management rights to Marosely for the local forest via a simple contract between the CLB, the Commune and E&F will be finalized with the help of an expert consultant in GPF; and the process of transferring management rights for parts of the Anosimijoro forest to 2 associations of charcoal makers on the Bekobay Road will be well advanced, if not finalized.

For the reinforcement of local partner capacity, a comprehensive training program for the CDIA will be developed and implemented to complement training and sensitization by field agents and socio-organiseurs in the SZIs. And finally, the joint activities specified in the various cooperative agreements with development partners will be implemented.

## Moramanga

CATEGORIES	ACTIVITIES	PARTNERS
<b>Conservation enterprise</b>	<p><b>Cinnamon</b></p> <ul style="list-style-type: none"> <li>- Handling and work out the collaboration with Phael Flor.</li> </ul> <p><b>Ecotourism</b></p> <ul style="list-style-type: none"> <li>- Financial support for room expansion and assistance in dossier "FIEFE" formulation to "restaurant Buffet de la gare"</li> </ul> <p><b>BRF</b></p> <ul style="list-style-type: none"> <li>- Make operational community based and private enterprises for BRF exploitation</li> </ul>	<p>PHAEL FLOR</p> <p>Buffet de la Gare</p> <p>VOLISOA, CJPM</p>
<b>CBRNM / GELOSE</b>	<p><b>Marsh natural resources management</b></p> <ul style="list-style-type: none"> <li>- Elaboration of natural resources management plan for 5 villages and IEC on existence of CBRNM for all the communities around the lake for practical execution of the scheme</li> </ul> <p><b>Forest Management</b></p> <ul style="list-style-type: none"> <li>- PRA session/ social survey on possibility of Community based Forest Management implementation in Vatomora - Ambatoharanana</li> </ul>	<p>DURELL, Z.P, CIREF, CIREL</p> <p>MIRAY</p>
<b>Monitoring and Evaluation</b>	<p><b>Participatory monitoring</b></p> <ul style="list-style-type: none"> <li>- Exploitation of household data book</li> <li>- Increase regional learning, responsibility sharing and promotion of an effective participation of the communities.</li> </ul>	<p>Kolo Harena</p> <p>Kolo Harena, CIIFAD</p>
<b>Capacity building</b>	<p><b>SUPPLY CENTER</b> Make the centers operational</p> <p><b>CREDIT</b> Granting credit to K.H farmers</p> <ul style="list-style-type: none"> <li>- Improvement of stakeholders synergy (MEF, CIREF, MIRAY, LDI)</li> <li>- Capacity building of AUE and A.K.H</li> </ul>	<p>BEST</p> <p>DID/OTIV</p> <p>MEF, CIREF, MIRAY</p>
<b>Agriculture Intensification</b>	<p><b>Planification process</b></p> <ul style="list-style-type: none"> <li>- Creation of land use plan for Kolo Harena associations</li> </ul> <p><b>Tanimboly</b></p> <ul style="list-style-type: none"> <li>- Diffusion of multi-purpose trees and propagation techniques.</li> <li>- Supervision of ginger ecological culture: weeding, eradicate disease and insects</li> <li>- Management, improvement of existing fruit tree production, robusta coffee tree and extension of arabica coffee tree plantation (12500 plants)</li> <li>- Diffusion of composting and BRF techniques</li> </ul> <p><b>Tanety</b></p> <ul style="list-style-type: none"> <li>- Stabilization of 2 lavaka in Antsahakely: invitation to bid and accomplishment</li> <li>- Development of tanety, contouring and association of culture with leguminous species for staple food (corn, bean, round bean) and cash crop food (coffee, ginger)</li> <li>- Improved pasture system</li> <li>- Reforestation: supervision of nursery and reforestation</li> </ul>	<p>-PDM, CIREF, CIRAGRI, TOPO, DOMAINES</p> <p>-CIREF, Ezaky ny Zanatany</p> <p>-CIRAGRI, BEMA Mac Donald E/se</p> <p>-CIRAGRI, ESSA</p> <p>-Office Engineering and other enterprises</p> <p>- TAFa, ANAE, BEMA</p> <p>-CIREL CIREF, Ezaky ny Zanatany</p>

