


JAPAN INTERNATIONAL  
COOPERATION AGENCY (JICA)

INSTITUTE OF AGRICULTURAL  
AND LIVESTOCK DEVELOPMENT  
OF THE STATE OF AMAZONAS (IDAM)

**THE STUDY  
FOR  
IMPROVING RURAL PEOPLE'S LIVELIHOODS  
THROUGH  
AGRICULTURAL ACTIVITIES  
AND  
SOUND NATURAL RESOURCES MANAGEMENT  
IN THE STATE OF AMAZONAS  
IN THE FEDERATIVE REPUBLIC OF BRAZIL**

**SUMMARY**

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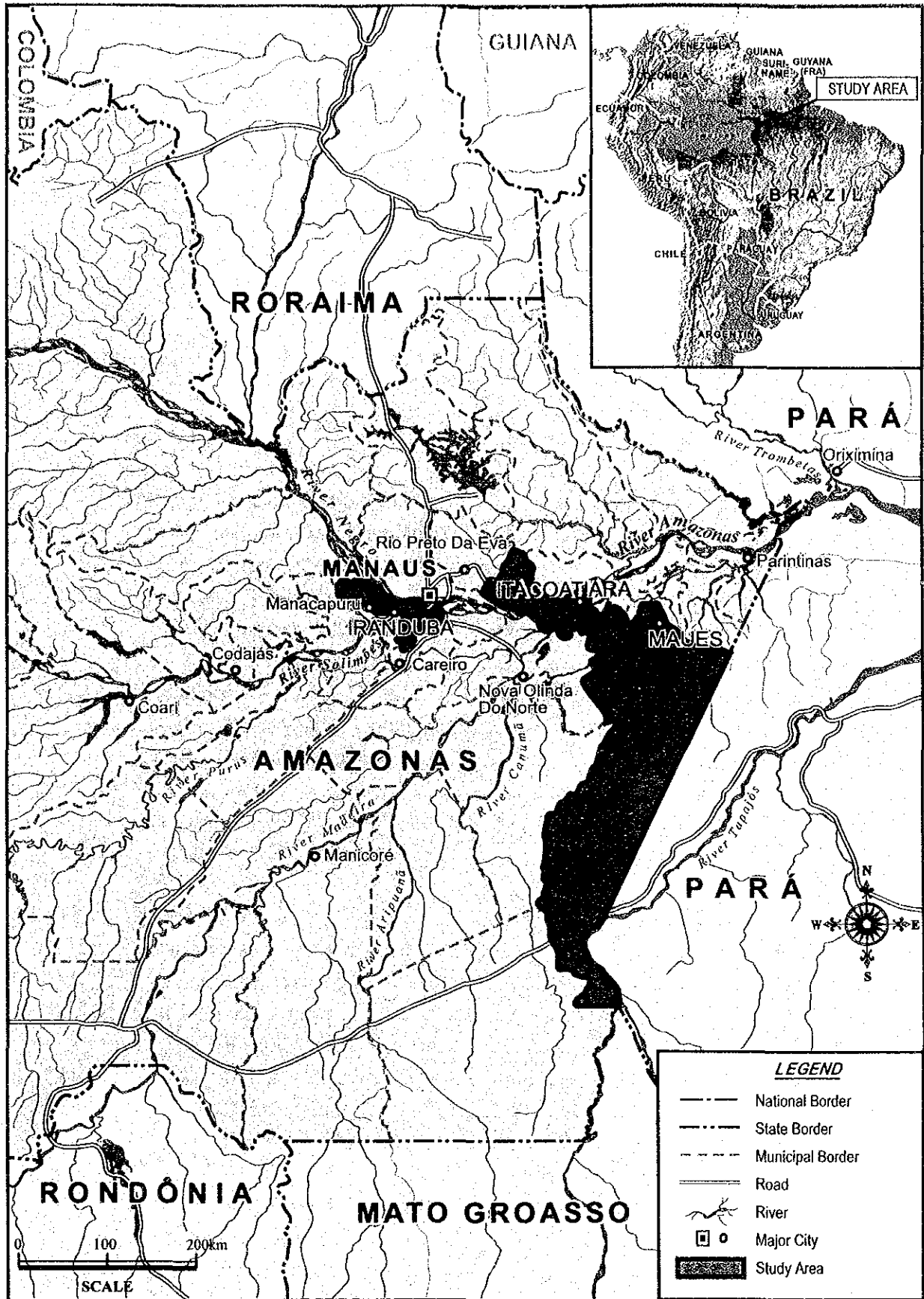
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LOCATION MAP OF THE STUDY AREA

**THE STUDY FOR IMPROVING RURAL PEOPLE'S LIVELIHOODS  
THROUGH AGRICULTURAL ACTIVITIES  
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IN THE STATE OF AMAZONAS IN THE FEDERATIVE REPUBLIC OF BRAZIL**

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## Summary

### 1. Authority

This is the Report on the Study for Improving Rural People's Livelihoods through Agriculture Activities and Sound Natural Resources Management in the State of Amazonas in Brazil (the Study) prepared in accordance with the Scope of Work (S/W) agreed upon between the Government of the Brazil represented by the Institute of Agricultural and Livestock Development of the State of Amazonas (IDAM) and Japan International Cooperation Agency (JICA) dated January 15, 2000.

### 2. State and Regional Socio-Economy

#### 2.1 Socio-economic Condition in Brazil and Amazonas State.

The rain forest of Amazon spread approximately 3.5 million sq. km. over several countries, 45% of which is in the Brazilian territory. The river Amazon with its branches extends to the total of 6,280 kilometers. The state of Amazonas, the largest of the 27 states with a little less than 1.6 million sq km, accounts for 18% of the national territory. With a population of nearly 50% is concentrated in the state capital, Manaus. Amazonas state is characterized by the large Export amount of forestry products mostly lumber and pulp, and the statistical data does not show much of the contribution of agricultural product. But considering the product from agricultural products, agricultural sector is accounted for as 13% of total export sales.

Economic Growth in Brazil has a fast-growing economy for many years, and the rate of economic growth accelerated after World War II with annual industrial growth of over 6% until 1973. But the growth in agricultural sector was only about 4%. Agriculture's share in GDP has been declining when the price of commodities are calculated by sectors. Although the share of agricultural sector is small in GDP, export amount of agriculture and its related products takes place more than 30% which is significantly large in the total amount of export.

#### 2.2 Socio-economic Condition in the Study Area.

Increase of population in Manaus, capital of Amazonas, is considered as a result of the Manaus Free Zone (ZFM). Many rural people went to ZFM and the rate of urbanization is very high at 70% of people living in urban district. The ratio of urban population increased rapidly since 1970 when the ZFM begin to operate.



Because of the special tax reduction for trading in the ZFM, 306 companies are operating in 1998 and marked the total sales of nearly 10 billion US\$ every year. The employee used to count 76 thousand people in 1990, but recently the number of employee is decreasing and only a little more than 40 thousand people are employed.

Study areas of Iranduba has population of 26,612, Itacoatiara 64,937, and Maués 36,628 in 1996. Iranduba is heavily influenced by its proximity to Manaus, while Itacoatiara represents the third largest population in the state.

### **2.3 Participatory Approach**

#### **2.3.1 Summary of Rural Society Survey**

Rapid Rural Appraisal and Questionnaire Survey (RRA/QA) was conducted in order to collect quantitative and qualitative information regarding the livelihood activities in the sample communities in the study areas. A Brazilian based consulting company was contracted to complement the RRA/QA and rural society expert has worked closely with them. Three interdisciplinary teams, combining insider and outsider knowledge, worked simultaneously in the three municipalities in order to complete the survey within the limited timeframe.

Choice of sample communities was derived from a joint process with IDAM staff and others applying a number of key criteria:

- significant presence of crops in question, - different agro-ecological zones, - presence of small farmers, - sufficient number of households in community, - ease/difficulty of access to local/regional market, - presence of extension agency, - level of accessibility for field teams, level of organizational activity.

