

CHAPTER 10

IMPLEMENTATION PLANS FOR PROGRAMS AND PROJECTS

CHAPTER 10

IMPLEMENTATION PLANS FOR PROGRAMS AND PROJECTS

10.1 Importance of Programs / Projects

In this chapter, the implementation plans will be analyzed for each program/project, which shall be implemented based on the Implementation Plan of the Master Plan. The core of the Master Plan consists of 3 projects including “Collection of Seeds and Production of Seedlings”, “Reforestation and Enrichment” and “Development and Improvement of Family Agriculture”, which are the Central Projects that will directly contribute to the recuperation of degraded areas through reforestation and cultivation activities in these degraded areas. The Central Projects are implemented not only for achieving the main direct objectives of the Master Plan, but also for applying the recuperation plans of degraded areas to the other regions of Pará State, representing as the technological models for the recuperation of degraded areas. The executing organizations of the Central Projects will be mainly formed by the rural population, such as settled farmers, and small-scale and medium-scale producers. Therefore, these Projects have to be implemented in an appropriate manner in terms of generation of income and work opportunities, mitigation of poverty and regional development. Besides, the Central Projects will exert a great influence on the implementation of the Master Plan, due to their relatively large scale. Consequently, the implementation plans of the Central Projects shall be elaborated through a detailed analysis.

10.2 Outline of Execution Plans for 7 Programs/Projects

10.2.1 Project to Study the Designation of Conservation Units in the Basins of Araguaia and Tocantins Rivers

(1) Objective

The main objective is to accomplish a feasibility study to designate the conservation units in the basins of Araguaia and Tocantins rivers, based on the Law 9,985 dated 18/07/2000, in order to motivate conservation of biodiversity, sustainable use of biodiversity and improvement of the value of environment.

(2) Target

The target of the Project is to accomplish the study of natural resources more accurately in combination with remote sensing analysis in order to identify the precise boundaries of the legal conservation units to be designated in the terrestrial and aquatic areas of Araguaia and Tocantins river basins.

(3) Project Area

The study area of the Project is proposed in the following two locations:

- a. An area estimated as approximately 8,700 ha located at the junction of the Araguaia river and its adjacent areas between the Tocantins River, the Tranzamazônica highway and the

headquarters of the municipal district of São João of Araguaia. There are approximately 70 lakes in this area, which needs to be protected and can be used sustainably for ecotourism.

- b. Another area estimated as approx. 4,700 ha located in the south of the river Tocantins, and its basin located in between the municipal districts of Marabá and New Ipixuna.

The proposed areas are considered as the most suitable areas in the Study Area with appropriate conditions for the creation, implementation and management of conservation units for the preservation of the biodiversity and sustainable use of the natural resources.

(4) Justification

Studies made by Institute of the Social development of Pará (IDESP), and published in “Development of Pará”, in June 1992, indicated these areas as Biological Reserves and Ecological Management categories under the names of Araguaia and Tocantins Reserves, respectively. However, since the time has passed after the studies were made and due to the socioeconomic and ecological changes in the region, the management categories will be made in accordance with the natural resources and socio economic studies, as well as in agreement with the norms of the National System of Nature Conservation Unit (SNUC).

The field studies will define the precise boundaries and the inclusion of the largest possible land, intermediary and water eco systems, as well as the upland eco systems, resultant of the advance of the local highways and the Tranzamazônica highway, and these areas will be used for regeneration and reforestation works. The inundated areas and the ponds, offer conditions for natural rearing of larva and small fish for reproduction, and other works may be developed with the animal population, especially, the capybaras, and the pacas (*Cuniculus paca*). Perhaps the proposed areas may be the last areas in the municipality in adequate conditions for the creation, implementation and management of the conservation unit, aiming at the management and the preservation of the bio diversity.

(5) Methodology

The Study shall include the following items:

- a. Study of current aspects
- b. Study of basic Aspects
- c. Detailed analysis including possible constraints and their countermeasures
- d. Classification and mapping of areas
- e. Preparation of study report

(6) Execution Schedule

Activities	Year 1		Year 2		Year 3	
	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.
Preparation for the Study including arrangement of finance						
First Field Survey						
Analysis of data and information						
2nd Additional Field Survey						
Data Analysis and Report preparation						

(7) Requirements of the Project

1) Requirement of Experts

In order to execute the Study, the experts required will be as follows :

- a. Team Leader/ Coordinator
- b. Remote Sensing Expert
- c. Forestry expert
- d. Flora Expert
- e. Fauna Expert
- f. Agroforestry expert
- g. Geologist/ Geomorphologist
- h. Archaeologist
- i. Climatologist/ Hydrologist
- j. Soils and Land Use Expert
- k. Socio-economist

Apart from these experts, three assistants, and three persons including drivers and labors are also required as assistants in the field survey works.

2) Equipment and Other Requirements

Precise GPS equipment, five personal computers and programs for data processing and calculations, local transport for the study team – two 4-wheel drive pickup trucks, small boat, color xerox machine for the study purpose, and fax machine.

(8) Executing Organization and Related Agencies

SECTAM will be the main executing organization of the Project. Organizations related to the Project are INCRA, ITERPA, FCAP, and MPEG. Data and information in regard to land ownership need to be obtained from INCRA and ITERPA. FCAP and MPEG shall provide the technical support needed for the Study.

(9) Effects of the Project

By accomplishing the Project, the major benefits to be attained are as follows:

- a. The precise boundaries of the legal conservation units to be designated will be confirmed and thereby approx.8,700 ha area in São João of Araguaia Municipality and 4,700 ha in Marabá Municipality can be preserved as legal conservation units.
- b. Conservation of the biodiversity for scientific research
- c. Eco-tourism
- d. Sustainable management of the natural resources and development by local population
- e. Recreation for local population
- f. Environmental education

(10) Project Cost Estimation

Cost of Consultancy Services	R\$1,656,000
Cost of Equipment	R\$216,000
Other costs including travel cost, office supplies, consumable items etc.	R\$228,000
Total Cost of the Study	R\$2,100,000

(11) Possible Funding for the Project

Support for biodiversity research and conservation has been available through the government programs such as National Environment Fund (FNMA) and the Pilot Program for the Conservation of Tropical Rainforests (PPG-7). During the first year of the project necessary preparations for financing the Project including making applications shall be made so as to find the suitable funding source for the project.

(12) Important Observations

The conscience of the environmental organizations about the preservation of environment and the availability of human resources with specialized knowledge are considered as very important. Prior to the establishment of conservation units, it is necessary to clarify the land properties with the existing boundaries. The procurement of financial resources is also necessary together with the formation of an organization to be responsible for administration and maintenance of the conservation units to be established.

10.2.2 Project to Study the Natural Resources and Socioeconomic Conditions for the Conservation of Basin at the Northwest of Itacaiúnas River

(1) Objective

The main objective is to accomplish a feasibility study on the natural resources and socioeconomic conditions of the basin at the northwest of the Itacaiúnas river and to prepare a land use plan of this area in order to promote conservation of biodiversity and sustainable use of biodiversity area, which has been suffering intensive activities of deforestation of natural forests.

(2) Target

The target of the Project is to accomplish the study of natural resources and socioeconomic conditions of the Project area in combination with remote sensing analysis in the terrestrial and aquatic areas of the basin at the northwest of the Itacaiúnas river. Zoning of the land use for conservation and sustainable development will serve as the basic information for future elaboration of development plan and conservation of the area.

(3) Project Area

The Project area is located at the basins of Bernadino, Itapirapé, Tapirapé and Preto rivers, where there are dense and open upland rain forests. Another factor, which justifies the conservation of the area is that headwaters (springs) of the tributaries that form the Itacaiunas river are found in this area. The Project Area covers approx. 4,268 km², at the northwest of Marabá Municipality.

(4) Justification

Marabá municipality has a high percentage of degraded areas, which makes it necessary to protect the hydrographic basins to secure water production, bio diversity and the micro climate balance. Companhia Vale do Rio Doce, which explores the iron ore mines at Serra dos Carajás, has a small protected area and the Brazilian Institute of Environment and Renewable Natural

resources (IBAMA) has units of conservation located at the west and southwestern part of the municipality. The proposed area for the study is still one of the most conserved areas in the municipality, requiring a basis for a better form of identification, either as direct or indirect unit of conservation, or as an area for multiple uses, helping the gene flux of the forest and the animals as a large ecological corridor in the central part of the State, involving federal conservation units and private areas of sustainable management.

(5) Execution Method

The Study shall include the following items:

- a. Study of current aspects
- b. Study of basic aspects
- c. Detailed analysis including possible constraints and their countermeasures
- d. Classification and mapping of areas
- e. Preparation of study report

(6) Execution Schedule

Activities	Year 1		Year 2		Year 3	
	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.
Preparation for the Study including arrangement of finance						
First Field Survey						
Analysis of data and information						
2nd Additional Field Survey						
Data Analysis and Report preparation						

During the first field survey, the entire area will be surveyed and detailed information and data will be collected. Based on the analysis of data and information, suitable areas will be selected, where more detailed study will be carried out during the second field survey.

(7) Requirements of the Project

1) Requirement of Experts

In order to execute the Study, the experts required will be as follows :

- a. Team Leader/ Coordinator
- b. Remote Sensing Expert
- c. Forestry expert
- d. Flora Expert
- e. Fauna Expert
- f. Agroforestry expert
- g. Geologist/ Geomorphologist
- h. Archaeologist
- i. Climatologist/ Hydrologist
- j. Soils and Land Use Expert
- k. Socio-economist

Apart from these experts, three assistants and three persons including drivers, labors are also required to assist in the field survey works.

2) Equipment and Other Requirements

Precise GPS equipment, five personal computers and programs for data processing and calculations, local transport for the study team – two 4-wheel drive pickup trucks, color xerox machine for the study purpose, and fax machine

(8) Executing Organization and Related Agencies

SECTAM will be the main executing organization of the Project. Organizations related to the Project are INCRA, ITERPA, FCAP, and MPEG. Data and information in regard to land ownership need to be obtained from INCRA and ITERPA. FCAP and MPEG shall provide the technical support needed for the Study.

