

USDA-Forest Service Technical Assistance Trip Republic of Madagascar

In Support to USAID Madagascar for Assistance in Developing a Technical and Financial Diagnosis of the Utilization, by the Fanalamanga Corporation, of 60 000 ha of Pine Forest in the Region of Moramanga, in order to support the development of a New Restructuring Plan, a Utilization Plan, and a Business Plan

FINAL REPORT

Mission Dates: July 18 – July 31, 2004

Report Submitted by:

MARLIN A. JOHNSON
USDA Forest Service
333Broadway SE
Albuquerque, NM 87102
(505)842-3242
majohnson02@fs.fed.us

Mike Higgs
USDA Forest Service S&PF/CF
Mail Stop Code 1123
201 14th St. SW
Washington, DC 20250-1123
(202) 205-1382
mhiggs@fs.fed.us

DAVID E. KRETSCHMANN
USDA Forest Service
One Gifford Pinchot Drive
Madison, WI 53726
(608) 231-9307
dkretschmann@fs.fed.us

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BACKGROUND

USAID Request and Objectives of the Technical Assistance Trip

Introduction: The International Programs office of the USFS has a long standing partnership, funded by the U.S. Agency for International Development (USAID), to provide technical assistance in various aspects of forest management to the Ministry of Environment, Water and Forests (MEEF) in Madagascar. As part of this partnership, the Minister has asked the USFS to support an initiative to improve the management of a 60,000 ha pine plantation in Eastern Madagascar, known as the Fanalamanga Plantation. For a variety of reasons, management activities at this plantation have not fully utilized this resource, and the volume of pine removed and processed from this plantation is well below the full potential of the plantation. In an effort to provide wood for local and international markets during a period when new logging in natural forests is banned temporarily, MEEF has made improved utilization of this plantation a top priority, ostensibly to meet the wood needs of the nation. Specifically, the Minister has requested USFS support to provide recommendations on how the management of this resource can be improved without sacrificing sustainability or environmental considerations, and eventually, via a business plan, contracted out for private management.

To support the MEEF with improving the management of the Fanalamanga Pine Plantation, a USAID funded mission of three United States Department of Agriculture – Forest Service (USDA-FS) technical experts was undertaken from August 18 through August 31, 2004. The mission team consisted of:

Marlin A. Johnson Assistant Dir. Forest Management, Southwestern Region,

Mike Higgs, USDA Forest Service S&PF/CF, Washington, DC

David E. Kretschmann Research General Engineer, Engineering Properties of Wood, Forest Products Laboratory, Madison, WI

1. Mission Objectives

The Ministry of Environment, Water, and Forests, in collaboration with USAID Madagascar and its partners, defined the following objectives for this technical assistance mission:

1. Perform an evaluation of current and past plantation management practices, from technical, social, and environmental perspectives, focusing on an evaluation of the current status (quality) of the plantation and recommendations for management / silvicultural actions to improve the quality of the resource
2. Describe existing wood processing infrastructure, existing and potential wood products from this resource, and equipment needs to improve or begin production of various wood products
3. Perform a market analysis of existing and future products from this pine resource and develop a business plan for the Government. of Madagascar to successfully contract out management of this resource to a private or parastatal company

2. Mission Activities

USAID Madagascar provided the team with some general guidelines to facilitate the team's mission in Madagascar and help accomplish the mission's goals. These activities included the following:

1. Meet with representatives of the DGEF, Observatoire National du Secteur Forestier (OSF), USAID partners, Syndical National des Exploitants Forestiers de Madagascar (SNEF), and others to gain a better understanding of the current forest product system in Madagascar.
2. Review appropriate documents and visit sites on Fanalamanga forest
3. Formulate a set of recommendations to be shared with DGEF on how the current plantation operation might be modified to address current issues.

3. Anticipated Outputs

The Madagascar Mission of USAID identified specific outputs they would like the technical assistance team to provide. These outputs included the following:

1. An assessment of the existing databases for the Fanalamanga Forest.
2. An assessment of the current state of the Fanalamanga Corporation Operation.
3. A list of Potential Alternatives for Future Fanalamanga Management

Objectives and Expectations of the Minister of the Ministry of the Environment, Water, and Forests, Madagascar

In a letter dated January 21, 2004 to Jean-Robert Estime, director of the Eco-regional Transition Project (PTE), Minister Charles Sylvain RABOTOARISON of the Ministry of Environment, Water, and Forests Madagascar requested the following support for the implementation of a study on the Fanalamanga Plantation:

- Evaluate the Fanalamanga Project Plantation, for silvicultural and environmental impacts based on past management
- Evaluate the facilities and infrastructure of the Fanalamanga Company and those of industrial wood producers in the region
- Prepare a business plan to promote the sustainable management of the Fanalamanga Pine Plantation, including notably the size and type of investments to complete, as well as the products and markets to develop in the future.
- Present recommendations for the eventual "placement into private ownership" of this society, that will permit it to obtain foreign capital and investment in the form of a partnership with the Republic of Madagascar

According to the Minister, this study is destined to help the Ministry make decisions and strategic choices to improve the management of this plantation, with an aim for profitability and sustainability. The study will therefore allow the MEEF to valorize to the fullest the potential of these 60,000 hectares, which will have a considerable economic and environmental impact on the entire Moramanga region.

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Terms of Reference

To continue preparations for this mission, the members of the technical assistance team, along with Lisa Gaylord (Environment Team Leader, USAID), and Ndrantomahefa Razakamarina (Forestry Specialist, USAID), met with Rhodin , Director General, DGEF and Feurette ANRIANTSILAVO president of the current Fanalamanga Board of Directors. At this meeting the terms of reference that had been developed prior to the current technical visit were discussed and agreed to. An additional meeting was held in Moramanga with staff of PTE, the Fanalamanga Corporation, Cabinet ECR (a private consulting firm who had been asked to support the work of the USFS), and the Regional Office for Water, Forests and the Environment (CIREEF), to further discuss the terms of reference and confirm the primary actors charged with completing the work for each task outlined. The eight tasks are listed below, and the complete terms of reference are found in Annex A.

Task 1 : Establishing data bases for the project

Task 2: Detailed Description of the Project Planned by the Company

Task 3: Market Analysis

Task 4: Defining and Proposing Models for Management of the Fanalamanga Plantation

Task 5: Financial Analysis

Task 6: Environmental Analysis for the Project

Task 7: Preparing recommendations for concession granting

Task 8: Developing, Preparing, and Presenting the Final Report

Of the eight tasks proposed, tasks one, two, and four were determined to be the responsibility of this USFS team.

PRINCIPAL ISSUES: FINDINGS, RECOMMENDATIONS, AND ALTERNATIVES

Introduction

For various reasons, contracting with Cabinet ECR had not taken place prior to the mission, and they were not able to provide direct support to the team during the mission. Therefore, the reported info is based on our own information collection, interviews, observations, and analysis.

Principal Issues: Findings, Recommendations, and Alternatives

The technical assistance team reviewed previous studies and had personal communications with representatives of the DGEF, CIREEF, the Fanalamnga Corporation, individual logging companies, NGOs, and donor organizations. Conflicting information and opinions were sometimes expressed, most likely due to the experiences of people in different locations or due to the varying perspectives of the people interviewed. Nevertheless, based on these discussions, the results of the assigned tasks are presented below.

Task 1. Establishing Data Bases for the Project

1a. Background info

Explanatory Note:

None of the “existing data” identified in Task 1a as background material had been collected prior to the arrival of the USFS Team. It is understood that ECR’s contract for this work had been delayed due to technical complications.

Resource:

Description of the Pine Plantation—The latest available descriptions of the Fanalamanga plantation are based on individual stand examinations made from the early 1990’s to 1997. We were told that since 1998 crews with measurements skills have been taken off stand exams and moved to measurement of areas to be sold. Therefore, no updated information is being gathered about the present condition of the plantation.

The latest information was reported in the **Consultation report** prepared by RAMAKAVELO Seth Philippe dated April, 1999. Following is a synopsis of the description of the Fanalamanga plantation from that report.

- First plantations (1969/70 - 1974/75) with only Malagasy Government funds: 24 000 ha.

- Mangoro Forestry Project (1975-80) with World Bank funds, in return for which the government created the *Société d’Economie Mixte de Fanamalanga*,, to carry out the programme : plantation of 35 000 Ha and building of infrastructures .

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- **Mangoro II Forestry Project** (1981-1987) with the financial participation of IDA (66 %), the BADEA (14 %), the UNDP (3 %) and the Malagasy Government (17 %).

Plantation of 20,000 ha and continuation of infrastructure works.

- **Mangoro III Forestry Project** (1988-1994). New orientation : a slow down in the rhythm of planting, but upkeep and improvement of existing plantations, with funding from the World Bank, the Government and Fanalamanga's own resources ; the programme included development of the forest, forest upkeep works, the start of forestry exploitation and commercialisation.

Types of trees or forest composition

The trees planted are essentially of the *Pinus* type with four dominant species:

- . *Pinus Kesiya* : 83 % of the area;
- . *Pinus Caribaea* : 10 % of the area;
- . *Pinus Elliottii* : 6 % of the area;
- . *Pinus Oocarpa* : 1 % of the area.

