Chapter 1 Introduction

1.1 Authority

This Report is prepared in accordance with the "Scope of Work for the Study on Small Scale Horticultural Development Project for Poverty Alleviation to Farmers in Coast Region (hereinafter referred to as "the Study")" agreed upon between Coast Regional Commissioner's Office (hereinafter referred to as "CRCO") and Japan International Cooperation Agency (hereinafter referred to as "JICA") and signed on the 15th April 1999.

1.2 Historical Background of the Project

Coast Region (hereinafter referred to as "the Region") is poorer than the surrounding regions in spite of its favourable location near the trading city of Dar es Salaam. This is because it does not have any major manufacturing industries or highly profitable agriculture. Therefore, promotion of agriculture is the most important in the Region.

Owing to such circumstances, the Government of Tanzania requested the Government of Japan to formulate a development plan on horticultural development in the Region. In response to the request, the Government of Japan dispatched a preparatory study team through JICA and decided to conduct a study on the above project signing the Scope of Work.

1.3 Project Objectives

The main objective of the Project is poverty alleviation to farmers by means of horticultural development. Horticultural development is considered to be the most cost-effective method to realise the goal in a short span with small investment.

1.4 Prerequisite for the Project

(1) The Project should focus on a small-scale horticultural development, as most of the poor farmers in the Region are involved in small-scale farming and it brings them quicker increase in income.

(2) The Project should be as much economical as possible considering the budgetary situation of the Government and the capacity of the farmers.

(3) Farmers and farmers' groups should be actively involved in the Project from its planning

till its evaluation, as participation by beneficiaries and community is always prerequisite for project sustainability along the decentralisation policy of the Government to encourage people's autonomous participation.

1.5 Objectives of the Study

The objectives of the Study are:

(1) To formulate a Master Programme on small-scale horticultural development in order to increase farmer's income.
(2) To form Action Plans for the priority sites.
(3) To lead and transfer technology to counterparts on investigation skills and planning methods on each study component.

The Study analyses the actual situation, constraints and opportunities of the study area and explores methods of relaxing the constraints.

Chapter 2 Project Background

2.1 National Economy

2.1.1 Population

Population increase of Tanzania in recent years is shown in the following table.

Population of Tanzania from 1992 to 1998

Year	1992	1993	1994	1995	1996	1997	1998
Population (million)	25.3	26.0	26.7	27.5	28.3	29.1	30.0

Source: Bureau of Statistics

The average annual population increase during this period is 2.9 per cent.
Population density in 1998 is 31.7 people/km^2.

2.1.2 Economic Growth and Balance of Payment

(1) Economic Growth

Gross Domestic Product (GDP), growth rates and GDP per capita are shown in the following table.

GDP, Growth Rate and GDP per Capita of Tanzania from 1992 to 1998

Year	1992	1993	1994	1995	1996	1997	1998
GDP (TSh. billion)	1,276	1,281	1,299	1,345	1,402	1,448	1,506
Growth rates (%)	1.8	0.4	1.4	3.6	4.2	3.3	4.0
GDP per capita (TSh.)	50,432	49,269	48,650	48,918	49,530	49,767	50,194
Mean selling rates of USD in TSh.	479.9	523.5	550.4	595.6	624.6	681.0	

Source: Bureau of Statistics, Per Capita GDP-BOT computation

This table shows almost stagnant economic growth between 1992 and 1994 and some recovery between 1995 and 1998.

(2) Balance of Payments

Tanzania has been a country with international payments deficit in recent years as shown below. The deficit has been balanced by arrears, rescheduling, debt forgiveness, use of fund credit and grants.

Balance of Payment from 1992 to 1998

Year	1992	1993	1994	1995	1996	1997	1998
Overall Balance (TSh. billion)	-66.8	-272.7	-227.7	-214.6	-129.9	-387.2	-417.2

Source: Bureau of Statistics

2.1.3 Administrative Structure and Decentralization

(1) Administrative Structure

The Ministry of Agriculture and Cooperatives (MAC), the Ministry of Regional Administration and Local Government (MRALG), the Regional Commissioner's Office (RCO), the District Commissioner's Office (DCO) and the Divisional Secretary Office (DSO) are the Central Government Institutions, and the District Director's Office (DDO), the Ward Executive Office (WEO) and the Village Executive Office (VEO) are the Local Government Institutions in charge of governmental administration of the local governments in the Region. It appears that the administrative structure is generally well established for prudent rural administration. The organograms of MAC and RCO that are the key Central Government Institutions concerning the Project are shown in Fig 2.1.1 and 2.1.2, and the relationship between Central and Local Government Institutions is shown in Fig. 2.1.3.

(2) Local Government Reform Programme

The ongoing Local Government Reform Programme, which started in 1996, has three major reform areas. They are: 1) Reallocation of staff to district councils; 2) Autonomy of district councils; and 3) Formation of Regional Secretariat. Tanzania once had a system of centralised administration, with central government directly controlling regions, districts, divisions, wards and villages.

Local Government Reform Programme aims at improving public services by shifting many powers from the central government to local governments. Most of the powers of the region have already been delegated to the districts. They now have the mandate to decide their own budgets, personnel affairs and development programmes.

Implementation of the Local Government Reform Phase I started in January 2000 at 35 districts selected out of 102 in the country as model districts. Kisarawe is the only district among 6 in the Region, which will be among the said 35 selected (refer to Table 2.1.1).

The total cost of the Reform Phase I is estimated to be US$ 8.1 million or about US$ 230

thousand per district and is a grant to the districts. The main developmental sectors for the grant are water, agriculture, education, health and roads.

At present, as it is a transition period for local government reform, it seems that there arise many disorders in terms of personnel affaires, budgetary allocation and so forth. However, since it is said that Local Government Reform Programme has concretely got into action, watching shall be made to find whereabouts it goes.

2.1.4 Agricultural Sector

(1) Agricultural Holdings

In the agricultural year 1996/97, the number of agricultural households in Mainland Tanzania was 4,357,100. Out of this figure, 2,895,800 (67%) grew crops only, 47,869 (1%) raised livestock only and 1,413,460 (32%) had a combination of crops and livestock. Average family size of agricultural household was 5.29 persons.

(2) Planted Area

Estimated total planted area in the long rainy season was 2,743,700 ha in 1996/97, with average household planted area of 0.6 ha. Planted crops are cereals (56%), roots and tubers (14%), oil crops (9%), legumes (8%), fruit (5%) and vegetables (4%). (Source: Expanded Agricultural Survey 1996/97)

(3) Food Crop Production

Planted area, production and productivity of food crop are shown below:

Planted Area, Production and Yield of Food Crop in Tanzania

	Maize	Paddy	Sorghum	Millet	Beans
Planted area ('000 ha)	2,391	343	523	186	592
Production ('000 t)	2,386	413	449	195	370
Yield (Kg/ha)	998	1,204	859	1,052	624

Source: Expanded Agricultural Survey 1996/97

Main food crop producing Regions for each crop are shown in the following table:

Main Food Crop Producing Regions in Tanzania

Crop	Maize	Paddy	Sorghum	Millet	Beans
Region	Rukwa	Mbeya	Shinyanga	Singida	Karega

Source: Expanded Agricultural Survey 1996/97

(4) Horticultural Crop Production

Production of horticultural crops is normally carried out by small-scale farmers who cultivate small plots of land. In Tanzania, inter-cropping by different crops in same plot is popular to avoid risks derived from vagaries of weather.

