CHAPTER XII PLAN FOR IMPROVING RURAL PEOPLE'S LIVELIHOOD

12.1 Guarana

12.1.1 Basic Plan

The basic plan proposes to increase guarana production had two fundamental components: (1) a guarana productivity improvement project, and (2) an environmentally sustainable guarana production project.

The Productivity Improvement Project (PIP) will seek to increase guarana yields through largely conventional methods, i.e., improved access to farm inputs and improved adoption rates of technical recommendations and cultural practices. Increased farmer acceptance of simple technologies will require a strengthened and team-driven effort in research and extension between EMBRAPA/CPAA, IDAM, and the private sector.

The Environmentally Sustainable Guarana Production Project (ESGP) will ensure that guarana production agro-ecosystems stay economically viable for the next twenty years through the minimization of agro-chemicals, mixed cropping, agro-forestry, and preservation of virgin rain forest. IDAM, CEPLAC, and INPA will be the major participants in this project.

The Basic Plan for Guarana Production is summarized in the table below:

Table 12.1.1-1 Basic Plan for Guarana Production Program (Productivity Improvement and Environmental Sustainability)

Project Name	Project Purpose/ Expected Outputs	Comments Based on "Lessons Learned"
Productivity Improvement	Farmers improve yields through:	Yields must be increased or most Maues guarana will be abandoned within 5 years.
	Increased access to inputs (more clones, fertilizer arrive at villages)	Technical recommendations must be made more simple.
1. Input Supply		Improved clones are currently too expensive and not widely accepted. Low cost alternative to EMBRAPA nurseries must be created.
2. Cultural Practices	Increased adoption of cultural practices (farmers have time and money to manage trees)	More demo trials are needed to convince farmers to use inputs. Cultural barriers impede use of inputs, even if donated
3. Recovery	Rejuvenation of old trees (farmers increase focus on yield of older trees vs. area expansion)	Yields must be increased primarily through recuperation of old orchards – aggressive area expansion is not an option.
4. Private Sector Participation	Increased role of processors in farmer sustainability (processors invest in small farmer yield improvement)	IDAM and EMBRAPA must try to engage Ambev and other private sector companies in a team approach to guarana extension.
5. Research, Training & Extension Support	Strengthened research, training, and extension capacity focused on high yield	Research on breeding should be de-emphasized in favor of cultural practices.
		IDAM staff must be intensively trained in guarana
Environmentally Sustainable Guarana Production	Ensure long term preservation of guarana agroecosystem through promotion of env. sound production practices, such as:	Farmer livelihood is too dependent on just guarana and cassava – production must be diversified to lower risk
		Protocols for the mixed cropping of guarana with other tree species is scarce – research and demo plots must be encouraged.
1. Sustainable Agro Forestry	Diversification with annual and perennial high value crops; minimized land clearing	Land clearing techniques which minimize cutting of forest species are not being practiced.
2. IPM	Minimal use of agrochemicals	IPM techniques for thrips and anthracnose are badly needed.
3. Organic Production	Zero use of agrochemicals	Market potential for organic guarana needs to be performed before serious production is attempted.
4. Pilot Farms	Demonstrated ability for commercial production in eco-friendly fashion	

12.1.2 Lessons Learned Affecting the Basic Plan

The following is a summary of how "lessons learned" during Field Phase III should affect the basic plan:

- Technologies developed in the future must be made more simple and easier for the farmers to understand. Currently there is a low rate of acceptance of technical recommendations since they are perceived to be too complicated
- Yields must be increased in the next 2-3 year period or else there is a high risk of guarana buyers losing interest in Maues guarana and trading more with other areas such as Urucura, AM or other States (namely Bahia). If yields are not increased, farmers will continue to abandon their fields and Maues will lose it's prestige as a premier guarana producing area. Production increases merely through expansion of new areas is counterproductive and not an acceptable alternative for the environment.
- Current cost of seedlings is too high. New nursery production must be stimulated in order to make less expensive materials more readily available to farmers.
- EMBRAPA should continue to be supported in the area of development of new cultural practices – breeding work already has sufficient funding. EMBRAPA, IDAM, Mayor's Office, and Ambev need to work more closely together in order to ensure appropriate extension of research results, and to avoid "mixed messages" and duplication of efforts.
- Through the leadership of CEPLAC, an aggressive project on the use of guarana in sustainable agro-forestry systems should be pursued. Research and demonstration plots should be developed simultaneously. INPA techniques in participative forestry should also be employed using INPA researchers.
- In addition to SAF, a package of environmentally sustainable production techniques such as IPM, green manure, and organically grown guarana needs to be developed and the economic viability compared with conventional systems.

12.1.3 Detailed Plan

In preceding chapters, the major constraints to guarana production in Maues have been identified, a series of project activities have been presented in summary form (Chapter X) and in the form of a Project Design Matrix (Chapter XI). Given the budgetary projections proposed earlier in this Chapter, more detailed plans for the project activities will now be described. Activities are categorized in terms of when they should be considered for initiation, i.e., in the short term (S = year 1-2), medium term (M = year 3-5), or long term (L = year 6-9).

(1) Guarana Productivity Improvement Project (PIP)/Detailed Plan

The PIP has five major subprojects, all of which are designed to increase yields in

existing guarana orchards that are in decline, while allowing for a limited expansion into new orchard areas. These activities are designed to take place in ten selected communities in Maues. If successfully implemented, they will undoubtedly have indirect beneficial effects in many other Maues communities:

(a) Input Supply Sub Project

The expected outputs of this Sub Project are increased small farmer access to improved seedling clones, fertilizer, and a limited quantity of pesticides (primarily for thrips control). The following activities are planned:

- Expand production capacity for improved seedling clones beyond EMBRAPA facilities through the establishment of ten community nurseries. After five years of operational support, these nurseries should become self-sustaining through sales of high quality seedlings to farmers at a reasonable price. (S)
- Improve mechanism for clone & fertilizer transport to remote areas. Clones should be transported in small tubes as opposed to heavy sacks with soil. Facilitate transport of clones and fertilizer to the remote communities through the provision of boat services. (S)
- Improve ability to purchase clones, fertilizer, pesticides through grants and/or credit programs for a period of 5 years. (S)

(b) Cultural Practices Sub Project

The expected output of this Sub-Project is higher yields through the increased knowledge, acceptance, and utilization of techniques recommended by EMBRAPA and IDAM for the cultivation of guarana. Assistance will be rendered through the provision of capital for cultural practice activities (mainly for the hiring of labor), and through a series of technical training workshops in the communities.

- Training in site selection and planting techniques. Focus on care of seedling during first 6 months. (S)
- Training in weed control, both around the seedlings and between rows of seedlings. (S)
- Training in pruning. Focus on first pruning prior to flowering and second pruning after harvest. (S)
- Establish grant and/or credit programs to provide capital to hire labor for thorough implementation of cultural practices. (S)
- Training to improve timing of cassava production to provide better food security during period of cultural practices and harvest. Farmers must learn to time their cassava harvests so that surplus farinha can be produced just prior to intense labor activities. (S)

(c) Recovery of Degenerated Orchards Sub Project

This Sub Project is focused on specifically on implementing those techniques

necessary for obtaining acceptable yields from the many guarana orchards that are in serious decline, or which have been practically abandoned after 15 or more years of production.

- Training in use of cultural practices to improve productivity of old trees. Focus on grafting new clones onto old rootstocks. (S)
- Establish grant and/or credit programs to generate capital for recovery activities (S)
- Promote "5+1" concept described in previous Chapters (only those farmers which have demonstrated an ability to renovate 5 ha of declining orchards, will receive Project support to plant one "new" hectare. (M)

  Note: EMBRAPA has already conducted considerable research in this area and knows which recovery techniques work best. Activities such as demo plots in the villages, or farmer visits to the EMBRAPA farm need to be increased in order to heighten farmer awareness. An incentive program should be implemented for those farmers who adopt the "5 + 1" concept and decrease the rate of land clearing.

(d) Private Sector Participation Sub Project

The expected output of this component is an increased sense of cooperation and communication between the field teams of the beverage companies, and the field workers of EMBRAPA and IDAM, such that the farmer does not receive "mixed" technical messages, and so that there is better communication between him and the buyers in terms of price information and longer term expectations.

- Establish a co-funded project (matching funds?) to increase private sector participation in research and extension activities carried out by public sector. (S)
- Increase frequency of visits and exchanges between farmers and technical staff of the processors through a series of joint "private/public sector workshops in the communities. (S)

  Note: The private sector needs to be convinced to work hand-in-hand with IDAM and EMBRAPA to better serve the needs of the remote farmers in an extension capacity. Duplicated efforts need to be avoided, and a feeling of common cause in support of the small farmer needs to be developed. The private sector cannot be expected to fully fund such an integrated approach so joint training and demo activities should be cost-shared. Although agricultural technicians from all processors would b encouraged to participate, the focus here is on AmBev staff.

(e) Research, Training, and Extension Support Sub Project

Essentially, this Sub Project establishes a fund from which a series of research, training, and extension activities will be supported on an annual basis.

- Establish a public/private sector steering committee to determine priorities for funding. If EMBRAPA and other agencies are to receive research funds, there needs to be strong consensus among the guarana community that the research remains focused on practical problems, and that such research will have potential to improve small farmer livelihood within a reasonable amount of time. (S)
- Establish a funding mechanism and administration/monitoring scheme for the research agenda. Preliminary focus might be on the following areas:

- Research (focus on demo farm trials)
    1. Cabruca system vs. slash & burn. (S)
    2. Mixed cropping with annual crops. (S)
    3. Sustainable agroforestry models. (S)
    4. Development of IPM approach. (M)
    5. Organic guarana production. (L)
- Training (focus on farmer field school approach)
    1. Focus: clonal selection, planting, cultural practices. (S)
    2. Processing techniques (mainly through "factory school located at central Coop). (M)
- Extension (increased emphasis on development of "young farm leaders" or YFL's)
    1. Hire more IDAM extensionists, train them, improve their transport to the communities for increased interaction with and training of the YFL's.
    2. Focus: cultural practices, crop budgeting, farm business planning, food security (timing of cassava harvests, etc.)

(2) Environmentally Sustainable Guarana Project (ESGP)

The purpose of the ESGP is two-fold. First, it is in the long term interest of the guarana agro-ecosystem to quickly implement environmentally friendly production practices so as to preserve the guarana plantations for future generations. Secondly, a trend needs to be established in crop diversification, not only to produce guarana efficiently within the context of a mixed species native forest, but also to find other high value perennial crops which can provide income generation in case of future diminished market interest, or even failure of guarana. The ESGP has four major sub projects which are briefly described below:

(a) Sustainable Agro Forestry Sub Project (w/CEPEC)

- Integrate existing EMBRAPA and INPA research activities with a new, CEPEC research project focused on guarana in agroforestry systems. (S)
- Initiate four demonstration projects at community level combining guarana with annual crops and perennial tree species. (S)
- Include the comparison of different land clearing techniques which disturb the virgin forest vegetation at different levels (slash & burn/cabruca/capoeira)

Note: These research projects need to have a high degree of visibility within the communities so that the farmers very quickly become acquainted with the ecological principles that are at stake. It may take years to actually obtain meaningful research results but farmers need to accompany the development of trials at an early stage so they will benefit throughout the entire research process. Therefore, it is recommended to use the "Participative Agro-Forestry" approach championed by INPA. Since CEPEC is leading this effort, it may be fruitful to have one or more of the demo farms where their resources are close at hand, such as in Itubera, Bahia or Transamazonica, Para.

(b) Integrated Pest Management (IPM) Sub Project

- Strengthen EMBRAPA research in determining economic threshold levels (ETL's) for pests/diseases. This critical research determines the levels of pest attack which are required in order to make a recommendation for chemical control that will be economically viable. Accordingly, easy to use pest rating systems must be devised so that farmers can eventually make these decisions for themselves. Establish demonstration farms in 3 Maues communities.
- Participatory training (Farmers Field Schools) in IPM concepts. Farmers need to improve their skills at identification and quantification of attack by weeds, insects, and diseases. Trainers must develop a highly participatory approach, especially with the YFL's. (S)
- Training in pesticide safe use and handling (S)

Note: The IPM approach is important in order to minimize the application of toxic agrochemicals in the rain forest agroecosystem of Maues. Disease pressure is intense, but chemical control is very difficult due to the extreme conditions of heat , humidity, rain which make proper coverage of the plant surfaces difficult to obtain. Resistant varieties in combination with integrated cultural practices are the best way to control disease and pests. There is a role for pesticides, but it needs to be minimized.

(c) Organic Guarana Sub Project

- Initiate market study for potential buyers. If market opportunities exist, the establishment of several pilot farms should be pursued. Guidelines for "certified organic production" need to be clearly established. (S)
- Select farmers for participation in two pilot farms for organic crop production. The farms should be in traditional Maues guarana producing communities, but ones which are not too remote so as not to discourage visitation by potential customers/investors. (M)
- Initiate pilot farms through a grants program which furnishes operating expenses for up to 7 years. The first 1-3 years are basically a research phase to determine feasibility. Potential buyers of organic guarana should accompany the development of the farms. (M)

Note: It would be important to seek the participation of agencies such as IBAMA and IPAAM in this effort in order to increase the importance and visibility of the Project with the environmental community.

12.2 Vegetable

12.2.1 Directions and Periodical Objectives on Developing Improvement Plan for Vegetable Cultivation

The following is the time schedule for the directions, strategies and phases in accomplishing objectives for the development of the vegetable cultivation.

Short term for 3 years: The period for strengthening the foundation and solving urgent problems

a. To collect basic data for establishing appropriate techniques by conducting fundamental studies and researches.
b. To make the farmers learn basic technologies and knowledge and improve their abilities on farm management by spreading basic technologies for agriculture.
c. To foster capable staff for the support organization (IDAM) by actually conducting promotional activities that reflect farmers' needs.
d. To structure systems (organization, management rules, etc.) for effective promotion.
e. To extend information and technology for applicable agro-chemical us.

Middle range for 6 years: Improvement on the ability of the conducting organizations (farmers, support period) and accumulation of capital (great stride)

a. To improve productivity and quality by establishing and promoting appropriate techniques.
b. To expand possibilities (particularly on organization and pilot projects) by improving farmers' abilities.
c. To make promotional activities more effective by establishing efficient management system for the support organization and fostering capable staff.
d. To utilize support systems and tools for making the activities of the farmers and the support organization more effective.

Long term for 10 years: Promotion on diversification (sustainability and continuity brought by diversification)

a. To take measures for diversification by conducting continuous studies and researches.
b. To diversify as the farmers' abilities improve (diversification on crops, mechanization, diversification on cultivation practice, such as organic agriculture, value add products)
c. To improve the quality of the services offered by the support organization, diversify the contents of the services, and promote technology transfer to the farmers.
d. To improve productivity and labor saving as the network between farmers and the support organization is made.

Until the end of the 3-year short term, the emphasis will be made for the vegetable cultivation in varzea to stabilize and increase profit and quality. At almost the same time, the research for examining the possibility together with the development on appropriate technologies will be conducted for introducing new aquatic vegetables such as swamp cabbage, potherb mustard and other possible vegetables in order to secure the income during the flood season. The vegetable cultivation with

"Canteira" (hanging beds system) is also involved in the plan as the expected new technology. The introduction of these technology and new vegetables will make it possible for farmers to produce vegetables through the year. By establishing technologies and cultivation, the farmers' economic situation is expected to be improved, and their independence to be promoted.

The goals for the agriculture improvement plan until the end of 6-year middle term will be summarized below:

1. To establish the farmers' fundamental abilities (acquiring technologies and accumulating own capital)
2. To increase harvest of the candidate crops and to improve quality and crop diversification (improvement on profitability)
3. To reduce cost (cost reduction by joint purchase, joint shipment, and appropriate spraying)

The long term plan from 6 years to 10 years will be reviewed in conjunction with the accomplishment and progress of the goals set for the short and middle terms.

12.2.2 Strategy and Programs for Improving Vegetable Cultivation

The followings are the approaches for improving and stabilizing vegetable cultivation in order to accomplish the goals of this plan. These approaches reflect the results of the problem analysis shown in Figure 9.2.2-1.

1. Priority Project
   Soil Survey
2 Priority Extension Project
   Basic Production Technology and Agro-chemical Information and technique
3. Environment Friendly Technology
   1) Extension Project of Preservation Type Technology (Agro-chemical Reduction Technology Promotion Project and Promotion Organic Agriculture Project)
   2) Extension Project of Environmental Adaptation Type Technology (Flood Season Production Improvement Project)

These approaches do not differ largely from those for tropical fruits and guarana, but contain special projects for vegetable cultivation as subproject. Needles to say, developing the abilities of the farmers and the support organization as well as the mutual cooperations among them will form the basis of the plan. These components of each approach are shown in Figure 12.2.2-1. The outline of each approach is summarized in Table 12.2.2-1. The outline of each approach will be discussed below. The aim of Priority Project and Priority Extension Project is to exclusion of a basic and essential prevention factor on vegetable cultivation.

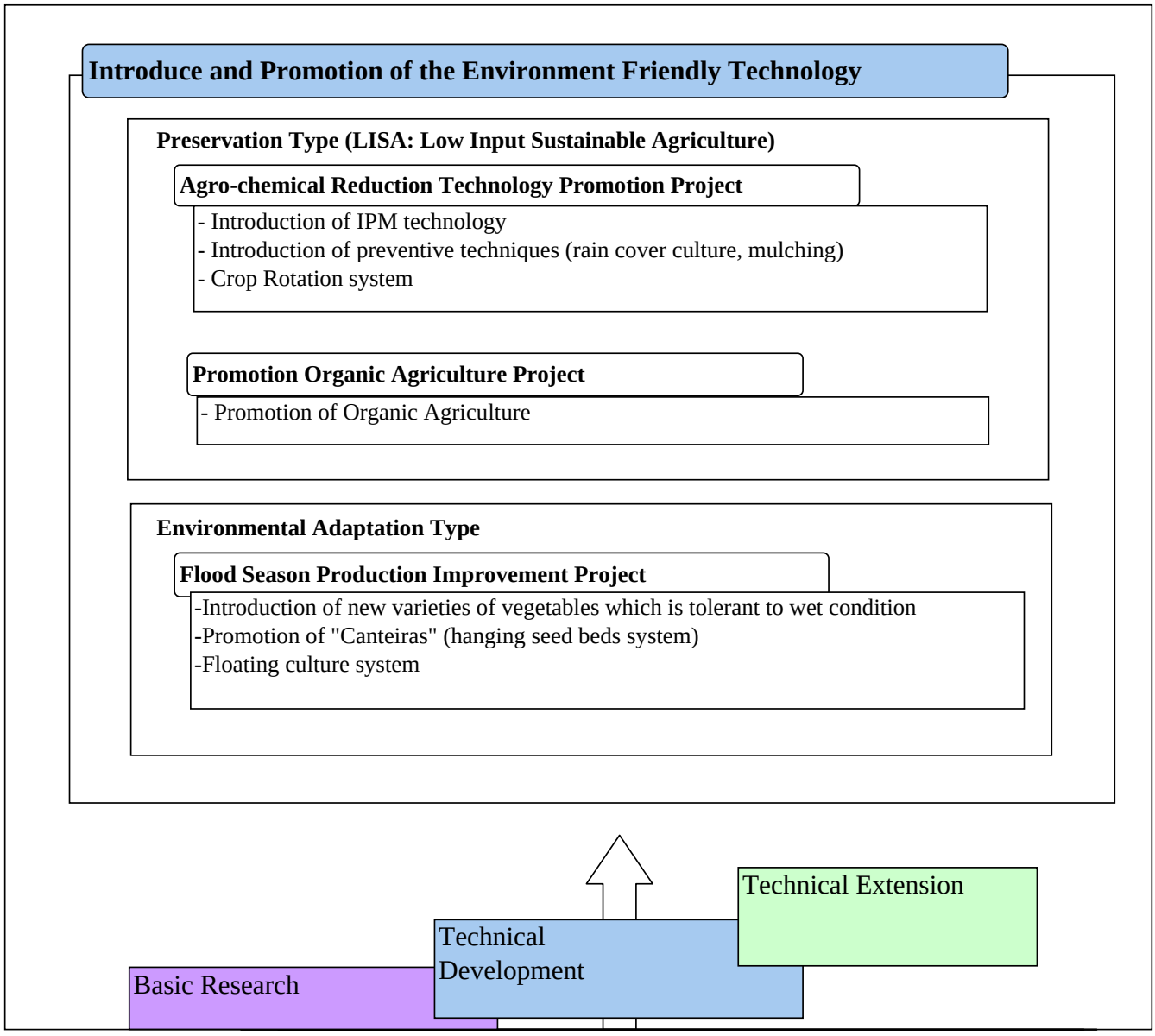

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Table 12.2.2-1 Summary of Improvement Plan (Vegetables)

Project	Project Component/Outline	Purpose/Expected Effect	Implementation Agency and Necessary Support	Note (Remark, Premise)
Priority Project				
1. Soil Survey	1. The soil survey in and around existing farm land should be done in order to collect basic data about soil. 2. Soil maps with GIS should be created based on the obtained data, and the recommendable farming practice for vegetable production should be established on the basis of the maps.	- To grasp the characteristics of the soils in the study area. - To establish recommendable farming practice based on the results from field experiments.	- EMBRAPA should make plan ,carry out the study and prepare reports. - As for IDAM, the person in charge of each municipality should take soil samples in cooperation with a farmer.	- Soil survey should be carried out simultaneous parallel with field experiments. - It is important to cooperate with related projects and organizations on the occasion of mapping.
Priority Extension Project				
2. Extension of Basic Technology on Vegetable Production	1. Extension of Basic Technology of Vegetable Production. (The applicable and recommendable farming practices and technologies should be extended.) 2. Extension of Agro-chemical Information and applicable technologies on agro-chemical supply (Preparation of Agro-chemical Guideline/Mannual for farmers)	- To contribute to the increase in unit yield, and the improvement in quality through verification of basic technology for vegetable cultivation, and establishment of the recommendable farming practice. - Mitigation of Influence to human health, and environment.	- EMBRAPA should make plans for experiments of vegetable cultivation and transfer technology to IDAM extension staff and a farmer volunteer. - IDAM should promotes this project as a high priority project within a year.	- IDAM should prepare effective extension system including Guideline, Pamphlet, Presentation methods etc. in cooperation with the University of Amazonas and. - While IDAM extension staff should master recommendable technology through field work in the pilot farms, they should perform participatory approach through cooperation work with farmers.
Introduction and Promotion of the Environment Friendly Technology				
Extension Project of Environment Preservation Type Technology (LISA: Low Input Sustainable Agriculture)				
1.Agro-chemical Reduction Technology Promotion Prpject	1. Introduction of IPM (Integrated Pest Management) 2. Introduction of preventive techniques Rain Shade Culture Mulching Culture Crop Rotation System	- Mitigation of Influence to Environment - Reduction of Input Costs, Such as fertilizer and Agro-chemical - Prevention of soil fertility and water-quality eutrophication - Infiltration of ETL(Economic Threshold Level) idea - Promotion of preservation type technology	- IDAM should request technical cooperation from the University of Amazonas, EMBRAPA and INPA. - The manual and a guideline should be prepared taking in an opinion of farmers.	- -When performing continuous agriculture, this plan is indispensable, and applicable agricultural technology also enters into this framework. - This is the important plan which can give high priority and should be carried out in its early stages. - Farmers should introduce applicable technology positively and provides IDAM with information.
2.Promotion of Organic Agriculture Project	1. Extension of Organic Agriculture Technologies (Low or Non agro-chemicals cultivation and organic agriculture) 2. Promotion of introduce of applicable varieties 3. Introduce of effective use of useful resources, and organic farming 4. Practice of Crop rotation 5. Selection of vegetables considering consumer's Intention (Analysis of consumption trend and consumer intention through continuous market research)	- Curtailment of Input Cost - Supply of healthy and safe food for producer and consumer	- IDAM should request technical cooperation from the University of Amazonas, EMBRAPA and INPA. - EMBRAPA should conduct technology transfer from advanced states of organic agriculture. - The manual and a guideline should be prepared taking in an opinion of farmers.	- Organic agriculture is already established in several advanced states in Brasil. IDAM should introduce advanced technology from these states. - Farmers should introduce applicable technology positively and provides IDAM with information. - The organic agricultural techniques and low level agro-chemical type practice should be carried out from the first stage of the program.
Extension Project of Environmental Adaptation Type Technology				
3.Floood season Production Improvement Project	1. Promotion of crop diversification through introduce of new vegetables (including floating culture of Kangkong) 2. Introduce and Promotion of “Canteiras” culture system (hanging seed beds system, including promotion of new vegetables)	- Promotion of crop diversification - Create of income during flood season - Effective use of farm land during flood season - Establishment of Brand, and improvement in Unit Price - Mitigation of Influence to human health, and environment.	- IDAM should request technical cooperation from the University of Amazonas, EMBRAPA and INPA. - The manual and a guideline should be prepared taking in an opinion of farmers. - IDAM should establish technical know-how and transfer technology to farmers on the job. - IDAM should secure seeds from research organization or private sectors and provide them to farmers. And IDAM should get parmission from MOA. - While IDAM should ask EMBRAPA aptitude examination of new vegetables and carry out marketing research to grasp demand in cooperation with persons concerned.	- Since it is very effective that the vegetable cultivation during a flood season, aptitude examination should be carried out positively from the beginning of the program. - Since it is failure if there is no demand, market research is necessary. The active promotion of a promising vegetable is also required. - IDAM needs to prepare a new loan system for Canteira construction for the farmer who needs a loan.

(1) Priority Project

Soil Survey

The information and data on chemical and physical characteristics of soils is indispensable in order to establish vegetable cultivation technology with consideration of the area and to decide the adaptability of new introduction crops. So, in the vegetable cultivation improvement plan, high priority is given to the soil survey. Soil maps with GIS technology should be created based on the obtained data. At the beginning of the implementation, the soils in the Pilot Farms and Trial Farms should be studied first in order to establish recommendable farming practices for vegetables.

The total cost concerning this project estimates it as R$100,000. This survey should cover study area.

(2) Priority Extension Project

Extension of Basic Production Technology

The major and common problem of farmers in the study area is lacking the fundamental knowledge and technique on vegetable cultivation and the improvement of agricultural productivity is fettered by this problem. Inactive extension activity is accelerating this problem.

In order to overthrow this present condition, the Extension of Basic Production Technology enterprise is taken up as a priority enterprise. It is expected that this project will contribute to realization of sustainable agriculture. Many of basic knowledge and technologies as the object of extension are already developed by EMBRAPA or EMATER. IDAM planed to extend these knowledge and technologies as a recommendable cultivation methods. As most of knowledge and technology are in the reasonable level, farmers can accept them without any big problems.

Extension of Agro-chemical Information and Basic Techmology

Extension of the basic knowledge and important notice, especially information of the influence to a human health, crops and environment should be carried out urgently.

At present, the information about the danger and toxicity of the agricultural chemicals which a farmer can buy is prepared by the state of Amazonas. However, the system which transmits the information to a farmer is not established at all. It is necessary to promote safe use of agro-chemicals and control of high toxic agro-chemicals. It is judged that there is high risk of use of agro-chemical in Iranduba under the present condition. The study result which the Amazonas University performed has supported it. Measure needs to be immediately taken including creation of the guideline of agricultural-chemicals use.

The total cost concerning this project estimates it as R$100,000. This survey should cover study area.

(3) Introduce and Promotion of the Environment Friendly Technology

This project aims at realizing stability of a life, and improvement in a living standard. The aim will be achieved through sustainability and increase of vegetable production and improvement in quality. Therefore, a farmer needs to master basic technology and basic knowledge. This project consists of the technology transfer from an advanced district and the actual proof in pilot farms and trial fields of research result of Amazon University, EMBRAPA, INPA etc. While IDAM extension staff should master recommendable technology through field work in the pilot farms, they should perform participatory approach through cooperation work with farmers. It is important to cooperate with related projects and organizations.

This project consists of two sub project, namely, Extension Project of Preservation Type Technology and Extension Project of Environmental Adaptation Type Technology.

Extension Project of Preservation Type Technology (Agro-chemical Reduction Technology Promotion Project and Organic Agriculture Promotion Project)

The target farmers of this enterprise is an advanced farmer who has mastered basic technology and basic knowledge. They will confirm the applicability of new technologies through field work with IDAM extension staff in the pilot farms or trial fields. The purpose of this project is the implementation and promotion of Low Input Sustainable Agriculture (LISA). In order to achieve the purpose two projects are formulated. This project focuses on 2 large input materials, namely, fertilizer and agro-chemical.

The outline of two projects and the technology in which introduction is planned are as follows.

1) Agro-chemical Reduction Technology Promotion Project

1. IPM (Integrated Pest Management)

   The main aim of the IPM are to improve the farmers' ability for problem identification and analysis in the field by learning the basic agricultural knowledge and farming practice, and eventually to adopt a low input sustainable agriculture and to obtain significant benefit through the operation of IPM.

   Two or three communities will be selected as the target communities a year. The concentrated extension activity will be provided to the target communities.

2. Prevention Type Techniques

   Prevention Type Technologies such as rain shade culture, rain cover culture,

mulching culture, ridge culture, crop rotation system etc. were developed. In the farm land in Terrafirme, Green house culture (Plasticulture) is expanded abruptly. In contrast, only a few advanced farmers adopt these technologies. Such technologies is prevention type ones which restricts contact of the soil containing pathogenic and plants or, and contact of the insect as carrier and plants. These technologies will be introduced through the field trials which verify whether the technologies are applicable. The materials are selected considering useful resources in the area, comparatively cheap materials, environmental friendly materials, recyclable resources.

Two or three communities will be selected as the target communities a year. The concentrated extension activity will be provided to the target communities.

2) Organic Agriculture Promotion Project

1. Extension of Organic Agriculture

The results of several studies on the soils in Varzea show that the soils are fertile as compared with them in Terrafirme. However, it is clear the nitrogen contents in these Varzea soils is generally low and the shortage of microelements of soils are observed in some area in Varzea.

Moreover, it is pointed out that there are also few organic matter contents. Apply of chemical fertilizer which has quick effect is an effective means. The apply of organic matters is the most effective means in order to increase soil fertility though the improvement of physical property and chemical property of soil. Moreover, the heat tolerance of subterranean part (root) is weaker than that of aerial part of the plant. The temperature of soil containing low organic matter tends to become higher compared with soil contain high organic matter under the same weather condition. Such soil (low organic matter soil) tends to do a damage and an obstacle to a plant.An apply of organic matter is the effective means in order to avoid the high temperature injury.

Application of barnyard manure, poultry manure and compost using a available material as organic material are recommended. Moreover, application of sawdust which is the waste from sawmill and charcoal made is also effective for soil improvement.

Two or three communities will be selected as the target communities a year. The concentrated extension activity will be provided to the target communities. The total cost concerning this project estimates it as R$130,000.

Environmental Adaptation Type (Extension of Flood Season Production)

The purposes of the introduction of the flood season production are to improve farm income and to encourage economical consciousness. As two key elements, new technology and a new introduction vegetable, are involved for these projects, the advanced farmers and enterprising farmers will become target farmers of technical extension for this projects at the beginning. Farmers will confirm the applicability of new technologies and crops through field work with IDAM extension staff in the pilot farms or trial fields. The technology transfer to the farmers in communities should be done through the field work in the pilot farm which will provide a nuclear for extension. It is expected that the vegetable cultivation involving introduce new vegetables during a flood season will contribute reduction of risks of vegetable production. It is expected that cultivation of the Kangkong (aquatic- vegetable) during a flood season contributes to an improvement of farmer's nutrition state during flood season, an effective use of farmland and creation of employment opportunity, the improvement in income etc. In consideration of these possibilities, high priority is given so that this enterprise may be realized in its early stages.

1) Introduce of Aquatic vegetable (Kangkong)

As mentioned above, the aquatic vegetable (Kangkong) will be introduced as a priority crop. Kang kong can grow under flood condition. Furthermore, floating culture method with rafts is also acceptable in the example in Philippines. It is thought that this vegetable fits the environment of Varzea. Moreover, since this vegetable needs especially neither advanced technology nor special technology, it is judged that a farmer's addition is also light. Thus, it is judged that the condition for introduce of Kangkong in the early stage are complete. In order for this project to import new introduction crops to the state of Amazonas, it needs to obtain approval of the State Office of Ministry of Agriculture. An early correspondence of IDAM to the State Office of Ministry of Agriculture is required in order to get an approval in cooperation with EMBRAPA, INPA and University of Amazonas.

Two or three communities will be selected as the target communities a year. The concentrated extension activity will be provided to the target communities.

2) Introduce of “Canteiras” (Hanging Seed Deds System)

Canteiras is a typical agricultural technology practiced in the Varzea along the Amazon river since ancient age. This horticulture technology enables vegetable cultivation during a flood season. Throug the implementation of this project, the improved Canteiras with rain shades developed by University of Amazonas will be promoted. The features of improved type Canteira are as follows.

1. Shape: the bed suspended by props, the height of beds about 1m, equipped rain shades
2. Area and Volume per bed: Area, 1.5m x 2.0m =3 ㎡、 Volume, 0.6m^3
3. Bed spoil：Mixture of charcoal and sawdust (recommendation) or compost

Farmers can input more time and manpower into the cultivation with Canteira during a flood season , so careful care to vegetable will be possible. The trial cultivation of new vegetables (red onion parsley etc) which require careful care will be done with Canteiras.

This project is also including introduce new vegetables. An early correspondence of IDAM to the State Office of Ministry of Agriculture is required in order to get an approval in cooperation with EMBRAPA, INPA and University of Amazonas.

The construction cost of improved type Canteira is estimated to be about R$22 per square meter. IDAM needs to prepare a new loan system for Canteira construction for the farmer who needs a loan.
Two or three communities will be selected as the target communities a year. The concentrated extension activity will be provided to the target communities.

12.3 Tropical Fruits

12.3.1 Basic Plan

As for tropical fruits, a trial, the target of which is Itacoatiara, will be carried out, based on the environmentally friendly production approach. Since, the temperature and humidity are high, it is very likely for the damages from pest/disease to occur in the tropical rain forests in Amazon. Therefore, the orchard-style monoculture can always face the risk of the damage from disease.

In this section, JICA Study Team would like to aim at the comprehensive improvement of the tropical fruit production and the production well harmonized with the environment, in the following basic areas. In order to implement the plan, the close cooperation not only with IDAM but also with EMBRAPA is crucial.

1) Aim at the healthy growing of tropical fruits and the improvement of the total productivity of tropical fruits, by the mixed cropping based on the concept of agroforestry, where several kinds of species of tropical fruits can coexist.
2) Implement the tropical fruit production mainly using less agricultural chemicals and more organic manure, by adopting the fertilization with compost, etc., based on the conventional organic agricultural practices.
3) Select pilot farms. And, under the cooperation of EMBRAPA, implement agroforestry and conventional organic agricultural practices in selected pilot farms, while at the same time examining the possible measures for the fusion

with livestock farming, such as the measure where livestock can be bred to improve the production of organic manure.

4) Integrate and compile the experience and technologies learned in pilot farms into the standard process of agricultural management. And, IDAM and EMBRAPA will extend such experience and technologies to other farmers, jointly. Create the opportunities where farmers can train each other, in order to encourage them voluntarily make efforts for their own improvement.

12.3.2 Implementation Plan

The promotion of the environmentally friendly tropical fruit production will be likely implemented in accordance with the following steps.

