

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES(MAFF),
DEMOCRATIC REPUBLIC OF EAST TIMOR

THE STUDY
ON
INTEGRATED AGRICULTURAL DEVELOPMENT
OF
EAST TIMOR

DEVELOPMENT PLAN REPORT

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JULY 2002

SANYU CONSULTANTS INC.

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PREFACE

In response to a request from the United Nations Transitional Administration in East Timor (UNTAET), the Government of Japan decided to conduct the Study on Integrated Agricultural Development of East Timor and entrusted the Study to the Japan International Cooperation Agency (JICA).

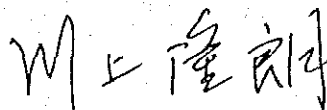
JICA selected and dispatched a study team headed by Mr. Seiji Takeuchi of Sanyu Consultants Inc. to East Timor three times between March 2001 and March 2002.

The Team held discussions with the officials concerned of East Timor, and conducted field surveys at the Study Area. Upon returning to Japan, the Team conducted further studies and prepared this report.

I hope that this report will contribute to the agricultural development of East Timor and also promote further friendly relation between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of East Timor for their close cooperation extended to the Team.

July, 2002



Takao Kawakami
President
Japan International Cooperation Agency

Mr. Takao Kawakami
President,
Japan International Cooperation Agency

July, 2002

Dear Mr. Kawakami,

Letter of Transmittal

We are pleased to submit to you the Study Report on the Integrated Agricultural Development of East Timor. The Report presents agricultural development plan formulated with the advices and suggestions of the authorities concerned of the Government of Japan and your Agency. Also included were comments made by the Ministry of Agriculture and Fisheries, and related agencies of East Timor Public Administration (ETPA)/United Nation Transitional Administration in East Timor (UNTAET).

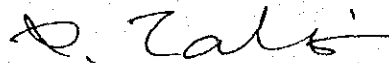
In East Timor, the riot and destruction which occurred after the independence referendum in 1999, caused massive loss of lives and property. There was a consequent general breakdown of the entire social fabric and a sudden collapse of the economy. Since the Tokyo Donor Meeting for East Timor held in December 1999, all donors have been strongly promoting supporting activities for reconstruction and development of East Timor. The Japanese Government has implemented urgent studies for reconstruction and support projects for the development and welfare of East Timor since January 2000. These works shall aim to accelerate the urgent reconstruction of East Timor by way of rehabilitation and maintenance of infrastructures, capacity building and rural community development..

Agricultural sector in East Timor provides about 78 percent of the nation's employment. This sector would be considered to play an important role for reconstruction and development of the country. It would be strongly requested to promote sustainable agricultural development toward security of staple food and income generation of the farmers through, increase in agricultural production, capacity building of the government and community people.

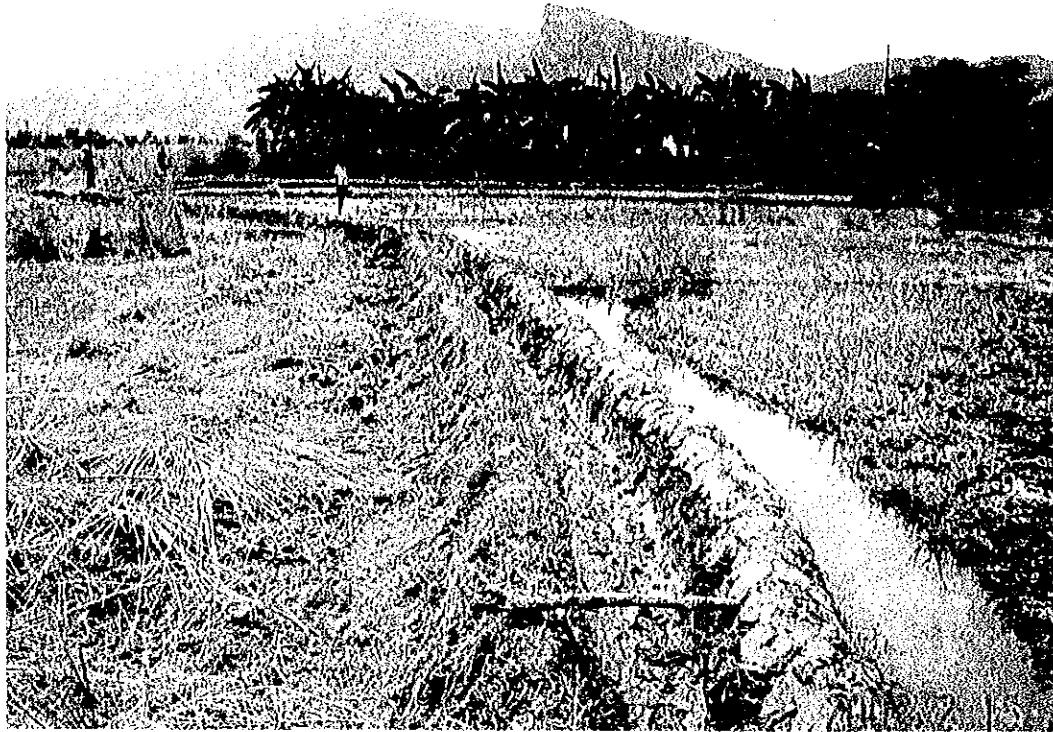
This Report includes the mid-term integrated agricultural development plan setting up a target year of 2007 for the sectors of agriculture, livestock, forestry and fishery for the whole of East Timor. It would be expected that this report would contribute to reconstructing the agricultural sector of East Timor.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, Ministry of Agriculture, Forestry and Fisheries of the Government of Japan, especially for Advisory Committee, which gave useful advice to the Study Team from time to time so as to smoothen the Study. We also wish to express our deep gratitude to the Ministry of Agriculture, Forestry and Fisheries, and related agencies of the Government of Democratic Republic of East Timor for the close cooperation and assistance extended to us during our investigation and study.

Very truly yours,



Seiji Takeuchi
Team Leader, The Study on Integrated
Agriculture Development of East
Timor



Typical secondary canal in the Laolo Irrigation System, which is managed by farmers. Paddy fields are just before planting period. (Manatuto)



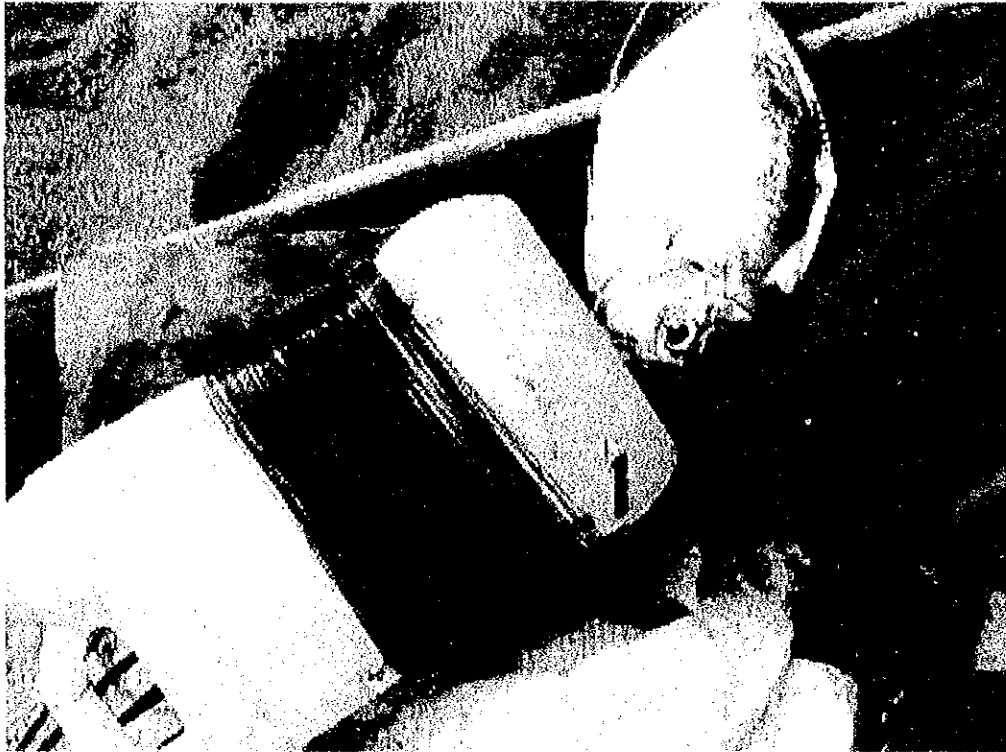
Paddy is cultivated at sloping areas depending on rainfall and spring water. (Baucau)



Typical farmland in East Timor where many crops such as maize, sweet potatoes, taro, squash, banana and palms are raised with mixed crops. (Baucau)



Upland rice is cultivated at the terraces where irrigation is not available. (Baucau)



This hand line is used both for bottom fishing and trolling (Liquica)



Examples of hand-made lure, attached with hen feathers (Liquica)

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ABBREVIATIONS AND GLOSSARIES