(9) Project Effects

By accomplishing the Project, the effects to be attained are as follows:

- a. The precise boundaries of the legal conservation units to be designated will be confirmed and, thereby, approx.50,000 to 100,000 ha area in Marabá Municipality can be preserved as legal conservation units.
- b. Conservation of the biodiversity for scientific research
- c. Sustainable management and development of the natural resources by local population
- d. Environmental education.

(10) Cost Estimation

Cost of Consultancy Services	R\$1,656,000
Cost of Equipment	R\$166,000
Other costs including travel cost, office supplies, consumable items etc.	R\$228,000
Total Cost of the Study	R\$2,050,000

(11) Funding for the Project

Support for biodiversity research and conservation has been available through the government programs such as National Environment Fund (FNMA) and the Pilot Program for the Conservation of Tropical Rainforests (PPG-7). During the first year of the project necessary preparations for financing the project including making applications shall be made so as to find the suitable funding source for the project.

(12) Important Observation

The classification and the delimitation of subjected areas are to be done to classify the areas as conservation units and areas for development activities, and the development objectives will be identified accordingly. For this matter, the work on Ecological-Economic Zoning (EEZ) should be implemented as soon as possible. Besides, it is necessary to clarify the properties of lands and their boundaries, which need to be carried out with the coordination of INCRA, the agency responsible for the planning of resettlement areas.

10.2.3 Program for Institutional Support to Environmental Organizations of the State and Municipalities

(1) Objectives

In order to render the State guideline of decentralization through the strengthening of the environmental agencies in Pará State and municipalities of Marabá micro region, staffing of

persons in charge of planning and execution of environmental policies in these agencies is considered necessary so that these organizations can accomplish the state environmental policies efficiently and effectively. Besides, in the process of policy making for the protection and conservation of natural resources, their recuperation, and their appropriate uses etc., the implementation of researches and surveys on related science and technologies is considered indispensable.

(2) Target

- a. To strengthen the environmental agencies in Pará State
- b. To decentralize the activities on environment of Pará State through the establishment of representatives at the municipality level in order to match the working correlation between the environmental institutions of public and private sectors,
- c. To strengthen the material and human resources in these environmental agencies in order to improve their agility and efficiency in works, and to avoid the duplicity in their works,
- d. To establish and to support the centers of scientific and technological surveys for their works in creation and adaptation of technologies, management of basic information in connection to the making of environmental policy and the planning of geo-economic utilization.

(3) Project Area

The program consists of strengthening of SECTAM, the environmental agency of Pará State, and establishment of its representative office in Marabá, strengthening of Municipal Environmental Secretariats in Marabá, São João do Araguaia, São Domingos do Araguaia, Brejo Grande do Araguaia and Palestina do Pará, and establishment of a Center for Scientific and Technological Survey in Marabá.

(4) Methodology

The Center of Scientific and Technological Survey and the representative offices of SECTAM in main localities such as Marabá will serve as a partnership with other institutions such as IBAMA, CNPq, universities and other related organizations. With this system, the municipal environmental organizations can improve their equipment and technical training in the subjects of environmental protection, control and monitoring works. The reduction of overlapped works in different levels of the government (federal, state and municipalities) will be carried out through the utilization of a similar information system for making a network. Besides, the improvement in institutional management can be achieved through the establishment of work demarcation of each institution/organization participated in this system.

(5) Activities

The principal operations to be implemented are as follows:

- a. To set up an Intelligent Unit in SECTAM for the procurement of financial assistances from national and international sources, as well as public and private institutions;
- b. To identify and to analyze the works of various institutions involved in the environmental and technological matters related to Marabá micro region;

- c. To establish a representative office of SECTAM and the Center of Technological Survey in Marabá through partnership with other institutions already installed or to be installed in the region;
- d. To implement an information system for activating the activities of SECTAM in the micro region, and the correlation of works in other projects/programs proposed in the Master Plan;
- e. To equip and to train the staff of Municipal Secretariats.

(6) Project Schedule

The project will be implemented for a period of 5 years, divided into following stages

	Year				
	1	2	3	4	5
To establish an intelligence unit in SECTAM					
Consultant / cooperation					
To identify and to analyze the works of institutions on environmental problem and technology					
To establish the representative office of SECTAM and the center of technological survey in Marabá					
To equip and to allocate the personnel for new organizations					
To implement the information system					
To equip and to train the municipal environmental secretariats					

(7) Coordination Organization

SECTAM as the Secretariat of Science, Technology and Environment of Pará will be the coordination agency of the program. As for the executing agencies, SECTAM, Municipal offices and related institutions shall participate in this program. As for the related organizations, MMA, Ministry of Science and Technology, IBAMA, CNPq Municipal Secretariats of Environment, universities and NGOs will be involved in this program. The unconditional participation of the community centers, UEPA and municipal schools to guarantee the success of the program will be implemented accordingly.

(8) Beneficiaries and Project Effects

The effects of the program will be as follows:

- a. To elaborate the environmental policies with scientific and technological base for meeting with the local characteristics;
- b. To improve the partnership among the public, private and local institutions in activities of preservation, conservation, recuperation and correct exploration of natural resources;
- c. To improve the diffusion of environmental politics;
- d. To improve the activities in environmental control and monitoring;
- e. To improve the adoption of policies and regulations of environment by local people through the activities of diffusion of environmental regulations towards localities;
- f. To reduce the destruction of forests; and
- g. To reduce the overlapped works in governmental institutions.

(9) Estimation of Costs

a.	Initial Investment on Personnel/ Consultant:	R\$ 2,400,000
b.	Initial Investment on Installations and Equipment:	R\$ 2,706,000
c.	Annual Cost for Operation and Maintenance:	R\$ 1,153,000

(10) Financial Resources

A technical cooperation on human resources in the aspect of environmental management for water resources, park management, solid waste management, equipment for environmental monitoring and technicians related to on the job training is considered necessary.

The resources for installations (equipment for environmental monitoring) and special consultant (environmental management, park management, management of solid waste and water resources) can be procured through the projects of international cooperation, sectoral funds and private sources. For the annual costs of operation and maintenance, these will be allocated in the annual State Budget.

(11) Important Observation

The environmental agencies should have a concept on the importance of their functions, an unconditional participation in this Program, and the sufficient provision of human resources and finance for implementing the Program. Coordination among the activities of the organizations in federal, state and municipalities, and NGOs is also considered important. The success of this Program depends on the improvement of inter-institutional relationship among these agencies and organizations at various levels for making a good cooperation in this Program.

10.2.4 Project of Land Ownership Survey, Registration and Mapping

(1) Objectives

The main objective is to capacitate and to strengthen the Institute of Land in Pará State (ITERPA) for establishing the knowledge on producing reliable data on land ownership information and for training its technical staff. The information will be made in a data bank for the availability of an information system, reference maps and reports as basic referential materials to be used in the strategic development planning of Pará State. The project aims at promoting the interaction and integration of ITERPA with other federal agencies such as INCRA, IBAMA and FUNAI in order to utilize the existing data together and to make a possible use of new data for a mutual cooperation in the operation of related activities.

(2) Targets

- a. To realize the study on land ownership registration for Marabá micro region, the initial area of the study, including the analyses of certificates, surveys and activities considered necessary for the study;
- b. To organize and to systematize the registers of rural properties in federal, state, rural, municipal and private areas;

- c. To set up the organizations of State and municipalities responsible for the registration/land ownership survey of rural lands the information system which can offer a knowledge the land proprietors in the State;
- d. To establish an interface between SECTAM, which is responsible for the environmental problems of Pará State, ITERPA, which responsible for the land problems in the State, and the representatives of federal organizations such as INCRA, which is responsible for federal lands, FUNAI for Indian lands and IBAMA for the environmental problems on the national level, as well as the related organizations at the local level.
- e. To establish a data bank (data warehouse) with graphic, geo-referential information and literature identifying the relation of utilization of related properties.

(3) Project Area

The program will be carried out in ITERPA Belém, where technicians and equipment are available, for realizing the works related to the municipalities of Marabá, São Domingos do Araguaia, Brejo Grande, Palestina do Pará and São João do Araguaia. The program shall be expanded to other areas in Pará State.

(4) Methodology

A group of technicians from SECTAM and ITERPA will be formed in Belém for the execution of this program. Their works in preparation and systematization of existing data to be checked at field sites will be implemented for formulating the data forms and geo-referential data. The registrar offices of properties and the related Municipal secretariats will be visited by these technicians also for checking the related documents. The collected information will be stored in the data bank and will be made available in various formats such as maps, for instance, through a system of 'on line' and 'off line'. Besides, the technical group will train the personnel in municipalities for frequently modifying the information system to provide the users with updated information.

The participation of SECTAM in all phases of the project is important for gathering data to be combined with those in the Laboratory of Remote Sensing which monitor the forest fires, pluvial precipitation etc. The interaction between ITERPA and SECTAM will improve the activities of Secretariat of Environment concerning the environmental controls and related licensing of environmental projects.

(5) Activities

The principal activities to be carried out are as follows:

- a. To identify and to analyze the existing data, as found in the National System of Rural Registration of INCRA, and the land titles issued by INCRA and ITERPA.
- b. To elaborate a technical solution (information system and data bank) in connection with other systems presently functioning in the country such as SIR (Rural Information System) of INCRA and SIVAM (Amazônia Vigilance System);
- c. To present the concept of the system to the public (users of the system, organizations of partnership, internal personnel etc.) through their participation in related seminars in order to identify the needed information to be added,

- d. To diagnose the rural properties (land lots or land portions of resettlement projects, farms, villas, agricultural colonies, biological reserves, Indian reserves etc.) through the application of forms and geo-referential data,
- e. To check the reliability of information in registry offices,
- f. To realize the utilization of data in graphic or literal forms,
- g. To evaluate the results and to implement the alterations,
- h. To define the final flow of works.

(6) Project Schedule

The project will be implemented in 5 years.