1) Through the research and development activities by EMBRAPA, etc., fully grasp the applicable technologies in the aspects of the conditions of soil and water management and the learnings of the development of the disease-resistant varieties with high yield. Conduct the additional research, if necessary, in order to improve the varieties durable for the practical use.（Compile the learnings in three to five years.）
2) Select the three experimental pilot farms in the municipality to crop the newly-developed varieties. Select the improved varieties, depending on the soil condition, and accumulate the experience on the technical management of the growing.
3) Integrate and compile the technical items into the style applicable to general farmers, based on the experience in pilot farms, in order to prepare the manual for the extension. In order to judge the effects of new varieties and agricultural practices in pilot farms, the comparison with general tropical fruit farms can be sometimes needed. Therefore, examine the necessity of a broad range of cooperation with residents, colleges, and researchers.
4) Select the three areas applicable to the concept of Agroforestry to implement the tropical fruit production by mixing several species of fruit trees. Grasp and analyze the local characteristics in the aspects of soil and water management conditions to select the appropriate species of fruit trees.
5) Select the three areas applicable to the conventional organic agricultural practices to crop improved varieties. Introduce the livestock for self-sustenance , depending on the condition, to examine the sustainable agricultural practices.
6) Continuously implement the extension/training on the technically-improved items through seminars and on-farm training. Organize the symposiums and work shops where the mutually cooperative relations between research organizations including EMBRAPA and INPA and colleges can be established to create the regular opportunities to present the research learnings. Promote the information exchange even in the process of the study activities of researchers so that the

experience learned in pilot farms can be spread not only through seminars but also by the exchange of residents.

7) Invite the researchers of INPA conducting the study/research on the environmental preservation to symposiums and seminars so that the opinions not only on the crop production but also on the environmental aspect can be adopted.

12.4 Aquaculture

12.4.1 Basic plan

(1) Aquaculture Development Flow

Overall aquaculture development flow is shown in Figure 12.4.1-1. Based on strengthening of project implementing capability of IDAM, technical verification and extension are carried out. In the course of project implementation, collaboration and linkage with relevant organizations are indispensable.

(2) Strengthening of Project Implementing Capability of IDAM

As mentioned earlier, number of fishery engineer of IDAM is largely insufficient at the level that routine administrative services cannot be reached to beneficiaries of this sector. As a mandate of IDAM, not only aquaculture but also fishery development shall be included.

Table 12.4.1-1 Number of IDAM fishery specialists required to implement the project.

Location	IDAM fishery specialists required		
	Present	To be recruited	Total
Head quarters	2 *1)	2	4
IDAM Balbina Hatchery	1	1	2
Local units			
Iranduba	-	1	1
Itacoatiara	-	1	1
Maués	-	1	1
Total	3	6	9

Remarks: *1) One of them takes leave for 2 years now for post-graduate study.

Number of fishery specialists required for adequate technical services is preliminary indicated in Annex 12.4.1-1. More or less 37 staff members shall be assigned, which is extremely large comparing to the present number, 9 in total. Considering the present principle of the State Government and limitation of budget, practically it seems difficult to achieve such a drastic staff recruit for the fishery section. Table 12.4.1-1 indicates number of fishery specialists required for implementing the aquaculture development plan for the target three municipalities. After those staff are recruited, capacity building training, i.e., participation to technical training course offered by Federal Government, shall be conducted continuously.

In addition to general equipment required for extension activity, following facilities and equipment shall be furnished for implementation of aquaculture development programs.

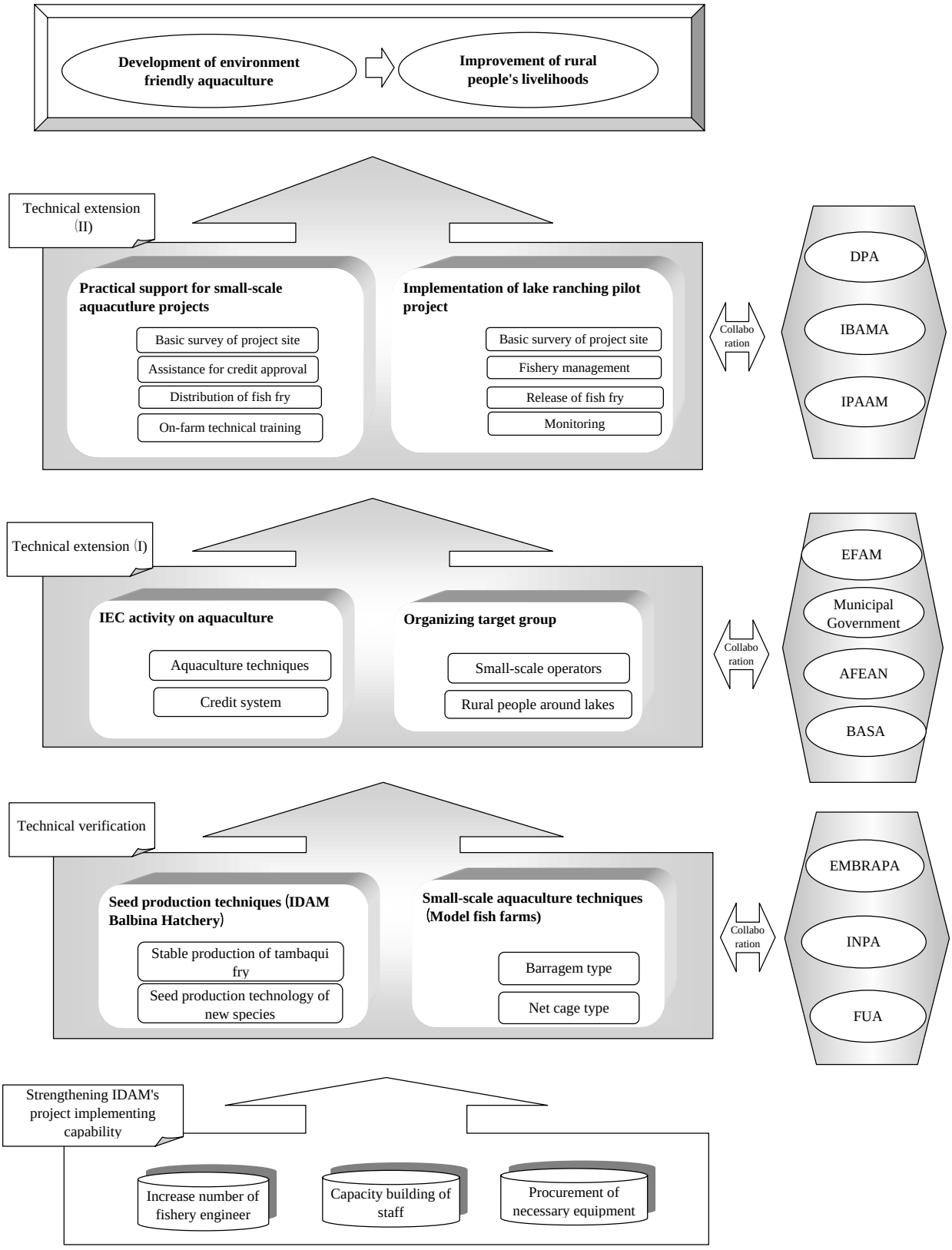


Figure 12.4.1-1 Direction of Small-scale Aquaclture Development

i) Facility and equipment for strengthening IDAM Balbina Hatchery（rehabilitation of existing facility, rearing equipment, laboratory equipment, equipment for seed distribution, etc.）
ii) Establishment of model aquaculture farms
    - Facility and equipment for barragem type farm
    - Facility and equipment for net cage type farm
iii) Equipment for quick site investigation (GPS, portable water checker, etc)

(3) Development of Seed Production Technology at the IDAM Balbina Hatchery (IBH)

Considering that seed production technology of tambaqui has already been established and several private hatcheries start operation in the State, function of IBH shall be reconstructed as the public hatchery. The key roles of IBH will be as follows:

i) Production of fish fry (mainly tambaqui) for the following three purposes
    - to give incentive for small-scale fish farmers (free for the first distribution)
    - to compensate demand of seeds that private hatcheries cannot cover (charged)
    - to release seed for the purpose of the lake ranching program (free or charged)
ii) Implementation of collaborative study on seed production technology.
    (reproductive biology, control of spawning season, larval biology, nutrition, genetics, fish disease, etc.)
iii) Implementation of technical training on seed production for students and private persons

In order to coordinate the above activities, the IBH management committee (temporary name) is proposed to formulate together with relevant government organizations such as EMBRAPA, INPA, FUA and EFAM. Annual operation plan shall be decided by this committee.

(4) Development of Small-scale Aquaculture Technology at Model Fish Farms

Model fish farms shall be established in order to verify and demonstrate available technology for family farmers. Two types of farms, i.e., barragem type and net cage type, are established.

Site of the barragem type model farm shall be identified among existing or abandoned private farms and the project supports necessary improvement of facility such as water distribution and drainage system and provision of equipment. Basic instruction on the operation of model farm is given by the project, and actual operation is rendered to the owner in terms of cost-benefit sharing with the project.

For the net cage type model farm, the project provides net cage materials for

community group or fishermen's group who will carry out assembly of materials and operate them based on the instruction of the project.

Model fish farms will be established for each municipality as Table 12.4.1-2.

Table 12.4.1-2 Model Fish Farms for each Municipalities

	No of Model fish farms	
	Barragem type	Net cage type
Iranduba	1	1
Itacoatiara	1	2
Maues	—	2

Major subjects of verification study at the model farms are as follows:

i) Barragem type model fish farms
   - Rearing experiments using low cost feed such as fruit seeds and agriculture by-product
   - Relation between spring water volume, stocking density and production.
   - Polyculture of tambaqui or matrincha with jaraqui
   - Small-scale nursery operation

ii) Net cage type model fish farm
   - Growth and survival of tambaqui, matrincha and pirarucu

(5) Information, Education and Communication Activity (IEC activity) on Aquaculture

IDAM's IEC activity for target group shall be strengthened by demonstration of practical operation at the model fish farms and refinement of existing group training program. Following knowledge shall be disseminated in addition to aquaculture techniques through this activity. These IEC activities shall be an important tool for encouraging organization of target group.

- Technical support system of IDAM and relevant government organization
- Adequate procedures to obtain aquaculture license of DPA of MAA
- Adequate procedures to obtain environmental licenses of IPAAM
- Available credit system for small-scale operators

(6) Organizing target group

There are some aquaculture associations being formulated in the State, i.e., Coari, B.J.Constant, and Sao Paulo de Olivenca. Taking an example of Coari, core members of those associations are young fish farmers of high school graduates. The project supports development of key human resources in cooperation to vocational education schools such as FEAM.

Fishermen's organization has been developed in Amazonas State as indicated in Section 5.8.3. Utilizing these existing organizations, sub-grouping on aquaculture particularly for net cage culture practice shall be encouraged, firstly for participation to model fish farm operation.

For the lake ranching pilot projects, organization of riverine people is indispensable. The organization shall be supported by IBAMA and NGO.

(7) Practical support for development of small-scale aquaculture projects

Following practical supports shall be provided for fish farms to be operated by a family or a group of family either for new establishment or rehabilitation.

i) Quick investigation on feasibility of sites such as volume of available spring water, water quality and topography in pond culture, and seasonal fluctuation of water depth, effect of storm, water quality, accessibility and harmful animals in net cage culture. For the investigation, necessary number of field workers shall be procured by the project budget
ii) Advice on the facility design based on the above
iii) Suggestion about how to procure construction materials and heavy duty machines
iv) Support on preparation of application documents for acquisition of aquaculture license and environmental license
v) Support on application of credit
vi) Free distribution of tambaqui fry (only at the first rearing cycle)
vii) On-farm technical advice

(8) Implementation of lake ranching pilot project

Lake ranching program means stock enhancement of important fish species through seed release, and recapture of the grown fishes under proper fishery management. Rural people's livelihood shall be improved by this program. Seed release is known to be effective for propagation of decreased fish stocks. On the other hand, there is an argument about negative effect of seed release to open waters from the view of disturbance of natural genetic structure. Therefore, the first target water area shall be closed or semi-closed lakes where distribution of most of released fish can be restricted. This project sub-component shall be implemented in collaboration with relevant institutions which have knowledge on natural ecosystem and environment, namely IBAMA and INPA. Outline of project implementing flow is shown in Figure 12.4.1-2.

In this project, it is important to organize lake community for creation of fishing activity control system, which involves commercial fishing, traditional fishing and sport fishing. This fishery management system shall be maintained in terms of participatory manor, because community members will be primary beneficiaries as their fish catch increase and become valuable one.

12.4.2 Improving livelihoods through Small-scale Aquaculture

Typical facilities to be introduced for family farmers will be small- or medium-scale barragem and net cages. Detailed examination on the recommendable specification and cost shall be carried out through operation of model fish farm of the project. Hereinafter, preliminary examination on expected return from such facilities is conducted based on the knowledge and information obtained in this study.

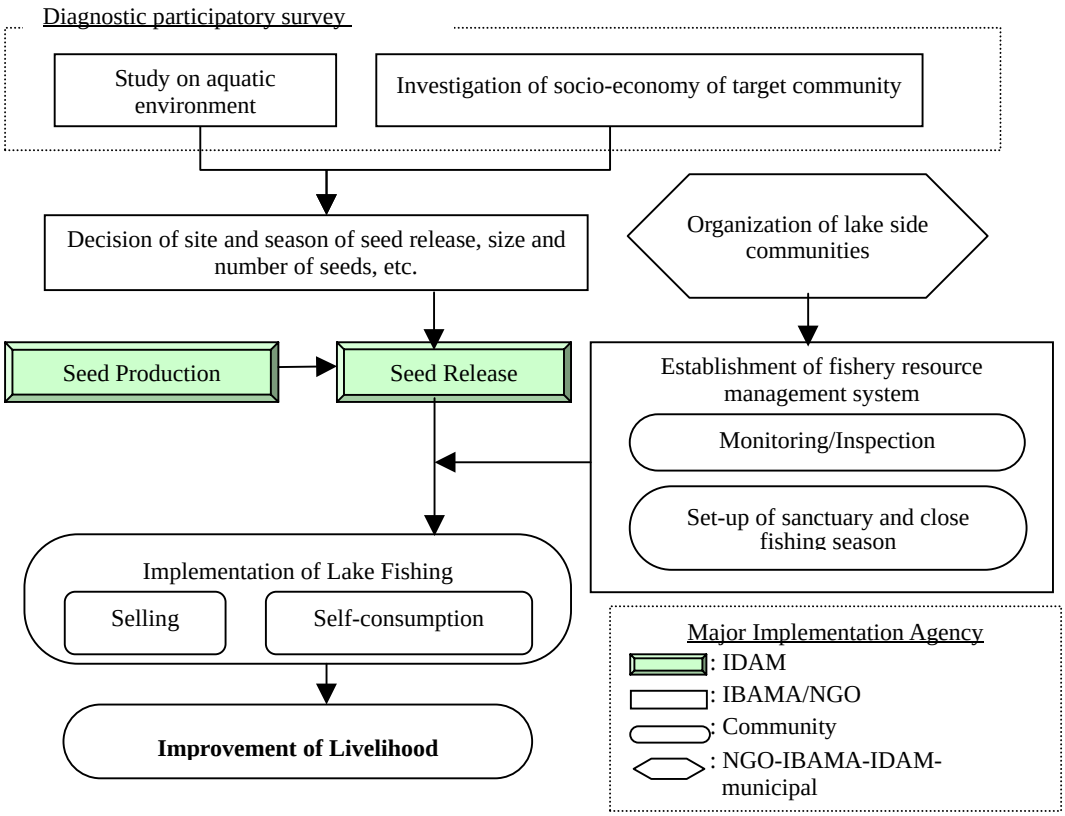


Figure 12.4.1-2 Implementing Flow of Seed Release Pilot Project or Community-base lake ranching Program

(1) Facilities to be introduced

(a) Barragem

The size and cost of barragem depend largely on topography of site and flow volume of spring water. Hence, it is difficult to generalize the relationship between the size (= construction cost) of dyke and area of dam pond. For the purpose of cost analysis of this study, two types of barragem are examined provisionally; one is small-scale, 0.2 ha with water flow of 5l./sec, and medium-scale, 1 ha with 50l./sec. Construction of 0.2 ha barragem is mainly done by family labor and the direct expense is estimated to be R$ 2,200, while it will cost R$ 25,000 for construction of an 1 ha barragem using heavy duty machineries (Annex 12.4.2-1).

(b) Net cages

Two types of net cages are considered, one is small-scale as 2x2x2m which is the same one used in rearing experiment of EMBRAPA in Iranduba, and the other is medium-scale as 5x5x2.5m which is a similar type having been introduced to an existing fish farm in Itacoatiara. Material cost of a small-scale cage is estimated to be about R$ 480, and that of a medium-scale cage is about R$ 4,800 (Annex 12.4.2-1). Those cages shall be assembled by beneficiaries. When four small-scale cages or two medium-scale cages are introduced to a family, initial investment cost will be R$ 1,920 and R$ 9,600 per family, respectively.

(2) Examination of cost and benefit

(a) Basic rearing conditions

Taking into consideration technology of family farmers is not sufficient, productivity of facilities was set lower than that shown for earthen ponds of progressive fish farmers by reducing stocking density of fish fry. For small-scale facilities of both barragem and net cage, only family labor is used, while labor cost of 0.5 person was added in operation cost of medium-scale facilities. Major differences in rearing conditions and thereby operation cost between barragem and net cage are shown in Table 12.4.2-1.

Table 12.4.2-1 Difference in Rearing Condition between Barragem and Net Cage

	Basic difference about feeding conditions	Initial size of fish fry	FCR*1)	Unit feed price	By-product
Barragem	Fish can utilize zooplankton and other natural food in fishponds. In order to propagate them, fertilizer is applied.	Can be smaller	Lower	Cheaper	Jaraqui and curimata can be cultured as by-poduct
Net cage	Daily feeding is the only source of food. Fertilizer is not used.	Shall be larger	Higher	Expensive because artificial feed shall contain all necessary nutrient	No

Remark: *1) food conversion rate

(b) Result of the examination

Results were shown for barragem and net cages in Annex 12.4.2-2 and 12.4.2-3, respectively, and summarized in Table 12.4.2-2. These results shall be considered as approximate examples including a series of assumptions. In this examination, profit from pirarucu culture is lower than tambaqui and matrincha, because higher cost of fry (R$ 20/individual) and relatively low selling price (R$ 3.5/kg) are applied for pirarucu culture. Selling price of pirarucu must be higher in near future when new markets like Sao Paulo or overseas are developed according to Amazonas Ecopexie LTDA.

Table 12.4.2-2 Summary of Crude Profit to be Liquidated by Small-scale Acuaculture

Unit: R$/year/family

	Small-scale				Medium-scale		
	Tambaqui	Matrincha	Pirarucu		Tambaqui	Matrincha	Pirarucu
Barragen	1,007	748	335		4,651	3,996	2,953
Net cages	675	444	17,317	*1)	3,964	2,726	471

Remark: *1) This is the case of inter-mediate culture, which is calculated as a reference

12.4.3 Adoption of Lake Ranching Program

(1) Potential Areas and Communities

Considering the effect of seed release and recapture, relatively small-size varzea lakes with narrow strait to open water are recommended as project sites. From this view point, potential sites are examined preliminary using geographic map of 1: 100,000 and approximate water areas are counted (Annex 12.4.3-1 and Table 12.4.3-1 and). In the three target municipalities, roughly a total of 1,445 ha of varzea lakes

is identified as a potential areas of lake ranching program. Around the lakes, a total of 100 communities or 3,219 families are living.

Table 12.4.3-1 Summary of Rough Estimate of Candidate Sites and Potential Beneficiaries for Lake ranching Program

Candidate Sites	Community around lakes			Rough estimation of water area(ha) *1)
	No. community	No. family*2)	Population	
1. Iranduba				
Islands having varzea lakes	15	488	2,440	190
Varzea lakes	15	818	4,090	240
sub-total	30	1,306	6,530	430
2. Itacoatiara				
Islands having varzea lakes	22	502	2,511	200
Varzea lakes	37	1,107	5,535	420
sub-total	59	1,609	8,046	620
3. Maues				
Islands having varzea lakes	0	0	0	0
Varzea lakes	11	304	1,610	410
sub-total	11	304	1,610	410
Total	100	3,219	16,186	1,460

Remark: *1) Water areas are roughly estimated by using map (1:100,000)
*2) Number of family in Iranduba and Itacoatiara is estimated by 5 persons per family

(2) Expected returns

According to INPA's monitoring at Lago do Ariauzinho, recapture rate of tambaqui fry released was estimated less than 5% at present. This is due to undeveloped state of seed release technologies and low quality of seeds used, as well as difficulty to estimate actual recapture rate. Taking into consideration recent experience in Japan, more than 10% of recapture rate can be expected for seed release program in lakes. When methodology of domesticated stocking is introduced during early dispersing stage of fish fry, recapture rates of 20-30% can be expected (Dr. Atsushi Ohno, Tokyo University of Fisheries).

Expected production of lake ranching program is examined by varying multiple factors, i.e., recapture rate (5, 10 and 20%), stocking density of tambaqui fry (500, 1000 and 2000 fry/ha), and size at recapture (1, 1.5 and 2 kg), as shown in Table 12.4.3-2. The production from a total of 1500 ha varzea ponds varies between 38 and 1200 tons. When taking the moderate value, 225ton of tambaqui are to be produced. This production is equivalent to about R$ 600,000 supposing selling price of R$ 2.6-2.7/kg. It should be viable considering the approximate total cost of fish fry for

Table 12.4.3-2 Matrix of Expected Production of Tambaqui from Lake ranching Program in a Total of 1,500 ha

unit: ton

Recapture rate= 5%		Stocking density of fish fry (fish/ha)		
		500	1000	2000
Size at recapture (kg/fish)	1	38	75	150
	1.5	56	113	225
	2	75	150	300

Recapture rate = 10%		Stocking density of fish fry (fish/ha)		
		500	1000	2000
Size at recapture (kg/fish)	1	75	150	300
	1.5	113	225	450
	2	150	300	600

Recapture rate = 20%		Stocking density of fish fry (fish/ha)		
		500	1000	2000
Size at recapture (kg/fish)	1	150	300	600
	1.5	225	450	900
	2	300	600	1200

release, R$ 120,000 (R$ 0.08/fry x 1000fry/ha x 1500ha).

Supposing 80% of lake side family (3,219 family x 80% = 2,575 family) participate in the recapture of this program, average production by released tambaqui will be 87 kg/family or about R$ 230/family per year.

12.5 Processing, Distribution and Marketing

12.5.1 Overview of the Plan

As for each of the three crop categories, namely guarana, fruits, and vegetables, post harvest problems are essentially very similar, but solutions will differ based on the crop and the available infrastructure in each municipality where each crop is grown. The "Basic Plan" of this project must attend the following basic problems for all of the target crops concerned:

- Lack of basic processing infrastructure to add value and quality to the raw materials
- Existing processing infrastructure produces low quality, unhygienic products and must be upgraded.
- Lack of market information for farmers to bring their products to market places.
- Lack of adequate transportation and storage and lack of adequate distribution materials including packages to preserve initial quality and freshness
- Poor direct access to retail markets, resulting in high dependence upon "brokers" for distribution to point of sale.

The following table presents a summary of the "Major Projects" for processing, distribution and marketing.

Table 12.5-1 Project Outline concerning Processing, Distribution and Marketing

Short Term Project

Scope and Objective		Processing, Distribution and Marketing（Short Term）			
		Primary Processing Center（Guarana, Fruits）	Support of Transportation	Direct Marketing	Market Information System
Description	Target Place	3 Municipalities	3 Municipalities	Manaus	IDAM/SEBRAE
	Outline	-Construction of primary processing center for facilitating sales of farmers' products in local area	・ Improvement of transportation by providing trucks and boats ・ Improvement of transportation Infrastructure	・ Prepare sales counter for rural farmers to market their crop directly. ・ Introduction of trade partner	・Collection of market data as to price, amount traded and trend of consumer ・Publication of market outlook for supply demand balance
	Agency	IDAM	IDAM	IDAM & SEBRAE	IDAM ＆ SEBRAE
	Time	2002-2005	2002-2007	2002-2005	2002-2007
Estimated Cost US$		1,206,700	720,000	150,000	907,200
Priority		High	High	Medium	High
Expected Benefit		- Increase in the sale of agricultural products (Decrease of discards）	- Increase in the amount of products transported for marketing - Increase of emergency transportation	- Farmers can understand the consumer needs quickly & directly	- Increase of sales income. - Strategic Marketing becomes possible according to the supply-demand balance

Long Term Projects

Scope and Objective		Processing, Distribution and Marketing（Long Term）			
		Central Processing & Distribution Center	Improvement of distribution material	Training & Extension service	Promotion of products by establishing Quality standards
Description	Target Place	Manaus	3 Municipalities	Farmer, Trainer, IDAM Staff	IDAM, SEBRAE
	Outline	- Central Receiving Center in Manaus - Central Organization to negotiate with traders/processors	- Selection and implementation of environmentally friendly material for distribution	- Train staff, personnel and farmers for the improvement of processing, distribution and marketing according to trainee's needs	- Testing Lab preparation and establish Quality standards for guarantee - Promotion of products
	Agency	IDAM	IDAM	IDAM & SEBRAE	IDAM
	Time	2002-2012	2002-2012	2002-2012	2002-2012
Estimated Cost US$		592,000	300,000	365,550	950,000
Priority		Medium	Medium	High	Medium
Expected Benefit		- Increase in the sales amount of farmers' products	- Decrease in the amount damaged during transportation - Increase in the sales amount	- Improvement of Post harvest technology - Increase in the sales income	- Increase in the sales amount

12.5.2 Description of Projects

(1) Projects in Maues for Guarana Processing

(a) Central Cooperative Project

The objective of this Coop is to provide a place where farmers can deliver their crop, receive a fair price, and receive processing and marketing assistance with minimum interference from brokers. The Coop will be central to the guarana community, but will also be designed to receive, process, and market other key crops (fruits, cassava) for its members.

- Form public/private sector steering committee to guide formation of the Coop.
- Establish funding and management scheme for initiation of the Coop. Coop services should be self-sustaining after 7 years of Project support.
- Construct facility, hire staff, and initiate Coop services. Principal services include crop reception, quality control, farmer payments, storage, resale, and distribution of profits to members.
- Establish boat and truck transport services of the Coop. Design crop pick up service for remote areas. Include delivery service for key agro inputs (clones, fertilizer).
- Establish training and marketing arm of the Coop. Link with logo campaign and certification service.
- Establish agro processing capacity of the Coop.

Establishment of a central Coop will basically serve to break farmer dependency on brokers and AmBev. AmBev will still be the largest buyer of guarana in the area, but sales will be negotiated with Coop management for large volumes of the highest quality grain, instead of with individual farmers with small lots. Such negotiation

on a volume basis should improve price structure for the small farmer. If AmBev stops buying or offers too low a price, the Coop will have other buyers lined up or will process the crop into easy to sell, value-added products such as bars and powder.

(b) Guarana Processing Project

The main objective of this activity is the establishment of pilot processing plants for guarana in three Maues communities. These pilot activities will hopefully stimulate the villagers into becoming more entrepreneurial and successful in adding value to the guarana crop.

- Identify three target communities for the establishment of small-scale, processing activities.
- Establish seed fund to initiate village level processing (micro-credit, community grants).
- Establish training center (factory school) for guarana processing activities at Central Coop for use by all processors in Maues area. Include food safety component, use EMBRAPA trainers.
- Establish a market linkages program for all guarana products processed in Maues. Emphasize Amazonian origin and quality. Highest priority is to find buyers for Coop products.

(c) Guarana Distribution Project

IDAM has approved funding for the purchase of a number of medium/heavy boats and trucks to improve the transport infrastructure of various municipalities in Amazonas. This Project will complement the IDAM activity by supplying a fleet of smaller boats and trucks to improve transport of produce in the more remote communities of the three target municipalities.

- Identify network of remote target communities to be supported by an upgraded boat transport system.
- Establish funding mechanism to purchase and maintain a limited fleet of guarana "support" boats. Boats should also backhaul agro inputs, and could also be used for transport of IDAM staff for extension visits.
- Establish a management system to administer guarana boat services and maintenance.
- Purchase limited fleet of boats and initiate services.
- After 3-5 year period, arrange private sector buyout of fleet to provide sustainability.
- Design, fund, and implement a distribution study for Maues-sourced guarana and guarana products. Focus on Mato Grosso and other important destinations.

This activity is distinct from the transport services offered by the Coop. This activity will have a larger fleet of multipurpose boats (5-10), smaller in size, and

wider in rural coverage. The Coop may only have one or two boats operating within a smaller range of service, and dedicated to guarana Coop activities.

(2) Projects in Iranduba for Vegetable Processing

(a) Integrated Receiving Center & Farmer's Market Project

The objective of this activity is two-fold: create a receiving area in Iranduba to collect the produce from remote communities and prepare it for market, and then transfer the produce to a dedicated market area in Manaus which serves as the primary selling point. The Manaus-based farmer's market can be established within a Centralized Receiving Station that IDAM has approved for funding.

- Create a steering committee to design project approach and administration plan.
- Design funding mechanism to attract private sector interest in management of the facilities.
- Obtain approval from steering committee for ownership, management plan, and farmer service arrangements of the two facilities.
- Construct facilities (Iranduba – receiving station with minimal processing and cold storage areas; Manaus – Iranduba farmer's Market with areas for sales, storage, kiosk development, and marketing activities).
- Start up facilities after aggressive promotional campaign in Manaus.

The key to post harvest improvement for Iranduba vegetable farmers is increased market access, primarily through breaking the existing dependence on brokers for transport and a point of sale. Provision of adequate crop to market transport is only part of the solution. In order to compete successfully against low cost imported vegetables, the farmers need a place where they can aggregate their harvests, sell in volume, and exercise some measure of quality control to improve product appearance. The Iranduba Receiving Center will provide an area where high volumes of quality vegetables can be organized for shipment (under refrigerated transport) to an Iranduba Farmer's Market facility in Manaus where additional measures will be taken to promote only fresh, local vegetables from Iranduba. Importantly, these two facilities will serve to remove many of the difficulties of post harvest market access so that the farmer can quickly and efficiently deposit his crop, receive a fair payment, and return to the farm to further increase his productivity. These two facilities could initially be run by an NGO, but in the interest of sustainability, preparations must be made to offer services for fees so the system can eventually function as a viable business or cooperative.

(b) "Iranduba-Fresh" Promotion Project

- Conduct a marketing research survey in Manaus which will identify the vegetable crops which offer the most strategic advantage for Iranduba farmers faced with competition from imported crops.
- Design a promotion program ("Iranduba-Fresh") to enhance appeal of local produce vs. imported. Develop an "Iranduba-Fresh" logo to give Iranduba vegetables identity and consumer appeal.
- Launch promo campaign using multi media ads and kiosks in supermarkets and other strategic areas. Start as pilot project while Iranduba Receiving Center and Farmers Market facilities are under construction.

The marketing survey will ensure that farmers only grow those vegetables where they have a strategic advantage over imported vegetables and can hope to gain market share. The concept of an "Iranduba-Fresh" campaign with advertisements, logo, and kiosk delivery system is fashioned after the "PROVE" (Vertical Integration Program for the Small Farmers of the Federal District) model which has helped small farmers in Brasilia improve their direct sales and marketing to urban consumers.

(c) Distribution Infrastructure Project

- Establish funding mechanism to purchase a limited fleet of trucks and boats for produce pick up and delivery of packaging materials and farm inputs.
- Create steering committee to determine which communities are to be serviced by the transport support service and devise a fee structure and sustainability plan.
- Finalize fleet admin plan, purchase vehicles, initiate services.
- Arrange buyout of fleet system to private sector investors.

The proposed fleet of produce boats and trucks should focus on transport of vegetables from remote communities to the Iranduba Receiving Center. Transport from the Center to the Farmer's Market will be managed by one or two high capacity refrigerated trucks that are an integral part of the Receiving Center. Eventually, this rural transport service should be turned into a sustainable, private sector operation.

(d) Packaging Materials Project

- Conduct survey of regional suppliers of suitable, low cost materials.
- Conduct feasibility study for viable local manufacture of needed materials vs. importation.
- Establish funding mechanism for purchase of materials and/or startup of local packaging materials microenterprise.
- Initiate sustainable supply of packaging materials.

Establishment of a local enterprise to manufacture these materials would be a better option for the farmers in the long term, but initially, it may be more economical to negotiate for imported materials from an outside supplier. Price discounts could be

achieved by ordering higher volumes of materials to cover the full range of guarana, vegetable, and fruit packaging needs.

(e) Training and Extension Project

- Design a funding mechanism to finance training and extension activities in vegetable post harvest handling techniques.
- Organize site visits for outside training experts to determine the most appropriate training interventions for the municipality.
- Design and launch training workshops for YFLs, IDAM, facility staff, community farming associations, etc.

Again, the focus needs to be on practical training which leads quickly to improved product freshness and quality. Without improved quality, it will be very difficult for Iranduba to compete against low cost imported vegetables in the Manaus market.

(3) Projects in Itacoatiara for Tropical Fruits

(a) Central Fruits Processing Plant Project

This activity seeks to restore operations of a dormant fruit processing plant located on the outskirts of Itacoatiara. The plant has 90% of the equipment in place to re-start processing operations, but lacks a staff and a business plan. Initially, the plant was set up by the Mayor's office but the initial management team failed to keep the plant running after producing several tons of product 5 years ago.

- Create a public/private sector steering committee to plan the re-start of the idled fruit processing company near Itacoatiara town.
- Design funding mechanism and/or incentives scheme to attract private sector interest in plant renovation and start up.
- Establish new management team and hiring of new staff.
- Establishment of initial client base.
- Plant start up and commercial production. Purchase of at least one pick-up truck and reefer truck.

Since the plant site, building, and majority of processing equipment is already in place, this idle plant represents an excellent opportunity to quickly establish significant fruit processing capacity in Itacoatiara with a minimum of investment. Success will depend upon attracting competent private sector management to the project, production of a high quality product, and the establishment of long term supply contracts with reputable buyers. The plant will have the capacity to process multiple fruit products (mainly cupuacu) with an output of 3-6 tons of frozen pulp/day. If high volume contracts are negotiated, then current frozen storage capacity (40 tons) may have to be increased. The plant will have one or more vehicles with which to pick up fruits from nearby farms, or from nearby river points where communal boat traffic brings fruits from the remote communities. The plant

must also have one reefer truck to enable refrigerated transport of frozen pulp to the Manaus marketplace.

(b) ASCOPE Upgrade Project

IDAM has approved the funding for the upgrading of an existing fruit processing facility at ASCOPE, and the construction of two other facilities in the Itacoatiara area. The objective of this Project is to support these IDAM-sponsored plants with expenses for start-up, initial operations, and training. After 5 years of support, these plants are expected to be self sufficient.

However, electrical power is not yet available and not covered by the existing funds. Electrification, training, and creation of a business plan are crucial to the success of the new plant. Although there is one potential client (CIALI Corp.) there is no firm contract as of yet, so other clients need to be lined up as soon as possible in order to ensure the future of the plant. The new facility must demonstrate a significant improvement in product quality and presentation compared to previous production in order to successfully penetrate new market areas.

- Initiate construction of new facility at ASCOPE, and two other sites yet to be determined.
- Provide electrical supply to site areas.
- Plant start-up and launch of new commercial product to satisfy existing client. Implement training activities to quickly improve quality of product.
- Establish new client base through marketing activities.

(c) Rural Pilot Plants Project

Development of these rural pilot plants should proceed only if the upgraded facility at ASCOPE is on track for success. The ASCOPE facility actually should serve as a model and learning center for these other rural processing operations. Exchange visits should be arranged between these plants, ASCOPE, and the central processing plant planned for restoration in Itacoatiara town.

- Create steering committee to select and target two rural communities as recipients of small pilot plants for the processing of fruits. Strong level of farmer organization will be key for success.
- Design pilot plants for new target communities. Plants can be based on the upgraded ASCOPE model, but should be even smaller and simpler.
- Establish funding mechanism for pilot plant infrastructure.
- Line up potential buyers of product.
- Plant start-up and launch of commercial product.

(d) Distribution Project

Boats and trucks should be purchased in an integrated fashion with IDAM plans to purchase boats and trucks for the region. At least one reefer truck should be

purchased, but the fleet should focus on smaller boats and pick-up trucks that can service the more remote communities.

- Identify network of target communities to be supported by an upgraded system of boats and trucks. Vehicles will a) haul crop to wholesale markets or to processing plants in Itacoatiara region, b) backhaul farm inputs to the villages, and c) haul selected crops and frozen product to clients in Manaus (focus on banana and high quality cupuacu pulp).
- Establish funding mechanism to purchase and maintain a limited fleet of "support" boats and trucks.
- Establish a management system to administer boat and truck distribution services.
- Purchase limited fleet of boats and trucks.