I. Related Agencies

ACIAR	: Australian Council for International Agricultural Research
ADB	: Asian Development Bank
AusAID	: Australian Agency for International Development
BOLOG	: Bureau of Logistic
CCT	: Cooperative Coffee Timor
CIDA	: Canadian International Agricultural Research
CNRT	: National Council of Timorese Resistance
CSU	: Census and Statistic Unit of ETTA
DAA	: Division of Agricultural Affairs of ETTA
DOLOG	: District Logistic
DI	: Department of Infrastructure
DPU	: Department of Public Works (Indonesia)
EC	: European Commission
ET	: East Timor
ETFOG	: East Timor Foresters Group
ETTA	: East Timor Transitional Administration
ETPA	: East Timor Public Administration (ETTA was reorganized into ETPA in September 2001)
ETADEP	: <i>Fundacao Ema ma Ta Dalan ba Progresso- an East Timores NGO</i>
EU	: European Union
ETAVFFA	: East Timor Agriculture, Veterinary, Fisheries and Forestry Association
FAO	: Food and Agricultural Organization
FMES	: Fisheries and Marine Environment Service
IAC	: International Agricultural Center
IBRD	: International Bank for Reconstruction and Development
ICEDA	: Iceland Development Agency
IFAD	: International Fund for Agricultural Development
ILO	: International Labor Organization
IMF	: International Monetary Fund
JICA	: Japan International Cooperation Agency
KUD	: Cooperative Unit of Desa
MAF	: Ministry of Agriculture and Fisheries (DAA was reorganized into MAF in September 2001)
MAFF	: Ministry of Agriculture, Forestry and Fisheries (MAF was reorganized into MAFF in May 2002)
NCBA	: National Cooperative Business Association
NGOs	: Non Governmental Organizations
NPA	: National Planning Agency
NPDA	: National Planning and Development Agency
NUETL	: National University of East Timor Lorosae

PASC	: Pilot Agricultural Services Center
PMU	: Project Management Unit
UN	: United Nations
UNCRD	: United Nations Center for Regional Development
UNDP	: United Nations Development Programme
UNEP	: United Nations Environment Programme
UNICEF	: United Nations International Children's Emergency Fund
UNOPS	: United Nations Office for Project Services
UNPFP	: United Nations Population Fund Programme
UNESCO	: United Nations Educational, Scientific, and Cultural Organization
UNTAET	: United Nations Transitional Administration in East Timor
UNIL	: National University of East Timor
USAID	: United States Agency for International Development
WB	: World Bank
WFP	: World Food Programme
WHO	: World Health Organization
WUA	: Water User's Association
WV	: World Vision

2. Glossaries

ADO	: Agricultural Distinct Officer
AFTA	: ASEAN Free Trade Area
ALO	: Assistant Livestock Officer
ARP	: Agricultural Rehabilitation Project by World Bank Trust Fund
AEZ	: Agro-Ecological Zone
CBFM	: Commercial Based Fisheries Management
CEP	: Community Empowerment Project
CFET	: Consolidated Fund for East Timor
DAO	: District Agriculture Officer (Office)
DFO	: District Field Officer
EEZ	: Economic Expressive Zone
EIA	: Environmental Impact Assessment
FIRR	: Financial Internal Rate of Return
FRP	: Fiber Reinforced Plastic
FY	: Financial Year
GDP	: Gross Domestic Product
GRDP	: Gross Regional Domestic Product
GIS	: Geographical Information Systems
GNP	: Gross National Product
HH	: Households
IEE	: Initial Environmental Examination
JPA	: Joint Poverty Assessment

M/M	: Minutes of Meeting
MTFF	: Mid-Term Fiscal Framework
NCD	: Newcastle Disease
NTFP	: Non Timber Forest Products
OAL	: Overall Length
ODA	: Official Development Assistance(Japan)
OJT	: On the Job Training
Off-JT	: Off the Job Training
O&M	: Operation and Maintenance
PCM	: Project Cycle Management
PDM	: Project Design Matrix
PKF	: Peace Keeping Force
PNA	: Protected Natural Area
PPP	: Purchasing Power Parity
PRA	: Participatory Rural Approach
Rp	: Indonesian Rupiah
SALT	: Sloping Agricultural Land Technology
SPP	: Species
S/W	: Scope of Work
TA	: Technical Assistance
TEFT	: Trust Fund for East Timor
TERADP	: Timor Economic Rehabilitation and Development Project
TOR	: Terms of Reference
WID	: Women in Development
WUAs	: Water Users Associations
Suco	: Sub-District
Aldeia	: Village
Kelompok Tani	: Farmers' group
Rencah	: Trampling by buffaloes

3. Unit of Measurements

mm	: millimeter
cm	: centimeter
m	: meter
km	: kilometer
sq.m	: square meter
sq.km	: square kilometer
ha	: hectare
l, lit	: liter
cu.m	: cubic meter
MCM	: million cubic meter
cu.m/day	: cubic meter per day
lit/sec	: liter per second
cu.m/sec	: cubic meter per second
Sm	: staple meter

ppm	: parts per million
pH	: potential of hydrogen
EC	: electric conductivity
g	: gram
kg	: kilogram
t, ton	: metric ton
sec.	: second
min.	: minute
hr.	: hour
yr.	: year
ave.	: average
min.	: minimum
max.	: maximum
kcal	: kilocalories
kw	: kilowatt
kwh	: kilowatt-hour
%	: percent
No.	: number
°C	: degree centigrade
cap.	: capita
md	: man-day
mil.	: millimho
pers.	: person
mmho	: micromho
msl	: meters above mean sea level
vpd	: vehicle per day
ET	: evapo-transpiration
N	: nitrogen
P	: phosphorus
K	: potassium
US\$: US Dollar = 2 Ast. Dollar (April 2001)
Rp	: Indonesian Rupiah (8,710 Rp/US\$)

SUMMARY



1. Introduction

East Timor with a total population of about 737,800 in 2001 remains primarily an agricultural economy. Over 90 percent of the population still lives in the rural area. According to the population census in 1997, about 78 percent of the labor force engaged in agriculture is primarily subsistence in nature. Coffee is the only major export product. Throughout the 1990's domestic agriculture was not able to provide sufficient food, so that rice, wheat, maize and sugar were imported from Indonesia. East Timor was, and still is, one of the poorest countries of Southeast Asia. The identified significant problems include: malnutrition, widespread diseases, low education levels, poor transportation, communication, marketing, irrigation infrastructures, etc.

The series of destruction in 1999, which occurred days after the popular consultation, caused massive loss of lives and property. The scale of destruction was enormous. It is estimated that 95 percent of schools, 77 percent of health facilities, 70 percent of houses and nearly all public buildings were damaged. There was a consequent general breakdown of the entire social structure and a sudden collapse of the economy. Due to the extensive destruction, economic recovery is anticipated to be difficult. Poverty will therefore remain widespread.

In many conferences of supporting countries since the Tokyo meeting held in December 1999, all donors have confirmed the necessity of implementing projects for reconstruction and development in East Timor, and have been promoting strongly supporting activities. In addition to projects provided through the UN, the Japanese Government has implemented an urgent study of reconstruction, development and support projects for the development and welfare of East Timor. Since January 2000, JICA has implemented urgent rehabilitation projects, the community empowerment programme (grass-roots technical cooperation project), capacity building programs, etc. These works aim to accelerate the urgent reconstruction of East Timor by way of rehabilitation and maintenance of infrastructures, capacity building, agriculture and rural development.

Although the emergency phase has passed owing to the above-mentioned implementation of the urgent reconstruction and development projects, there is still the remaining challenge of building a sound economy for East Timor. This has already begun. There is an ongoing strong revival of economic activity led by growth in construction, commerce and basic services. However, the revival is largely driven by demand created by the large UN and expatriate presence. There is little evidence of permanent businesses being established outside of the service sector. The main reasons are lack of investment including political uncertainty, lack of a commercial legal code, confused situation with land and property rights, absence of labor code and lack of conflict resolution and arbitration mechanisms. Inflation appears to be running at an annual rate of about three percent. There are no comprehensive estimates of employment. However, there is little doubt that the agriculture sector will be able to provide most of the nation's 78 percent of labor force. Under these situations, it is strongly requested that sustainable agriculture of East Timor should be developed by promoting food security, increase in agricultural production, implementation of capacity building, etc.

Under these circumstances, JICA dispatched to East Timor in September 2000 the first Study Team for the purpose of reconstruction of the agriculture sector. The Study Team assisted in the

preparation of a development plan for reconstruction, and execution of a development program through the implementation of pilot projects in the agriculture sector for the whole of East Timor. As a result of the consultation with UNTAET-ETTA, a decision was made to prepare a mid-term integrated development program for the agriculture, forestry and fishery sectors throughout East Timor. Also, the study shall provide for the execution of pilot projects for the improvement of the technical knowledge and capabilities of trainers, farmers and fishers.

In November 2000, JICA dispatched the second Study Team to East Timor. The Implementation Plan (S/W) and Minutes of Meeting (M/M) for the Study on the Integrated Agricultural Development of East Timor were signed between JICA and UNTAET-ETTA on November 28, 2000. The Study was undertaken from March 2001 to March 2002 with the following objectives;

- To prepare a Mid-term Integrated Agricultural Development Plan up to year 2007 for the agriculture, forestry and fishery sectors in East Timor.
- To prepare a program that shall include pilot projects for the development of human resources and transfer of technology that is most suitable for the current situation of the agriculture, forestry and fishery sectors in East Timor. Coordination with other donor agencies, culture, tradition, customs, historical background, capacity and intention of the community for the project implementation should be considered when areas and components of the pilot projects are selected.

This report compiled the study results on Mid-Term Integrated Agricultural Development Plan (target year of 2007) involving agriculture, livestock, forestry and fisheries aspects. On the other hand, the National Development Plan was prepared by each division of MAF¹ and organized Planning Commission members in collaboration with JICA and AusAID experts. The agricultural sector's National Development Plan, with a five-year target from 2003 to 2007, was also formulated in accordance with the financial frameworks proposed in the Mid-Term Fiscal Framework (MTFF).