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Table 1.—The Surface Area and Year of planting for Pine and Eucalyptus

YEAR OF PLANTATION	SURFACE Pine plantations (ha)	SURFACE Eucalyptus plantations (ha) (outside development)
69/70	3 556	
70/71	3 170	
71/72	3 399	
72/73	3 264	
73/74	5 417	
74/75	4 248	
75/76	4 186	
76/77	5 088	
77/78	6 312	
78/79	7 205	
79/80	5 826	
80/81	3 503	17
81/82	4 222	30
82/83	2 038	25
83/84	1 013	13
84/85	439	299
85/86	507	460
86/87	48	394
87/88	115	371
88/89	160	175
89/90	165	130
90/91	400	136
91/92	60	83
92/93	36	72
93/94	8	30
94/95	50	12
95/96	186	218
96/97	6	393
97/98	412	289
TOTALS	65 039	3 147

(Source: Fanamalanga)

The 1999 **Consultation Report** estimated fertility class only from the first 53,257 heactares (Ha.) planted since that was all that was being looked at that time for harvest in the near future. However, we believe the percentages used for various sites at that time is the best indicator available of productivity

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and is applied to the entire 65,039 Ha. The Groups established for the Plantation are as follows:

Group A, corresponds to the fertility classification I. and II., covers 12 027 ha of which the products are essentially intended for wood works (sawing).

Group B, groups the medium plantings of fertility III. classification, and extends over 22 855 Ha, of which the products are intended for several uses: sawing and industry.

Group C, composed of planting from classification III. and IV., fairly old plantings that are too old to be maintained, barely average and which occupy a surface of 7 507 Ha of which the products are intended exclusively for industry.

Group D, constituted of classification IV. and V. out of place or deformed plantings, that are outside the development area. The plantings are located on big sterile slopes. They will remain a reforestation protection. It occupies a surface area of 10 868 Ha.

Finding:

Volume Estimates for Standing Pine in 2004

Our following observations are based on review of the 1999 **Consultation Report**, review of stand data tables with mid-1990's information in them, some additional reports, and spot field visits. These visits were largely to areas where the Fanalamanga staff chose to take us, and it needs to be recognized that we had neither current inventories nor time to make visits to major areas of the plantation. These observations and the recommendations we make from them need to be taken in this context, and as further information becomes available adjustments should be made.

While the 1999 **Consultation Report** estimates little volume available from Group D sites, our observations are that many of these have growth rates high enough to include as productive forest.

The following table shows area by fertility class for the entire 65,000 hectare plantation. It is based on the fertility classes from the 1999 report, and assumes the same proportions as for the 53,257 hectares broken out by fertility class in that report.

Table 2.—The fertility classifications and total hectares for fertility class groups

GROUP	FERTILITY CLASS	TOTAL (Ha)
A	Classes 1 – 2	14,699
B	Class 3	27,902
C	Classes 3 - 4	9,170
D	Classes 4 - 5	13,268
TOTAL		65,039

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The 1999 report estimates that total standing volume of Commercial (wood > 14 cm diameter) was 4,709,620 cubic meters, and that there was an additional 7,332,500 cubic meters of Trituration (chip) wood or fuel with a diameter from 7 cm to 13.9 cm. Since no inventories have been completed since 1998, we can only assume that standing volume is now these figures plus new growth and less any removals through harvest.

First, to add new growth, we believe the estimate in the 1999 **Consultants Report** of 10.2 cubic meters per hectare is the best available. However, based on the following we believe less than the full 65,039 hectares should be assumed to be available for commercial wood growth and harvest.

1. Some areas have been harvested and because of low site conditions reforested to eucalyptus instead of pine. This is reported to only be 600 to 800 hectares.
2. Some areas were of very poor site and have not amounted to much. We estimate this at about 800 ha.
3. Some areas have been harvested and not reforested promptly.
4. Only part of the site 5 lands may have a growth rate adequate to support commercial harvests in the long run.

We feel that based on the 4 factors above, a conservative figure of 58,000 hectares should be used at this time to estimate total volume available and total current growth. Prompt reforestation in the future, plus new information about the low site class areas, could raise this figure up to a possible 63,000 to 64,000 hectares.

It appears that the 1999 report based volumes on inventories done from 1992 to 1998. We will apply the average growth figure of 10.2 cubic meters per hectare (rounded to 10) to the 58,000 hectares from 1998 to 2004, or 7 years. (There could be more growth than shown, since the mid-point of the 1990's inventories was actually about 1995.)

Table 3.—Table of Volume, Growth and Removal estimates for Fanalamanga

Category	1997 Volume, m ³	Percentage	Growth, m ³	Removal, m ³	2003 estimate, m ³
Chipwood – 7 to 13.9 cm	7,332	61	2,477	575	9,234
Commercial, > 14 cm	4,710	39	1,583	310	5,983
Total		100	4,060	885	15,217

We know that some of the trees have increased in size and therefore more of the 2003 volume could be in the Commercial category and less in the chipwood category. However, we have nothing to base an adjustment on at this time.

Wood removed from the plantation since the last inventories were done was provided by Fanalamanga. They report that from 1996/97 to 2003/04, an average of about 111,000 m³ or a total of about 885,000 m³ were removed. Volume removed was not reported in chipwood and sawlogs, so we assumed

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for the numbers in the above table that it was 35 % sawlogs and 65 % chipwood.

From the above data, we estimate about 15,000,000 m³ standing in 2004.

Additional Dynamics

There are additional dynamics happening to the plantation. Here are a few of the most significant ones, as well as our observations about the current management situation.

1. **Fanalamanga Data Base.** Fanalamanga has a map and a computerized data base to maintain records about the plantation (Appendix B). The 3 Regional zones are divided into sections, designated by a letter. Each section is further divided into stands (parcels) usually ranging from about 30 to 100 hectares and designated by a number. This enables maintenance of good records about the condition of the forest. It is reported that within about one week an even better data base will be available that will allow also maintaining a record of each activity carried out in the stand.
2. **Updates to Data Base.** It is also reported that the resulting condition of a stand, after each activity is carried out, is entered into the data base annually. We were not able to ascertain if this actually happens, but it is a very important step.
3. **Deviations from Stand Treatments.** Treatments are planned as a pre-commercial thin at about age 5, commercial thin at age 15, and final harvest at age 25. However, deviation from this plan has been to often not do one or both of the thinnings. This has led to stands that are too dense and leads to more small trees rather than fewer larger trees. We feel this has detracted from the value of the plantation.
4. **Shelterwood Cut.** A treatment is done at age 25 to 30 called the "second thinning" but in reality more like the first entry of a shelterwood cut. This often allows natural regeneration to occur. The overstory is planned for removal 5 years later, allowing for some increase in size and value before final harvest.
5. **Road System.** The road system throughout the area is in very poor condition and urgently needs major maintenance and some reconstruction. This leads to excessive erosion and higher costs for all management activities, but especially for hauling of harvested timber.
6. **Thinning in Center Region.** The early planting in the Center Region received less thinning than the others, due to the fact that when this should have been thinned between 1975 and about 1985, the plan was to process this material into pulp, negating the need to thin and grow larger trees.

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7. **Early Harvest of Southern Region.** The poor road condition and proximity to mills has been allowed to concentrate harvest activities in the South Region. However, much of the Center Region was planted before the South Region so it should, with proper silvicultural treatments, have been ready to harvest first.
8. **High level of Harvest in South.** The team observed high levels of harvest having occurred within the last decade in the South Region. From their data base, Fanalamanga reports an average of about 800 ha per year of final harvest from the entire plantation. They also report 12,434 ha remaining in old forest of the 22,081 ha South Region. An analysis should be done to determine how much has actually been harvested and how much (in hectares) remains in older forest.
9. **Delays in Harvesting Damaged Material.** In the Central Region there seems to be a significant delay in harvesting after either forest fire or cyclone causes an area to be damaged. This allows deterioration of value that could be avoided. This may be due to the problem of road condition pointed out above.
10. **Questionable Benefit of Pruning.** Some pruning activities are being carried out, but the knots appear to be visible in the logs many years after it is done. There does not appear be any benefit to this in terms of getting a higher value from these logs, so doing pruning should be further evaluated to see if it is providing enough benefit to justify the cost.
11. **Environmental Impact.** Environmental impacts from the plantation do not appear to be significant except in the area of roads. Sedimentation from roads shows up nearly everywhere we visited and should be dealt with.
12. **Harvesting Plan.** The 1999 **Consultation Report** indicates Fanalamanga had plans to harvest remaining older stands those planted before about 1985) on a 9 year cycle. We did not hear about such a plan during our visit. Also, we did not receive copies of any written plans of what Fanalamanga plans to do with this plantation. However, we did hear from them frequently that their plan was as follows: Year 5, thin to 500 – 600 trees per hectare and prune crop trees to approximately 1/3 of total height. Year 15, commercially thin to about 250 – 300 crop trees per acre and prune these to 5 – 8 meters height.
13. **Thinning Treatments Missed.** Many of the stands in the plantation did not receive the planned treatments. We agree with the 1999 **Consultation Report** (p. 13) that thinning is no longer a valid treatment once the planned thinning ages have passed by more than 3 – 5 years.
14. **Hectares of Thinning.** The 1999 report indicates that thinning I. had been completed on about 32,000 ha., and thinning II. on about 2,400 ha. We were not able to verify these figures. Fanalamanga

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did report to us that thinning I. has been done on only 104 ha in the last 5 years, and thinning II. on 669 ha. They reported a total of 663 ha of pruning over the same time period.