#### **2.3.2 Workshop**

In phase-II second field work, based on Project Cycle Management (PCM), the Study Team carried out the study with participatory approach and the workshop in several times to investigate the condition of community group and organizations. As result of that, Ideas and needs of the beneficiaries and their abilities to solve problems by themselves are able to be grasped.

### **2.4 Rural Society**

#### **2.4.1 Rural Society Condition**

Contacts were made with membership organizations, NGOs, and others working with rural-producers' associations. Through these contacts and from initial

findings of the RRA Teams it is clear that associative forms have frequently been imposed from the outside, primarily driven by the needs of those wishing to intervene in the rural areas. In the 1990's there has been an increase in the formation of Producers' Associations in order to access different forms of institutional credit (eg PRONAF, FNO especial).

The communities in the study area can be characterized as populated by subsistence farmers who are increasingly interacting with the market and have growing demands for cash. This is particularly for certain food stuffs as well as for health and education needs, clothes and other consumer goods. At the same time as they are increasingly linked to the cash economy, the markets are failing them. Encouraged to produce more cash crops through incentives, coupled with increasing pressure on extractive resources, they find themselves in a vulnerable position. High dependence on family labor, this is a constraint in expanding activities.

#### 2.4.2 Farmers' Organization

In all three municipalities, most of the 11 types of community based organizations are informal community organizations. Some formally registered organizations are local welfare oriented town based NGOs, rural labor unions, agricultural cooperatives, producers associations, and community farmer associations. They all directly related to meeting farmers productive and social needs. Few meet the need to mobilize and manage savings of farmers to reduce risk of insecurity from agriculture income. Municipality town based organizations are more age and gender specific than rural based organizations; however, in Maués there is an active rural Mothers' Club program in rural areas and with fishing associations. Type of produce, type of labor, gender, religious persuasion of members and geographical location of community settlement, kinship bonds and services to be gained from collective action likely affect type of organization and the degree of its cohesiveness.

Based on the analysis of various sets of community data, it is estimated that there is a potential of 82 (20% of total communities) farmer-based community organizations in Iranduba, 218 community organizations in Itacoatiara, and 127 community organizations in Maués. The actual number of registered community farmer associations receiving technical assistance from IDAM and known as registered associations under PRONAF or FNO program requirements is 18 in Iranduba (22% of total communities), 93 in Itacoatiara (43% do), and 38 in Maués (48% do). The potential for mobilizing farmers to develop community farmer associations to improving their agriculture and quality of life is far from being met.

Current conditions of the organization and management capacity of farmer organizations indicate that they are weak and have limited sustainability capacity. Lack of trust and cooperation is also indicated by the absence of informal credit and savings organizations and percent of association members having no knowledge about services that have been available through membership of their community farmer association.

### 2.4.3 Farmer Economy

Based on information from the RAA and Questionnaire Survey (RRAQS), it is possible to characterize the household economy of a typical guaraná farm family in Maués. Although the RRAQS only interviewed 90 farm families in the three communities, the following information (averaged over the 3 villages) can be assumed to be representative of most communities in the municipality.

#### (1) Guaraná Farmer

In general terms, the average guaraná household has a holding of 53 ha, but only 5 ha are planted to crops. Since the average family size is about 6.0, this means the average planted area per family member is a little under 1 ha.

All 90 families interviewed plant guaraná and cited it as their second most important crop behind cassava. Due to marketing difficulties, only 63% of the harvested crop could be sold in 1999/2000. Some estimates on the general breakdown of family income are noted below.

Type of Income	Value (R\$)
Total Annual Income	3,540
Total Annual Income Agriculture, Livestock, & Extractivism (Hunting/Fishing)	978
Total Annual Income from Agriculture (Crops)	787
Total Annual Non-Farm Income	2,562

Source: RRAQS, 2000

With an annual expendable income of less than R\$ 4,000, it is obvious that the typical guaraná-based family household income comes from activities in Surprisingly, only about 28% of their household income comes from activities in agriculture, livestock, and extractivism. Non-agricultural income is significant (78%) and is largely comprised of pension money from the senior household members and cash income derived from the adult males (daily labor activities).

Farmers cite the current low prices for guaraná as one of the major reasons for their poverty. Although farinha prices have remained fairly steady over the last 5 year (13-15 R\$/sack), guaraná prices have been reduced from levels of 8-10 R\$/kg to levels of 3-5 R\$/kg. Additionally, yields have steadily declined due to lack of farmer ability to buy inputs and spend time with crop management.

## (2) Vegetable Farmer

Based on the Survey report, the municipalities of Costa de Iranduba, Ilha de Jacurutu and Costa de Jandira, Caldeirao were selected for the survey area. 90 completed questionnaires formed the survey sample.

The results of the analysis are summarized as follows:

### Average Household Income in the Survey Area

Item	(Unit: R\$/year)			Average
	Costa de Iranduba	Ilha de Jacurutu	Costa de Jandira, Caldeirao	
Gross Income	5,990	4,150	6,270	5,470
Farm Income	3,820	1,910	4,060	3,260
Off-farm Income	2,170	2,140	2,210	2,110

Source: JICA Study Team, RRA and Farm Economic Survey, 2000

Above table shows that the average farm income of the farmer in the Survey area in Iranduba is about R\$5,470/year. Agricultural income forms 61.4% of total income in Iranduba. There are variations within the sample communities, Ilha de Jacurutu having half the income of the others. Currently the main sources of livelihoods for the communities are small scale agriculture and livestock production, as well as artisanal fishing. Forest based activities are less practiced - due to the effects of logging and due to the increase of cropping areas.

Costa de Jandira, Caldeirao have the highest income in the sample. In Costa de Jandira, Caldeirao, the degree of commercialization is significant. Many of the farmers do not plant manioc. They buy farinha from neighbors or in Iranduba. In these rare cases, the farms can be said to have a high degree of market dependence and their farming is basically a commercial activity.

Income from hunting, fishing and extraction of forest fruits and trees is not significant. Average non-farm income for the whole sample is R\$2,110, forming 38.6% of total income. There is no difference of non-farm income within the sample communities. The sources for cash income are salaried jobs, pensions, day labor, trading, handicrafts, other services, etc. The main source of non-farm income for the majority is retirement pension.

Per capita annual cash income of Iranduba is R\$1,050 as result of this study. That is very low level of income. It is a fact that living condition of most of farmers in the Study area except a few is extreme poverty. The farm economic survey showed a great lack of cash income - many households stating this, to the point of lacking money for purchase of daily necessities.

## (3) Tropical Fruits Farmer

Income of farmers of Itacoatiara comes from three main sources: agricultural

income, non agricultural sources and extractivism. According to the RRA report, for a sample of 90 farmers on 3 communities, average of total income is R\$7,935.28 per household of these R\$4,335 (54.6%), comes from agriculture. The average income of each community is summarized in the following table.

**Average Income of the Selected Communities.**

Item	S. Antonio	S. Coração	S.J. Araça	Mean
Sample	30	30	30	
Total	6,393.27	13,453.83	3,958.73	7,935.28
Agriculture	2,336.87	8,448.33	2,219.80	4,335.00
Other	4,056.40	5,055.50	1,738.93	3,600.28

Source: RRA

From IDAM sources, target crop for the Itacoatiara area, are distributed as follows: 700 cupuaçu producers on 1,900 ha with a mean area of 2.7 ha; 260 banana producers on 450 has with mean of 1.7 ha; 97 passion fruit producers on 45 ha with a mean of 0.46 ha.

The most planted crop is cassava with 1,800 families on 5,500 ha with a mean of 3 ha per producer. Pineapple is the second most planted fruit crop with 400 producers on 650 ha giving a mean of 1.6 has per producer. Pupunha is also a for own consumption and to do some exchange with other farmers, they consume extractive products for consumption and some get income from pensions.

## 2.5 Government Program for Financial Support

**PRONAF:** Federal Government Fund handled by BB (Banco de Brasil) as a sub program of National Program of Development (PRONAF)

**FNO:** Federal Fund for development aid to North region, which is handled by BASA (Banco de Amazonia)

**FMPES:** State Fund to assist farmers, breeders and small industries which is handled by BEA (Banco Estado do Amazonia)

The size of the total fund amounts to 11.5 million R\$ for the State of Amazonas for the year 2000, and IDAM promotes approximately 70% to 75% of loan projects. The total amount of credit is in the trend of declining in recent years mainly because of the decrease of federal fund. Problems in Financial Support contains, poor understanding of the program on both sides of farmers and operator, limited human resources and limited fund of IDAM to operate technical support, lack of marketing ability to cash in from agricultural products.