Main horticultural production areas are Morogoro, Mbeya, Iringa, Kilimanjaro and Tanga Regions. Among them, Tanga Region has the top production of oranges, pineapples, mangos, tomatoes, apples, pears, plums, apricots, eggplants, sweet peppers and papayas. Irringa Region produces tomatoes, cabbages, onions and peas. Arusha Region produces bananas. Flower production is increasing in Arusha Region (refer to Table 2.1.2).

2.1.5 Poverty Alleviation

The National Poverty Eradication Strategy is being applied by Ministries, Local Government Institutions, private sectors, NGOs and other communities under the leadership of the Vice President's Office. The Strategy aims at involving the people, especially the poor in identifying, planning, implementing, monitoring and evaluating poverty eradication programmes. In order to measure progress achieved in eradicating poverty, the following goals are indicated; (1) Increase of economic growth, (2) Higher people's incomes, (3) Better education, (4) Improved water and sanitation facilities, (5) Better health and nutrition, (6) More employment opportunities, (7) Better housing and (8) Improved infrastructure.

2.1.6 Foreign Aid

Foreign aid from the DAC countries and International Organisations in 1997 are as follow.

Foreign Aid to Tanzania in 1997

(Unit: US$ million)

	1	2	3	4	5	0thers	Total
DAC	France 79.6	GB 67.6	Denmark 64.0	Germany 59.3	Japan 55.4	243.2	569.1
IO	IDA 169.0	CEC 63.9	IMF 53.5	AfDF 47.8	UNDP 14.9	43.2	392.2

Source: ODA white paper, Japan
DAC: Development Assistance Committee
IO: International Organisation

Japan was the largest donor country in the DAC in1994, 1995 and 1996, however, dropped to the fifth in 1997.

2.2 National Development Plan

2.2.1 National Rolling Plan

National Development Plan was implemented until 1993/94 financial year. From 1994/95, the Government adopted the Rolling Plan and Forward Budgeting, in which the Government monitors the work done in the previous year and plans projects in the coming years. According to the Rolling Plan and Forward Budget, the tenable macroeconomic targets for 1999/2000 - 2001/02 are as follows:

- Real economic growth of 4.1 per cent in 1999, rising progressively to 6.1 per cent for 1999/2000 - 2001/02;
- Consumer price inflation of 7.5 per cent by the end of June 2000, declining to about 5.0 per cent by the end of June 2002;
- Revenue collection equivalent to 12.6 per cent of GDP in 1999/2000, and allowing it to stabilise at 12.2 per cent by 2001/02;
- Maintenance of recurrent budget saving of at least 1.0 per cent of GDP throughout the period:

There is no National Horticultural Development Plan, however, the above Rolling Plan and Forward Budget shows the policy for agriculture as below.

The strategy for 1999/2000 - 2001/02 will focus on improving the core services of the sector that include, extension services, research and regulatory services, cooperatives promotion, information services and food security. Priority to utilisation of the development expenditure will be directed towards the completion of the on-going programmes/projects.

2.2.2 Budgetary Arrangement

The following table shows the budget of the Tanzanian Government and the expenditure of agricultural sector from1996/97 until 1998/99.

Budgetary Arrangement of Tanzania from 1994/95 to 1998/99

(Unit: TSh. mill)

(Resource)	1994/95 Actual	1995/96 Approved	1996/97 Budget	1997/98 F/Budget	1998/99 F/Budget
Domestic Revenue	331,239.2	455,980.8	563,756.4	671,980.0	781,425.0
External Grants	105,592.0	107,290.0	109,337.0	110,812.0	101,392.0
External Loans	14,319.5	77,454.0	78,200.9	83,631.6	70,738.5
Total	451,150.7	640,724.8	751,294.3	866,423.6	953,555.5
(Expenditure)					
Recurrent Expenditure	420,004.2	493,505.0	631,906.7	702,923.0	792,743.0
Development Expenditure	49,692.0	138,858.0	126,990.4	130,047.0	99,505.0
Total	469,696.2	632,363.0	758,897.1	832,970.0	892,248.0
(Expenditure of Agricultural Sector)					
Recurrent	7,667.0	11,860.4	14,598.3		
Development	7,603.8	6,819.3	3,456.2		
Total	15,270.8	18,679.7	18,054.5		
Ratio of Expenditure of Agricultural Sector	3.3%	3.0%	2.4%		

Source: The Rolling Plan and Forward Budget for Tanzania for the Period of 1996/97 - 1998/99

Figures of budget increase every year. However, the real amount may not be expanded largely, as the constant price expenditure in 1996/97 has almost no difference between that of 1997/98 or 1998/99. Agricultural sector has a ratio of 2.4 per cent to the total expenditure in 1996/97.

2.3 Background of Coast Region

2.3.1 Population

The Region has the smallest population of 638,015 people among all regions in Tanzania Mainland. This is only 2.7 per cent of the total population of the country. Population in the Region is dispersed widely all over the Region, and the population density ranges from 63.8 people/km^2 in Mafia to the lowest population density of 11.4 in Rufiji. The population increase is relatively lower than in other regions. The national average is 2.8 per cent between 1978 and 1988, while that of the Region is 2.1 per cent.

2.3.2 Economy

Agriculture is the major sector of the regional economy, which produces more than 80 per cent of the total regional income and provides employment to more than 90 per cent of its population. The Region, however, has been facing sluggish economic development for the past decade. Its per capita GDP of TSh. 22,624 in 1994 was ranked as the lowest among all regions. The Region still continues to be the lowest in economic development.

2.3.3 Regional Budget

The actual/estimated budget of the Region is presented below. After the financial year 1998/99, the all budget was transferred to the Region from the Central Government. Therefore, the regional budget increased after that year. The breakdown of government subventions for each district is also presented.

Public Expenditure of Coast Region

(TSh. '000)

	1997/98 (actual)	*1998/99 (approved estimates)*	*1999/2000 (estimates)*
Net Total of Vote	643,360	573,088	4,947,673

Source: Volume III Estimates of Public Expenditure Supply Votes (Regional)

Government Subventions to District Councils from 1st July 1999 to 30th June 2000

(TSh. '000)

Bagamoyo	*Kibaha*	*Kisarawe*	*Mkuranga*	*Mafia*	*Rufiji*	*Total*
902,396	747,449	678,887	622,758	448,251	891,175	4,290,919

Source: Volume III Estimates of Public Expenditure Supply Votes (Regional)

Chapter 3 Findings on the Project Area

3.1 Natural Conditions

3.1.1 Physiography and Topography

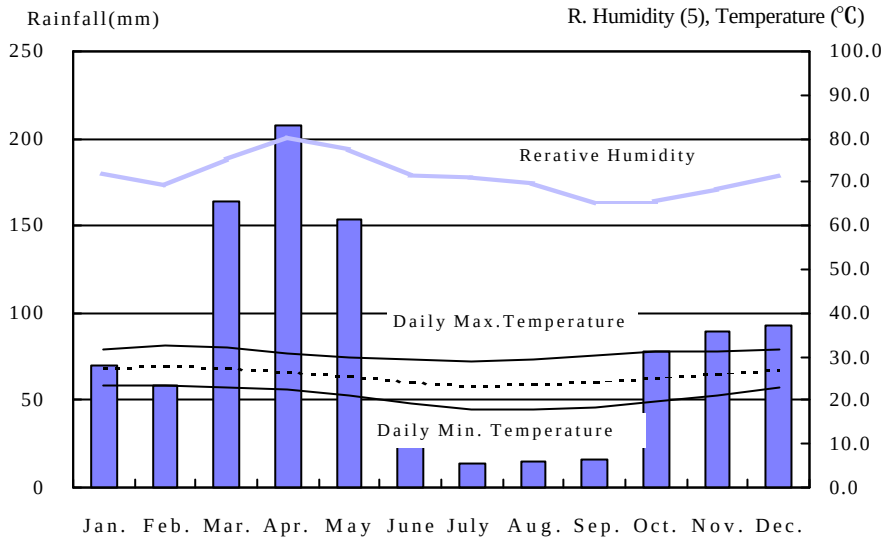
The Region is situated on the eastern part of Tanzania Mainland along the coastal belt of the Indian Ocean. It is located between latitudes 6 ° and 8 ° South of the equator and longitudes 37 ° 30' and 40 ° East of the Greenwich line.