Therefore, when considered the timing of compilation of these plans, the Mid-Term Integrated Agricultural Development Plan are strongly desirous not only to contribute to reconstruction and development of East Timor, but also to harmonize with formulated National Development Plan, especially in the aspects of strategies of the development plan. Furthermore, it will be expected that this report will be effectively utilized by agricultural staff and related experts in East Timor.

2. Current National Development Strategy²

The development strategy evolved under UNTAET followed closely the World Bank strategy of "user pays". World Bank staff members designed all of the programmed field activities of the emerging MAF. Most of these activities, aside from a cattle vaccination program and the supply of other livestock to farmers who had lost animals during the disturbances, were involved in the planning activities for the World Bank's center of activities: the PASC. These three PASC

¹ Ministry of Agriculture and Fisheries (MAF) was reorganized into Ministry of Agriculture, Forestry and Fisheries (MAFF) in May 2002.

² This strategy corresponds to the National Development Strategy prior to the formulated National Development Plan

centers are purported to be able to privatize agricultural extension services following a private sector model with the expectation that East Timorese subsistence farmers are eager to pay for such extension services.

The donor's agricultural development policy for East Timor proposed by agricultural joint donor mission for the year 2000 to 2005, is summarized as follows; a) lessening the government burden as much as possible due to limited allocated budgets (no subsistence), b) promotion for participation of donors, private sector, NGOs and others, c) introduction of open market economic system and full cost-sharing by beneficiaries (full cost recovery)³.

The sector investment plan for the above strategies will span the following three overlapping phases of rehabilitation (2000), transition (2001-2002) and sustainable development (2001-2005). The table below indicates the expected levels of international and government expenditure in East Timor by type from 2000 to 2006.

Estimated International and Government Expenditure

(unit : million US\$)

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Bilateral & Multilateral	79	110	70	50	40	20
UNTAET	120	101	58	34	22	-
Combined Sources (a)+(b)	96	120	152	125	115	122
CFET (a)	45	63	97	112	115	122
TFET (b)	51	57	55	13	-	-
Total	295	331	280	209	166	142

Source : East Timor Combined Sources Budget 2001-02, by Ministry of Finance

The basic framework for international funding is as follows;

Framework for International Financing

Source of Budget	Administrator	Funding for
UNTAET Assessed Contribution	UNTAET	governance and security
Trust Fund (CFET)	ETTA (CFET)	governance and security
Domestic Revenue of East Timor (CFET)	ETTA (CFET)	governance and security & reconstruction/development
UN Agencies	UNDP, UNESCO, FAO, UNICEF, UNHCR, etc	humanitarian aid, reconstruction and development
TFET	World Bank and ADB	reconstruction and development
CAP Fund	Consolidated Inter-Agency Appeal	humanitarian aid
Bilateral Assistance	By Country	bilateral projects include both humanitarian aid, governance, reconstruction and development
NGOs	International and Domestic NGOs	humanitarian aid, reconstruction and development

Note: CFET: Consolidated Fund for East Timor (Trust Fund + Domestic Revenue)

³ Regarding the agricultural joint donor mission's policy of introduction of open market economic system and full cost-sharing by beneficiaries, this report does not always correspond to the strategy proposed by the agricultural joint donor mission (refer to 4.2.3 "Analysis on Food Security Policy Aspects and 6.6 "Project Costs for Mid-Term Agricultural Development Plan").

3. Study Area

3.1 Location and Geography

East Timor is approximately located on the north-western part of port Darwin, Australia by only about 500 km, and in the southern part of Denpasar, Bali Indonesia. The area of East Timor is only about 14,600 sq.km and includes the enclave of Oecussi-Ambeno (about 814.3 sq.km) and inserted in the north coast of West Timor. The topography of East Timor is dominated by a massive central backbone of up to about 3,000 m, and could be grouped into four landforms, that is, i) lowland plain, ii) high plain, iii) hills and undulating mountain, and iv) rough mountain. Furthermore, according to the geography, climate, administration, etc., East Timor could be presented to be western, central and eastern regions. Major features of these presentations are summarized below;

- **Western Region**
Western region facing the areas of West Timor is an agricultural productive area of such staple foods as maize and paddy similar to the eastern region. Population density is relatively high at 44 persons/sq.km following Central region, but this region shows a surplus of agricultural productions.
- **Central Region**
Central region inclusive of East Timor capital of Dili has the highest population density of 79 persons/sq.km. Since most of lands are covered by rough mountain, agricultural production is generally low, resulting to shortage of food crop.
- **Eastern Region**
Eastern region is the agricultural productive area where food crops such as maize and paddy, mainly in Baucau and Viqueque districts are located. But, due to unstable climate conditions and undeveloped marketing facilities and systems for agricultural crops, surplus and/or shortage of crop production are remarkable observed by districts in the region.

The population in each region is presented in the table below;

Population Information - East Timor (2001)

Region	Population			
	Population ^{1/}	Percentage (%)	Density (person/sq.km)	Growth Rate (%) ^{2/}
Western Region	149,296	20.2	44	2.43
Central Region	359,021	48.7	79	3.64
Eastern Region	229,494	31.1	34	1.22
Total/Average	737,811	100.0	51	2.56

^{1/} Civil Registry Unit: Results - 2 July 2001

^{2/} Computed from the 1980 to 1998 Population Record

3.2 Economic Condition in the Rural Area

East Timor is one of the poorest countries in South East Asia with the rural areas considered as the poorest parts of East Timor. Over 30 percent of rural households live below the poverty level (i.e., one US\$ per day). Poor health, housing, education, transportation, communication and energy conditions characterize the region. This lamentable poverty situation manifests itself in many ways. Infant mortality rates at 20 per 1,000 are 2.4 times that of eastern Asian Countries; and average life expectancy of 46.7 years for men and 48.4 years for women is 30 percent below the Eastern Asia averages.

To obtain a more precise overview of rural economic and agricultural conditions in East Timor, JICA Study Team conducted an Village Survey⁴ covering the whole county, in collaboration with WB, UNDP, ADB and JICA. ETPA's Census and Statistic Units (CSU) conducted the survey and data analysis. The inventory survey consists of village and household surveys. The objective samples for the survey are 106 villages for the village survey and 1,800 households for the household survey.

The survey results of the village and household surveys are presented below;

Village Survey

- 63 percent of the main village roads are in poor condition with an average of 9.2 km of road requiring repairs.
- Only 18 percent of rural villages have access to electricity.
- Only 21 percent of rural residents get water from well or pumped source. The remaining 79 percent rely on open springs and rivers.
- 38 percent of the rural population have no access to credit at all, 62 percent can borrow from a formal source.
- Respondents listed infrastructure requiring improvement in order of priority as:
 - Irrigation systems
 - Drinking water
 - Schools
 - Farm to market and other roads
 - Power
 - Health clinics/hospitals
 - Marketing facilities
 - Telephone systems
- 76 percent of villages report some form of irrigation. However, 89 percent of irrigations come from simple, farmer made systems. An overview of all irrigation systems shows that at present 20 percent are no functional.
- Generally crop yields are very low; no fertilizer, herbicides or pesticides are used for crops.
- Livestock population has decreased by about 40 percent since early 1999.
- About one third of all villages include some fishers. About half the villages follow some type of traditional rules. The number of full time fishers has decreased by over 80 percent since early 1999.

⁴ Village Survey (Suco Survey), which was initiatively undertaken by JICA Study Team forms a part of Poverty Assessment Project implemented in collaboration with WB, UNDP, ADB and JICA.

- There were very few processing and storage facilities for agriculture, forestry and fishery.
- On the average, agriculture extension worker visit a village only once a year.
- 75 percent of all villages report some type of erosion problems in their watershed. However, 60 percent of all villages are taking no measures to control erosion.

Household Survey

- 76 percent of households have cultivated crops or owned/controlled some arable land during the last year (from a month to the month).
- In 89 percent of households, the household heads makes the decisions about their land.
- 33 percent of households own less than one hectare of land, 37 percent own one hectare or over one hectare and less than two hectare, 30 percent own over two hectares. The average is 1.6 ha.
- 73 percent of whole land is used for annual crops or fallow, 24 percent is used for plantation. Each area of tree cropland, forest and house/building occupies one percent.
- 85 percent of whole arable land is planted over 75 percent.
- The reason of 46 percent of not planted land is lack of manpower, 28 percent is crop rotation and seven percent is no water source, and 19 percent are others.
- Personal owners own 93 percent of whole land and four percent is public land. Each "part owners" and "rented from someone", and others own one percent each.
- 80 percent of whole land is inherited, and seven percent is opened. Each "use right given by a local leader", "occupied" is five percent, and purchases are three percent.
- 84 percent of whole land has customary right as an ownership right, five percent has its deed and one percent has its sales receipt as a legal title. Another one percent has no ownership right or legal title. Others are nine percent.
- 43 percent of whole land was acquired 10 or less than 10 years ago, 38 percent was acquired between 11 and 20 years ago, and 19 percent was 21 or over 21 years ago.
- Five percent of land owned by household has dispute of the ownership.
- 38 percent of whole land is priced less than 10 million Rp/ha, 58 percent is priced 10 million or over 10 million Rp/ha and less than 100 million Rp/ha and four percent is 100 million or over 100 million Rp/ha.
- 38 percent of whole land is flat, 38 percent is slightly sloping, 17 percent is moderately sloping and seven percent have steep slope.
- Situation of 16 percent of whole land is simple irrigation, six percent is semi-technical irrigation and the remaining 78 percent is no irrigation.
- 27 percent of irrigated area is year-round and the remaining 73 percent is seasonal.
- Irrigation mode of 66 percent of irrigated area is river, 13 percent is spring and 12 percent is swamp and creek, and nine percent are others..
- Management system of 55 percent of irrigated area is self-managed, 25 percent is farmer community, 18 percent is community managed and two percent is agency managed.
- 98 percent of whole land is less than 500 m away from the nearby road, one percent is 500 or over 500 m and less than one kilometer away, and another one percent is one or over one kilometer and less than five kilometer.
- Order and land proportion of main crops grown during the last year, during both dry and wet seasons, are as follows; 1st: maize (22%), 2nd: coffee (19%), 3rd: cassava (16%), 4th: sweet potato (11%), 5th: bananas (8 %), 6th: rice (8%)
- 90 percent of arable land is cultivated by hands, six percent is cultivated by animals and four percent is by tractors.
- 19 percent of whole households harvested coffee in the past 12 months.