<b>Agriculture Intensification (cont.)</b>	<b>Intensify lowland rice production</b> <ul style="list-style-type: none"> <li>- Irrigation improvement : <ul style="list-style-type: none"> <li>- Waterway maintenance in Ambohimiarina (accomplishment)</li> <li>- Dam in Antsahakely (accomplishment)</li> <li>- Dam in Ambohimananarivo (examination and accomplishment)</li> <li>- Dam in Andavafody (accomplishment)</li> <li>- Dam in Ambatovy (examination and accomplishment)</li> <li>- Dam in Fotsialanana (étude et réalisation)</li> </ul> </li> <li>- Test SRI supervision</li> <li>- Diffusion of SRI / SRA supervision</li> <li>- Market gardening (Planning)</li> <li>- Community granary (Supervision and creation)</li> <li>- Small animal raising</li> <li>- Continuation of diagnostics and activity identification</li> <li>- Bee keeping development</li> <li>- Add species to the lake fish population et fish raise development</li> </ul>	-Office engineering Other research departments ESSA  Local ONG,  -CIRAGRI, TefySaina BEST  -CIREL, ONG Ramilamina -CIREL -CIRPRH
Environmental education and Communication	<ul style="list-style-type: none"> <li>- Improvement of management capacity of Kolo Harena association members</li> <li>- Kolo Harena Functional training <ul style="list-style-type: none"> <li>- Training for AUE</li> <li>- Training on lake population biodiversity</li> </ul> </li> <li>- School garden</li> </ul>	BEST, CIRPRH, DURELL  DURELL, CISCO, Ezaky ny Zanatany
Regional level support activities	<ul style="list-style-type: none"> <li>- Eradicate disease and insects on plants (Diagnostic, therapy and training)</li> <li>- CDIA ( Strengthen management system, realizations, exhibit and training)</li> <li>- Rural radio broadcast</li> <li>- Research (SRI, Compost, fallow use and domestication of home fruits, animal raise)</li> <li>- Supervise supply center management</li> <li>- Development of communication and commercial information network</li> </ul>	DPV, ONG MAROTIA BEMA, SAF, BEST, CIREL BEMA, DDC, SAF/FJKM, Médiascope ESSA, CORNELL  BEST CIM, MIRAY

## **ANNEX1**

**Study and Research reports from Cornell University students in Beforona**

## **Annex 1 : Study and Research reports from Cornell University students in Beforona**

### **EVALUATION OF THE DOMESTICATION POTENTIAL OF USEFUL WOODY RAINFOREST SPECIES IN THE EASTERN REGION OF MADAGASCAR -Erika Styger's research**

Rainforests in Madagascar could disappear within the next several decades if present trends of deforestation due to slash and burn agriculture persist. Most of plant biodiversity is restricted to intact rainforest areas because outside the forest, repetitive burning kills regenerating indigenous species and favors fire-resistant, exotic plant species. There is a rich undervalued potential for multiple uses of rainforest plants, and people living next to the forest have an intimate knowledge of these plant resources. As the forest disappears, this knowledge gets lost as well.

One strategy for conservation of biodiversity is to support the domestication of useful woody forest species, which is the focus of Styger's research. The aim is to increase the availability of these species and their products to rural populations, thereby contributing to agricultural diversification and creating new sources of income. The integration of these species into agroforestry systems would assist the rehabilitation of degraded land and to the restoration of biodiversity within the landscape.

Most activities noted below are still in process and not conclusive, especially as the approach is to integrate ecological, social and economic components of tree domestication, with each complementing the other as research advances. The research began with informal surveys and with discussions to LDI staff and other professionals to refine understanding of research issues, and with exploration of zones within the Mantadia -Zahamena forest corridor. On the eastern as well as on the western side, three research sites were identified as well as two forest sites within the corridor. The sites outside the forest represent different stages in the evolution of agricultural systems as well as in environmental degradation.

Research started with an inventory of useful rainforest trees, including description of ecological and species characteristics, economic values at forest gate, etc. Already 250 species have been inventoried through discussions with communities. Botanical specimens of these species have been collected and their scientific name determined at the herbarium of the FOFIFA Forestry Department in Antananarivo. The inventorying process continues.

In three major regional markets -- Tamatave, Ambatondrazaka and Moramanga -- a weekly survey over a 12-month period has been initiated, to apprehend the products from woody rainforest species that appear in the market. Product classes are: wood, food, medicinal plants, and others like fibers.