## 2.6 Development Program

The Program "Third Cycle" has a principal objective to promote the development

of each municipality in the State of Amazonas. The general objective of the program is to reduce the imbalances among sectors and between urban and rural. It is intended to stop the immigration of people from rural area to urban district by creating new employment opportunities in each municipality, and provide education and health-care for the better quality of life in rural area.

The program intended a chain reaction starting with the government investment to rural infrastructure, then stimulating private enterprises to work with local low income farmers for the increase of agricultural production. But target beneficiaries of people in the rural area were not easy to be informed of the program even through the program appears to carry a significant political message. It will take a long time and enduring efforts to make the political dream of rural development come true.

### **3. Natural Conditions**

#### **3.1 Characteristics of Land**

Varzea, the area stretching to the Igapo, is a flooded area during the high-water period of the Amazon River. The characteristic of the natural environment of Varzea is that the ground soil is fertile and the water level of the river change by the season. Terra Firme, is not flooded even in the high-water period but the soil is acid and poor in nutrition with red clay quality. Terra Firme area covered 3,303,000 km<sup>2</sup> of the plateau, which is 90% of the Amazon.

#### **3.2 Geology and Agriculture**

In general, the soil condition of the Amazon region including the study area is lean and not suit for cultivation because of its characteristics. Red soil with clay quality, which may have been placed in the Amazon region, is an acid soil with little nutrition contained.

#### **3.3 Environment Aspect**

##### **3.3.1 Ecology, Fauna and Flora**

The rainforest and associated aquatic ecosystem contain some of the world's highest biological diversity in terrestrial and aquatic plant and animal life of which many are known, and presumed, to be useful natural products. There are many endangered species and protected species of fauna and flora inhabiting in tropical rainforest in the Amazon region.

### 3.3.2 National Park and Reserved Area

The tropical rainforest area in Amazonas state is estimated about 1,559,000 km<sup>2</sup>. There are threetype of reserved parks in amazonas state such as; i) Federal Conservation Unit, ii) State Conservation Unit, iii) Municipal Conservation Unit. In the PPG7, park and reserves project is being carried out presently. The PPG7 is aimed to contribute to the protection of the environmental heritages, through conservation of the bio-diversity of the Brazilian tropical rainforest.

### 3.3.3 Deforestation

The rapid agricultural development and the pasture development since 1970s lead to rapid disappearance of forest. During the economic stagnation since 1988 to 1991, annual forest decrease slowed down, but when the economy recovered in 1991 slush and burn gets active again.

### 3.3.4 Indigenous People

There are reserve areas for indigenous people located approximately 200 km far from the central part of the Maués. Approximately 5,800 indios live in this area.

## **4. Environmental Organization and the Relevant Law**

### **4.1 Procedure of EIA**

Basically, there are no Initial Environmental Examination (IEE) system legally required in the Amazon state. It is therefore requested that the examination of its potential influence, which can cause impact to the environment shall be conducted by Environmental Impact Assessment (EIA). The size of development required by EIA is more than 100 ha per each developer (farmer). Basically the EIA is not required in this project according to Environment Law.

### **4.2 Environmental Licensing System**

There is a licensing system in addition to the Environmental Impact Assessment (EIA) system. The IPAAM is the state environmental organization responsible for licensing system according to the Government low (No. 1532, July 6, 1982, No. 1642 May 22, 1984, and No. 8812 July 26, 1985). According to the above laws, the project which includes the activities such as vegetal extraction, agriculture, cattle raising, hunting and fishing, have to prepare application for obtaining the license.

### 4.3 Relevant Project and Program

#### 4.3.1 Subprogram of PPG7

The implementation of PPG7 project was made official by the publication of decree no. 563, on June 5, 1992 and is carried out with the purpose of developing sustainable utilization of the Amazon forest. The subprogram of the PPG7 is a structural project, the purpose of which is to obtain satisfactory results, which may be applied institutionally in the consolidation of Brazilian environmental policy and the expansion of knowledge of Amazon ecosystems for the sustainable use of natural resources.

#### 4.3.2 PGAI Project

The Amazonas state government is implementing ecology and economy zoning project in the northeastern part of the southeastern part of the state through the cooperation of the Federal Government and NGO. Zoning plan of project area will be conducted according to this implementation plan. It is expected that zoning plan will be completed around 2002 to 2003 according to the information of IPAAM.

## 5. Present Condition of Guaraná

### 5.1 Production

Brazil is the only significant producer of commercial guaraná in the world. An estimated 2,438 tons of grain were produced in 1999; 22% of that total was from Amazonas (530 tons) and 62% from Bahia (1,512 tons). Bahia has far less area planted to guaraná than Amazonas but productivity in Bahia is more than double that of Amazonas (497 kg/ha vs. 234 kg/ha).

guaraná can be grown in all three municipalities of the Study Area, but Maués is the most important producer of guaraná in the State, producing 230 out of 530 tons in 1999. Maués has been considered to be the "cradle" of guaraná production since the early 1900's but unfortunately, the traditional farmers who cultivate the crop have very low yields. The principle factors limiting yields are infertile soils, attack by anthracnose disease and thrips, heavy rains which disturb flowering, and the economical restriction of traditional farmers to adopt improved technologies. High yielding, disease resistant varieties have been developed by both the public and private sector, but the Maués farmers are very slow to accept them despite extension activities by IDAM. However, the guaraná of Maués is still in very high demand due to its superior processing qualities. However, the small



guaraná product farmers in Maués are in a critical situation to be capable of being taken the marketing share of guaraná by other states, specially Bahia state, that productivity is high.

## 5.2 Processing and Distribution

Guaraná is prized for its high level of caffeine and other natural factors which reputedly give it stimulatory and therapeutic properties as a food additive. Guaraná is commercialized in several forms: (1) as whole seeds, roasted or unroasted, (2) as an insoluble powder, (3) as heat-cured bars or "bastoes", and (4) as a liquid concentrate for incorporation into soft drinks and energy drinks. Except for the concentrate, all these products have the ability to be produced, processed, and marketed by small farmers or small rural agro-industries. Large beverage companies buy whole seeds and process them into the concentrate, which can be sold as is or further processed into proprietary drinks.

Maués and Manaus comprise the "nerve center" for guaraná processing and distribution activities through out Brazil. A high percentage of the seeds are commercialized by beverage companies and traders. It is estimated that in 1999, the Maués crop was distributed as follows: beverage companies (70%), bar processors (20%), and powder processors (10%). Over 70% of the bars and powder processed in the Maués /Manaus (10%). Over 70% of the bars and consumers. An estimated 5 tons of powder and bars and 9 tons of beverage concentrate were exported to foreign countries from Manaus. Export demand is expected to increase sharply over the next few years due to the increased interest of multinational companies.

## 5.3 Awaiting Solution of Development for Guaraná

Currently, both the domestic and international demand for guaraná is outstripping supply. Due to this trend, two major opportunities for improvement should be focused on:

- (1) Higher yields through increased farmer adoption of new, proven technologies,
- (2) Increased participation of rural Maués growers and cooperatives in processing activities.

## 6. Present Condition of Tropical Fruits

### 6.1 Production

Cupuaçu, açaí, maracujá, and banana were selected as the target tropical fruit crops

for the Study. All four of these fruits are grown in the three municipalities of the Study Area, but the potential for future expansion is the greatest in the region of Itacoatiara. With the exception of maracujá, all of these fruits are characteristic to Amazonia and are widely cultivated by family farmers. In 1999, Itacoatiara produced an estimated 608 tons of cupuaçu, 270 tons of maracujá, and 240 tons of banana. By contrast, the State of Amazonas produced cupuaçu, maracujá, banana, and açaí at levels of 2,572, 3,872, 5,568, and 240 tons, respectively.