3.3 Administrative and Village Conditions

East Timor has 13 districts. Each district is divided to a maximum of five sub-districts (postos) each with the total number being 67. Each sub-district is divided into Sucos, which are collections of Aldeias (roughly equivalent to villages). Village Survey and GIS data indicates that there are 498 Sucos and about 2,100 Aldeias in East Timor, as shown below;

Administrative and Village Distribution by Region

Region	District	Sub-District	Village	Remarks
Western	3	18	120	Bobonaro, Covalima, Oecussi districts
Central	6	26	217	Manufahi, Dili, Aileu, Ermera, Ainaro, Liquica districts
Eastern	4	23	161	Lautem, Baucau, Viqueque, Manatuto district
Total	13	67	498	

The Ministry of Agriculture and Fisheries (MAF) is the central administration organization, which develops the plans, programs, directions and policies of the agriculture sector. Current agricultural activities are shifting from the transition, and from emergency rehabilitation to longer-term goals of higher agricultural productivity, greater food security and sustainability of the sector to help the transition from a heavily subsidized sector to one with limited government funding. MAF has five major departments, which includes the one each for Directorate of Agriculture, Division of Agriculture and Rural Extension, Division of Geography and Cadastry, Division of Irrigation, and Davison of Forestry⁵.

Besides the national level organization, there are also similar organizations at the district level comprising 13 districts. These organizations supervise the agriculture plans and programs in the district and sub-district levels in accordance with the policies and directions set by the MAF. Present MAF staff is 126 as of March 2002; 35 staff at the central level and 91 staff at the district level.

3.4 Meteorology and Hydrology

The climate in East Timor belongs to the tropical monsoon zone. Thus, the climate is divided into the wet and dry seasons and is generally hot and humid weather. Meteorological and hydrological conditions of East Timor are divided into three regions as shown below;

⁵ These department and divisions are reorganized into latest one in accordance with newly establishment of Ministry of Agriculture, Forestry and Fisheries (MAFF) in May 2002.

Climate Character of East Timor

Item	Northern Coastal Area		Mountain Area		Southern Coastal Area	
	Manatuto	Baucau	Ermera	Ainaro	Viqueque	Suai
Annual Rainfall (mm)	667	1,318	N.A	2,653	1,642	N.A
Average Temperature (°C)	26.3	23.5	20.5	21.0	27.0	27.0
Relative Humidity (%)	69	78	78	75	80	73
Annual Evaporation (mm)	1,812	N.A.	N.A.	N.A.	N.A.	N.A.

Source: Volume 2, Annex 1-5, Regional Physical Planning Programme for Transmigration (RePPProT) by Land Resources Department ODNRI, Overseas Development Administration, Foreign and Commonwealth Office, March 1989

The average annual rainfall is 500 to 1,500 mm in the northern coastal area, characterized by one rainfall peak within four to six months usually from December to February. In the southern coastal area, annual rainfall is from 1,500 to 2,000 mm characterized by two-rainfall peak occurring within seven to nine months with the first peak appearing between December and February and the second peak between May and June. In the mountain area around Ainaro, Same, Lolotoe and Soibada average rainfall is from 2,500 to 3,000 mm.

3.5 Water Resources and Utilization

There is a watershed ridge running down the middle of the country such that rain falling on the northern half flows in stream northward and the southern half southward. One of the implications of this fact on such a narrow island, along with the steep of the terrain and the infrequent rain, is that there are very few rivers, which flow regularly and usefully throughout the year. Some rivers, which carry water perennially, are used for domestic needs such as irrigation and potable water.

Available annual water resources in five-year drought at the existing 26 irrigation schemes were analyzed by regions. Findings show that the amounts are 157,000, 446,000, and 313,000 cu.m/sq.km/annum at the western, central, and eastern regions, respectively.

3.6 Existing Irrigation Projects

According to the collected data from MAF, there are about 60 main irrigation schemes, with an approximate potential area of more than 100 ha⁶, and total potential irrigable areas are around 33,000 ha and out of this area 13,800 ha (40 percent of total potential area) are currently functioning as irrigation scheme. Remaining areas are no functioning due to damages with light to medium situations. Agriculture Rehabilitation Projects (ARP) of main irrigation schemes shall be implemented by TFET and bilateral governmental funds due to the requirement of high engineering and high cost.

⁶ Irrigation schemes less than 100 ha in size are referred to as the Communal Irrigation Scheme, and it is reported in the ARP data that their number and areas in the whole country are 16 schemes and 751 ha respectively.

Potential annual cropping intensity was preliminarily analyzed based on available water resources and crop water requirement for the 26 irrigation schemes. Results revealed an average annual cropping intensity of 116 percent for the 26 irrigation schemes.

3.7 Present Agriculture

The soil of East Timor is derived from a continental fragment. The geologic formation is largely made up of limestone and sedimentary rocks. East Timor soils are predominantly alkaline clays derived from limestone rock or marine sediment with small pockets of metamorphic rock of volcanic origin. The significant soil problem is the highly erodible calcareous soil and relatively high pH reaction. The main fertility constraints of East Timor are soil erosion, low fertility, shallow soil depth and some micro nutrient deficiency of major soil groups such as sulfur (S), zinc (Zn), iron (Fe) and molybdenum (Md).

Total area of East Timor is about 1,461 thousand hectare consisting mainly of arable land of 174 thousand hectare, bushed garden of 123 thousand hectare, bushed forest of 1,113 thousand hectare and residential and public area of 50 thousand hectare. Arable lands are further divided into four categories, i.e., wetland with ponded area (mainly paddy land), bare-land and mixed garden for upland crops, grazing land and fruits plantation, and estates (mostly plantation area). The bushed forestland includes protected and recreation forest, jungle forest, forest stable products, forest limit product and forest converted product areas.

The existing land use in the 13 districts of East Timor is summarized below;

District-Wised Land Use

(unit: ha)

Region	Arable Land					Bushed Garden	Bushed Forest	Others	Total
	Wet Land	Bare Land	Mix. Garden	Estates	Sub-Total				
Western	17,859	11,466	15,868	11,296	56,489	60,363	533,438	17,918	668,208
Central	11,955	22,444	7,518	31,845	73,762	25,292	334,375	18,470	451,899
Eastern	12,091	26,446	3,089	2,533	44,159	37,723	245,461	13,488	340,831
Total	41,905	60,356	26,475	45,674	174,410	123,378	1,113,274	49,876	1,460,938

Source: National Board of Land of East Timor Province, Dalam Angka, 1997

Total arable land is about 174,400 ha, and total cropping area is about 180,200 ha, resulting in estimated cropping intensity of 103 percent. Major crops are maize, rice, green peas, peanuts, soybeans, cassava, sweet potato, kidney beans, and are cultivated in the lowland, upland and high plains. Cropping area of maize and rice being the staple food in East Timor cover about 53,400 ha and 14,200 ha, respectively.

3.8 Production of Major Crops and Supply and Demand Balance

In East Timor, major staple crops are maize, rice, cassava and sweet potato. Common cropping patterns are single or double cropping as rice + rice, rice + maize or maize + maize. In particular area like Bobonaro district, triple crops are planted as rice + maize + maize or rice +

maize + cassava. In any cases, seasonal labor intensive at the continuous works between harvesting and subsequent cropland preparation becomes a serious issue. Maize and paddy productions in 1999 and 2001 are shown below;

Maize and Rice Production

(unit: ton)

Region	1999		2001	
	Maize 1/	Rice 2/	Maize 2/	Rice 2/
Western	53,227	25,400	30,684	13,025
Central	31,770	9,479	25,509	7,551
Western	38,507	37,079	38,372	30,344
Total	123,534	71,958	94,565	50,920

Source: 1/: Timor Timur Dalam Angka, 1997

2/: Special Report, FAO/WFP Crop and Food Supply Assessment Mission to East Timor

According to the statistical data in 1997, local paddy production was about 38,000 ton, equivalent to 32 percent of total demand, while imported paddy was about 41,800 ton.

3.9 Farm Mechanization

Animal drawn plow and leveler, even cart that are most common in Asian countries are not widely adopted in East Timor. Farming implements commonly used are crowbar (linggis or aisual), hoe (cangkul or enxada) and knife (tudik, machete or katana). However, "rencak" (land preparation system for rice utilizing cattle and buffalo to till and puddle the soil ready for planting instead of any equipment) is practiced. The reason why animal drawn equipment were not introduced is because agriculture in East Timor is considered subsistence farming, and does not require much labor, technology and farm implements. In East Timor, livestock may be sold for cash, kept as a savings bank, or slaughtered for feast.

