

CHAPTER V.
BASIC CONCEPT FOR AGRICULTURAL
DEVELOPMENT



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5.1 Development Objectives and Needs

Since the Tokyo Donor's Meeting on East Timor in December 1999, UNTAET/ETPA (ETTA) and many bilateral and multilateral donor countries, agencies and NGOs have realized a positive reconstruction program for sustainable development and rapid relief in East Timor. East Timor counterparts and donor agencies have grappled with difficult formation of development projects with limited basic data and information.

In rural area of East Timor, many of households remain under poverty line and suffer from poor and insufficient social and agricultural infrastructures that should support activities on agricultural production. Primary development objective of the agricultural sectors is considered to increase self-supportive and sufficient food production, to increase income level, and to improve living standard through economic development in rural area.

Prioritized sectors are considered to be sustainable development of food crops production, poverty abbreviation, community development, environment-oriented agriculture, and capacity building/human resources development.

For this, the following four items and their sub-components items are to be the needs:

1) Realization of stable production of food crops attained by:

Followings will be essential to attain the realization of staple production of food crop;

- Improvement of infrastructures for production
- Improvement of supporting services for production
- Extension of production technique
- Development and improvement of marketing system
- Watershed conservation
- Improvement and establishment of statistical information systems

Production will be enhanced by improvement of productivity, by seed improvement, increase of planted area and yields through improvement or development of farm fields, irrigation facilities, supply of agricultural inputs, reduction of production cost by introducing of agricultural machinery, improvement of disease and pest control, fertilizer and agro-chemical management along with organic farming, training and extension of production techniques.

Future proportion of food production will be shared by more rapid increase of rice than maize production. Maize production at mountainous slope area will be decreased to protect the environment.

2) Securing of self-supporting funds for sustainable development by development/diversification of cash crops and value-added agricultural products

- Improvement of productivity of main crops such as rice, maize, coffee, etc.
- A forestation with teak and sandal wood trees
- Improvement of value-added by processing, quality control and stable supply of the products
- Diversification of crop, vegetable and tree crops

3) Human resources development

- Capacity building of the government staff, i.e.; Ministry of Agriculture and Fisheries (MAF) officials
- Capacity building of NGOs which should play a role of "bridge" between communities or people and the "compact government"
- Capacity building of farmers/fishermen, which would be started by demonstration or enlightenment on new production techniques for them
- Development and capacity building of National University of East Timor Lorosae

4) Development of value added agriculture

- Increase of farmers' profit by reduction of production cost through joint operation, mechanization, reduction of post-harvest losses, etc.
- Quality improvement, stable supply, improvement of post-harvest treatment and processing, and selection of crops taking market and demand into account.

5.2 Development Potentials and Resources

5.2.1 Land and Water Resources

1) Land Resources

The potential area for land development is confined to the southern coastal portion of East Timor where vast elongated lowland plains are dissected by many rivers and streams. The rivers and streams are not heavily silted as a result of moderate forest cover in the mountain areas. The low-lying lands of Covalima, Ainaro, Viqueque, Manufahi, Manatuto and Lautem could be utilized for possible irrigation development.

Other areas possible for agricultural development is the Ira Lalaro Lake in Lospalos. A limited area of the plain is cultivated to rice paddy and the rest are covered by Savannah grass. The lake at Los Palos could be utilized for irrigation by pumping in order to develop the vast plains in the sub-district.

2) Water Resources

There are very few rivers, which have the water throughout the year. However,

because of the reduced availability and irregular flow of water and due to the narrowness of the island with steep terrain and the infrequent rain, the river waters have comparatively low water resource potential. Similarly, there are few springs or sources of groundwater. They are of importance as only potable water supply. Due to the availability of a limited water amount, they also have low potential for water resources.

5.2.2 Crop Production Resources

Because there is a lack of modern airtight on-farm storage containers, many of the present crop production problems involve post-harvest operation losses. There are few production related reasons that crop yields could not be raised significantly in the near future with the addition of some post-harvest related activities. Airtight containers - often 220 liter drums - are commonly used in some areas and provide good storage conditions for the maize crop but these are infrequently used to store beans.

Ample land is available to increase crop production, especially in the southern highlands and southern lowlands, but there are significant land tenure problems. Rich cattle owners who only want to use the land for raising cattle and not for food crops own much of the land in the lower southern slopes. Additional land was available in areas where former transmigrates from Bali and Java lived prior to September 1999. The legal status of this land is not clear at present but some of it is already occupied and is being used by spontaneous settlements of local Timorese.

Many of the original inhabitants of these southern mountain slopes and upper mountainous areas were forced to resettle in the northern lowlands for security reasons in the past 25 years. If farmers who used to live in these areas were encouraged to return, there could soon be a significant increase in production. The soils and climate in these areas are favorable for crop production. Land tenure and land ownership remain complex because of the lack of legal titles to land that is presently usually claimed and used by informal and traditional systems.

In terms of biological resources, rice seed with the appropriate genetic qualities are available from IRRI in the Philippines and also from Indonesia and only need to be multiplied and distributed to significantly increase rice yields. The use of high quality pure rice seed is necessary start for improving rice production, but a greater constraint at present is the difficulty in obtaining credit to purchase fertilizer and difficulties in milling and marketing the rice after harvest. The problems are circular but a good first start would be to distribute varieties of known characteristics.

There is, however, a present lack of locally adapted high yielding varieties of crops other than rice. Varieties of beans, sweet potatoes, cassava and maize need to be tested and released as soon as possible. Again, the immediate problem with these crops is post-harvest operations but the long-term survival of a high yielding productive agriculture depends on good seeds of appropriate varieties with appropriate use of fertilizer.

As with rice production, the lack of fertilizer and marketing channels for maize are presently more important than any other factor. Farmers in productive districts like Covalima and Viqueque on the south coast are faced with exceptionally difficult economic choices in terms of marketing their crops. With few buyers available, the producers of maize are reluctant to produce a surplus because of marketing problems. Marketing remains the most significant problem

5.2.3 Livestock Resources

1) Exportable Bali Cattle

Indonesia's Transmigration Program necessitated movement of large numbers of people to the less populated islands such as Kalimantan and Papua (Irian Jaya). Each family was allocated one head of female cattle, and Bali cattle became the preferred animal after imported Brahmins (Ongole) were either too wild or reproduced poorly. This gave incentive to the islands of high cattle populations to further increase production and benefit from the inter-island "export" trade. The chief sources of Bali cattle were Sulawesi and the Nusa Tenggara islands including West and East Timor.

The post-conflict situation offers two challenges; a) recovery: to increase animal numbers back to post-conflict levels and then beyond to be able to export, and b) normalization: anticipate export to Indonesia or elsewhere.

2) Goats and Sheep for Poor Families

For their faster reproduction, and lower value compared to the large ruminants, goats and sheep have direct impact in helping the poorest families to earn income. The traditional "matang" system of lending-and repayment- in kind has the potential of being expanded through micro-finance schemes. Additional breeder animals may be imported.

3) Dairy in the Highlands

Although no milk extraction or drinking tradition exists, goats and buffaloes have an unutilized potential of providing milk. Such milk would be vital in improving nutrition of children during the vulnerable age from infancy up to pre-school. A wide cool highland area exists which is ideal for raising dairy animals; and their integration would further complement mixed coffee and food crops through inclusion of multi-purpose fodder trees and forage grasses for cut-and-carry feeding.

- Goats

Existing goat herds of native Indonesian breeds would provide very little milk, not more than 0.2 liter milk per day for 45-60 days lactation. Crossbred Anglo-Nubian x Native females would yield more milk of about 0.3 liter per day, although very few such Nubians

have been introduced for crossbreeding purposes.