(7) Coordination, Executing Agencies and Related Institutions

The Secretariat of Science, Technology and Environment of Pará State - SECTAM, and the Land Institute of Para (ITERPA) will be the coordination and executing agencies of the program. SECTAM, ITERPA and the Municipal Secretariats of Land will be the executing agencies of the program. Other institutions related to this project are INCRA, MMA, IBAMA, FUNAI, NGOs, the Municipal Secretariats of Environment and Agriculture, the registry offices for land properties.

(8) Beneficiaries and Project Effects

The beneficiaries will be the public and private institutions, as well as the public in general. The effects are as follows:

- a. To formulate the reliable source of registration information in Pará State,
- b. To make the basic references for the strategic planning of Pará State
- c. To unify the data of organizations and programs at federal level in order to avoid the overlapped works,
- d. To improve the security in transactions of real estates,
- e. To identify the areas of public and private lands, and the registration of properties,
- f. To regularize the formalities of registered properties for using in the credit application,
- g. To reduce the social conflicts on land problems,
- h. To optimize and to activate the activities of land ownership reform,
- i. To optimize the control and investigation of the remaining forest areas, and
- j. To support the implementation of projects in development and environmental management.

(9) Estimation of Costs

Initial Investment on Personnel / Consultant	R\$ 2,400,000
Initial Investment on Equipment and Materials	R\$ 2,700,000
Annual Cost for Organization and Management	R\$ 300,000

(10) Finance Resources

The costs for consultants, equipment and materials for the first 3 years of program implementation will be procured through the technical cooperation from international organizations. The costs for the funds of annual operation and management during the 5-year

period of the program will be allocated in the State Budget.

(11) Important Observation

It is extremely important to establish an interaction among the municipal agencies responsible for the registration and land ownership of rural lands and the register offices of land properties. The collaboration among land owners is also preconditional. Besides, it will be important to prepare sufficient human resources and finances for the operation and maintenance of equipment and materials to be installed.

10.2.5 Environmental Education and Technical Training Program

(1) Objectives

The main objectives are to promote the knowledge on environment and sustainability in development of local inhabitants engaged in the farming system of family agriculture, to formulate the education system using techniques without causing damages to the environment for promoting the recuperation of degraded areas and the protection of bio-diversity, and to improve the farm management system and the capacity for procurement of financial resources.

(2) Targets

- a. To promote the knowledge on the importance of harmony between human and nature to local children, young people and adults;
- b. To change the farming habits in production of small farmers for lessening the damages to environment by the shift and burn farming system;
- c. To realize the system of fixed residency and eternal land use for local inhabitants in order to improve their living conditions;
- d. To strengthen the related organizations and to promote the supply of appropriate equipment;
- e. To train the techniques on agro-forestry to farmers through related models;
- f. To train the techniques on afforestation to farmers through related models;
- g. To capacitate the human resource on farm operation and management so that they can procure and operate the farming machinery, apply for agricultural credit and function the management organization in order to manage their farms;
- h. To train farmers on the new techniques including processing techniques for value-adding their agro-forestry produces;
- i. To formulate and to diffuse the educational set with the seal of 'Development without destructions = Appreciation from Environment' through means of workshops and multi-media communication system.

(3) Project Area

The program will be executed through the establishment of " Patrol Units " for visiting the community centers and local schools subjected to the 5 municipalities of the Study area. Besides, the areas outside the Study area but belonged to the Master Plan coverage will be subjected to this program also.

(4) Justification

The program needs to promote the recuperation of degraded areas caused by the lack of knowledge and information of local inhabitants by providing them with reliable information for changing their habits and for realizing the slogan of Pará State “Development without destructions”.

This program supplies the information and knowledge to the people subjected to the degraded areas:

- a. To valorize and to preserve the environment
- b. To utilize sustainably the areas planned for forestation and silvopastoral agriculture.
- c. To recuperate the degraded areas through the following means:
 - Regeneration and enrichment of forests
 - Afforestation
 - Introduction of Agro-forestry (Intercropping) and silvopastoral
 - Other appropriate techniques

This program is made in accordance with the Federal Pluriannual Plan (PPA 2000-2003), which has been allocated with program expenditure of R\$ 18,890 million for Environment. The program is also made in accordance with the Program of Ecological Compensation for the Use of Forestal Areas in Pará State – PROECO.

(5) Methodology

The program will be executed through the co-operation of related institutions with the responsibility on general coordination by SECTAM. The institutions of SAGRI, EMATER and FCAP will participate in this program as executing agencies for specific activities. These require the availability of related physical infrastructures, special technical groups and the supporting personnel. This program covers the participation of consultant with special capacities of technical transfer in the aspects of Environmental Education, Agroforestry System and Reforestation.

The phases for executing the program are as follows:

- a. Planning and Programming
- b. To improve the equipment of related organizations
- c. To train the professional groups
- d. To establish the partnership between the training groups and the communities
- e. To investigate the persons related to the technical training
- f. To realize the workshop on environmental education
- g. To train and to diffuse the techniques of afforestation and agro-forestry
- h. To re-evaluate the program
- i. To prepare and to diffuse the kit of “Development without destructions = Appreciation from Environment”

(6) Activities

- a. To realize the socio-economic diagnosis in selected areas, including the annual revenue and production data of related farms;
- b. To identify the preferences in production and principal local problems;
- c. To prepare the materials of environmental education based on the analysis of local problems;
- d. To inform the public (families, teachers and children) on the necessity of the program;
- e. To promote workshops with teachers and representatives of local communities with the finalization of the theme “Environmental Education for Sustainability” in the school curriculum and in community activities, in order to define the demonstration areas for the technical training;
- f. To implement an education system for improving the habits in family of children from 3 years old;
- g. To implement the education to farmers groups of same levels of revenues as models of demonstration areas;
- h. To instruct the making of application forms for agricultural credits to be used for the improvement of infrastructures, if necessary;
- i. To observe the progress of plant growth, the caring works, the harvest and the marketing;
- j. To prepare and to diffuse the kit with the seal of “Development without destruction - Appreciation from the Environment “.

(7) Implementation Schedule

The program will be implemented for 10 years in total, including a period of 3 years as the preparation stage.

(8) Coordinating and Executing Organizations and Related Agencies

SECTAM as the Secretariat of Science, Technology and Environment of Pará State will be the coordinating and one of the main executing agencies of the program. As for the executing agencies, SAGRI, EMATER and FCAP will be participated in this program. SAGRI, EMATER-Para and SECTAM have their personnel, techniques and experiences in the proposed projects/programs. The unconditional participation of the community centers, municipal schools to guarantee the success of this program will be carried out accordingly. As for related organizations, INCRA, MMA, Ministry of National Integration, Ministry of Science and Technology, IBAMA, EMPRABA, SENAR, NGOs, Municipal Secretariats of Environment and Agriculture will be involved in this program for supplying the equipment and materials.

(9) Beneficiaries and Project Effects

The beneficiaries of the program will be medium/small farmers including their families, teachers, technicians and organizations related to the environmental matter, municipal schools and local governments. The effects of the program are as follows:

- a. To improve the equipment and the human resource for supporting the sustainable development of the agro-forestry sector,
- b. To integrate the operations of preservation, conservation among the communities and the

- local governments of State and municipalities,
- c. To integrate schools and communities for strengthening the environmental management concept;
 - d. To increase the personnel in charge of the environmental matter in the Study area
 - e. To motivate the responsibilities of individuals towards the environment management;
 - f. To improve the agro-system for promoting the agro-forestry activities and reforestation.;
 - g. To have the involvement of hundreds of small/medium farms;
 - h. To capacitate the human resource (technicians and producers) relating to the environmental education, agro-forestry and the operation and management of natural resources;
 - i. To improve the revenues of farmers
 - j. To improve the living conditions and the professional level of local inhabitants
 - k. To diffuse the concept of educational importance in order to carry out a permanent education program to local inhabitants;
 - l. To increase the production and the generation of job opportunities

(10) Costs

Initial Investment on Personnel / Consultant -	R\$ 3,600,000
Training in Abroad -	R\$ 120,000
Initial Investment on Equipment and Materials -	R\$ 2,034,300
Annual Cost on Organization and Management	R\$ 293,300

(11) Financing Source

The costs for consultant, equipment and materials for the first 3 years of program implementation will be procured through the technical cooperation from international cooperation programs. The funds for annual operation and maintenance in 10 years will be allocated in the annual State Budget.

(12) Important Observation

The identification of the motives of farmers from other regions of the country should be carried out. As they don't like the community activities, it is necessary to make them adhering to some kind of organization in order to participate in the Program. Besides, it is important to obtain sufficient human resource and finance during the whole duration of the Program.

10.2.6 Project of Utilization of Organic Manure made of Sawdust, Manure and Bark of Trees

(1) Objective

The main objective is to produce and supply necessary organic manure for using in the Project of development and improvement of family agriculture through agrosilvipastoral activities and the Project of reforestation and enrichment with native and forest species. For this purpose, technology should be established to produce an effective organic fertilizer for improvement and conservation of the soil, and promotion should be carried out for the popularization of the applicable technology.

(2) Target

The duration of the Project will be 17 years including 2 years of preparatory phase, which begins from 2005. Target area for the 2 projects is 3,500 ha/year totaling 35,000ha for 10 years period. Although the volume of organic manure needed depends on crop species to be grown, the average volume of compost to be used in each year in the Project of development and improvement of family agriculture is 3.9 m³/ha (1,000ha), and that of the Project of reforestation and enrichment is approximately 3.6m³/ha (2,500ha). Annual production volume is approximately 13,000m³. For this purpose, processing facilities should be installed in 8 locations with a production volume of 1,000-2,000m³/year.

(3) Project Area

The areas to implement the Project is selected based on the infrastructure conditions considering the expenditure of the transportation of the raw material and the supply of organic manure. In consideration of economic aspect, the maximum distance to transport the organic fertilizer is 30km. In the Marabá municipality, where the sawmills are concentrated, concrete box style processing facilities shall be set up in 3 locations and a simple processing facility shall be set up in Santa Fé in the western part of the municipality. One simple processing facility shall be set up in each of the municipality of São João of Araguaia, São Domingos of Araguaia, Brejo Grande do Araguaia and Palestina do Pará.