The Introduction of mechanized farming are strongly desired in East Timor, considering the following reasons, that is, unbalanced supply and demand of staple food, weak competence against imported rice, shortage of family labor, no market access of produced crops, undeveloped post-harvest facilities, etc. With these current situation of farm mechanization in East Timor, the following projects have been implemented; Mobile Brigade (MB), a grant-aid program of farm machinery by the Republic of China, provision of hand tools funded by TFET, training of rice farmers to offset labor shortage and increase production, assistance, etc.

During the period of 15 months from March 2000 to May 2001, Mobile Brigade (MB) was carried out to achieve such goals as i) to decrease level of dependency of the farmers to the international aid, ii) to empower the people to reconstruct themselves and fulfill their basic needs, iii) to increase income of the farmers, and iv) to accelerate the reconstruction of agricultural sector by utilization of farm machinery. The project was funded by the Government of Macau, Norwegian Government, JICA and the Australian Phillips Petroleum Company at the six districts of Baucau, Viqueque, Manatuto, Manufahi, Bobonaro and Covalima. However, after the completion of one year MB under emergency foreign assistance, all organization and staff had to be dismissed with no plan, no budget and no staff to sustain the continuation of the MB program. Most of farm machinery provided are now not in use.

3.10 Marketing of Agricultural Products

Marketing of staple food crop (rice, maize, cassava, etc.), especially rice is at present a serious socio-economic problem, because of the extensive importation of cheap Vietnamese and Thai rice. Rice selling in districts far from Dili (Viqueque, Lautem and Covalima) have largely stopped because of high transportation and milling costs.

On the other hand, cheap imported Vietnam rice is sold in these rice surplus districts, hence local producers find it difficult to compete. The sale of cheap imported rice has also decreased the sale of maize. Because rice is the preferred staple food, it usually enjoys a price premium over maize but now consumers who normally would buy maize can now afford to buy imported rice.

From districts like Viqueque about 180 km from Dili the cost of rice milling and transport to Dili is about US\$ 0.075-0.08/kg while imported rice is about US\$ 0.14/kg. Clearly with the cost of milling and transport taking up 53 percent of the cost of local rice against imported rice, the prospects are not good for local rice production. The sale of cassava, which is even cheaper than rice or maize, is still competitive since there is no importation of cassava. Sales of cassava are reported to have increased.

3.11 Livestock

Livestock production is predominantly small in scale, and integrated into individual household farm systems. Virtually no commercial livestock project operates except for a poultry farm located in Dili on the way to Ermera, and a part of hog farm. Except for some large herds of buffalo, cattle, sheep or goats, typical animal holdings per household are from one to several heads for each type of livestock, or all types including pigs and chickens. Due to economic difficulties, livestock have become more important as cash income source, to the point of limited consumption by households, even for chicken eggs.

A comparison of estimate of livestock number between the pre and post-conflict situation based on Indonesian data showed an average of 40 percent reduction in animal numbers from 1998 to 2000, with the year 1998 having the highest reduction of animal numbers. For a rough comparison, cattle and buffalo decreased by 34 percent each from 1997 to 1999. The Village Survey showed 27 percent reduction in native chickens, but no reduction in sheep number. All these estimated decrease were due to the following: animals that were killed and/or consumed during the conflict, replacements from ETPA animal distributions, mortality, sales and subsequent animal births.

3.12 Forestry

Based on the data obtained from the National Board of Land of East Timor Province (1997), out of the total land area of about 1,461 thousand hectares, forest land area is 1,113 thousand hectare. This presents 76 percent of the total land area. Forestland areas are divided into two categories as inside forest area (national forest) and outside forest area (private forest). Based on the Land Utilization Design by Indonesian system, inside forest areas are divided by functions based on

the following: i) production forest, ii) protection forest/conservation forest, iii) park and preservation forest, and iv) convertible forest.

There is no remarkable activity on forest sector in East Timor. The Sandal wood resources are almost exhausted. At present, trial breeding of seedling and planting activity is being implemented. Nursery for this tree should be rehabilitated because of the difficulty to plant the Sandal wood tree. The big Teak trees that were planted during the Portuguese period are now limited in numbers though small second growth is seen in several areas. Sandal wood, Teak and Nara trees which are very useful tree species are commonly found in the Western Region such as Covalima, Bobonaro and Oecussi districts.

During the Indonesian period, the industrial plantation was started to promote the production of commercial wood in Aileu, Ermera, Baucau and Manatuto districts, but now these activities are stagnant. In the western areas such as Ermera and Liquicia districts, where coffee production are common, many big Sau tree (Sengon) are planted as shade trees for coffee trees. In the densely populated areas of Dili and Manatuto districts, big trees like Eucalyptus trees were already cut down for fuel. Moreover, the growth of natural seedling is very difficult because of the practice of burning, therefore deforestation is remarkable.

In the Central Region such as Mantuto, Ainaro, and Manufahi districts, there are still big Eucalyptus and Mountain Ru trees. However, these three are already old with parasite, so that the regeneration of these trees are expected. In the areas of Covalima, Bobonaro, Baucau and Viqueque districts in the Central Region, the plantation of Candle-nut tree was promoted during Indonesian time. In the Eastern Region such as Lautem district there are still Sandal wood and Nara trees because of the limited population.

The condition of forest in East Timor shows that the northern part of Timor Island, which is divided by mountains from west to east has less forests covers, while that of the southern part of Timor Island has more forest cover. The potentials of forest resources are uncertain. Therefore the forest resource inventory will be executed as soon as possible, to be able to draw up a sustainable forestry plan. Though timber production from Sengon, old age Eucalyptus and Mountain Ru are available, materials for construction purposes are now imported from Indonesia.

3.13 Fisheries

In 1997, there were 9,066 fishermen and 2,027 canoes in East Timor. In addition to these, there were 160 fishing boat with inboard engine reported. After the post referendum violence in 1999, the number of fishermen and fishing fleet were greatly decreased. This condition still prevails up to the present time. Most of the assistance that has been provided for the fishery sector has been oriented towards urgent recovery of the damaged fishing equipment and materials.

Among 46 surveyed coastal villages, 31 villages reported a total of 2,032 full-time and part-time fishermen operators. The rest of the villagers have no reported fishermen. Majority of the fishing fleet in East Timor is dugout canoe. 708 canoes were reported in the 31 villages. The

main fishing gears are gillnets and hand line. Other gears reported were beach seine, casting nets, and fish traps. The current level of fish catch in East Timor was roughly estimated to be in the range of a few to thousands tons. From the information on weekly food consumption in the households sampled by the Poverty Assessment Project in 2001, it was also estimated at around 3,800 ton.

Most of the interviewed fishermen residing near populated town or city cited that fish traders visit their landing sites to buy their catch. Marketing by fish traders has become general already. Though fish traders show different scales of business, the majority of transactions are individualized. Based on results of poverty assessment conducted in the area, fresh fish is consumed more in the populated region of the north coast. In the uplands, except Bobonaro District, less or no fresh fish is consumed. The upland districts consume preserved fish products (salt or canned fish) in equivalent level, or more in the case of Ermera, in the coastal district. However, fish consumption is not reported in Manufahi and Viqueque, even if the sampled households are located in some populous regions in these two districts.

3.14 Rural Agro-Industry

The biggest agro-industry in East Timor is coffee production⁷. Since most of the coffee in East Timor is still afforest coffee and the organic certification largely determines the price, there is little push as yet to make it more productive per hectare by using organic inputs. It is estimated that the highlands of East Timor have 47,784 ha of coffee trees and 45,972 farmers in 1997. It is reported that NCBA (National Cooperative Business Association) will purchase about 20,900 ton of cherry for US\$0.117 per kg and 18,800 coop members will on average receive about US\$148 per member in total annual payments in 2001. For the vast majority of farm families living in the highlands of East Timor, coffee represents over 90 percent of their annual cash income. USAID, AusAid and Portuguese Government are providing technical assistance for the coffee industry.

Second biggest industry is vanilla production and processing. NCBA (National Cooperative Business Association), through its cooperative operations in Indonesia, is the largest exporter of vanilla bean in the world. To reduce income risk to coffee farmers because of international commodity, NCBA has started a vanilla bean production and extension training activity. In 2001, NCBA plans to ship approximately 400 kg of good quality processed vanilla beans with expected price of US\$ 10.0/kg. There is a small start but significant potential in East Timor. USAID plans to assist vanilla production promotion additionally under the TERADP (Timor Economic Rehabilitation and Development Project).

⁷ According to the National Development Plan, it is reported that coffee in East Timor was responsible for more than 90 percent of export income during Indonesian time. Since 1999, however, the world price of coffee has slumped to historic lows, while inadequate control and poor crop husbandry typify the local industry.

3.15 Agricultural and Fisheries Organization

As per the village survey, most of the villages reported the presence of organization or associations in their communities. Reported organizations are: farmers' associations (58 percent of villages surveyed), water users' associations (11 percent), drinking water associations (two percent), livestock organizations (eight percent), fishermen's groups (18 percent) and traders' organizations (four percent). No organization on agro-forestry was reported. However, it is well known that organizations exist in the coffee areas. The organization with the largest number of members (14 members) is a water users' association and lowest (four members) is a livestock organization.