The Region covers the area of 33,539 km^2 in total, where dry land area is 32,407 km^2, equivalent to about 3.8 per cent of the total area of Tanzania. It is dominated by the Indian Ocean coastal belt extending from the northern border with Bagamoyo District to the southern border with Rufiji District. The Region borders Lindi Region on the South, Morogoro Region on the West, Tanga Region on the North and Indian Ocean on the East. The Coastal area that rises from 0 m to 100 m above sea level is covered by sandy loam soil except the lower land areas by heavy clay water logged soil suitable for high delta crops. Toward the western part of the Region, the coastal hills and highland extend which rise from 100 m to 480 m above sea level.

Settlement of people in the Region seems to be highly dependent on the topographic conditions. Population distribution is shown in Fig. 3.1.1. According to the distribution, almost all people inhabit the areas where water is available, such as along rivers and suitable locations for groundwater use.

3.1.2 Agro-Climate

The Region is placed on the eastern part of Tanzania Mainland along the Indian Ocean lowland, where the weather is generally hot with periods of high humidity. The salient climatic features of the Region are as follows:



Salient Climatic Features of Coast Region

There are two rainy seasons, the long rainy season and the short rainy season. The long rainy season lasts for around 90 days between March and May with about 55 per cent of the annual precipitation. The short rainy season spans about 60 days between October and December with about 27 per cent of the annual precipitation. The rains during the short rainy season are not evenly distributed, and sometimes not reliable. The period from June to October is cooler and drier and rainfall during this period is generally associated with locally generated convectional storms of limited extent.

Climate data available in several reliable stations in the Region are summarised in Table 3.1.1. Annual rainfall in the Region varies from 800 mm to 2,000 mm depending on areas and years. Isohyetal analysis was made using data in the recent 20 years, from 1979 to 1998, the finding of which is shown in Fig. 3.1.2.

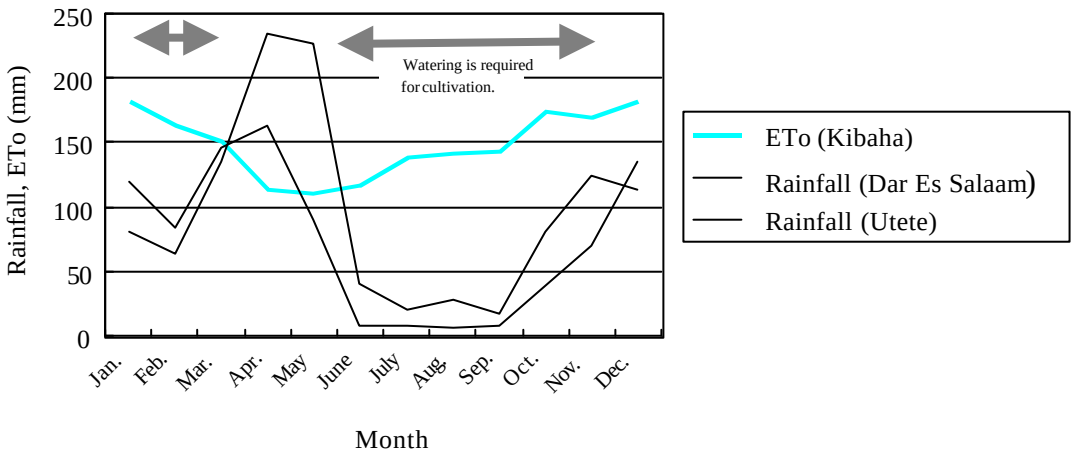
Furthermore, evapotranspiration analysis was carried out by the Study team, because no reliable long term data to show record of evaporation are available in the Region. Using those meteorological data, Reference Evapotranspiration (ETo) was analysed by the Penman-Monteith Method as follows:

Reference Evapotranspiration (ETo) in a Typical Area of Coast Region

Items	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Temperature (max.)	31.80	32.40	32.20	30.90	29.80	29.40	29.10	29.40	30.40	31.00	31.40	31.60	
Temperature (Min.)	23.50	23.50	22.80	22.50	21.30	19.10	18.10	18.10	18.40	19.80	21.30	22.90	
Air Humidity	72.1	69.3	75.4	80.2	77.5	71.6	71.1	69.8	65.2	65.8	68.5	71.8	
Wind speed	363.7	239.3	193.5	102.0	95.0	133.9	249.7	209.1	125.3	222.0	239.3	386.2	
Sun Shine	7.48	8.16	6.43	5.53	6.24	7.71	7.49	7.47	8.30	8.41	8.39	7.35	
Sol.Radiation(MJ/day)	21.30	22.70	19.60	17.00	16.60	17.70	17.80	19.20	21.90	22.80	22.70	20.90	
ETo (Daily)	**5.86**	**5.80**	**4.86**	**3.79**	**3.55**	**3.86**	**4.44**	**4.58**	**4.77**	**5.60**	**5.64**	**5.84**	
ETo (Monthly)	**181.7**	**162.4**	**150.7**	**113.7**	**110.1**	**115.8**	**137.6**	**142.0**	**143.1**	**173.6**	**169.2**	**181.0**	**1,780.8**

Note: Above ETo was calculated by Penman- Monteith Method using data in Kibaha.

The figure below shows monthly balance comparison between water requirement as ETo and rainfall in the Region. It is made evident that watering is required for crop cultivation almost full season except only a few months during the main rainy season.



Water Requirement and Rainfall in Coast Region

3.1.3 River Systems

There are three main rivers, namely the Wami River, the Ruvu River and the Rufiji River, all of which traverse the Region. The major drainage areas in the Region are divided into four systems as shown in Fig. 3.1.3.

Flow characteristics of the drainage systems are summarised in the following table.

Flow Characteristics of the Drainage Systems in Coast Region

Drainage System	Catchment Area (km^2) **	Area under the Region (km^2)	Max. flow ($m^3/s/km^2$)	Average flow ($m^3/s/km^2$)	Low flow ($m^3/s/km^2$)
Wami Drainage	36,450	4,711	0.0201	0.0027	0.0003
Ruvu Drainage	15,190	7,533	0.0347	0.0054	0.0008
Rufiji Drainage	154,000	6,334	0.0261	0.0046	0.0012
Coastal Drainage	-	13,311	-	-	-

**: Catchment areas of the rivers are at the major gauging stations, namely, Mandera of the Wami River, Morogoro Road Bridge of the Ruvu River, and Pangani Rapids of the Rufiji River.