- Buffaloes

The existing native swamp buffalo by itself also gives little milk of about one liter per day for 250 days. Crossbreeding with Murrah results in larger animals with better milk yield, but there are few such crossbred animals that are available. Initial efforts to create milk herds such as at Don Bosco and National University of East Timor could be established with selected cows then bred with imported Murrah semen.

4) Pastures and Other Feed Resources

Wide grassland areas occur all over the country, ranging from undulating hills near the coast and steep mountainous slopes inland. Most of these are already being grazed by cattle and buffaloes especially during the rice cropping season, and sheep and goats almost throughout the year. Expansion of grazing areas is rather limited, except for some stony brush-land in Baucau and the dry plains in Los Palos, but only interim and/or in conjunction with more high value plantation alternatives. Lack of control measures for grazing instituted within the villages or by the government to prevent overgrazing also make it difficult to establish fruit or forest plantations.

The bigger potential for expanded livestock production lies in smallholder upland and subsistence farms, with mixed cropping of maize and root crops and field legumes like kidney bean, pigeon pea (*Cajanus*), cowpea and rice bean (*Vigna unguiculata* and *Vigna umbellata*). Expanded and/or increased production of these crops help assure food supply for the family and feed for the small animals, especially pigs and chickens Sorghum can also be included for more animal feed.

Trees and shrubs for additional fodder will help stabilize feed supply in both grasslands and smallholder farms. These could be planted in contour hedgerows or in living fence-lines or shelterbelts for fire control. These trees include *Gliricidia*, *Hibiscus*, *Calliandra*, and *Leucaena*, *Sesbania* and *Flemingia*.

5) Wild Game and Honey

In mountainous areas, wild game such as deer, wild pig, and some birds are being hunted. The Village Survey (Suco Survey) indicated roughly people in 50 percent of Sucos hunt for wild game; of which 39 percent consist of wild pigs and deer, and 16 percent birds. To insure continued availability in line with biodiversity conservation, some control mechanism is also needed to limit quantity hunted, impose hunting seasons, etc.

Gathering wild honey from sengon (*Paraserianthes*) plus coffee and Eucalyptus forests remain, and will foreseeably remain as additional income source for villagers. Such wild honey also provides a cheap alternative to imported honey, although some standardization pasteurization, and control of adulteration could be instituted to improve the product.

5.2.4 Draft Animal Power and Farm Machinery

1) Draft Animal Power

Especially for the small farms, there are two important uses of draft animals that could further be developed animal traction and transport. Animal traction, with the use of plow and implement for field cultivation, could replace the present practice of "rencah" either partly or in full. This will result in more efficient utilization of animals when they are trained to use the plow either as single animal units or in pairs in the Indonesian system.

Transport of men and goods in the villages is facilitated by horses, especially in areas where roads are absent or vehicles transport are in short supply.

For both animal traction and transport, increased availability and distribution of animals to more farmers would result in increased cultivable area for each farm and for the country as a whole.

2) Farm Machinery

A farm mechanization program needs to consider such key factors as the emergency necessity of farm mechanization, improvement of agro-produce marketing, and past historical progress and farmers' acceptability in East Timor. Farm mechanization will be promoted by farm machinery while developing animal drawn equipment based on the provision of complete training and front-line extension service network together with after-care service network for realizing food security and competing local produce against imported one within the targeted period. Most important training activity to train trainers for trainees, selected farmers and mechanics for group utilization to moderate heavy investment will be done in and by the newly established stations provided with farm machinery and rice/maize milling/pounding units for enabling contract/hiring plowing, milling and marketing for its self-maintenance and sustainability.

5.2.5 Forestry Resources

There is a large potential for wood production from Sengon trees that are planted as shade tree for coffee trees. Now they are already over matured, therefore their leaves are getting fewer and they will soon wither and die. They should be regenerated. But there are serious difficulties in cutting down the Sengon, because of damage to coffee trees that are planted under the Sengon trees. Before any action, agreement should be obtained from the inhabitants concerned.

There are enough Candle-nut trees/areas. Before the Candle-nut was shipped to Indonesia (almost to Surabaya), but now they are not shipped (exported) to foreign countries, so that farmers have many Candle-nuts/seeds.

There exists a large potential for wood production, such as *Eucalyptus Urophylla*, *Casuarina* species. They are already mature with parasite plants (SARUOGASE). These trees should be regenerated and used for construction materials. There are many beautiful landscape points. They can be used for natural resource based tourism in the future. In East Timor there is sufficient forestry sector potential. But now data on forestry potential is lacking. Therefore, a forestry inventory survey should be done as soon as possible.

5.2.6 Fishery Resources

1) Near Shore

East Timor has a 725 km coastal line. It seems that, due to steep bottom topography surrounding the island, the shallow waters area is significantly limited. Coral reefs are observed occasionally but seem not to develop to fringe the whole coast. Apparently, inner reef fishing does not have good potential for intensive development. Therefore, outer reef fishing, such as trolling and surface gillnet, or bottom line fishing in deeper waters up to a few hundreds meters will be given more priority for the future development. FMED plans to install FADs a few kilometers from the northern coast to attract pelagic fish species. The devices will be checked in view of their endurance under oceanographic conditions in the Strait of Wetar.

2) Offshore

In the north coast, over the narrow Strait of Wetar, there are several Indonesian islands that can be seen from the shore of East Timor. At some narrower places in the strait, in only around 15 miles, vessels can reach to the Indonesian waters. Throughout the strait, it will be difficult to operate fishing fleets of a large scale in any kind, unless based on a bilateral agreement with Indonesia. It is said there are seasonal fishing grounds of skipjack, yellow-fin tuna and big-eye tuna in the strait and off the Oecusse coast.

In Timor Sea off the south coast, there may be potential to develop a commercial fishery, as the EEZ waters will be much more spacious. Between the south coast and the Sahul Bank, it is said that spanish mackerel and fork-tailed cat fish were fished in the Indonesian times. There is no information on the commercial scale fishing in that time for migratory pelagic fish species in a possible range of the East Timor waters off the south coast. In the Sahul Bank, a large part of which will be covered by the EEZ, there exist exploitable demersal fish resources. It is said¹ that these include snappers (*Pristipomoides* spp., *Lutjanus* spp.), and cods (*Epinephelus* spp.). The source also says, in the Australian section of the bank, the dropline fishery has been developed since the early 1980s. Indonesian fishing boats also started operation by hand lines and traps in Indonesia's zone in the bank in the early 1990s.

¹ "Developing Droplining in Northern Australia", www.spc.org.nc/coastfish/news/fish_news

3) Aquaculture

As the hatcheries for common carp are hoped to resume fingerling production, there should be a certain demand for the freshwater fish, and it can be one of the cash income sources for farmers especially in the uplands. Milkfish production in brackish water ponds is another feasible culture in the sector, as young milkfish were once actively exported for inter-island trade as shown in East Timor in Figures, though many of the existing ponds are intact but unused due to unclear land tenure.

5.2.7 Human Resources

The human resources of East Timor have high potential in the medium to long-term. Firstly, because of the budgetary allocation of the government for its development and, secondly, because of the large portion of the population that shall directly benefit from the programs.

Large portions of budgetary allocation for the year 2000-2001 are in the education and health sectors, at 21.0 percent and 13.1 percent, respectively. The levels of allocation may continue to be such in the years to come. Further, the allocations emphasize the policy of the government to develop its human capital.

About 43.9 percent of the population is below 15 years old and 10.1 percent between 15 and 20 years old for a total of 54.0 percent. Therefore, more than half of the population shall directly benefit from about one-third of the budgetary allocation of the government to the health and education sectors.