15. **Volume of Wood on Plantation.** It is difficult to determine what exists on the plantation at present. Often treatments have been completed only on portions of stands, so the stand data base needs to be split to allow for recording of different conditions on the treated and untreated portions. It does not appear that this has been done.

16. **Fanalamanga Yield.** The 1999 **Consultation Report** indicates the plantation has a capability of providing about 650,000 m³ (p.13) on a sustained basis, and that it would be about 35 % sawtimber and 65 % chipwood. On p.20, using a slightly different approach, it indicates the annual possible yield of the Fanalamanga Plantation to be 575,000 m³.

Processing:

The processing facilities including harvesting techniques that were observed during our visits to facilities in Moramanga and Tamatave varied extensively in their sophistication. Ranging from the semi sophisticated export operation at Transformation Industrielle du Bois (TIB) and a very primitive mill that processed hand hewn squared logs on a contract basis. All operations visited had aging equipment requiring substantial maintenance and were very dependent on manual labor to accomplish their production. The lumber production at the TIB mill involved the following steps for log processing, breakdown of logs, edge trimming, kiln drying, and planing. The other mills observed had no drying or planing operating at this time and served as a feeder to secondary processing.

The Fanalamanga Corporation sawmill facility was at the lower end of quality and sophistication of those facilities observed. The full potential of Fanalamanga to produce marketable material from the existing forest is not yet reached. All of the products produced by Fanalamanga did, however, have a market.

The current processing capabilities of the Fanalamanga Corporation appear to be divided into five categories: 1) harvesting with the merchandizing of logs in 3 or 4 meter lengths and limbs for charcoal; 2) sawn boards and planks; 3) and slabs "backs" for sale as fencing or remanufacture into ceiling boards or charcoal; 4) piecework contracts for Furniture collection; 5) Resin production in the central region.

Finding:

1. **Round-Logs and Squared Logs:** Fanalamanga Corporation and those that are given concessions for harvest appear to be doing a good job of harvesting logs. The sites that we visited did not have any high stumps, or breaks caused by improper felling. The lengths of the remaining tops observed were a reasonable diameter considering the lengths restrictions (3 and 4 meters) being placed on the logs being sold. The waste produced from the harvesting was being marketed

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for charcoal production and served the dual purpose of providing income as well as fire prevention by reducing fuel loads. No soil compaction issues were observed in the stands visited nor significant residual damage on trees still standing after thinning.

The road conditions were a major hindrance to efficient transport of products sold. Every effort should be made to improve the quality of the current road system. The prioritization of funding to maintain a regular maintenance schedule on the existing road infrastructure is needed.

- 2. Lumber:** Currently Fanalamanga Corporation operates one sawmill located in the Southern Region near the Fanalamanga Headquarters. This mill was initially installed with World Bank funds and operated as a training center for sawmill technicians. This sawmill produces sawn boards and planks, and “backs” for sale as fencing or remanufacture into ceiling boards or charcoal. The logs brought into the sawmill are sorted into two diameter classes. There are currently two saw lines operated to handle these size classes. One line handles the larger material where the logs are broken down into planks and slabs “backs”. The size limitations on the existing equipment are logs less than 35 cm in diameter. The second line handles the smaller diameter material.

The condition of the existing processing equipment makes it impossible for the mill to maintain consistent dimensions for the material produced. If the lumber production at the Fanalamanga mill is to continue, the existing equipment needs to be replaced.

- 3. Sawmill Waste:** With the exception of sawdust, sawmill waste produced at the Fanalamanga sawmill is being utilized. The sawmill waste (“backs” slabs created by sawing) are sold for three purposes. Remanufacture as ceiling material, fences, or charcoal.

Changes in the equipment used to process logs would allow for much greater recovery. Also, there is a great deal of room for increased recovery of wood if additional products which utilize smaller diameter material were added to the product mix.

- 4. Furniture:** The Fanalamanga Corporation has a Furniture production facility that produces furniture on a piecework basis in response to individual orders. The current equipment available to do this work is aging and allows for the production of rectangular shapes only. No equipment was present to produce round material. The equipment available limits the amount and style of furniture that can be produced.

If furniture production at Fanalamanga is to continue, newer equipment will need to be installed to compete with other existing operations in the Tamatave region.

- 5. Resin:** Resin production exists on the Eastern edge of the Central Region. The current operation is strictly a collection operation operated by the Fanalamanga Project staff. The material collected here is sold in the raw form. No distilling operations are present.

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Because of the highly resinous characteristic of the Kesiya pine there is considerable potential for resin production. Newer techniques for resin collection would greatly benefit the quantity and quality of material harvested.

Marketing:

Information provided by Fanalamanga Corporation (FC) Management indicates there currently are nine types of market transactions (some of which may be informal) involving products from the plantation.

Findings:

1. **Timber Concessions:** Contracts are made for purchaser access to specific sections of the forest, (In Appendix B note the map and its subdivision referred to as parcels) in order to harvest timber during a specified period. Some concessions allow access for a long-term: 5-10 yrs, and some for a short-term: 6 mo. Both are subject to review and termination for non-conformance. These harvest contracts give the purchaser the right to remove the timber for their own use. The purchaser of the trees pays an amount agreed to by both parties and agrees to harvest and remove the logs involved by a particular date.
2. **Round Log and Squared-Log Sales:** Contracts are made for the sale of specific log volumes selected to match a purchaser's specification either picked up by the purchaser in the forest, or at a FC log collection point. The purchaser pays an amount agreed to by both parties for the logs involved, which sometimes includes the cost of removing the outer portions or slab (back) of a log.
3. **Lumber Sales:** Contracts are made for specific amounts, quality and species (Pine and Eucalyptus) for various sizes of material sawn at the FC sawmill from logs harvested on the FP. The purchaser pays an amount agreed to by both parties for sawn lumber of specific specifications, and typically includes delivery to the purchaser's preferred location
4. **Sawmill Waste for Remanufacture:** The thicker slab material "backs", produced when a round log has a flat surface sawn on one of its sides, are reportedly sold to willing buyers who employ their own machinery to remanufacture specialized products, e.g., thin, milled-to-specification ceiling boards, or used un-processed as fencing materials.
5. **Sawmill Waste for Charcoal Manufacture:** Thinner slab material and edgings are sold to charcoal makers near the mill site for charcoal manufacture. The purchaser pays an amount agreed to by both parties and then converts, bags and ships the charcoal, typically from the location at which the waste accumulated.
6. **Furniture:** The FC produces a range of pine household furniture sold by the piece to interested individuals. The purchaser pays a set amount for any given piece of furniture based upon the

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Fanalamanga’s manufacturing, raw materials, labor, overhead costs and margin for profit.

7. **Pine Resin:** Kesiya pine are “tapped” for their resin by FC staff who collect and sell this product to local buyers at a price agreed to by both parties, for further processing.
8. **Harvest-Waste for Charcoal Manufacture*:** Waste material developed in the conversion of standing trees to sawmill logs is made available to charcoal makers for their use in the manufacture of charcoal. The purchaser pays an amount agreed to by both parties and convets, bags and sells the charcoal, typically from the location at which the waste accumulated.
9. **Eucalyptus Coppice for Poles, Firewood and Charcoal Manufacture*:** Stump sprouts from previously harvested Eucalyptus trees in a specific locale, are made available to local parties. The purchaser uses the taller and straight material to manufacture poles, splits and sells firewood from the thicker, less straight material, and then employs all remaining sprout material in the manufacture of charcoal. The purchaser pays an amount agreed to by both parties and then manufactures and sells these products, typically from the harvest location.

Sales

Sales information for the FY04 included products from both their forest and their sawmill and are displayed, as provided, in the following transaction summary:

Table 4.—The Volume and Value Data For the Fiscal Year 2003 (7/02-6/03)

<u>Plantation Transaction</u>	Hectres	Volume (m ³)	Value*
Concession – long-term		50,413,529	
Concession – short-term		68,826,866	
Pine Logs-in the forest		2,777,835	
Euc. Logs-in the forest		281,012	
Squared Logs “		4,476,405	
Sawlogs-collected (Pine)		223,706	
Remanufacture		-	
Charcoal		74,032	
Fuelwood		4,611	
Pine Resin		11,121,000 kg	
<u>Sawmill Transaction</u>			
Sawn Products #1		889,521	
Sawn Products #2		253,672	
Sawlog Slab Remanufacture		-	
Furniture		-	2,462,263 FMG

*To assure commercial confidentiality, minimal pricing data was gathered.