The ecological domestication potential of rainforest species lies mostly in their ability to grow under present conditions outside the rainforest. The first step initiated has been to analyze which of the useful rainforest species already naturally occur in different types of secondary vegetation or fallows. For this, a fallow classification has been initiated based on the criteria of dominant fallow species, land use history, and soil fertility status. Identifying the presence of rainforest species in secondary vegetation is complemented by analyzing the existence of mycorrhiza associated with those species, as mycorrhizal fungi are responsible for essential nutrient uptake for plants which is especially important in more degraded soils.

A direct seeding experiment of four forest species was set up at the beginning of the rainy season and will be extended in January with at least four more species. This experiment is being carried out in five sites, two forest sites, and three sites outside the forest along a soil fertility gradient.

With this information collected on different classes of fallow classes, since the link to agricultural productivity potential of these soils is very close, we can gain some useful insights on sustainable land and soil management practices and have some bases for agricultural intensification strategies. A multilocational experiment has been set up on four major fallow types along a soil-fertility gradient evaluating agricultural productivity with upland rice. The cultivation practice of slash-and-mulch (rather than slash-and-burn) has been adopted as well as the application of locally available guano phosphate (Hyperbarren phosphate). This contributes to soil pH correction and thus increases nutrient availability to plants.

During the next six months, the species inventory, the market survey, and an ecological study of species will be continued. Another component will be added to the research -- the social analysis, looking at people's knowledge, perception and behavior toward useful rainforest trees, including the option for domestication. All this information will be integrated to identify species with a promising potential for domestication as part of a larger landscape strategy for biodiversity conservation.

## THE POTENTIAL FOR FUTURE PROPAGATION WORK VIA THE CENTER FOR PROPAGATION IN BEFORONA -- Ben Niemark's research

### Introduction:

Increasing population demands in Madagascar have caused rapid rates of deforestation; thus the need to conserve existing stands of tropical forests has become a top priority. One approach is to intensify, stabilize and improve existing small-scale agricultural plots so as to reduce the need to clear new tracts of forests via slash-and-burn. Alternatives to the traditional slash-and-burn systems (called *tavy* in Madagascar) are increasing the demand for new agricultural techniques that may accomplish this goal. Agroforestry is such a system, and innovations in new and traditional agroforestry systems can have a major effect on farmers' adoption of these alternatives to slash-and-burn. Improvements in propagation techniques are a key innovation that may make alternatives more attractive.

Asexual propagation has played an important role in traditional agroforestry practices, particularly in case of staple foods like cassava, banana, taro, potato, sweet potato and others (Mudge, 1999). New approaches like the etiolation of cuttings and *in-vitro* micrografting have shown great promise for improved asexual propagation of a wide range of difficult-to-root woody crops. The experimental evaluation of these methods with many as-yet-untested multipurpose fruit and forest trees is likely to bring further success. As advances are made at both the low and high end of the technological spectrum, asexual propagation will increase in importance as a powerful tool for the development of sustainable agroforestry systems.

In November of 1999 a rural farmer survey was conducted in four villages around the Center for the Diffusion of Agricultural Intensification located in Beforona (CDIA). Its purpose was to gather information on the *tanimboly*, a traditional farming system of perennial fruit crops usually consisting of two to three exotic cash crops (i.e. banana, coffee). This system is a legacy of French colonialism that established a Malagasy export industry for fruit tree cash crops.

The *tanimboly* system, if managed correctly can improve farmer income, add a vital nutritional source, and establish much needed food security. These systems if managed properly can be used as an intensive farming system the provided year round income and added nutritional source. Modeled after the Javanese homegarden system, the *tanimboly* system has the potential to support a multitude of fruit trees, livestock, annual crops, medicinal plants, and multipurpose forest trees.

The purpose of this survey was to investigate what propagation skills and knowledge the Betsimisaraka farmer's have, and what is the best strategy to improving these skills. With this knowledge we can begin to understand how to improve and intensify this traditional fruit tree system. Discussed below are results of a farmer survey conducted with the Betsimisaraka ethnic group located in the East coast and medium altitude humid forests of Madagascar. There were 48 farmers surveyed, from four villages; Marlolafa, Ambinanitsavolo, Maromitety, Ambatomisina.