The productivity of all these fruits is 25 - 50% lower in the State of Amazonas compared to other parts of Brazil. Poor soil fertility and the farmer's unwillingness (and inability) to use fertilizer and improved varieties are major factors resulting in these low yields. In addition, yield limiting diseases and pests such as anthracnose of cupuaçu, açaí aphids, scale insects of maracujá, and black sigatoka of banana typically cause more damage in Amazonas than in other growing areas of Brazil. Technologies have been developed to encourage higher and more sustainable yields using resistant varieties, low levels of fertilizer, integrated pest management, mixed cropping and other agroforestry techniques, but farmer adoption of these practices has been very slow. In addition, post harvest losses are very high due to the isolation of the farms, poor access to transport, lack of protective packing materials, and absence of a cold chain.

## **6.2 Processing and Distribution**

With the exception of banana, a high percentage of these fruits are shipped by boat from Itacoatiara to Manaus, where they are consumed fresh or quickly processed (mainly into frozen pulp). By contrast, much of the banana crop is distributed by road, and there is no significant processing of banana in Manaus. None of these fruits are exported out of Amazonas whereas tons of subtropical fruits (orange, apple, grapes) are imported.

In 1999, the State of Amazonas processed over 1,500 tons of cupuaçu and maracujá frozen pulp alone. Most of this processing took place in the immediate vicinity of Manaus. There is now considerable interest in the processing of cupuaçu, açaí, and maracujá at a more rural level so that post harvest losses can be minimized and farmer income can be improved. Aside from frozen pulp, other products of interest are fruit preserves and nectars, dehydrated açaí powder, "Cupulate" (chocolate derived from fermented cupuaçu seeds), and concentrated maracujá juice. Some of these products have significant export potential, but exports are currently constrained due to low levels of quality and hygiene, and difficulties in establishing stable linkages to buyers.

### 6.3 Problems to be solved of Development for Tropical Fruits

It will be indispensable to alleviate some of the following key constraints for tropical fruit development: 1) low acceptance of technology packages by the family farmers, 2) poor market linkages, 3) difficult access to capital for investments in production and processing by rural communities, and 6) the delay of Amazonas in establishing a good reputation as a supplier of high quality, hygienic fruit products.

## 7. Present Condition of Vegetable

### 7.1 Production

According to the IDAM estimation, the various were planted in the 6,390 ha in the state of Amazonas. The main areas of vegetable cultivation are located in the suburbs of Manaus which is the only one big consuming place in the stage, in these areas that border the Sorimois river, and Iranduba located there. Overall, most of vegetables have a flat to upward trends, and from this view, it may be said that vegetables have a growing market in the state. The majority of some kinds of vegetables consumed in the state are imported from South and Southeast region. The state agricultural plan put high priority to the achieving greater stability and improved production of vegetables.

Irاندuba is considered as one of the vegetable supply bases of Manaus. The holm areas (varzea) occupied by farmers who cultivate areas up to 3 hectares, with vegetables, papayas, passion fruit, banana and so on. The number of small farmers is estimated 840 families or about 90% of total families in Varzea areas of Irاندuba. Vegetables are cultivated in scattered land and mostly concentrated to varzea. In the sector of agriculture, Irاندuba appears with great potentiality, showing significant progress with vegetable production.

Almost of all the small farm works are done by manual, and majority of small farmers adopts traditional technique. These small farmers suffer from lack of their own capital and very few of them can access to credits and receive technical assistance. Small farmers do not always apply fertilizer at the recommended rates, because of the high price of fertilizer. While pest and diseases sometime give serious problems to the farmers, application of agro-chemicals depends on the situation of farmers' economical situation. Furthermore, the vegetable cultivation in the low varzea area is practible form 5 to 8 month period in a year, and dominated by weather and flood conditions in each year. As the cultivation period is quite limited, the vegetable production in varzea area is characterized by fitting

in a short cycle. As the result, both of productivity and quality of the vegetables remain at low level.

The study aims at the increase in agricultural production and thereby improvement of the farmers living standard in the study area through the improvement of farming practices and the establishment functional marketing system for the both of producers and consumers. With this view, the promising vegetables would be selected based on the following criteria: 1) Natural Adaptability, 2) Consistency with the Government policy.

## **7.2 Processing and Distribution**

As for the distribution, of over 90% of Iranduba vegetables is transported to Manaus for local consumption, except the minor consumption in Iranduba, and a few vegetables are shipped on the river to other municipalities by brokers. It is estimated that 67% vegetables in Iranduba is sold by intermediaries. The vegetable production farmers in the area do not enjoy fair share as showing disparity between farmgate and retail price.

## **7.3 Problems to be solved of Development for Vegetable**

The major constraints are 1) an extended high water season, 2) insufficient agricultural supporting services, 3) lack of farmers' knowledge and technology for cultivation, 4) poor infrastructure and worse access to market.

# **8. Present Condition of Fishery and Aquaculture**

## **8.1 Fishery**

The Amazon River is characterized by having one of the richest aquatic bio-diversity in the world. More than 2,500 species or about 20% of world freshwater fish species have been recorded in this system. In recent years, however, fishery resources particularly for valuable large-size species like pirarucu, tambaqui, surubim and other catfishes have decreased seriously. Stock enhancement programs such as release of artificial fry and fishing effort control have been started experimentally but are now at just a beginning stage.

Total fish catch of the Amazonas State was increased from an average of 34,000 tons in 1980s to the peak of 63,100 tons in 1996, and then decreased to 48,500 tons in 1997. Purse seine and gillnet are the major fishing gear used. Fish catch of jaraqui has been dominated followed by curimata, pacu and matrinxã. Unloading of those four species in Manaus was accounting for 76% in both 1997 and 1998.

Fish catch of the 1st class fishes such as tambaqui and pirarucu decreased sharply, and currently commercial fishing is prohibited totally for pirarucu and partly for

tambaqui. Surubim, an important catfish for export, is also recognized as overexploited, and the minimum catchable size is indicated in the fishery regulation together with tambaqui and pirarucu.

People in the Amazonas State traditionally prefer fishes with scales to those without, i.e., catfishes including surubim. The scaled fishes are marketed locally in fresh state. On the other hand, catfishes are frozen-processed and distributed to overseas market as well as other regions of the country. Per capita fish consumption is estimated to be 37.2 kg/person/year in Manaus, which is much higher than the national average of about 4.5 kg.

## **8.2 Aquaculture**

Integrating all the information obtained in this study, number of fish farms in the State is estimated to be an order of 500 at present. Total fishpond area will be 1,000 ha with annual production of 1000-1500 tons. Most common facility used for fish culture is so-called "barragem", which is a dam pond constructed on "igarape" (small water canal originated from spring water). Regarding tambaqui, IDAM has been producing juvenile tambaqui at the Balbina fish hatchery, which is the biggest one in the State, and distributed them to private fish farms.

## **8.3 Problems to be solved of Development for Fishery and Aquaculture**

As for capture fishery and fish marketing, decrease of important fishery resources coupled with present difficulty in law enforcement is the fundamental problems. Non-existence of reliable fishery statistics makes difficult to given scientific examination. Discharge of excess fishes due to unbalance of catch and market demand is also serious problems in Manaus today.

As for aquaculture, problem analysis was conducted through a series of discussion with counterparts, and the following four major problems are confirmed:

- Basic aquaculture technology is not disseminated
- There are significant number of suspended aquaculture facilities
- Bank credit is difficult to obtain
- Supply of fish fry of potential species is not sufficient

Unlike the case of agriculture crops, marketing system was not recognized as a serious problem for restricting development of small-scale aquaculture at the moment.