Project Organization	Productivity of Organic Manure	Equipments and Facilities
SEAGRI and SEMMA of Marabá • Vila São José • Santa Fé	2,000 m ³ 2,000 m ³	8 ton. truck, power shovel 8 ton. truck, power shovel
Department of Agriculture and Environment of São João do Araguaia	1,000 m ³	Nil
Department of Agriculture and Environment of São Domingos do Araguaia	2,000 m ³	power shovel
SEAGRI of Brejo Grande do Araguaia	1,000 m ³	Share Equipment with Palestina do Pará
SEAGRI of Palestina do Pará	1,000 m ³	8 ton. Truck, power shovel
FETAGRI, COCAT and other cooperatives	2,000 m ³	8 ton. Truck, power shovel
ASSIMAR	2,000 m ³	12 ton. truck, power shovel

(4) Outline of the Project

The project should take advantage of those materials such as sawdust and wooden dust product from timber factories consolidating the system of supply of organic manure. The processing centers shall be allocated in each municipality of the Study Area, in strategic places in function of the areas of execution of the Project of collection of seeds and of production of seedlings of forest and fruit species. The machines and equipments shall be allocated in each processing center.

a. Facilities

- Organic manure processing facilities (concrete box facilities - 3, portable facilities - 5)
- Tab system - 7
- Stock houses and garages - 6

b. **Machineries**

- Vehicle for transportation (12ton tracks - 1, 8ton track - 4)
- Vehicle for operation (power shovel - 6)

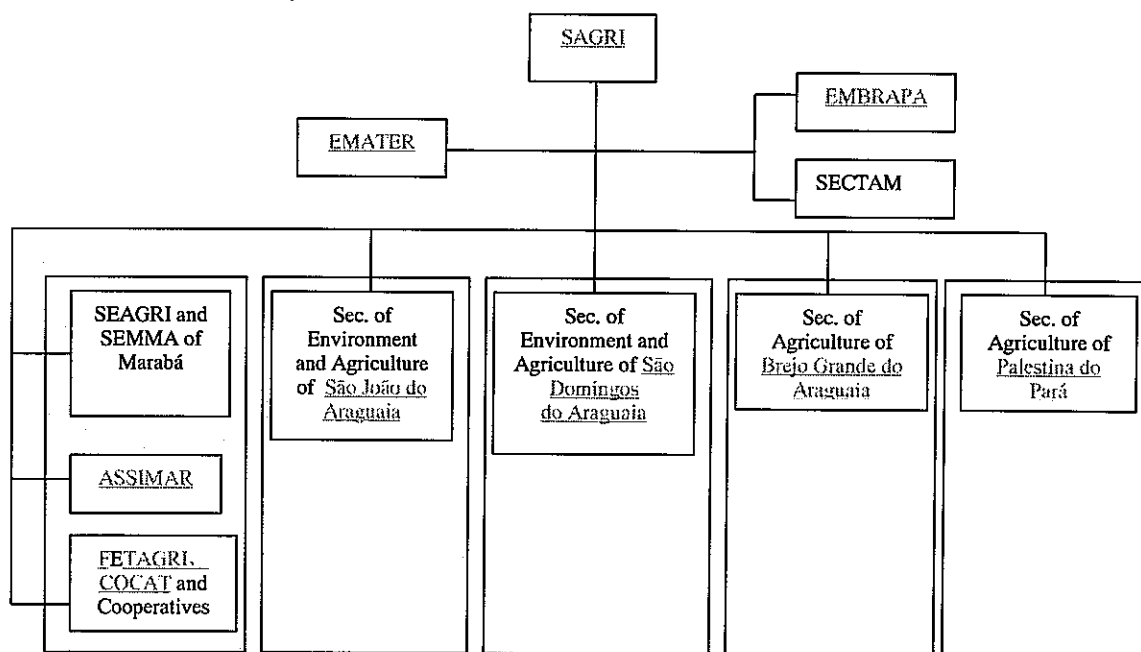
(5) **Project Schedule**

Project period implementation period is 17 years, which is divided into preparation period and execution period. In the preparation period, activities including collection of raw materials, surveying and preparation of the land, construction of facilities, acquisition of machinery and equipment, among others shall be carried out. Main activities carried out are also divided into collection of sawdust, production and distribution of organic manure.

Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Preparation Period																	
Preparation for collection of raw material																	
Land Preparation																	
Facilities Construction																	
Equipments Procurement																	
Execution Period																	
Collection of Sawdust																	
Production of Organic Manure																	
Supply of the Organic Manure																	

(6) **Coordinating Agency and Executing Organizations and Supporting Institutions**

SAGRI will be the main executing agency of the Project, assuming responsibilities of administration and operation of the whole Project in cooperation with 7 executing organizations. As the supporting organizations, EMBRAPA provides the technical assistance for the project and EMATER is responsible for extension work of the project. Project organization includes department of agriculture in each municipality, and organizations such as ASSIMAR, farmers cooperatives including FETAGRI, COCAT, etc., in the Marabá municipality.



(7) Benefits of the Project

The annual income with sale of the organic manure will be R\$ 390,000 (R\$ 30/m³). The other annual income is R\$ 102,000. Besides, the qualitative benefits such as the effective use of wasted sawdust and reducing burning in the sawmills, contributed to the reduction of emission of CO₂.

(8) Cost Estimation

The initial investment, including expenses of construction of facilities, and acquisition of machinery and equipment will be R\$ 1,811,000. The cost of installation of processing facility of a concrete box will be R\$ 104,000 each (if tab system is excluded, it will be R\$ 70.000) and the cost of simple processing facility will be R\$ 37,500 each. The annual cost of operation and maintenance, including the raw material transport, production and distribution of organic fertilizer will be R\$ 227,000.

(9) Financial Resources

SAGRI should apply for the budget to secure the capital for the initial investment from the general account budget of the State government. As an alternative, it can apply to financing agents such as BANPARA, BASA and international financial agents together with AMAT (Association of the Municipalities of Araguaia-Tocantins). The annual cost of operation and maintenance can be attained through the sale of organic manure.

(10) Important Observations

Considering the importance of stable supply of mineral nutrients, the Project foresees the purchase of urea for supply of nitrogen; however it is necessary to consolidate a system of collecting the chicken manure and cattle manure in the farm household area and to supply them to the centers of processing of organic manure, in order to reduce the production costs. On the other hand, responsible municipal organizations for the sector, which will participate in the Project as the executing agency, should be competent enough to execute the Project. Therefore the institutional strengthening of the regional executing organization, as well as the formation of the human resources and the technical support for operation and administration of the Project will be necessary.

10.2.7 Project of Agroindustrial Development

(1) Objectives

The objectives of this project are (a) to develop and to promote the agroindustrial potential in Marabá micro region, to improve the local commercialization in order to enhance the value-added of produces from the family agriculture, (b) to study the economic viability in utilization of Babaçu, (c) to promote the industry of making furniture for exporting to neighboring countries, and (d) to develop the region with consolidated infrastructures for supporting the marketing of regional produces. Besides, for the farmer groups, with the improvement in physical infrastructures and materials, administrative system and proper management, they will be involved in the processing works for increasing the local production (animal and/or agriculture). Therefore, groups of micro-enterprises of rural family-type will be

established. The generation of job opportunities can be expected, offering the sustainability in operation of the program.

(2) Targets

- a. To establish the small and medium types of agroindustry for processing of fruits and cassava flour for domestic and international markets;
- b. To expand the cow milk production network by establishing in Marabá micro region 10 locations of cold storages for milk for group-users to improve their benefit in milk production;
- c. To establish 10 cassava milling factories, 10 rice milling factories with group management system for value-added purpose to small farmers;
- d. To establish a medium-sized furniture making factory for promoting this industry;
- e. To establish 10 charcoal factories with 12 fire-places to promote the charcoal production as the local cottage industry;
- f. To establish one place for primary washing, drying and storage of grains;
- g. To produce the high value-added products with market competitiveness in quality and price;
- h. To establish an agricultural marketing promotion center for elaborating the needs in production with marketability to develop the local market as well as domestic and international markets; and
- i. To promote a F/S study for the efficiently use of Babaçú.

(3) Project Area

The area for implementing the Project will be the 5 municipalities of Marabá micro region.

(4) Justification

With the implementation of the central projects of the Master Plan, an increase in local agricultural production will be observed. A project for agroindustrial development, therefore, is considered as fundamental for the economic promotion of Pará State, since it will increase the investments and will generate a high number of jobs. The strengthening of local agro-industry with the establishment of various industries for the diversified products is considered basically important.

(5) Methodology

As the program is made up of many components, it is necessary to establish a strategic planning committee with representatives of implementing agencies and related sectors. The following items will be implemented by the committee:

- a. To request the finance from the financing agencies for implementing an F/S study on the utilization of Babaçú;
- b. In order to establish the Agricultural Marketing Promotion Center, it is necessary to request for finance from the Secretariat of Production of Pará State;
- c. The staff of this center will be composed of technicians from several executing agencies and related organizations. A partnership with SEBRAE and Secretariat of Industry and Commerce should also be evaluated.
- d. The finance procurement for the factory construction and installation of processing

machinery would be proceeded through the utilization of government financing programs for supporting the agroindustrial development and family agriculture such as PRONAF and FNO-PROAGRIN etc.). Generally, the agricultural business promotion marketing center shall support in smooth advancing of the financing negotiation, though the producer association will be incharge of borrowing.

- e. The concept of putting the seal ‘Socio-Environmental Approval’ on local products will emphasize the activities of the Agricultural Marketing Promotion Center towards local groups and the international reputation, facilitating the finance procurement and the management for this project in Marabá micro region.

(6) Implementation Schedule

The total duration of the Project is 25 years. All of initial investment will be made in the first year. However, the items of medium terms will be made in a period of 2 years.

(7) Coordinating Organizations and Executing Agencies and Supporting Institutions

Secretariat of Production and SECTAM (Executive Secretariat of Science, Technology and Environment of Pará State) will be the executing agency at central level. Meanwhile, the implementing organizations of the core projects will be Cooperatives and Associations of producers. Municipal secretariats, NGOs, SEBRAE and financial institutions (BASA, Banco do Brasil etc.) will be the supporting institutions.