### Results of the survey:

Majority of fruit grown in the *tanimboly* is designated for home consumption, but some is brought to local markets (usually coffee some bananas). The majority of the management and experimentation on propagation is conducted by the man, 93%, 73% respectively, but some work is conducted by both the man and the children together, production s done by the whole family.

Eighty-nine percent of farmers surveyed had no knowledge of the three asexual propagation methods shown, top-wedge grafting, bud-grafting, although some said they had seen grafting but had no confidence in their skills. Most had some knowledge and skill in marcottage, but it was the traditional technique of using raffia palm and compost instead of moss and polyethylene, the former technique has a lower success rate due to desiccation.

What is the biggest problem you have with diversifying your *tanimboly*?

€ Lack technical knowledge, 38%

- € No time to wait for fruit tree returns, 18%
  - € Lack technician present, 11%
  - € Lack knowledge about other fruit trees, 11%
  - € Cultural limitations, 9%
  - € Lack of market knowledge, 7%
  - € Confidence in techniques, land availability, insect protection
- When was the last time you saw a fruit tree technician in your village?
- € 66% had not seen a fruit tree technician in their lifetime,
  - € 18% had,
  - € 15% saw one in 1960-62.
- What are some fruit trees that you would grow in your tanimboly?
- € Citrus and Litchi, 62%
  - € Citrus, Litchi, and Avocado, 13%
  - € Litchi, 23%
  - € Coffee, 2%
- What are some forest fruit trees that you would grow in you tanimboly?
- Lack of knowledge about what trees they can grow, 75%
  - Voangy ala (citrus spp.), 15%
  - Rotra, 10%
  - Govyaers, Samborozano

Due to an absence of a fruit tree technician or some type of extension agent, the farmers surveyed are lacking technical skills in both what type of trees they can grow, how to propagate, and management of existing trees. As the tanimboly systems grow older there is a decline in yields this might cause neglect because of low returns from fruit, which are less attractive to the biannual rice and ginger.

Some type of training on propagation, management and intensification of fruit trees are necessary in the Beforona area. Trainings should be conducted via hands-on demonstrations of grafting, layering, division, seed collection, fruit tree management, post-harvest handling and storage and marketing. The Center for Diffusion of Agricultural Intensification in Beforona is in a good position to facilitate this task.

#### Conclusions:

Results via the rural farmer survey and personal observations made in the five months working out of the CDIA in Beforona, I can clearly state that the majority of the farmers living in the four villages around the center lack basic knowledge of fruit tree propagation, i.e. grafting, layering (marcott), cutting propagation and rootstock regeneration. Results of the farmer survey show that they desire to learn these skills, and wish to improve their fruit tree management, production and markets.

CDIA should conduct plant propagation trainings on applicable fruit and forest trees commonly grown in the area. To accomplish this task a full time nursery director should be hired to run the nursery. This propagation specialist must have skills with grafting, nursery management, rootstock training, development and market knowledge. The nursery should be expanded so high-quality germplasm can be generated successfully. Litchi, citrus, avocado, and mangosteen are fruit trees identified as top priority species, with high production potential in the Beforona region. Virus-free seeds of these fruit's rootstock should be obtained and grown in high quality conditions with skill and care.

The nursery should be expanded to include fruit trees and materials need to be procured that will ensure the success of the increase in production, for example, rooting hormone, grafting bands, Parafilm plastic, and grafting wax. Some of these items might be able to be found in Madagascar, if not, appropriate local material should be obtained, for the farmers availability to these items are very limited. The CIDA Center should be used as a stock center that germplasm can be filtered down to the satellite centers. With this germplasm, technical skills and training materials can also be passed down.

In 1995 on a research trip to Kenya, Professor Kenneth W. Mudge, Cornell Floriculture and Ornamental Horticulture, developed training manual called, Plant Propagation: with an Emphasis on Fruit and Agroforestry Trees in East Africa. This farmer level teaching guide is filled with diagrams,

slides, and descriptions of all related techniques needed to conduct farmer level trainings. He has given his permission for the use and translation of this packet, and should be a top priority for LDI and the CDIA.