Source: *Hydrological Year-Book 1965 – 1970, Ministry of Water*

3.1.4 Groundwater

The three major rivers of Wami, Ruvu and Rufiji form the topographic land. Two of these rivers, the Ruvu and the Rufiji, define three geohydrologic zones in terms of geology, groundwater regime and potential groundwater utilisation. The seven geohydrologic zones in total within the Region, adding other zones defined by other rivers, are shown in Fig. 3.1.4 and their characteristics and groundwater availability are explained in Table 3.1.2.

There are a number of shallow wells and shallow pits (called Kisima) in the Region. The shallow pits are the most common sources of water in the Region. These pits are generally located in valleys and depressions reflecting the availability of shallow groundwater. The depth of these shallow pits is very shallow and varies from 1.0 m to 1.5 m, and most of them meet the requirement of water in the dry season.

3.1.5 Soils and Land Suitability

Inceptisol and Entisol dominate the Region in accordance with the USDA soil order classification. The central and northern parts of the Region are widely covered by Inceptisol and Entisol covers the river basins of Wami, Ruvu and Rufiji. Partly, Vertisol is found along the Ruvu River and Ultisol exists at the northwestern part of the Region.

As for the soil texture, loamy sand, sandy loam and sandy clay are dominant in the inland part. Sandy soil exists along the coastal areas. Clayey soil is found along the Ruvu River and at the estuary area of the Rufiji River. The mouth of the Wami River is covered by loamy soil. The soil with poor drainage extends in the northern part along the Ruvu River, the Wami River and lower reaches of the Rufiji River. The northwestern, central and southern parts of the Region are widely covered by soil that moderates drainage conditions.

As for the soil capability classification, the central part and the three river basins are identified as preferable soil caracteristics with moderate or moderately severe limitations that restrict the

range of crops or require moderate or special conservation practices.

The soil map and agricultural soil capability map for the Region are attached as Fig. 3.1.5 and 3.1.6.

3.1.6 Land Use

The land use pattern estimated by the Regional Commissioner's Office for the total land area of 33,539 km^2 in the Region is shown in the following table. The cropland, which is under cultivation of various cash and food crops, covers 2,991 km^2 or 8.9 per cent of the total area. The state farms, where various activities such as dairy cattle farming, beef cattle ranches and plantations, exist in the area of 1,021 km^2 or 3.0 per cent of the Region.

Land Use in Coast Region Estimated in 1996

Land Use	Estimated Area (km^2)	Percentage to Total Area (%)
Crop Land	2,991	8.9
Settlement Area	593	1.8
State Farms	1,021	3.0
Forest Reserves	3,013	9.0
Grazing Land	2,147	6.4
Public Land	22,642	67.5
Water Area	1,132	3.4
Total	33,539	100.0

Source: Coast Region Socio-Economic Profile, 1997

The classification of agricultural land use is rather difficult to identify because most of the farmland is of mixed farming with various kinds of tree crops and herbaceous crops. Based on the interpretation of satellite images and field verification, the cropland was identified by the Institute of Resource Assessment of the University of Dar es Salaam as shown in the map of Fig. 3.1.7. The area of mixed cropping where scarce tree crops and annual crops grow is estimated at 93,816 ha or 2.9 per cent of the total area of the Region. The area under cultivation with tree crops where dense tree crops and some annual crops are found is estimated to cover 264,614 ha or 8.3 per cent of the Region. The area under cultivation with herbaceous crops where food crops grow widely is estimated at 43,533 ha or 1.4 per cent (refer to Table 3.1.3).

Agricultural Land Use in Coast Region

Land Use	Area (ha)	Percentage to Total Area (%)
Mixed Cropping	93,816	2.9
Cultivation with Tree Crops	264,614	8.3
Cultivation with Herbaceous Crops	43,533	1.4

Source: Land Cover and Land Use (Maps), 1996

3.2 Socio-economic Conditions

3.2.1 Overview of Regional Socio-economy

(1) Economic Conditions

The major sector of the economy in the Region is agriculture that produces more than 80 per cent of the total regional income, and also employs more than 90 per cent of the population in the Region. The table below shows the contribution of agricultural sector to the regional economy in 1991 and 1996.

Contribution of Agriculture and Other Sectors to the Regional Income

Year	Contribution by Agricultural Sector		Contribution by Other Sectors		Total Regional Income	
	Income (TSh. thousand)	%	Income (TSh. thousand)	%	Income (TSh. thousand)	%
1991	4,912,600	84.7	887,400	15.3	5,800,000	100.0
1996	17,310,440	83.3	3,462,088	16.7	20,772,528	100.0

Source: The Coast Region Socio-Economic Profile, 1997

The Region has been facing sluggish economic development in terms of regional income for the past decade, and is ranked as one of the regions with the most severe economic conditions in Tanzania. According to the table below showing GDP and GDP per capita of the Region, the economy of the Region has been on the increase in terms of current prices, however, in the real terms in US dollar, it shows drastic drop in 1985 and has been almost stagnant since then.

GDP and GDP per Capita of the Region

Year	GDP at current prices (TSh. mil.)	Per Capita GDP at current prices (TSh. and US dollars)			Average % contribution to National GDP
		TSh.	Exchange Rate TSh./USD	USD	
1980	464	862	8.22	105	1
1985	1,037	1,735	16.50	105	1
1990	6,637	9,860	197	50	1
1991	8,372	12,095	234	52	1
1992	10,504	14,756	335	44	1
1993	13,312	18,183	480	38	1
1994	17,033	22,624	553	41	1

Source: The Coast Region Socio-Economic Profile, 1997

Detailed comparison with other regions shows that the per capita income of the Region is ranked as the lowest in Tanzania in 1994. The main development constraints in the Region rest in lack of efficient utilization of agricultural potential due to the farmers' use of

rudimentary local farming methods as well as allocation of insufficient budget for agricultural sector by the Government (refer to Table 3.2.1).

Comparison of Per Capita Income in Tanzania (1994)

	Region	Tsh		Region	Tsh
1	Dar es Salaam	197,107	11	Mbeya	48,737
2	Arusha	91,024	12	Mwanza	48,508
3	Iringa	64,502	13	Tabora	44,984
4	Morogoro	59,370	14	Mara	43,748
5	Kilimanjaro	55,716	15	Rukwa	40,669
6	Singida	55,644	16	Dodoma	39,604
7	Shinyanga	52,746	17	Mtwara	39,533
8	Ruvuma	52,537	18	Lindi	38,340
9	Kagera	50,105	19	Kigoma	30,103
10	Tanga	50,021	20	Coast	22,624

Source: The Coast Region Socio-Economic Profile, 1997

(2) Social Conditions

The conditions of health and sanitation facilities in the Region are shown in the table below. Out of six hospitals, five are owned by the government and are located in centre of each district town except in Mkuranga District, which has no district hospital. Though many dispensaries have been built, very few health centres have been constructed and no district hospital has been built for the past decade.

Health and Sanitation Facilities in Coast Region (1995)

	1995
Hospital	6
Health Center	14
Dispensary	140
Population/hospital	122,989
Population/bed	875
Population/dispensary	5,271

Source: The Coast Region Socio-Economic Profile, 1997

Education in the Region has improved gradually in enrolment ratio and pupil dropout ratio for these two decades. The facilities of education in the Region, however, still cannot satisfy necessities such as classrooms and desks. The current enrolment ratio (1996) is approximately 84 per cent, and the dropout ratio varies from 5 to 7 per cent.