(e) Packaging Materials Project

Supply needs in packaging materials should be combined with those of the guarana and vegetables projects so that initial purchases can be made on a high volume basis. Focus should be on crops such as banana and maracuja that are easily damaged during rough transport and have high market potential in Manaus. Transport of unprocessed cupuacu to manaus should be discouraged as it will be far more cost effective to transport high quality frozen pulp.

- Identify sources of suitable packaging materials and arrange for low cost supply.
- Training of farmers in packaging principles, materials, and techniques.
- Design incentive program to stimulate creation of local businesses willing to manufacture low cost packaging materials for Itacoatiara.

(f) Training and Extension Project

Training needs to be focused not only on processing technologies, but more importantly, on food safety and hygiene. The major obstacle to sales of processed fruit products from Itacoatiara has been very poor reputation in the area of food safety. Customers worry about microbial contamination, especially since many of these products are to be eventually consumed by children.- Design a funding mechanism to finance enhanced training and extension activities in fruit processing and post harvest handling.

- Organize site visits for outside training experts in "Good Manufacturing Practices" (GMP's), "Hazard and Critical control Point Analysis" (HACCP) and other aspects of food hygiene.
- Design general training workshops for YFLs from diverse rural communities, IDAM extensionists, and existing fruit processors.
- Design training workshops for the communities targeted to receive pilot plants.
- Design training workshops for the incoming staff of the central fruit processing company.

(4) Marketing related projects

(a) Market Information Systems

It is important to compile data-base of market information because successful marketing depend on effective use of market data. In order to have a good maket data-base it takes a few years of continuous effort, therefore this project should be treated as a long term project and be started as soon as possible.

After the baseline survey of the current market condition, items of data should be selected and regular survey of price, trade volume, and market trend should be conducted. Based on the data collected and compiled, market outlook is expected to be published so that farmers understand the future trend of each crop and design their farming effort adjusted to the market needs. In order to understand the market trend, test marketing needs to be conducted when necessary and the result will be fed-back to market outlook.

(b) Promotion of Direct marketing

The government is expected to provide sales space for farmers to sell their products directly to consumers and restaurants. The sales place is not only in local market-places but also in distribution points such as the Central Receiving Station which is now under planning in Manaus.

Direct marketing includes linkage between farmers and processors who engage in trade each other directly. SEBRAE and IDAM is already cooperatively providing information under the project of “Balcaon Negocios”, and the service is expected to reach more farmers in rural area so that both processors and farmers will benefit from the increase of direct trade.

(c) Certification of standard and quality of product

The quality of agricultural product needs to be properly controlled and tested in order to guarantee hygienic safety for consumers. The quality aspect is extremely important because the image of the Amazon origin will add value to the product and the publicity effort in large cities such as San Paulo will create new market.

(5) Summary by Project Type

The following table depicts the interaction of Project activities designed to support processing, distribution infrastructure and marketing for farmers. A column on “Comments” has been included to reflect learning discovered during field survey.

Table 12.5.2-1 Project Description by Type of Project

Project Name	Project Purpose/ Expected Outputs	Comments
Organizational improvement with Cooperative movement (Guarana, Fruits,Vegetable)	Improve market access of farmers through creation of a centralized coop which facilitates selling, storage, processing, marketing, promotion, and transport of their crop.	Cooperative should be "mixed", and should receive and process cassava and tropical fruits. Coop must have professional management and administration.
Village-Level Processing (Pilot Plants)	Improve market opportunities of farmers through expansion of small scale processing activities in select villages. These should evolve into profit-driven small businesses permitting generation of added income. Improvement of existing "model" plant at ASCOPE Creation of several new village-level pilot plants to stimulate interest in value-added processing.	CTAA and/or CPATU could establish the pilot plants. Focus would be on guarana and farinha processing. Restart of idle plant assumes any legal requirements can be cleared with previous operators.
Distribution Improvement Project including Packaging Materials (Fruits, Vegetable)	Improve market access of farmers through improved river/land transport infrastructure and improved knowledge of post-Maues distribution chain. Improvement of river and land transport infrastructure in Itacoatiara. Improvement of river and land transport infrastucture in Iranduba; Improved knowledge of consumption patterns of Iranduba produce. Increased availability of low cost packaging materials to reduce losses.	There is a significant need for a fleet of small boats since it appears that IDAM's transportation project is not going to assist Maues Distribution study could be done by SEBRAE and/or CTAA. JICA should focus on boats and packaging materials fo remote communities. IDAM has committed to provision of some boats, trucks, and packaging materials.
Market Information System	Compile market data and prepare for farmers to access as needed. Market outlook will be published so that farmers will be able to focus on the farming program based on the market needs	Prepare base-line survey and make analysis of market trend Test marketing and consumer needs will be examined
Promotion of Direct marketing	Create sales points where farmers bring crops and sell directly to consumers Create receiving facility in Iranduba town, and a sales facility in Manaus The two facilities are linked by refrigerated transport.	Farmers need to understand consumer needs and trend of market directly and quickly Farmers will be able to understand marketing difficulties and distribution loss.
Training & Extension	Farmers, government officials and traders will understand market system. Farmers will be able to plan crop production by improved technology and information through extension service.	IDAM Processing Project will upgrade infrastructure of ASCOPE and one other community-based plant. JICA project should therefore focus on training, not infrastructure. Both IDAM and JICA should focus on food safety training. Processing plant may be developed into a regional training center.
Quality control and Certificate	Improvement of product safety/quality in order to satisfy market requirements. Improvement of product quality resulting in increased sales to high end customers.	Prepare and register Testing Lab in order to respond to increasing test requests Training in GMP's and HACCP is critical to improve pulp quality – CTAA is best source of expertise.

12.6 Environment

To carry out a sustainable agriculture in the tropical rain forest in the Amazon Region, the project planned by IDAM is required to have a sound natural resource management, and in order to improve the rural people's livelihood in the projected area such as increasing the productivity of agriculture as Guarana, tropical fruits and fish culture with environmental sound conditions, IDAM has to carry out the implementation of environmental management. In addition, IDAM is required to tackle environmental issues, which causes problem in the present organization, and establish short and long-term plans for environmental management.

For reducing the environmental impact caused by agricultural activities by middle and small-scale farmers who are the target of PRONAF and projects planned by IDAM, the following countermeasures are recommended: i) Enforcement of

organization for environment, ii) Collection of data and information regarding the environment iii) Providing cooperation with PPG7, iv) Providing environmental consideration for each project. IDAM shall provide an environmental consideration to the project in both the long and short-term plan as shown in Table 12.6-1.

Table 12.6-1 List of Proposed Projects for Environment

Short Term Plan

Project scope		Environment			
		Enforcement of IDAM organization for environment.	Collection of data and information.	Providing cooperation with PPG7 project.	Environmental consideration for each project.
Contents of project	Outline	Assignment of the person in charge for environment.	Data collection from concerned organizations.	Utilization of data prepared by PPG7 project. Reflect the policy and guidelines prepared by PPG7 to the IDAM project.	Project shall be planned with environmental consideration.
	Implementing body	IDAM	IDAM	IDAM & PPG7	IDAM
	Implementing period	2004	2003	2003	2003
Priority		High	High	Middle	Middle
Project benefit		Capacity building of IDAM.	Capacity building of IDAM.	Reducing of environmental impact caused by agriculture.	Reducing of environmental impact caused by agriculture.

Long Term Plan

Project scope		Environment			
		Enforcement of IDAM organization for environment.	Collection of data and information.	Providing cooperation with PPG7 project.	Environmental consideration for each project.
Contents of project	Outline	Establishment of environmental Section/Department Strengthening of organization for environment conservation.	Connection to the existing common database system by information technology system.	Proceeding environmental education and enlightenment of environment to farmers. Monitoring of the projects and slash and burn field.	Proceeding environmental impact assessment and evaluation of environment for the projects.
	Implementing body	IDAM	IDAM	IDAM & PPG7	IDAM
	Implementing period	2007	2007	2007	2007
Priority		Middle	Middle	Middle	Middle
Project benefit		Capacity building of IDAM.	Capacity building of IDAM.	Reducing of environmental impact caused by agriculture.	Reducing of environmental impact caused by agriculture.

(1) Enforcement of Organization of Environment

As there is no person in charge for environment inside the organization of IDAM, it is very hard to unify the data and information regarding the environment, which are required in the project. Accordingly, data collection is not proceeding smoothly at the present stage. In the long-term plan, it is required to establish a Section/Department to be responsible in the environment and in strengthening the organization for environment conservation. The actions taken by IDAM such as reflection of the policy and guidelines prepared by PPG7 and the establishment of environmental conservation plan in the Amazon Region will enable the smooth operation of IDAM project and sustainable development of agriculture.

(2) Collection of Data and Information for Environment

For proceeding with the rational environmental management, it is required to collect data and information from concerned government organizations such as INPA, EMBRAPA, IPAAM and IBAMA. It is necessary to establish cooperation with these organizations and obtain the data and information for the environment from them continuously. For the long term plan, it is required to connect existing database system utilizing information technology (IT), and the data prepared by the PPG7 project and others shall be readily available through access from a computer network system in the future.

(3) Providing Cooperation with PPG7 Project

Many environmental data prepared by the PPG7 project are indispensable for IDAM projects in terms of agricultural administration of sustainable farming continuously in future. These data and information have to be obtained smoothly and speedily from each government organization. For the long term plan, it is required that the education and enlightenment of the environment conservation to farmers who live in the service area shall be carried out by IDAM to improve the environmental awareness of the local residents. Many environmental management projects are conducted as a subproject of PPG7 at present. In the case that planning for environmental management is implemented in the service area of IDAM, the joint activity requiring the cooperation of both parties shall be considered for improving the environmental awareness. The monitoring caused by slush and burn agriculture by medium and small-scale farmers is not conducted presently, however it is recommended to carry out the required survey work through PPG7 activity in future.

(4) Providing Environment Consideration for IDAM Project

Basically, the project planned by IDAM shall be carried out based on the result of zoning plan of EEZ together with consideration of environmental issues. All of the plan shall be

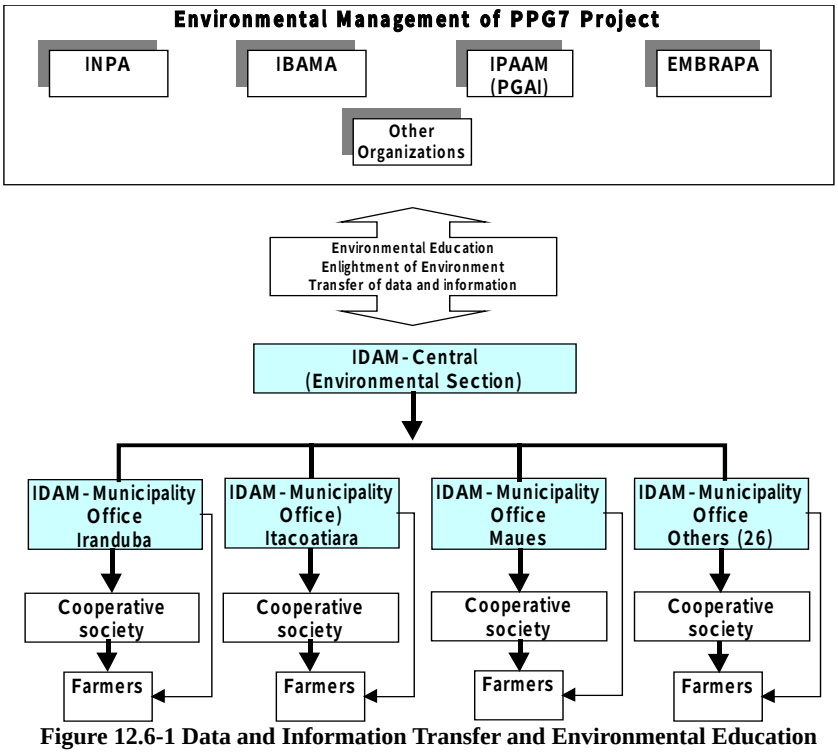


Figure 12.6-1 Data and Information Transfer and Environmental Education

prepared with sufficient environmental consideration and reflects the environmental policy and guidelines issued by the Government. In the planning stage, the utilization of data and information, which are obtained by PPG7 and EEZ project is necessary. To improve the environmental preservation in the Amazon Region, it is required to increase the public awareness and environment education of the local residents in the Amazon Region. Figure 12.6-1 shows the flow of data and information and environmental education.

12.7 Farmers' Organization

Strengthening Farmers' Organization Project can be roughly divided into the three main components as follows.

1. Providing Local Leadership and Agribusiness Informal Group Extension Services
2. Providing Association Extension and Agribusiness Formal Development
3. Establishing Association and Agribusiness Policy/Program Support

Each component will be implemented within the period of 10 years of the project. And, the short term plans （2002-2005）and long term plans （2006-2012）will be set for each component, depending on the activities and priorities of each component.

Short Term Plan

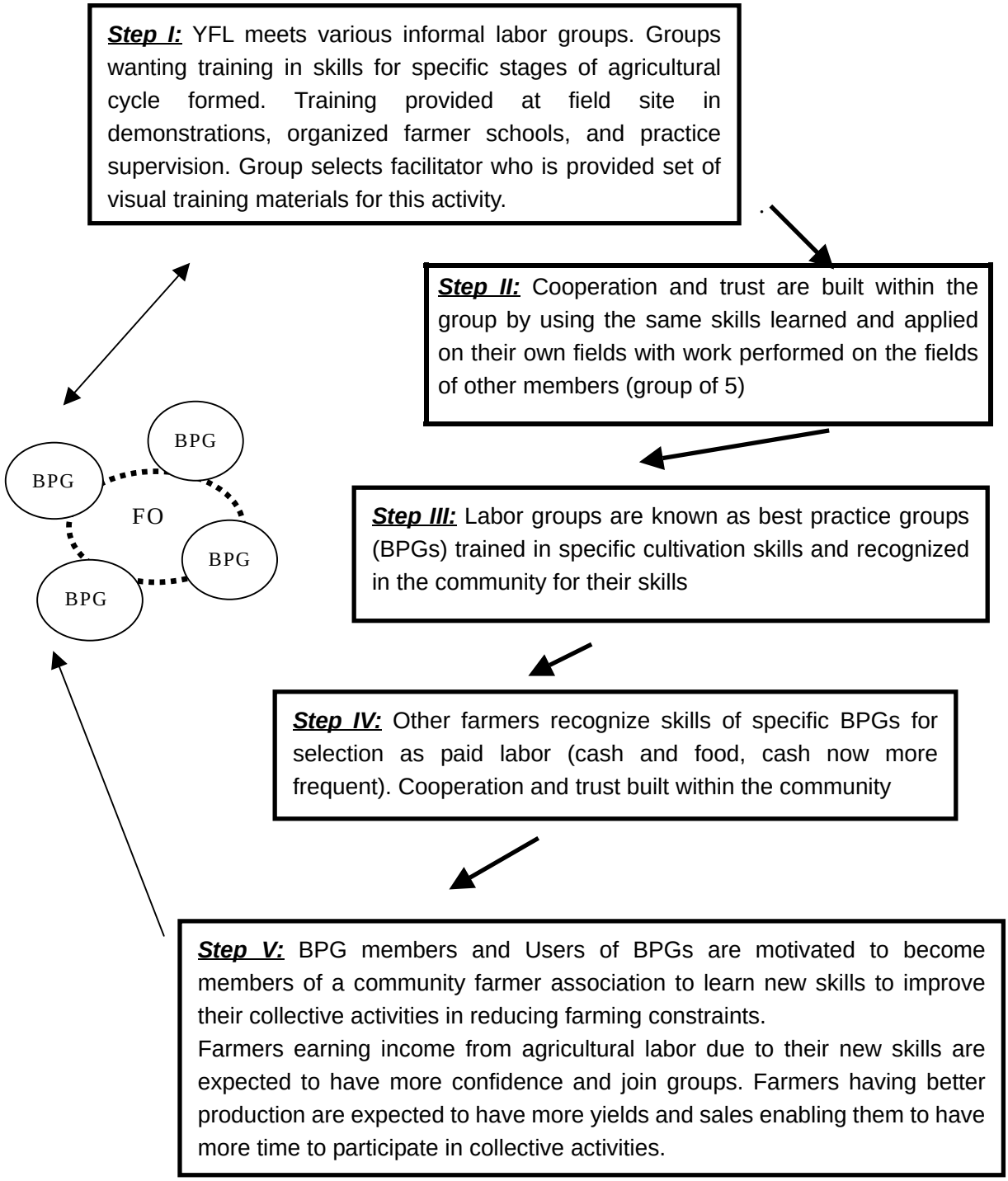
Project Scope		Strengthening Farmers' Organization		
		Providing Local Leadership and Agribusiness Informal Group Extension Services	Providing Association Extension and Agribusiness Formal Development	Establishing Association and Agribusiness Policy/Program Support
Contents of project	Target Area	Each community (3municipalities targeted)	Each community (3municipalities targeted)	Each community (3municipalities targeted)
	Outline	-Train Young Farm Leaders in improved technologies (micro-region, study exchange, farmer schools) -Form informal "Best Practice Groups" by crop -Identify local natural resources for agribusiness development -Establish production records and savings guidelines	-Form multiple types of agribusiness associations -Establish resource partnerships for increasing adoption of improved technologies -Train associations in sustainable agribusiness management, policy -Train associations in agribusiness enterprise skills	-Establish IDAM/ Municipality/ Cartorio rural legal-aid boat and mobile van delivery services -Formulate state policy on common resource management for community farmer association agribusiness growth -Improve producer and association implementation of agribusiness investment projects
	Implementing body	IDAM with NGOs	IDAM with Public Institutions and PPG7 Related Institutions	IDAM with Governor, Mayor
	Implementing period	2002-2005	2002-2005	2002-2005
Project Cost US$		711,869	484,262	618,333
Priority		High	Medium	High
Project benefit		- Capacity building of young leaders. - Improved technical outreach to producers at field and household levels.	- Capacity building of community farmer associations. - Improved income from better organized business relations	- Increasing livelihood opportunities through legally managed agribusinesses and better access to social security

Long Term Plan

Project Scope		Strengthening Farmers' Organization		
		Providing Local Leadership and Agribusiness Informal Group Extension Services	Providing Association Extension and Agribusiness Formal Development	Establishing Association and Agribusiness Policy/Program Support
Contents of project	Target Area	Each community (3municipalities targeted)	Each community (3municipalities targeted)	Each community (3municipalities targeted)
	Outline	-Train Young Farm Leaders in improved technologies (micro-region, study exchange, farmer schools) -Form and strengthen informal "Best Practice Groups" by crop -Train youth and women in savings mobilization strategies	- Provide legal education and for-profit sustainable management entrepreneurial training - Form cooperatives and pre-marketing cooperatives - Establish association and consumer stores or cantinas - Adopt and promote improved technologies developed under association resource partnerships	-Maintain IDAM/ Municipality/ Cartorio rural legal-aid boat and mobile van delivery services -Implement state policy on common resource management for community farmer association agribusiness growth -Train and monitor Community Livelihood Development Fund pilot agribusiness investment projects for socio-economic impact on producers
	Implementing body	IDAM with NGOs	IDAM with Public Institutions and PPG7 Related Institutions	IDAM with Governor, Mayor
	Implementing period	2006-2012	2006-2012	2006-2012
Project Cost US$		858,916	778,588	664,167
Priority		High	High	Medium
Project benefit		- Capacity building of young leaders. Improved technical outreach to producers at field and household levels.	- Capacity building of community farmer associations. Improved income from better organized business relations	-Increasing livelihood opportunities through legally managed agribusinesses and better access to social security

(1) Providing Local Leadership and Agribusiness Informal Group Extension Services

In order to organize farmers, the persons with strong leadership and excellent management abilities are needed. In this section, the program to develop young farm leaders will be focused, so that young farm leaders in each community can be developed to let youth remain in rural communities and technology transfer can be conducted. The young leaders selected by community will be trained regularly in basic organizational management techniques, agricultural techniques, and savings mobilization strategies. In addition, they will learn the analytical skills and applied techniques through research and exchange visitations with the leaders and community producers' groups organized by leaders within a community and between communities. The producers' group for each crop will directly transfer the techniques to farmers. In addition, under the leadership of a young leader, both men and women will be trained in how to record agricultural production, savings methods, how to introduce new techniques, how to purchase production input materials（i.e. seeds, fertilizers, tools, etc.）in bulk. Furthermore, in order to maintain the high-level techniques inside the organization under the support of a young leader, "Best Practice Groups" will be formed. The process to form these groups will be as shown in Figure 12.7-1.



YFL: Young Farmer's Leader

BPG: Best Practice Group

FO: Farmers' Organization

Figure 12.7-1 Group Formation Step for Strengthening Farmers' Organization

The members of this “Best Practice Groups” will be trained in the technical items on agricultural products from production to marketing. And, they will exchange opinions on new techniques and their utilization methods with technical extensionists of IDAM, staff of NGO, and young leaders of the organization. They will also hold public hearings on new techniques and their utilization methods. Through the above-stated exchanging opinions and public hearings, the further improvement of the techniques will be aimed. And, in order to do so, technical support from IDAM and NGO will be required. The sub programs for this component are as follows.

1. Identifying local natural resources inside community（mapping）
2. Development and training of young leaders.
    - Basic training
    - Technical training
    - Opinion exchange/ public hearing
3. Training in savings mobilization strategies
4. Training producers’ groups in technical items on agricultural management and extension
    - Work shops inside a producers’ group
    - Opinion exchange/ public hearing between producers’ groups in respective communities

(2) Providing Association Extension and Agribusiness Formal Development

The emphasis will be placed on learning agricultural management, management techniques, and the legal items to establish the for-profit business including mobile stores（cantinas：consumer stores）. IDAM will help other for-profit businesses such as outside cooperatives and consumer stores obtain the opportunities to increase their profits, and will monitor their activities. IDAM will engage in the development of the management, legal awareness, and financial abilities of community farmers’ associations (CFA）, together with them. IDAM will coordinate and provide training courses on the entrepreneurial techniques of outside organizations such as SEBRAE/AM and the Office of Brazilian Cooperatives. IDAM will provide the support to form the partnership, with which a community farmers’ association (CFA) can practice the research applicable to the resources in their community, with public organizations. This partnership enables the community farmers’ association to more deeply understand how to develop their natural resources and how to establish a business harmonized with the environment. As the organizations with such partnership, INPA, INPAAM, Federal University of Amazonas, SESCOOP, FETAGRI. etc., can be listed. Federal University of Amazonas, SEBRAE, the Office of Brazilian Cooperatives, and other public organizations can provide their support in the organizational training of aquaculture and in the training of legal rights. The sub programs for this component are as follows.

1. Form multiple types of agribusiness associations
2. Establish resource partnerships for increasing adoption of improved technologies
3. Provide legal education and for-profit sustainable management entrepreneurial training
    - Entrepreneur Training Program
    - Management Course
    - Management Training Program

(3) Establishing Association and Agribusiness Policy/Program Support

Critical for the success of this project is the development of state user right policy. IDAM as the State extension arm can play an important role in securing this law as well as promoting it to motivate community farmer associations to organize agribusinesses. Farmers will also improve their ability to obtain legal documents and notary certifications as necessary steps to access social security benefits from federal government, municipal and state benefits, and obtain legal and notarized documents to engage in agribusiness sales, especially across municipality boundaries. This will be carried out by five year support for a rural legal aid delivery service. This will be provided by a floating IDAM/Municipality/Cartorio office boat to service isolated riverine communities and a mobile office van to reach into the remote isolated areas around lakes. It is recognized that "bringing services" to rural producers and their families is expensive. However, this pilot rural legal aid service is expected to help broaden the economic base in the municipality. The sub programs for this component are as follows.

1. Establish IDAM/ Municipality/ Cartorio rural legal-aid boat and mobile van delivery services
2. Formulate state policy on common resource management for community farmer association agribusiness growth
3. Improve producer and association implementation of agribusiness investment projects
4. Train and monitor Community Livelihood Development Fund pilot agribusiness investment projects for socio-economic impact on producers

12.8 Project Cost

This project can be broadly divided into seven key component areas:

1. IDAM Capacity Building
2. Support of Farmer's Organizations
3. Environmental Support
4. Technical Production Support (Environmentally Friendly Agriculture, Guarana, Tropical Fruits, Vegetables, Aquaculture)
5. Processing and Distribution Support

6. Marketing Support
7. Overall Project Monitoring and Evaluation

The key activities proposed for each component area are fully described elsewhere, and they are designed to support the three basic approaches of the project in an integrated fashion:

1. Agricultural Productivity Improvement: Introduction of new production techniques and support of delivery, training, and extension activities such that yields are improved, quality is improved, and the rural producers generate more income.
2. Marketing Improvement: Through support of post harvest processing, transport and distribution infrastructure, and through introduction of improved services in marketing research and mechanisms to form market linkages, rural producers will experience greatly improved access to better defined markets.
3. Social Conditions Improvement: Rural producers will be trained to form and lead community-level organizations, associations, and cooperatives as conduits for accessing a wide variety of resource planning technologies, entrepreneurial training and social support services so that their livelihood insecurity risks are reduced, quality of life is improved, and local management of resources is organized.

This project is budgeted for a 10-year period and is designed to strengthen IDAM staff, infrastructure, and extension services at the Manaus Headquarters and three of the 29 municipal offices (namely, Iranduba, Itacoatiara, and Maues). IDAM will select 10 communities in each municipality and these will become "JICA Target Communities". These thirty "target communities" will then become the focus of the project's activities in the key areas of association strengthening, environmental awareness, crop production assistance, aquaculture production assistance, food processing and distribution assistance, and marketing assistance. Additionally, a component is budgeted to provide an external monitoring and evaluation of the project commencing in the fifth year of the project cycle. A summary budget for the seven key component areas of the project is presented as Table 12.8-1.

Table 12.8-1 Summary of Proposed Budget for Seven Key Components of the Final Project

Project Component	Cost ($USD)
1. IDAM Capacity Building	4,372,800
2. Farmer's Organization	4,907,235
3. Environment	1,500,000
4. Technical Production	12,120,000
5. Processing & Distribution	2,862,000
6. Marketing	1,855,000
7. Monitoring & Evaluation	220,000
Sub-Total	27,837,035
Contingency (5%)	1,391,852
GRAND TOTAL	29,228,887

Table 12.8-1 Overview of Principal Components of the Project with Timeline and Indicative Budget (1/5)

PROJECT COMPONENT	Year	1	2	3	4	5	6	7	8	9	10
IDAM Capacity Building	US$	P: Preparation and Planning, I: Implementation, ME: Monitoring and Evaluation									
Manaus-Design Overall Restructure Plan											
$10,000 design team/yr x 5r =	50,000	P	I	I	I	ME					
Manaus Additional Staff (28)		P	I	I	ME						
Agriculture Engineer (3)											
2 eng x $6300/yr x 9yr =	113,400										
1 eng x $6300/yr x 6yr =	37,800		2			1					
Aquaculture Engineer (3)											
2 eng x $6300/yr x 9yr =	113,400										
1 eng x $6300/yr x 6yr =	37,800		2			1					
Food Processing Engineer (1)											
1 eng x $6300/yr x 9yr =	56,700		1								
Environment Engineer (3)											
2 eng x $6300/yr x 8yr =	100,800										
1 eng x $6300/yr x 5yr =	63,000			2			1				
Associations Engineer (2)											
1 eng x $6300/yr x 9yr =	56,700										
1 eng x $6300/yr x 6yr =	37,800		1			1					
Economist/Agribusiness (2)											
1 econ x $6300/yr x 9yr =	56,700										
1 econ x $6300/yr x 6yr =	37,800		1			1					
Resource Management Manager (1)											
1 mgr x $7200/yr x 9yr =	64,800		1								
Information Technology Engineer (1)											
1 eng x $6300/yr x 9yr =	56,700		1								
Information Technology Technician (2)											
1 tech x $3350/yr x 9yr =	30,150										
1 tech x $3350/yr x 6yr =	20,100		1			1					
Computer System Technician (2)											
1 tech x $3350/yr x 9yr =	30,150										
1 tech x $3350/yr x 6yr =	20,100		1			1					
Human Resources Engineer (1)											
1 eng x $6300/yr x 9yr =	56,700		1								
Human Resources Specialist (1)											
1 splst x $3350/yr x 9yr =	30,150		1								
Staff Training Specialist (1)											
1 splst x $3350/yr x 9yr =	30,150		1								
Administrative Support (3)											
3 adm x $2,800/yr x 9yr =	75,600										
2 adm x $2,800/yr x 6yr =	33,600		3			2					
Manaus – Additional Facilities											
$100,000/yr x 2yr =	200,000	I	I	ME							
Manaus – Additional Equipment											
$30,000/yr x 10yr =	300,000	I	I	ME	I	I	ME	I	I	I	ME
Manaus – Additional Training											
10 wshop/yr x $3,000/wshop x 10yr =	300,000	P	I	I	I	ME	I	I	I	I	ME
Manaus – Additional Operating Expenses											
$50,000/yr x 10yr =	500,000	P	I	I	I	ME	I	I	I	I	ME
Municipal Offices – Additional Staff (18)		I	I	ME							
Agriculture Technician (6)											
3 tech x $3,350/yr x 9yr =	90,450										
3 tech x $3,350/yr x 6yr =	60,300		3			3					
Aquaculture Technician (3)											
3 tech x $3,350/yr x 9yr =	90,450		3								
Associations Technician (3)											
3 tech x $3,350/yr x 9yr =	90,450		3								
Marketing Technician (3)											
3 tech x $3,350/yr x 9yr =	90,450		3								
Administrative Support (3)											
3 adm x $2,800/yr x 9yr =	75,600		3								

Table 12.8-1 Overview of Principal Components of the Project with Timeline and Indicative Budget (2/5)

Municipal Offices – Additional Facilities											
3 off x $20,000/off x 2 yr =	120,000	I	I	ME							
Municipal Offices – Additional Equipment											
3 off x $ 10,000/off x 10yr =	300,000	I	I	ME	I	I	ME	I	I	I	ME
Municipal Offices – Additional Training											
3 off x 5 wshop/yr/off x $3000/wshop x 9yr =	405,000	P	I	I	I	ME	I	I	I	I	ME
Municipal Offices – Add. Oper. Expenses											
3 off x $20,000/off/yr x 9yr =	540,000	P	I	I	I	ME	I	I	I	I	ME
Sub-total	**4,372,800**										
Farmers' Organization											
Micro-Region Association Development Workshops											
4 wshop/munic/yr x 3 munic x $2385/wshop x 8yr =	228,960		P	I	I	ME	I	I	I		ME
Entrepreneurial Training – IMFLORA Agribusinesses											
4wshop/munic/yr x 3 munic x $2385/wshop x 7yr =	200,340				P	I	I	I	I	I	ME
Entrepreneurial Management Workshops											
4 wshop/commun/yr x 30 commun for 5yr in phased 6,12,18,											
24,30 commun assoc EM program or 264 wshops =	396,000				P	I		ME	I	I	ME
Entrepreneurial Management – OCB Cooperative Training											
6 coop trng/commun x 30 commun x $2385/commun x 1yr =	71550					P	I				ME
Community Resource Mapping											
1 wshop/commun./yr x 30 commun. x $1500/wshop x 5yr =	225000		P	I	I	ME				I	ME
Community Resource Agribusiness Partnership Support Fund											
1 partnership/commun x 30 commun x $1500/p'ship x 6yr =	270000			P	R	R	R	I			ME
Young Farmer Leader Training - Basic											
4 wshop/yr/commun. x 30 commun. x $1000/wshop x 8yr =	960000	P	P	I	I	ME	I	I	ME	I	ME
Young Farmer Leader Training – Technical											
3 wshop/munic/yr x 3 munic x $2385/wshop x 8yr=	171,720		P	I	I	ME	I	I	I		ME
Young Farmer Leader Training - Exchange Study Visits											
3 ex./munic/yr x 3 munic x $1000/ex. x 9yr =	81,000		P	I	I	ME	I	I	I	I	ME
Community Livelihood Development Fund Training											
2 wshop/commun./yr x 30 comm. x $1500/wshop x 5yr in											
phased 6,12,18,24,30 community CLDF program (180ws)=	270,000		P	I	I	ME	I				ME
Community Livelihood Development Fund											
1 CLFD project/commun x 30 commun x $10,000/project =	300000		P	I	I	ME	I	I			ME
Producer Group Agribusiness Training - Formal											
1 TOTwshop/munic./yr x 3 munic. x $2385/wshop x 8yr =	57240		P	I	I	ME	I	I		I	ME
Producer Group Agribusiness Training – Exchange Visits											
3 ex/munic/yr x 3 munic x $1000/ex x 9yr =	81,000		P	I	I	ME	I	I	I	I	ME
Savings Mobilization - Training											
3 wshop/munic/yr x 3 munic x $2385/wshop x 5yr =	107,325		P	I	I	ME	I				
Savings Mobilization – Pilot Consumer Community Stores											
2 stores/3 munic x $8000/store x 2yr =	96,000					P	I				ME
Floating Municipal/Cartorio Service											
1 boat/munic. x $25,000/boat x 3 munic. =	75,000										
$10,000 fuel expense/boat/yr x 3 boat x 9yr =	270,000										
$15,000 program expenses/boat/yr x 3 boat x 9yr =	405,000	P	I	I	I	ME	I	I	I	I	ME
Resource Management & Agric. Extension Policy Support											
$30,000 opex for policy team/yr x 5yr =	150,000	P	I	I	I	ME					
Resource Management & Agri Extension Program Training											
$455,100 for IDAM training in assoc's and agribusiness=	455,100	P	P	I	I	ME	I	I	I	I	ME
Preparation of IDAM Participatory Resource Strategy											
$3000 opex for design team/month x 12 month=	36,000	P									
Sub-total	**4,907,235**										

Table 12.8-1 Overview of Principal Components of the Project with Timeline and Indicative Budget (3/5)

Environmental Aspect											
Establish new IDAM Environmental Section											
$70,000 opex/yr x 7yr =	490,000				P	P	I	I	I	I	ME
Linkage to Existing Environmental Database											
Computer Hardware/software =	20,000										
$10,000 opex/yr x 9yr =	90,000	P	I	I	I	ME	I	I	I	I	ME
PPG7 Linkage Project											
$20,000 opex/yr x 9yr =	180,000	P	I	I	I	ME	I	I	I	I	ME
Environmental Impact M & E											
2 env. ass'mt/munc/yr x 3 munic x $20,000/ass'mt x 6yr=	720,000				P	P	I	I	I	I	I
Sub-total	**1,500,000**										
Agricultural and Aquacultural Production											
IDAM Agroforestry Project											
$50,000 Planning & Research opex/yr x 3yr =	150,000										
3 project sites x $70,000 opex/site/yr x 7yr =	1,470,000	P	R	R	I	ME	I	I	I	I	ME
Research in Env. Friendly Agric. Practices											
$30,000 Planning & Research opex/yr x 3yr =	90,000										
3 project sites x $35,000 opex/site/yr x 7yr =	735,000	P	R	R	I	ME	I	I	I	I	ME
Integrated Traditional Farming											
$40,000 Planning/Research opex/yr x 3yr =	120,000										
3 demo farms x $50,000 opex/farm/yr x 7yr =	1,050,000	P	R	R	I	ME	I	I	I	I	ME
Guarana Input Supply											
Est. 10 Community Nurseries x $30,000/nursery =	300,000										
$10,000 opex/nursery/yr x 10 nursery x 5yr =	500,000										
$200 fert+pest exp/farmer/yr x 1000 farmer x 5yr =	1,000,000	P	I	I	I	ME					
Guarana Cultural Practices											
$150 Cult. Practice exp/farmer/yr x 1000 farmer x 5yr =	750,000										
2 wshop/commun./yr x 10 commu x $1500/wshop x 5yr =	150,000	I	I	I	I	ME					
Guarana Old Orchard Recuperation											
2 wshop/commu/yr x 10 commu x $1500/wshop x 5yr =	150,000	I	I	I	I	ME					
Guarana Private Sector Support											
2 wshop/comm./yr x 10 comm. x $500/wshop x 9yr=	90,000	P	I	I	I	ME	I	I	I	I	ME
Guarana Training & Extension											
$20,000 opex/yr x 9yr =	180,000	P	I	I	I	ME	I	I	I	I	ME
Guarana Sustainable Agro-Forestry											
$40,000 Planning & Research opex/yr x 3yr =	120,000										
3 demo farms x $50,000 opex/farm/yr x 7yr =	1,050,000	P	R	R	I	ME	I	I	I	I	ME
Guarana IPM											
$25,000 Planning & Research opex/yr x 3yr =	75,000										
2 demo sites x $25,000 opex/site/yr x 7yr =	350,000	P	R	R	I	ME	I	I	I	I	ME
Guarana Organic Production											
$25,000 Planning & Research opex/yr x 3yr =	75,000										
2 demo sites x $25,000 opex/site/yr x 7yr =	350,000	P	R	R	I	ME	I	I	I	I	ME
Fruits Production Training & Extension											
2 wshop/comm./yr x 10 comm. x $1500/wshop x 9yr =	270,000	P	I	I	I	ME	I	I	I	I	ME
Fruits Production Research											
$30,000 Planning & Research opex/yr x 5yr =	150,000	P	R	R	R	ME					