It seems that the vegetative propagation of *Prunus africana* seems to be a very important priority for LDI. Asexual propagation by cuttings has shown some limitations in the past, and the need for further propagation experiments is essential for the survival via the domestication of this highly valuable species. Finding the correct set of treatments, and environmental conditions that induce advantageous root growth will take time through careful experimentation. The building of a non-mist propagator would facilitate this goal, developed by Leaky et al., it is designated for the use of multiplying difficult-to-root species at a successful rate (6). This propagator would help researchers find the correct set of conditions for the vegetative propagation of *Prunus*. The non-mist propagator is a closed case propagation system, very similar to the polyethylene tent described in the moisture management experiments above (see 4.1). Its dimensions are not fixed to the diagram below but should be built with equal treatment flats to ensure correct experimental units.

#### PRESERVATION AND PROPAGATION OF PRUNUS AFRICANA -- Bryan Dailey's research

*Prunus africana* is a medicinal tree native to the high-altitude rainforests of Madagascar. For the past thirty years, an extract from its bark has been clinically tested and used in Europe and the United States for the treatment of various prostate disorders, including prostate gland hypertrophy and benign prostatic hyperplasia. Prostate cancer is the most common type of cancer and the number two cause of cancer deaths among males in the United States, making this tree is an important source of medicine for patients and of income for the local and national economies of Madagascar. In just one week, local harvesters of the bark earn over 15% of the island's annual average income. The complex, synergistic composition of *P.africana*'s chemicals makes artificial synthesis unlikely, ensuring the economic future of the species, but perhaps threatening its ecological future.

In Madagascar, this canopy species is found exclusively in wild stands of virgin forests where it has a crucial ecological niche. The typical harvesting technique of chopping down the tree not only affects the forest structure, but is thought by some to reduce food sources for birds and primates. Its survival, and that of the threatened environments in which it grows, relies on the tree's protection. Accordingly, *P.africana* was added to Appendix II of the Convention on International Trade in Endangered Species of wild fauna and flora (CITES), imposing strict regulations on its harvest and export. It is possible that the protected status of *P.africana* can save not only the tree itself, but also the forests in which it plays a critical part, while maintaining the supply of this important medicine and income source.

In July 1999, he started to record a series of ecological characteristics of *P.africana*, including the exact location using GPS, slope, aspect, distance from water, associated species, and the size and health of tree. From the same trees, he took samples of bark that will be analyzed at Cornell University by Mass Spectrometry - Gas Chromatography (MS-GS) to determine the quantity and quality of medicinal compounds found at various sites. The results may establish a correlation between certain ecological characteristics and the medicinal value of the tree, providing valuable information for conservation and protected area management efforts.

This information should be helpful in the improvement of propagation and reforestation projects, one of which LDI is leading in Phelps-Dodge. In-situ nurseries and then reforestation can use growing conditions and harvest techniques that maximize the production of biomedical material. Perhaps the value of these forests could be increased enough so that their conservation and sustainable use would be more economically valuable than their destruction. This type of conservation could limit the need for laws and their continuous enforcement and funding. The end result, an integrated stand of permanent, high-value trees, can be one component of sustainable livelihood systems based on integrated, multi-story agroforestry systems rather than detrimental forest exploitation and slash-and-burn agriculture.

Part of his work was focused on bringing together current efforts to conserve *P.africana* and the associated forests into a focused, cooperative effort to address the needs of the Malagasy rainforest, to add stability and diversity to the income sources of small-scale farmers, and to aid those suffering from prostate disorders. In addition to LDI and Cornell University, his research has involved

collaboration with the following organizations; the University of Antananarivo, the exporting company Pronatex, Projet d'Appui aux Exportations Agricoles, Fanamby, SILO and GTZ, the Missouri Botanical Garden, and ICRAF.

## CONSTRAINTS TO ADOPTION OF THE SYSTEM OF RICE INTENSIFICATION -- Christine Moser's research

The extraordinary rice yields that can be achieved through the production method known as the System of Rice Intensification (SRI) -- double, triple and even quadruple -- have raised hopes that this method can greatly improve food security and welfare in the country and reduce economic and ecological pressures on remaining forest areas. Why such a productive system is not being adopted more rapidly and widely remains to be explained.

After two months of field work, no firm conclusions can be reached, but initial investment costs, risk, and labor requirements associated with SRI certainly represent barriers, based on interviews with farmers and agricultural personnel. Until there is more widespread understanding and acceptance of the method, its promotion will require considerable effort by government or NGO staff.