Adult literacy rate in the Region, about 51 per cent in 1988 census, also shows slower improvement, however, it is still lower than the national average (refer to Table 3.2.2).

3.2.2 Administrative Structure

The Region holds 6 districts, 25 divisions, 75 wards and 414 villages at present.

The Regional Commissioner's Office (RCO), the District Commissioner's Office (DCO) and the Divisional Secretary Office (DSO) are the Central Government Institutions. The District Director's Office (DDO), the Ward Executive Office (WEO) and the Village Executive Office (VEO) are the Local Government Instirutions.

RCO and DDOs in the Region are main counterpart organisations technically supported by the Ministry of Agriculture and Cooperatives (MAC) at national level and by the Morogoro Zonal Irrigation Office at zonal level.

The RCO and the DDOs are organisations under the Ministry of Regional Administration and Local Government (MRALG). Before the Local Government Reform, based on the Local Government Reform Agenda 1996 - 2000 and other programmes, the RCO had administrative powers over the DDOs and directed developmental activities to all DDOs through the Regional Development Committee (RDC). The budgets were formulated by DDOs and forwarded to the RDC for scrutiny and approval.

Presently, the RCO has no direct control over DDO. The DDO has become more independent in decision making after the enactment of the Local Government Reform Bill by Parliament. However, all budgets prepared by the District Council's Offices have to be forwarded to the Regional Secretariat to check if they conform to sectoral policies. The budgets are then forwarded to the Treasury and finally to the Planning Commission at national level.

Many technical personnel have been transferred from the RCO to the DDOs to strengthen the administrative and technical capacities.

Phase I of the Local Government Reform began in January 2000 by having 35 out of 102 districts in the country adopting the reform as model districts. Kisarawe is the only district among 6 districts in the Region, which will be among the 35 districts to start implementing the reform.

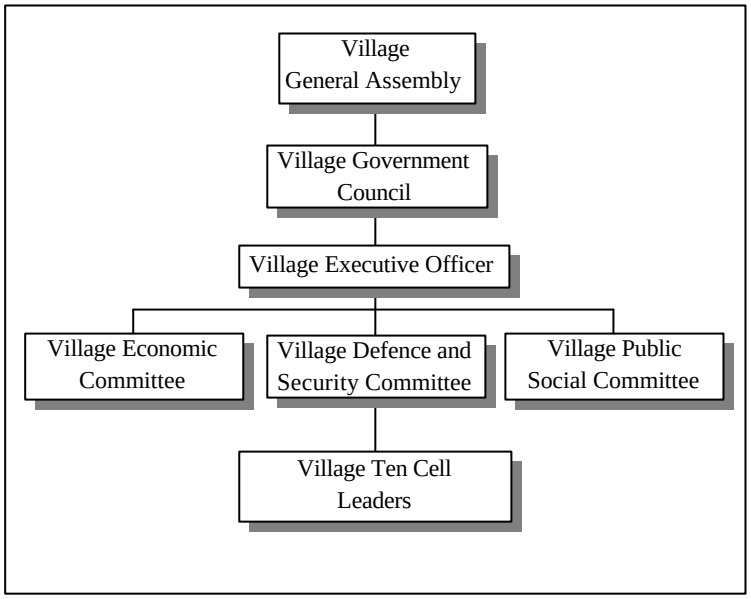
The total cost of Phase I will be US$ 8.1 million or about US$ 230 thousand per district and this will be a grant to the districts selected. The main developmental sectors for the grant are water, agriculture, education, health and roads.

Taking this reform into consideration, the administrative structure of the project has been

designed as shown in Fig. 2.1.3.

3.2.3 Rural Society

Although slight difference is recognised among villages, the village organisation is summarised below.



Village Organisation

Village General Assembly: This is composed of every household of the village and is the highest decision making body in the village. The assembly is held four times a year (every three months). The village recurrent and development budget are approved and the sanctions made by village council or their lower organs are ratified at the assembly.

Village Government Council: The council has 25 members elected in multiparty election. It is led by the Village Chairman, Village Executive Officer and Village Treasurer with their duties including supervisory, management and executive roles of the Village General Assembly (day to day activities). It prepares and proposes the village budget as well as forwarding sanctions onto any village member to the Village Government Assembly (VGA) for ratification or disapproval.

Village Chairman: This position is a political administrative head of the village chairing the meetings of VGA and Village Government Council (VGC), and the Chairman represents the village.

Village Executive Officer: This Officer is employed by the village as executing personnel. His

duty is to perform all administrative and executive roles for the VGC.

3.2.4 Population and Employment

According to the 1988 Population Census, which is the latest available statistics, the Region had a population of 638,015 comprising of 309,751 males and 328,264 females with a population density of 19.7 people/km^2.

Population distribution is not even in all districts ranging from the highest population density of 63.8 people/km^2 in Mafia to the lowest population density of 11.4 in Rufiji.

The population distribution in the Region for 1988 by broad age groups is shown in Table 3.2.3 and is summarised in the table below.

Population Distribution in Coast Region

District	Age Groups (Years)			Total
	0-14	15-64	Over65	
Bagomayo	76,701	86,744	10,440	173,918
Kibaha	33,778	42,224	6,461	83,018
Kisarawe	83,879	91,422	19587	195,709
Rufiji	66,300	73,836	12,180	152,316
Mafia	14,473	17,177	1,464	33,054
Total	275,131	311,346	50,132	638,015

Source: Population Census 1988.

Note: Kisarawe district has now been divided into two districts of Kisarawe and Mkuranga. Difference between a cumulative figure of age groups and the total figure in each district come about no counting "Not Stated".

According to the data from the Population Censuses carried out in 1967, 1978 and 1988, the population of the Region was increasing at a lower rate than that of the National. The national population growth rates for 1967/78 and 1978/88 were 3.3 per cent and 2.8 per cent respectively, while those of the Region were 1.7 per cent and 2.1 per cent respectively.

The 1988 Population Census of the Region also revealed that the population aged 10 years and above was 436,794 out of which 371,007 were living in the rural areas, while 65,787 were living in urban areas. Out of this population, only 311,766 (71.4%) were employed while 65,438 (15.0%) were students and 58,047 (13.3%) had no employment including those who were too old or looking for employment.

The breakdown of population employed by type of occupation in 1988 both in rural and urban areas is shown in the following table.

Population (≧ 10 years old) Employed by Type of Occupation in Coast Region

Type of Occupation	Total		Rural	Urban
	Population	%	Population	Population
1. Legislator, Administrator	951	0.2	542	409
2.Technicians & Teachers	7,346	1.7	4,527	2,819
3.Clerks	1,385	0.3	719	666
4.Service & Shop Sales	6,290	1.4	3,436	2,854
5.Cultivators	268,642	61.5	237,675	30,967
6.Mixed Farming	12,068	2.8	10,472	1,596
7.Agricultural Workers	1,137	0.3	889	248
8.Craftsmen & Machine Operator	2,450	0.6	1,354	1,096
9.Students	65,438	15.0	55,526	9,912
10. Others	71,087	16.2	55,867	15,220
Total	436,794	100.0	371,007	65,787

Source: Population Census Regional Profile, Coast, 1988. President's Office, Planning Commission.

3.2.5 Rural Infrastructures

(1) Roads

Roads in the Region are classified into four categories, namely, Trunk Roads, Regional Roads, District Roads and Feeder Roads. The trunk roads are the most highly trafficked with an average of up to 2,200 vehicles in a day, while the feeder roads are with single lane width having the minimum traffic. The distribution of road network by district is shown in the following table.