Task 1 b. Analysis of existing information

Resource:

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We use the information above to estimate the total capability of the plantation to provide wood products in an environmentally sound manner. We looked at sustainability based on the best information we were able to obtain and calculated sustained yield 2 ways. We looked at sustainability based on the best information we were able to obtain and calculated sustained yield 2 ways. First, we took the total standing volume of 15,217,000 m³ and assumed we could harvest 90 % of that in the next 20 years. That would allow for the younger stands to mature. This method provided a sustained harvest of 685,000 m³ annually.

Our second approach was to divide the 58,000 ha that we assume to be in productive sites and stocked with trees by the 25 year planned rotation to give a final harvest available on 2320 ha annually. The 15,217,000 m³ of current standing volume divided by 58,000 ha shows 262 m³ per ha. Multiplying the 2320 ha by 262 gives us 608,000 m³/year available for harvest. We feel this figure could be higher if proper reforestation and thinning are applied so nearly the entire 65,000 ha could be counted on for pine yield. Additionally, we believe the proportions of chip wood (65 %) and saw timber (35 %) used by the 1999 report are the best available.

We find our 2 estimates of 608,000 and 685,000 m³ annually correspond closely with the 1999 **Consultation Report's** estimates of 650,000 m³ and 575,000 m³. However, there are many uncertainties in the information (see Section 1. a.) that lead us to believe that a maximum of 600,000 m³ annually should be used until new stand exams yield information that will allow making adjustments to this figure.

We find that current reported harvest is averaging about 111,000 m³ per year, less than 20 % of the potential. This is allowing many stands in the plantation to grow beyond the 25 year target age, something that should not be done if growth and value of the plantation is to be maximized.

We believe the current level of fire protection to be inadequate. More effort needs to be applied to minimize future damage from forest fires.

There are 2 areas of significant environmental impacts from the Fanalamanga operation. The roads are neither properly constructed nor maintained to minimize erosion and subsequent sedimentation of streams. Also, the process of making charcoal from the small wood leads to high levels of air pollution in the vicinity of these operations. We do not have specific knowledge in the area of human health as it relates to air pollution, but perhaps this should be evaluated further.

Good road management could provide 2 benefits. First, as just mentioned, it would reduce overall erosion. Second, it would lead to shorter travel times and therefore more efficiency in the overall process of managing, harvesting, and marketing of wood from Fanalamanga.

Processing:

The current saw milling equipment is extremely old and worn out. During our visit the large scale saw had broken down and was unable to process material. It was indicated to us that this was a common situation. It has reached such a state that it is impossible to maintain quality and productivity in the final sawn products. Wide variation in dimensions and consistency of

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saw-cut quality were observed. This was mainly due to the state of the various pieces of equipment. Also, potential value of the product is being lost because there is no effort to manufacture or sort on quality.

The location of this mill and the conditions of the roads leading to it will make it very difficult to process material that is harvested in the upper Central and North regions in a timely and efficient manner. If it is decided that lumber production at Fanalamanga is to continue, it would be best if the current saw equipment be scrapped and other equipment with the appropriate technology be installed and road improvements must occur.

Marketing:

See Task 3 for market analysis.

Task 2: Detailed Description of the Current Management Planned by the Fanalamanga Corporation

Explanatory Note:

As part of our terms of reference were instructed to obtain a detailed description of the current management planned by the Fanalamanga Corporation. A list of the suggested areas to gather information was:

- Planned objectives, strategies, and approaches;
- Planned products;
- Establishment regions and zone;
- Project package;
- Technical and environmental aspects;
- Needs for improving plantation management
- Partnerships,...
- Technical description of the processing methods
- Needs for raw materials and supply requirements

Finding:

We were given no written plans that indicated what the Fanalamanga Corporation plans to do with the plantation. However, in discussions with them it was evident that they plan to continue toward a regulated forest by increasing the amount of treatment appropriately. They indicated they are pursuing funding to replace bridges in the Central Region to make more of the plantation accessible to log trucks. They indicated they would like to have improved equipment at the Fanalamanga Mill so they could increase production and quality of sawn products. Finally, they indicated there is a serious lack of financing and staff to achieve their goals and desired results.

Fanalamanga Corporation has plans to improve the data base they store plantation information in. This is a positive step toward having better information available for decision making.

In Section 1. a. we discuss some of the plans, and under Task 4 we develop baseline and alternative plans that we believe need consideration and further analysis.

Task 3: Market Analysis

Explanatory Note:

Preliminary information developed addressed the current and potential role the Fanalamanga Plantation's (FP) products play in the Madagascar's consumption of tree-based forest products.

Supply – Interviews, records, and the visible quantities both in stock at distributors and users, as well as the amount of wood in transit suggest a vibrant market for wood products in general and pine in particular. Specific observations include:

1. **Pine** - There is a reported shortage of pine lumber overall relative to current demand. Some FC customers report losing business because of their inability to obtain specifically sized products. The FC sawmill and the largest mill in the area were observed to be operating with ample log supplies, but only the latter appeared to have ample product in its inventory. Log supplies available to the many, many smaller mills was difficult to gauge because most operated with only minimal storage space for either logs or finished products. However, a market for logs, both round and squared up by hand in the woods, supplies a growing number of sawmills within the FP's supply range. The array of products, including both sawn lumber and the use of slabs for products like fencing appears to serve a large and active market
2. **Eucalyptus** - Supplies appear ample based upon the amount of stock in storage and transit, specifically large amounts of charcoal and poles, for which eucalyptus is the preferred species. But the rural and extremely small scale of most individual manufactures and marketers made this difficult to judge.
3. **Charcoal** – Both pine and eucalyptus based charcoal appear to be in ample supply, both of which are supplied by the waste generated in the manufacture of other products
4. **Resin** – Records suggest that there is a vibrant market, but evidence of both gathering and shipment on a large scale were difficult to find.
5. **Fuel wood** – As a product fuel-wood ranks just above sawdust in terms of customer demand - most Malagasy reportedly prefer charcoal when given a choice between pine and split eucalyptus piles at the roadside.
6. **Sawdust** – There appears to be no current use for this material and large amounts are apparently dumped indiscriminately and left to burn at local whim.

Marketing Infrastructure – The small cross-section of transport, storage, and distribution enterprises observed suggested the following conclusions:

1. **Transport** – Both roads and vehicles related to the forestry sector are problematic, but neither appeared to be currently harming market activities.

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The rainy season however reportedly negatively affects the nation’s entire economy, including especially transport.

2. **Storage** – Various products appear to be stored in all imaginable locations, including at the manufacturing site, and in both “open-to-the-weather” and warehouse facilities at the various points of customer sales, both wholesale and retail. This storage capacity also includes an ample supply of container capacity in transit, for those products to be exported.

Market Vigor—The short time window to interview and observe the vigor of the market for Fanamalanga’s wood products in particular, and the wood marketing sub-sector in general, provided the basis for the following conclusions. (Recall though that base information on marketing was included under Task I, and should be referenced for information on the plantation’s current raw material and primary product market activity.)

1. **Current Activity** – even at the constrained level of FC’s current operation, overall product demand and the ingenuity of local entrepreneurs is clearly sustaining a robust market sector.
 - **Domestically** - FC records alone show an fiscal year 2003 harvest level in excess 120 thousand m³, reportedly supplying the wood needs of over 70 mills in the immediate area, most of which however are quite small. (However, questions surrounding the role of illegally logged materials in supplying this growth in the Moramanga sawmill sector were raised in a number of settings)
 - **Export** – Sawn wood, and even small quantities of wood products in the form of doors and furniture, supplied by wood from both the FC sawmill, and especially from mills operating in the Moramanga area reportedly provide a basis for a thriving export trade, primarily to adjoining island nations, e.g., Reunion. In fact a French multinational in the packaging business has established a sawmill in a “free-trade zone” supplied by FP timber, expressly for the lumber, currently reports exporting 2000 m³ per month. Customer locations referenced included both Indian Ocean islands and the middle east. Unfortunately the data available provides only volume figures for the few products types currently exported (figures supplied were for 2002):

Table 5.—Product Types Export

Product Type	Cubic Meters
Logs & Poles	2,575,
Charcoal	39,430,
Boards	134,046,

- **Import** – Records verify Madagascar’s significant reliance on off-shore sourcing of major portions of its wood products’ needs, especially in their use of paper products. Consider for example some selected general statistics from 2003:

Table 6.—Product types from Import

Product Type	Metric Tons	Value (FMG)
Moulding	26	87,603,000

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Plywood & Panel	985	3,632,500,000
Sawn Lumber	12	78,580,000
Toilet/Tissue Paper	159	1,089,605,000
Newsprint	2,092	7,355,700,000
Print/Office Paper	4,640	25,728,900,000
Cardboard & Kraft Stock	1,899	8,437,500,000
Misc. Paper Products	6,934	70,408,000,000

2. **Projections** – it is reasonable to expect that the domestic demand for wood products provided by both population growth and the continuing rise in the standard of living will continue to drive market expansion. This would be especially true and even accelerated by government policies to prevent further exploitation of Madagascar’s natural forest, as well as encourage the logical use of plantation grown wood expand. Demand from exports could also be reasonably assumed to grow, in keeping with expanding global appetite for wood and wood products, as well as regional economic vigor.