## **8.4 Fish Species to be studied in Aquaculture Sector**

The study shall focus on the four fish species, which IDAM is planning to develop a hatchery technology in future. Those are pirarucu, surubim, jaraqui and

matrinchã as stated in the Minute of Meeting on 15 January 2000. Tambaqui is not included in the priority species for extension to small-scale farmers. Whereas, it shall be remarked that jaraqui is the most abundant fish species caught in this locality and marketed at low price. Although fish unloading of jaraqui tends to decrease today, aquaculture of this species may not contribute for cash income of family farmers. From those viewpoints IDAM and the Study Team exchanged respective views on identification of the target. At the start of the Second Fieldwork study, those two parties held a sincere discussion regarding the study approach of the aquaculture sector, and agreed each other as shown in the minutes of meeting on September 27, 2000 (Attachment 2). As indicated in the minutes, tambaqui that is an existing aquaculture species shall be investigated together with the four new species from the aspect of introducing them as an alternative livelihood for the beneficiaries of the Study. Therefore, the priority fish species to be studied are now five, namely pirarucu, surubim, matrincha, jaraqui and tambaqui.

## **9. Marketing**

The foodstuff currently traded in the state of Amazonas is categorized into three types, I) produced and consumed in the state of Amazonas, II) produced outside and imported to be consumed in the state of Amazonas, and III) produced in the state and exported to be consumed outside. Staple foods such as farinha (mandioca flour), fruits, fish are produced and consumed in the same state, but there are imported foods such as rice, beans, flour and vegetables. Imported vegetables such as potato, onion, tomato come mostly from southern states through São Paulo Central Marketplace. Exporting items including frozen fish and guaraná are traded by specialized traders who often have processing and refrigerating facilities.

### **9.1 Marketing of Guaraná**

Based on information obtained from the Ministry of Agriculture, major guaraná beverage producers, local farmers and small processors, overall flow diagram can be constructed to describe distribution of guaraná from Maués municipality.

Maués guaraná farmer has the following basic options for distribution of his crop: 1) sell to a beverage company, 2) sell to a local processor of bars/powder, 3) sell to a collector, i.e., broker, or 4) store the crop and direct marketing.

The following table shows the distribution of guaraná products from Maués. It is a point to notice that over 40% of the guaraná and guaraná products produced in

Maués are probably “unregistered”, i.e. not reported to the Ministry of Agriculture, for the reason that trade as long as these buyers insist on evading taxes and tend to underestimate the amount of guaraná production.

**Total Distribution of “Registered” Guaraná Product From Maués, 1999**

Product	Amount (kg)	% of Total	Primary Destination
Seed (for beverage industries)	200,000	71.4	Manaus
Seed (officially exported)	1,342	0.5	Japan
Powder (officially exported)	2,452	0.8	Mato Grosso
Bars (officially exported)	15,398	5.5	Mato Grosso
Seed, Powder, Bars (estimated unreported consumption)	60,808	21.8	Mato Grosso

Source: Ministry of Agriculture - Manaus; Antarctica Co.

## 9.2 Marketing of Vegetable

The main production areas of the vegetables delivered to Manaus can be roughly divided into the two sections, one of which includes the southern states such as Sao Paulo, and the other of which includes the surrounding villages of Manaus, including Iranduba. The transport from Sao Paulo is mainly conducted with cargo trucks and refrigerating vehicles. And the sufficient supply of the crops such as papaya and onions, which can not grow in the weather of Amazon area, which has high temperature and humidity, has sustained the demand in Manaus. The crops such as sweet pepper, cabbage, and carrots, which can keep the quality appropriate enough to supply after the ten-day transportation, are transported, using refrigerating vehicles. The crops to easily be damaged, such as broccoli and spinach, are transported by plane.

On the other hand, the conditions of the delivery and sales of the local crops in the market in Manaus are as follows. From Iranduba: long bean, eggplants, sweet pepper, etc. from suburban areas of Manaus: spring onion, leaves of coriander, cucumber, cabbage, lettuce, etc. from the surrounding towns and villages of the Negro river and the Solimoes river: Watermelon, cabbage, lettuce, the vegetable called Macici, etc.

The official statistics of the governmental body have been implemented through the grasp of the amount of the limited items, on which taxes are imposed. And, even if the data are recorded, such data are not compiled into a database. Due to the above-stated condition, the records are scattered and lost. Therefore, there is a little information to grasp the entire condition of the vegetables. Therefore, there is a data on the vegetable, the amount unit of which is bundle or bunch, can not be grasped accurately. Therefore, as only the reference, the amount of the import and the yield shall be shown in below table. The total of the import of sweet pepper and the total of the yield in Iranduba are almost equal, which can represent that the competition over sweet pepper has existed.

Crop	Production (ton)	Import (ton)	Total (ton)
1. Cabbage	2,995	6,789	9,784
2. Green Pepper	709	5,128	5,837
3. Long Beans	524		524
4. Okra	53		53
5. Pumpkin	1,602		1,602
6. Spring Onion	1,569		1,569
7. Sweet Potato	6,357		6,357
8. Lettuce	3,781		3,781
9. Couve	269		269
10. Coantro	371		371
11. Cucumber	6,920		6,920
12. Tomato	214	23,948	24,162
13. Eggplant	832		832
14. Maxixe	34		34
15. Garlic		784	784
16. Potato		11,102	11,102
17. Beet		461	461
18. onion		12,667	12,667
19. Carrot		11,702	11,702
20. Chayote		15	15
<b>Total</b>	<b>26,230</b>	<b>72,597</b>	<b>98,827</b>

Source: Relatório de Atividades do IDAM, 2000, Marketing Survey conducted JICA Study Team (Manaus Moderna Administration Office, CEASA)

The JICA Team has commissioned a study in which over 500 brokers and traders were interviewed at the eight major wholesale vegetable markets in Manaus (Panair, Adolfo Lisboa, Manaus Modera, Santo Antonia, Alvorada I, FPZ, Leste, Coroado). Among other things, the brokers were asked to indicate a preference for imported (Sao Paulo) vs. local (Iranduba, Manus) vegetables according to vegetable type.

Crop	Prefer Local (%)	Prefer Imported (%)	Crop	Prefer Local (%)	Prefer Imported (%)
Pumpkin	71	29	Coriander	91	9
Lettuce	84	16	Couve	88	12
Garlic	16	83	Long Bean	94	6
Potato	15	85	Watermelon	77	23
Sweet Potato	73	27	Cucumber	84	16
Beet	13	87	Green Pepper	52	48
Onion	15	85	Okra	94	6
Spring Onion	97	3	Cabbage	40	60
Carrot	18	82	Tomato	24	76
Chayote	11	89	Eggplant	47	53

Source: JICA/IDAM research with eight Manaus wholesale markets.

As a challenge to the economic threat posed by importation, based on the preliminary data from the above three tables, Iranduba farmers would be encouraged to focus on the following five crops for the following reasons.

- Green Pepper: Because there are significant numbers of imports already, but broker preference is mixed, providing a market opportunity.
- Tomato: Due to the significant numbers of imports. Brokers prefer imported tomato only because local tomato is scarce and small-sized. They are very unhappy with the quality of imported tomato which is too hard and tasteless.
- Cabbage & Eggplant: Because there are not yet high numbers of imports, and since broker preference is mixed there is a market opportunity. Same possibility exists for lettuce.
- Maracujá: Because it sells well in Manus and imports are on the rise.



### 9.3 Marketing of Tropical Fruits

There is very little transportation of fruit or processed fruit products out of Amazonas. In fact, Amazonas actually imports significant amounts of fruit and pulp products from the southern states. This is mainly because there is a significant internal demand for the products in Manaus, and export quality requirements are very difficult for Amazonian food processors to meet. Very limited amount is traded outside of the state such as cupuaçu Juice to neighboring states and frozen pulp to São Paulo.

### 9.4 Market Analysis by Commodities

Each crop is unique and has specific characteristics for the supply and demand. The following table describes the characteristics and balance of demand and supply by each target crop. In this study, it is important to analyze the balance of demand and supply.