Distribution of Road Network in Coast Region

Districts	Land Area (km2)	Length of Roads concerned					Road Density (m/km2)
		Trunk Road	Regional Road	District Road	Feeder Road	Total	
Bagamoyo	9,842	154	353	73	382	962	98
Kibaha	1,812	45	53	243	148	489	270
Mkuranga	2,432	110	45	212	228	595	245
Kisarawa	4,464	0	161	121	479	761	170
Rufiji	13,339	118	122	215	424	879	66
Mafia	518	0	68	36	105	209	403
Total	32,407	427	802	780	1,624	3,633	101

Source: *District Offices' data*

The road network in the Region is shown in Figure 3.2.1, and the road distribution by Division is shown in Table 3.2.4.

The responsible agencies for road construction and maintenance are Regional Engineer Offices of Ministry of Works, Road Engineers of Regional Secretariats, and District Engineers

of District Secretary's Offices. Their areas of work are as in the following table.

Responsible Agencies of Roads by Category

Road Category	Responsible Agencies	Responsible Sections	Remarks
Trunk Road	Regional Engineer Office of Ministry of Works	Trunk Road Engineer	Maintenance, repair, contracts, engineering work
Regional Road	Regional Engineer Office of Ministry of Works	Rural Road Engineer	Maintenance, repair, contracts, engineering work
District Road	District Secretary's Office	District Engineer	Road Engineer of Regional Secretariat supervises activities of District Secretary's office.
Feeder Road	District Secretary's Office	District Engineer	Road Engineer of Regional Secretariat supervises activities of District Secretary's office.

These responsible agencies have to deal with new construction work, rehabilitation, improvement and maintenance work of the roads, however, they are facing some difficulties in fulfilling their duties due to inadequate equipment, material, budget and so forth. The Tanzanian Government has targeted to begin with improved maintenance of roads before embarking on new road construction. The Region has earmarked a list of priority roads to receive regular maintenance. A total of 350 km of trunk roads and 189 km of regional roads will be serviced by the year 2000.

The civil works on road construction or improvement/maintenance is to be conducted under contract basis with the private contractors in line with the Government policy of privatisation. Maintenance Units have been established in Kibaha and Ikwiriri under the cooperation of the Danish International Development Agency (DANIDA) in order to strengthen the system providing necessary equipment for the maintenance works. However, the available equipment in the units is far from adequate to facilitate the district offices to carry out their road maintenance work. Village Governments are required to participate in carrying out minor maintenance works on roads in their respective areas.

(2) Water Supply

The overall objective of the Water Sector in the National Policy is to provide safe and clean water to the whole population within a distance of not more than 400 m by the year 2002. Ratios of coverage with clean water in the Region by the year 1996 were still 56 per cent in rural areas and 48 per cent in urban areas. Coverage conditions of water supply in the Region are shown in the following table:

Coverage Conditions of Water Supply in Coast Region

Rural Area (685,180)	56% (383,700)	Covered by some water supply schemes	47% (177,900)	By pumped water schemes
			28% (108,200)	By water wells
			25% (97,600)	By water dams
	44% (301,480)	Not covered	65% (195,000)	By direct use from rivers
			35% (106,480)	No system *
Urban Area (72,865)	48% (35,300)	Bagamoyo and Kibaha towns are getting water from Lower and Upper Ruvu Water Scheme under management of the Dar Es Salaam Water and Sewerage Authority (DAWASA). Other urban areas such as district headquarters are getting water from their water schemes.		
	52% (37,565)	Not covered *		

*: They are getting water from traditional water points, hand pumping and non-hand pumping machines, or rain water-harvesting systems.

Water supply conditions by district are shown in Table 3.2.5. There is a system of Village Water Fund that is managed by Village Water Committees to run and maintain water supply schemes. However, only about 30 per cent of registered villages have started such fund.

About 45 per cent of the population in the Region is not covered by any kind of water supply schemes. A number of people depend on unreliable and unsafe water sources. Even the population served by existing water schemes is not always supplied with suitable and required amount of water regularly because of inadequate maintenance of the facilities, higher water utilisation beyond designed capacity and lack of water in the dry season. The Ministry of Water has design criteria for rural water supply with an average consumption of 30 litres per capita per day (Lcd). However, it is difficult to follow the criteria in all seasons due to the shortage of water especially in the dry season. In some rural areas, villagers can at best get 5 Lcd after transporting water by hand (head) from different sources located a few kilometres away from their dwellings.

(3) Others

Most of the areas in the Region are presently at their initial stage of development in social infrastructure. Electrification is made only for 3.1 per cent of the entire Region, 0.8 % of rural areas and 16.0 per cent of urban areas. Mkuranga and Utete district headquarters have not been electrified. Communication network in the Region is still not fully developed as shown in the following table:

Communication Network in Coast Region

District	Number of Telephone	Number of Full Time Post Office	Number of Sub-Post Office
Bagamoyo	129	1	2
Mafia	81	1	0
Mkuranga	-	0	0
Kisarawe	44	1	0
Kibaha	424	2	2
Rufiji	109	2	4
Total	787	7	8

Source: TTCL Offices, Kibaha 1997

Since the Region was established in 1972, the development in the sector of social service has been left far behind by other regions. Present conditions of social service are summarised in the following table. Division data are shown in Table 3.2.6.

Social Service Centres in Coast Region

District	Number of Pre-Primary Centres	Number of Primary Schools	Number of Secondary Schools	Number of Hospital	Number of Health Centres	Number of Dispensaries
Bagamoyo	8	82	2	1	3	25
Mafia	4	18	1	1	0	10
Mkuranga	0	3	3	0	2	13
Kisarawe	7	62	4	1	2	15
Kibaha	21	45	5	1	2	26
Rufiji	6	96	5	2	4	59
Total	46	306	20	6	13	148

Source: Interview Survey, JICA Study team

3.3 Agriculture

3.3.1 General

Agriculture, the most important economic sector, employs more than 90 per cent of the population in the Region. According to Expanded Agricultural Survey 1995/96 and 1996/97, however, 67 per cent of the farmers in Coast Region and Dar es Salaam live mainly on off-farm income. The farmers whose main income source is crop production are 33 per cent, and the activity in livestock is very low. An average family size of agricultural household is about 5.1 - 5.3 persons and the average household members working on farm are about 3.6 - 3.9 persons. The average land size is about 4 ha per agricultural household, while the average planted area is estimated at 0.7 - 0.8 ha in a season. The cultivation techniques on the crop production, such as irrigation, farm input, farm management and extension services, are less improved, even compared with the country level.

The main food crops in the region are cassava, sorghum, paddy, maize and legume (mainly cowpea). The area cropped by food crops is about 125,000 ha a year. The annual production

of cassava is the largest amounting to as much as 478,000 tons, followed by paddy, maize and sorghum.

Cashew and coconut are very important cash crops for the Region also for a number of small farmers. Various horticultural crops are also produced in the Region, although the area under horticultural crop cultivation is smaller than that under food crop and cash crop cultivation. These cash crops and fruit are widely planted all over the Region for the outer large market and international market. However, the vegetable production stands behind other developed regions, such as Arusha, Tanga, Morogoro and Mbeya.