These associations have for its organization unit the traditional self-reliant organizations called Kelumpok Tani. They serve as starting blocks or basic units of higher-level organizations such as cooperatives, water users' associations, livestock organizations and fishery associations that are top-down initiatives of the government-the transitional one at present and during the past Indonesian time.

The other organizations commonly found in the rural area are Timorese Women and Timorese Youth organizations. However, these are new organizations and form part of the parallel structure organized by the CNRT. However, they are distinct and different organization from the political parties. They represent the interest and sentiments of the women and youth in the community.

3.16 Agricultural and Rural Infrastructures

Major contents of agricultural and rural infrastructures are irrigation facilities, access roads, rural water supply, rural electrification, etc.

There are nearly 60 main irrigation schemes with 33,000 ha of irrigation potential area. Most irrigation schemes were established by Indonesian authorities (DPU: Department of Public Works) in the last two decades. Almost all the irrigation schemes have been found to be functionally insufficient due to negligence of under-investment, engineering maintenance and rehabilitation works. The irrigation facilities can be classified into three types as shown below depending on its functional conditions;

- Seriously damaged irrigation systems (17 irrigation schemes, 16,861 ha)
- Light to medium damaged irrigation systems (22 irrigation schemes, 2,453 ha)
- Functional irrigation systems (18 irrigation scheme, 13,750 ha)

The main access roads which links villages/irrigation area to the national & district roads are either asphalt paved, gravel paved or not paved. The rehabilitation and construction of access road except for national and district roads are implemented through community empowerment project (CEP) under the agriculture rehabilitation project (ARP) funded by TFET and CFET. According to the inventory by MAF, the total length of roads that requires rehabilitation in 10 districts is approximately 110 km. About 54 km out of 110 km have already been rehabilitated up to the fiscal year 2000. The rest have also been implemented in 2001.

The rural water supply and sanitation works are mainly carried out by four NGOs, namely Bia Hula, PROBEM, FORTE and HTO, funded by various international aid. The assistance provided are the rehabilitation of pipeline, construction of new facilities such as hand pump, pipeline, water distribution tank and public fountains, equipment, materials and personnel to effect emergency repairs in the field of water supply.

There is no electricity in the rural area except for main towns in the 13 districts. Even the main towns has limited electricity supply from 18:00 to 24:00 at night or supplied on whole days alternately.

4. Present Problems and Constraints

Present problems and constraints confronting agriculture, forestry and fisheries are summarized as follows;

Agricultural Sector

- High surface soil erosion in catchment basin
- Importation of cheap rice and undeveloped marketing systems for local rice
- Shortage of farming labor
- Lack of farm inputs and high price
- Poor post-harvest technology and facilities
- Ineffective land preparation works for rice cultivation
- Lack of new high yielding bean variety
- Farmer's destruction for use of chemical fertilizer

Livestock Sector

- Farmer's low awareness for seasonal feed availability
- Spread of livestock diseases
- Lack of veterinarians
- Inadequate extension services
- Lack of slaughterhouses
- Lack of an integrated livestock development program

Forestry Sector

- No forestry activities under restricted budgets and staff
- High rate of critical lands
- Uncertain forest boundary and potential
- Forest burning due to no monitoring staff
- Shortage of Forest Products

Fishery Sector

- Shortage of fishing vessels and lower seaworthiness of canoes
- Undeveloped Fishing Gears
- Undeveloped Fish Marketing

Capacity Building

- High enrolment in primary level and its decrease in secondary and high education level
- Low awareness of parents for necessity of education
- Shortage of curriculum and materials for capacity building

Environment

- Deforestation, soil-erosion and land slides
- Lack of environmental legislation
- Absence of information on biodiversity and environmental status

GIS and Data Base

- Shortage of GIS engineers
- Undeveloped maintenance of database and unestablishment of modification /correction methods
- Undeveloped Operation Rule of Application Method
- Restriction of free utilization of GIS

5. Integrated Rural Development Plan and Macro-Economic Perspective

5.1 Analysis on Financial Perspective

After the Oslo donor meeting, the financial cash flow of East Timor was well re-organized by the Ministry of Finance. The financial cash flow will be divided into the general administrative fund as well as the small-scale investment and development fund covered by CFET, and the large-scale investment and development fund covered by TFET, the bilateral aid and multi-lateral aid. It should be noted that apart from the taxes levied on the sales and profits from the Timor Gap project, the special "Saving Fund" was set up to manage the Royalty revenue (FTP) from the Timor Gap project. Although there is no final agreement on how to utilize this fund, at present, two ways for the management of this fund are under study. The first way is that the principal of and interest revenue from the fund will be directly utilized for the administrative, investment and development expenditure under CFET. The second way is that only the interest revenue from the fund will be directly utilized for the administrative expenditure under CFET. The second way is so-called "Norwegian way".

In line with the financial cash flow diagram that was re-organized after the Oslo donor meeting, there are mainly two determinant factors to decide the financial scale available for the agriculture sector. The first determinant factor is whether or not the royalty revenue from the Timor Gap project will be utilized for the administrative, investment and development expenditure under CFET. The second determinant factor is the estimate of the level of the bilateral aid for the agriculture sector committed by the second Joint Donor Agriculture Mission, while the additional amount for TFET will not be committed by donors. The table below shows the comparison of the estimated available financial resources for the agriculture sector in the most optimistic and pessimistic cases of "pre-Oslo" conditions and "post-Oslo" conditions, respectively.

Comparison of Financial Analysis between Pre-Oslo and Post-Oslo Versions

(unit: thousand US\$)

Conditions	Case/Financial Year	2003	2004	2005	2006	2007
Pre-Oslo	Most Optimistic Case	14,398	18,534	26,516	26,573	22,430
Pre-Oslo	Most Pessimistic Case	4,662	3,624	3,293	3,318	3,350
Post-Oslo	Most Optimistic Case	25,054	14,221	14,259	11,305	14,183
Post-Oslo	Most Pessimistic Case	20,096	11,229	11,305	11,305	11,248

It can be observed that the available financial resources for the agriculture sector range from 3,293 thousand US\$ at the minimum for year 2005 to 26,573 thousand US\$ at the maximum for year 2006, indicating that the planned integrated agricultural development plan is within these financial limitations. It was also observed that after the Oslo donor meeting, it became clear that there would be no more additional TFET, implying that the available financial resources for the agriculture sector after the financial year 2004 onward in case of the post-Oslo version is considerably less than that of the pre-Oslo version.

5.2 Analysis on Food Security Policy Aspect

It is essential to explore the appropriate combinations of food security policies following both basic policy concepts of the draft National Development Plan for the agriculture sector and the Joint Donor Agriculture Mission.

Taking into account the fact that East Timor is presently not capable of self-supplying rice, its staple food, it would be difficult for East Timor to rapidly achieve self-sufficiency of rice within a short-term period. The National Development Plan for the agriculture sector and the Joint Donor Agriculture Mission emphasized the “sustainable” and “wide-range” approach for food security in East Timor, the sustainable increase in the self-sufficiency ratio of rice as well as the comprehensive food security policies such as quality improvement, mitigation of post-harvest loss, improvement in access to market, etc. These have been taken into account so that food securities at community and household levels are maintained.

In general, the food security policy is divided into the narrow defined economic policy options and the broadly defined agricultural policy options. Economic policy options include tariff, import restriction, subsidy for producers, and subsidy for exporters, while agricultural policy options include, expansion of irrigated area, productivity improvement, improvement of access to market, mitigation of post-harvest loss, and quality improvement, etc. The table below shows major policy options for food security in developing countries.

Major Policy Options for Food Security

Economic Policy Options	Agricultural Policy Options
1. Tariff	1. Enlargement of irrigated area
2. Import restriction	2. Productivity improvement
3. Subsidy for producers	3. Improvement in access to market
4. Subsidy for exporters	4. Mitigation of post-harvest loss
	5. Quality improvement

Regarding the tariff policy, it was concluded that the continuation of the present tariff level is on the right track, adding that the present 10 percent tariff ad valorem is the balanced level of the tariff on rice. However, due to unavailability for the required data for the analysis, it is also true that the above analysis could not accurately justify the present tariff level of 10 percent.

After the field survey, the results of two important surveys were disclosed. These are the Suco

survey, the final report of which was presented in November 2001 and the Poverty Assessment Project⁸ was presented in February 2002. These surveys made it possible to analyze the effectiveness of the food security policies in addition to the tariff policy analysis. By utilizing the results of these detailed surveys, further analysis on food security policy options was conducted.

An accurate price comparison between local rice and imported rice was reported by the Suco survey with the results indicated below;

- National average price of local rice is 3,587 Rp, and this is quite similar to that of imported rice at 3,590 Rp;
- In urban areas, the average price of local rice is 3,074 Rp which is higher than that of imported rice at 2,815 Rp;
- In rural highland area, the average price of local rice is 3,571 Rp which is lower than that of imported rice at 3,959 Rp; and
- In rural lowland areas, the average price of local rice is 3,802 Rp which is almost the same as that of imported rice at 3,805 Rp.

It is estimated that, due to the higher transportation cost as well as scarcity of imported rice in rural highland areas, the average price of imported rice is higher than that of local rice. These household-level price data of rice make it possible to accurately analyze the optimum level of tariff on rice. Since Dili and Baucau are main markets of rice in East Timor, the simulations of tariff adjustment of retailed rice were conducted at Dili and Baucau to measure a more accurate optimum level of tariff rate on rice. The results of simulations shows that, even in case of no quality adjustment, the tariff should be lifted up to the level of 30 percent in order to make the price difference between local rice and imported rice zero.