	Supply-Demand Balance	Demand Characteristics	Supply Characteristics
Guanara	Demand is constantly existing from large buyer, Ambev in Maués. But because ambev is the only company who buys large amount, the company controls purchase price low and farmers do not benefit from marketing. Competition with Bahir is a threat.	Competition with other state such as Bahir increases. Current tendency toward Maués guaraná is to consider quality.	Improvement in the productivity in Maués farmers is increasing the supply, but the result is still to be seen. Quality and price will be the issue for marketing the commodity.
Fruits			
Cupuaçu	Seasonal fluctuation of supply is a major concern of supply-demand balance.	There are constant demand. Manaus is the largest local consumer market but not growing.	Technology improvement is the key to increase the supply. Seeds will increase supply for butter and powder when fermentation and drying technology is extended.
Açaí	Seasonal fluctuation of supply is a major concern of supply-demand balance.	Demand is gradually increasing in southern states.	Supply according to the taste of consumer will require some organized promotion effort. Current supply capacity is limited within the effort of private companies.
Maracujá	Local balance is important for this commodity, and currently a constant demand supercede the supply in off season.	Local demand is constant.	Supply during the off season will improve the farmer's income.
Banana	Supply from suburban town is limited. Demand seems to be higher than the supply for Manaus market	Constant demand as a staple food in the state of Amazonas.	Disease resistant species will improve the supply in a few years.
Vegetable	Supply from southern states exceed in major items such as Potato, onion and tomato. But the supply from local farm begins to be identified for its quality. Demand therefore tend to exceed to supply.	Consumers identified the quality of local vegetables and demand is increasing especially for leafy items.	Supply is increasing as result to farmer's effort and extension service of governmental agencies.

## 10. Capacity and Activities of Supporting Agency (IDAM)

The Institute of Agricultural and Livestock Development of the State of Amazonas (IDAM) is a task force organization of the Government of the Amazonas State responsible for sustainable development of agriculture sector including livestock management, fishery and aquaculture. It was established in March 1996 by succeeding partly functions from former EMATER. Major mandate of IDAM is to provide farmers and fishermen with technical assistance and rural extension (ATER) services. The headquarters of IDAM is composed of two departments

(Technical Department and Administration and Finance Department). There are three sections, 14 subsections and 29 local units in the Technical Department.

IDAM has current institutional function for promoting policy changes, developing livelihood programs, and delivering community services. These functions can be strengthened to ensure government policies and programs directly deliver services and transfer knowledge to farmers. IDAM needs to continue to strengthen its leadership role to advocate for more municipalities and federal government services to direct benefits towards rural families in the State of Amazonas.

In this official allocation of covering area, it is aimed that Technical Assistance and Rural Extension (ATER) services shall be extended to all the 62 municipals of the State. However, due to limitation of staff members, equipment and budget, ATER is forced to be implemented at restricted scale presently. The three local units of the study area namely Iranduba, Itacoatiara and Maués are recognized as major local units having more than 10 local staff members, although they are still considered insufficient to achieve the mandate successfully.

The following problems are identified about activity of IDAM office:

- Area and families to be covered by one technical staff are too large to provide them with sufficient ATER services.
- Few engineers are assigned for livestock, fishery and aquaculture.
- Percentage of qualified staff is low.
- Transportation means are very poor, which restrict routine access to communities.
- Office equipment is not sufficient, which hamper efficiency of activity.
- There are few opportunity for technical training despite technical level of staff seems relatively low.

## **11. Logical Framework Approach and Analytic Observation**

Project cycle management method has been applied to this investigation, so as to enable the partner sides to meet their needs on planning and come to a mutual understanding with IDAM. Throughout investigation, participatory and logical frame approach could be executed by holding workshops for beneficiaries in 3 target municipalities and for IDAM. In consequence, problems relevant to Improving Rural People's Livelihood were identified and analyzed. Based on these results, overall project approaches, basic strategy were established and furthermore were studied analytically, then problems relevant were analyzed in general.

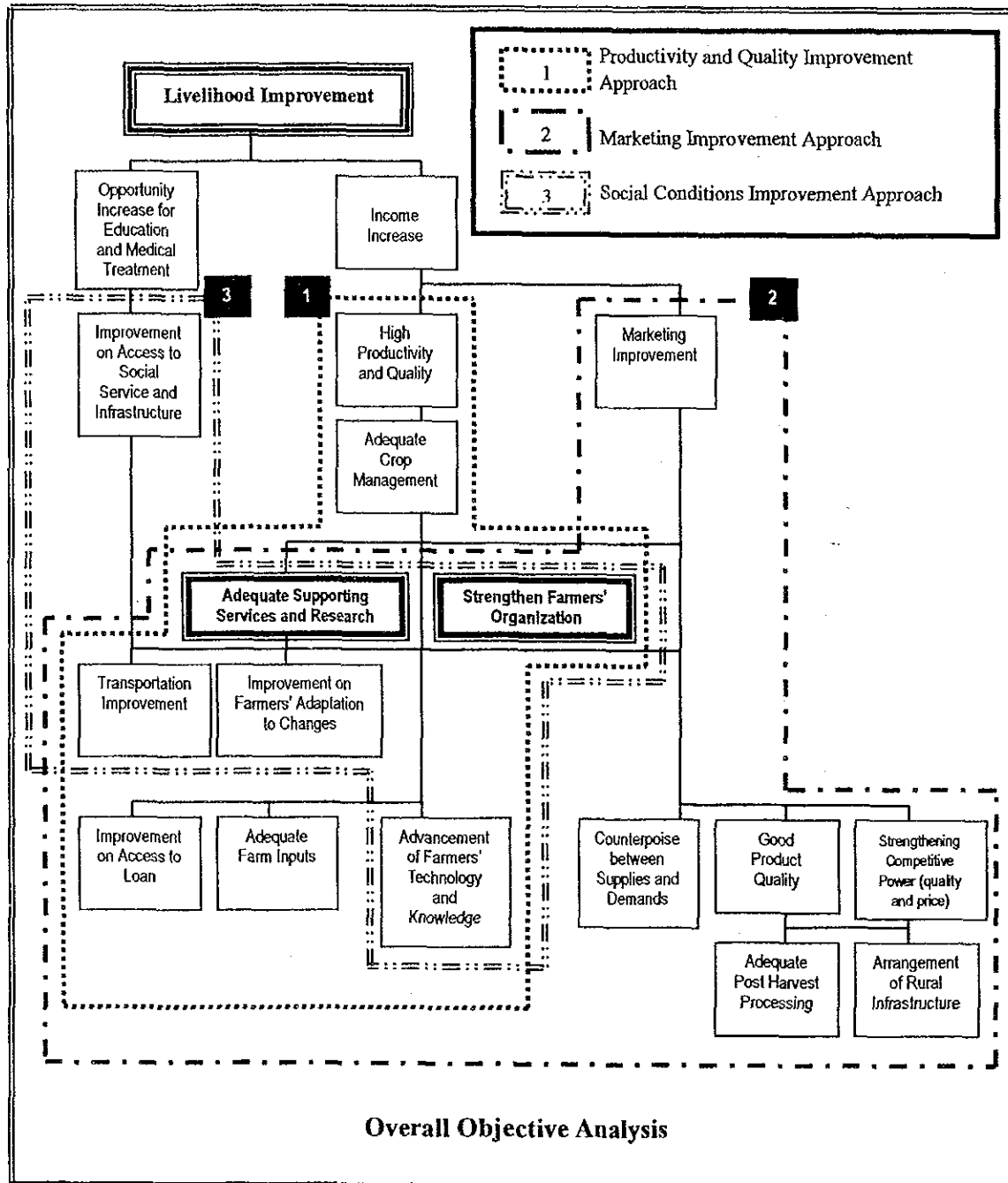
## **12. Objective Analysis**

By reformulating all elements in the problem tree into positive, desirable conditions, the tree is transformed into the objective tree.

"Severe natural conditions" out of all elements would be unchangeable, so counter

measures for them are proposed as improvement of transportation by providing boats for farmer's organizations under social subsidy program as in the past. Objective tree is shown in the following figure. As shown in the tree, 3 project approaches were selected for this planning

- Agricultural productivity and quality improvement approach,
- Marketing improvement approach, and
- Social conditions improvement approach.



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### **13. Project Approach and Basic Strategy for Planning**

The following three project approaches were selected by the objective analysis.

1. Productivity and quality improvement approach
2. Marketing improvement approach
3. Social conditions improvement approach

The above are the key development strategies and the basic approaches for improving the livelihood of the regional residents. The plan will be structured based on the development strategies.