Agricultural Production in Coast Region

Crop	Cropped Area (ha)	Production (t)	Yield (t/ha)
Food Crops (1993/94)			
Paddy	15,000	52,562	3.50
Maize	15,000	35,770	2.38
Cassava	60,000	478,060	7.97
Sorghum	28,361	15,129	0.53
Legume	6,375	4,345	0.68
Cash Crops (1995/96)			
Cashew	100,000	9,446	0.09
Cotton	1,578	1,500	0.95
Coconut	84,000		
Horticultural Crops (1996/97)			
Orange	880	14,664	16.6
Pineapple	1,235	19,971	16.2
Mango	435	5,170	11.9
Tomato	412	8,760	21.3

Note: The categories of crops follow the original source.
Source: Coast Region Socio-economic Profile, 1997

General cropping calendar in the region is shown below. Paddy, maize and sorghum are cultivated during the long rainy season. Some maize may be sown after the long rainy season using residual moisture or at the beginning of the short rainy season. Cassava is planted during the short and long rainy seasons and harvested after 8 - 10 months. The harvest season of fruit and nuts varies by crop. The planting season of the seedlings is mainly the beginning of the long rainy season.

General Cropping Calendar in Coast Region

Crop	Jul		Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun	
	Dry Season								Short Rainy S.								Long Rainy Season							
Paddy (Rainfed)	oo										xx	xx	xx	xx	xx	xx	==	==	==	==	oo	oo	oo	oo
Maize (Long Rain)	==	==	oo	oo													xx	xx	==	==	==	==	==	==
Maize (Short Rain)									xx	xx	==	==	==	==	oo	oo								
Sorghum	oo	oo	oo														xx	xx	==	==	==	==	==	==
Cassava (Long Rain)	==	==	==	==	==	==	==	==	==	==	==	==	oo	oo	oo	oo			xx	xx	xx	xx	==	==
Cassava (Short Rain)	==	oo	oo	oo	oo			xx	xx	xx	xx	==	==	==	==	==	==	==	==	==	==	==	==	==
Dry Season Vegetables	xx	xx	==	==	oo	oo	oo	oo															xx	xx
Pineapples (Long Rain)	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	xx	xx	xx	xx	==	==	==
	==	==	==	==	==	oo	oo	oo	oo	oo							==	==	==	==	==	==	==	==
Pineapples (Short Rain)								xx	xx	xx	xx	xx	==	==	==	==	==	==	==	==	==	==	==	==
	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	oo	oo	oo	oo	oo
Cashews	==	==	==	==	==	==	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	==	==	==	==	==	==	==	==
Coconuts/Banana/Papaya	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo
Citrus	oo	oo	oo	oo	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	==	oo	oo
Mango/Jackfruit	==	==	==	==	==	==	==	==	oo	oo	oo	oo	oo	oo	oo	oo	==	==	==	==	==	==	==	==

Note: "x" sowing/planting; "=" growing; "o" harvesting
Source: District Agricultural Officers of Kibaha

3.3.2 Horticultural Crop Production

The Region produces various types of tropical fruit and some vegetables under higher temperature and higher humidity than other places. The cultivated area of major horticultural crops, such as mangoes, pineapples, citrus fruits and tomatoes, is about 3,100 ha, although there is plenty of land suitable for the production. The regional government pointed out the main constraints hindering full development of horticultural crop production as; 1) inadequate horticultural technology for extension staff, including production technique, post-harvest handling (processing) and marketing technique, 2) poor road communication to production areas, resulting into delay in the delivery of these perishable crops, and 3) lack of processing facilities. Besides, the cashew and coconuts are produced as the largest income source in the regional economy. These two crops cover quite large area, which amounts to 184,000 ha. The area distribution of the above horticultural crops and tree crops are shown in the following table.

Cropped Area of Major Horticultural Crop in Coast Region by District

(Unit: ha)

Crop	Bagamoyo	Kibaha	Kisarawe	Mkuranga	Rufiji	Mafia	Total
Cashew	14,000	17,000	19,000	35,000	14,000	1,000	100,000
Coconut	9,861	1,058	8,753	31,253	15,863	17,212	84,000
Orange	220	120	250	*	250	40	880
Pineapple	600	200	400	*	30	5	1,235
Mango	100	60	120	*	140	15	435
Tomato	120	60	200	*	30	2	412

Note: Cropped areas of oranges, pineapples, mango and tomatoes in Mkuranga are included in ones in Kisarawe.

Source: Coast Region Socio-economic Profile, 1997

Cashew is the major cash crop in the Region, which contributes more than 30 per cent of the total regional income. The Region had a total area of 100,000 ha planted with a total number of 8,300,000 cashew trees as of 1996. The area with cashew trees is equivalent to about 33.4 per cent of the total land area under cultivation. The production of cashew in the region reached 12,200 tons in the year 1994/95. The area under coconut cultivation is estimated to be 84,000 ha with 7,560,000 trees. The annual production of coconut is estimated at about 300,000 tons.

Regarding fruit, the area under cultivation of orange trees is estimated to be 880 ha with a high increasing ratio. Bagamoyo, Rufiji, Kisarawe and Mkuranga are the principal orange growing areas in the Region. Annual production of oranges in the Region is estimated at about 14,000 tons. Pineapples are produced in all districts of the Region on an area estimated to cover 1,200 ha. Bagamoyo and Kisarawe/Mkuranga are the major pineapple growing areas in the Region. Total production of pineapples in the Region is estimated at about 19,000 tons a year. An estimated area of 435 ha is under mango trees. Rufiji, Bagamoyo and Kisarawe/Mkuranga are main districts producing mangoes. Total production of mangoes in the Region is about 5,000 tons a year. The shares of the production of oranges, pineapples and mangoes in the Region are estimated at 38 per cent, 56 per cent and 9 per cent in national average production from 1990/91 to 1995/96.

Tomatoes, the dominant vegetable, are produced in all districts mainly along riverbanks, river valleys, lowland area and other areas with fertile soil and water for irrigation. Total production of tomatoes in the Region is about 8,000 tons a year. It is equivalent to about 18 per cent of the national tomato production in average from 1990/91 to 1994/95.

Some statistical data of horticultural crop production in Tanzania and the Region are shown in Table 3.3.1 and 3.3.2 for recent years.

The situation of horticulture in the divisions was studied by using questionnaire to district

agricultural offices, because there was not any authorised data available on the horticultural crop production by district/division. Although there were difficulties in data collection due to mixed cropping system on scattered small plots, the district agricultural officers provided general information on horticulture and some quantitative data on the cultivation areas and production of each crop. The following tables show the summary results of the collected information (refer to Table 3.3.3).