3. **Opportunities** – A quick review of available import data for one year provides a picture of the influence wood from the Fanamalanga Plantation could have as a substitute for products currently being imported to meet the nation’s overall wood products needs. Note for example that the nation’s expenditures on one year’s supply of paper related products exceeded 110 billion FMG. This figure is doubly significant because each FMG spent on imports is not only a direct cost, but also a collection of indirect costs (foreign wages, raw materials, manufacturing infrastructure, transport, and duties) whose substitution by local capacity could fuel Madagascar’s own future growth.

Environment Issues: The marketing of FP forest products currently appears to be generally benign. However, as the potential for the Malagasy to use more plantation grown wood for their housing and personal needs, the environmental damage associated with such products as bricks or worse yet, harvest of natural forests can, and should be promoted at least in part for the environmental benefits associated with substitution.

Social Issues: The role the operation of FP plays in Malagasy society is primarily twofold. Locally, the direct and indirect jobs and commerce, fuels a vibrant wood-based economy and resulting quality of life. But for the abysmal safety circumstances observed, this is clearly a positive social influence as long as wages, and/or associated compensation are fair and just. Nationally, associated jobs, but also economic vigor associated with trade, export and government income from licenses, fees and taxes can and should play an expanding role in the nation’s overall economic and therefore health. Coincidentally however, the indirect role played by FP in sustaining local village life, as well as it’s productivity’s potential to balance the nation’s trade in wood products, may be more significant over the long-run and should not be overlooked.

Task 4: Potential Alternatives for Future Fanalamanga Management

Explanatory Note:

It is possible to conceive many scenarios for Management of Fanalamanga Plantation. The scenarios that will be discussed below are: continue current

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Fanalamanga Corporation Management Structure; do all on the ground operations by contract and get Fanalamanga out of Sawmilling (Wood Processing) with the management of the plantation to be done by Madagascar Government; operate the Fanalamanga Plantation in a partnership with a private entity; or concession of the plantation to a private company which would handle all management duties. Regardless of the scenario we feel there is a minimum level of improvement and investment that should be undertaken.

Findings:

Recommendations common to all alternatives:

1. Reforest. Areas already harvested and to be harvested in the future should be reforested within a minimum of two years after harvest.
2. Do not miss the first and second scheduled thinnings as a means of increasing value.
3. Disperse harvest to all three regions.
4. Prioritize activities by current parcel condition and age.
5. Enter all activities and new condition into the data base within one year.
6. Speed up the harvest of stands damaged by fire or cyclone.
7. Evaluate the value of pruning.
8. Do a stand exam on the individual parcels on a five to seven year cycle.
9. Obtain technical assistance to design an efficient inventory. (USFS?)
10. Maintain roads as a way of minimizing cost and making the center and the north regions available for management.
11. Study the markets to determine the best value for products that can be provided and processed from this plantation.
12. Evaluate the risk for insect and disease problems in a forest with only one dominant species (USAID?)
13. Safety at harvesting and production facilities needs to be improved.

I. Maintain the Current Fanalamanga Management Structure

Explanatory Note:

Continue current operational policies and procedures and avoid the turmoil associated with change:

Advantages:

1. No immediate investment, beyond the level required to satisfy the list of recommendations listed above, would be necessary.
2. There would be no disruption to the people and procedures currently involved

Disadvantages:

1. The current conditions and trends would continue.
2. Loss of potential revenue because of inefficient processing facilities will continue.

Concerns:

1. The current levels of investment, management and operational procedures are not capable of sustaining the Fanalamanga Plantation (FP) over the long term. Therefore the minimum level of investment outlined in the Recommendations above is needed.

2. The potential for financial loss, waste and damage to the economies, communities and environments associated with the FP will increase over time if not immediately addressed with reasonable alternatives

II. Keep Land Management Decisions with the Madagascar Government. Do all on the ground operations by contract and get Fanalamanga out of Thinning, Logging, and Sawmilling (Wood Processing).

Explanatory Note:

This option is dependant on having the Government of Madagascar making land management decisions. This option suggests that Government should be managing the land resource but close its processing facility. Also, the Government of Madagascar should try to attract additional processing facilities that more fully utilize the potential growth on the Fanalamanga Plantation.

Advantages:

1. Doing the on the ground management by contract gets the government out of maintaining staff to do physical operations on the ground such as logging, thinning, and pruning.
2. The government maintains ownership of the land and ultimate control of management decisions on it.
3. It gets the government out of managing an inefficient processing facility.
4. This approach provides the government the ability to manage the environmental and social impact of a newer more efficient mill(s) on the existing small sawmill operators. Small size contracts could be offered to these existing operators.

Disadvantages:

1. Locating the investment and expertise necessary to provide the optimum improvements could be difficult.
2. Entrenched policies, procedures and management styles could be difficult to change.

III. Operate the Fanalamanga Plantation in Partnership with a Commercial Investor

Explanatory Note:

Sharing the Fanalamanga Plantations' financial opportunity with a knowledgeable investor, through a partnership agreement, shares the risk and potentially provides the benefit of skills not currently available.

Advantages:

1. Ongoing risks to the Government of Madagascar would be shared.
2. A carefully selected partner would provide the skills and investments necessary to improve current Fanalamanga Plantation operations.

Disadvantages:

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1. The Government of Madagascar would have to share management decisions in accordance with partnership agreements.
2. As would financial returns on the investments.

Concerns:

1. This approach would require the government to anticipate and manage the environmental and social impact of a newer more efficient mill(s).
2. Selecting a partner with both the necessary skills in management and the appropriate concerns for the people and environment of Madagascar would be a challenge

IV. Lease Rights to Operate Fanalamanga Plantation as a Concession

Explanatory Note:

This option would have the lessee sign an agreement which gave them the right to operate the Fanalamanga Plantation for a set period time, dependant on the review by the Madagascar Government as spelled out by the lease agreement terms.

Advantages:

1. Income for the Government of Madagascar would accrue regardless of the success of the concession operator.
2. The challenges associated with the operation of the Fanalamanga Plantation would be transferred to a second party.
3. The knowledge and skills obtained by the Government of Madagascar's negotiation and then oversight of the operations of a concession would benefit its operational effectiveness in the administration of all its forests.

Disadvantages:

1. The majority of financial benefit available from Fanalamanga Plantation's operation would accrue to the concession holder.
2. Control of the operation of the Fanalamanga Plantation would have to be maintained in a second-hand manner through Madagascar's laws and procedural oversight mechanisms outlined in the terms of the lease.
3. Assurance of the concession holder's financial, social and environmental responsibility would have to be provided by new levels of government oversight.

Concerns:

1. This approach would require the government to anticipate and manage the environmental and social impact of a newer more efficient mill(s).
2. Finding a potential concession holder with the finances and skills necessary to operate the Fanalamanga Plantation, as well as appropriate concern for the environment, communities and economies the Fanalamanga Plantation should be sustaining, would be an undertaking beyond simply finding an investor with the proper financial resources.
3. Concessions traditionally require a degree of oversight beyond the capacities of the governments who pursue this option.

THE TEAMS' THOUGHTS ON THE FOUR OPTIONS

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We recognize that we have had a very limited exposure to the issues and concerns that are present for managing Fanalamanga Plantation in our two weeks. There will be more information developed and a second team responsible for assessing in the development of the business plan is to follow. We have been able to agree amongst our selves on the following conclusions:

1. **It is in the best interest of the Malagasy People to implement the 13 recommendations sited above.**
2. **Option I. currently does not appear to be a viable choice because it keeps the government in the primary processing business.**
3. **Option III. currently does not appear to be a viable choice because we feel it would be a very complicated task to keep the partners going down the same path.**
4. **In choosing between Option II. and Option IV., we feel we do not have sufficient knowledge at this time to recommend one over the other. We believe, however, that these two options should be further investigated as viable choices, and the Government of Madagascar should make the choice that best suits their needs.**

FINAL THOUGHTS

Goals, Strategies and Planning - Important components necessary to restoring the sustainable potential of the Fanalamanga plantation, and the communities and economies that forest in turn sustains, are being assembled. The Ministry is knowledgeable, committed, and hard at work to serve this goal. Local Malagasy experience and initiative now focus on this effort. USAID and perhaps other donar organizations, are actively supporting some of the many tasks necessary to this achievement. This report is a key component in restoring the sustainable operation and management of the Fanalamanga Corporation. It is an excellent example of the focus, collaboration and progress necessary to success. It is equally important to remember however, that this report and the business plan it will help generate, requires and must operate as part of a larger national strategy for Madagascar's entire forest estate. To succeed, and fully serve the nation's goals and needs, Fanalamanga's plantations must be managed as part of an overall national forest strategy - a strategy that assures the long-term health, vigor and productivity of all Madagascar's forests, their soils, water, wildlife, diversity, and the sustainability of their dependent communities and economies.

Planning as a Factor in Successful Funding - It is no accident that forest sector business plans need to be in harmony with national goals and strategies in order to attract investment, expertise and collaboration. And Madagascar's renowned diversity and fragility offers added appeal to

potential funders interested especially in promoting sustainable development, “green” products, and growth in the availability of green-certifiable forests and forest products. Investors, seeking a “green” reputation (and the resulting access to global markets for green products) must provide credible plan-based administrative and operational performance consistent with the standards employed in green certification audits. Madagascar will not only serve its own goals, but facilitate its forests appeal to potential investors and their potential to maximize “green” market opportunities by being sure its plans for Fanalamanga’s forests are consistent and harmonized with national goals, strategies and plans.