Putting the key strategy into practice would principally rely on farmers' endeavor and supporting services, especially IDAM's activities. These correspond to the articles of "Advancement of farmers' technology and knowledge", "Strengthening farmers' organizations" and "Adequate supporting service and research" involved in the objective tree. Development and improvement on both farmers' and IDAM' capacity would be based on sustainable rural development, therefore capacity building of both sides is esteemed to be key strategy. Capacity building in key strategy is aimed not only at farmers but IDAM as the main agency, so planning focussed on this key strategy could be justifiable as high actualization plan. Through various field investigations, it is found that formers have suffered from the vicious circle of poverty.

The way to final goal for the Project would attribute to cutting the vicious circle of poverty and improving it. Under this viewpoint, the basic and key strategy above could be envisaged coping with poverty circulation.

### **14. Identification of Beneficiaries**

According to the Scope of Work (S/W), beneficial population of the study is defined as the following two types;

- I) Family farmers relying on agricultural production with limited land scale (from 25 ha to 100 ha), which is defined as family farming by PRONAF,
- II) People whose livelihoods rely on extractive activities exploiting natural resources including forest products and aquatic produce.

In view of IDAM, beneficial population would be limited to the people within the lands assisted by IDAM at present and in the foreseeable future, because farmers in the outside of the IDAM service area could not be defined as family farmers under PRONAF and besides. As IDAM supporting services would be essential to attain the final goal, beneficial population satisfying with I) and II) above would be limited preferably within the IDAM service area. In addition to above, if it is

possible that the function of IDAM s improved and the supporting service is extended within ten years from now, the number of beneficiaries in 3 municipalities is estimated to be 4,953 families.

## 15. Project Design Matrix

Basic plan for the study centers on how to bring the overall strategy of improving rural people's livelihood to fruition. The fundamentals of this plan are identified as:

- (i) Improve productivity and quality of environment friendly agriculture and fishery which directly links to the main income source of rural people through making them environment friendly,
- (ii) Improve marketing which forces farmers now to suffer low gross margins, and
- (iii) Improve access to social security and quality of farmer resource management by forming farmer associations and learning to exercise their legal rights to social security.

Various investigations have been executed during the third fieldwork to learn how to cope with the constraints that could hinder achievement of these fundamentals. These investigations included the development of lessons learnt from various types of experiences in the Amazon and applying these lessons to the development of the overall planning strategy. A prerequisite to achievement of the project plan is the strengthening of IDAM's capacity and the development of farmer organizations. In the third fieldwork, another prerequisite is providing access to information and legal services to improve social security and legal services for association development. Modification of the latter situation could contribute largely to improving their livelihood.

Based on the result of the problem analysis and the fundamental project approach, PDM was formulated. Three municipalities; Maués, Itacoatiara and Iranduba, located in the northeast and the southeast of Amazonas are selected as the Study Area. Beneficiaries of the Study are family farmers relying on agricultural production with limited land scale, which is defined as family farming by the "Programa Nacional de Fortalecimento da Agricultura Familiar (PRONAF)" and people whose livelihoods rely on extractive activities exploiting natural resources including forest products and aquatic produce. The project period is 10 years from the implementation, and the project is designed in prospect of the abolition of the tax exemption benefit for the free ports in 2013. PDM concerning overall plan is as next table.

**Overall Project Design Matrix**

Target Area : Irauduba, Itacoatiara, Maues Target Group: Small-scale Farmer Project Period: From 2002 to 2012 (10years)

(Narrative Summary)	(Verifiable Indicator)	(Means of Verification)	(Important Assumption)
Overall Goal: Extending environment friendly agriculture beyond the target area	Strengthening farmers' organisations in neighbouring regions Increasing beneficiaries' income through the introduction of new technologies Decreasing slash and burn agriculture Extending environment friendly agriculture	Farmers' Organisations register book Farm economy monitoring S&B application to IBAMA Land cultivation (use) register	Government Policy for family farmers is unchanged
(Project Objective) Improving rural people's livelihoods through agricultural activities and sound natural resource management	Increasing farmers' income by 20% in 10 years with the increases of productivity by 10%, farm gate price by 20% and area of agro-forest by 60%	Agricultural Production Statistics Farm gate price Statistics Land use register Farm survey (Benchmark survey)	Manpower of and finances from IDAM are acquired (Securing of the staff and the budget of IDAM)
(Output): 1. IDAM's capacity as the supporting agency is strengthened. 2. Farmers' organisations are strengthened. 3. Environment friendly agriculture and fishery are extended 4. Balancing on supply and demands 5. Processing of target crops is improved. 6. Marketing is improved. 7. Access to social services is improved. 8. Access to social security is improved.	(Indicators of outputs) 1. IDAM's staff, vehicle, and vessel increase 2. Farmers' Organisation membership increase to 60% in 5 years 3.1 Agro-forest areas increase to 60 % in 10 years 3.2 Production of aquaculture increase to 200 tons/year in 10 years 3.3 Establishment of 3,900 facilities of hanging seed beds for vegetables, and Increased area of 124 ha for new vegetables 4. Access to market information more than 50 times per month 5. Establishment of 4 facilities for preliminary processing 6. Establishment of more than 10 facilities for producers market 7. Provision of 30 multipurpose vessels in the three municipalities	IDAM's annual report FO's register book Land use register Fishery statistics Farm gate price statistics & data base Processed agricultural products price statistics Market information data base Community register in INSS register book	INSS programs continue Market prices of the target crops are stabilised (are stable) Inflation does not abruptly occur Abnormal weather does not occur in the target (project) area
(Activities): 1.1 New technology extension program 1.2 Program for establishment of and education for Farmers' organisation 2.1 Regulation, financial management program 2.2 Credit access program 2.3 Leader training and activity program (Leadership program) 3.1 Environment friendly agriculture and fishery extension 3.2 Establishment of agriculture technique 4.1 Establishment of marketing database 4.2 Execution of marketable production plan 5.1 Plan of processing facilities and management 6.1 Plan of marketing improvement 7.1 Subsidy for transportation	(Inputs): [ IDAM ] 1. Organising project teams for farmers' organisations, vegetables, aquaculture, tropical fruits, marketing/processing, and project management 2. Establishment of project offices : provision of equipment for experiments, vehicles and vessels 3. Operation fund	Co-operation with relevant agencies and institutions  The state government renders financial and personnel supports to the IDAM for its capacity building  The state government supports IDAM from the finance and personnel aspects for its capacity building.  (Pre-conditions) Communities in the target (project) area understand the rationality of the project, and positively promote it.	

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**16. Plan for Project Implementation**

**16.1 Project Schedule**

The Program "Third Cycle" has a principal objective to promote the development of each municipality in the State of Amazonas in order to establish economical basis which realize economical independence after the abolition of the tax exemption benefit for the free ports in 2013. The program is now on going and involved participation of private sector. The proposed project period is appointed at for 10 years until 2012 in order to contribute the materialization of the target of the superior project in the State of Amazonas.

**16.2 Capacity Building of Implementation Agency (IDAM)**

The strategy for the improvement of the capability of IDAM has three main components:

1. Reforms of the organization, operation, and rules of IDAM  
(This includes reorganization and increasing the number of divisions. It also includes additional staff, facilities, equipment, staff salary review and reform, and the financial resources to implement agreed reforms)
2. Development of human resources  
(This builds the capacity of staff through policy, program and project education and training programs, and staff incentives for effective implementation of project related activities)
3. Building the support system  
(The technology can complement the lack of the budget and human resources. Farmers can participate in the spread activities)

The contents of these components are described in detail as follows;

**16.2.1 Reforms of the Organization, Operation, and Rules of IDAM**

The improvement of the functions of the organization including the reforms of the organization, thorough which the personnel can work more efficiently, can be considered as the key to realize the organization. In addition, through the reorganization of the departments inside the organization in accordance with the important and new needs for farmers, farmers' organization, and marketing, the smooth operation can become possible.