(8) Beneficiaries and Project Effects

As small and medium industries can offer more job opportunities for local inhabitants in various economic sectors, the whole local society in general will be considered as the beneficiaries of the Program. The Center of Promotion and Marketing would make the difference in its products by putting the seal ‘Socio-Environmental Approval’ for value-adding and promoting its products. The annual revenues from selling the products will be at R\$ 6,800,000.

(9) Cost Estimation

Initial Investment for Installations and Equipment	R\$ 5,836,000
Annual Cost for Operation and Maintenance:	R\$ 4,659,000

(10) Finance Resources

The financial resources for the Project of Agro-industrial development may be procured from PRONAF, FNO-PROAGRIN, the development programs of Pará State, financial institutions, international finance cooperation and private sources

(11) Important Observation

In order to implement this Project with the participation of various agencies and organizations, a Commission of Strategic planning should play an important role. Moreover, cooperation of the financial agencies is indispensable for the smooth advancing of the funding and operation of the executing agencies in procurement of initial investment for the small scale projects. Thus, it is necessary to establish a system of fiscal incentives or other subsidies, which permit collection

of general products in the markets and an agro-industrial development of small scale. Besides, a stable supply and storage of prime materials is considered especially important, especially, supply of fruits depends on the success of the Project of Development and Improvement of the Family Agriculture.

10.3 Project of Collection of Seeds and Production of Seedlings of Forest and Fruit Trees

10.3.1 Objective

The main objective is to collect seeds and to produce and distribute seedlings of forest and fruit species necessary for the execution of the Project of development and improvement of the family agriculture through activities agrosilvipastoris, and the Project of reforestation and enrichment with native and exotic forest species. Besides, a germoplasm bank shall be established, which makes it possible for the future collection of seeds, establishing a center of stabilized supply of produced seedlings.

10.3.2 Target

Plantation area for 2 projects is totally 35,000ha, and is divided to 10,000ha in the Project of development and improvement of the family agriculture through activities agrosilvipastoris, and 25,000ha in the Project of reforestation and enrichment with native and exotic forest species. Average the number of seedlings varies with characterization of each adopted system, which is estimated as 220 seedlings in the former project each project, and 640 seedlings in the latter project. Thus, the total number seedling required in the first Project is 220,000 seedlings and 1,600,000 seedlings and in the Project of reforestation and enrichment with native and exotic forest species. And the total requirement will be 1,820,000. Considering the need to supply seedlings to the producers other than the referred 2 projects, the target of annual production is 2,500,000 seedlings. The duration of execution of this Project is 12 years including 2 years for the preparatory phase starting from 2005.

10.3.3 Project Plan

(1) Project Details

The main activities include setting up forest nursery with a total capacity of producing 2,500,000 seedlings annually and establishing a germ plasm bank to assure the supply of seeds of good quality, including spike seedlings. Besides, a system of collecting, handling, stocking distribution of high quality seeds should be established. For that purpose, germ plasm bank should be established, especially, of fruit and native forest species in 7 places adjacent to the 7 centers of forest nursery. In the main forest nursery center, the management research facilities and the seed storage house will be set up. The surplus of seedlings will be distributed to the farmers who don't participate in the referred 2 projects, for which the technical support will be accomplished by charging the farmers for the assistance.

a. Facilities

Nursery facilities (store house, garage, germination house, nursery beds): 7 units

Management Research facilities (including seed storage): 1 unit

Germ plasm: 7 places

- b. Machineries and Equipments
Computer: 7 units
Vehicles (pick up: 2 units, 4t track: 6 units)
Vehicles (Tractor: 4 units, Crawler Tractor:1)
- c. Maintenance, sustainable management and technical assistance
Technical expert (Forestry:2, Agroforestry: 5)

(2) Project Area

In the initial stage of the Project, the collaboration of EMBRAPA and AIMEX is also necessary to assure the collection of seeds. For that purpose, the administration nucleus and research facilities will be built in Marabá to control the conservation and the storage of seeds and the production of seedlings. The forest nursery should also be set up in other 4 municipalities in dispersed places, considering the access to the areas of the implementation of the Project of development and improvement of the family agriculture and of the Project of reforestation and enrichment. Adjacent to the forest nurseries, germ plasm bank will be established. The maximum distance to transport seedlings of the forest nursery to the planting areas will be of 30 km. As to forest species of fast growth such as Eucalyptus, the seedlings will be produced partially in consignment in the existent forest nurseries of ASSIMAR and of COSIPAR that possess the latest technology.

Executing Organization	Implementation Area	Activity	Capacity of Production
SEMMA and SEAGRI of Marabá	8 km Point of Marabá	Nursery Facilities, Research Facility, Germ plasm	350,000 seedlings
	Santa Fé	Nursery Facilities, Germ plasm	350,000 seedlings
FETAGRI and other cooperatives	9 km Point of Marabá	Nursery Facilities, Mother Trees	350,000 seedlings
Sec. of Environment and Agriculture of São João do Araguaia	2 km Point of São João	Nursery Facilities, Germ plasm	200,000 seedlings
SEAGRI of São Domingos do Araguaia	4 km Point of São Domingos de Araguaia	Nursery Facilities, Germ plasm	200,000 seedlings
SEAGRI of Brejo Grande do Araguaia	4 km Point of Brejo Grande de Araguaia	Nursery Facilities, Germ plasm	100,000 seedlings
SEAGRI of Palestina do Pará	Palestina do Pará	Nursery Facilities, Germ plasm	100,000 seedlings
ASSIMAR	Marabá	Consignment Production	370,000 seedlings
COSIPAR	Marabá	Consignment Production	480,000 seedlings

(3) Project Schedule

The Project period is planned to be 12 years. Project schedule is divided into preparation phase and execution phase. Preparation phase includes land acquisition, soil preparation, nursery establishment, establishment of research and management facilities, acquisition of seeds, equipment and materials, and establishment of germ plasm bank. The execution phase includes nursery management, production and distribution of seedlings, and technical assistance for the project.

Activities	1	2	3	4	5	6	7	8	9	10	11	12
Preparation Phase												
Land acquisition and Preparation.												
Nursery establishment												
Construction of research and management facilities												
Acquisition of Seeds												
Acquisition of machinery and equipment												
Establishment of Germ plasm												
Execution Phase												
Management of Nursery												
Production and distribution of Seedlings												
Maintenance and Technical Assistance												

(4) Benefits of the Project

The annual income with the sale of produced seedlings will be of R\$ 1,250,000 (R\$ 0.5 x 2,500,000 seedlings/year).

(5) Cost Estimation

Initial investment cost is R\$1,846,000. The cost of construction of forest nursery is 1) R\$ 48,000 each for nursery with the capacity to produce 350,000 seedlings/year; 2) R\$ 35,000 each for nursery with a capacity to produce 200,000 seedlings/year; and 3) R\$ 19,000 each for nursery with a capacity to produce 100,000 seedlings/year. Annual maintenance cost, which includes equipment, fuel, production, maintenance/technical assistance, is R\$750,000.

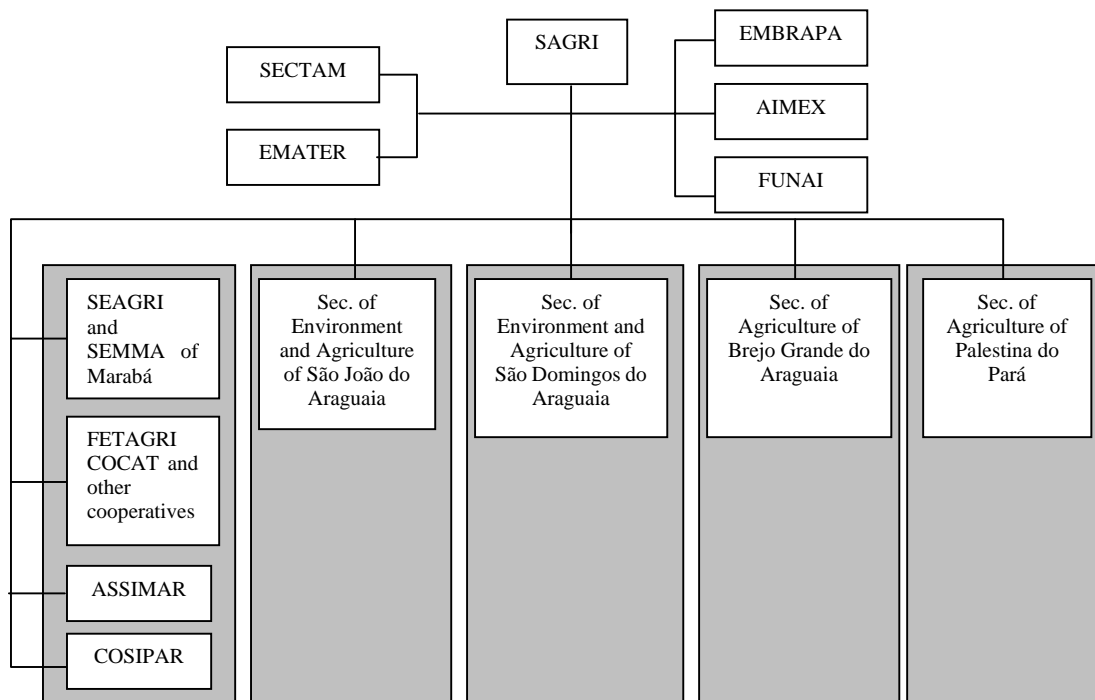
10.3.4 Project Implementation Structure

(1) Methodology

This Project should be implemented under the coordination of SAGRI, in relationship with other related organizations and executing agencies such as Secretariat of agriculture of each municipality and agricultural cooperatives.