**Methodology:** Interviews were conducted in the areas of Marovoay, Antsirabe, Ranomanfana and Aloatra. Fifty-four SRI adopters, ten SRI "disadopters" (those who tried SRI in the past but no longer use the method) as well as non-SRI farmers, extension agents and technicians were interviewed. Questions were asked regarding specific rice cultivation practices, access to extension agents and materials, advantages and disadvantages of SRI, land holdings, sources of income, and labor uses.

**Investment Costs:** One of the advantages of SRI over other methods for raising production was thought to be its low cash cost to farmers, and thus its suitability for poor farmers. However, the initial investment required for land improvements and materials is substantial and is a constraint to adoption. The ability to control the water level in the rice field, and specifically the ability to drain the water off it, is an essential part of SRI. The amount of time or money needed to assure good water management and the zero percent slope required for SRI obviously depend on the location and initial state of the field. In some areas, minor work done by the farmer himself may suffice, while in other areas, major rehabilitation of irrigation and drainage systems is necessary to practice SRI.

The issue of water control often goes beyond physical requirements; in some cases the ability to control water is linked to the actions of farmers in adjacent rice fields, especially true of terraced fields. A farmer may not be able to drain or water his fields as needed for SRI without the cooperation and consent of his neighbors.

In addition, a farmer should also have access to a mechanical hand weeder. While this is not technically required for SRI, weeding frequently by hand is not practical. Many feel the weeder is a necessity and that it also aids in aeration of the soil. Out of 64 farmers interviewed, only 20 owned their own weeders, and of these 20, at least 5 were given weeders with their training. Only 5 farmers weeded entirely by hand and most used the weeder of a local association. Partly as a result of SRI, demand for weeders has grown in the last few years and the price of weeders has increased, making them even more difficult for farmers to buy. (The cost of locally fabricated weeders can be as low as \$5-10, so this limitation could be reduced by increasing the demand, such as by bulk purchases, and by raising supply, encouraging more blacksmiths to undertake production.)

The problems of water management and mechanical weeders have often been overcome with the help of NGO or project intervention. This partly explains why SRI does not often spread spontaneously from farmer to farmer. Regardless of the expected gains, many farmers cannot undertake these initial investments without help.

**Risk:** Farmers in Madagascar face many risks (weather, pests, sickness, price instability, etc.), and for most the goal is to try to minimize these risks as much as possible to assure food security for the family. For farmers thinking about adopting SRI, risk is an important consideration; farmers have to think not only about the risk of trying a new technique, but also the risk of failure of the rice crop due to weather or pest infestation.

The reluctance of a farmer to change may often be the result of perceived risk rather than adherence to traditional ways. SRI, in particular, looks very risky to a farmer; the SRI system is very different from traditional methods. The transplanting and water control practices are the most difficult aspects for farmers new to SRI. More than half of the farmers interviewed mentioned transplanting as a difficulty in the beginning; many said they were afraid to transplant the young, delicate plants.

Even if a farmer knows that SRI yields will be higher and he has mastered the techniques, he still must be willing to forego other activities to devote more time to his rice fields. Several farmers said that they are afraid to invest too much time in their rice fields because if the rice crop fails (due to drought, flood or infestation), they will lose everything. If, however, they split their time between rice and other activities, they are sure of having something regardless of how much rice they harvest. In other words, despite the promise of high yields with SRI, they prefer to diversify their sources of income in order to spread their risk.

**Additional Labor Requirements:** The greater labor requirements of SRI are the most persistent problem for farmers. While several studies have previously shown that SRI requires 25 to 65 percent more labor than traditional methods, these estimates did not take into account such tasks as the daily inspection of the water level and guarding the seedbed and young transplants against birds and rats. Traditional methods do not require so much daily attention for most of the season, thus leaving the farmer free to engage in other activities, even away from the village.

Most SRI adopters (even those with several years of experience) are only able to put a fraction of their total rice fields in SRI due to lack of time, money or both. This is true for those who may have several fields in different locations or for those who have to work away from the rice fields frequently during the rice season. Unfortunately, the poorest farmers are the ones who must engage in most off-farm employment to earn enough money to make it to the harvest. Thus lack of time and/or lack of money for hired labor or for *entre-aide* prevents farmers without a significant degree of food and monetary security from adopting SRI.