5.2.8 Socio-Economic Resources

Over the short-term, the nations' access to financial resources is very limited. At present, farmers have virtually no discretionary funds. GDP per capita for 2001 is estimated at 466 US\$. Average income in the countryside is even lower. Due to the dualistic nature of the economy, rural and farmer incomes lag behind that of urban areas. Making matters more serious, the government is little able to assist with funding. It is itself short of cash.

At least until 2004, the East Timor government will be in a chronic deficit situation. For FY 2001/02, revenues are projected to be only 50 percent of expenditures. The cash shortfall is at present provided through donor assistance. In the future, as Timor Gap oil/revenue resources are exploited, the public funding picture could improve dramatically. Under the government's base scenario, oil/gas revenues will generate approximately 136 US\$ million per year at the beginning in 2005. Such a windfall could allow financing of all recurrent public expenditures and still provide an excess of about 36 US\$ million per year. This would cause a significant positive multiplier effect throughout the economy. The resultant increased consumer affluence would boost the demand for food products and raise agricultural

prices and farmer incomes. Additional public resources would then also become available for investment in agriculture development.

The people of East Timor have a long tradition of forming self-reliant organizations in the community, normally based on clans or villages. This tradition was substantially used by the clandestine organization that was against the annexation of East Timor to Indonesia, in perpetuating the independence movement and in the success of the popular consultation. It has been said many times that East Timorese has the gift of perseverance despite all odds – exercising passive resistance within moments of despair and glory. This social orientation of the people of East Timor could be a potential tool for the development of the country.

5.3 Development Constraints

5.3.1 Physical and Technical Issues

Crops

The poor state of the road network and the exceptionally high cost involved in transporting agricultural products, especially rice, from farm to market is perhaps the major cause of production constraints in East Timor other than the disruptions caused by flooding the market with cheap foreign rice. Transport is as expensive as rice milling for rice production in the southern coastal rice belts. The potential for significantly increasing rice yields depends about as much on rural transport as it does in increasing the efficiencies for production. The loss of traditional and normal marketing opportunities with the introduction of a western boarder has made it necessary to ship agricultural commodities over a series of mountains to reach the northern coast where they can be sold.

Irrigation

Apart from the budgetary constraints, the following are constraints on irrigation rehabilitation and water management;

- Lack of basic data such as meteorology and hydrology
- Lack of design criteria
- Scarcity of capable officials
- Lack of water measurement and control facilities
- Lack of adequate equipment for construction and maintenance
- Lack of transportation means for operation and maintenance

Livestock

Reduced livestock numbers will continue to limit the recovery to 1997 levels, and needs to be supplemented with redistribution of breeder animals through micro finance. Moreover, feed resources for livestock, especially pigs and chickens are partly tied up to food supply of farm families. Thus, increase mixed crop production of maize, legumes and root crops could

better assure food security, and at the same time increase feed supply for pigs and chicken. The ruminant animals are also partly dependent on crop residues and home-grow fodder such as trees for hand-feeding in the dry season.

Forest

Issues in the forest sector include:

- Forestry inventory survey (mapping and putting up posts for boundary, forest resources survey) should be done as soon as possible.
- Before the commencement of logging operations, sustainable wood production plan should be established.
- Forest rehabilitation plan should be made, then nursery for seedling production should be prepared.
- Production equipment for candle-nut oil should be procured.
- Nurseries for seedling production should be established for development of forest products
- Community forests.

5.3.2 Socio-Economic Issues

The lack of cash in both private and public sectors is a major constraint. Furthermore, the priority given by the government to agriculture spending appears to be low. At present, donor funding for agriculture per year is over 50 times annual agricultural sector expenditures. Barring a windfall from Timor Gap oil, funding for investment in agriculture development over the short and med-term will continue to be dependent on donor contributions. Since financial resources are so lacking, it is vital that agricultural funding priorities be determined and money given *only* to well conceived projects. It is also highly recommended that reliance be placed on the private rather than the public sector for economic development.

The level of experience and technology know how of the farmers is one major constraint. Many of them are still using the traditional method of cultivation that may have been reinforced by the continual lack of cash in the rural area. Hence, there was not opportunity to use better production technology – one that requires agricultural inputs. Some farmers are using farm equipment, provided during the emergency phase of the transition, but lack the proper training and knowledge on its proper maintenance and repair.

Further, the lack of product markets at the community level also shall constrain farmers from producing surplus products. The absence of market and lack of cash make a combination that will constraint substantially the development of agriculture. Farmers will not produce more than their food requirement, will not use better production technology, and it will take development sometime to take off the ground.

5.3.3 Administration and Institutional Issues

1) UNTAET

Since 1999 the United Nations Transitional Administration for East Timor (UNTAET) has managed the administration and reconstruction of East Timor. It has promoted the country's reconstruction, developed Timorese administrative and technical capacities, and is preparing to hand over functions to an East Timorese Public Administration (ETPA) which act as government function until new government creates. Building institutions and capacity development of the ETPA government in this transitional stage is the most important issue in the transitional period. Successful transition is the most important factor for sustainable development.

2) ETPA/MAF

Agricultural sector and rural development will be covered under the responsibility of the Ministry of Agriculture and Fisheries (MAF) and related departments, in the UNTAET/ETPA administration.

Former Agricultural District Office attached to the DAA (MAF) transferred and integrated under the management of Local District Administration from June 2001. All district agriculture officers are now under Timorese management.

MAF has not enough resources to answer all the needs of the rural communities. MAF has only 126 posts for East Timorese staff (actual appointment of 126 staff was completed in January 2001, in next fiscal year it will be 160 staff). MAF has recently established four major divisions; Agricultural and Rural Extension, Geography and Cadastral, Irrigation and Forestry, as shown in Figure 2.2-1. MAF will focus on essential government functions and foster partnership with the rural peoples, NGOs and community organizations to deliver effective agriculture services. As a result of aiming for establishment of small government by the instruction of the UNTAET/ETPA government, the scale of MAF staff has become very small, if compared with the scale under Indonesian rule as indicated below.

Administrative Comparison between Indonesian Rule and Current Government

Items	Under Indonesian Rule	UNTAET/ETPA Government
Number of Public Servants	28,000 staff (Some from outside. About 75% East Timorese)	(July 2000 recruited) (Permanent) 5,776 (Temporary) 2,152 Total 7,928 Actual : 14,639 (June 2001) Target in July 2000: 12,000 (FY2001-2002)
Staff of Agricultural Sector	6,000 staff	(MAF) 126 staff of which 35 staff in Dili and 91 staff in local (in 13

Items	Under Indonesian Rule	UNTAET/ETPA Government
		DAO (No. of staff increase 160 in next FY 2002)
East Timor Budget	US\$ 27.2 million (1997) (Rp. 81,657.8 million) (About Rp. 3,000/US\$)	US\$65.4 million (2001/2002) (CFET)
Budget of Agriculture Sector	US\$1.04 million (1997) (Rp. 3,121 million) (About Rp. 3,000/US\$)	US\$1.2 million (only 1.8% of total national budget) (2001/2002)

3) MAF and Institutional Capacity Development

The implementing agencies, MAF and Local Administrations may, at present, not have the proper technical, financial, staffing and management capability to implement projects and more specifically to operate and maintain systems for the project sustainability. There is much to do for MAF and the many agencies concerned. Problems and constraints that may occur with inexperienced implementing agencies' are as follows;

- Coordination mechanism for sector development strategic framework, prioritization, project implementation, monitoring and evaluation
- Ownership status of projects implemented, capacity needed to implement
- Limited resources (budget constraints and staffing) and lack of experience with execution as implementing agencies; limited financial resource is one of the most serious constraints of the MAF in the implementation of the projects
- Procurement and disbursement arrangements from the donor to the recipient and to the other sub-implementing agencies
- Responsibility and cost sharing; roles and responsibilities must be identified
- Counterpart funding arrangements and delivery mechanisms
- Universal practice/custom of local people in some district connected to the former kingdoms ("Keliurajan")(liurai=king) and "traditional adat ruler", Aldeia (hamlet) chiefs or reino (commoners). Only the projects supported by traditional rule are deemed to be the long-term income generation projects.