(2) Coordinating Organization, Executing Agencies, Related Organizations and Supporting Institutions

The coordinating organization of the Project will be SAGRI, and SECTAM and EMATER should provide technical assistance for the project. EMBRAPA, AIMEX and FUNAI should participate as supporting organizations contributing to the handling of seeds of native forest species and the establishment of germ plasm stocks. Executing agencies in the municipality of Marabá will be composed of SEAGRI and FETAGRI and other agricultural cooperatives that control most of the existing settlements in the municipality. ASSIMAR and COSIPAR shall make available of their existing facilities and technologies, once they possess forest nurseries in a bigger scale. In the other 4 municipalities, Secretariat of Agriculture (and of Environment) of each municipality will participate as executing agencies.



(3) Financial Resources

SAGRI should search for the resources of the initial investment from the general accounting budget of the Pará State government. As an alternative, it can request for the financing of BANPARA, BASA and international financial agencies in cooperation with AMAT. The annual cost of operation and maintenance will be provided through the sale of seedlings and through the technical support.

10.3.5 Project Evaluation

(1) Position of the Project

This Project aims at the supply of necessary seedlings for the implementation of the Project of development and improvement of family agriculture and the Project of reforestation and enrichment, which are aimed at the direct recuperation of degraded areas. Therefore it is considered as an indispensable project in the Master plan of Recuperation of Degraded Areas.

(2) Costs and Benefits of the Project

The costs of the Project consist of initial investment of R\$ 1,846,000 (in the period of 2 years) and annual costs of operation and maintenance of R\$ 750,000 (in the period of 10 years). The average annual quantitative benefits is R\$ 1,250,000 (R\$ 0.7/seedlings x 250,000 seedlings/year), and they will be obtained in 10 years period, starting from 6th year upto 15th year.

(3) Economic Analysis

Based on the cash flow analysis between project cost and project benefit, IRR of this project is 23.0%, and net present value is R\$ 747,000 with a 10% discount rate as of July, 2001. Cost-benefit ratio is 1.19 with the 10% annual discount rate. As the results of economic analysis, it is found out that IRR of this project is higher than opportunity cost of capital with a positive net present value and benefit cost ratio is higher than 1. Therefore the execution of the Project is

considered justified economically. And, the project is highly justifiable economically even among the 3 central projects. Besides, this project should be executed so that it will be feasible to execute the other two central projects.

(4) Financial analysis

The financial analysis is for the purpose of evaluating the financial viability of the Project by identifying the proper rate of return, based on the benefits and costs derived from project implementation. The project shows an Internal Rate of Return (IRR = 24.1%) with generation of benefits after a short period (3 years), offering a considerable financial viability. Besides, as its average annual benefit (R\$ 1,250,000) is higher than the annual O.M cost (R\$ 750,000), the Project is considered viable in financial management. Since the initial investment is relatively low (R\$ 1,850,000), the procurement of public finance for its implementation is considered to be feasible.

10.3.6 Important Observations

The production of seedlings needs a high number of good quality seeds. To minimize the ecological risk, the selection of main trees to collect seeds and the conservation of seeds are important. Therefore it is indispensable to obtain the technical cooperation of EMBRAPA and AIMEX, which possess high experience in the area. In the Study Area, the experiences of the industrial reforestation of the metallurgical company and the production of seedlings should be incorporated and should settle down a system of mutual complementation through the interaction with such enterprises.

10.4 Project of Development and Improvement of Family Agriculture through Agrosilvipastoral Activities

10.4.1 Objective

The objective of the project is to introduce appropriate technologies for family agriculture such as agroforestry, and silvipastoris, with the purpose of recuperation of degraded areas. It aims at stabilizing the farm management of small and medium producers, improving the quality of life, with job and income generation.

10.4.2 Target

The implementation period is ten years from 2007, and considering a rate of 1,000/ha, a total of 10,000ha will be implemented to establish agroforestry systems in degraded areas of focusing mainly on small and medium scale farm lands. The plan for recuperation of degraded areas includes 690ha for small scale farms, 260ha for medium scale farms, and 50ha for large scale farms.

10.4.3 Project Plan

(1) Project Details

The forest and fruit species will be planted in the following space densities: 277 plants/ha for the planting of fruit trees with irrigation; 277 plants/ha for the planting of fruit trees tree

plantations; 100/ha in fruits and fodder legume plantations; 100/ha silvopastoral systems using coco palms; 100/ha in pasture systems using babaçu palms. Agricultural crops, fruits, and pasture, etc. are introduced between the planting of the fruit trees and the forest species.

A compost stock house facility shall be installed to store the organic fertilizer of sawdust and trees bark in the farm of each producer. The deposit will have the maximum capacity of 10 tons and it should have the high roof for the best ventilation and the roof of anticorrosive, since the organic fertilizer contains microorganisms. The ground should be cemented to avoid the leak of nutrients contained in the organic fertilizer. One unit (a tractor and a truck), is to set up every 20-30 families, and 20 units should be stationed at every year, and 200 unit arranged for 10 years. Extension lecture room has to attach to garage house of a tractor and a track, to be used for activity of technical extension. Apart from planting and harvesting periods, the tractor and the truck shall be rent out to neighborhood farmers in the other projects.

(2) Project Area

Most of the executing organizations will be formed by the small and medium producers, being 560 producers benefited annually. The planting of fruits with irrigation will be accomplished in 100 projects/1,000 ha in the dry areas in the southeastern region of the Study Area. The planting of fruit trees with forest tree species will be implemented in 200 projects/200 ha and it is implemented in 50 projects/50 ha in Marabá municipality. The planting of fruit trees with high profit forest species will be implemented in 100 projects /100 ha, in which half is planted in the Municipality of Marabá and other half in the other municipalities. The silvopastoral system in consortium with coconut etc. will be implemented in 22 projects/110 ha in the medium and big producers in the surroundings of Marabá and in the southeastern region of the Study Area considering commercialization of products. The silvopastoral system with babaçu will be accomplished in 88 projects/440 ha in the southeastern region of the Study Area.

Municipality		Project Name				
		Mixed cropping of fruits with irrig. systems	Mixed cropping for fruits and trees	Mixed cropping for fruits and legumes	Coco palm in silvopastoral system	Babaçu palms in pasture and silvopastoral system
Marabá	Suburb	-	25	25	12	-
	Southeast	-	5	5	-	-
	Santa .Fé	-	5	5	-	-
	Vila União	-	5	5	-	-
	Southwest	-	5	5	-	-
	West	-	5	5	-	-
São João do Araguaia		30	45	12	5	24
São Domingos do Araguaia		35	50	13	3	24
Brejo Grande do Araguaia		30	50	20	2	30
Palestina do Pará		5	5	5	-	10
Total		100	250	100	22	88

(3) Project Schedule

The Project will be implemented in 10 years period. The schedule includes preparation of land, acquisition of organic fertilizer, seedlings, equipment and materials, surveying, installation of facilities and agricultural activities. The organic fertilizer will be supplied by the ‘Project of Utilization of organic fertilizer’, and the seedlings will be supplied by the ‘Project of collection of seeds and production of seedlings’. The monitoring will be accomplished by the support of

the agricultural activities.

Activities	1	2	3	4	5	6	7	8	9	10	11	12
Land Preparation												
Arrangement of Compost												
Arrangement of Seedlings												
Equipments Procurement												
Surveying												
Facilities Construction												
Farming Implementation												
Monitoring												

(4) Effects of the Project

The annual gross yield with the production of agricultural products will be R\$ 3,850,000. It contributed to job generation and of additional income, consequently improving the quality of life of the rural producers.

Project	Yield Period (year)	Benefit
Mixed cropping of fruits with irrigation systems	Passion fruits 1 - 6 years, Cupuaçu 4 - 10 years	R\$ 14,750/ha
Mixed cropping of fruits and trees	Banana 3 - 10 years, Cupuaçu 4 - 10 years	R\$ 10,504/ha
Mixed cropping of fruits and legumes	Pineapple 2 - 10 years	R\$ 9,604/ha
Coconut palm in silvopastoral system	Cattle 2 - 10 years	R\$ 6,082/ha
Babaçú palms in pasture and silvopastoral system	Cattle 2 - 10 years	R\$ 3,600/ha

(5) Equipment Cost

The initial investment, including expenses with acquisition of tractors, trucks, fertilizer and seedlings and construction of grocery stores will be R\$ 19,545,000 in 10 years. The annual costs of operation and maintenance, and agricultural activities will be R\$ 1,592,000 on average.

Project	Initial investment
Mixed cropping of fruits with irrigation systems	R\$ 7,279 / ha
Mixed cropping of fruits and trees	R\$ 2,359 / ha
Mix cropping of fruits and legumes	R\$ 1,835 / ha
Coconut palm in silvopastoral system	R\$ 1,269 / ha
Babaçú palms in pasture form and silvopastoral system	R\$ 713 / ha

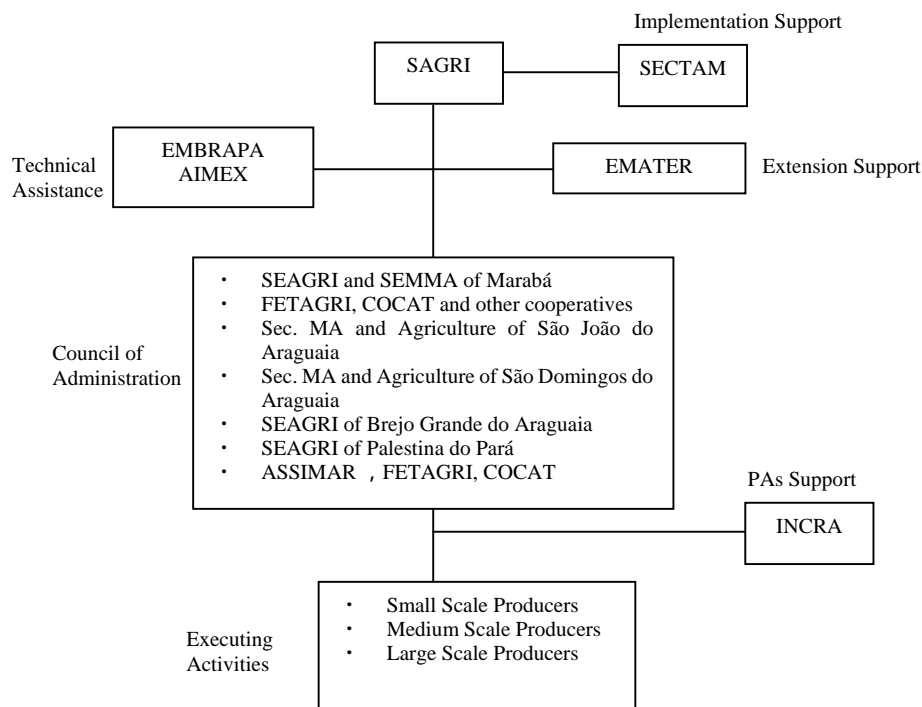
10.4.4 Structure of Execution of the Project

(1) Methodology

SAGRI and SECTAM will be responsible in executing the Project, including arranging financial resources for the Project. On the other hand, SAGRI and EMATER should guide Secretariats of Agriculture of each municipality and other organizations in order to promote the Project. They should carry out periodic workshops for popularization of information regarding implementation of the Project, as well as to promote the appropriate development of the activities through the monitoring.