Management of Fanalamanga Plantation - Finally, we believe that improving utilization and management of Fanalamanga and associated wood processing facilities could take the pressure off natural forests which we understand and have observed are being used unsustainably. This improved management needs to be done in conjunction with two other actions in order to really be effective.

- 1. Until such time that the harvest in the indigenous forest can be better regulated, stop harvesting of indigenous forests to allow better acceptance of plantation wood in the market place.**
- 2. Through education, help modify current Malagasy attitudes toward utilization of plantation forest resources.**

REFERENCES

RAMAKAVELO Seth Philippe, April 1999. “Consultation Report.” EC FAO PARTNERSHIP PROGRAMME (1998 - 2000), Funded in part by Tropical Forestry Budget Line B7 – 6201, Project GCP / INT / 679 / EC

Technical data provided by Fanalamanga Corporation

Appendix A: Complete Terms of Reference

TERMES DE REFERENCE

DE LA CONDUITE D'UN DIAGNOSTIC TECHNIQUE ET FINANCIER DE L'EXPLOITATION, PAR LA SOCIETE FANALAMANGA, DE 60 000ha DE FORET DE PIN DANS LA REGION DE MORAMANGA, EN VUE DE L'ELABORATION D'UN NOUVEAU PLAN DE RESTRUCTURATION, ET DE LA PRODUCTION D'UN PLAN D'EXPLOITATION ET D'UN BUSINESS PLAN

1. Introduction

Le Programme de Transition Eco-régionale (PTE) a pour objectifs de favoriser une gestion durable des ressources naturelles, à travers une approche éco-régionale, et d'atténuer la pauvreté des populations-cibles, dans les zones considérées comme prioritaires pour la conservation de la biodiversité à Madagascar. Parmi les activités menées par PTE pour atteindre ces objectifs, la promotion des entreprises favorables à l'environnement tient une place très importante, dans la mesure où elles permettent de générer des revenus à partir des ressources naturelles, d'une manière écologiquement durable, et de contribuer ainsi à la protection des écosystèmes.

Dans cette optique, est intéressé à supporter les efforts entrepris depuis des décennies par la société Fanalamanga dans la plantation, la gestion et la valorisation des 60.000ha de forêts de pins, lesquelles sont destinées à la production de bois à multiples usages (bois de trituration, bois d'industrie et bois de sciage) ainsi qu'à la production d'autres produits dérivés et complémentaires (Gum de rosine, Gum de térébentine, ...), contribuant ainsi à la préservation du corridor forestier Mantadia-Zahamena. C'est ainsi que PTE a décidé d'appuyer la Société Fanalamanga dans ses efforts de restructuration enfin d'assurer une meilleure gestion et valorisation de ces 60 000ha de forêt de pin.

Cet appui de PTE consiste à apporter une assistance technique à la société Fanalamanga, par le recrutement d'un consultant, pour conduire un diagnostic technique et financier de la situation actuelle de l'exploitation, en vue de la production d'un nouveau plan de restructuration et d'exploitation, ainsi que l'élaboration d'un business plan. Les détails des tâches et produits livrables ainsi que l'organisation et les conditions d'exécution de ces travaux de consultation sont détaillés dans le présent document << Termes de reference >>.

Cette étude sera réaliser par une équipe composée des experts du Service Forestier des Etats Unix (USFS), l'équipe PTE, et des consultants du cabinet ECR. Les experts de l'USFS travailleront à Madagascar par le biais d'un protocole d'accord existant entre cette organisation et la DGEF, et effectueront des missions de court délai à Madagascar. Il est prévu d'envoyer quatre experts de l'USFS dans au moins deux missions d'appui technique pour l'élaboration de cette étude. Les rôles respectifs de ces trois parties seront développés en détail dans ce document.

L'équipe de l'USFS aura quatre experts avec les compétences suivantes :

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1. Un expert dans les aspects sylvicole et la gestion technique d'une plantation de pin
2. Un expert dans la production industrielle des produits de pin, qui connaît des équipements et infrastructure nécessaire et les types de produits possible
3. Un expert dans l'élaboration d'un « Business Plans » pour les plantations de pin, avec de l'expérience concernant la mise en concession
4. Un expert sur l'analyse des marchés possibles, y compris local, national, et internationale

C'est prévu que les experts de l'USFS effectueront deux missions d'appui à Madagascar. Pendant les missions, les experts travailleront en étroite collaboration avec Chemonics, ECR< et la DGEF. D'abord, les premiers deux experts effectueront une mission « technique » pour donner des recommandations concernant les aspects sylvicoles et production industrielle des produits en bois. La deuxième mission capitalisera sur les conclusions de la première mission, et focalisera sur l'analyse des marchés possibles et le développement d'un « Business Plan. »

Pour renforcer les compétences de la DGEF et pour promouvoir la pérennisation des activités proposées dans cette étude, il est demandé a la Ministère de fournir des personnels pour travailler en collaboration avec l'équipe d'appui technique pendant tous les étapes de cette mission.

2. Objectifs du mandat

L'objectif principal visé par l'intervention du consultant est de conduire une évaluation technique, financière, et environnemental de la plantation et de l'exploitation en cours ; d'établir un nouveau plan d'exploitation tenant compte de l'optimisation de l'exploitation par la diversification de ses activités (bois, produits dérivés, produits complémentaires, ...) et d'élaborer une étude de faisabilité du projet qui fera ressortir toutes les données techniques et commerciales permettant de faire les analyses financières sur une période de cinq ans, afin d'analyser la rentabilité du projet et de déterminer les besoins de financement ainsi que le plan de financement correspondant. Ces travaux devraient être combinés pour le développement d'un « Business Plan » pour la plantation de Fanalamanga.

En Suite il faut préparer des recommandations portantes sur une éventuelle mise en concession de la société et faire une présentation de ce document au Ministère pour validation.

3. Tâches à exécuter

Pour mener à bien cette étude, les Consultants devront s'acquitter les tâches suivantes:

Tâche 1 : Constitution de bases d'informations du projet

- a. Collecte de toutes les informations auprès des responsables de la société Fanalamanga et de ses partenaires : document de projet initial, programme de restructuration depuis 1995, plan d'aménagement existant, résultats des études et des projets déjà entrepris, documents

financiers, relations contractuelles avec les partenaires sociaux, économiques et financiers;

- b. Analyse des données existantes : contraintes et potentialités sur terrain et celles du marché avant et après 1995, adhésion sociale sur la restructuration proposée.

Partie Responsable : ECR s'occupera de la Tache 1a. ECR rassemblera les données existantes et les experts de l'USFS et ECR travailleront ensemble pour réaliser la Tache 1b.

Tâche 2 : Description détaillée du projet envisagé par la société

- Objectifs, stratégies et démarches envisagés ;
- Produits envisagés ;
- Régions et zone d'implantation ;
- Montage du projet ;
- Aspects techniques et environnementaux ;
- Besoins pour l'amélioration de la gestion de la plantation
- Partenariat, ...
- Description technique du processus de transformation
- Besoin en matières premières et exigences des approvisionnements

Partie Responsable : Les travaux pour effectuer la Tache 2 seront largement effectués pendant la première mission d'appui « technique » de l'USFS. L'équipe de l'USFS donnera des recommandations dans un rapport de mission, et l'équipe de l'ECR prendra ces recommandations et sera chargé d'écrire le rapport final.

Tâche 3 : Analyse des marchés :

- Description pour chaque produit des informations disponibles auprès du promoteur, de la concurrence locale, régional et internationale, ainsi que des marchés locaux, régionaux et internationaux, contraintes et potentialités, caractérisation du marché actuel, quantification, qualification et segmentation, tendances et perspectives des prix et des volumes.
- Etablissement d'un scoring production/marché pour chaque phase du projet, rapprochement des contraintes sur terrain aux exigences du marché : qualité produit, régularité, saisonnalité. Déterminer les quantités et les prix pour l'écoulement de **chaque** produit pendant la période considérée.

Partie Responsable : Un expert de l'USFS travaillera ensemble avec l'ECR pour élaborer l'analyse des marchés. L'expert de l'USFS donnera des recommandations dans un rapport de mission, et l'équipe de l'ECR prendra ces recommandations et sera chargé d'écrire le rapport final.

Tâche 4 : Définition et proposition des schémas du montage projet:

- Relations : état/société et société/partenaires socio-économiques en matière d'aménagement et de gestion de la plantation, d'approvisionnement et de transformation. Modalités

de gestion, organigramme et analyse des ressources humaines au niveau de la Société

Partie Responsable : Les travaux pour effectuer la Tache 4 seront largement effectués pendant la première mission d'appui « technique » de l'USFS. L'équipe de l'USFS donnera des recommandations dans un rapport de mission, et l'équipe de l'ECR prendra ces recommandations et sera chargé d'écrire le rapport final.