### 16.2.2 Development of Human Resources

The basic education and training method shall be the OJT method, where their abilities can be improved through not the training courses but the practice such as the growing test in the pilot farm jointly operated with research institutions and the joint farming with hard-working farmers. In addition, the basic education and training method shall also cover the areas including the below-stated areas, which can be considered necessary for the future spread activities. The areas are as follows; i) to organize, ii) to improve the marketing, iii) to develop the community base, iv) to promote for farmers to organize, v) to grasp the needs of farmers through the participatory approach, vi) to work out participatory projects.

### 16.2.3 Building the Support System

The basic strategy of the support system is to share the knowledge and experience with the use of "Network" and "IT". It is essential for the institution such as IDAM, the main activities of which can intellectual, to share the information. Therefore, to share the information can be considered that the networking is the most efficient on the investment and should be implemented as soon as possible.

Another network is the community network. The system with the following functions shall be established.

- To select the farmer volunteers to support the spread activities by IDAM at the community level
- To use the farmer volunteers as the core medium to convey the information more efficiency.
- To give the instructions on the technical matters more smoothly.
- To promote the development of the group (organization) activities.

Some consideration, with which they can obtain some advantages of learning the technology through the participation in the operation of a pilot farm, getting the supply of the necessary input through the test growing, etc., shall be given to the volunteers.

To assure effective extension service delivery capacity of IDAM, the strategic component was found to be organization reform. The Study Team and IDAM headquarters staff took into account the following points in the formulation of the institutional capacity building organization plan:

1. The organization will be better equipped to address new needs, such as agribusiness, aquaculture, environmental preservation and farmer organization development.
2. The organization will improve its management of two important resources needed in extension --human resources and information and knowledge.



3. The organization will have the technical expertise to offer useful information to the State for policy development on rural agribusiness development and program development for improvement of rural livelihoods of small scale agricultural and extractivist families.
4. The organization will be in a better position to partner with other institutions and agencies involved in agribusiness, aquaculture, environmental preservation and farmer organization program development and technically report the effects of the application of decentralization and participatory management development policies on rural development and rural livelihoods within the State.

### **16.3 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.

#### **16.3.1 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. 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 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. 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

#### 16.3.2 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. 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

16.3.3 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

**16.4 Guaraná**

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

16.4.1 Guaraná Productivity Improvement Project (PIP)

The Productivity Improvement Project (PIP) will seek to increase guaraná 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 PIP has five major subprojects, all of which are designed to increase yields in existing guaraná 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 Maués. If successfully implemented, they will undoubtedly have indirect beneficial effects in many other Maués communities:

(1) 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).

(2) 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 guaraná. 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.

(3) 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 guaraná orchards that are in serious decline, or which have been practically abandoned after 15 or more years of production.

(4) 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.

(5) 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.

#### 16.4.2 Environmentally Sustainable Guaraná Project (ESGP)

The Environmentally Sustainable guaraná Production Project (ESGP) will ensure that guaraná 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 purpose of the ESGP is two-fold. First, it is in the long term interest of the guaraná agro-ecosystem to quickly implement environmentally friendly production practices so as to preserve the guaraná plantations for future generations. Secondly, a trend needs to be established in crop diversification, not only to produce guaraná 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 guaraná. The ESGP has four major sub projects which are briefly described below:

1. Sustainable Agro Forestry Sub Project (w/CEPEC)
2. Integrated Pest Management (IPM) Sub Project
3. Organic Guaraná Sub Project

## 16.5 Vegetable

### 16.5.1 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

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

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

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.

### 16.5.2 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.

1. Priority Project  
Soil Survey
2. Priority Extension Project  
Basic Production Technology and Agro-chemical Information and technique
3. Environment Friendly Technology

- Extension Project of Preservation Type Technology (Agro-chemical Reduction Technology Promotion Project and Promotion Organic Agriculture Project)
- Extension Project of Environmental Adaptation Type Technology (Flood Season Production Improvement Project)

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.

(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.

(2) Priority Extension Project

Extension of Basic Production Technology

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 Technology

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. Measure needs to be immediately taken including creation of the guideline of agricultural-chemicals use.

(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.

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.

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. 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.

2. Organic Agriculture Promotion Project

1) Extension of Organic Agriculture

The apply of organic matters is the most effective means in order to

increase soil fertility through 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 containing 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.

#### 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. 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.

##### 1. Introduce of Aquatic vegetable (Kangkong)

As mentioned above, the aquatic vegetable (Kangkong) will be introduced as a priority crop. Kangkong can grow under flood condition. 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.

##### 2. Introduce of "Canteiras" (Hanging Seed Beds 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. Through the implementation of this project, the improved Canteiras with rain shades developed by University of Amazonas will be promoted.

## **16.6 Tropical Fruits**

### 16.6.1 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. Therefore, the orchard-style monoculture can always face the risk of the damage from disease. 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.

#### 16.6.2 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 learning 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 learning 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.

- 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 workshops 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 learning. 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.

#### **16.7 Aquaculture**

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.

##### **(1) Strengthening of Project Implementing Capability of IDAM**

Necessary number of fishery specialists required for adequate technical services will be assigned. 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. Fishery specialists will be assigned 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.

(2) 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

(3) 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.

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

(4) 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.

- 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

(5) 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. 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.

(6) 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.

- Quick investigation on feasibility of sites
- Advice on the facility design based on the above
- Suggestion about how to procure construction materials and heavy duty machines
- Support on preparation of application documents for acquisition of aquaculture license and environmental license
- Support on application of credit
- Free distribution of tambaqui fry (only at the first rearing cycle)
- On-farm technical advice

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## 16.8 Processing, Distribution and Marketing

### 16.8.1 Overview of the Plan

As for each of the three crop categories, namely guaraná, 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.

#### (1) Projects in Maués for guaraná 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 guaraná community, but will also be designed to receive, process, and market other key crops (fruits, cassava) for its members.

##### (b) Guaraná Processing Project

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

##### (c) Guaraná 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.

(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.

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. 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

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

The proposed fleet of produce boats and trucks should focus on transport of vegetables from remote communities to the Iranduba Receiving Center. Eventually, this rural transport service should be turned into a sustainable, private sector operation.

(d) Packaging Materials Project

Price discounts could be achieved by ordering higher volumes of materials to cover the full range of vegetable packaging needs.

(e) Training and Extension Project

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.

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 should 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.

(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.

(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.

(e) Packaging Materials Project

Focus should be on crops such as banana and maracujá that are easily damaged during rough transport and have high market potential in Manaus. Transport of unprocessed cupuaçu to manaus should be discouraged as it will be far more cost effective to transport high quality frozen pulp.

(f) Training and Extension Project

Training needs to be focused not only on processing technologies, but more importantly, on food safety and hygiene. Design a funding mechanism to finance enhanced training and extension activities in fruit processing and post harvest handling.

(4) Marketing related projects

(a) Market Information Systems

In order to have a good market 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 São Paulo will create new market.

## **16.9 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 guaraná, 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 below.

(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.

(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 slash 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 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.

#### 16.10 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, guaraná, 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 Maués). Communities".

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 in the table.

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
<b>GRAND TOTAL</b>	<b>29,228,887</b>

## 17. 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 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.

**18. Beneficiaries**

The proposed projects consist of improvement of agricultural production, marketing improvement and social condition improvement. Since the beneficiary created by the projects concerning marketing improvement and social condition improvement attained to many and unspecified persons, only beneficiaries created by agriculture was estimated.

The beneficiaries consist of target beneficiaries who will enjoy direct benefit and potential beneficiaries who will have indirect benefit brought by the ripple effect. The expected beneficiaries will be estimated as shown right table.

Beneficiaries Assisted by IDAM	
	Family
Guarana (Maues)	627
Vegetable (Iranduba)	1,104
Tropical Fruits (Itacoatiara)	495
Small-scale Family Fish Farmer (Aquaculture)	
Barragem	443
Net Cage Culture	666
Lake Ranching Program	2,575
sub-total	3,648
Total	5,874

**19. Recommendations**

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.

If proposed project is implemented quickly, IDAM and beneficial farmers will learn necessary ability, knowledge, technology and experience to overcome unknown and hard condition after the abolition of the tax exemption benefit for the free ports in 2013.

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



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