Table 12.8-1 Overview of Principal Components of the Project with Timeline and Indicative Budget (4/5)

Vegetable Soils Survey												
$30,000 opex for sampl, analysis, mapping/yr x 5yr=	150,000	P	I	I	I	ME						
Vegetable Production Research												
$30,000 Planning/Research opex/yr x 5yr=	150,000	P	R	R	R	ME						
Promotion of Hanging Seed Beds for Vegetables												
$25,000 Planning & Research opex/yr x 2yr =	50,000											
$500/bed x 25 bed/commun. x 10 commun =	125,000											
$2,000 opex/commun./yr x 10 commun. x 8yr =	160,000	P	R	I	I	ME	I	I	I	I	ME	
Intro. of New Vegetables (Flood Season)												
$10,000 Planning & Research opex/yr x 7yr =	70,000											
$10,000 opex for promotion/yr x 7yr =	70,000	P	R	R	I	ME	I	I	I	I	ME	
Implement New Seasonal Vegetable Production Pattern												
$10,000 opex/yr x 6yr =	60,000					I	I	ME	I	I	ME	
Vegetable Production Training												
2 wshop/comm/yr x 10 comm x $1500/wshop x 9yr =	270,000	P	I	I	I	ME	I	I	I	I	ME	
Aquaculture Staff Training												
3 wshop/yr x $3,000/wshop x 9yr =	81,000	P	I	I	I	ME	I	I	I	I	ME	
Establish Model Aquaculture Farms w/Rearing Experiments												
Est. 4 barragem x $60,000/barragem =	240,000											
Est. 10 net cage x $24,000/net cage =	240,000											
$15,000 farm opex/yr x 5yr =	75,000											
$20,000 rearing research exp./yr x 5yr =	100,000	P	R	I	I	ME	I	I	I	I	ME	
Establish IEC Activities (Small Fish Farm Development)												
Est. 20 small farms x $2000/farm =	40,000											
$1,000 opex/farm/yr x 20 farm x 5 yr =	100,000											
$10,000 training exp./yr x 9 yr =	90,000	P	I	I	I	ME	I	I	I	I	ME	
On Farm Training in Credit/Accounting												
$10,000 training exp./yr x 9yr =	90,000	P	I	I	I	ME	I	I	I	I	ME	
Upgrade Balbina Hatchery												
$50,000/yr x 2 yr=	100,000	P	I	I								
Stabilize Production of Tambaqui Fry												
600,000 fry/yr x $.032/fry x 70% x 10yr =	134,400	I	I	I	I	ME	I	I	I	I	ME	
Develop Seed production Technology for New Species												
$25,000 res. expense/yr x 6yr =	150,000	P	R	R	R	R	ME					
Introduce Develolped Seed Production Technology												
$15,000 opex/yr x 8yr =	120,000			P	I	I	ME	I	I	I	ME	
Lake Ranching Seed Release Program												
2 yr consultancy plan x $40,000/yr =	80,000											
500,000 fry x $.032/fry x 70% x 8yr =	89,600											
$12,000 opex/yr x 5yr =	60,000	P	P	I	I	ME	I	I	I	I	ME	
Baseline Study Freshwater Aquaculture												
2 yr consultancy plan x $25,000/yr=	50,000	I	I									
Sub-total	**12,120,000**											
Processing and Distribution												
Central Guarana Operation Station												
2yr planning expenses x $20,000/yr =	40,000											
Est. processing area for guarana/fruits =	200,000											
Coop. Boat =	24,000											
Coop. Truck =	28,000											
$10,000 fuel & vehicle expen./yr x 5yr =	50,000											
$50,000 coop. Opex/yr x 5yr =	250,000	P	P	I	I	ME	I	I	ME			
Village Level Guarana Pilot Plants												
3 plant x $25,000/plant =	75,000											
$5,000 opex/plant/yr x 3 plant x 5yr =	75,000	P	I	I	I	ME						

Table 12.8-1 Overview of Principal Components of the Project with Timeline and Indicative Budget (5/5)

Reactivate Central Fruit Processing Plant											
1yr planning expense =	20,000										
1 reefer truck =	40,000										
$20,000 opex/yr x 5yr =	100,000	P	I	I	ME	I	I	ME			
Support ASCOPE & Other IDAM Plants											
$10,000 opex/plant/yr x 3 plant x 5yr =	150,000	I	I	I	I	ME					
Village Level Fruit Processing Plants											
$25,000/plant x 3 plant =	75,000										
$5,000 opex/plant/yr x 3 plant x 5yr =	75,000	P	I	I	I	ME					
Establish Iranduba Vegetable Receiving Ctr.											
Est. center =	100,000										
$20,000 opex/yr x 5yr =	100,000	P	I	I	ME	I	I	ME			
Support Manaus Central Receiving Station											
$20,000 opex/yr x 5yr =	100,000	P	I	I	I	ME	I	I	I	I	ME
Establish Fleet of Support Boats & Trucks											
3 reefer truck x $40,000/truck =	120,000										
30 alum. boat-25 hp x $5,000/boat =	150,000										
$50,000 fuel and opex/yr x 5yr =	250,000	P	I	I	ME	I	I	ME			
Source & Distribute Packaging Materials											
$20,000/munic./yr x 3 munic. x 5yr =	300,000	I	I	I	I	ME					
Training of Processing, Food Safety											
3 wshop/yr/comm x 30 comm x $1000/wshop x 6yr =	540,000	P	I	I	I	I	ME	I			
Sub-Total	**2,862,000**										
Marketing											
Establish Central Market Assistance Ctr.											
Upgrade Sebrae facilities =	100,000										
$50,000 opex/yr x 10yr =	500,000	P	I	I	I	ME	I	I	I	I	ME
Baseline Marketing Research Studies											
1 yr planning expense =	10,000										
$10,000/study/yr x 2yr x 7 studies =	140,000	P	I	I		ME					
Direct Sales Promotion Program											
$10,000 opex/yr x 5yr =	50,000	P	P	I	I	ME	I	I	ME		
Standards & Quality Certification Program											
Upgrade existing food lab =	500,000										
$50,000 opex/yr x 5yr =	250,000	P	I	I	I	I	ME				
Identity Preservation Project											
$20,000 opex/yr x 10yr =	200,000	P	P	I	I	ME	I	I	I	I	ME
Train Marketing Staff											
5 wshop/yr x $3000/wshop x 7yr =	105,000	I	I	I	I	ME	I	I			
Sub-total	**1,855,000**										
Overall Project Monitoring and Evaluation											
1yr planning expenses =	25,000										
5 man-month/yr x $12,500/man-month x 6 yr =	75,000										
$20,000 travel expenses/team visit x 6 team visit =	120,000										
(5 man review team, one month/yr x 6 yr)					P	ME	ME	ME	ME	ME	ME
小計	**220,000**										
総計	**27,837,035**										

CHAPTER XIII EVALUATION ON IMPROVEMENT RURAL PEOPLE'S LIVELIHOOD

13.1 General

One of the main issues of this Study is how the intentions and requests of farmers, which are reasonable but are not practical and concrete, and the existing improvement plans of IDAM can be incorporated into this Plan, while respecting such intentions, requests, and plans. The projects proposed by the Study Team in this report can adopt the requests and wishes of farmers and IDAM, while adopting unique viewpoints and ideas. And the projects are designed to improve the livelihood of the regional residents environmentally friendly within the targeted period of a project of ten (10) years. In addition, as a result of this Study, the following conclusion can be obtained. That is, in order to accomplish the issues, it is appropriate to implement the capacity building of IDAM, while at the same time improving the abilities and technical skills of farmers.

In order not only to continue and develop the projects but also to obtain the expected ripple effects to surrounding areas, it can be determined that the development of human resources and the capacity building are essential. In order to implement the Capacity Building of farmers and the supporting agency（IDAM）, in this Plan, education/training are the prioritized items, regardless of sector. As for education/training, it can be considered that it is indispensable to take the following matters into consideration.

To set and accomplish the objectives can create the motivation to the next step.

To aim at the accomplishment of the common objectives can strengthen the unity of an organization.

Given the tight financial conditions linked with the conditions of the limited resources (human resources, financial resources, natural resources, etc.) in Amazonas State, the measure to efficiently use all the resources available in the country must be adopted. Moreover, in order to implement improvement projects in this context, it is essential to introduce the techniques conformable to the ecosystem and the environmentally friendly techniques.

Whenever any project proposed in this report is implemented, the related activities need to be carried out in the manner where the three project strategies followed in this Study (Productivity and quality improvement, Marketing improvement, and Social Conditions improvement) can be harmonized.

13.2 Beneficiaries

13.2.1 Guarana

The Guarana Component of this Project is expected to primarily support guarana farmers in ten target communities in Maues municipality. According to IDAM statistics, IDAM-Maues currently assists 627 guarana farm families (households) on approximately 1,124 ha of actively productive land. Based on close discussions with IDAM personnel and based on findings from the Rapid Rural Appraisal (RRA), it is approximated that the typical guarana farmer in Maues has an average of 5 ha of guarana currently in production, with yields of about 80 kg/ha. Assuming an average of 30 farm households per community are selected for participation in this 10-community project, a total of 300 households would be directly impacted by improvements in the guarana production system. Since each household has an average of 6.36 people, an estimated 1,908 people would therefore be directly affected by Project activities to improve guarana yield in Maues. It is also estimated that the other 327 households assisted by IDAM, or 2,080 inhabitants, would be "indirectly" affected by the Guarana Component of the Project due to increased extension activities, training workshops, technical knowledge that will pass by word of mouth between communities, improved access to high yielding clones, etc.

Table 13.2.1-1 Effects of Guarana Project Component on Maues Beneficiaries

Beneficiary Parameter	Number
Average Holding Size (ha)	35.5*
Average Guarana Area in Production (ha)	5.0
Average # People Per Household	6.36*
# Guarana Households Assisted by IDAM/#people	627/3988
# Guarana Households Targeted for "Direct" Project Assistance/#people	300/1908
# Guarana Households Targeted for "Indirect" Project Assistance/# people	327/2080
Current Average Total Household Income (R$)	3540*
Current Average Income from Agriculture, Livestock, Extractivism (R$)	978*
Current Average Net Income from Guarana Farming, (R$/ha)	210

Source: Data from IDAM/Maues, and RRA*/** See next table

13.2.2 Vegetables

It is expected that the number of beneficiaries involved in Priority Projects and Priority Extension Projects will be reach 1,104 farm families. The number is equal the beneficiaries identified by IDAM. However, it is expected that the project benefit will extend to unspecific farmers in and around the project area. Regarding the extension of an applicable technology on agro-chemical apply, it is expected that the benefit will extend to the inhabitants, livestock and environment in and around the target area and the activity will contribute to the consumer's health through the production of safe and healthy vegetables.

Regarding the extension of environment preservation type technology and

environmental adaptation type technology, these technologies will be spread in the target community through the intensive extension activity to the target community. Two or three communities will be selected as the target communities a year. Some pilot farms which will play a important role as base of the rural extension will be established in the farmland where IDAM agriculture volunteers or progressive farmers in the communities.

As shown in the Table 13.2.2-1, twenty-six 26 communities are scattered in the coast area and islands in the target area in Iranduba. It is judged that the extension projects to these target communities will be completed in ten years. Therefore, when a plan is overdue without any delay, it is expected that direct or indirect benefit will be brought to the target farm families of 1,104. The realization of the agricultural production during the flood season by introduction of new technology and new crops is expected as the special effect of the project implementation. About new technology (improved type Canteira), it mainly will introduce into the farmers of the coast area, and the number of target farmhouses is estimated as 300 farm families. Moreover, cultivation of a new variety of a vegetable (Kangkong) will be mainly introduced to the farm families of islands, and the target is set as 350 farm families.

Table 13.2.2-1 Beneficiaries and Cultivated Area of Vegetables in Iranduba

No.	crops	Varzea		Average (ha)	per centage (%)
		No. of Farm families	Cultivated Area(ha)		
1	Long beans	268	95.05	0.35	5.3
2	Cabbage	434	136.30	0.31	7.7
3	Coriander	646	226.00	0.35	12.7
4	Cucumber	476	136.45	0.29	7.7
5	Leaf Cabbage	249	67.00	0.27	3.8
6	Lettuce	547	165.90	0.30	9.3
7	Pumpkin	286	98.10	0.34	5.5
8	Spring Onion	630	204.10	0.32	11.5
9	Green Pepper	301	66.00	0.22	3.7
10	Tomato	256	75.80	0.30	4.3
11	Watermelon	209	173.00	0.83	9.7
	Total	-	1,443.70	1.24	-

Inventory survey was carried in cooperation with IDAM Iranduba branch office in order to grasp the cultivated area of vegetables and number of farm families in the study area more correctly during 3rd field survey period. The result of the survey is shown in the following table. It is judged that the number of the existing farm families at the survey period is 1,164, which is mostly in agreement with the benefit farmhouse obtained from IDAM. If the plan described previously is followed, an introductory area of “Kanteira” is expected to reach 1,260m^2 and expected cultivation area of “Kangkong” is 124ha. The target area of cultivation during flood season is about ten percent of existing vegetable cultivated area.

13.2.3 Tropical Fruits

The Tropical Fruits Component of this Project is expected to primarily support fruit farmers in ten target communities in Itacoatiara municipality. According to IDAM statistics, IDAM-Itacoatiara currently assists 958 farm households in Itacoatiara which produce the target tropical fruits (cupuacu, acai, banana, maracuja). Of these, 495 grow cupuacu on approximately 1,010 ha of actively productive land. Based on close discussions with IDAM personnel and based on findings from the Rapid Rural Appraisal (RRA), it is approximated that the typical cupuacu farmer in Itacoatiara has an average of 3 ha of cupuacu currently in production, with yields of about 1500 fruits/ha. Assuming an average of 30 farm households per community are selected for participation in this 10-community project, a total of 300 households would be directly impacted by improvements in the cupuacu production system. Since each household has an average of 5.49 people, an estimated 1,647 people would therefore be directly affected by Project activities to improve cupuacu yield in Itacoatiara. It is also estimated that the other 195 households assisted by IDAM, or 1,071 inhabitants, would be "indirectly" affected by the Tropical Fruits Component of the Project due to increased extension activities, training workshops, technical knowledge that will pass by word of mouth between communities, improved access to high yielding clones, etc.

Table 13.2.3-1 Effects of Cupuacu Project Component on Itacoatiara Beneficiaries

Beneficiary Parameter	Number
Average Holding Size (ha)	40.5*
Average Cupuacu Area in Production (ha)	3.0
Average # People Per Household	5.49*
# Cupuacu Households Assisted by IDAM/#people	495/2718
# Cupuacu Households Targeted for "Direct" Project Assistance/#people	300/1647
# Cupuacu Households Targeted for "Indirect" Project Assistance/# people	195/1071
Current Average Household Income (R$/yr)	7935*
Current Average Income from Agriculture, Livestock, Extractivism (R$/yr)	4335*
Current Average Net Income from Cupuacu Farming, (R$/ha/yr)	300

Source: Data from IDAM/Itacoatiara, and RRA*/** See next table

13.2.4 Aquaculture

(1) Identification of Potential Beneficiaries

Potential beneficiaries of aquaculture programs are identified among candidate families by multiplying the coefficients, which are created in this study. The identification procedure and the result are shown in Tables 13.2.4-1 and 13.2.4-2, respectively.

Number of potential beneficiaries for aquaculture in barragem was estimated to be 443 families, for aquaculture in net cages, 666 families and for lake ranching program, 2,575 families. Those are 3,648 families in total.

Table 13.2.4-1 Identification Procedure of Potential Beneficiaries for Aquaculture Programs

Aquaculture schemes	Candidate families and their base data		Set-up of physical potential coefficient
Aquaculture in barragem	Family farmers in terra firme	Number of identified beneficiaries for agriculture program	% of farmers who have igarape with spring
Aquaculture in net cage	Professional fishermen	Number of fishermen registered at fishery colonia	% of fishermen who can join the net cage culture in lakes
	Lake side community	Number of family in the community around lake	% of family who can join the net cage culture in lakes
Lake ranching programb	Lake side community	Number of family in the community around lake	% of family who go fishing for self-sustenance and for sale.

Table 13.2.4-2 Potential Beneficiaries (number of family) in Aquaculture Related Programs

	Candidate families a	Physical potential coefficient b	Potential beneficiaries a x b
Aquaculture in barragem			
	Family farmers in terra firme *1)		
Iranduba	511	20%	102
Itacoatiara	2,964	10%	296
Maues	885	1%	9
Total	*4,360*		*407*
Aquaculture in net cage			
	Professional fishermen *2)		
Iranduba	350	10%	35
Itacoatiara	1,387	10%	139
Maues	850	20%	170
Sub-total	*2,587*		*344*
	Lake side community (Family farmers in varzea) *3)		
Iranduba	1,306	10%	131
Itacoatiara	1,609	10%	161
Maues	304	10%	30
Sub-total	*3,219*		*322*
Total	*5,806*		*666*
Lake ranching program			
	Lake side community (Family farmers in varzea)		
Iranduba	1,306	80%	1,045
Itacoatiara	1,609	80%	1,287
Maues	304	80%	243
Total	*3,219*		*2,575*
Grand total	*13,385*		*3,648*

Remarks:

*1) Based on this report. For Iranduba ratio of farmers in terra firme is estimated to be 46.3% according to IDAM's data.

*2) Latest data obtained in this study are used.

*3) See, Annex

(2) Number of Target Beneficiaries and Expected Production

Number of target beneficiaries was obtained by multiplying number of potential beneficiaries and considerable % of project influence, i.e., 10-20% in 5 years after start of the projects, 50% in 10 years and 80% in 20 years. Expected production was calculated based on those numbers. After 10 years of project implementation, a total of 1,830 family farmers will be benefited by the aquaculture programs with expected production of 547 tons (Annex 13.2.4-1). At this time a total of 1.37 million fish fry shall be produced a year (Annex 13.2.4-2).

13.3 Recommendations

13.3.1 Reasonability of this Project

As one of the problematic points on the current condition, it can be pointed out that IDAM has still worked out the plans where the emphasis is placed not on the parties concerned but on the numerical targets and failed to establish the system to design the participatory development. In addition, the low-level capacities of technicians and farmers have become the factors to deter the preparation and implementation of projects. Furthermore, as for how farmers can benefit, the considerations on the basic market principles such as the causal relationship between demand and supply and on marketing are insufficient. And, subsequently, from the preparation of the plans to the implementation of them, the improvement and sustainability of the projects have hardly been taken into consideration. This point should not be missed, either. Behind the above-stated condition, the fact that the planning side (the supporting side) does not have the specialists in marketing and market principles has also existed.

In consideration of these actual conditions, in this Plan, “Two Basic Strategies” are designed, in order to improve the livelihood. And, with these basic strategies as the preconditions, the Plan has “ Three Project Strategies”, the main pillar of which is “Marketing improvement”, as the main components. And, in order to settle on the Plan, “Development Plan Approach through Resident-Participatory Approach” is adopted. In other words, the Plan where not only the supporting side but also farmers are required to share their appropriate burdens and study by themselves after the respective roles of the supporting side and farmers’ side clarified was worked out in the participatory development approach. Moreover, in the case of study, paying attention to the collection of the data and information that can become the grounds of the study, the feasibility of the Plan has been verified, through studying the present conditions of existing areas and the cases of advanced areas.

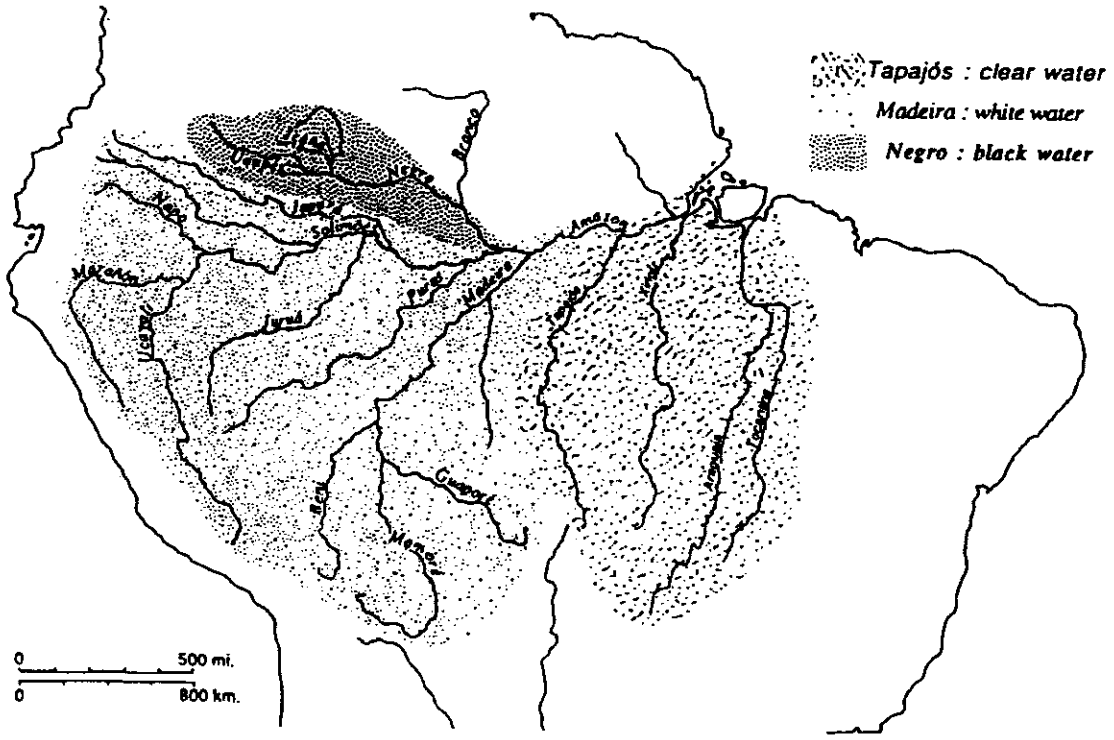
The main pillars of the projects proposed in this report are “Productivity and quality improvement”, “Marketing improvement”, and “Social Conditions improvement”. And, in the Plan, the intentions of farmers, the sustainability of the projects, and the harmony with the environment are especially taken into consideration. And, first and foremost, the accomplishment of the plan depends on IDAM (the supporting and implementing agency) and the regional residents. The implementation of the projects proposed can not dramatically improve the livelihood of farmers. However, it can be expected that the implementation of these projects can contribute to the sound and smooth improvement of the livelihood of farmers. Therefore, it can be considered that this very Plan can improve the livelihood of the regional residents in a manner appropriate for the environment of the basin of the Amazon River.

The characteristics of this Plan are as follows.

1. This Plan can confirm the residents' intentions to aggressively participate in the projects through the participatory approach adopted for the preparation of this Plan, which approach is unfamiliar for IDAM.
2. This Plan places the emphasis on the capacity building of the parties concerned （the supporting party and farmers）.
3. As the model project, this project can be expected to extend throughout the Amazonas State.
4. This Plan can adopt the environmentally friendly techniques to reduce the ongoing negative effects on the environment.

In light of these characteristics, it is important to urge the agencies concerned to implement the project as early as possible.

ANNEX



The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.1.3-1**
Japan International Cooperation Agency (JICA)	**Type of Amazon River**

Annex 5.1.4-1Data of Meteorology at Manaus (1/2)

1999

Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	30.3	21.0	33.0	31	19.0	27	93	411.6	67.8	24	0.7
Feb.	30.2	20.8	33.0	24	19.0	25	93	260.8	57.2	23	0.8
Mar.	30.4	20.6	32.8	23	19.0	13	91	233.2	59.0	7	0.6
Apr.	30.5	20.9	32.8	12	20.0	20	91	421.2	133.2	27	0.7
May	30.1	20.9	34.2	19	20.0	4	92	445.4	89.6	22	0.3
Jun	31.2	21.0	33.4	30	20.0	6	90	149.3	53.0	3	0.4
Jul	31.7	21.2	33.1	24	19.5	7	83	27.3	11.0	11	0.6
Aug	32.6	21.6	35.2	29	18.0	17	79	40.6	27.0	12	0.6
Sep	33.0	22.0	36.0	8	20.5	13	82	98.8	51.8	27	0.7
Oct	33.5	22.0	36.0	27	20.0	15	77	123.3	44.2	7	0.6
Nov	33.0	22.7	35.2	22	21.0	1	79	203.5	70.0	14	0.7
Dec	32.4	22.7	35.2	14	20.5	28	82	198.3	51.2	21	0.6

1998

Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	31.3	23.2	33.8	24	21.4	5	85	302.6	55.6	2	0.6
Feb.	32.3	23.6	34.6	2	22.4	7	85	171.7	31.6	4	0.6
Mar.	31.5	23.1	34.0	29	21.0	20	89	210.8	38.2	20	0.8
Apr.	31.3	22.4	33.8	8	20.0	12	91	407.2	60.6	2	0.3
May	31.0	22.5	33.0	26	20.0	17	90	273.4	64.8	6	0.4
Jun	31.3	21.9	33.2	12	20.0	5	89	167.2	32.1	2	0.4
Jul	31.9	22.2	34.0	26	21.0	9	87	92.0	25.4	10	0.4
Aug	33.1	22.0	35.0	25	20.0	30	85	41.8	22.0	2	0.5
Sep	32.8	21.9	35.2	19	20.0	14	86	115.6	67.2	21	0.8
Oct	33.3	22.5	35.2	20	21.0	15	85	73.5	31.1	15	0.9
Nov	32.0	22.0	34.8	10	20.0	28	89	153.6	32.8	23	0.8
Dec	32.6	21.7	35.0	4	20.0	1	85	191.0	69.2	24	0.7

1997

Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	30.2	23.3	33.6	3	22.1	13	86	220.6	40.6	29	1.2
Feb.	30.0	22.9	32.4	3	21.4	8	87	344.5	55.8	18	0.9
Mar.	29.9	23.0	33.4	25	21.9	26	89	534.9	54.6	9	0.9
Apr.	30.7	23.5	33.2	7	22.2	5	85	310.8	75.2	12	0.9
May	30.9	23.7	33.0	20	22.2	10	83	252.2	105.0	6	0.9
Jun	32.1	24.2	33.1	23	23.0	3	76	9.5	4.4	10	1.1
Jul	33.3	24.6	34.6	18	23.0	2	73	0.0	0.0	1	1.4
Aug	33.0	23.7	35.2	29	21.2	9	73	111.5	64.3	12	1.2
Sep	35.2	24.4	36.6	16	22.8	7	64	40.5	28.2	9	1.1
Oct	35.8	24.8	38.0	26	19.4	6	74	60.9	31.4	5	0.8
Nov	33.2	24.0	36.5	8	22.0	12	80	182.3	56.6	29	0.6
Dec	32.1	23.8	35.2	7	22.0	28	83	261.5	88.4	18	0.4

Annex 5.1.4-1Data of Meteorology at Manaus (2/2)

1996

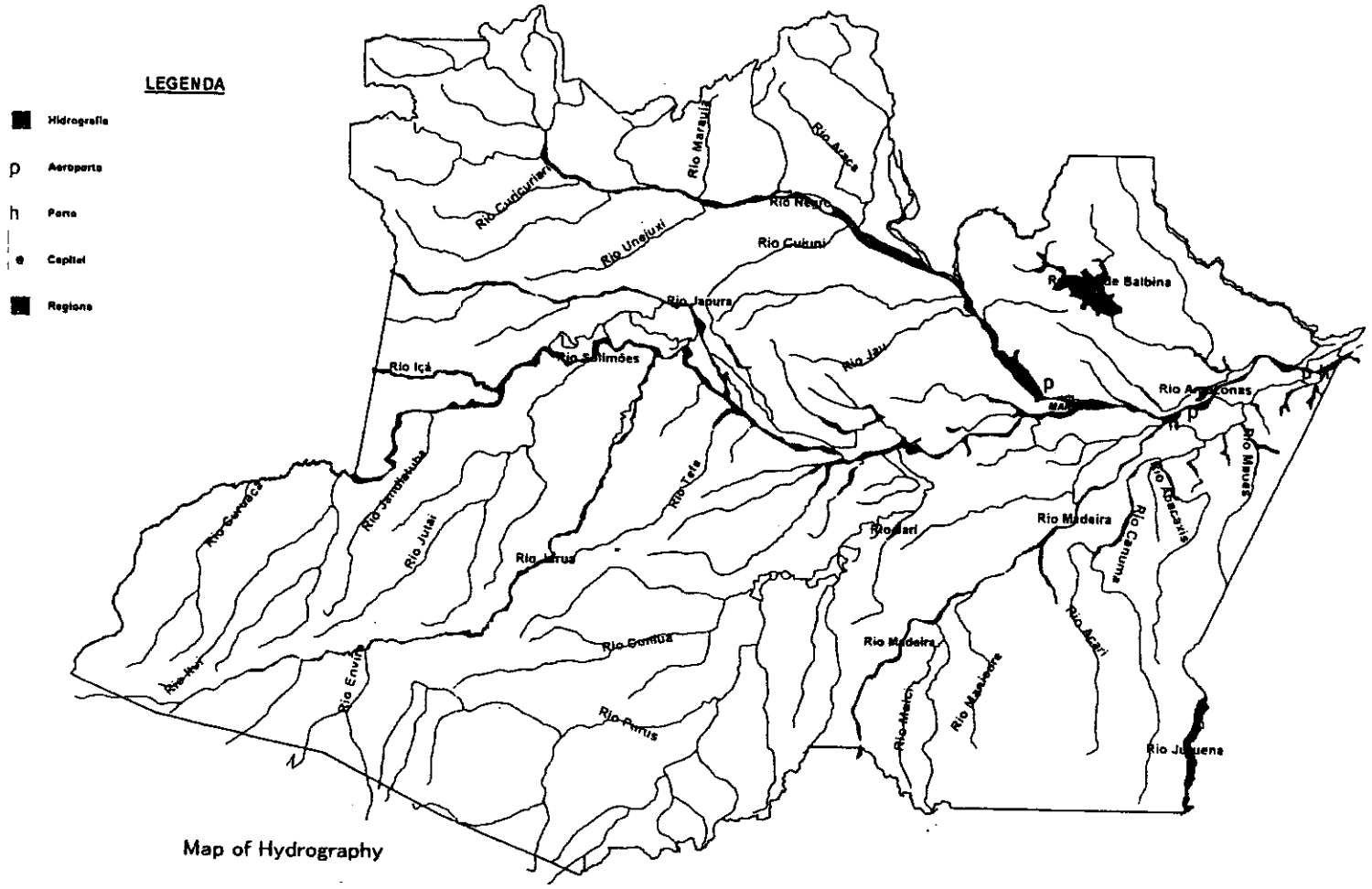
Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	29.9	22.6	33.2	27	21.4	30	87	571.3	155.0	15	0.9
Feb.	30.2	22.8	32.6	26	21.4	21	85	257.6	50.4	17	0.8
Mar.	30.6	23.1	32.8	21	21.4	15	85	338.1	66.6	4	1.1
Apr.	30.1	23.1	33.8	14	21.6	11	86	428.5	72.0	18	0.8
May	30.9	23.5	33.2	3	22.4	29	84	127.5	22.6	16	0.9
Jun	30.6	22.4	32.6	17	17.0	30	81	185.1	33.4	5	1.0
Jul	31.6	22.7	33.4	6	19.5	1	76	16.9	6.0	15	1.0
Aug	32.1	23.4	34.2	27	21.6	20	80	65.0	22.6	4	1.0
Sep	33.1	23.9	35.0	3	21.3	23	76	114.0	46.2	23	0.5
Oct	32.6	23.3	35.0	30	21.2	15	80	186.0	51.6	15	1.0
Nov	32.3	23.7	35.0	2	21.2	17	81	163.0	49.0	17	1.0
Dec	31.4	23.6	33.8	19	21.4	12	84	142.2	92.0	2	1.0

1995

Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	31.0	-	33.8	9	-	-	82	286.0	96.2	14	1.1
Feb.	31.0	23.5	33.7	14	21.2	25	83	132.0	24.0	25	1.5
Mar.	31.1	23.0	34.3	24	21.0	9	84	301.4	43.8	13	1.3
Apr.	30.6	22.9	33.0	30	21.5	23	87	480.5	89.0	19	0.8
May	30.8	23.2	32.8	6	21.6	22	87	217.5	55.8	21	1.1
Jun	30.8	23.2	33.2	19	21.6	28	82	107.0	29.0	2	1.0
Jul	32.3	23.5	34.0	29	20.2	3	76	76.9	32.6	3	1.0
Aug	33.5	24.4	34.6	3	21.0	8	73	34.2	15.4	8	1.0
Sep	33.6	24.4	38.0	15	20.2	11	75	72.4	40.0	6	0.5
Oct	33.5	24.2	36.6	6	21.0	24	76	81.0	25.0	11	1.0
Nov	31.3	23.3	34.2	9	21.9	13	86	312.0	59.4	9	1.0
Dec	31.5	23.3	33.5	10	21.4	14	85	160.5	39.1	16	1.0

1994

Month	Temperature						Relative Humidity %	Rain			Wind velocity m/s
			Maximum Absolute		Minimum absolute			Rain	Max. 24 hr		
	Maximum	Minimum	Degree	Day	Degree	Day		Total(mm)	Total(mm)	Date	
Jan.	29.9	22.5	32.9	28	20.9	21	91	371.1	58.0	20	1.3
Feb.	29.8	22.7	32.0	22	20.9	2	90	399.5	64.2	18	1.1
Mar.	30.6	23.1	33.6	15	21.2	9	87	259.5	54.0	7	1.1
Apr.	30.6	23.1	32.6	27	21.3	30	86	258.7	106.6	30	1.0
May	30.6	23.0	32.6	26	20.5	3	85	174.2	35.0	29	1.0
Jun	30.2	22.7	32.2	7	21.3	29	85	125.2	34.0	8	1.0
Jul	31.2	22.9	33.4	30	20.3	10	78	29.9	13.4	14	1.3
Aug	32.3	22.9	34.0	30	19.3	25	79	96.7	21.0	26	1.1
Sep	32.8	23.7	34.4	24	20.3	13	78	62.6	24.1	13	1.3
Oct	33.1	23.7	35.4	19	20.9	7	76	91.8	22.3	26	0.9
Nov	32.8	23.4	35.0	16	21.3	15	79	207.3	106.7	23	0.8
Dec	31.2	23.2	33.6	5	19.1	26	84	222.5	47.0	25	1.3



Map of Hydrography

The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.1.5-1**
Japan International Cooperation Agency (JICA)	**Map of Hydrography**