Tâche 5 : Analyse financière du projet :

- Détermination de l'enveloppe nécessaire (investissement et fonds de roulement) pour le financement du projet, proposition de montage financier, simulation et projection financière, test de sensibilité ;
- Elaboration de tous les comptes prévisionnels y afférents (compte d'exploitation, tableau emplois/ressources, bilan prévisionnel...). Calcul du taux de rentabilité interne et des principaux ratios financiers demandés par les banques.

Partie Responsable : L'expert de l'USFS dans le développement d'un « business plan » travaillera en collaboration avec l'ECR pour réaliser cette analyse financière.

Tâche 6 : Analyse environnementale du projet

- Evaluer les impacts environnementaux des activités du projet pendant les phases de planification, d'exécution et d'exploitation, en tenant compte des environnements physiques, biologique et socio-economique autour du projet
- Proposer des mesures d'atténuation concrètes ainsi que des méthodes de suivi de ces mesures particulièrement pour les points ayant des impacts négatifs sur l'environnement

Partie Responsable : Les consultants de l'ECR prendront en charge l'analyse environnementale du projet, avec des recommandations des experts de l'USFS.

Tâche 7 : Présentation de recommandations sur une mise en concession

- Elaborer un plan de « mise en concession » destinés aux acteurs privées qui intègre les résultats des autres analyses et les présentes dans une façon cohérente pour attirer les investisseurs
- Développer des stratégies pour obtenir des capitaux étrangers dans le cadre d'un partenariat avec l'Etat Malgache pour la gestion de cette plantation
- Elaborer des actions nécessaires pour l'Etat Malgache pour promouvoir cette investissement (infrastructure, avantages financière, etc.)

Partie Responsable : L'expert de l'USFS dans le développement d'un « business plan » travaillera en collaboration avec l'ECR pour réaliser ces recommandations. C'est possible que cet expert effectue ces travaux aux

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Etats-Unis après la mission de la deuxième équipe, ou bien pendant cette mission.

Tâche 8 : Elaboration, Préparation, et Presentation du rapport final

- Synthèse de tous les travaux effectués et intégration dans un produit final.
- Présentation des conclusions au Ministère

Partie Responsable : L'expert de l'USFS dans le développement d'un « business plan » travaillera en collaboration avec l'ECR pour cette tâche, probablement dans une troisième mission d'appui. ECR sera chargé de prendre tous les documents, les traduire en Français si nécessaire, et les intégrer pour le rapport final.

4. Biens livrables

L'équipe devraient remettre, en cinq (5) exemplaires (en français) et sur une disquette (WORD) un plan de restructuration et d'un « Business plan » comportant et les détails et les résultats des tâches susmentionnées avec toutes recommandations techniques, économiques, environnementales et financières utiles pour la bonne réalisation du projet, et conforme au canevas de business plan de l'institution financière avec qui le promoteur travaille.

5. Durée et calendrier de travail

Le nombre des jours effectifs de travail est estimé comme suit :

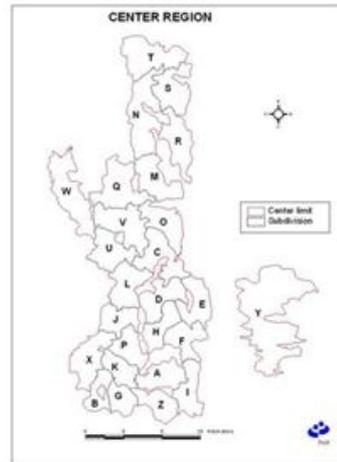
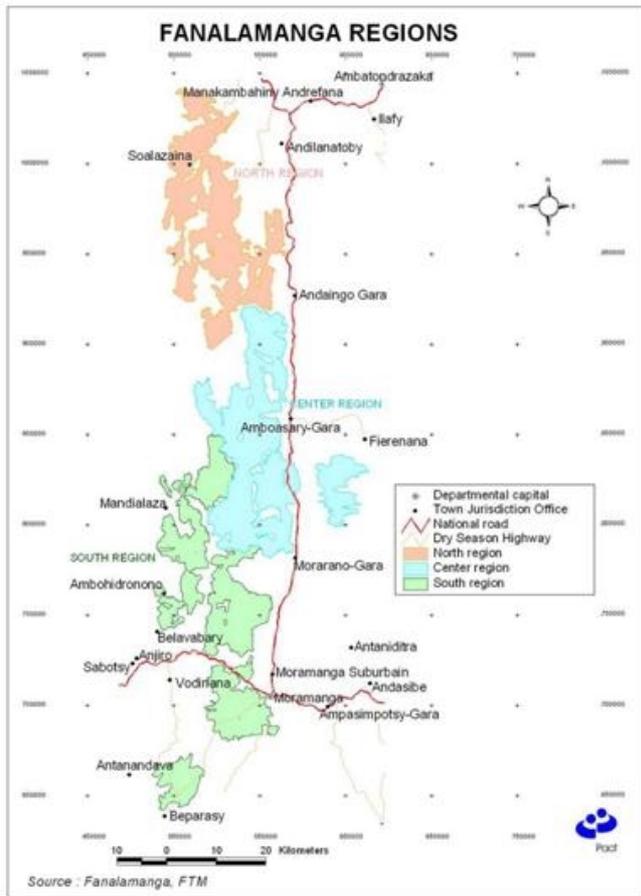
TACHES	NOMBRE DE JOURNEES DE TRAVAIL – USFS	NOMBRE DE JOURNEES DE TRAVAIL - ECR
TACHE 1	Equipe 1 : 1 jour par personne Equipe 2 : 1 jour par personne	
TACHE 2	Equipe 1 : 5 jours par personne	
TACHE 3	Equipe 2 : 10 jours (8 jours expert marche, 2 jours expert « Business Plan »)	
TACHE 4	Equipe 1 : 5 jours par personne	
TACHE 5	Equipe 2 : 10 jours (8 jours expert « Business Plan », 2 jours expert marche)	
TACHE 6	Equipe 1 : 1 jour par personne Equipe 2 : 1 jour par personne	
TACHE 7	Equipe 2 : 5 jours expert « Business Plan »	
TACHE 8	Equipe 2 : 10 jours expert « Business Plan »	

6. Qualifications

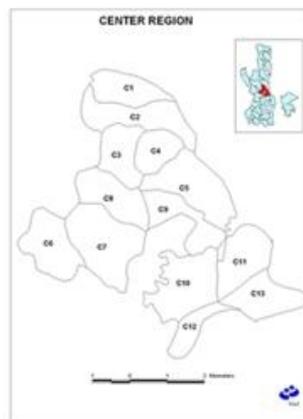
Les experts de l'USFS seraient identifiés par le Coordinateur des Programmes Africaines de l'USFS à Washington, en étroite collaboration avec l'équipe PTE et la DGEF. L'USFS enverra des experts avec les compétences nécessaires, des expériences dans des écosystèmes tropicales, et des expériences dans les pays en voie de développement si possible.

Pour l'équipe ECR, cette consultation sera réalisée par une personne(s) possédant des connaissances approfondies en technique de sylviculture et disposant des expériences éprouvées dans l'étude de faisabilité technique, économique, financière et environnementale de projet. Le consultant devra disposer aussi des capacités d'adaptation et de communication..... et aptes à travailler dans des conditions assez difficiles.

**Appendix B
Maps Of Fanalamanaga Plantation**



Regions divided into Sections



Sections divided into Parcels

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Appendix C
CONTACTS

MINISTRY OF THE ENVIRONMENT, WATER, AND FORESTS

Mr. Charles Rabotoarison, Le General de Division Ministre de l'Environnement et des Eaux et Forêt

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Ms. Fleurette Andriantsilavo, General Project Coordinator to the Ministre de l'Environnement et des Eaux et Forêt

Mr. Rodin Rajaonahsoa, Director General, Directorate of Water and Forests

Chemonics International/Cornell International Institute for Food, Agriculture and Development