The institutional schemes, which have no modernized systems, are very weak and need the assistance of foreign donors and NGOs. MAF in collaboration with foreign assistance is expected to provide technical, financial and academic support for institutional development. In this respect, a strong coordinating agency together with various implementing agencies will be required to overcome problems.

The participation of NGOs and foreign donors will be desirable particularly for community development, rural development programs, social development of depressed communities in rural areas and the agriculture sector. Combinations of NGOs, the university and the community are important for institutional development in small government policy.

5.3.4 Issues on Data and Information

Suco data of the Inventory Survey and census data, and the data of statistics information are being collected as a present database. However, as regards Sucos, there are also restrictions of a time and/or budget, as a result the number of Suco covered is only 106, about 25 percent of all Sucos were investigated. Depending on the strata studies, there is some possibility to have a statistically biased calculation from this limited information.

As for a future problem, collection of all Suco data will become needed. Similarly, it is asked for with the same thing of investigation of household under investigation. Although some foreign donor organizations, presently have been contributing to the creation of a database, the management of these data will be transferred to East Timor hereafter. Then, it is desirable to consider that all information can be utilized by all government organizations for its effective policy making. Spending cost and time against the same data collection by different organizations should be restricted. Besides this restriction, it must consider about the disclosure of information which should be the 1st priority order in principle.

5.4 Study on Agricultural Development Scenario

The target year of the Mid-Term Integrated Agricultural Development Plan is 2007 as a mid-term to recover the 1997 living standard of the people by the end of 2007, and 2017 as a long-term to promote sustainable agricultural development with self-sufficiency of staple foods and to stabilize agriculture and fishery income for beneficiaries.

As mentioned in previous Chapter IV. "Overall Development Strategy for the Country", development frameworks for agriculture sector for East Timor will directly be influenced by the future situations of Timor Gap. Therefore, development scenario for agriculture sector in the study was examined for the following cases considering the future situation of Timor Gap;

- Case-A : Agricultural development plan in case of full-scale development
- Case-B : Agricultural development plan in case of minimum-scale development

5.4.1 Development Scenario and Frameworks in Case of Full-Scale Development

- 1) Projection and Analysis of Supply and Demand for Staple Food
 - a) Conditions of Case Study on Development Scenario

The key factor in the development scenarios of the integrated agricultural development plan is agriculture production to secure sustainable food security in the country. Since the 1999 violence, the national economy, especially performance of agricultural production sector, has dropped down due to no government subsidization of infrastructure improvement /rehabilitation and input materials for agricultural production. In order to realize sustainable stable food

supply, projection of staple foods supply and demand shall carefully be studied taking into account population growth with repatriated people, minimum level of caloric intake (2,100 kcal/capita/day), recovery of crop production levels by application of appropriate level of input materials, rehabilitation of irrigation and farm road facilities, etc.

Following conditions are taken into consideration for analysis of staple food supply and demand in terms of development scenario formulation;

- Target year: mid-term in 2007 and long-term in 2017
- Population projection:
 - without returnee (Alternative-1): 2007 : 830,410, 2017 : 1,037,100
 - with returnee (Alternative-2) : 2007 : 888,910, 2017 : 1,133,510
- Countermeasures for food demand increase :
 - Rice : Increase of rice production with rehabilitation of non-functional irrigation schemes
 - Maize: Increase of maize production with increased unit yield and improvement of post-harvest losses
- Supply and demand analysis
 - Caloric level: present condition of 2,100 Kcal(1997 level) and 10 percent increase case of 2,300 kcal compared to the 1997 levels (Alternative-A and B)
 - Calories consisting of both staple food (rice, maize and cassava) and other crops (sweet potato, root crops, sugar, fruit/seed oil, fruits, vegetables, meat, eggs, milk, fish, animal oil/fat, etc.)
 - Target yield:
 - Rice : with and without rehabilitation of irrigation facilities, and without and with material subsidy (2.50 ton/ha and 3.00 ton/ha) (Option-1/Option-2 and Option-3)
 - Maize: 2.00 ton/ha (increase of 0.10 ton/ha)
 - Others: no increase (constant of 1997 level)
 - Cropping intensity of rice: 120 percent and 160 percent (Option-1/Option-3 and Option-2)

Table P-1 indicates the relations of these conditions as mentioned above.

b) Projection of East Timor's Population

The growth rate of the population used in projections is the constant rate estimated by the UN in 1998. According to this data, population before and after violence in 1999 was 881,600 (1997) and 737,811 (2001). The differences between both years are 143,789. Returned people from other countries is assumed to be 71,895, which is equivalent to 50 percent of this difference.

Population projection for the case of Alternative-1 (without returned people) is tabulated in Table P-2. On the other hand, in Alternative-2 case (with repatriated people), it is assumed that those people will be returned constantly up to the year 2007 with an annual returned people of 11,982 (71,895 /6 years). The results of these projections are indicated in Table P-3.

c) Supply and Demand Analysis

(1) Food Supply

(a) Food Supply Policy

Food Supply to meet the increased demand will be made by crop production increase of mainly staple food such as rice and maize, and also decrease in post-harvest losses. In case of rice, cultivation areas will be rehabilitated by the strong assistance of government. On the other hand, in case of maize, supply is assumed to be increased by inputs of materials, and by decrease of the post harvest losses without expansion of cultivation areas to avoid the raising of soil conservation problems in catchments basin.

(b) Basic Considerations for Land Development to meet Food Supply

As already mentioned in paragraph of "3.5.2 Existing Water Utilization Projects", current irrigation areas under functional irrigation scheme with area size more than 100 ha are about 13,750 ha, out of the total potential irrigation area of about 33,060 ha. And non-functional irrigation area is about 19,310 ha (see Table I-2). Land development strategies to meet the future food demand are set as follows;

- 2,120 ha of 12 irrigation schemes under the name of UNOPS will be rehabilitated with the assistances of WB and Japanese Government by the end of 2002, which have been planned and implemented at present (see Table I-2).
- The areas of 17,190 ha, which is equivalent to remaining non-functional areas will be rehabilitated during 15 years, consisting of mid-term development period of five years (2003-2007) and long-term one of 10 years (2008-2017). Annual rehabilitation areas become 1,145 ha except for the year of 2002, and total rehabilitation areas by the end of 2007 are 6,703 ha.

In addition to the irrigated areas mentioned above, about 8,840 ha of land exists as rain-fed areas in East Timor.

(c) Target Yields and Cropping Intensity

The target yield of paddy rice will reach 2.5 ton/ha for a single crop from the present level of 1.8 ton/ha. The forecast of paddy rice yield by World Bank and DAA indicates that annual average yield will be achieved at the level of 3.0 ton/ha consisting of 100 % of wet season and about 20 percent of dry season crop intensity. In case of application of chemicals by farmers themselves and/or some subsidization by the government, the target yield of 3.0 ton/ha (20 percent increase of 2.5 ton/ha) will be realized.

Regarding target yield and cropping intensity of rice, following alternatives are planned;

- Option-1: Target rice yield of 2.5 ton/ha with cropping intensity of 120 percent under without subsidization for input materials,
- Option-2: Target rice yield of 2.5 ton/ha with cropping intensity of 160 percent under without subsidization for input materials,
- Option-3: Target rice yield of 3.0 ton/ha with cropping intensity of 120 percent under with subsidization for input materials.