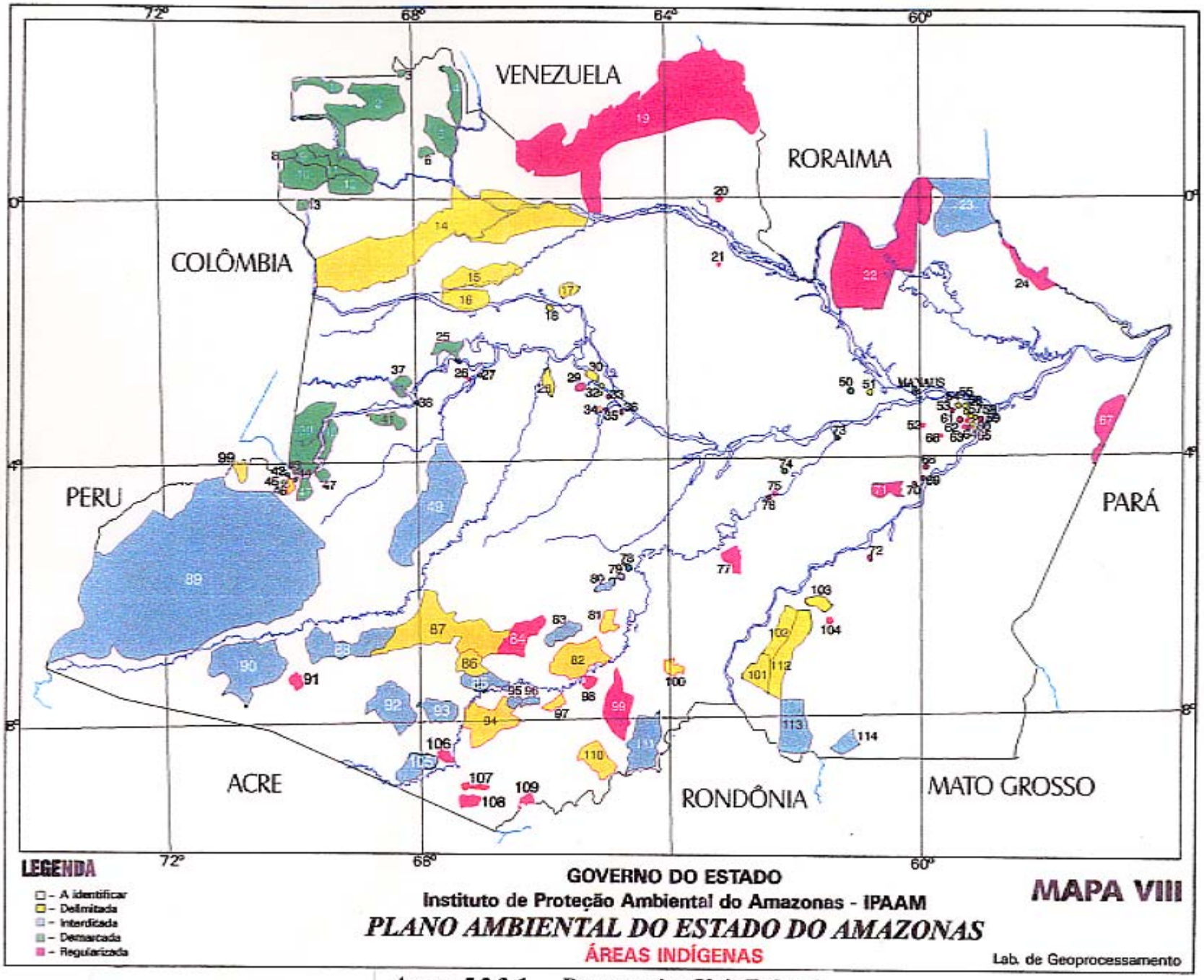
Annex 5.2.1-1 Major Target Species in Fishery of the Amazonas State

Biological classification	Local name	Traditional preference of local people *1)
Osteogrossiformes		
Arapeimidae		
Arapaima gigas	Pirarucu	1st
Osteoglossidae		
Osteoglossum bicirrhosum	Aruana	-
Clupeiformes		
Clupeidae	Apapa	-
Ilisha amazonica		
Characiformes		
Prochilodontidae		
Semaprochilodus insignis	Jaraqui escama grossa	2nd
S. taeniurus	Jaraqui escama fina	2nd
Prochilodus nigricans	Curimata	2nd
Curimatidae		
Potamorhina latior	Branquinha-comum	2nd
Characidae		
Brycon cephalus	Mantrincha	1st
Triportheus angulatus	Sardinha	1st
Serrasalmidae		
Colossoma macropomum	Tambaqui	1st
Metynnis hypsauchen	Pacu	1st
Piaractus brachypomus	Pirapitinga	2nd
Perciformes		
Cichlidae		
Astronotus crasipinis	Acara-Acu	Special
Cichla sp.	Tucunare	Special
Cichlasoma spectabile	Cara	-
Astomidae		
Leporinus friderici	Aracu-cabeca-gorda	-
L. fasciatus	Aracu-amarelo	2nd
Schizodon fasciatus	Aracu-comum	-
Sciaenidae		
Plagioscion spp.	Pescada	Special
Siluriformes		
Pimelodidae		
Pseudoplatystoma fasciatum	Surubim lenha (Pintardo)	3rd
P. tigrinum	Surubim tigre (Pintardo)	-
Brachyplatystoma flavicans	Dourada	3rd
B. vaillantii	Piramutaba	3rd
B. filamentosum	Piraiba	3rd
Leiarius marmoratus	Jandia	3rd
Brachyplatystoma filamentosum	Filhote	-
Paulicea luetkeni	Jau	-
Phractocephalus hemioliopterus	Pirarara	-
Hypophthalmidae		
Hyopophthalmus spp.	Mapara	-
Doradidae		
Pterodoras lentiginosus	Bacu liso	-
Oxydoras niger	Cuiu-cuiu	-
Callichtyidae		
Holplosternum litoralle	Tamoata	-
Loricaridae		
Liposarcus pardalis	Acari-bodo, Bodo	-

Source:

*1): After Falabella P. G. R. (1994). Family and scientific name, and local name are amended according to Ruffino et al. (1998).

: Species to be investigated with priority in this Study



Annex 5.2.3-1 Preservation Unit Federal

Annex 5.2.3-2 Conservation Unit of Amazon

Federal Conservation Unit

NO.	Name	Area	Number
1	National Park	4,487,000	3
2	Biological Reserve	848,900	4
3	Ecological Reserve	461,476	3
4	Ecological Station	922,668	2
5	National Forest	6,887,795	16
6	Relevant Ecological Interest Area	18,288	2
7	Experimental Reserve	11,000	2
8	Forest Reserve	3,790,000	1
9	Natural Patrimony Particular Reserve	104,286	6
10	Native Animals Particular Refuge	2,700	1
11	Fauna Reserve	14,150	1
	Mining Reserve	253,227	1
	Total	17,801,490	

State Conservation Unit

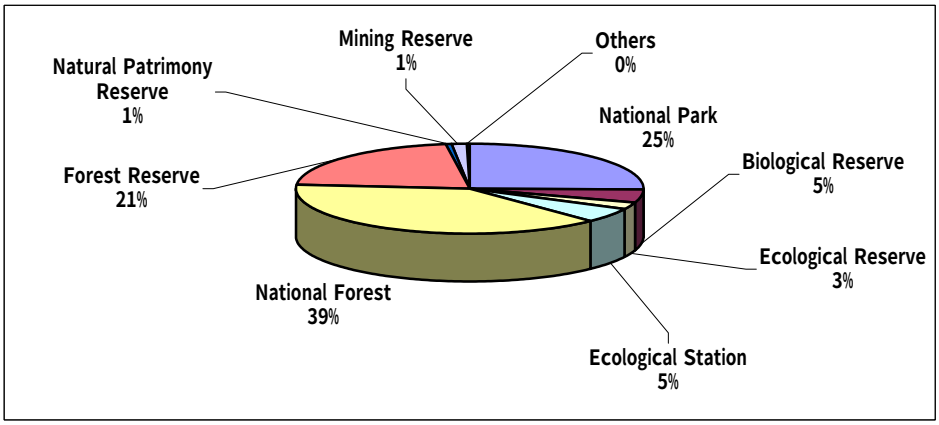
NO.	Name	Area	Number
1	Environmental Protection Area	2,475,691	5
2	State Park	2,283,112	3
3	Biological reserve	36,900	1
4	Development Sustained Reserve	3,437,000	2
	Total	8,232,703	

Municipal Conservation Unit

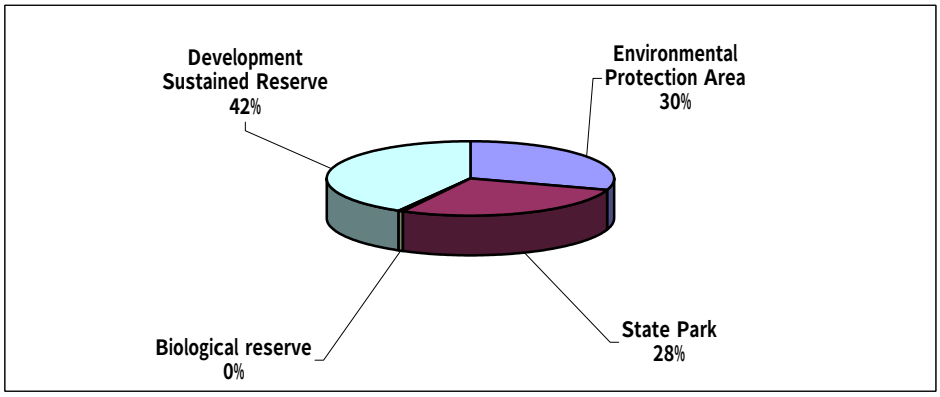
NO.	Name	Area	Number
1	Municipal Park	391	4
2	Municipal Garden	-	1
3	Natural Monument	-	2
4	Environmental Protection Area	879,378	5
5	Ecological Station	2,750	1
6	Botanical Garden	2	1
7	Zoo	-	2
8	Environmental Unit of Manaus	26,346	7
	Total	879,769	

- : Data is not available

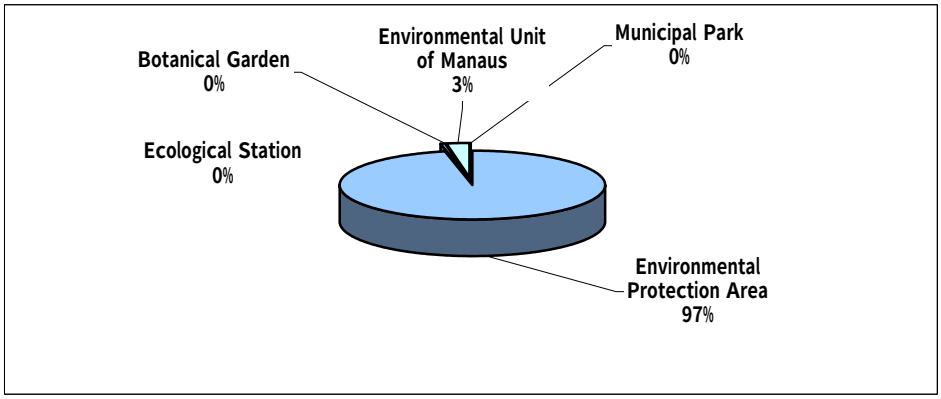
Data source : IPAAM



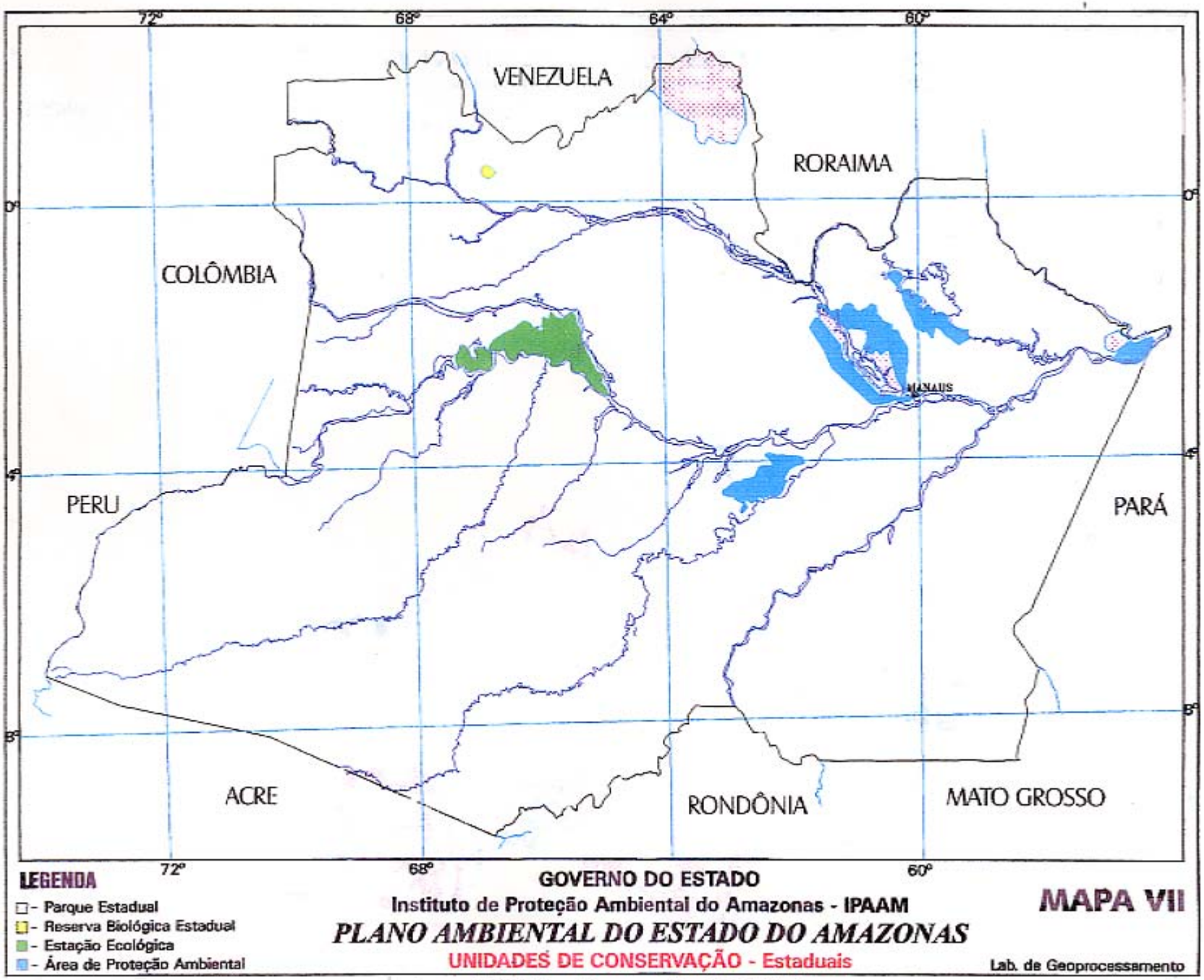
Federal Conservation Unit of Amazon



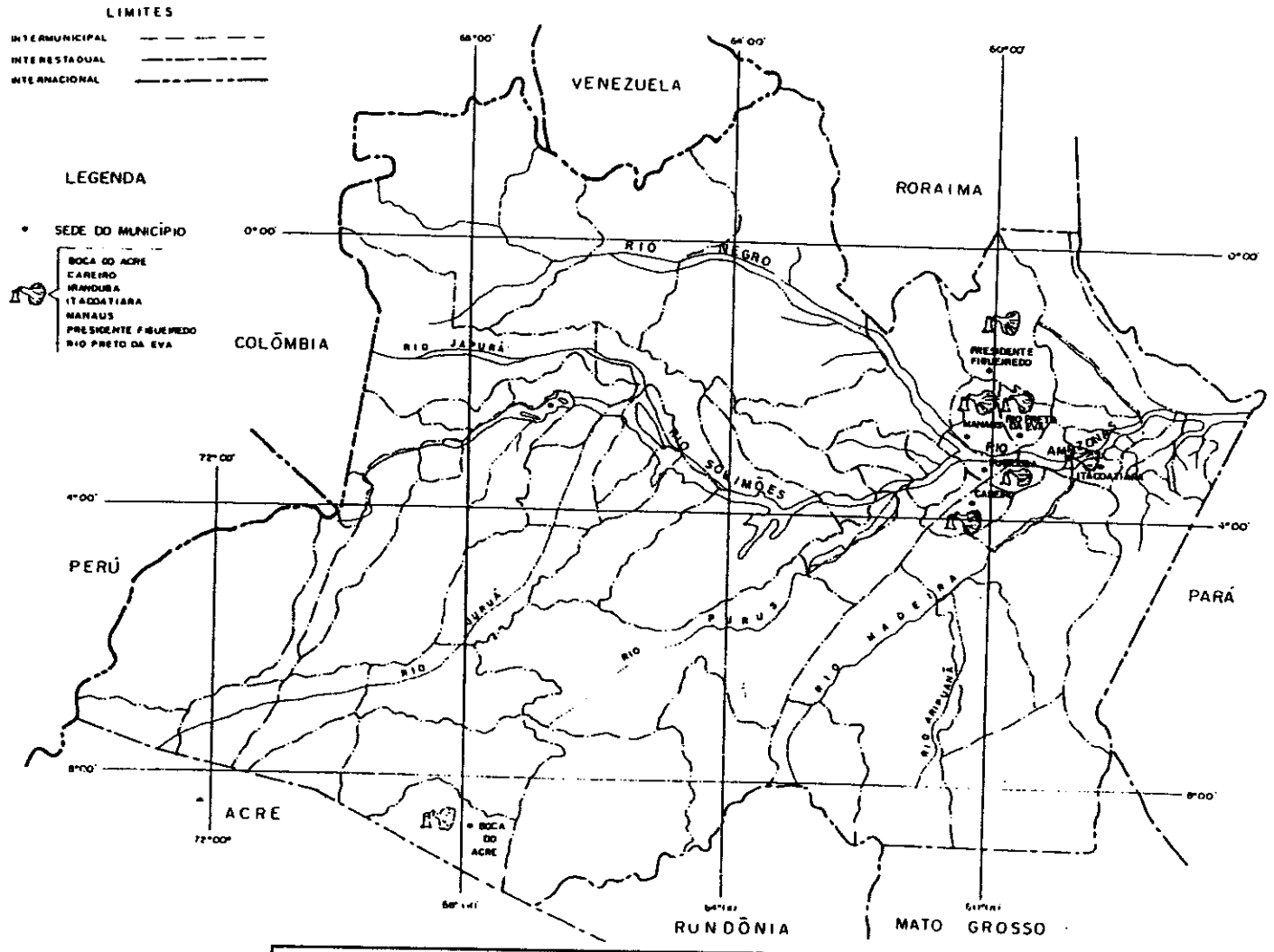
State Conservation Unit



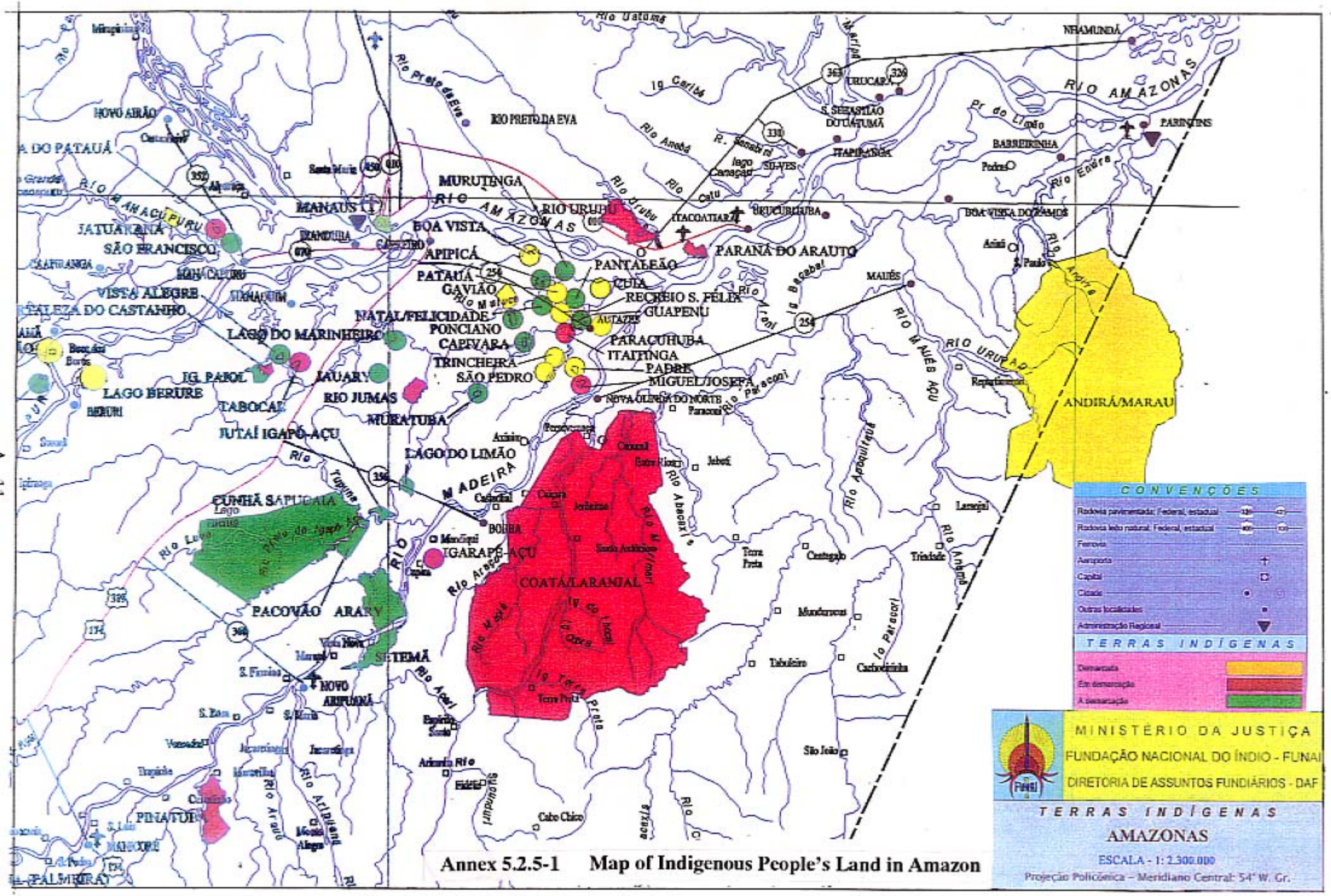
Municipal Conservation Unit



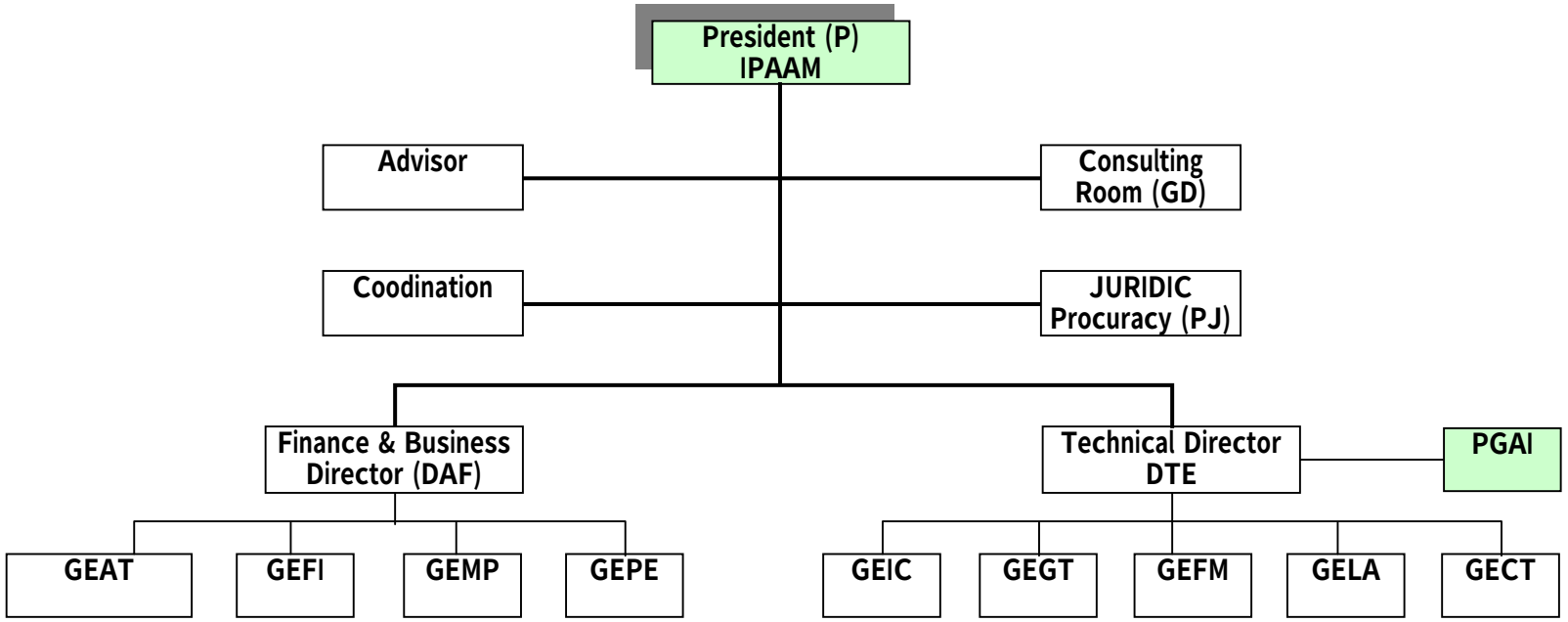
Annex 5.2.3-4 Preservation Unit State



The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.2.4-1**
Japan International Cooperation Agency (JICA)	**Location of Higher Level Deforestation**



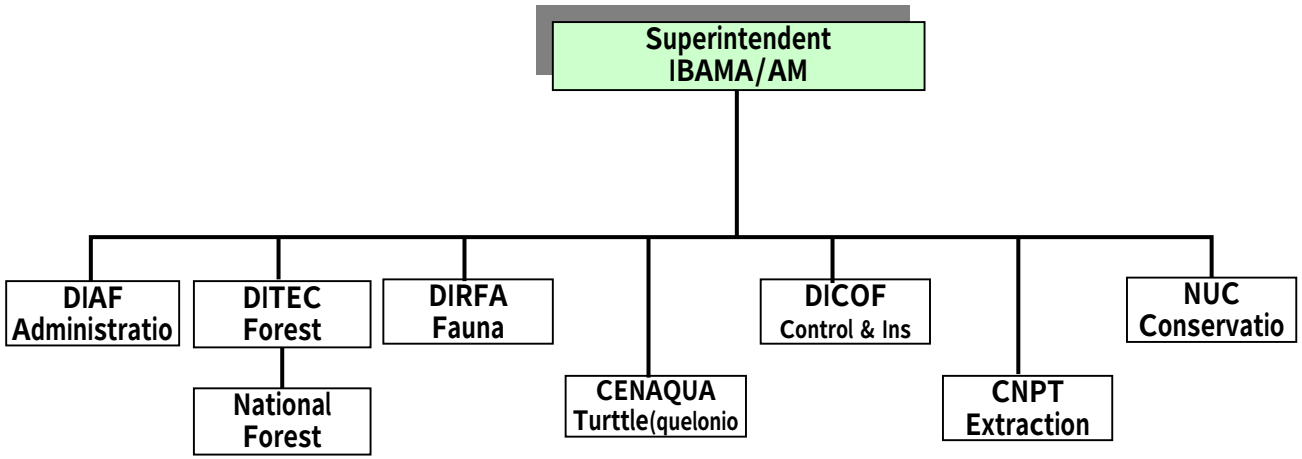
Annex 5.2.5-1 Map of Indigenous People's Land in Amazon



GEAT	Transport and support management
GEFI	Financial management
GEMP	Material and patrimony management
GEPE	Personnel management

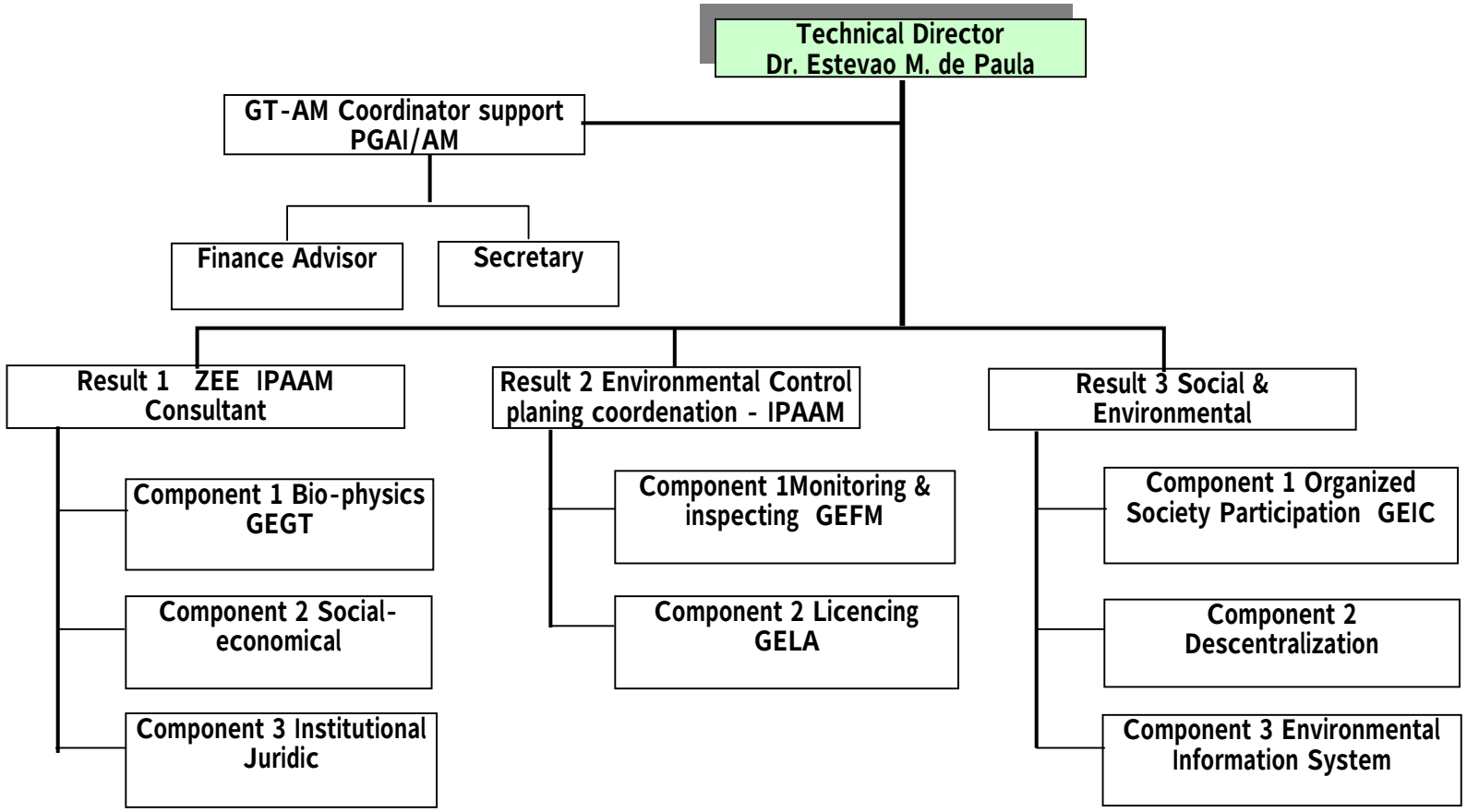
GEIC	Environmental education & information & comunication management
GEGT	Teritorial mangement
GEFM	Monitoring & inspecting management
GELA	Licencing management
GECT	Sciencce & Technology management
PGAI	Integrated environmental management

The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.1-1**
Japan International Cooperation Agency (JICA)	**Organization of IPAAM**

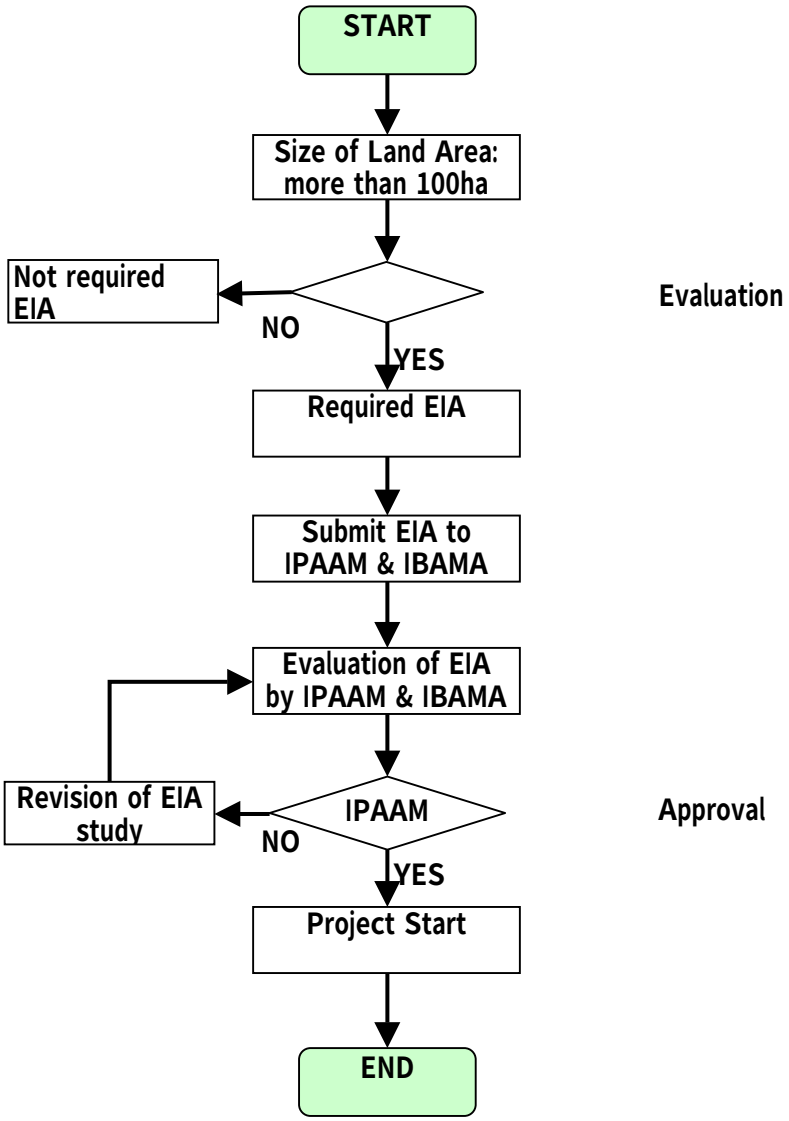


DIAF Finance & Administration Director
DITEC Technical Director
DIRFA Fauna Director
DICOF Inspection & Control Director
NUC Conservation Unit
CNF National Forest Center
CENAQ Turtle (quelonio) National Center
CNPT National Center for the Development of traditional population

The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.1-2**
Japan International Cooperation Agency (JICA)	**Organization of IBAMA/AM**



The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.1-3**
Japan International Cooperation Agency (JICA)	**Organization of PGAI/AM**



The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.2-1**
Japan International Cooperation Agency (JICA)	**Flow of EIA (RIMA)**

Annex 5.3.4-1 Project Title and Objectives of Subprograms for On-going Projects

1. Natural Resources Policy Subprogram (SPRN)
   1) To strengthen state environmental agencies
   2) To implement zoning, monitoring, command and control in priority areas.
   3) To decentralize the environmental management.

2. Demonstration Projects Subprogram (PD/A)
   1) To generate knowledge about conservation, preservation and sustainable management of natural resources through demonstration activities involving local communities' participation.
   2) To transfer the knowledge resulting from the experiences to other communities, other NGOs, decision makers, government technicians and other representative groups.
   3) To strengthen the organization, articulation and technical capacity of local populations to elaborate and implement projects.

3. Science Centers and Directed Research Subprogram (PDD)
   1) To strengthen institutional management and administration.
   2) Rehabilitation and expansion of research infrastructure and development.
   3) Increase human resource capacity in scientific research and education.
   4) Disseminate research results.
   5) Key policy studies and strategic plan at Museu Paraense Emílio Goeldi.