**Disadoption:** Lack of time and money were the most frequently cited reasons for discontinuing SRI. Farmers may want to continue practicing SRI, but if they cannot wait until the rice harvest for money, they may be forced to revert to traditional methods in order to free up more time to work elsewhere.

Work done by *Projet Terre-Tany/BEMA* also suggests that poverty is an obstacle to intensification of agriculture. The poorest group cannot devote adequate time to their own fields and are thus stuck in a cycle of low production, low inputs and continuing poverty. SRI, like other intensification methods, is a difficult undertaking for those living day to day.

The SRI adopters interviewed did seem to be relatively well off (and likely not as a result of SRI), and several field agents reported that it is extremely difficult for the poorest farmers to adopt the method. The average adopter in the study had 2 zebu, enough rice to last 8 months, 60 ares in lowland rice, a consistent source of income (from cash crops, commerce, or a salaried job) and used hired labor or *entre-aide* for at least three major tasks during the rice season. According to the classifications of both the *LDI-Fianarantsoa* and *BEMA*, such farmers would be placed in the middle income level of rural *paysans*.

Only 3 of the 54 SRI adopters interviewed used no hired labor, and 11 used hired labor only for soil preparation and leveling. The rest hired labor for at least the most difficult tasks (preparation, transplanting and/or weeding). However, even those who can afford to hire labor still face difficulties with SRI. Teaching the SRI techniques (especially the transplanting) to hired labor and finding persons willing to do it are common problems, especially during the first year of SRI use. Several farmers said they had to pay 500 to 1,000 FMG more per person per day for SRI transplanting than for traditional transplanting.

Given the limited nature of this study and absence of a control group of non-SRI farmers, it is impossible to determine the degree to which poverty is an obstacle to SRI adoption. A few farmers felt that after several years of experience with SRI, the method does not require much, if any, more work than traditional methods. However, even if this is true, if farmers cannot afford the additional requirements the first year, they will not adopt the method.

Extension: Lack of extension for agriculture in general is a problem in Madagascar, but because SRI is fairly complicated and significantly different from other methods, extension is particularly important for SRI farmers. Many farmers considered the initial training and follow-up essential.

ATS has done an excellent job of training farmers and establishing a network of agents and farmer-leaders in the areas in which they have worked. The establishment of SRI in areas such as Ranomafana is largely due to the efforts and dedication of ATS staff. It is difficult to compare the success of different extension methods and publications due to lack of SRI diffusion efforts by organizations other than ATS. Most of the farmers interviewed received training or extension support from this organization. Some learned the method from government extension agents and a few from reading journals.

Many farmers reported trying SRI after seeing their neighbors' SRI fields. Thus, sometimes the obstacle is getting the initial SRI field established, and then having in place a system for training those who become interested.

Regional Differences: The environmental, cultural and economic differences between the areas where the interviews took place were significant, and below is a brief summary of issues particular to each region in the study.

Marovoay: Water control issues were the most serious problem in the Marovoay plain, and most farmers must wait for large-scale rehabilitation of the irrigation works (currently underway) before SRI is possible. Some fields in this area also have problems with high salinity, which prevents transplanting young plants.

Antsirabe: SRI farmers in this area generally had less land for rice, but had more diverse sources of income and heavily relied upon hired labor. SRI seems to be most solidly established in this area.

Ranomafana (Ambatovaky, Ranomafana, Tsaratanana): Protecting seedbeds and young transplants from birds was a major concern to all farmers here. Without constant vigilance during the first week or two after seeding, farmers risk losing everything and having to seed over. The poverty constraint to adoption was most marked with the Betsileo near Ambatovaky. Among these SRI farmers, expansion of SRI parcels was reported to be difficult because of the cost of either hired labor or *entre-aide*.

Among the Tanala around Tsaratanana, the economic differences among farmers were less pronounced. Farmers reported fewer labor problems, even when they used little hired labor. This may be due to the relatively low-input cash crops (coffee and bananas) in the region which give the Tanala a certain degree of flexibility. In other regions, farmers may be much more constrained by labor.