Target yield of maize is assumed to be 2.00 ton/ha, which is increased at 0.10 ton/ha by input of material, etc. Target yield of cassava is assumed to be same from the 1997 level due to no changes in farming conditions and practices under the rain-fed conditions.

(d) Consumable Amounts of Staple Food

The consumable amounts of staple foods could be estimated subtracting post-harvest losses, seeds for the next season, feed for animals, etc. from total projected supply amounts (demand), which will be discussed latter. These amounts to be subtracted were analyzed based on obtained data through field survey and interviews. As a result, the consumable ratios to the total production of crops are revealed to be 53 percent for rice, 65 percent for maize and 78 percent for cassava, respectively (see Table P-8).

In this development scenario, post-harvest losses of maize is assumed to be five percent down by introduction of tin can, and consumable ratio is revealed to be 70 percent.

(2) Food Demand

(a) Calories Level

Present actual calorie balance (Alternative-A) in East Timor in 1997 was estimated based on the data of "Neraca Bahan Makan Propinsi Timor Timur 1999", and actual consumed food amounts such as staple food and others. As a result, it indicates that actual calories received are 2,100 kcal/capita/day (see Table P-9 and Table P-10).

On the other hand, the proposed calories balance (Alternative-B), which gives 2,300 kcal/capita/day, equivalent to ten percent higher than Alternative-A, is also estimated. The diet to be consumed other than staple crops is assumed to be at the same level as the 1997 amount (581 kcal/capita/day).

(b) Projected Demand for Staple Food in 2007 and 2017

Projected supply amounts (demand) for staple food such as rice, maize and cassava for both cases of 2007 and 2017 were estimated based on the target annual consumption per capita mentioned below and projected population (see Table P-1 and Table P-2). Table 5.4-1 gives the projected demand of staple food.

Target Annual Consumption per Capita

Alternative	Crop	Target Calories Per Capita a (kcal./day)	Calories per 100gr b (kcal/100g)	Consumption Per		Consumption per Capita Equivalent to Paddy (gr/capita/year)
				Capita Day c=a/b (gr/capita/day)	Capita Year d=365*c (gr/capita/year)	
A 2,140 (kcal/day)	Milled Rice	701	364	193	70,291	70,291
	Maize	711	355	200	73,143	73,139
	Cassava	146	146	100	36,611	14,644
	Total	1,559	-	493	180,045	158,074
B 2,300 (kcal/day)	Milled Rice	780	364	214	78,243	78,243
	Maize	792	355	223	81,418	79,187
	Cassava	146	146	100	36,611	14,644
	Total	1,719	-	538	196,272	172,074

a : Table P-10 Target of Staple Foodstuff Balance

b : List of Foodstuff Composition, International Table of Foodstuff Composition

(3) Supply and Demand Balance

The supply and demand analyses of future staple food for each option were made for both years of 2007 and 2017. Details of such balance tables for Option-1 are shown in Table 5.4-3 as a sample. Balance between demand and supply including rice volume to be imported is summarized in Table 5.4-4. In case of the balance of rice/paddy production for target year 2007, followings are summarized;

Balance of Supply and Demand of Rice/Paddy in 2007

Case	Option and Alternative		Total Demand (milled) (ton/annum)	Supply	
				Local Rice (milled) (ton/annum)	Import Rice (milled) (ton/annum)
Case-I	Op.-2, Alt.-2, Alt.-B,	Intensity : 160 % Yield :2.5 t/ha 2,300 kcal/day	71,010	51,450 1/ (97,075)	19,560 (27.5 %) 2/
Case-II	Op.-3, Alt.-2, Alt.-B,	Intensity : 120 % Yield :3.0 t/ha 2,300 kcal/day	71,010	47,114 (88,894)	23,896 (33.7 %)
Case-III	Op.-1, Alt.-2, Alt.-B,	Intensity : 120% Yield :2.5t/ha 2,300 kcal/day	71,010	40,610 (76,622)	30,400 (42.8%)

Note; 1/: Milled rice volume was converted applying milling rate of 53 % to paddy rice.

2/: Figures in parenthesis indicate the percentage of imported rice.

2) Development Frameworks under Full-Scale Development

In order to realize sustainable development and stable food supply, Case-II is considered to be adequate plan for full-scale development from view points of proposed cropping intensity and yield, and the development frameworks of Case-II are shown in Table 5.4-5.

5.4.2 Development Scenario and Frameworks in Case of Minimum-Scale Development

1) Conditions of Case Study on Development Scenario

- Target year: mid-term in 2007 and long-term in 2017
- Population projection:
 - with returnee (Alternative-2) : 2007 : 888,910, 2017 : 1,133,510
- Countermeasures for food demand increase:
 - Rice : Increase of rice production with rehabilitation of non-functional irrigation schemes
 - Maize: Increase of maize production with increased unit yield and improvement of post-harvest losses
- Supply and demand analysis
 - Calorie level: proposed level of 2,300 Kcal (Alternative-B)
 - Calories consisting of both staple food (rice, maize and cassava) and other crops (sweet potato, root crops, sugar, fruit/seed oil, fruits, vegetables, meat, eggs, milk, fish, animal oil/fat, etc.)
 - Target yield:
 - Rice : with rehabilitation of irrigation facilities, and with material subsidy (3.00 ton/ha) (Option-3)
 - Maize: 2.00 ton/ha (increase of 0.10 ton/ha)
 - Others: no increase (constant of 1997 level)
 - Cropping intensity of rice: 120 percent (Option-3)

2) Projection of East Timor's Population

Regarding the population projection in the case of Alternative-2 (with returned people), same procedures as the case of Full-Scale Development were applied, and results of the projections are indicated in Table P-3.

3) Supply and Demand Analysis

(1) Food Supply

(a) Food Supply Policy

The same policy as the case of Full-Scale Development was applied for staple food.

(b) Basic Considerations for Land Development to meet Food Supply

Land development strategies to meet the future food demand in case of Minimum-Scale Development are set as follows;

- 2,120 ha of 12 irrigation schemes under the name of UNOPS funded by Japanese Government will be rehabilitated with the assistances of WB by the end of 2002, which have been planned and implemented at present (see Table I-2)
- The areas of about 2,450 ha categorized into light to medium damaged irrigation schemes will be rehabilitated during 5 years (2003-2007) as a scheme of the mi-term development plan. Annual rehabilitation areas become 198 ha, after reducing the World Bank rehabilitation area (11 irrigation areas of 1,463 ha) will be implemented during 2002

In addition to the irrigated areas mentioned above, about 8,840 ha of land exists as rain-fed areas in East Timor.

(c) Target Yields and Cropping Intensity

The target yield of paddy rice was assumed to be 3.0 ton/ha with 120 percent of cropping intensity under the adequate application of chemicals by farmers themselves and/or some subsidization by the government.

Target yield of maize is assumed to be 2.00 ton/ha, which is increased at 0.10 ton/ha by input of materials, etc. On the other hand, the target yield of cassava is assumed to be same from the 1997 level due to no changes in farming conditions and practices under the rain-fed conditions.

(d) Consumable Amounts of Staple Food

The consumable amounts of staple foods were analyzed applying the same procedure as mentioned previously.

(2) Food Demand

Projected supply amounts (demand) for staple food such as rice, maize and cassava in 2007 were estimated based on the target annual consumption per capita and projected population. Table 5.4-4 gives the projected demand of staple food.