4. Indigenous Land Project (PPTAL)
   1) To legalize the indigenous lands in the Legal Amazon.
   2) To protect the populations and indigenous areas.

5. Extractive Reserves Project (RESEX)
   1) To complete the legalization of extractive reserves and other procedures required to guarantee traditional populations' access to natural resources.
   2) To strengthen community-based organizations and set up social and communal infrastructure in the reserves.
   3) To develop, try and publicize appropriate technologies to improve subsistence and commercialization of productive activities mainly in non-timber forestry products.
   4) To improve the conservation and management of natural resources in the extractive reserves.
   5) To promote a participatory management and administration method in the project.

6. Forest Resources Management Project (PROMANEJO)
   1) To contribute to the forestry-based economic activities to result from areas managed in a sustainable way and contribute for the development of a learning process among the several wood-based productive businesses.
   2) To develop strategic analysis of the main policies and incentives affecting the forestry sector, proposing new systems and key reforms.
   3) To encourage people, firms, NGOs and communities to develop sustainable management techniques and/or adopt forestry exploitation standards compatible with sustainable development principles capable of being

replicated later on.

4) To implement an integrated monitoring and control pilot system on timber harvesting in a “terra firme” area in Pará state and flooded “Várzea” area in Amazonas state.
5) To develop and implement a participator y resources management plan for the sustainable use of the National Forest of Tapajós.

7. Fire Prevention, Mobilization and Training Project (PROTEGER)
   1) To mobilize and train rural communities on the prevention of fire in the Amazon.
   2) To create community-based fire brigades.
   3) To carry out research on the alternatives to burning during land preparation.

8. Monitoring and Analysis Project (AMA)
   1) To promote learning about the Pilot Program and the application of lessons learnt.

9. Support of the Brazilian coordination of the Pilot Program
   1) Management and coordination of the Pilot Program
   2) Monitoring
   3) Interaction and articulation between subprograms and projects
   4) Support to public policies

10. Floodplain Resources Management (PROVARZEA)
   1) Development of management, monitoring and control systems. This includes economic and environmental analysis of floodplain soils use and management of natural resources, environmental legislation, land-tenure aspects and political analysis.
   2) To develop innovative floodplain natural resources management systems in an economically, socially and environmentally sustainable manner.
   3) To implement a pilot integrated monitoring and control system for the use of floodplain natural resources in two selected areas (Santarém/PA and Silves/AM) to produce and promote knowledge base to be used in the management of floodplain natural resources project proposals.

11. Support of the NGO Networks (GTA)
   1) To guarantee GTA network participation in the design, execution and monitoring of the Pilot Program activities and PD/A in particular.
   2) To enable the GTA network to follow, execute and monitor public programs and policies for the Amazon.
   3) To implement mechanisms for GTA’s sustainability.
   4) To implement a mobilization and training project on the prevention of fires in the Amazon (PROTEGER).
   5) To set up an Amazonian network for the commercialization of sustainable products.

12. Fire and Deforestation Control Project (PRODESQUE)
   1) To contribute to reducing actual deforestation and forest fire in the Amazon.
   2) To monitor and control fire and deforestation in priority areas.
   3) To study and promote alternatives to fire and deforestation.

4) To implement a monitoring and control program against illegal deforestation and fire to reduce their current levels in the Amazon deforestation arch.
5) To stimulate the involvement of local players to create a co-responsibility system related to deforestation and dissemination of relevant technical information.
6) To develop guidelines for public policies to reduce fire and deforestation rates in the Amazon.

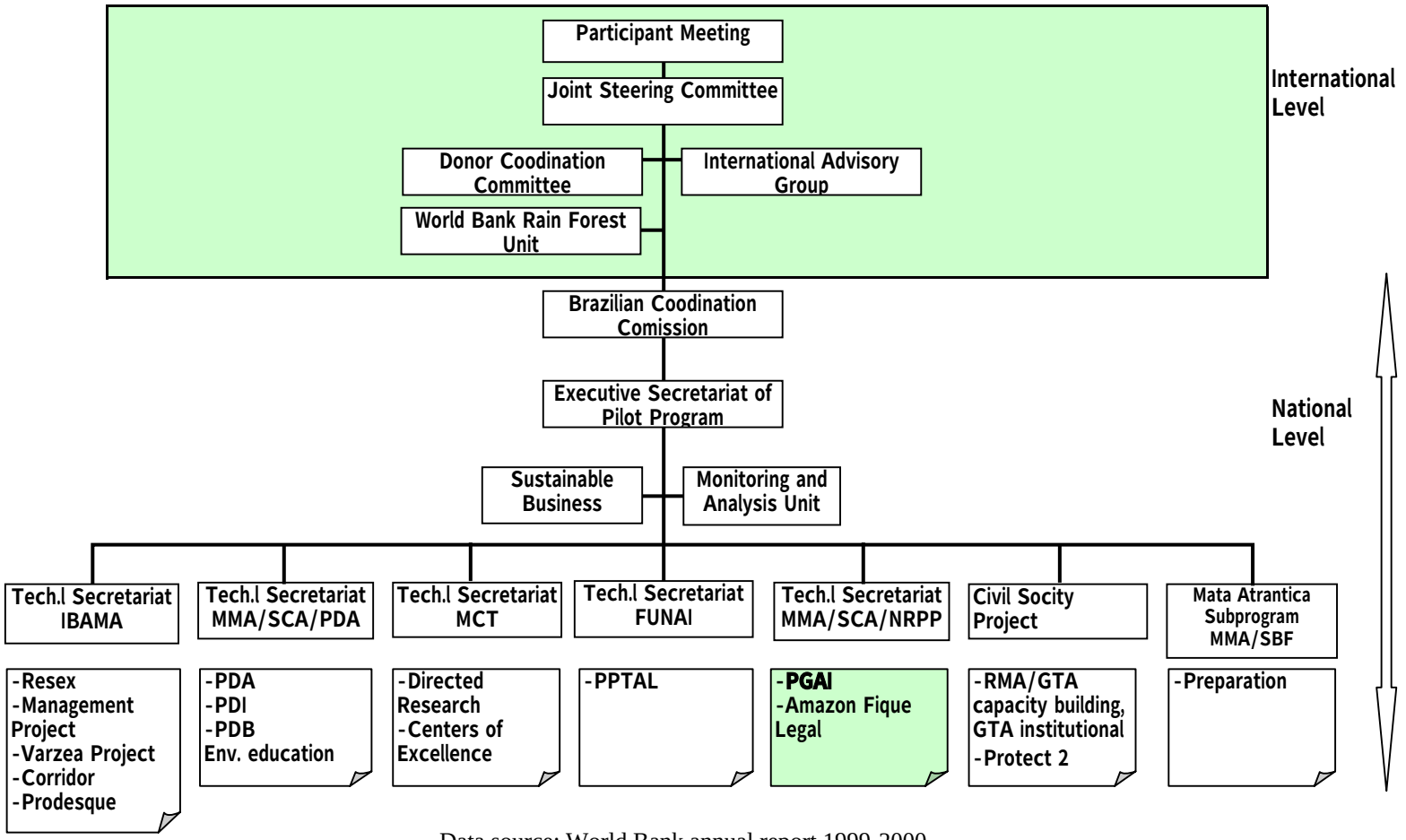
13. Ecological Corridors Project (CE)
1) To contribute for the effective conservation of biodiversity by implementing ecological corridors in the Amazon and Mata Atlantica regions including relevant players, to preclude or reduce deforestation of remaining fragmented forest areas and increase the connection between protected areas.

14. Environmental Education (CEDUC)
1) To stimulate the development of pilot non-formal environmental education demonstration experiences in the legal Amazon to disseminate already known proven initiatives as well as to promote generation and dissemination of new relevant knowledge on the issues of preservation, conservation and sustainable development in the region.
2) To stimulate the involvement of rural associations and other civil society organizations, public and private institutions committed to non-formal environmental education to develop pilot demonstration experiences in the region.
3) To strengthen partnerships between government and non-governmental institutions involved in training, production and dissemination of non-formal environmental education.

15. Demonstrative Projects by Indigenous Peoples (PD/PI)
1) To improve the prospects for economic, social and cultural sustainability of indigenous peoples in their lands, and to conserve the existing natural resources.

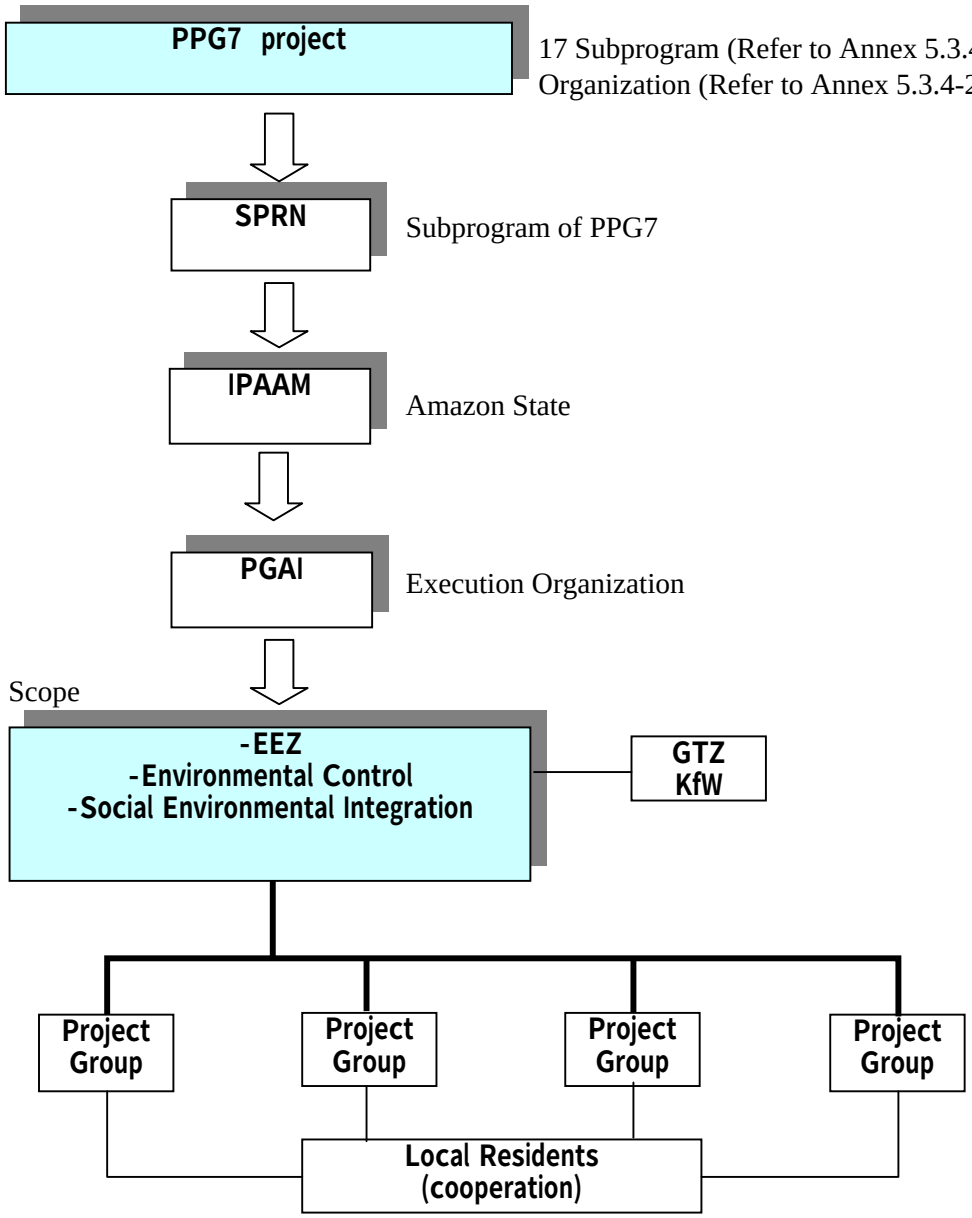
16. Municipal Demonstration Projects (PD/B)
1) To realize pre-investment activities and partnerships in order to implement sustainable productive projects in Amazonian municipalities.
2) To finance community projects in partnership with the private and/or public sectors to promote sustainable use of natural resources in tropical forests.
3) To reinforce the management capacity of the PD/A Technical Secretariat for the implementation of the Phase 2 activities.

17. Sustainable Business Practices (SBP)
1) To increase the economic sustainability of the initiatives started by other Pilot Program projects and promote independent environmentally sustainable companies outside of the Pilot Program.



Data source: World Bank annual report 1999-2000

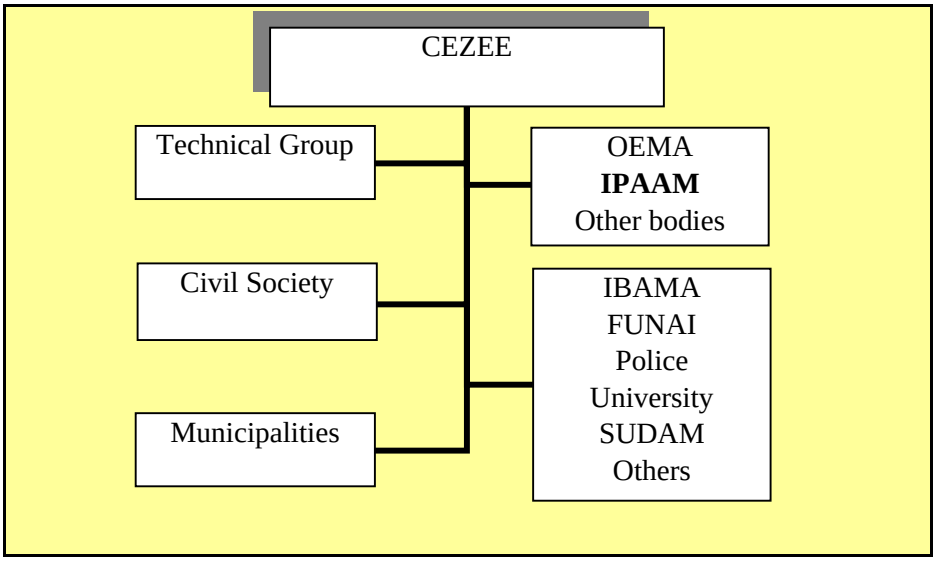
The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.4-2**
Japan International Cooperation Agency (JICA)	**Institutional Structure of the PPG7**



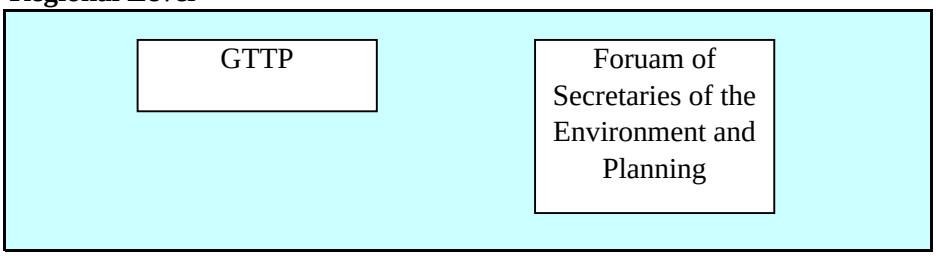
IPAAM	Institute of Environmental Protection on Amazon
PGAI	Project for Integrated Management of the Environment
EEZ	Ecological Economic Zoning
SPRN	Natural Resource Policy Subprogram
GTZ	German Technical Cooperative Agency
KfW	German Bank of Development

The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.4-3**
Japan International Cooperation Agency (JICA)	**Existing Organization & Flow of EEZ Project**

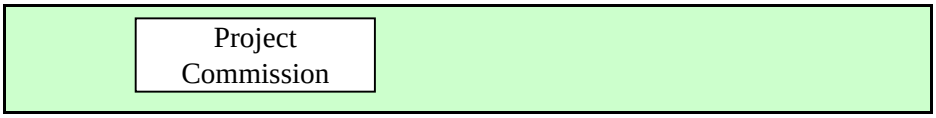
State Level



Regional Level



Federal Level



CEZEE	State EEZ Commission
FUNAI	National Indian Foundation
GTTP	Permanent Technical Working Group
IBAMA	Brazilian Institute of the Environment and Renewable National Resources
OEMA	State Environmental Agency
IPAAM	Institute of Environmental Protection on Amazon
SUDAM	Superintendence for the Development of the Amazon Region

Data source : MMA

The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural Resources Management in the State of Amazonas	**Annex 5.3.4-4**
Japan International Cooperation Agency (JICA)	**Organization for Implementation of the EEZ Project**

Annex 5.3.4-5 Information of Proposed New Project for PPG7 (1/3)

The international group of scientific assistance - GIAC, responsible for the independent evaluation of the scientific and technological subprogram, consider the progress, notable and had a very positive impression about the subprogram which is part of a objectives of PPG-7.

23 projects that are in their finishing phase and 30 new one's are part of the directed research project (PPD) of the subprogram of PPG-7.

Those new projects will open 4 principal priority areas:

1. environmental infrastructure;
2. better life quality of the Amazon Region;
3. research of the ecosystem;
4. technologies to develop the Amazon.

The Jacaranda Project is a result of the collaboration between the Japanese and Brazilian Government, through PPG-7/MCT/INPA/ABC and JICA

First phase started in April/95 and finished in Marc 98.

The second phase has an investment preview of 4,26 million USD from Japan, for the next five years. This phase started in October 98

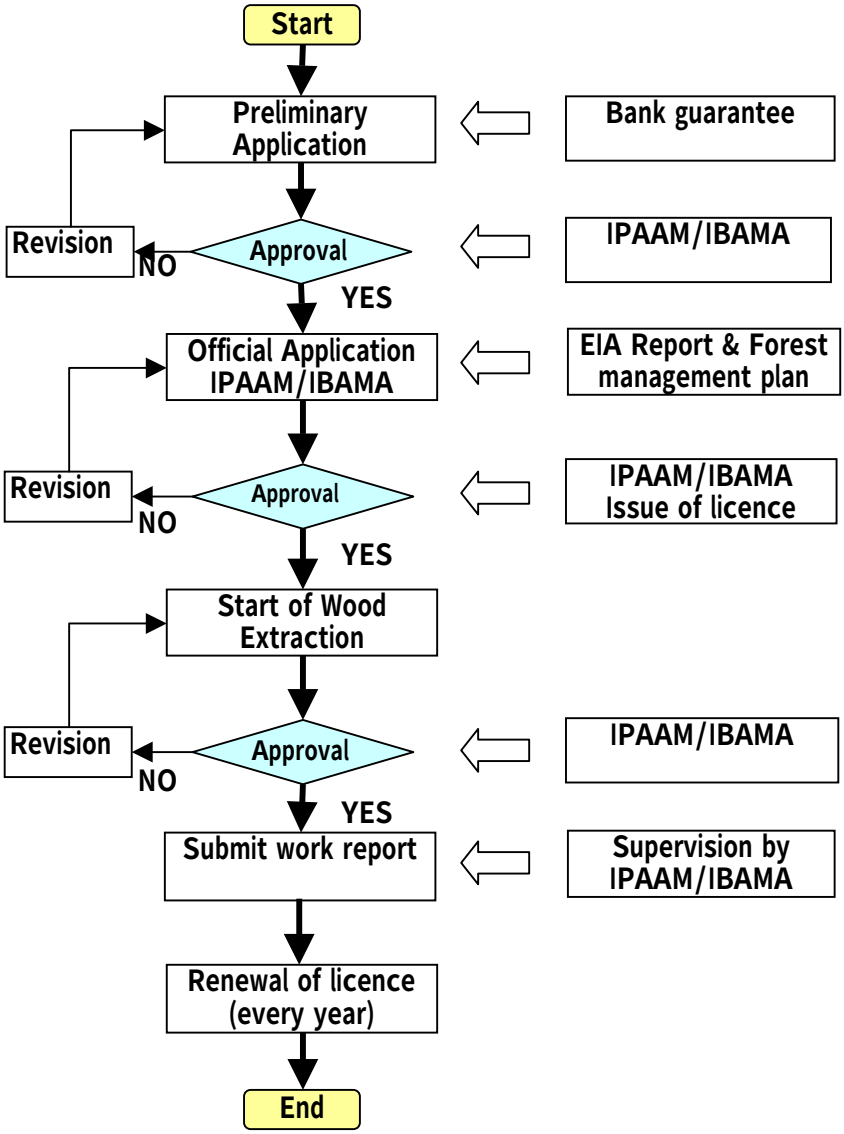
No.	NAME OF PROJECT	RESPONSIBLE	OUTPUT
1	Malaria and Amazon Ecosystem; Transmission and control.	INPA	The main objective of this project is to study the dynamics of transmission and strategies to control the malaria decease on the Amazon Ecosystem.
2	The Amazon Forest contribution for the global balancing of carbon.	INPA	Recent studies have shown that the water is very important for the physiological process of plants and that it affects directly the changes of the atmosphere, consequently, the absorption of CO2.
			this project will follow up for two seasons the dynamics of transfer and the storage of water in the various sections of the ecosystem to be studied.
3	Extensive Fishery of Tambaqui on Varzea (holm) forest.	INPA	This project will study the conditions of Tambaqui fishery in the Amazon varzea, if it would be suitable and what would be its monetary impact within the communities. Also it will be analyzed genetic aspects relevant to the addition of the species of fish
4	Development and co-activity of Agroforestory system.	INPA	This project is dedicated to develop an Agroforestory proposal for interested producers. Both husband and wife will define what kind of plantation based on the quality of the land and producers they wish. The project will accompany, analyze and follow up the plantation development. More than 100 kinds of plantations have been installed already, with 76 producers in 3 regions. They're all located in areas previously deforested.

Annex 5.3.4-5 Information of Proposed New Project for PPG7 (2/3)

5	Preservation and Management of the Amazon Manatee.	INPA / LMA	Considered an endangered specie, the Amazon Manatee project will study aspects like its nutrition, eating habits, health, physiological, reproduction and social behavior. Only after this data is collected will any preservation and management of the manatee be possible.
6	Evaluation of the viability of populations, on the long run, through generic analysis: ALUOATTA BELZEBUL (Primates Platyrrhini) 15 years after the construction of the hydroelectric plant of Tucurui (Para).	Federal University of Para - FADESP	Compares the genetic of the mentioned populations of primates before and after the construction of Tucurui.
7	The impact of politics on the handling of communities and the natural resources of the Amazon.	Institution of Environmental Research of the Amazon - IPAAM.	Handing of forest and holm areas by communities, preserving the ecosystem, taking effects with locals, using natural resources of the Amazon and neighbor countries.
8	Technological development for the handling and cultivation of Acai and to produce fruits.	Institution for Scientific and Technological Research of the State of Amapa IEPA	This project is to develop handing technologies of the native acai with the purpose to produce fruit pulp. Maintaining stocks this fruit pulp will increase the income of the population at the river sides.
9	New technologies for family agriculture of the Eastern Amazon (Amazonia Oriental).	EMBRAPA / CPATU	Develop technologies to avoid deforestation and the burning of areas.
10	Genetic variety and productive flow of forest species of high economical value.	INPA	Genetic characteristics of 4 types of the tropical forest. 1-Mogno, 2-Sumauma (Bomacacia family), 3-Castanha-do-Para and 4-Piquia; 1-Mahogany, 2-Kapok Tree, 3-Brazil Nut Tree.
11	Alternatives to the development of tendencies of the dislocation in the Amazon area.	MPEG Museum Emilio Goeldi of Para	Study about the exodus from the interior.
12	Use of the soil, landscape dynamic and constructing the space of the Easton Amazon (Amazonia Oriental)	UFPA Federal University of Para	Create and test monitoring systems of human activity in the frontier of agriculture of the Amazon.
13	Research and monitoring of information in Preservation Areas, with a Traditional Administration of Populations.	Association of lately extractors and farmers of the Reserve Alto Jurua.	Create methods and procedures which can be applied in other areas with a similar activity.
14	Classification, Processing and Utilization of the Pupunha (Bactris gasipaes Kunth) Acai (Euterpe oleracea Mart) and Cubiu (Solanum sessiliflorum Dunal).	INPA	Collect Agronomic, Therapeutic, Economic, Nutritional and Technological information about the Pupunha, Acai and Cubiu.
15	Effects of long periods without rain: (when does the forest become inflammable?)	IPAAM	Study about hydro stress of the rain forest.

Annex 5.3.4-5 Information of Proposed New Project for PPG7 (3/3)

16	The use of Primates of the Amazon for Bio-Medical research.	UFPa Federal University of Para.	Making use of primates as models for Bio-Medical research.
17	Alternative Production Systems of Catitu (Tayassu Tajacu) for the small farmer of the Amazon.	EMBRAPA / CPATU	This project is to study the breeding of the Catitu (small wild pig)
18	Evaluation of the potential and sustainability of small Agroforestry Properties.	INPA	Study of the projects of RECA Association if, they are sustainable.
19	Health Nutrition and Settlement: comparative between Indian settlements and Settlements of missions.	ISA Socio-Ambiental Institute - Rio Negro Program	After help to the Indian Associations and others locals, prepare mechanisms for nutrition and sanitary control.
20	About areas of wood extraction in the Amazon.	IMAZON Amazon Man and Environment of Amazon Institute.	15 - 20% of the production PIB of the State of Para, Mato Grosso and Rondonia is wood. Government agencies need to have more infomation about the pertinent activities.
21	Interactions between Savannah and Forests of the Amazon and their importance for the Biodiversity.	INPA	Evaluation of the Biodiversity of the region of Santarem.
22	Use of Medicine Herbs to attend and treat the health of the communities of the interior.	IEPA Scientific and Technologic Research Institute of Amapa State.	Create through fitotherapic measures an alternative for the population of the interior.
23	Development of a method to monitor the chemicals in the atmospheres of the Amazon of the LBA experiment.	EMBRAPA	This project tries to understand the today's influence of the Amazon as a provider of tropical nutrients.
24	Aromatic Plants of the Amazon: compositions of insecticides, fungicide their use and the Biologic Control.	MPEG Museum Emilio Goeldi of Para	Increase the data bank which holds already 800 complete entrances.
25	Domestication of Camu Camu forest germopleasma (Myrciaria dubia (H.B.K.) MC V AUGH) for agro-industrial use in the Amazon.	INPA	Project to find a way of regional exploitation and plantation of the Camu Camu.
26	Increment, increase of a forest or firm soil. Ecological experiments with its commercial species.	INPA	This project is the continuation of a project that stated in 1980. The project wants to test the dynamic of the forest.
Source : IPAAM			



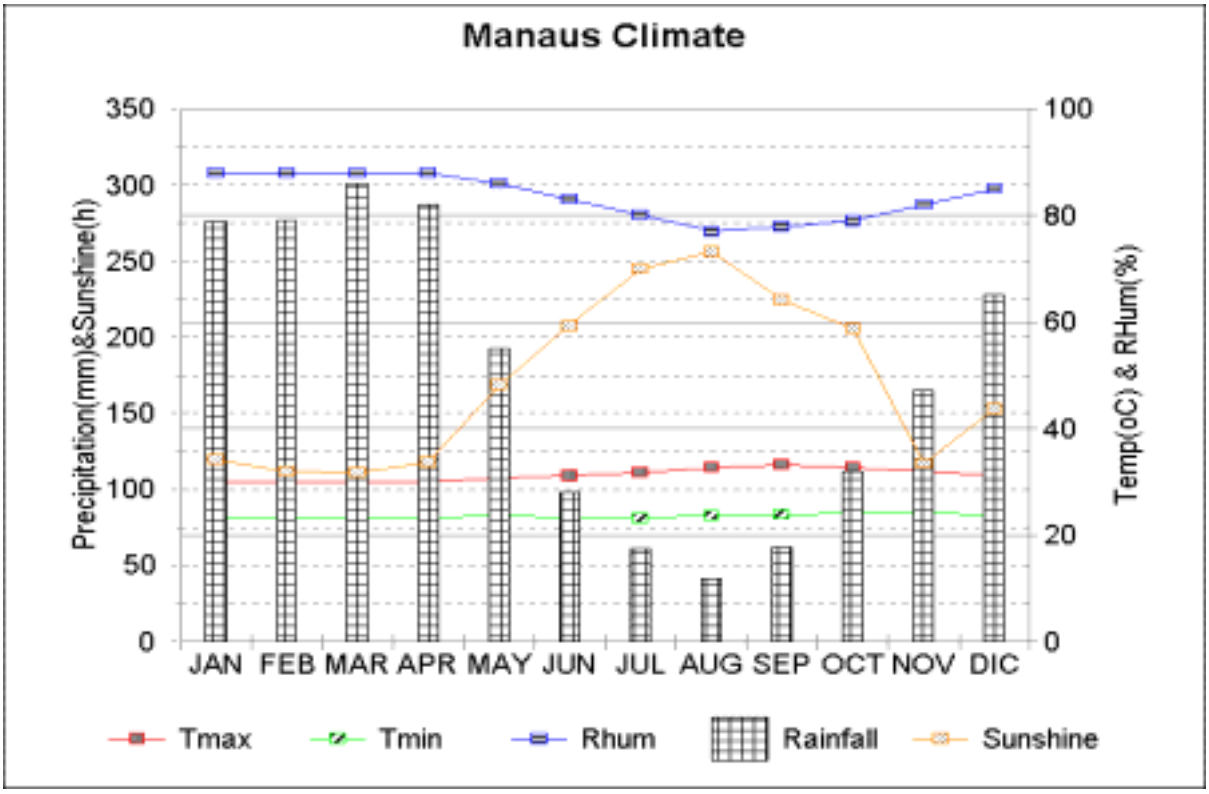
Conditions: Application for the wood extraction more than 2,000 ha

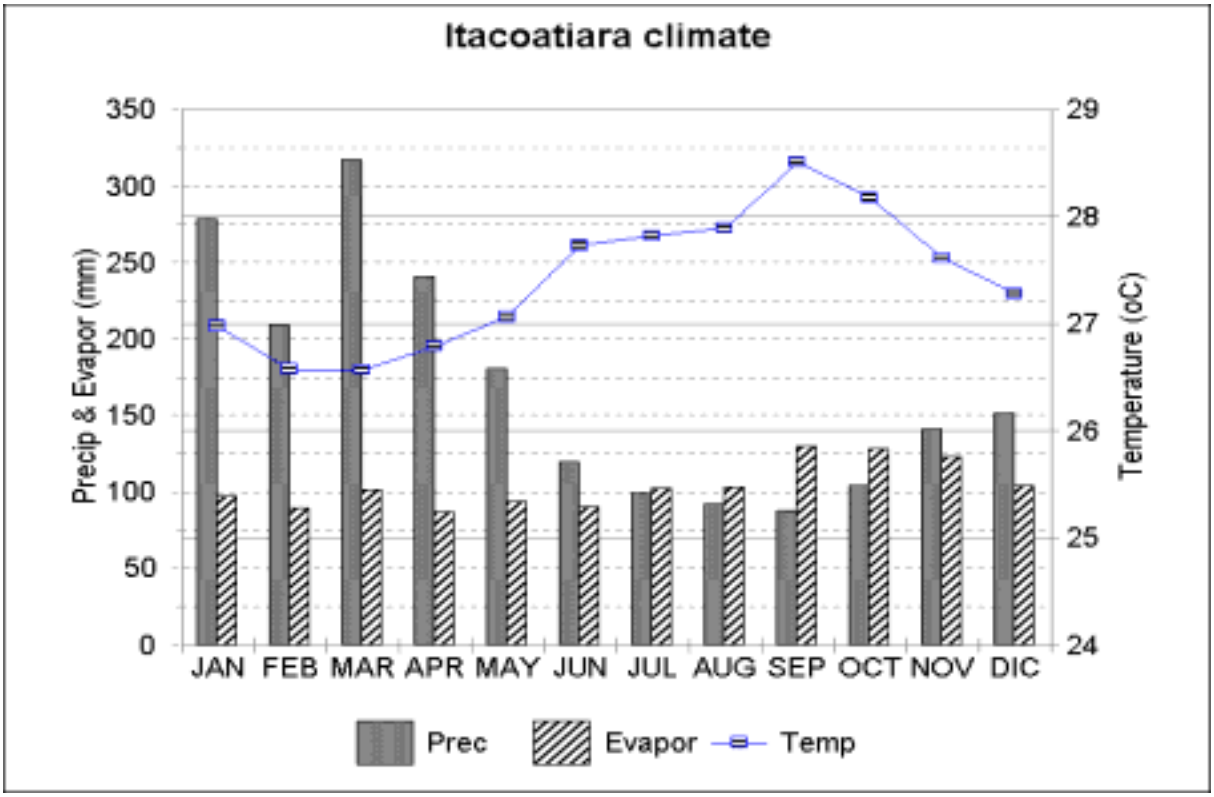
The study for improving Rural people's livelihoods through Agricultural Activities and Sounds Natural ResourcesManagement in the	**Annex 5.3.5-1**
Japan International Cooperation Agency (JICA)	**Application and Procedure of Forest Management Plan**

Annex 5.5.2-1 Production Data on Vegetables for Study Area (1997-2000)

PRODUCT (Production)	1997				1998				1999			
	# of Farmers (IDAM/Total)	Total Area Planted (ha)	Total Area Harvested (ha)	Total Production	# of Farmers (IDAM/Total)	Total Area Planted (ha)	Total Area Harvested (ha)	Total Production	# of Farmers (IDAM/Total)	Total Area Planted (ha)	Total Area Harvested (ha)	Total Production
IRANDUBA												
Watermelon (1,000 fruit)	60/70	45	28	57	55/183	90	90	225	111/185	137	127	381
Cabbage (tons)	37/60	30	8	128	64/194	41	26	416	34/48	43	32	384
Green Pepper (tons)	5/10	2	3	20	84/191	31	31	372	47/69	42	24	288
Long Bean-meter (1000bunches)	21/70	12	6	1200	-	-	-	-	90/90	26	18	1,008
Okra (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Pumpkin (ton)	0	0	0	0	80/83	56	40	400	43/54	40	30	900
Spring Onion (1000 bunches)	32/60	10	9.1	1820	114/210	10	7	126	58/91	22.2	14	252
Sweet potato (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Lettuce (1000 head)	0	0	0	0	114/380	4.99	4.99	309.38	52/82	26	21	1302
Couve (1000 bunches)	0	0	0	0	43/94	17	17	374	26/57	9	4	88
Coantro (1000 bunches)	90/100	6.5	4.5	90	89/261	14.5	14	252	64/118	64	54	972
Cucumber (tons)	0	0	0	0	89/98		17	340	101/108	69	67	1340
Tomato (ton)	0	0	0	0	28/53	9	9	108	ND/53	9	9	108
Eggplant (ton)									48/48	18	12	468
ITACOATIARA												
Watermelon (1,000 fruit)	0	0	0	0	0	0	0	0	0	0	0	0
Cabbage (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Green Pepper (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Okra (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Pumpkin (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Lettuce (1000 head)	0	0	0	0	0	0	0	0	0	0	0	0
Couve (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Coentro (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Spring Onion (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Sweet potato (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Long Bean (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Cucumber (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Tomato (ton)	0	0	0	0	0	0	0	0	0	0	0	0
MAUES												
Watermelon (1,000 fruits)	0	0	0	0	4/50	100	100	400	/50	100	60	360
Cabbage (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Green Pepper (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Okra (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Pumpkin (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Lettuce (1000 head)	0	0	0	0	0	0	0	0	0	0	0	0
Couve (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Cilantro (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Spring Onion (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Sweet potato (ton)	0	0	0	0	0	0	0	0	0	0	0	0
Long Bean (1000 bunches)	0	0	0	0	0	0	0	0	0	0	0	0
Cucumber (tons)	0	0	0	0	0	0	0	0	0	0	0	0
Tomato (ton)	0	0	0	0	0	0	0	0	0	0	0	0

* Projections by IDAM Planning Division
Source: IDAM Consolidated Tables of ATER Activities (1997-2000)


Manaus Climate
Precipitation(mm)&Sunshine(h)
Temp(oC) & RHum(%)
350
300
250
200
150
100
50
0
100
80
60
40
20
0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DIC
Tmax
Tmin
Rhum
Rainfall
Sunshine


Itacoatiara climate
Precip & Evapor (mm)
Temperature (oC)
350
300
250
200
150
100
50
0
29
28
27
26
25
24
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DIC
Prec
Evapor
Temp

Annex 5.5.4-1 Fishery Production of Brazil in 1993-1997.