Lac Alaotra: Farmers in general are relatively well off in this region, especially on the west side of Lac Alaotra, and the SRI farmers interviewed relied heavily on hired labor and animal traction. Both the extension agents and the SRI farmers interviewed generally agreed that it would be difficult for the poorest families in the area to use SRI techniques due to the high costs and time constraints of the families.

Recommendations: SRI is not a simple technique for farmers to adopt, and its promotion needs to be accompanied by a significant amount of technical (and possibly monetary) support, plus commitment to making it work. SRI should not be presented as a single solution, but as one of several options. Where SRI is to be promoted, the environmental and economic constraints, the methods used in training farmers, the availability of mechanical weeders, and the fertility of the soil are among the factors which ought to be considered.

If local economic and environmental conditions are not favorable to SRI, the method will not be adopted without active promotion. SRI may be particularly beneficial where land holdings are small and there is pressure to intensify rice production. Full SRI is most appropriate for families with either sufficient available family labor or the ability to hire labor, but sources of income and the agricultural

calendar are also important factors. More appropriate alternatives (possibly improved varieties, soil management, or diversification) are needed for families that cannot practice SRI.

The way in which SRI is taught may affect whether a farmer makes changes in his cultivation practices. Often farmers seem to believe they have only the choice between SRI and changing nothing. The farmers interviewed generally used either "full" SRI or traditional methods, with little in between. According to ATS, under the philosophy currently used in their training SRI is taught as a system of principles that the farmer can adapt to his own environment and circumstances, rather than as a set of necessary conditions. This more flexible way of looking at SRI is undoubtedly a response to the slow rate of expansion of the full method.

The principles of SRI should give farmers a better understanding of the needs of the rice plant. Once given this knowledge, it is possible that more farmers will be able to make some cultivation changes with modest increases in output (such as planting in line and weeding more frequently, or transplanting early). It is possible that the number able to practice "full" SRI will be small due to previously discussed constraints, but small changes may be easier to make.

Finding new ways to make the mechanical weeders more accessible and affordable is important for the long-term success of SRI. The fact that most adopters depend on weeders furnished by projects represents a constraint to potential adopters in areas outside of a project's reach, and a possible cause for disadoption once a project is finished. The weeders can usually only be purchased in larger towns and, as mentioned earlier, their price has increased significantly, indicating rising demand. The fabrication of mechanical weeders could be easily taught to local metal workers. This would reduce the price and serve as an additional source of income in villages.

The little fertilizer (compost, manure, or chemical fertilizer) used with either SRI and traditional systems is worrisome, and improving soil fertility should be a priority. The addition of organic material to the field is the recommended component of SRI that is least practiced by SRI users. Over 30% of SRI users with 2 or more years of experience added no nutrients to their fields, and those who do usually do not apply enough. The long-term sustainability of SRI yields in the absence of fertilizer has not been studied, but certainly if the yields fall off rapidly, this may encourage more farmers to abandon the method.

Conclusion: Some SRI proponents seem to be dismayed by the lack of uptake of SRI given the large yield increases possible. However, the inability to make the additional investments in land and labor required by SRI and the perception of risk mean that adoption rates will remain low without adequate support.

It is impossible to say, based on the information gathered thus far what portion of Malagasy rice farmers will find "full" SRI is appropriate and feasible based on their environmental and economic conditions. Water control will remain the fundamental obstacle unless there is significant investment. The degree to which poverty is an obstacle to SRI adoption, or to rice intensification in general, merits further study. Some believe that it is not means, but mentality that is the obstacle to SRI. It could also be argued that the farmers who are willing to try SRI are relatively well off because they are more dynamic and innovative. However, the large number of farmers who are convinced of the merits of SRI but who cannot find the means to expand their use of the method shows that the constraints are real.

This report is not intended to discourage SRI promotion, but rather to assess some of the limits of its applicability. SRI is not a panacea, but neither is it without merit and without a role to play in development. The high yields that can be obtained with SRI have helped many farmers in Madagascar and have the potential to help many more. However, its limits need to be looked at realistically, and the method needs to be presented to farmers as part of a larger range of options.

The knowledge gained about SRI adoption and the obstacles thereto during the summer of 1999 raises more questions about this process meriting examination. Because there is potential to increase rice production with SRI and to reduce pressures on remaining forest ecosystems, we would like to pursue these questions in more depth in the coming year.