(2) Coordinating Organization, Executing Agencies and Related Organization

The coordinating organization of the Project will be SAGRI, being supported by SECTAM in all the aspects of the Project. EMATER should support the administration of the Project as the extension organization. EMBRAPA and AIMEX should provide the technical support. The participation of INCRA is necessary to implement the projects in the communities of settlements. The department of agriculture each municipality, COCAT, ASSIMAR, FETAGRI shall establish a new organization in cooperation with association of small and medium scale farmers for executing the project. As executing organizations, they should involve small and medium producers who practice the family agriculture, and associations of producers.



(3) Financial Resources

SAGRI should analyze, together with SECTAM, the creation of a special fund of the State government for the execution of PROECO, which shall be used for the implementation of this Project. For financing to the small producers, FNO (Constitutional Fund of Financing of the North) through BASA and PRONAF (National Program of Strengthening of the Family Agriculture) may be applicable. Especially, PRONAF is financing in agroforestry activities, being applicable to the small scale farmers. It is also possible to use PRODERUR (Rural Development program) which has an objective to support the training of human resources for the administration of agroforestry businesses, in combination with the Project of environmental education and technical training. On the other hand, PROFLORESTA (Program of Support to the Forest Development) which aims at motivating and supporting the initiatives to seek the rehabilitation of degraded areas to incorporate agroforestry systems applicable not only to the small scale producers, but also for the medium and big scale producers. Besides, the State Government of Pará should analyze the possibility of reception of financial resources, looking for international resources of financing, of international organizations of bilateral cooperation, considering the importance of activities for recuperation of degraded areas.

10.4.5 Project Evaluation

(1) Position of the Project

This Project, being of one of the Central Projects of the Master plan for Recuperation of Degraded Areas, it has the target of recuperating 10,000 ha of degraded areas through the agroforestry and silvipastoris systems. Therefore it is considered as one of the most important projects of the Master plan.

(2) Project Cost and Benefit

The Project cost includes initial investment of R\$ 19,545,000 (in the period of 10 years) and annual costs of operation and maintenance in R\$ 1,592,000 (in the period of 19 years). On the other hand, the benefits of the Project vary from one year to another, with an annual average of aprox. R\$ 3,850,000, which will be expected for 19 years starting from the 6th year to 24th year.

(3) Economic Analysis

Based on the cash flow analysis between project cost and project benefit, IRR of this project is 20.6%, and net present value is R\$ 3,135,000 with a 10% discount rate as of July, 2001. Besides, the cost- benefit ratio is 1.21, with the same annual discount rate. As a result of economic analysis, it is found out that IRR of this project is higher than opportunity cost of capital with a positive net present value and benefit cost ratio is higher than 1. Therefore the execution of the Project is considered justified economically. Besides, the Project has qualitative benefits such as generation of job and income, quality of life of the small and medium producers through family agriculture, and therefore it is considered appropriate to implement the Project.

(4) Financial analysis

The financial analysis is made to assess the economy of the farm household through the analysis of its 'cash flow' with the purpose of evaluating the contributory capacity for the net yield and the costs for the implementation of the Project. The objective area of implementation of the Project and the applicable models for recovery of degraded areas are made according to the management scale and the Annual Plan of Execution of the Model for recovery of degraded areas (Table 9.3-1). The results of the financial analysis are as follows.

Type of Producer	Average area.	Applicable models	IRR (%)	NPV (R\$)	B/C
Small	1.7	1, 2, 3, 5	21.2	R\$ 552	1.22
Medium	1.9	1, 2, 4, 5	19.7	R\$ 573	1.18
Large	25.0	4	17.0	R\$ 5,599	1.20

IRR is higher than the discount rate of 10% for all the types of producers, being positive NPV and B/C values of above 1. Therefore the execution of the Project is considered justified financially. Besides, the annual income increment is of satisfactory level, being possible for the financial management of the Project. On the other hand, the consideration of a preferential treatment of financing etc. is necessary, although it is possible to repay even if an agricultural financing is used for an initial investment.

10.4.6 Important Observations

In the Study Area, it is difficult to obtain seedlings of fruit species and the soils have low fertility status. Therefore, at first it is necessary to reach the goals of the 'Project of Collection of Seeds and Production of Seedlings' and of the 'Project of Utilization of Organic Fertilizer', to obtain necessary materials in the culture of forest and fruit species. It is also necessary to establish cultivation technologies so that the executing organizations, such as the farm families, can introduce new forest species and new agricultural products, carrying out the productive activities in a sustainable manner. And, it is indispensable to carry out the technical training successfully through the Program of Technical Training.

10.5 Project of Reforestation and Enrichment with Native and Exotic Species

10.5.1 Objective

The object of the project is to accomplish reforestation plantation involving forest products and forest enrichment alternative to improve forest ecosystems with fertile soil for the recuperation of degraded areas. The Reforestation activities and enrichment include efficient forest management, silvopastoral management in Juquira and Capoeira, among others.

10.5.2 Target

The target is to accomplish reforestation and enrichment in degraded areas of 25,000 ha belonging to the large, medium and small scale producers, for 10 years period starting from 2007. Sustainable forest management is needed to recuperate the degraded areas degraded with aggregation of the economical value to those areas. Reforestation will be accomplished with goals of attaining 2,500 ha/year, being distributed as 1,050 ha for small scale farmers, 150ha for medium scale farmers and 1,300 ha for large scale farmers. Number of projects and area of execution of the several systems are as follows.

Reforestation System	Annual Number of Projects	Annual Area
Reforestation of fast growing trees	255	350 ha
Multiple plantation (Silvopastoral system)	325	740 ha
Multiple plantation in Taunya System (Silvopastoral)	6	300 ha
Multiple reforestation using Rubber trees	210	210 ha
Reforestation using exotic species	3	900 ha

10.5.3 Project Plan

(1) Outline of the Project

The reforestation enrichment project shall cover 2,500ha of degraded areas through applied technology of reforestation and forestry ecosystems. Spacing density in mixed plantations per ha is as follows; 500/ha in fast growing tree plantation, 264/ha in 4 different tree species plantations; 264/ha in mixed Taunya plantations; 714/ha in mixed plantations with rubber trees (rubber 476/ha) and exotic tree species - 1,111/ha. Mixed rubber tree plantation to provide value added management shall include easy processing facilities, and a small rubber latex processing facility.

(2) Project Area

The farmers of each scale is responsible in executing the project, including 3 technical model (Model of reforestation of fast growing trees, model of multiple plantation (Silvopastoral), and Model of multiple reforestation using Rubber) for small scale farmers. Target area is around PA settlement of INCRA. Plan for reforestation area is approximately 1-2 ha, and the total area is 750 units per year.

In the properties of medium scale producers, the reforestation with species of fast growth will be accomplished in an area unit of 1 ha/project and the multiple plantation shall be carried out in an area unit of 2 ha/project. The annual implementation of 32 projects is foreseen in the central area of the Marabá municipality and in the municipalities of São João of Araguaia, Brejo Grande do Araguaia, and Palestina do Pará.

For large scale farmer, plan areas for Reforestation with fast growing trees and Multiple plantation each year will be 20 ha / unit in central Marabá, São João do Araguaia, São Domingos do Araguaia and Brejo Grande do Araguaia. 17 units are planned to be implemented annually. Plan for Multiple plantation in Taunya System and Reforestation using exotic species is to carry out in central Marabá and other 4 municipalities.

Scale of Farmer	Marabá	São João do Araguaia	São Domingos do Araguaia	Brejo Grande do Araguaia	Palestina do Pará
Small Scale	440	110	110	45	45
Medium Scale	13	4	5	5	5
Large Scale	7	2	3	3	2
Total	460	116	118	53	52

(3) Principal Activities and Project Schedule

The Project period is planned as 10 years. The seedlings will be provided by the ‘Project of collection of seeds and production of seedlings of the forest and fruit species’. Project schedule includes soil preparation, soil improvement, plantation, inter-medium cuttings, pruning, and cuttings. It also includes plantation and harvest of legumes. Forestry plantation should be established against forest fire, and road should be constructed between those plantation for the transport of the logs and of the heavy machines.

Activities	1	2	3	4	5	6	7	8	9	10
Land Grading, Fertilization	■									
Planting	■									
Cultivation of Legumes		■	■	■						
Sowing of Pasture					■					
Ground Clearance		■	■	■	■					
Supplementary Planting, Weeding		■	■	■	■	■	■			
Cleaning Cutting, Regeneration Cutting							■	■	■	■
Setting up of Fire Break Tree Belt			■	■	■	■	■	■	■	■
Fertilization and Prevention	■	■	■	■	■					
Construction of Forest Road			■	■	■	■	■	■		

(4) Effect of the Project

The annual average gross yield will be R\$ 6,624,000, of which the annual income for the

production of wood will be R\$ 4,747,000. Besides, there will be an additional income of R\$ 1,877,000 by animal husbandry.