	Production (x 1000 ton)					Composition in 1997 (%)		
	1993	1994	1995	1996	1997			
Total Fish Production	*676.4*	*701.3*	*652.9*	*693.2*	*732.3*	100.0	100.0	100.0
1. Capture fishery	673.9	697.5	606.7	632.5	644.6	88.0		
1.1 Marine fishery	470.2	494.2	413.6	422.2	465.7		63.6	
Fishes	387.4	413.6	339.5	362.1	399.0			54.5
Crustacean	76.9	74.8	66.1	55.8	61.2			8.4
Molluscus	5.9	5.9	8.0	4.4	5.6			0.8
1.2 Freshwater fishery	203.7	203.2	193.0	210.3	178.9		24.4	
Fishes	201.8	201.3	191.6	207.6	176.7			24.1
(Amazonas State)	*(57.3)*	*(57.4)*	*(57.5)*	*(63.1)*	*(48.5)*			
crustacean	1.9	1.9	1.4	2.7	2.2			0.3
2. Aquaculture	2.5	3.8	46.2	60.7	87.7	12.0		
2.1 Marine water	2.2	3.4	5.4	8.5	10.2		1.4	
Crustacean	0.7	0.7	2.0	3.4	3.6			0.5
Mollusca	1.5	2.7	3.4	5.1	6.6			0.9
2.2 Freshwater	0.4	0.4	40.5	51.8	77.0		10.5	
Fishes	0.3	0.3	40.1	51.3	76.5			10.5
Crustacean	0.1	0.1	0.3	0.5	0.5			0.1

Source: DPA, MAA

Annex 5.5.4-2 Frozen Fish Production by Frigorifico in the Amazonas State (1994-1998)

Unit: ton

Municipal/frigorifico	1994	1995	1996	1997	1998	% in 1998
Manaus						
Fepesca (Codepesca)	40	-	-	-	-	0.0%
Rio Amazonas (Surubim)	680	537	779	79	54	0.7%
Fripeixe	573	809	356	881	975	12.0%
Iranduba						
Friuba	2,925	2,629	2,071	2,326	3,292	40.4%
Dourado	270	507	616	504	550	6.8%
Manacapuru						
Frigopesca	-	-	-	1,773	1,189	14.6%
Sta. Maria	-	-	-	1,146	1,213	14.9%
Itacoatiara						
Rio Mar	633	964	389	719	868	10.6%
Parintines						
Coopesca	150	88	-	-	1	0.0%
Teixeira	58	140	141	183	4	0.1%
Labrea						
Solapesca	318	174	17	6	3	0.0%
Total	5,648	5,848	4,368	7,616	8,149	*100.0%*

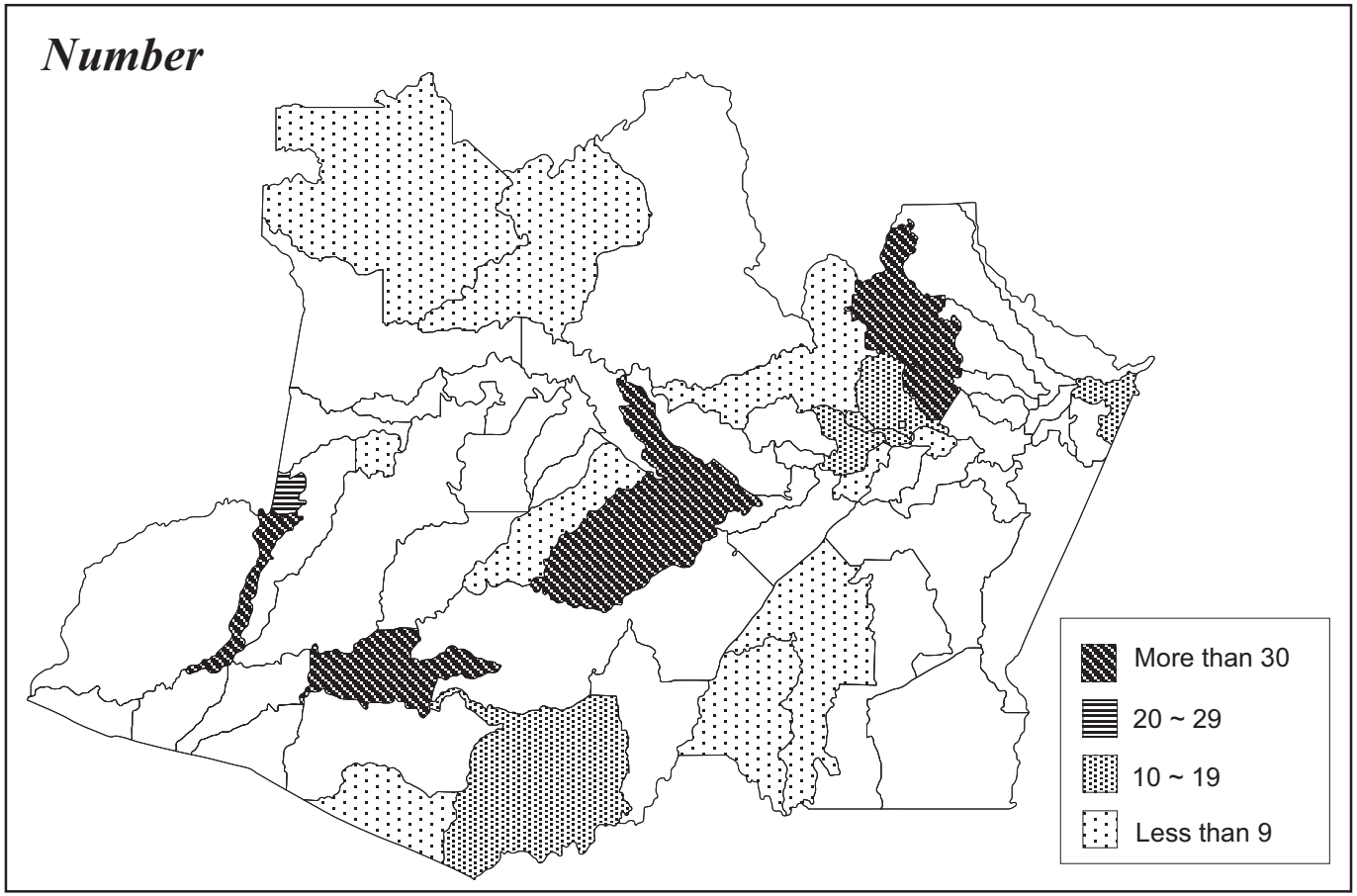
Source: DFA-AM

Annex 5.5.4-3 Frozen Fish Production by Type of Product and by Fish Group in the Amazonas State (1994-1998)

Unit: ton

	1994	1995	1996	1997	1998	% in 1998
Whole fishes	749	2,147	739	1,450	434	5.30%
Characiformes	666	467	685	1,244	292	
Siluriformes	7	1,542	0	-	35	
Perciformes	51	122	50	183	107	
Osteoglossiformes	24	16	4	24	-	
Clupeiformes	1	-	-	-	-	
Without gut	4,031	3,192	2,964	5,861	7,467	91.60%
Characiforms	225	134	43	178	20	
Siluriformes	3,505	2,961	2,894	5,531	7,362	
Perciformes	199	50	26	152	86	
Osteoglossiformes	103	47	-	0	-	
Cut in pieces	12	73	286	23	17	0.20%
Characiforms	9	15	2	-	-	
Siluriformes	1	58	284	23	17	
Osteoglossiformes	2	0	-	-	-	
Fillet	829	428	379	282	230	2.80%
Characiforms	-	-	1	-	-	
Siluriformes	623	425	286	274	202	
Perciformes	57	2	92	8	27	
Osteoglossiformes	149	-	-	-	2	
Others	27	9	-	-	-	
Total	5,648	5,848	4,368	7,616	8,149	100.00%

Source: DFA-AM, Setor de inspecao de produto de origem animal (1994-1998)



Source : IDAM

Annex 5.5.5-1 Distribution of Fish Farms in the Amazonas State

Annex 5.5.5-2 Calculation of Fee of Aquaculture License and Environmental Licenses

1) Aquaculture License

Aquaculture license is issued by DPA of MAA. Without this license, fish farmers cannot sell the products.

Table Aquaculture license fee table

Semi-intensive and intensive system		Extensive system	
Area category (ha)	Fee (R$/year)	Area category (ha)	Fee (R$/year)
<2	free	<2	free
2-10	137	2-50	137
10-30	165	50-100	165
30-50	214	100-200	214
50-100	300	200<	278
100<	420		

Source: Cadastro Nacional de Atenidades Pesqueires, Manual de Procedimentos, 1999, DPA, MAA

2) Environmental Licenses

Environmental licenses (LP, LI and LO) are issued by IPAAM of State Government. Without these license, aquaculture facilities cannot be developed and operated.

Value of license (VL) in unit of fiscal reference (UFIR; 1 UFIR = R$ 1.0641 in 2001) is calculated based on the following formula.

a. Extensive/semi-intensive system VL (for LP, LI and LO) = UA x CL
b. Intensive system VL (for LP, LI and LO) = UA x CL x FC1
c. Super-intensive system VL (for LP, LI and LO) = UA x CL x FC2

Remarks:

LP: Preliminary license	UA: Area used
LI: Installation license	CL: Coefficients of licensing
LO: Operation license	FC: Condition factor, FC1=2.51, FC2=5.02

Relations between UA and CL are given by the following table.

Size category	Area of development (A: ha)		Coefficients of Licensing (CL)		
	Extensive/Semi-intensive (Pollutant potential: Medium)	Intensive Super-intensive (Pollutant potential: High)	LP	LI	LO
Small	< 10	< 5	23.74	31.65	42.98
Medium	10-25	5-20	27.13	36.17	49.39
Large	25 - 40	20-35	30.52	40.69	55.8
Exceptional	40<	35<	33.91	45.21	64.1

Definitions are as follows:

Useful Area – means the area in hectare, effectively utilized by activity, including the flooded area and facilities (office, circulation area, of stocking,etc.).

Extensive – is characterized by the population and repopulation of lakes and ponds, at this system fishes survive with the natural food occurring in their own aquatic environment, there is no zoo-technical management at the rearing and the productivity is low.

Semi-intensive – is characterized by introduction of some inputs of the zoo-technical management means. Grow-out culture is carried out in fishponds in which water is fertilized and controlled of inflow and outflow.

Intensive – is characterized by the total control of environmental and limnological conditions, with the maximization of the productivity, using the artificial food, associated by the using of fertilizers and correctives at the fishponds and nursery.

Super-intensive- is characterized by fish culture at high density, in tanks and net cages, with intensive circulation of water, forced aeration and control of physical factors and chemicals of the water, associated to complete feeding, in order to increase productivity of the system.

Annex 5.6.6-1 Export of Frozen Fish Products from the Amazonas State (1994-1998)

	1994		1995		1996		1997		1998	
	Quantity (tons)	Value ('000US$)	Quantity (tons)	Value ('000US$)	Quantity (tons)	Value ('000US$)	Quantity (tons)	Value ('000US$)	Quantity (tons)	Value ('000US$)
FRIUBA, Iranduba	***542.9***	***1,819.1***	***394.1***	***993.9***	***285.8***	***1,261.7***	***89.7***	***458.6***	**-**	**-**
For USA	542.3	1,817.4	187.7	458.8	285.8	1,261.7	89.7	458.6	-	-
Whole fishes										
Piramutaba	21.8	45.6	-	-	-	-	-	-	-	-
Piranha	0.1	0.3	-	-	-	-	-	-	-	-
Without gut										
Piramutaba	16.3	34.2	-	-	-	-	-	-	-	-
Cut in pieces										
Piramutaba	-	-	73.5	146.6	208.7	751.7	-	-	-	-
Fillet										
Pirarucu	35.1	280.7	-	-	-	bb	-	-	-	-
Piramutaba	403.1	1,272.9	-	-	12.7	83.7	-	-	-	-
Mapara	52.8	126.6	114.3	312.2	55.1	364.2	89.7	458.6	-	-
Tucunare	13.1	57.2	-	-	9.4	62.1	-	-	-	-
For Europ	0.5	1.7	206.3	535.2	-	-	-	-	-	-
Fillet										
Mapara	0.5	1.7	206.3	535.2	-	-	-	-	-	-
RIO AMAZONAS, Manaus	**-**	**-**	**-**	**-**	***14.8***	***59.3***	**-**	**-**	**-**	**-**
For USA										
Without gut										
Dourado	-	-	-	-	2.0	5.4	-	-	-	-
Surubim	-	-	-	-	7.8	28.9	-	-	-	-
Tambaqui	-	-	-	-	5.0	25.0	-	-	-	-
Total	**542.9**	**1,819.1**	**394.1**	**993.9**	**300.6**	**1,321.0**	**89.7**	**458.6**	**-**	**-**

Source: DFA-AM

Annex 5.6.6-2 Frequency of Occurrence of the Most Preferred and Rejected Species Groups in Riverine Communities

Subregion	Preference		Rejection	
	Species group	%	Species group	%
Pesqueiro (Manacapuru)	Tambaqui	46.9	Bacu	96.3
	Tucunaré	40.0	Sarapo	80.0
	Pacu	23.8	Piracatinga	31.9
	Pirarucu	18.8	Traira	30.0
	Curimatã	15.6	Pacamon	26.3
	Cuiu	14.4	Mandubé	18.8
	Ruelo	9.4	Piranha	16.9
Paciência (Iranduba)	Curimatã	36.2	Bacu	50.4
	Tucunaré	30.7	Pacamon	37.0
	Tambaqui	27.6	Jiju	20.5
	Pacu	22.1	Pirarara	16.5
	Bodó	18.1	Mandubé	13.4
	Pirarucu	11.0	Piracatinga	9.5
	Pescada	9.5	Piranha	9.5
Aruanã (Manaquiri)	Tambaqui	14.1	Jiju	12.1
	Tucunaré	10.4	Bacu	10.3
	Pirarucu	7.1	Traira	5.3
	Cuiu	7.0	Piracatinga	4.7
	Curimatã	6.2	Barba-chata	2.9
	Pacu	5.0	Pacamon	2.0
	Jaraqui	2.6	Sarapó	1.8
Marimba (Careiro da Varzea)	Tucunaré	71.1	Bacu	75.8
	Curimatã	32.0	Traira	15.2
	Pacu	26.4	Surubim	11.9
	Cuiu	17.7	Piranha	9.6
	Ruelo	12.8	Bodó	7.2
	Surubim	11.6	Cuiu	5.8
	Aruanã	9.0	Mapará	5.6

Source: Batista et al. (1998)

Annex 5.7.2-1 Estimated Crop Budget per Hectare

Description	Unit	Unit Cost	Cabbage Varzea Quantity	Cabbage Varzea Value	Green Pepper Varzea Quantity	Green Pepper Varzea Value	Cucumber Verzea Quantity	Cucumber Verzea Value	Leaf Cabbage Verzea Quantity	Leaf Cabbage Verzea Value	Coriander Varzea Quantity	Coriander Varzea Value	Spring Onion Verzea Quantity	Spring Onion Verzea Value	Lettuce Varzea Quantity	Lettuce Varzea Value	Watermelon Verzea Quantity	Watermelon Verzea Value
Yield	t/h		12		12		20			22,000	pac	18,000	pac	18,000	plt	62,000	fruits	3,000
Price	R$/t			300		500		300			pac	0.3	pac	0.2		0.1		0.5
										0.15								
Gross Revenue	R$/ha			3,600		6,000		6,000		4,125		5,400		3,600		6,200		1,500
Inputs																		
1. Seed Material	kg	-	0.25	92	0.3	360	2	920	0.25	124	9	1,728	0.8	755	0.5	201	1	390
2. Fertilizer																		
Am.Sulphate	kg			0		0						0				0		
Urea	kg	0.7	300	210	300	210			300	210	100	70	500	350	100	70		
NPK (4-14-8)	kg	0.7					200	140									50	35
TSP	kg			0		0						0				0		
MP (K2O)	kg			0		0						0				0		
Organic matter	kg			0		0						0				0		
3. Agrochemicals																		
Borax	kg	5	10	50														
Insecticide	lit	20	2	40	4	80	3	60	2	40	2	40			1	20	2	40
Fungicides	kg	20		0	5	100	2	40									2	40
Weedicides	lit			0														
Fixation	lit	20	0.5	10	2	40	1	20	0.5	10					0.2	4	1	20
4. Machinery																		
2W.Tractor	ha			0		0		0		0		0		0		0		0
Sprayer	md			0		0		0		0		0		0		0		0
Thresher	md			0		0		0		0		0		0		0		0
5. Labour																		
Preparatory Work																		
1) Land Clearing	md	10	20	200	20	200	20	200	20	200	20	200	20	200	20	200	20	200
2) Nursery Pr.Seeding	md	10		0		0		0		0		0		0		0		0
3) Seedling preparation	md	10	5	50	5	50			5	50		0	15	150	15	150		0
4) Land Prepn.	md	10	20	200	20	200	20	200	20	200	20	200	20	200	20	200	7	70
5) Fertilization to hole	md	10								0		0		0		0		0
6) Seeding	md	10								0	5	50		0		0		0
7) Trans plant/Plantg.	md	10	5	50	10	100	5	50	5	50		0	16	160	16	160	2	20
Management Work																		
4) Fertilg.	md	10	10	100	10	100	8	80	10	100	5	50	6	60	5	50	5	50
5) Disbudding	md	10	0	0	5	50	18	180		0		0		0		0		0
6) Thinning	md										5	50		0		0		0
7) P/D Contl.	md	10	10	100	20	200	10	100	10	100		0		0	10	100	8	80
8) Weeding/Earth	md	10	10	100	30	300	12	120	20	200	10	100	10	100	10	100	8	80
9) Irrign.	md	10	30	300	30	300	20	200	30	300	15	150	20	200	18	180		0
10) Watching	md	10	0	0		0		0		0		0		0		0		0
11) Harvestg.	md	10	30	300	40	400	50	500	30	300	30	300	20	200	20	200	40	400
12) Processing	md	10	0	0		0		0		0		0		0		0		0
13) Pac./Trans.	md	10	0	0		0		0		0		0		0		0		0
Total*1	md	10	140	1400	190	1900	163	1630	150	1,500	110	1100	127	1,270	134	1,340	90	900
6. Miscelaneous/matelials				740		1,108		1,287		788		734		746		700		503
Cost of Production	R$/ha			2,542		3,798		4,097		2,672		3,672		3,121		2,335		1,928
Net Revenue	R$/ha			1,058		2,202		1,903		1,453		1,728		479		3,866		-428
(Rounded)	R$/ha			1,100		2,200		1,900		1,500		1,700		500		3,900		-400
per labor unit	R$/labor			8		12		12		10		15		4		29		-4

Source: IDAM, EMBRAPA, JICA RRAQS, Interview Survey, FELTRIN

Annex 5.7.4-1 Distribution of Small-scale Farmer's Households by Fishing Days per Month

	Flood season					Dry season				
	Seldom	1-5 days	6-15 days	more than 16 days	Total	Seldom	1-5 days	6-15 days	more than 16 days	Total
Iranduba										
Costa do Iranduba	4	3	7	16	30	4	7	10	9	30
	13%	10%	23%	53%	100%		23%	33%	30%	100%
S.José/ S. Francisco	8	1	5	16	30	7	3	12	8	30
	27%	3%	17%	53%	100%		10%	40%	27%	100%
Jandira	9	8	6	7	30	12	8	7	3	30
	30%	27%	20%	23%	100%		27%	23%	10%	100%
Sub-total	**21**	**12**	**18**	**39**	**90**	**23**	**18**	**29**	**20**	**90**
	23%	**13%**	**20%**	**43%**	**100%**	**26%**	**20%**	**32%**	**22%**	**100%**
Itacoatiara										
Santo Antonio	15	7	7	1	30	11	10	6	3	30
	50%	23%	23%	3%	100%	37%	33%	20%	10%	100%
S. Coração	17	3	6	4	30	14	7	3	6	30
	57%	10%	20%	13%	100%	47%	23%	10%	20%	100%
São João	1	0	9	20	30	3	2	11	14	30
	3%	0%	30%	67%	100%	10%	7%	37%	47%	100%
Sub-total	**33**	**10**	**22**	**25**	**90**	**28**	**19**	**20**	**23**	**90**
	37%	**11%**	**24%**	**28%**	**100%**	**31%**	**21%**	**22%**	**26%**	**100%**
Maués										
Pupunhal	4	5	2	18	29	4	5	8	12	29
	14%	17%	7%	62%	100%		17%	28%	41%	100%
P. Alegre	2	4	7	17	30	2	6	8	14	30
	7%	13%	23%	57%	100%		20%	27%	47%	100%
N. S.de Nazaré	1	2	5	23	31	1	4	9	17	31
	3%	6%	16%	74%	100%		13%	29%	55%	100%
Sub-total	**7**	**11**	**14**	**58**	**90**	**7**	**15**	**25**	**43**	**90**
	8%	**12%**	**16%**	**64%**	**100%**	**8%**	**17%**	**28%**	**48%**	**100%**
Total										
	61	**33**	**54**	**122**	**270**	**58**	**52**	**74**	**86**	**270**
	23%	**12%**	**20%**	**45%**	**100%**	**21%**	**19%**	**27%**	**32%**	**100%**

Source: RRA/QS, JICA Study Team, 2000

Annex 5.7.4-2 Review of Supplemental Interview Survey on Fishery and Aquaculture in Iranduba and Manacapuru

	No. of family			Agricultur e land area (ha)	Income (R$/month)	Fish consumption		Contribution of family fishing and aquaculture to fish consumption (%)	Possession of fishing boat or canoe			No. of fishing day (days/week)		Fish catch (kg/day)		Possession of potential area for aquaculture		Interest on aquaculture		Remarks
						per week (kg/week /family)	per capita (g/day /peson)		Yes		No	Flood season	Dry season	Flood season	Dry season	Yes	No	Yes	No	
	Adult	Chird	Total						with motor	without motor										
1. Higher income group (N = 9)																				
	2	3	5	24	2000	2	57	100	bbb			1	1	5	30	(fish pond under construction)				Mechanical engineer
	5	0	5	10	800	9	257	0			x	0.2	0.2	10	20	x		x		Medium-scale farmer in terra ferme
	2	4	6	32.5	1000	5	119	100		x		3	2	30	50	x			x	Medium-scale farmer in terra ferme
	2	1	3	n.a.	1000	6	286	5			x	-	-	-	-	(already developed for fish pond)				Medeum-scale fish farmer (*)
	2	3	5	46	3000	6	171	100	x			6	6	400	400	(already developed for fish pond)				Owner of restaurant, fishing boat and fish farm
	6	2	8	12	1500	12	214	100	x			6	6	200	360	x		x		Fishing boat owner
	3	3	6	0	1500	12	286	100	x			7	7	200	150		x		x	Fishing boat owner
	8	3	11	10	5000	15	195	0	x			-	-	n.a.	n.a.		x		x	Fishing boat owner
	3	1	4	45	6000	20	714	100	x			7	7	120	180	x		x		Fishing boat owner
Ave.	3.7	2.2	5.9	22.4	2422	9.7	255.5	67.2						230.0	272.5					
														(average of 4 boat owners)						
2. Small-scale farmers (N = 11)																				
	1	0	1	n.a.	150	2	286	0			x	-	-	-	-		x	x		Worker of fish farm
	4	0	4	53.5	150	2	71	100			x	-	-	-	-	(already developed for fish pond)				having barragen
	4	0	4	60	200	2	71	0			x	-	-	-	-	(already developed for fish pond)				having barragen but not operated now
	1	0	1	30	300	3.5	500	100			x	7	7	0.5	0.5	(already developed for fish pond)				Charcol producer who have barragen
	3	2	5	43	200	9	257	25		x		0.2	0.2	3	4		x		x	Small-scale farmer in terra ferme
	5	3	8	25	200	16	286	50	x			1	1	4	30	x		x		Worker of agriculture farm
	2	3	5	n.a.	250	14	400	100	x			7	7	6	10	x			x	Small-scale farmer and fisherman (*)
	2	2	4	8	250	4	143	100		x		2	2	2	2	x		x		Small-scale farmer in varzea
	2	0	2	47	350	2	143	50		x		n.a.	n.a.	10	10	x		x		Small-scale farmer in varzea
	6	1	7	39	350	4	82	100	x			3	1	4	30	x		x		Small-scale farmer in varzea
	6	0	6	2.5	500	12	286	0			x	-	-	-	-	x		x		Medium-scale farmer in terra ferme
Ave.	3.3	1.0	4.3	34.2	264	6.4	229.5	56.8				3.4	3.0	4.2	12.4					
												(average of 7 families that go fishing)								
3. Fishermen (N = 14)																				
	4	1	5	0	180	10	286	100	x			4	4	40	80		x	x		living in Iranduba town
	2	1	3	0	200	10	476	100	x			7	7	25	75		x	x		living in Iranduba town
	4	3	7	0	200	15	306	100	x			7	7	40	75		x	x		living in Iranduba town
	2	1	3	0	200	12	571	100		x		5	5	25	40		x	x		living in Iranduba town
	2	0	2	8	200	10	714	100	x			6	6	20	70		x	x		living in Iranduba town
	10	2	12	1.6	250	20	238	100	x			5	5	30	50	x		x		living in Iranduba town
	6	2	8	0	250	15	268	60		x		7	7	30	60		x	x		living in Iranduba town
	3	4	7	0	300	15	306	100	x			6	6	10	20		x		x	living in Iranduba town
	3	0	3	30	300	15	714	100	x			7	7	60	80	x		x		living in Iranduba town
	5	0	5	0	300	8	229	80	x			5	5	30	50		x	x		living in Iranduba town
	7	5	12	15	350	20	238	100	x			7	7	40	70	x			x	living in Iranduba town
	7	0	7	3	400	10	204	100	x			6	6	20	45		x			Fisherman in varzea
	8	4	12	n.a.	500	10	119	100		x		4	3	40	80		x		x	living in Iranduba town
	3	3	6	0	500	40	952	100		x		5	5	50	80		x		x	living in Iranduba town
Ave.	4.7	1.9	6.6	4.4	295	15.0	401.6	95.7				5.8	5.7	32.9	62.5					

Remarks: n.a.: not available, (*): person of Manacapuru

Annex 5.7.4-3 Various Aquaculture Activities in Iranduba and Manacapuru investigated by Field Survey

Income (R$/month)	Contribution of aquaculture to cash income (%)			Period of operation (year)	Facility				Initial investment (R$ '000)	Fund source		Species cultured						Source of fish fry			Approximate productivity (ton/ha/yr)	Remarks
					Barragen		Earthen pond															
	<20%	20-50%	50-80%		No	Area (ha)	No	Area (ha)		Own fund	Bank credit	Tambaqui	Matrincha	Pirarucu	Surubim	Jaraqui	Others	IDAM	Private hatchery	Capture from wild		
1. Phase I study																						
n.a.			x	6	3	3.8	6	0.6	n.a.	-		x		x		x		x		x	0.9	worker of fish farm
n.a.		x		6	2	3.0	1	0.2	n.a.	x		x	x				x	x		x	n.a.	Medium-scale fish farmer
n.a.	x			2	2	5.0	16	8.0	1200	x	x	x		x				x	x	x	n.a.	IDAM-assisted fish farm (MP)
2. Phase II study																						
150	x			10	1	0.5			5	x		x				x	x	x		x	n.a.	small-scale farmer
200	x			3	1	0.4			2	x		x						x			Failure	Small-scale farmer
300	x			3	1	0.3			3	x		x					x			x	Failure	Charcol producer
150			x	4	1	1.5			n.a.	-						x				x	n.a.	worker of fish farm
1000			x	16	1	4.0	4	2.2	100	x		x		x					x		2.0	Medium-scale fish farmer (MP)
3000	x			6	3	2.8			50	x		x	x	x		x	x	x			3.8	Owner of restaurant, fishing boat and fish farm
					1	3.0			30		* 1)	(under construction)									-	

Remarks: n.a.: not available, (MP): person of Manacapuru
*1) accredited but canceled thereafter (see, text)

Annex 6.1.1-1 Expanded Summaries (1/6)

N.	AUTHOR	TITLE	CODE
1.	Camera, Valdemir of Araújo; Oliveira, Elisiana Pereira de	The community of Collembola (Hexapoda) in the sitemas Agroforestry in small farmers' area in the area of Manacapuru-AM.	**BIA**
2.	Melo, José Teodoro of; Guimarães, Daniel Pereira	The culture of guariroba (Syagrus oleracea Becc.) in Agroforestry systems in the Cerrado's areas.	**SEV**
3.	Oliveira, Elisiana Pereira de	The diversity of the mesofauna of the soil in systems Agroforestry in areas of Manacapuru.	**BIA**
4.	Braga, Márcio da Silva Regallo; Müller, Manfred Willy	The importance of the *arboreto* and a methodological proposal for his organization and maintenance.	**ASY**
5.	Arco-Verde, Marcelo Francia; Schwengber, Dalton Roberto; Xaud, Haron Magalhães	Chemical alterations of the soil after the implantation of Agroforestry systems in the state of Roraima.	**SOF**
6.	Moreira, Marcos Antonio Barbosa; Schwengber, Dalton Roberto; Arco-Verde, Marcelo Francia; Wandelli, Elisa	Analysis of the soil's macro-fauna as bio-indicator sustainability in different uses of the land in Roraima, Brazil.	**BIA**
7.	Wandelli, Elisa Vieira; Souza, Maria do Perpétuo Socorro	Analysis of the sustainability of agi-forest systems in the Amazonas state through his floristic diversity.	**SOE**
8.	Venturin, Nelson; Macedo, Renato Luiz Grisi; Pereira, Ailton Vitor; Pereira, Elaine Botelho Carvalho; Gomes, Jozébio Esteves	Analysis of Agroforestry compatibility of the permanent mixed-crops with *Arabic Coffea* L. (coffee tree) and *Hevea brasiliensis* Muell arg. (seringueira)	**SEV** **ASY**
9.	Wandelli, Elisa V.; Fernandes, Erick C. M.; Perin, Rogério; Sousa, Silas Garcia A. de; Matos, João C. de Souza; Tapia-Coral, Sandra; Gallardo-Ordinola, Jorge Luis H.	Biophysical aspects of the recovery areas of degraded pastures, through Agroforestry systems.	**BIG**
10.	Lunz, Aureny Maria Pereira; Franke, Idésio Luis	Structural and functional aspects of Agroforestry backyard in a community of Occidental Brazilian Amazon.	**ASY**
11.	Neves, Edinelson José Maciel; Reissmann, Carlos Bruno; Dünisch, Oliver; Bellote, Antonio Francisco Jurado	Nutritional aspects of *Ceiba pentandra* (L.) Gaertn and *Virola surinamensis* (List.) Warb: the Amazonian species with potential for Agroforestry systems.	**SEV**
12.	Magalhães, João Avelar; Costa, Newton de Lucena; Tonwsend, Claudio Ramalho; Pereira, Ricardo Gomes de Araújo.	Evaluation of arboreous and shrubby vegetables of multiple proposes in Rondônia.	**SEV**
13.	Amaral, Emanuel Ferreira do; Lima, Márcio Venicio de Oliveira; Ludewigs, Thomas; Andrade, Alcimar do Carmo; Bardales, Nilson Gomes; Meneses Filho, Luis Carlos de L.; Recco, Roger Daniel; Melo, Antonio W. Flores de; Amaral, Eufran Ferreira	Evaluation of the effect of the phosphated fertilizing in the distribution of the radicular system of the "Ingá-de-macaco" (*Inga coreacea*), "Ingá-mirim" (*Inga fagifolia*) and "Ingá-de-metro" (*Inga edulis*) cultivated in alleys in the Acre state.	**SOF**
14.	Figueiredo, Neizia Nunes; Macêdo, Jeferson Luis V. de; Cravo, Manoel da Silva	Evaluation of the nutricional condition of the cupuaçu tree (Theobroma grandiflorum (Wild. former Spreg.) Schum.) in an Agroforestry system, in Central Amazon.	**SEV**
15.	Passos, Carlos Alberto Moraies; Gonçalves [1], Maria Rosa; Peres Filho, Otávio; Miyakawa, Yugo Marcelo	Evaluation of the method Taungya with Tectona grandis in the municipality of Cáceres, Mato Grosso State.	**ASY**
16.	Recco, Roger Daniel; Amaral, Eufran Ferreira do; Pinto, Ermilson Maciel; Melo, Antonio W. Flores de	Evaluation of the organic carbon's level in tropical soils, submitted to planting of Agroforestry systems in different ages, in the Western Amazon.	**SOF**

Annex 6.1.1-1 Expanded Summaries (2/6)

17.	Thomazini, Marcilio José; Costa, Charles Rodrigues da	Evaluation of larvae's population of "drill of fruits" (Conotrachelus humeropictus Field) of cupuaçu trees, component of Agroforestry systems.	**SOC**
18.	Arco-verde, Marcelo Francia; Schwengber, Dalton Roberto; Duarte, Otoniel Ribeiro; Lucas, José Gilmar dos Santos	Silvicultural evaluation of the "chestnut-of-brazil" (*Bertholletia excelsa*) and "cupiúba" (*Goupia glabra*) in Agroforestry systems, in Roraima State.	**SEV**
19.	Valeri, Sérgio Valiengo; Menezes, José Maria Thomaz	Bio-diversity and potentiality of Agroforestry systems in the area of Jaboticabal, São Paulo State.	**ASY**
20.	Cruz, Eniel David; Carvalho, José Edmar Urano de	Biometry of fruits and germination of tauari seeds (*Couratari stellata* A. C. Sm–Lecythidaceae).	**BIV**
21.	Welch, Steven A.; Riha, Susan H.; Fernandes, Erick C.M.; Wandelli, Elisa V.; Rondon, Marco A.	Capture of water and light resources for Agroforestry systems, implanted in areas of degraded pastures, of Western Amazonian.	**BIA**
22.	Falcao, Newton Paulo de Souza	Characterizations of some soils' chemical properties under systems Agroforestry in the municipality of Manacapuru, Amazonas.	**SOF**
23.	Santos, Eyde Cristianne Saraiva dos	Characterization of backyards in communities of River Solimões, Municipality of Manacapuru, Amazonas State, Brazil.	**SOV**
24.	Caliri, Guilherme José Abtibol; Azevedo, Celso Paulo de; Rossi, Luiz Marcelo Brum; Leeuwen, Johannes van; Sousa, Nelcimar Reis de; Gomes, João Batista Moreira	Characterization of the sumaúma (*Ceiba pentandra*) growth under several planting conditions in the Central Amazonian.	**SOV**
25.	Rodrigues, Maria do Rosário Lobato; Santos, Jackson de Araújo dos; Barcelos, Edson	Carbon and nitrogen in the aerial biomass of "dendê" palm oil cultivation in Yellow Latossolo, in the Western Amazonian.	**SOF**
26.	Tapia-Coral, Sandra C.; Luizão, Flávio J.; Wandelli, Elisa; Sarrazin, Max; Chaves, Edivaldo; Fernandes, E. C. M.	Carbon and nutrients in the sedan chair layers in Agroforestry systems, in Central Amazonian.	**SOF**
27.	Leite, Angela M. C.; Pérez, Eduardo Lleras; Campelo, Fabiana Rocha; Ribeiro, Maura Regina; Silva, Caio Carlos da	Checklist of the amazon species of agronomic interests – Part 1.	**BIV**
28.	Mitja, Danielle; Leeuwen, Johannes Van; Mota, Maria do Socorro Souza da; Gomes, João Batista Moreira	Lianas on the capoeiras: a threat for the Agroforestry systems (Manacapuru, Amazon State, Brazil).	**BIV**
29.	Oliveira, Arlem Nascimento de; Oliveira, Luiz Antonio de	"Microrizica" Colonization in Agroforestry systems with cupuaçu and guaraná in an Acid Latossolo and with low fertility of Central Amazon.	**BIV**
30.	Franke, Idésio Luis; Miranda, Elias Melo de; Valentim, Judson Ferreira	Behaviors of arboreal species with multiple use for Agroforestry systems, in Acre State.	**SEV**
31.	Costa, Newton de Lucena; Townsend, Claudio Ramalho; Magalhães, João Avelar; Pereira, Ricardo Gomes de Araújo	Behaviors of forrageous vegetable crop under shady of adult seringal.	**SEV**
32.	Meirelles, Paulo Roberto de Lima; Mochiutti, Sillas	Behaviors of forrageous vegetable crop under shady of "taxi-branco" (S. paniculatum Vogel).	**SEV**
33.	Silva, José Ferreira; Coutinho, Enilton Fick; Cravo, Manoel da Silva; Atroc, André; Ribeiro, José Ribamar Cavalcante	Echo-physiologic behavior of guarana clones in two agricultural systems in the Amazonian.	**SEV**
34.	Schwengber, Dalton Roberto; Arco-Verde, Marcelo Francia; Duarte, Otoniel Ribeiro ; Xaud, Haron Abraim Magalhães	Initial behavior of wood species and vegetable crop in agriculture-silvi-pastoral system in "cerrado" ecosystem, in Roraima	**SEV**