However, although the price data suggests the present tariff level is not sufficient to protect the local rice in terms of price, the optimum level of tariff should be carefully examined through the following further specific studies.

- Price elasticity of demand of rice should be calculated to accurately grasp the impact of tariff change on the demand of rice.
- Substitute effect from rice to other food crops should be accurately grasped.
- Quality difference between local rice and imported rice should be numerically verified.
- The equilibrium point of tariff on rice which maximizes the national welfare should be calculated taking into account both producers' increase in revenue and consumers' increase in expenditure, since the majority of households in East Timor are rice producers as well as rice consumers.
- Effect on rice consuming families and rural peoples living in mountainous areas to be considered as the most low level of living standard.

⁸ Poverty Assessment Project was undertaken in collaboration with WB, UNDP, ADB and JICA, and Village Survey (Suco Survey) was initiated by JICA Study Team as a part of Poverty Assessment Project.

6. Basic Concept for Agricultural Development

6.1 Development Objectives and Needs

In the rural area of East Timor, many of households remain below poverty level. The areas suffer from poor and insufficient social and agricultural infrastructures that should support activities on agricultural production. The primary development objectives of the agricultural sector are to increase self-supportive and sufficient food production, to increase income level, and to improve living standard through economic development in rural areas. The priority program focuses are sustainable development of food crops production, poverty alleviation, community development, environment-oriented agriculture, and capacity building/human resources development.

For this, the following issues should be attained;

- Realization of stable production of food crops, and increase of self-supporting ratio
- Securing of self-supporting funds for sustainable development by development/diversification of cash crops and value-added agricultural products
- Human resources development
- Development of value added agriculture

6.2 Study on Agricultural Development Scenarios

To recover the 1997 living standard of the people, the proposed mid-term target-year of the agricultural development plan is 2007, while the long-term plan is by 2017 to be able to promote sustainable agricultural development with self-sufficiency of staple foods and to stabilize agriculture and fishery income for beneficiaries. As mentioned in "5.1 Analysis on Financial Perspective", development frameworks for agriculture sector in East Timor will directly be influenced by the future satiations of Timor Gap project. Therefore, development scenario for agriculture sector in the study was examined for the following cases;

Case-A : Agricultural development in case of full-scale development

Case-B : Agricultural development in case of minimum-scale development

Agricultural Development in Case of Full-Scale Development

In the study on agricultural development in case of full-scale development, the following conditions are taken into account 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
 - Calorie 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)

Supply and demand analyses of staple foods were made for both years of 2007 and 2017. The results of analysis of rice in 2007 are given below;

Balance of Demand and Supply 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 percent to paddy rice.

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

In order to realize sustainable development and stable food supply, Case-II plan is considered to be adequate plan for full-scale development, and its development framework is shown in Table-1.

Agricultural Development in Case of Minimum-Scale Development

In the study on agricultural development in case of minimum-scale development, the following conditions are taken into account;

- 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)

Supply and demand analyses of rice were made for the year 2007 based on the above conditions, and the results are 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)	Imported 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.

Development framework for agricultural sector in case of minimum-scale development plan is given in Table-2.

6.3 Farmer's Organization and Capacity Building

Establishment and strengthening of farmer's organization in East Timor would be implemented through the following five steps considering the present particular situations of rural area.

- Step-1 : Support for building the awareness and mentality of farmers
- Step-2 : Confirmation of leader or leaders respected by community people, or implementation of capacity building for them
- Step-3 : Support to the representative organization of community
- Step-4 : Identification of organization responsibility for project implementation, roles, and rights,
- Step-5 : Raising whole community's commitments to the projects

As to capacity building, the following are targets to be involved; agricultural officers at the central and local (district) level, agricultural extension workers, international and local NGOs, and farmers. The capacity building proposed for this stakeholder is described below;

- The capacity building of agriculture officers at the central and local levels should aim at strengthening the supporting systems of the government to the farmers. Since the government structure is not yet clear and the capability of the officers not yet known under just immediately after the foundation of new government, the proposal is only limited to the supporting systems. That includes i) the definition of the roles of the agriculture officers, ii) the required necessary skills of the officers, and iii) the coordinating mechanism among the officers, extension workers, NGOs and the farmers.
- The roles of international and local NGOs are getting more important with the severely limited human and capital resources of the government. However, at present only a limited number of NGOs seem to be capable of undertaking agriculture development. Moreover, most of these capable NGOs are small in scale. For the implementation of the agricultural development, it is proposed to involve NGOs wherever possible and be trained on-the-job basis.
- For the capacity building of the farmers, program would include awareness building for self-support efforts, formal and informal education and training on various subjects, exchange visits, study tour, information campaign, participatory process with farmers in decision making-planning-implementation-evaluation, etc.

7. Formulation of Agricultural Development Plan

7.1 Contents of Integrated Agricultural Development Plan

The mid-term (2007) and long-term (2017) integrated agricultural development plan was prepared to provide countermeasures to solve present problems and constraints, and was based on the availability of central government investment capacities, requirement of national level food securities proposed by donors, proposed development scenarios mentioned previously, etc. Integrated agricultural development plan involves the following: agricultural development, livestock development, forestry development, and fisheries developments. Major components of each sector are itemized below, and flow of plan formulation of the integrated agricultural development plan is given in Figure-1.

Agricultural Development Plan

- Agricultural Production Plan
- Consolidation of Agricultural Infrastructures
- Establishment of Farm Machinery Training and Hiring Station
- Micro-Finance Plan
- Marketing Plan
- Farmer's Organization and Capacity Building

Livestock Development

- District-Level Development Plan
- Collaborative Program Implementation

- Micro-Finance Plan
- Marketing Plan
- Capacity Building
- Research and Development

Forest Development

- Forest Rehabilitation and Production Plan
- Production of Fuel Wood
- Production of Timber Wood
- Production of Candle-Nut Oil
- Preparation of Forest Law, Regulation, Rule and Required Data
- Institution Development and Capacity Building

Fishery Development

- Development Demand Analysis
- Boat Building Project (Phase III)
- Fishing Gears Improvement Project
- Fish Landing Survey
- Project for Small-Scale Fishery Enterprise
- Baseline Survey for Commercial Based Fishery Management

7.2 Project Costs for Mid-Term Agricultural Development Plan

Project costs for mid-term development plan were preliminarily estimated for both cases based on the proposed development plan in the aspects of agriculture, livestock, forestry, and fishery sectors, that is, full-scale development and minimum-scale development cases.

The former case is the full development to meet the necessary requirements of food supply and demand, balanced land uses considering adequate crop and forestry land uses, under strong support by Timor Gap revenues. The latter case is the minimum development under restricted revenues from Timor Gap revenues. In this latter plan, project plan is at the minimum level with limited rehabilitation of damaged irrigation schemes (light to medium damaged areas) and capacity building.

The estimated project costs for mid-term development summarized below consist of three categories of costs such as government, donors and community. The contents of government burden in case of full-development plan consists of i) agricultural extension and material subsidy and ii) capacity building for government staff and farmers representative. The case of minimum development only consists costs of former contents.

Project Costs for Mid-Term Agricultural Development Plan

(unit: '000 US\$)

Item	2003/04	2004/05	2005/06	2006/07	2007/08	Total
Full-Scale Development						
Government	5,414	3,117	3,117	3,117	3,117	17,882
Donors	14,578	9,349	9,085	9,354	9,346	51,712
Community	2,146	1,551	1,391	1,341	1,301	7,730
Total	22,138	14,017	13,593	13,812	13,764	77,324

Item	2003/04	2004/05	2005/06	2006/07	2007/08	Total
Min.-Scale Development						
Government	2,275	2,246	2,246	2,246	2,246	11,259
Donors	8,759	2,439	2,439	2,439	2,439	18,515
Community	943	98	98	98	98	1,335
Total	11,977	4,783	4,783	4,783	4,783	31,109

The rate of project costs as against total revenues including donor's financing amounts is estimated and shown below. As shown in the results, full-scale development will need a budget equivalent to about nine percent of the total revenue including donor's finance amount except for year 2003/04. On the other hand, for a minimum scale development, the rate is about three percent except for year 2003/04 year.

For a reference, moderate development plan, which stands for intermediate case between full- and minimum-development plans was additionally studied in terms of implementation plan and preliminary project costs. This moderate development plan indicates the plan subtracting the forest land rehabilitation plan, which is deemed to be low priority from viewpoint of the development priority from the full-development plan case. In this moderate development plan, project costs are preliminarily estimated at 60,632 thousand US\$ with following burden; government: 17,882, donors: 36,550, community : 6,200 thousand US\$ respectively (refer to Table U-13 and Figure U-2).

Rate of Project Cost against Total Amount of Revenue and Donor's Financing

(unit: '000 US\$)

Item	2003/04	2004/05	2005/06	2006/07	2007/08	Total
Full-Scale Development						
Project Costs 1/	19,992	12,466	12,202	12,471	12,463	69,594
Revenue + Donor's Finance 2/	170,400	151,200	135,400	141,300	147,500	745,800
Percentage (%)	11.7	8.2	9.0	8.8	8.4	9.3
Min.-Scale Development						
Project Costs	11,034	4,685	4,685	4,685	4,685	29,744
Revenue + Donor's Finance	170,400	151,200	135,400	141,300	147,500	745,800
Percentage (%)	6.5	3.1	3.5	3.3	3.2	4.0

Note: 1/ No inclusive of costs shared by community

2/ Derived from IMF, Donor Meeting Staff Statement, June 2001

7.3 Implementation Programme

Since the specific feature of the development plan includes various components, the Ministry of Agriculture and Fisheries (MAF) can not solely handle all the components including implementation, management, and operation and maintenance (O&M). In the scope of development planning, MAF will play a vital role. On the other hand, construction/rehabilitation and supervision of irrigation facilities and structures will be under the Ministry of Water and Public Works (MWPW), while monitoring of process and/or results of the whole projects shall be under the supervision of the Ministry of Economy Affairs and Planning (MEAP). Nevertheless, the participation of Donors and NGOs, will be needed in each stage, namely planning, designing, implementation, operation and maintenance.