(3) Supply and Demand Balance

Supply and demand analyses of rice were made for the years of 2007 as shown below;

Balance of Supply and Demand of Rice/Paddy in 2007

Case	Option and Alternative		Total Demand (milled) (ton/annum)	Supply	
				Local Rice (milled) (ton/annum)	Import Rice (milled) (ton/annum)
Case-II	Op.-3, Alt.-2, Alt.-B	Intensity : 120 % Yield :3.0 t/ha 2,300 kcal/day	71,010	41,894 1/ (79,045)	29,116 (41.0 %) 2/

Note; 1/: Milled rice volume was converted applying milling rate of 53 % to paddy rice.

2/: Figures in parenthesis indicate the percentage of imported rice.

2) Development Frameworks in Case of Minimum-Scale Development

Development frameworks for agricultural sector in case of the Minimum-Scale Development are given in Table 5.4-6, which was formulated based on the above analysis.

Table 5.4-1 Demand of Staple Food Production in 2007

Alternative.	Crop	Target Consumption per Capita/Annum. a (gr/person)	Population Projection		Total Demand	
			Alt.-1 b (person)	Alt.-2 c (person)	Alt.-1 d=a x b (ton)	Alt.-2 e=a x c (ton)
A 2,140 (kcal./day)	Milled Rice	70,291	830,405	907,563	58,370	63,794
	Maize	73,143			60,738	66,382
	Cassava	36,611			30,402	33,227
	Total	180,045			149,510	163,403
B 2,300 (kcal./day)	Milled Rice	78,243	830,405	907,563	64,973	71,010
	Maize	81,418			67,610	73,892
	Cassava	36,611			30,402	33,227
	Total	196,272			162,985	178,129

a : Estimated Annual Consumption per Capita

b,c : Population Projection without/with Repatriate (see Table S-1 and Table S-2)

Table 5.4-2 Demand of Staple Food Production in 2017

Alternative.	Crop	Target Consumption per Capita/Annum a (gr/person)	Population Projection		Total Demand	
			Alt.-1 b (person)	Alt.-2 c (person)	Alt.-1 d=a x b (ton)	Alt.-2 e=a x c (ton)
A 2,140 (kcal./day)	Milled Rice	70,291	1,037,138	1,133,505	72,901	79,675
	Maize	73,143			75,859	82,908
	Cassava	36,611			37,971	41,499
	Total	180,045			186,731	204,082
B 2,300 (kcal./day)	Milled Rice	78,243			81,149	88,689
	Maize	81,418			84,442	92,288
	Cassava	36,611			37,971	41,499
	Total	196,272			203,562	222,476

a : Estimated Annual Consumption per Capita

b,c : Population Projection without/with Repatriate (see Table S-1 and Table S-2)

Table 5.4-3 Supply of Staple Foods Production (Option-1)

Year	Crop	Alternative		Demand a (ton)	Local/ Import	Demand Allowance b (ton)	Propotion of Consumable c (%)	Supply d (ton)
		Population	Calories					
2007	Rice	Alt.-1 without returnee	A (2,140kcal)	58,370	Local	40,610	53	76,622
			B (2,300kcal)	64,973	Import	17,760	100	17,760
			A (2,140kcal)	63,794	Local	40,610	53	76,622
			B (2,300kcal)	71,010	Import	24,363	100	24,363
		Alt.-2 with returnee	A (2,140kcal)	63,794	Local	40,610	53	76,622
			B (2,300kcal)	71,010	Import	23,184	100	23,184
			A (2,140kcal)	71,010	Local	40,610	53	76,622
			B (2,300kcal)	71,010	Import	30,400	100	30,400
	Maize	Alt.-1	A	60,738			70	86,769
			B	67,610				96,586
		Alt.-2	A	66,382				94,831
			B	73,892				105,560
	Cassava	Alt.-1	A=B	30,402			78	38,977
		Alt.-2	A=B	33,227				42,599
	Total	Alt.-1 without returnee	A (2,140kcal)	149,510	Local	131,750	65	202,368
			B (2,300kcal)	162,985	Import	17,760	100	17,760
			A (2,140kcal)	162,985	Local	138,622	65	212,185
			B (2,300kcal)	162,985	Import	24,363	100	24,363
		Alt.-2 with returnee	A (2,140kcal)	163,403	Local	140,219	66	214,052
			B (2,300kcal)	178,129	Import	23,184	100	23,184
A (2,140kcal)			178,129	Local	147,729	66	224,781	
B (2,300kcal)			178,129	Import	30,400	100	30,400	
2017	Rice	Alt.-1 without returnee	A (2,140kcal)	72,901	Local	52,764	53	99,554
			B (2,300kcal)	81,149	Import	20,137	100	20,137
			A (2,140kcal)	81,149	Local	52,764	53	99,554
			B (2,300kcal)	81,149	Import	28,385	100	28,385
		Alt.-2 with returnee	A (2,140kcal)	79,675	Local	52,764	53	99,554
			B (2,300kcal)	88,689	Import	26,911	100	26,911
			A (2,140kcal)	88,689	Local	52,764	53	99,554
			B (2,300kcal)	88,689	Import	35,925	100	35,925
	Maize	Alt.-1	A	75,859			70	108,370
			B	84,442				120,631
		Alt.-2	A	82,908				118,440
			B	92,288				131,840
	Cassava	Alt.-1	A=B	37,971			78	48,681
		Alt.-2	A=B	41,499				53,204
	Total	Alt.-1 without returnee	A (2,140kcal)	186,731	Local	166,594	65	256,605
			B (2,300kcal)	203,562	Import	20,137	100	20,137
			A (2,140kcal)	203,562	Local	175,177	65	268,866
			B (2,300kcal)	203,562	Import	28,385	100	28,385
		Alt.-2 with returnee	A (2,140kcal)	204,082	Local	177,171	65	271,198
			B (2,300kcal)	222,476	Import	26,911	100	26,911
A (2,140kcal)			222,476	Local	186,551	66	284,598	
B (2,300kcal)			222,476	Import	35,925	100	35,925	

a : Table 5.5-1/5.5-2 Demand of Staple Food Production in 2007/2017

b : Local = d x c, Import = a - b(Local)

c : Table 5.4-3 Proportion of Consumable Amount

d : Rice(Local) = Refer to Table 5.4-8/5.4-9/5.4-10, Rice(Import) = b, Maize and Cassava = a / c

Table 5.4-4 Supply of Rice Production

Year	Option	Alternative		Demand a (ton)	Local/ Import	Supply d (ton)	
		Population	Calories				
2007	Op.-1 Yield level = 2.5 ton/ha Crop intensity = 120 %	Alt.-1 Without Repatriate	A (2,140kcal)	58,370	Local	76,622	
			B (2,300kcal)	64,973	Import	17,760	
		Alt.-2 With Repatriate	A (2,140kcal)	63,794	Local	76,622	
			B (2,300kcal)	71,010	Import	24,363	
		Op.-2 Yield level = 2.5 ton/ha Crop intensity = 160 %	Alt.-1 Without Repatriate	A (2,140kcal)	58,370	Local	97,075
				B (2,300kcal)	64,973	Import	6,920
	Alt.-2 With Repatriate	A (2,140kcal)	63,794	Local	97,075		
		B (2,300kcal)	71,010	Import	13,523		
	Op.-3 Yield level = 3.0 ton/ha Crop intensity = 120 %	Alt.-1 Without Repatriate	A (2,140kcal)	58,370	Local	88,894	
			B (2,300kcal)	64,973	Import	11,256	
		Alt.-2 With Repatriate	A (2,140kcal)	63,794	Local	88,894	
			B (2,300kcal)	71,010	Import	17,859	
		Op.-1 Yield level = 2.5 ton/ha Crop intensity = 120 %	Alt.-1 Without Repatriate	A (2,140kcal)	72,901	Local	99,554
				B (2,300kcal)	81,149	Import	20,137
	Alt.-2 With Repatriate	A (2,140kcal)	79,675	Local	99,554		
		B (2,300kcal)	88,689	Import	28,385		
	Op.-2 Yield level = 2.5 ton/ha Crop intensity = 160 %	Alt.-1 Without Repatriate	A (2,140kcal)	72,901	Local	131,473	
			B (2,300kcal)	81,149	Import	3,220	
		Alt.-2 With Repatriate	A (2,140kcal)	79,675	Local	131,473	
			B (2,300kcal)	88,689	Import	11,468	
		Op.-3 Yield level = 3.0 ton/ha Crop intensity = 120 %	Alt.-1 Without Repatriate	A (2,140kcal)	72,901	Local	118,706
				B (2,300kcal)	81,149	Import	9,987
	Alt.-2 With Repatriate	A (2,140kcal)	79,675	Local	118,706		
		B (2,300kcal)	88,689	Import	16,761		
Op.-1 Yield level = 2.5 ton/ha Crop intensity = 120 %	Alt.-1 Without Repatriate	A (2,140kcal)	72,901	Local	118,706		
		B (2,300kcal)	81,149	Import	18,235		
Alt.-2 With Repatriate	A (2,140kcal)	79,675	Local	118,706			
	B (2,300kcal)	88,689	Import	25,775			