Annex 6.1.1-1 Expanded Summaries (3/6)

35.	Sousa, Gladys Ferreira de; Oliveira, Luiz Antonio de; Silva, José Ferreira da Moreira, Adônis	Floristic composition of invading plants in Agroforestry systems with cupuaçu tree, at the municipality of Presidente Figueiredo, Amazon State.	**BIV**
36.	Sousa, Nelcimar Reis de; Moreira, Adônis	Macro and micro-nutritious concentration of twelve vegetable species, cultivated in Agroforestry system	**SOF**
37.	Melo, Antonio Willian Flores de; Amaral, Eufran Ferreira do; Lunz, Aureny Maria P.; Pereira, João Batista Martiniano	Correlation of fisiografic parameters with the ideal tenors of nutrients in Projeto Reca, Nova Califórnia, Rondônia	**SOF**
38.	Miller, Robert P.; Nair, P. K. R.	Growth of fruits in ambient of "roça" and "aldeia": a study with indigenous communities Parakanã in the southeast of Pará.	**SOV**
39.	Franklin, Elizabeth; Morais, José Wellington	Density and biomass of soil mesofauna in primary forest, second growth and polyculture in central Amazonas.	**BIV**
40.	Martins, Emerson Gonçalves; Neves, Edinelson; Ferreira, Carlos Alberto; Shimizu, Jarbas Yukio	Deposition of sarpler and nutrients in settlements of grevílea (silk oak) of different origins in the Southwest of Paraná	**SEV**
41.	Freitas, João da Luz	Acting of a model of Agroforestry system for the estuary várzeas, of the municipality of Marzagão – Amapá.	**SEV**
42.	Radomski, Maria Izabel; Steenbock, Walter; Baggio, Amilton João; Soares, Arnaldo de Oliveira; Battistelli, Deyse A.	Developments of Agroforestry systems seeking to the production of medicinal plants.	**ASY**
43.	Macedo, Renato Luis Grisi; Venturim, Nelson; Gomes, Jozébio Esteves; Lima, Elisete Maialu Giacomim; Dantas, Frederico Wesley Figueiredo	Gowth dynamic of *Bertholletia excelsa* Humb et Bompl (castanheira-do-brasil) and establishment of clones of *Hevea brasiliensis* Muell Arg. (seringueira) introduced in Agroforestry system at Lavras – Minas Gerais.	**BIV**
44.	Campos, Carla Eloiza Bavose; Lehmann, Johannes; Macêdo, Jeferson Luis V. de; Silva Junior, José Pereira da	Phosphorus dynamic in the soil under the cupuaçu (Theobroma grandiflorum) and urucum (Bixa orellana) in an Agroforestry system in the Central Amazonian.	**SOF**
45.	Mota, Maria do socorro Souza da; Lehmann, Johannes; Schroth, Götz; Silva Junior, José Pereira da	Dynamics of nutrients in a yellow Latossolo, in an Agroforestry system, at Central Amazonian.	**SOF**
46.	Amaral, Emanuel Ferreira do; Lima, Márcio Venicio de Oliveira; Ludewigs, Thomas; Andrade, Alcimar do Carmo; Bardales, Nilson Gomes; Meneses Filho, Luis Carlos de Lima; Recco, Roger Daniel; Melo, Antonio Willian Flores de; Amaral, Eufran Ferreira do	Distribution of systems radiculares of "Ingá-de-macaco" (*Inga coreacea*), "Ingá-mirim" (*Inga fagifolia*) and "Ingá-de-metro" (*Inga edulis*), cultivated in alleys on an Yellow plinthic Argissolo, at Acre State.	**BIV**
47.	Queiroz, José Antonio Leite de; Mochiutti, Sillas	Forest diversity in Agroforestry systems with açai tree in the Amazon Estuary.	**BIV**
48.	Alves, Raimundo Nonato Brabo; Rodrigues, João Elias Lopes F.; Silva, José Francisco de Assis Feliciano da	Diversification and intercalation of cultures in Agroforestry system, in the family agricultural of the Municipality of Ponta de Pedras – Pará	**BIA**
49.	Hayek, Tânia; Franklin, Elizabeth Nazaré; Morais, José Wellington de; Woas, Steffen	Dynamic and succession of Acari (ACARI: ORIBATIDA) on decomposing leaf litter in primary forest, second growth and polyculture in Central Amazon region.	**BIA**
50.	Morais, José Wellington de; Franklin, Elizabeth Nazaré; Luizão, Flávio	Dynamics of mesofauna colinization on decomposing leaf in primary forest, secondary forest and polyculture systems in Central Amazonia.	**BIA**
51.	Souza, Alexandre Dias de; Ludewigs, Thomas; Meneses-Filho, Luis Carlos de Lima; Brilhante, Nilson Alves; Oliveira, Aluildo Costa de	Effect of the use of the taboca for protection in the cupuaçu planting (Theobroma grandiflorum) and pupunha (Bactris gasipaes).	**ASY**
52.	Araujo, Edson Alves de; Lani, João Luiz; Amaral, Eufran Ferreira do	Effects of the dynamics of use of the land on the stocks of carbon and nutritious in a YELLOW ARGISSOLO in Occidental Amazon.	**SOF**

Annex 6.1.1-1 Expanded Summaries (4/6)

53.	Gomes, João Batista Moreira; Van Leeuwen, Johannes; Ferreira, Sidney A. N.	Fruitful species of várzea and igapó for associated cultivation of tambaqui creation, matrinxã and turtle.	**ASY**
54.	Townsend, Claudio Ramalho; Magalhães, João Avelar; Costa,Newton de Lucena; Pereira, Ricardo Gomes de Araujo; Pequeno, Petrus Luiz de Luna	Establishment of *Acacia angustissima* in pastures of Brachiaria brizantha cv. Marandu.	**SEV**
55.	Mochiutti, Silas; Meirelles, Paulo Roberto de Lima	Establishment of eucalyptus clones in pastures at areas of cerrado, in Amapá.	**SEV**
56.	Silva, Alexandre Souza e; Barbosa, Antenor Pereira; Azevedo, Celso Paulo de; Murioka, Kikue	Estimate of dry biomass of the trunk of jatobá (Hymenae courbaril L.) planted in two types of ambient, in Central Amazon.	**SEV**
57.	McCaffery, Karen A.; Fernandes, Erick C. M.; Wandelli, Elisa V.; Rondon, Marco A.	Stocks of carbon and nutritious in Agroforestry systems implanted in areas of degraded pastures of Occidental Amazon.	**SEF**
58.	Bacelar, Christinny Giselly; Pessoni, Luiz Alberto	Population structures of the tucumã (*Astrocaryum aculeatum* Meyer) at Ecological Station of Maracá – RR.	**BIV**
59.	Campanha, Mônica Matoso; Freitas, Gilberto B. de; Santos, Ricardo Henrique Silva; Martinez, Herminia E. P.; Garcia, Silvana Lages Ribeiro	Study of the vegetative development of coffee plants (*Coffea arabica* L.) in Agroforestry system and in single cultivation.	**SEV**
60.	Araujo, Edson Alves de; Alechandre, Andrea Silva; Paiva, Maria do Socorro	Preliminary studies about occurrence of spontaneous plants in two Agroforestry systems in the state of Acre.	**BIV**
61.	Meneses-Filho, Luis Carlos de Lima; Ludewigs, Thomas; Cavalcante, Maria Ivanilde; Peneireiro, Fabiana Mongeli; Souza, Alexandre Dias de; Brilhante, Nilson Alves; Oliveira, Aluildo Costa de; Queiroz, João Bosco Nogueira de; Gonçalo, Edivaldo Nunes	Quantitative study about the biomass of eight species of arboreal vegetables for using as Agroforestry components– Final Results.	**SEV**
62.	Schroth, Götz; D'Angelo, Sammya Agra	Exotic timber tree species – a threat to native biodiversity or an additional production option for Amazonian agroforesters? The case of African mahogany (*Khaya* spp.)	**BIV**
63.	Uguen, Katell Franklin, Elizabeth	Fast decomposition of peach palm (*Bactris gasipaes*) residues in an agroforestry system and a monoculture.	**SEV**
64.	Dinkelmeyer, H.; Lehmann, J.; Kaiser, K.; Teixeira, W. G.; Renck, A.; Zech, W.	Fate of applied N fertilizer in mixed cropping systems in the central Amazon.	**SOF**
65.	Dünisch, Oliver; Gasparotto, Luadir; Azevedo, Celso Paulo Neves, Edinelson M.; Bauch, J.	High quality timber production in mixed plantations of the Amazon.	**ASY**
66.	Cavalcanti, Nilton de Brito; Resende, Geraldo Milanez de; Brito, Luiza Teixeira de Lima	Imbu tree (*Spondias tuberosa* Arr. Cam.): Alternative for agroforestry systems in the semi-arid of Northeast.	**SEV**
67.	Oliveira, Arlem Nascimento de; Oliveira, Luiz Antonio de	Influence of the colonization for fungus *micorrízicos arbusculares* (FMA) in the absorption of nutrients for the cupuaçu and guarana in a Agroforestry System of Amazon.	**SOF**
68.	Queiroz, Juliete M. T.; Ackerman, Ilse A.; Wandelli, Elisa V.; Rondon, Marco A.	Influence of the cupinzeiros (termitary) presence in the biomass of the vegetation on degraded pasture, secondary forest and agroforestry system.	**BIA**
69.	Moraes, Cássia Regina de Almeida; Bernardes, Marcos da Silveira; Castro, Paulo Roberto de Camargo; Macêdo, eferson Luis Vasconcelos de	Influence of the solar radiation over the *perfilhos* (sprouting) amount and the production of pupunha palm hearts in agroforestry systems in Amazon.	**ECO** **SEV**
70.	Rodrigues, João Elias L. Fernandes; Müller, Carlos Hans; Alves, Raimundo Nonato Brabo; Silva, José Francisco de Assis F. da	Influence of NPK levels in the production of pupunha palm heart (*Bactris gasipaes* H.B.K.) cultivated in Yellow Latossolo in the northeast of Paraná.	**SOF**

Annex 6.1.1-1 Expanded Summaries (5/6)

71.	Guimarães, Daniel Pereira; Melo, José Teodoro de; Amabile, Renato Fernando	Influence of the Agroforestry systems and of the soil texture over the productivity of the associated cultures.	**ASY**
72.	Macedo, Renato Luis Grisi; Venturin, Nelson; Gomes, Jozébio Esteves; Dantas, Frederico Wesley Figueiredo; Lima, Elisete Maialu Giacomim	Introduction and establishment of associated Agroforestry with Tectona grandis L.f. (teak) with Arabic Coffea (coffee) in Lavras–Minas Gerais.	**ASY**
73.	Gehring, Christoph Vlek, Paul L. G.; Souza, Luiz Augusto Gomes of	Vegetables of *similar liana´s* habit: key importance for the biological nitrogen fixation in the initial secondary succession?	**ASY**
74.	Souza, Mylene Dutra Barbosa de; Silva, José Ferreira da; Souza, Luciana Souza de Aguiar; Sousa, Gladys Ferreira de Fernandes, Erick C. M.	Researches about weeds in agroforestry systems in the municipal district of President Figueiredo, Amazon State.	**BIV**
75.	Souza, Luciana Souza de Aguiar e; Silva, José Ferreira da; Souza, Mylene Dutra Barbosa de	Researches about weeds in the cupuaçu cultures and pupunha on mono-cultivation and on agro-system, in Amazon.	**BIV**
76.	Franke,I.L.	Research of "mulateiro" population (*Calycophyllum spruceanum)* on pasture in Acre.	**BIV**
77.	Costa,J.R.	Tucumã *(Astrocaryum aculeatum* G.F.W.Meyer): an agroforestal potential specie for *terra firme* in the Amazon State-Brasil.	**ASY**
78.	Chagas Jr,A. Oliveira,L.A Willerding,A. Hara,F.A S	Occurrence Phosphate Solubilized bacterium (BSF) on roots of plants on Agroforestal System in rural property of Manaus-Amazonas.	**BIV**
79.	Moura,J.I.L Leite,J.B.V.	Occurrence of diseases at the coconut tree (*Cocos nucifera)* cultivated on agroforestal systems at the south region of Bahia	**PDC**
80.	Cardoso,M.O. Xavier,J.J.B. Almeida,E.F. Antonio,I.C.	Development of sweet potato cultivar with potential of utilization in diversified system at the conditions of two soils of *terra firme* of the Amazon.	**SEV**
81.	Barbosa,A.P. Morais,J.W. Nascimento,C.S.	Potential of extractives forestall species of plantation for using at insecticides.	**BIV**
82.	Sousa,G.F. Oliveira,L.A Souza,A G C Moreira,A	Production and Growth of cupuaçuzeiro on agroforestal system at the Municipality of Presidente Figueiredo, Amazon State.	**SES**
83.	G.-Ordinola,L.H Luizão,F.J. Wandelli,E. Fernandes,E.	Production and quality of litter on agroforestall system at Central Amazonian.	**SOF**
84.	Meirelles,P.R.L Mochiutti,S.	Production of forage plants of cultivated gramineous under shading of taxi-branco.(*Sclerolobium paniculatum Vogel)*	**SEV**
85.	Gomes,J.B.M. Oliveira,L.A Leeuwen,J.Van	Productivity and economical revenue of *Pupunheira* associated with some semi perene species in SAFs at the region of Manaus-AM.	**SEV**
86.	Muroya,K. Sampaio,P.T.B. Azevedo,C.P. Silva,A S.	Vegetative propagation of samaúma *(Ceiba pentandra(*L.)Gaertn) by the stakes method.	**ASY**
87.	Azevedo,C.P. Caliri,G.J.A Dunisch,O. Rossi,L.M.B.	Quality of samaúma *(Ceiba pentandra)* wood planted in ecosystem of *várzea* and *terra firme* and in different system of plantation.	**SEV**
88.	Lima,H.V. Oliveira,T.S.	Quality of the soil at system of organic and conventional cotton cultivation at the Municipality of Tauá-CE.	**SOF**
89.	Luizão,F.J. Luizão,R.C.C. Desjardins,T.	Quality of the soil under agroforestall system installed at áreas of Forest and Capoeira at Central Amazônia.	**SOF**

Annex 6.1.1-1 Expanded Summaries (6/6)

90.	Souza,A D. Leite,A P. Rodrigues,F.Q.	Quantity and concentration of biomass nutrients of eight arboreous leguminous species for utilization as agroforestal components.	**SOF**
91.	Costa,N.L. Townsend,C.R. Magalhães,J.A	Answer of gramineous forage plants under the shading by eucalyptus	**SEV**
92.	Paulino,V.T. Costa,N.L. Costa,R.S.	Answer of *Sesbania sesban* to inoculation of arbuscular micorriza and fertilization with rock phosphate	**SOF**
93.	Paulino,V.T. Costa,N.L. Costa,R.S.	Answer of *Sesbania sesban* to inoculation of arbuscular micorriza.	**SOF**
94.	Magalhães,J.A Costa,N.L. Townsend,C.R. Pereira,R.G.A	Selection of leguminous forest plant for utilization on pasture and agroforestall system.	**ASY**
95.	Rodrigues,V.G. Castilla,C. Costa,R.S.C. Palm,C.	Absorption of carbon on agroforestall system with coffee in Rondonia.	**SOF**
96.	Santos,E.M.R Franklin,E N.	Short-term dynamics of litter in secondary forest in Central Amazon Region Soil Invertebrate.	**SOF**
97.	Matta,F.R. Passos,C.A M.	Agrisilvicultural system with angico (*Anadenanthera falcata),*cumbaru *(Dipteryx alata),* banana *(Musa sp.)* and manioc *(Manihot esculente)* at the cuiabana declivity, Mato Grosso State.	**ASY**
98.	Leite,J.B.V. Moura,J.I.L.	Agroforestall system of the giant coconut tree (*Cocos nucifera* L.) with the cupuaçuzeiro (*Theobroma grandiflorum)* at the cocoa region in Bahia.	**SEV** **ASY**
99.	Pereira,J.P. Androcioli,[a] Leal,A C.	Agroforestall system with seringueira (*Hevea brasiliensis* M.Arg.) at the northwest of the State of Paraná.	**ASY**
100.	Muller,C.H. Carvalho,J.E.U Nascimento,M.O Kato,A K	System of association involving the cupuaçuzeiro *(Theobroma grandiflorum)* as major culture.	**ASY**
101.	Townsend,C.R. Magalhães,J.A Costa,N.L.	Environmental temperature under different silvipastoril system in Presidente Médice,Rondonia	**ECO**
102.	Amaral,E F Brown, I F. Melo,A W F	Tenor of potassium into a chrono sequence with the agroforestal system in Occidental Amazonian.	**SOF**
103.	Souza,A D. Michellotti,F. Nascimento,R.T. Oliveira,R.S.	Taboca using: a technological alternative for implantation of IAPs-Islands of Big Productivity at Resex – Extractive Reserve of Chico Mendes.	**ASY**
104.	Garnica,A M	Utilization of the forest to diminish the proliferation of black sigatoka*(Mycosphaerella fijensis)* at the cultivtion of banana (*(Musa AAB,Simmonds)* at the production of the rural economy of Colombia.	**ASY** **PDC**
105.	Mitja,D. Costa,J.R. Da	Spontaneous Vegetation and seed bank of four agroforestall system in small properties (Manacapuru,Amazon,Brasil)	**BIV**
106.	Ferraz,P.A Souza, A D Oliveira,R.S.	Modular nursery: an alternative for seedlings production at the extractive reserves.	**ASY**

Annex 6.1.2-1 Recent Key Research and Background Articles on Guaraná Production (1/3)

	General (G)
1.	DUARTE, J. **Guaraná: a very Brazilian fruit**. Embrapa Report, v.4, p.12, 1996.
2.	MENDONÇA, M.S.; NODA, H.; CORREA, M.P.F. **Morphologic aspects from the seed and germination of Guaraná. (Paullinia cupana var sorbilis (Mart) Ducke).** University of Amazonas Magazine, Manaus, v.1., n.2, July/December. 1992 (UA. Ciências Agrárias).
3.	EMBRAPA. Center of Agri-forest Researches of Occidental Amazon (Manaus – AM). **Guaraná's production system – State of Amazon**. 3.ed. Manaus, 1998. 34p. il. (EMBRAPA-CPAA. Documents, 13).
4.	EMBRAPA. Center of Agri-forest Researches of Occidental Amazon (Manaus – AM). **Guaraná: how to cultivate.** Manaus, 1998. 15p. il. (EMBRAPA-CPAA. Documents, 14).
5.	GARCIA, T.B.; NASCIMENTO FILHO, F.J. **The guaraná cultivation in Amazon.** Manaus: EMBRAPA-CPAA, 1999. 25p. (EMBRAPA-CPAA. Technical Circular, 5).
6.	MARQUES, JULIO BRIGLIA. Agricultural Development: The Challenge of Guarana Production in Maues Municipality. Bachelor's Thesis, Economics Department, University of Amazonas. 2000. 83 pp.
	Agronomy (A)
1.	COUTINHO, E,F.; SILVA, J.F. da; CRAVO, M. da S; ATROCH, A.L. **Weed Control on Guaraná Tree Culture**. Manaus: EMBRAPA-CPAA, 1999. 2p. (EMBRAPA-CPAA. Ongoing Research, 15).
2.	CANTO, A. do C**. Ecological importance of the use of leguminous plants as guarana covering plants on the state of the Amazon**. Manaus; INPA/ FUA, 1989. 121p. Doctorate thesis. T008/89.
3.	CASTRO, N.H.G. de **Guaraná Plantation.** Belém: EMBRAPA-CPATU, 1992. 71P. (EMBRAPA-CPATU. Documents, 68.
4.	CHEPOTE, R.E.; SANTANA, M.B.M.; SACRAMENTO, C.K. do; MAIA, M.A.Z. **Symptoms of mineral deficiency on guaraná plants**. In: GUARANÁ BRAZILIAN SIMPOSIUM. 1., 1983, Manaus: EMBRAPA-UEPAE, 1984. P. 336-344 and on Revista Theobroma, Ilhéus, v.14, n.4, p.305-312, 1984.
5.	CORREA, M.P.F.; ESCOBAR, J.R.; DANTAS, J.C.R. **Evaluation of the guaraná seedling's growth, on two handling systems**. In: SIMPOSIUM OF HUMID TROPIC, 1., 1984, Belém. EMBRAPA-CPATU, 1984. P. 275.
6.	COSTA, R.S.C. da; SOUZA, V. F. de. **Technical recommendations about guaraná tree farming** Porto Velho: EMBRAPA Rondônia, 1999. 8p. (EMBRAPA Rondônia. Technical Recommendations, 15). FOL 7783.
7.	CRUZ, E. de S.; OLIVEIRA, R.F. de; FRAZÃO, D.A.C.; OLIVEIRA, R. P. de; **Identification of guaraná's nutritional deficiency.** Brasilia: EMBRAPA-DID, 1981. 14p. IL. (EMBRAPA-CPATU. Technical Circular, 13). FOL2082.
8.	ESCOBAR, J. R.; CORREA, M. P. F.; DANTAS, J. C. R. **Development and growth of the guaraná seedlings**. Brazilian Agri-farming Research, Brasilia, v.21, n.4, p.399-408, 1986.
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Annex 6.1.2-1 Recent Key Research and Background Articles on Guaraná Production (2/3)

	Breeding and Genetics (BG)
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2.	ESCOBAR, J.R. **Inheritability of some youth phase's characters for Guaraná clones: *(Paullinia cupana* var. sorbilis).** Manaus: EMBRAPA-UEPAE Manaus, 1986. 23p. (EMBRAPA-UEPAE Manaus. Research Bulletin, 6).
3.	GARCIA, T.B.; NASCIMENTO FILHO, F.J. do; COSTA JÚNIOR, R.C. **Characterization and evaluation of clonal germoplasm of Guaraná (*Paullinia cupana* var. sorbilis)**. Manaus: EMBRAPA-CPAA, 1991. (EMBRAPA-CPAA. Ongoing Research, 10).
4.	GARCIA, T.B.; NASCIMENTO FILHO, F.J. do, CORREA, M.P.F; DANTAS, JC.R. **Collect of Guaraná's clonal germoplasm (*Paullinia cupana* var. sorbilis)**. Manaus: EMBRAPA-CPAA, 1991. 7p. (EMBRAPA-CPAA. Ongoing Research, 7).
5.	NASCIMENTO FILHO, F.J. do; GARCIA , T.B. **Competition and evaluation of Guaraná clones (*Paullinia cupana* var. sorbilis).** Manaus: EMBRAPA-CPAA, 1991. 7p. (EMBRAPA-CPAA. Ongoing Research, 8)
6.	NASCIMENTO FILHO, F.J.do; CRUZ, C.D.; GARCIA, T.B. **Genetical divergences in Young plants of guaranazeiro and improving possibilities**. Brazilian Agropecuary Research, Brasília, v.27, n.12, p.1571-1577, Dec. 1992.
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10.	ATROCH, A.L.; CRAVO, M. da S; NASCIMENTO FILHO, F.J. do; COUTINHO, E.F**. Guaraná: main results of cloning's research**. Manaus: EMBRAPA-CPAA, 1999. 2p. (EMBRAPA-CPAA. Ongoing Research, 42)
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Annex 6.1.2-1 Recent Key Research and Background Articles on Guaraná Production (3/3)

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4.	FEITOSA, M.I.; PIMENTEL, C.P.V.; OLIVEIRA, V.P. de; BOAVENTURA, M.A.M. **Guaraná supersprouting (Paullinia cupana var. sorbilis (Mart) Ducke) on the state of São Paulo**. Agricultural Magazine, Piracicaba, v.60, n.3., p.283-288, 1985. Separata 6098.
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1.	SILVA, J.F.; COUTINHO, E.F.; CRAVO, M.S.; ATROCH, A.L.; RIBEIRO, J.R.C. **Ecophisiological development of Guaraná Tree's clone in Two different Ecosystems in Amazon.** In: Brazilian Congress of Agroforest Systems: Handling e Composing the Rural Landscape, 3., 2000
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3.	CORREA, M.P.F.; CANTO, A. do C.; CUNHA, G.A.P. **Partnership of Guaraná with pineapple.** Manaus: EMBRAPA-UEPAE Manaus, 1981. 2p. (EMBRAPA-UEPAE Manaus. Technical Communicate , 27).
4.	FONSECA, C. E. L. da; CORREA, M. P. F.; OLIVEIRA, M. G. C. de; ESCOBAR, J. R. **Preliminary Studies about mixed crops of guaraná, pupunha and passion fruit in the region of Manaus.** In: GUARANÁ's BRAZILIAN SYMPOSIUM, 1., 1983, Manaus. **Annals...** Manaus: EMBRAPA-UEPAE Manaus, 1984, p. 325-335.
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7.	OLIVEIRA, ARLEM NASCIMENTO de and OLIVEIRA, LUIZ ANTONIO de. **Influence in the colonization of FMA mycorizae fungi on the absorption of nutrients from cupuacu and guarana in an Amazonian agroforestry system.** In: 3rd Brazilian Congress on Agroforestry Systems. Manaus, pp 204-206, 2000
8.	FONSECA, C.E.L. da; CORREA, M.P.F.; TEIXEIRA, S.M. **Economic return caused by the passion fruit farming mixed with guaraná and pupunha**. In: HUMID TROPIC's SIMPOSIUM, 1., 1984, Belém, Summary... Belém: EMBRAPA-CPATU, 1984. p.276.

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Alves B, R.N, Rodrigues J.L, Silva J.S	2000	Diversification and intercalation of culture into agroforestal system, at familiar agricultural of the municipality of Ponta Pedra, Pará.
Alves et.al (1997)		Flow
Alves, R.M ,Araujo D.G. Fernandes.J.R.Q	1998	Preliminar evaluation of cupuaçu tree matrix
Alves, R.M, J.R.V Correa,M.R de O Gomes and G.L. da C. Fernandes	1996	Bettering of genetics of cupuaçu tree
Alves.R.M. liveiraR.P. de Lima,R.R. de Neves M.P. das, Chaves J.P.Rodrigues .Araujo, D.G. dePimental L.	1996	Genetic resources studies for cupuaçu tree development at Embrapa-CPATU
Amaral E.F, M.V.A Lima, T Ludewigs, A.C Andrade, MG Bardales	2000	Evaluation of P fertilization on four species. III Agroforestal System of Brazilian Congress
Avilán et.al (1980)	1980	Distribution of the radical system of banana “pigneo gigante” in four system of the soil management. Tropical Agronomy 29(29)
Avilan L, F. Leal y D, Batista.	1992	Manual of Fruitculture. Principle and Management of the production. Editorial America.
Barbosa, L.F., Stein,.R.L.B.	1997	Witches broom (Crinipellis pernicious) biological control
Bastos TX Gomes. M.R.O. Correa M.M.	1997	Weather and rainning variabilty for kingdom pepper and cupuaçu cultivation
Borges et.al	1999	In “Banana Culture”, EMBRAPA
Bueno	1997	Fertilization
Caliri G.J, Azevedo C.P, Rossi L.M, Leeuwen J, Souza N.R, Gomes J.B	2000	Characteriztion of the samaúma´s growth (Ceiba pentandra) under different condition of Plantation at Amazona Central.
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Da Costa (1986).	1986	Organic Fertilizer. New Synthesis and new way for agriculture
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EMBRAPA	1999	Production chain of cupuaçu in Amazonas
EMBRAPA (1999)		The Banana Crop, technical, socio-economical and agro industry aspects)
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FAO	1999	Copoaçu Cultivation and Utilization.
Franke I.L, E.M Miranda, J.F Valentim	2000	Behavior of the arboreous species of multiple for agroforestal system at Acre State.
Garcia et.al	1998	Biological control of bananeira-broca
GOMES, A RMULLER, M.W.ALMEIDA,C.M. CORRÊA,F.L.	2000	Agroforestall system at the recuperation of degraded areas in humidity tropical region.
IBGE	1998	Statistic Anuary
IPAB, 2001		Permaculture Institute - Austrian Brazilian

Annex 6.1.3-1 Bibliography with Reference to Tropical Fruits (2/3)

Author	year	subject
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Leite (2000)		Agroforestal System of the giant coconut tree with cupuaçu tree at the cocoa region in Bahia
Locatelli,M. Souza, V.F Vieira A.H.Quinsen, R.C.	1996	Studies about cupuaçu production behavior in agroforestal system
Locatelli,M.Souza, V.F., Vieira A.H.Quinsen, R.C.	1996	Studies about cupuaçu production behavior in agroforestal system
MACEDO,J.L.PEREIRA,M.M	2000	Financial analyses of agroforestall system implanted in Occidental Amazonian.
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Magalhaes J.V, N.L Costa, C.R. Tonwsend and R.G.A Pereira	2000	Evaluation of multi-use tree in Rondonia. III Brazilian Congress of Agroforestal System.
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Maues, M.M, Venturieri G.C. Souza, L.A. de Nakamura,J.	1996	Identification and techinique for polinisattor creatture of importants vegetal species
McCafferry K A, E.C Fernandes, E.V Wandelli e M.A Rondon	2000	Carbon and nutrients stocks in agroforestal system s implanted in areas of degraded pasture of Occidental Amazônia
Meirelles P.R and S Mochiutti	2000	Forage Plant of gramineous production cultivated under the shading of taxi-branco
Mendes et.al	1997	Cont biol
Menezes-Filho L.C, T Ludewigs, M.I Cavacante, F.M Peneireiro, A.D de Souza, N.A Brilhante, A.C de Oliveira, J.B Queiroz, E. N Gonçalo	2000	Quatitative Study of biomass of eight leguminous arboreous species to the utilization as agroforestal component –Final Result..
Merchán	1998	International Seminary about banana , Armenia, Colombia
Miller R.P and P.K.R Nair	2000	Growth of Fruitful in environment of roça (cleaned área) and a study with indigenous community to Parakana on the southeast of Pará
Müller et.al (2000)		
Müller, C.H and J.E.U de Carvalho	1996	Propagation system and technique of cupuaçu culture
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PPG7	1998a	Development of agroforestal System to the recuperation of abandoned area of Rondônia. PPG7
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Schwengber D.R M.F Arco Verde, O.R Duarte, H.A Xaud	2000	Initial Behavior of wooden species and leguminous in agrossilvipastoril system of cerrado system in Roraima
Scialabba ,Nadia	2000	Factors Influencing Organic Agriculture Policies With a Focus on Developing Countries IFOAM 2000 Scientific Conference, Basel, Switzerland, 28-31 August 2000
SEBRAE (2000)		Production of Organic Fertilizer
Sena-Gomes A.R, M.W Muller, C.M Vasconcellos, C Almeida, F.L Correa	2000	Agroforestal System at the recuperation on degraded areas in humid tropical region. CEPLAC

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Silva, R.M. da	1996	Reproductive system analysis and genetic divergency of cupuaçu tree.
Silva,A. de .Souza,L.A., Silva, A.T. de A.	1996	Cupuaçu tree plagues and natural ineming
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Souza, A. das G.C.	1996	Genetic resources and cupuacu tree improvement
Souza,A. das G.C., Silva, S.E.L. da	1996	Cupuaçu tree clones evaluation
Souza,A. das G.C., S.E.L da Silva, A.M Tavares, M.R.L Rodrigues	1999	Cupuaçu culture. EMBRAPA
SOUZA,F.K., MACIEL,R.C., SILVA,J.P.	2000	Economical analysis of RECA: a model of using the land in Occidental Amazonian
SOUZA,S.G. WANDELLI,PERIN,R., FERNANDES,E		Agronomical, silvicultural, and economical aspects of agroforestal system implanted on degraded pasture areas.
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Stein, R.L.B., Albuquerque, F.C., Nascimento, R.M.	1994	Crinipellis perniciosa biology of cupuacu tree: field analysis
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Steinberg (1991)		Maracujá(Passio flower): Pratical guide for an equilibred management
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Annex 6.1.5-1 Review of Important Basic Knowledge on Seed Production

1) Summary of reproductive biology of target species

	Age and size at first maturity			Fecundity	Spawning season	Source
	Age	Size				
		Length	Weight			
Tambaqui	4 yrs	50-56cm	6kg (< 5kg in captivity)	± 1 million	Early flood season (Dec-Feb)	Ruffino and Isaac (1995) IDAM Balbina Hatchery
Pirarucu	4-5 yrs	170 cm	40-45kg	0.05-0.5 million (about 5,000 eggs per spawning)	Nov.-Jan. (Tefe) Jan.-Mar. (Santarem)	Workshop Pirarucu (2000)
Surubim	3 yrs	-	6kg	0.5-1 million (0.1 million/kg of female)	Early flood season (Oct-May)	Projecto Pacu
Matrincha	2 yrs	45cm	1.5kg	0.5-1 million	Late dry season (Oct-Dec)	IDAM Balbina Hatchery
Jaraqui	2 yrs	25 cm	0.5 kg	0.2 million	Early flood season (Dec-Feb)	

2) Outline of seed production procedures of tambaque

Stages	Rearing facilities	Duration	Remarks
1. Broodstock management	Earthen ponds		0.5 kg of fish/m^2
2. Hormon injection	Small tank	12-15 hrs	Use of gonadotropins such as pituitary gland and HCG.
3. Artificial fertilization			Amount of eggs: 10-20% of female body weight
4. Incubation of eggs	Conical incubation tank (200l.)	14-16 hrs.	2 g or 3000 eggs/liter of tank water, Hatching rate: 80-90%
5. Rearing of yolk-sac larvae	Small tank or earthen pond	4-6 days	
6. Nursery culture of post larvae	Earthen pond	1 month	Natural zooplankton as food of larvae shall be propagated by giving fertilizer. Stocking density: 200-500 larvae/m^2, Survival rate: about 20%
7. Harvest and shipping of larvae			

Source: Lima and Gouldring (1997), IDAM Barbina Hatchery

3) Present availability of fish fry for aquaculture

Species	Origin	Size	Price (R$/fry)	Production capacity
Tambaqui	IDAM Balbina Hatchery	4-5 cm	0.06	1.0 million
	Private hatcheries in AM	2 cm	0.06-0.08	
	- do -	4-5 cm	0.15-0.20	
	- do -	10-12 cm	0.30	
Matrincha	IDAM Balbina Hatchery	4-5 cm	0.10	0.1 million
	Private hatcheries in AM	4-5 cm	0.20	
	Wild-caught in AM	4-5 cm	0.10	
	Project Pacu in MS	3-4 cm	0.35	2.5 million
Pirarucu	Ecopexie in AM	25 cm	30.00	
	Wild-caught in AM	25 cm	10.00	
	Project Arapaima in PA	15 cm	45.00	US$20 for export
Surubim	Project Pacu in MS	6-8 cm	1.00	1.25 million in total
	- do -	9-12 cm	1.50	
	- do -	13-15cm	2.00	
Jaraqui	Wild-caught in AM	3-4 cm	0.02	

AM: Amazonas State, MS: Mato Grosso do Sur State, PA: Para State