Project implementation programmes were studied for both cases of full-development and minimum development. In case of former development, project implementation programme for mid-term development (target year of five years from 2003 to 2007) and long-term development (target year 15 years from 2003 to 2017) were formulated. In case of minimum development, on the other hand, implementation programme of mid-term development was only formulated.

8. Environmental Management and Monitoring Plan

Studies have been made to construct a broad environmental management plan for East Timor. The major environmental problems and recommended countermeasures in the study are as follows;

- Low and declining economic and social welfare
 - Diversification of farming system
 - Introduction of pest control
 - Improvement of roads and bridges
- Environmental Degradation and conservation of waterways
 - Conservation of major watershed, waterways, and river from shifting cultivation, logging and land cleaning activities
 - Creation of buffer zone around conservation and protected areas
 - Creation of woodlots for fuel-wood diversity
 - Implementation of sound vegetative watershed management and soil conservation practices
- Increase in environmental hazards
 - Improvement of flood and flush protection measures
 - Improvement of public health and sanitation

A monitoring plan should be established to measure the effectiveness of the proposed mitigation in improving the bio-physical, economic and social performance of the project.

9. Justification of Development Plan

9.1 Analysis on Financial and Technical Appropriateness

Project justification for the mid-term agricultural development plan was preliminarily analyzed from economical/financial and technical viewpoints.

Economical/Financial Justification

The result of the financial internal rate of return (FIRR) is summarized as follows;

	<u>FIRR</u>
- Rehabilitation Plan of Irrigation Facilities	(%)
• Full-Development Case	16
• Minimum-Development Case	19
- Construction Plan of Farm Road	15
- Plan of Farm Mechanization	21
- Extension Plan for Agricultural Technology	14
- Livestock Development Plan	10
- Plan of Forest Land Rehabilitation	9
- Fund Plan for Fishing Boat	11
- Fund Plan for Fishery Enterprise	22

Appropriateness of Technical Level

In accordance with the contents of construction works in each project, the difficulty to implement such works is qualitatively judged and ranked with the conclusion of the financial analysis.

<u>Project</u>	<u>Difficulty</u>	<u>Rank</u>
- Rehabilitation Plan of Irrigation Facilities		
• Full-Development Case	Medium	A
• Minimum-Development Case	Medium	A
- Construction Plan of Farm Road	Medium	A
- Plan of Farm Mechanization	Low	A
- Extension Plan for Agricultural Technology	Medium	B
- Livestock Development Plan	Low	A
- Plan of Forest Land Rehabilitation	Low	B
- Fund Plan for Fishing Boat	Low	A
- Fund Plan for Fishery Enterprise	Low	A

9.2 Recommendation for Environment Examination

An initial environment examination (IEE) should be done considering the subsequent issues, before implementation of each project in order to judge the necessity of the environment examination.

- Agencies concerned should discuss mutually to decide serious points or division of responsibility.
- The need for an integrated approach to watershed or coastal zone management is especially important, and related agencies should tackle it cooperatively/collaboratively.
- Detailed assessment of the state of the environment, including bio-diversity is needed in agricultural projects.
- Development of laws and regulation governing the use of natural resources is important to empower support for customary laws and practices.
- There is a need to adhere to minimum input of agricultural chemicals in order to promote environmental sustainability in agriculture sector.
- Regarding agricultural licensing decisions, oversight of the environmental conservation is indispensable if project size is large in scale.

10. Suggestions and Recommendations

As the suggestions and recommendations of the study, following issues were pointed out;

- Food security policy of East Timor
- Basic development scenario for staple food supply
- Crop production increase plan
- Formulation of land use plan inclusive of forest land and forestry development plan
- Fishery development plan
- Capacity building and farmer's organization plan
- Project implementation and its prioritization

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>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"> <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 breedin		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																				
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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"> <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														
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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-1 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													
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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														
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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														

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Table-2 Development Framework in Case of Minimum-Scale Development

Inputs for Agricultural Sector

1. Low Food Supply Efficiency
2. Low Living Standard (Poverty, Deterioration of Nutrition, Health and Sanitation)
3. Environmental Disruption in Watershed by Deforestation, Burning, Shifting Cultivation, etc.

Present Problems and Constraints

1. **Agricultural Sector**
 - High Surface Soil Erosion in Catchment Basin
 - Import of Cheap Price of Foreign Rice and Undeveloped Marketing Systems for Local Rice
 - Shortage of Farming Labor
 - Lack of Farm Inputs and High Price
 - Poor Post-Harvest Technology and Facilities
 - Inefficient Land Preparation Works for Rice Cultivation
 - Lack of New High Yielding Bean Variety
 - Farmer's Destruction for Use of Chemical Fertilizer
2. **Livestock Sector**
 - Farmer's Low Awareness for Seasonal Feed Availability
 - Spread of Livestock Diseases
 - Lack of Veterinarians
 - Inadequate Extension Services
 - Lack of Slaughterhouses
 - Lack of Integrated Livestock Development Program
3. **Forestry Sector**
 - Low allocated Budgets for Forestry Sector
 - High Rate of Critical Lands
 - Uncertain Forest Boundary and Potential
 - Forest Burning due to No Monitoring Staff
 - Shortage of Forest Products
4. **Fishery Sector**
 - Shortage of Fishing Vessels and Lower Seaworthiness of Canoes
 - Undeveloped Fishing Gears
 - Undeveloped Fishing Marketing
5. **Capacity Building**
 - High Enrolment in Primary Level and Its Decrease in Secondary and High Education Level
 - Low Awareness of Parents for Necessity of Education
 - Shortage of Curriculum and Materials for Capacity Building
6. **Environment**
 - Deforestation, Soil-Erosion and Land slides
 - Shortage of Drinking and Irrigation Resources and Poor Water Quality for Drinking
 - Poor Rural Economy
 - Poor Resources Use (Fuel Wood for Cooking)
 - Lack of Environmental Registration
 - Absence of Information on Biodiversity and Environmental Status
7. **GIS and Data Base**
 - Shortage of GIS Engineers
 - Undeveloped Maintenance of Database and Unestablishment of Modification/Correction Methods
 - Undeveloped Operation Rule of Application Method
 - Restriction of Free Utilization of GIS

Agricultural Sector Strategic Frameworks

Overall Goal

1. Standard of Living Improved (Income, Nutrition, Health and Sanitation)
2. Economic Growth Stimulated

Project Purpose

1. Increased Food Security
2. Increased Production (Crops, Livestock, Fisheries, Forestry, etc.)
3. Increased Near-Term Employment Income
4. Capacity Building

Key Initiatives

1. **Realization of Staple Production of Food Crops**
 - Improvement of Infrastructures for Production
 - Improvement of Supporting Services for Production
 - Extension of Production Technique
 - Development and Improvement of Marketing Systems
 - Watershed Conservation
 - Improvement and Establishment of Statistical Information Systems
2. **Securing of Self-Supporting Funds for Sustainable Development**
 - Improvement of Productivity of Main Crops
 - A Forestation with Teak and Sandalwood Trees
 - Improvement of Value-Added by Processing, Quality Control and Stable Supply of the Products
 - Diversification of Crops, Vegetable and Tree Corps
3. **Human Resources Development**
 - Capacity Building of Government Staff
 - Capacity Building of NGOs and Farmer's and Fishermen's Representatives
 - Development and Capacity Building of NUETL
4. **Development of Value-Added Agriculture**
 - Increase of Farmer's Profits by Reduction of Production Costs,
 - Quality Improvement, Stable Supply, Improvement of Post-Harvest Treatment and Processing, and Selection of Crops taking Market and Demand into Account

Formulation of Agricultural Development Plan

1. **Agricultural Development**
 - Agricultural Production Plan
 - Consolidation of Agricultural Infrastructure
 - Establishment of Farm Machinery Training and Hiring Station
 - Micro-Finance Plan
 - Marketing Plan
 - Farmer's Organization and Capacity Building
2. **Livestock Development**
 - District Level Development
 - Collaborative Program Implementation
 - Micro-Finance Plan
 - Marketing Plan
 - Research and Development
3. **Forestry Development**
 - Forest Rehabilitation and Production Plan
 - Production of Fuel Wood
 - Production of Timber Wood
 - Production of Gandle-nut Oil
 - Preparation of Forest Law, Regulation, Rule and Required Data
 - Institution Development and Personal Capacity Building
4. **Fishery Development**
 - Demand Analysis
 - Boat Building Project (Phase III)
 - Fishing Gear Improvement Project
 - Fish landing Survey
 - Project for Small-Scale Fishery Enterprise
 - Baseline Survey for Commercial Based Fishery

Selection of Pilot Projects

1. Lowland Agricultural Development Project

*1 proposed by Agricultural Joint Donors Mission

Figure-1 Formulation Flow of Agricultural Development Plan