Projects	Period of Harvest (years)	Gross yield
Reforestation of fast growing trees	Logging age : 13 year and 20 year	R\$ 6,550/ha
Multiple plantation (Silvopastoral)	Logging age : 13 year and 25 years	R\$ 10,573/ha
Multiple plantation in Taunya System (Silvopastoral)	Logging age : 13 year and 25 years	R\$ 14,447/ha
Multiple reforestation using Rubber	Lubber Processing as from 6 th year, Logging age : 20 years	R\$ 27,153/ha
Reforestation using exotic species	Logging age : 7 year	R\$ 2,632/ha

(5) Cost

Initial investment cost such as soil preparation, seedling purchase, plantation, fertilization, and chemicals will be of R\$ 37,043,000. Average annual maintenance cost, includes pruning, forest fire protection, forest road preparation, fertilizer, and chemicals will be of R\$ 3,031,000.

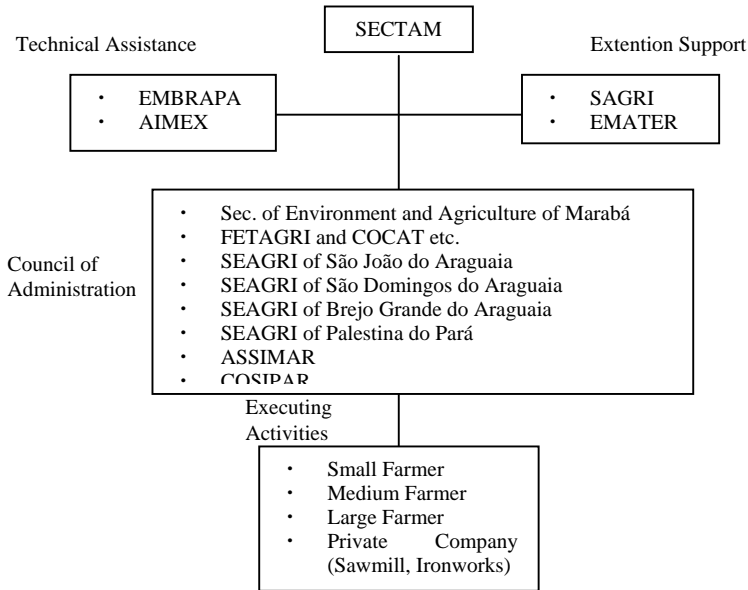
10.5.4 Structure of the Project Implementation

(1) Methodology

SECTAM shall take the responsibility of coordinating the Project, besides finding out the financial resources for execution. On the other hand, EMATER and SAGRI should guide the department of agriculture of the municipalities and other involved organizations, promoting the effective implementation of the projects.

(2) Coordinating Organization, Executing Agencies and Related Organization

SECTAM will be the coordinating organization of the Project and SAGRI and EMATER will participate as extension organizations for the administration of the projects. EMBRAPA and AIMEX shall provide technical support in reforestation. As executing organizations, the project shall include from small scale farm households to large scale farm households and a council of administration shall be created to control the executing organizations. In this context, the farmers will be represented by SEAGRI of each municipality and cooperatives and, the medium and big scale producers and private companies will be represented by ASSIMAR and COSIPAR.



(3) Possible Funding of the Project

SECTAM should analyze the creation of a special fund of the State government for the execution of PROECO, which shall be used for the implementation of this Project. Although the small scale farmers can apply for a loan of the FNO from the Amazonia Bank, they should consider a long term finance. Besides, considering the importance of the projects for recuperation of degraded areas, the State Government from Pará should analyze the possibility of receiving of financial resources, looking for international financing resources of international organizations and of bilateral cooperation.

10.5.5 Project Evaluation

(1) Position of the Project

This Project is considered as one of the Central Projects of the Master plan for Recuperation of Degraded Areas, with the goal of recuperating 25,000 ha of the degraded areas through reforestation and enrichment. Therefore the Project is considered as one of the most important projects of the Master plan.

(2) Project Cost and Benefit

Initial investment cost of the project is R\$ 37,043,000 (investment period of 10years), and annual maintenance cost is R\$ 3,031,000 (project period of 25years). On the other hand, Annual average benefit is R\$ 6,624,000, from 6th year to 39th year for a period of 34 years.

(3) Economic Analysis

Based on the cash flow analysis between project cost and project benefit, IRR of this project is 6.5%, and net present value is R\$ -590.000 with a 10% discount rate as of July, 2001. Besides, the cost benefit ratio is 0.78, with the same annual discount rate. As a result of economic analysis, it is found out that IRR of this project is lower than opportunity cost of capital with a negative net present value and benefit cost ratio is lower than 1. This means that the project can not be justified through economic analysis. However, it is considered appropriate to implement the Project from the viewpoint of the possible qualitative benefits through the preservation of the environment.

(4) Financial Analysis

The results of the financial analysis are as follows.

Scale of Producer	Average Area (ha)	Applicable models	IRR...	NPV (R\$)	B/C
Small Scale	1.4	6, 7, 9	6,4	R\$ -490	0.73
Medium Scale	4.6	6, 7, 8	7,6	R\$ -853	0.88
Large Scale	76.4	6, 7, 8, 10	6,4	R\$ -11,523	0.83

IRR is lower than the discount rate of 10% for all the types of producers, with negative negative NPV values and B/C of less than 1. Therefore the execution of the Project can not be justified

from the financial point of view. Besides, the annual increment of income increment is in a relatively low level. Therefore, in order to make it possible, a suitable financial administration is necessary through a lower interest rate to calculate IRR and for the finance like PRONAF, with favorable conditions: low interest rate, and a longer payment period. Moreover, it is indispensable to provide support for the operation through the establishment of a security fund for the initial investment.

10.5.6 Important Observations

The reforestation projects take a long time to obtain the investment return, being considered to be less attractive for investors. On the other hand, small and medium scale producers have limited financial capacity. Therefore it is necessary to introduce a financing system for reforestation projects with favorable conditions, which can motivate the participation in the Project. For the supply of seedlings and for the establishment of silviculture technologies, it will be indispensable to attain the success in reaching the goals of the other Projects of the Master plan, especially, the production of seedlings and the technical training.

10.6 Plans of Priority Activities

10.6.1 Request of Technical Cooperation

In order to implement the entire Master plan, the organizational strengthening of the involved organization and the formation of the human resources are extremely important. Therefore the activities with these objectives in the policy support program should be initiated as fastest as possible. The Program of Institutional Support to the Environmental Organizations of the State and Municipalities and the Program of Environmental Education and Technical Training are of high priority from the point of view of formation of the human resources in the areas of institutional administration and of diffusion of technologies. Therefore, the above mentioned programs should be executed focusing on the main executing organizations including SECTAM, ITERPA, SAGRI, EMATER, and the secretariats of environment of municipalities who will participate in the Master plan as coordinating organizations and the executing organizations of the individual projects. The technical training program shall focus on the farm households who will participate as executing organizations of the Central Projects and the extension officers and technicians who are in charge in activities of organization of the producers.

The programs mentioned above should be initiated immediately considering the need to reach the targets of the Master plan and the importance of its expected effect in implementation of other similar plans in the other areas. It is also possible to consolidate the 2 programs to be implemented together so as to implement them systematically. On the other hand, the implementation of these programs needs technical support of more industrialized countries with wider experience, for which international technical cooperation shall be requested. In regard to specialization of the technical cooperation, the main areas are the policies and administration of environment, environmental education, technology of the agroforestry and reforestation systems, technical training and diffusion of technologies, farmers' organization, agribusiness etc. Inviting suitable experts in the pertinent areas should also be analyzed.

10.6.2 Plan of Demonstration Projects

The Central Projects including the improvement of family agriculture and project of reforestation and enrichment may be considered less attractive in beneficial returns in comparison to the investment in the secondary and tertiary sectors industries. Therefore, the justification and necessity of implementing such projects shall be demonstrated to the producers participating in the Master Plan and to the financing agents, which shall finance the implementation of these projects. For this purpose, the small-scale demonstration projects, containing elements of the Central Projects, can be implemented at the initial phase of the Master Plan, and before the start of the Central Projects. Through the confirmation of results of the experience of demonstration projects, the organizational structure for the implementation of the entire whole Master Plan can be strengthened, by means of increasing the necessary personnel and budget based on the medium- and long-term plans.

The demonstration projects can also be utilized to demonstrate to the surrounding farmers the recuperation activities of degraded areas, stimulating their gradual participation in the programs and projects, accomplishing the technological transfer gradually together to the producers along with the technical training of the extension agents and of the technicians of the state and municipal organizations. In order to attain the referred objectives, the demonstration projects are recommended to be implemented within the Program of Environmental Education and Technical Training. For the implementation of the demonstration projects, the most appropriate locations for the demonstrative and diffusion effect shall be selected. In order to produce the higher demonstrative effect, the Pilot Projects shall be formed with different combinations of production scale and recuperation measures of degraded areas. Apart from this, through the implementation of demonstration projects, the following will be established: supply system of seeds, seedlings, equipment, agricultural inputs and production materials; commercialization system of generated products; rural credit system, among others. Consequently, the demonstrative effect of the demonstration projects shall contribute to facilitate the start of the Central Projects formulated in the Master Plan.

10.6.2 Appropriate Areas for the Implementation of Demonstration Projects

The following 3 representative locations in different phases of degradation are considered as representative models of degraded areas for implementing the demonstration projects:

- a. Municipality of São João do Araguaia – at the south of the PA Araras: Areas dominated by pastures, flat topography, sandy soils, and strong influence of erosion.
- b. Municipality of Marabá – at the PA Tamboril in the Santa Fé Village: Area after a subsequent phase of large extension forests deforestation, undulated topography, low fertility level, Podzolic red-yellow soils, where annual crops are cultivated as well as pastures.
- c. Southern portion of the municipality of São Domingos do Araguaia – near the PA Gameleiras: the abandoned areas are largely spread out after the practice of itinerant agriculture. There are well organized communities willing to introduce new technologies such as agroforestry systems.

The aforementioned areas are located relatively close to the Marabá city, being considered as appropriate locations for producing a high demonstrative effect. These are also representative areas in terms of the characteristics of degraded areas.