Mr. Glenn Lines

CIREF

Ms. Claudie Razafintsalama, District Chief CIREF, Moramanga

Mr. Ramenason Rasolonirina, CIREF Forest Engineer, Moramanga

IRG

Mr. Geoffrey King, Natural Resources Management Specialist

USAID MADAGASCAR MISSION

Ms. Lisa Gaylord, Natural Resources Team Leader

Mr. Ndrantomahefa Razakamarina, Forestry Specialist

MORAMANGA AREA FOREST EXPLOITERS

Mr. Jean Louis SERVAT, Technical Director in Charge of Production

Mr. Claude,

FANALAMANGA PLANTATION

Mr. Modine, Director General

Mr. Roger Rabetsoa, Assistant Director General of Operations

Mr. Luc Rabearisoa, Forest Engineer

Mr. Francois, Sawmill Manager

Mr. RAMILISON, Central district manager

ECR

Mr. Georges Ramanoara, Director General

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Appendix D

MISSION ITINERARY

Sunday 7/18	Kretschmann/Higgs/Johnson Arrive Antananarivo
Monday 7/19	Meet w/ Lisa Gaylord and Ndrantomahefa Razakamarina Meet w/ , CI and Lisa Gaylord, Team Leader for Environment USAID Madagascar Mission Meet with PTE Meet with MinEnvEF
Tuesday 7/20	Travel to Moramanga w/ Lisa Gaylord and Ndrantomahefa Razakamarina, USAID Madagascar Mission Forestry Meet w/ Assistant Director General and Forest Engineer of the Fanalamanga plantation Visit active forest exploitation sites on the Fanalamanga plantation Meet w/ Moramanga, CIREF district chief & forest engineer Meet w/ individual Moramanga area forest exploiter
Wednesday 7/21	Meet with the forest technicians possessing the better knowledge of the plantation Visit exploitation and of transformation and Meets with the industrial ones of local wood understanding the proportion of the consumption of the products to Moramanga, Tamatave and Madagascar
Thursday 7/22	Meet at Fanalamanga Headquarters review maps and Inventory data and production data. Tour Southern region pine forest parcel examples.
Friday 7/23	Dave and Mike Meet travel with Fanalamanga staff and meet w/ local Moramanga area forest exploiter TIB Small local mill, Secondary Processor, Fanalamanga nursery. Marlin Visit forest exploitation site in center region with Forest exploiter and Moramanga forest engineer for the Central Region
Saturday 7/24	Visit Andasibe RS Work on report at Glen's office
Sunday 7/25	Travel to Tamatave
Monday 7/26	Visit the DIREEF office and meet with lumber wholesaler, Dealer, and secondary processor. Visit the harbor of Tamatave.
Tuesday 7/27	Travel by plane back to Antananarivo visit PACT office and get Maps of the Fanalamanga Forest regions. work at USAID office Afternoon.

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Wednesday 7/28	Work on report USAID
Thursday 7/29	Work on report with ECR Debrief and review draft report w/ Lisa Gaylord
Friday 7/30	Debrief and review draft report w/ Ms. Fleurette Andriantsilavo, General Project Coordinator to the Ministre de l'Environnement et des Eaux et Forêt
Saturday 7/31	Depart Antananarivo

Appendix E

ACKNOWLEDGEMENTS

The authors greatly acknowledge the assistance and participation of the following key contacts:

Mr. Rodin Rajaonahsoa
Director General
Ministry of the Environment, Water, and Forests
Directorate of Water and Forests
Antananarivo, Madagascar

Modine Director General Fanalamanga
B.P. 4127 – Antananarivo 101
Antananarivo, Madagascar
And his staff...
Mr. Roger Rabetsoa, Assistant Director General of Operations
Mr. Luc Rabearisoa, Forest Engineer
Mr. Francois, Sawmill Manager
Mr. RAMILISON, Central district manager

Additional acknowledgement and gratitude for pre and post-travel logistics and briefings must be afforded to:

Oliver Pierson
Africa Program Coordinator
International Programs, USDA Forest Service
1099 14th Street, NW, 5500W
Washington, DC 20005

Our sincerest appreciation for invaluable in-country logistical and essential communication assistance is afforded:

Lisa Gaylord
Natural Resource Management Specialist
USAID / Madagascar
Villa Vonisoa III
Anosy
B.P. 5253, Antananarivo, Madagascar

Our warmest praise for patience and insight into the culture of Madagascar:

Glenn Lines
PTE
B. P. 26
Moramanga 514, Madagascar
gal@chemonics.mg

We would like to acknowledge the efforts and courtesy of Mr. Laudimalala, driver with PTE Moramanga motor pool, who so expertly provided our transportation to Moramanga, in, around, Tamatave and throughout Antananarivo.

Appendix F
RESUMES OF THE AUTHORS

Marlin A. Johnson

Education:

Bachelor of Science 1965 Iowa State University, Ames-Forestry
Additional Studies (no degree) Oklahoma State University, 1965

Experience:

Current Position, since July 1991: Lead and provide vision for Forestry (silviculture, sales, inventory, and planning) for the Southwestern Region. Develop direction for planning, harvest, and cultural activities for the eleven National Forest in the Region. Since 1998 played a key role in development and management of the 4-Corners Sustainable Forest Partnership.

In February and March, 1994, and again in June, 1995, worked with the World Bank in Honduras. In this capacity, evaluated the process used to direct and implement timber activities under the new (1992) forestry law and ensuing regulations.

From 1987 to 1991: Worked in the Washington Office in Timber Management Planning. Closely involved in forest planning nationally.

From 1986 to 1987: Was Forest timber Staff Officer on the Lassen National Forest in California, directing all aspects of timber growth and harvest.

From 1981 to 1985: As Forest Planning Staff Officer on the Lassen and Plumas National Forest, directed development of Land and Resource Management Plans for these two National Forests.

From 1979 to 1981: Held the same position on the Coconino National Forest in Arizona.

From 1972 to 1979: Served as assistant forest planner on the Ketchikan Area of the Tongass National Forest where, in the late 1970's, we developed the first forest plan for a National Forest.

From 1965 to 1967: Served in the Peace Corps in Bolivia. Worked closely with personnel of the Bolivian Forest Service on resource development and forest inventory in the Amazon region, and also on reforestation on the Bolivian Altiplano.

Recent Awards:

Certificate of Merit, 2001. (From FS Chief Bosworth)

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J. Mike Higgs

Education:

Bachelors in Forestry Wood products West Virginia University. 1971
MS technical education The Ohio State University. 1975

Experience:

Industry – 65-72

Small woodlot management/wood procurement-Appalacian hardwoods

Sawmill/stave-mill operation management

Fine hardwood veneer mill

Teaching –tech transfer – 73-80

Teaching/curriculum design, forestry/wood products – community college –
PA & OH

Tech. transfer program dev&del – improved for. Ind. Utilization and marketing
efficiency – FS/FPL

Sus. Dev – 80-

Prog. Dev & trng, expanding short-term forest-based sustainable
development work, Tribal, than AID W.Africa (Sahal), then UN Trust Territory
– W.Pac

FAO project management – 10 SADCC nation forest products training center
construction and startup in Zimbabwe.

FS/IF E&T Coordinator – globalAID and UN collab re forest resource sector

Non-fed land's issue analysis (Montreal, Certification, FedLaws, EnvCrdt, etc)
and collaboration with IP re UNDP/EP, FAO, WB, ITTO, NAFC, WFC,, sfm &
u & m)

Ranger School, BS For. Mngt & Wood Tech, MS Tech Ed.

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David E. Kretschmann

Research General Engineer
Engineering Properties of Wood
USDA Forest Service Forest Products Laboratory
Madison, WI 53705

FORMAL EDUCATION

M. S. Engineering Mechanics, 1987, University of Wisconsin-Madison
B. S. Engineering Mechanics (with honors), 1984, University of Wisconsin-Madison

POSITIONS HELD

1/92-pres Research General Engineer, Engineering Properties of Wood RWU 4714, USDA Forest Service Forest Products Laboratory, Madison, WI 53705
5/87-1/92 General Engineer, Engineering Properties of Wood RWU 4714, USDA Forest Service Forest Products Laboratory, Madison, WI 53705
summer 86 Engineering Technician, USDA Forest Service, Forest Products Laboratory, Madison, WI 53705
1/86-5/87 Teaching Assistant, Engineering Mechanics Dept., University of Wisconsin-Madison, Madison, WI 53706
1985-86 Engineer, Structural Dynamics Dept. 335, McDonnell Douglas Corporation, P. O. Box 516, St Louis, MO 63166

RESPONSIBILITIES:

Responsible for conducting research on: the effects of juvenile wood on physical and mechanical properties of solid and composite lumber, ways of monitoring structural lumber properties for change, and modeling the impacts of cell structure on the physical and mechanical properties of solid and composite lumber. Also, Technical Advisor (Alternate), Board of Review, American Lumber Standards Committee, 1994-present.

HONORS AND AWARDS

1992 George G. Marra Award (first place) for excellence in research and writing
1993 George G. Marra Award (first place) for excellence in research and writing

CERTIFICATION

Professional Engineer, Wisconsin - E-32535

PROFESSIONAL MEMBERSHIPS

Forest Products Society, 1987-2000
Treasurer of Midwest Section
American Society for Testing and Materials, 1987-present
Chair of ASTM D07.02.01 section (Solid Sawn Lumber) 1994 - present
D07 Main committee on Wood Secretary 2000 - present
Society of Wood Science and Technology, 1991-present

PUBLICATIONS

Author of over 45 technical publications on juvenile wood properties, wood quality, lumber monitoring, and wood property relationships.

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Appendix G

LIST OF ACCRONYMS

APN	Agents for Protection of Nature
CI	Conservation International
CIME	Inter-Ministerial Environmental Committee
CIREF	Circonscription des Eaux et Forêts (District office of the Ministry of Water and Forests)
DGEF	Directorate of et Eaux et Forêts (Directorate of Water and Forests)
DIREF	Direction des Eaux et Forêts (Regional office of the Ministry of Water and Forests)
FC	Fanalamanga Corporation
FP	Fanalamanga Plantation
GPS	Global Positioning System
NGO	Non-Governmental Organization
OSF	Observatoire National du Secteur Forestier
SNEF	Syndical National des Exploitants Forestiers de Madagascar
USAID	United States Agency for International Development
USDA – FS	United States Department of Agriculture – Forest Service
WWF	World Wildlife Fund

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