a : Table 5.4-1/5.4-2 Demand of Staple Food Production in 2007/2017

d : Local = Refer to Table S-4 to S-6.

Import = Refer to Table 5.5-3

Development Sector and Verification Items	Required Interventions and Inputs																					
1. Crop Production - Cultivable land (174,400 ha) - Cropped production for staple crops <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>1997</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>Rice(t)</td> <td>38,000</td> <td>88,900</td> </tr> <tr> <td>Maize(t)</td> <td>99,200</td> <td>105,560</td> </tr> <tr> <td>Cassava(t)</td> <td>41,400</td> <td>42,600</td> </tr> </tbody> </table> - Crop yield - Diversification of products (vegetables and tree crop collaboration with forest development) - Labor shortage for rice and maize farming - Population of draft animal power and farm machinery - Availability of farm-to-market roads - Post harvest and transportation facilities for production and marketing		1997	2007	Rice(t)	38,000	88,900	Maize(t)	99,200	105,560	Cassava(t)	41,400	42,600	- Land and water resources development - Formulation of suitable cropping pattern considering current available labor force - Distribution of inputs materials i.e.: qualified seeds and fertilizer for rice cultivation - Training for crop cultivation (including organic farming) and water management techniques - Improvement of agricultural infrastructures, i.e.: intake, canals, farm-to-market roads - Reduction of machinery hiring and purchasing costs by group and bulky purchase - Micro finance support for purchasing input materials - Strengthening farmer organizations and agro-cooperative business									
	1997	2007																				
Rice(t)	38,000	88,900																				
Maize(t)	99,200	105,560																				
Cassava(t)	41,400	42,600																				
2. Livestock Production - Expansion of animal numbers <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>1997</th> <th>2007^{1/}</th> </tr> </thead> <tbody> <tr> <td>Cattle</td> <td>146,500</td> <td>114,900</td> </tr> <tr> <td>Buffaloe</td> <td>73,800</td> <td>57,600</td> </tr> <tr> <td>Swine</td> <td>362,500</td> <td>284,200</td> </tr> <tr> <td>Horse</td> <td>32,800</td> <td>24,800</td> </tr> <tr> <td>Goat</td> <td>202,900</td> <td>159,700</td> </tr> <tr> <td>Chicken</td> <td>585,400</td> <td>448,000</td> </tr> </tbody> </table> - Bali cattle breeding		1997	2007 ^{1/}	Cattle	146,500	114,900	Buffaloe	73,800	57,600	Swine	362,500	284,200	Horse	32,800	24,800	Goat	202,900	159,700	Chicken	585,400	448,000	- Expansion of veterinary services - Introduction of new technologies to livestock growers and undertaking training programs for utilization of buffaloes and cattle as draft animals - Distribution to households with no animalied-up with micro credit (Repayment-in-kind) - Identification of suitable areas for livestock grazing - Assistance in production of supplemental feeds - Capacity building and research
	1997	2007 ^{1/}																				
Cattle	146,500	114,900																				
Buffaloe	73,800	57,600																				
Swine	362,500	284,200																				
Horse	32,800	24,800																				
Goat	202,900	159,700																				
Chicken	585,400	448,000																				
3. Forestry Production - Reforestation activity - Annual planting area 400 ha (1997), 705 ha (2007) - Production of seedlings: 450,000 (1997), 757,000 (2007) - Regreening activities: - Annual planting area: 1,800 ha (1997), 5,200 ha (2007) - Production of seedling: 720,000 (1997), 3,000,000 (2007)	- Rehabilitation of critical land in National Forest - Enforcement and enactment of forestry law to prevent from forest firing-Rehabilitation of critical areas and private forests - Promotion of fuel wood production and plantation of fruits trees by community people - Production of candle nut oil - Development of village nurseries - Promotion of household processing industries - Provision of micro finance activities																					
4. Fishery Production - Number of canoes: 2,027 (1997), 2,000 (2007) - Total fish landing volume: N.A (1997) 6,900 tons.(2007)	- Improvement of fishing gears - Improvement of fishing vessel building and repair technology - Promotion of small scale fishery enterprises - Fish landing survey - Baseline survey for CBFM																					
5. Agro-Industry Production - Production of coffee 9,900 tons (1997) 11,000 tons (2007) - Production of candle-nuts 1,055 tons (1997) 5,000 tons (2007)	- Improvement and upgrading of processing and marketing facilities - Candle-nut oil production promotion and improvement of marketing - Micro finance promotion																					

Development Sector and Verification Items	Required Interventions and Inputs															
6. Development Indicators 6.1 Supply and Demand (1) Calories Target 2,140 Kcal (1997) 2,300 Kcal (2007) (2) Balance of Supply and Demand for Staple Food: - Volume of domestic production <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>1997</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>Paddy rice(t)</td> <td>38,000</td> <td>88,900</td> </tr> <tr> <td>Maize(t)</td> <td>99,200</td> <td>105,560</td> </tr> <tr> <td>Cassava(t)</td> <td>41,400</td> <td>42,600</td> </tr> <tr> <td>- Imported rice(t)</td> <td>41,800</td> <td>23,900 (milled)</td> </tr> </tbody> </table>		1997	2007	Paddy rice(t)	38,000	88,900	Maize(t)	99,200	105,560	Cassava(t)	41,400	42,600	- Imported rice(t)	41,800	23,900 (milled)	- Establishment of market access on the basis of market economy - Establishment of quality standard and modernized weighing facilities - Improvement of post-harvest facilities and marketing systems - Reduction of processing losses by upgrading technology
	1997	2007														
Paddy rice(t)	38,000	88,900														
Maize(t)	99,200	105,560														
Cassava(t)	41,400	42,600														
- Imported rice(t)	41,800	23,900 (milled)														
6.2 Economy Indicator (1) Revenue and Expenditure <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>1997</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>- GDP per capita</td> <td>442 US\$</td> <td>673 US\$</td> </tr> <tr> <td>- Revenue coverage</td> <td>15%</td> <td>100%</td> </tr> <tr> <td>- Poverty (below level)</td> <td>50%</td> <td>30%</td> </tr> </tbody> </table> (2) Employment Rate - Employment in formal sector 25% (1997) 38% (2007)		1997	2007	- GDP per capita	442 US\$	673 US\$	- Revenue coverage	15%	100%	- Poverty (below level)	50%	30%	- Sound macro-economic policy - Reduce expenditure and increase government revenue - Boost household incomes - Create wage opportunities			
	1997	2007														
- GDP per capita	442 US\$	673 US\$														
- Revenue coverage	15%	100%														
- Poverty (below level)	50%	30%														
6.3 Social Indicator (1) Capacity Building - Human resources - Institutional capacity - Capacity for policy and strategy decisions - Government administration capacity (2) Strengthening of Farmers Organization - No. of farmers organizations formed and functioning - Process of organizing the farmers (top-down, bottom up, etc.) (3) Institutional Support to Farmers - No. of civil servants in MAF - No. of NGOs working in rural areas - No. of visit of the institutional staff to village - No. of staff participated to the training - Satisfaction rate of villagers with institutional supports (4) Access to Credit - No. of beneficiaries from credit schemes - Amount of capital build up in community or borrowers group	- Training of trainer, group dynamics and team building capacity - Implementation of pilot project and adaptive technology - Study on constraint analysis through workshop - Training in time management, team skills, reporting, etc. - Formulation of farmers organization through the participatory approach - Performance based training - Study tour - Exchange visit - Performance based training - Periodical planning and evaluation - Micro-finance program - Group formation - Saving exercise - Training															

1/ Number of cattle in 2007 is decreased in comparison with that in 1997. But, this number is proposed to be increased one in comparison with that in 1999. A lot of castles were slaughtered and foraged during the destruction in September 1999.

Table 5.4-5 Development Framework in Case of Full-Scale Development

Development Sector and Verification Items	Required Interventions and Inputs														
1. Crop production - Cultivable land (174,400 ha) - Cropped production for staple crops <table border="1"> <thead> <tr> <th></th> <th>1997</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>Rice(t)</td> <td>38,000</td> <td>79,000</td> </tr> <tr> <td>Maize(t)</td> <td>99,200</td> <td>105,560</td> </tr> <tr> <td>Cassava(t)</td> <td>41,400</td> <td>42,600</td> </tr> </tbody> </table> - Crop yield - Diversification of products - Labor shortage for rice and maize farming - Population of draft animal power and farm machinery - Post harvest and transportation facilities for production and marketing		1997	2007	Rice(t)	38,000	79,000	Maize(t)	99,200	105,560	Cassava(t)	41,400	42,600	- Formulation of suitable cropping pattern considering current available labor force - Distribution of inputs materials i.e.; qualified seeds and fertilizer for rice cultivation - Training for crop cultivation (including organic farming) and water management techniques - Capacity building of community people and establishment of farmer's group - Improvement of agricultural infrastructures, i.e.; intake, canals light to medium damaged - Reduction of machinery hiring and purchasing costs by group and bulky purchase - Micro finance support for purchasing input materials - Strengthening farmer organizations and agro-cooperative business		
	1997	2007													
Rice(t)	38,000	79,000													
Maize(t)	99,200	105,560													
Cassava(t)	41,400	42,600													
2. Livestock Production - Expansion of animal numbers <table border="1"> <thead> <tr> <th></th> <th>1997</th> </tr> </thead> <tbody> <tr> <td>Cattle</td> <td>146,500</td> </tr> <tr> <td>Buffaloe</td> <td>73,800</td> </tr> <tr> <td>Swine</td> <td>362,500</td> </tr> <tr> <td>Horse</td> <td>32,800</td> </tr> <tr> <td>Goat</td> <td>202,900</td> </tr> <tr> <td>Chicken</td> <td>585,400</td> </tr> </tbody> </table> -Bali cattle breeding		1997	Cattle	146,500	Buffaloe	73,800	Swine	362,500	Horse	32,800	Goat	202,900	Chicken	585,400	- Capacity building and research
	1997														
Cattle	146,500														
Buffaloe	73,800														
Swine	362,500														
Horse	32,800														
Goat	202,900														
Chicken	585,400														
3. Forestry Production - Reforestation activities - Annual planting area: 400 ha (1997) - Production of seedlings: 450,000 (1997) - Regreening activities : - Annual planting area: 1,800 ha (1997) - Production of seedling: 720,000 ha (1997)	- Promotion of household processing industries - Provision of micro finance activities-														
4. Fishery Production - Number of canoes: 2,027 (1997) - Total fish landing volume: N.A (1997)	- Fish landing survey														
5. Agro-Industry Production - Production of coffee: 9,900 tons (1997) - Production of candle-nuts: 1,055 tons (1997)	- Micro finance promotion														

Development Sector and Verification Items	Required Interventions and Inputs															
6.1. Supply and Demand (1) Calories Target 2,140 Kcal (1997) 2,300 Kcal (2007) (2) Balance of Supply and Demand for Staple Food : - Volume of domestic production <table border="1"> <thead> <tr> <th></th> <th>1997</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>Paddy rice(t)</td> <td>38,000</td> <td>79,000</td> </tr> <tr> <td>Maize(t)</td> <td>99,200</td> <td>105,560</td> </tr> <tr> <td>Cassava(t)</td> <td>41,400</td> <td>42,600</td> </tr> <tr> <td>-Imported rice(t)</td> <td>41,800</td> <td>29,100 (milled)</td> </tr> </tbody> </table>		1997	2007	Paddy rice(t)	38,000	79,000	Maize(t)	99,200	105,560	Cassava(t)	41,400	42,600	-Imported rice(t)	41,800	29,100 (milled)	- Establishment of market access on the basis of market economy - Establishment of quality standard and modernized weighing facilities - Improvement of post-harvest facilities and marketing systems - Reduction of processing losses by upgrading technology
	1997	2007														
Paddy rice(t)	38,000	79,000														
Maize(t)	99,200	105,560														
Cassava(t)	41,400	42,600														
-Imported rice(t)	41,800	29,100 (milled)														
6.2 Economy Indicator (1) Revenue and Expenditure <table border="1"> <thead> <tr> <th></th> <th>2007</th> <th>1997</th> </tr> </thead> <tbody> <tr> <td>- GDP per capita</td> <td>442US\$</td> <td>673US\$</td> </tr> <tr> <td>- Revenue coverage</td> <td>15%</td> <td>100%</td> </tr> <tr> <td>- Poverty(Below level)</td> <td>50%</td> <td>30%</td> </tr> </tbody> </table> (2)Employment Rate - Employment in formal sector 25% (1997) 38% (2007)		2007	1997	- GDP per capita	442US\$	673US\$	- Revenue coverage	15%	100%	- Poverty(Below level)	50%	30%	- Sound macro-economic policy - Reduce expenditure and increase government revenue - Boost household incomes - Create wage opportunities			
	2007	1997														
- GDP per capita	442US\$	673US\$														
- Revenue coverage	15%	100%														
- Poverty(Below level)	50%	30%														
6.3 Social Indicator (1) Capacity Building - Human resources - Institutional capacity - Capacity for policy and strategy decisions - Government administration capacity (2) Strengthening of Farmers Organization - No. of farmers organizations formed and functioning - Process of organizing the farmers (top-down, bottom up, etc.) (3) Institutional Support to Farmers - No. of civil servants in MAF - No. of NGOs working in rural areas - No. of visit of the institutional staff to village - No. of staff participated to the training - Satisfaction rate of villagers with institutional supports (5) Access to Credit - No. of beneficiaries from credit schemes - Amount of capital build up in community or borrowers group	- Training of trainer, group dynamics and team building capacity - Implementation of pilot project and adaptive technology - Study on constraint analysis through workshop - Training in time management, team skills, reporting, etc. - Formulation of farmers organization through the participatory approach - Performance based training - Study tour - Exchange visit - Performance based training - Periodical planning and evaluation - Micro-finance program - Group formation - Saving exercise - Training															

Table 5.4-6 Development Framework in Case of Minimum-Scale Development