Horticulture by District

District	Vegetables	Fruit Crops
Bagamoyo	Main vegetables are; Tomato (180 ha), Pumpkin (100 ha), Cucumber (20 ha), and Amaranthus (10 ha). Low-input production is commonly found in the Ruvu river basin. Some farmers near Bagamoyo town practice high-input vegetable production on commercial basis.	Major fruit crops are; Cashew (3,410 ha), Pineapples (380 ha), Mango (140 ha), and Orange (80 ha). Bagamoyo is a leading pineapple producer in the Region.
Kibaha	Main vegetables are; Tomato (130 ha), Okra (70 ha), Pumpkin (30 ha), Cucumber (30 ha), Eggplant (20 ha), and Amaranthus (10 ha). About 3/4 vegetables are grown with low-input in the Ruvu River basin. Some farmers along the Morogoro road practice high-input vegetable production on commercial basis.	Major fruit crops are; Cashew (17,760 ha), Citrus (120 ha), Pineapples (200 ha), Mango (60 ha) and Banana (38 ha).
Kisarawe	Main vegetables are; Pumpkin (30 ha), Tomato (20 ha), and Okra (10 ha). Most of vegetables are grown with low-input at the Ruvu River basin.	Major fruit crops are; Coconut (16,170 ha), Cashew (14,930 ha), Orange (470 ha), and Lemon (60 ha). Tree/fruit crop cultivation is a mainstream of the district agriculture.
Mkuranga	Main vegetables are; Amaranthus (60 ha), Tomato (50 ha), Chinese Cabbage (40 ha), Pumpkin (30 ha), and Okra (20 ha). The activity in vegetable production is much lower than it in tree crop production.	Major fruit crops are; Coconut (21,000 ha), Cashew (20,000 ha), Citrus (200 ha), Pineapples (200 ha), and Mango (70 ha). The scale of coconut and cashew is the largest in the Region.
Rufiji	Main vegetables are; Tomato (123 ha), Amaranthus (62 ha), Okra (22 ha), and Onion (12 ha). Northeastern part is a similar condition with Mkuranga district. Dry season vegetables are planted after paddy harvesting along the Rufiji River.	Major fruit crops are; Cashew (11,770 ha), Coconut (2,510 ha), Citrus (460 ha), Mango (170 ha), and Pineapple (90 ha).
Mafia	Vegetable production is very limited, and for local consumption only.	Coconut (17,000 ha) is the dominant fruit crop covering all over the island.

Note: The growing areas are based on the questionnaire answered by the district agricultural officers and the JICA Study team estimates. The areas are sometimes different from statistical data provided by regional offices.

Source: Agricultural officers of Districts concerned, and the JICA Study team

Cropped Area of Horticultural Crops by District

(Unit: ha)

Crop	Bagamoyo	Kibaha	Kisarawe	Mkuranga	Rufiji	Total	Ratio
Tomato	181	130	20	50	123	504	42 %
Pumpkin	101	30	30	30	15	206	17 %
Okra	0	74	12	20	22	128	11 %
Cucumber	19	27	0	12	20	78	6 %
Amaranth	8	15	5	60	62	150	12 %
Eggplant	1	18	0	20	13	52	4 %
Chilli	0	0	1	12	0	13	1 %
C. Cabbage	0	0	1	40	0	41	3 %
Sweet Pepper	0	0	1	12	0	13	1 %
Onion	0	0	0	0	12	12	1 %
Watermelon	0	0	0	8	0	8	1 %
Total-Vegetables	310	294	70	264	267	1,205	100 %
Orange	83	110	474	120	46	832	28 %
Lime/Lemon	0	10	64	80	5	159	5 %
Pineapple	382	200	0	200	94	876	30 %
Mango	139	60	0	225	169	593	20 %
Other Fruit	3	123	0	185	189	500	17 %
Total-Fruits	607	503	538	810	503	2,961	100 %

Note: There are some differences between the surveyed data and statistical data of the Region.

Source: Questionnaire Survey by JICA Study team

High quality seeds of vegetables are imported from other countries such as Kenya and European countries, and available in local markets. Most farmers use seeds collected from their previous products by themselves, then they replace the exhausted seeds by new seeds after several seasons. Seedlings of fruit crops are mainly locally produced in the small plots for the farmers themselves or neighbours. Each district has at least one seedling farm, which had produced and distributed a number of fruit crop seedlings under responsibility of the Ministry of Agriculture and Cooperatives until their transference to the districts. However, almost all the farms have been closed their operation because of lack of resources within the district governments.

Little chemical fertiliser and agro-chemicals are used in the Region. According to the expanded agricultural survey 1995/96 and 1996/97, only less than 5 per cent of the farmers use chemical fertiliser at the rate of 40 kg of urea on average per farmer. The reasons why most farmers do not use chemical fertiliser are; no money (64%), not available (15%) and do not know the benefit (8%). Although such farm inputs are common goods in Dar es Salaam, the Region has few retailers supplying farm inputs to the individual farmers. For example, only three towns in Kibaha district have small retail shops dealing limited kinds of and small amount of farm inputs.

While chemical fertiliser is used mainly for horticultural crops by limited farmers, organic fertiliser is used more commonly. Crop residues and green manure are dominant among the

farmers, and poultry manure is also used widely. Less than 10 per cent of the farmers seem to use cow dung for crop production, because the animal husbandry is not popular in the Region. In some limited places, bat manure is used as local manure.

In the Region, there is a big demand on seedlings for replacement in order to keep fruit productivity and marketability high. Moreover, it is very likely expected the demand on seedlings for citrus will grow in proportion as expansion of citrus land, since the fruit is getting popular especially among urban citizens. The estimated figures of the demand can be derived from cropped area, planting density, productive age of tree and so forth. The figures of cashews, coconuts, oranges and mangoes would be around 165,000, 168,000, 14,000 and 1,000, respectively.

3.3.3 Marketing and Processing

(1) Marketing of Horticultural Produce

1) Category of Marketing

Marketing for agricultural produce in the study area is categorised into three, each of which is detailed as follows:

(a) River basin areas

Vegetables are grown mainly in the dry season at the major vegetable producing areas located in the Ruvu River basins in Bagomayo and Kisarawe Districts and in the Rufiji River basin in Rufiji District. In these areas, vegetables except tomatoes and pumpkins are principally consumed by farmers themselves. When there is some surplus, the farmers sell it either to retailers in neighbouring markets or to neighbours in their own villages. While retailers and/or middlemen sometimes come to buy vegetables from the neighbouring markets, many farmers carry their produce to the nearest and/or district markets either on foot or by bicycle, public buses and so forth. Furthermore, few farmers sell their produce by themselves at the regular weekly market fixed on a given day in each village.

Since the vegetable production in the study area is concentrated on the short period of the dry season from August to October, it frequently brings about an over supply situation. Under such conditions, vegetable prices tend to fall remarkably and as a result retailers might not come to farmer's fields. This is the biggest problem for vegetable producers.

Even though tomatoes and pumpkins are mainly produced for commercial purposes, farmers are usually unable to send their produce to the market by themselves due to lack of transport facilities. Instead, farmers wait for traders and/or middlemen to come and buy

their produce. Normally these traders try to buy the produce as cheap as possible because the over supply situation and the lowest price can be observed in every market throughout the country, especially in the dry season (refer to Fig. 3.3.2). For instance, the over supply situation of tomatoes in the dry season of 1998 caused a good number of farmers in the basins to dump off unsold produce that was left to rot.

(b) Area along the Morogoro Highway

Vegetables in this area are also grown mainly in the dry season after harvesting paddy. The major vegetables grown are okras, cucumbers, eggplants, sweet peppers, chillies, and amaranthus. Of the above vegetables, amaranthus is grown only in the village environs.

The vegetable production in this area is mainly aimed for commercial purposes. While the farmers usually harvest the produce, pack and take it to the collection points along the side of major roads and wait for middlemen, sometimes the middlemen come to farmer's fields to buy the produce. In addition, a part of the produce is brought into the Kibaha market either by the farmers themselves or through the middlemen. Since the demand for vegetables in Kibaha market, particularly for eggplants and cucumbers, is not so high, the middlemen usually sell their goods through the Kariakoo market in Dar es Salaam.

Nearly all the middlemen engaged in the business are petty businessmen who do not have their own vehicles. They usually take the first bus to Kariakoo market in order to transport their vegetables as early as possible. A bus fare is 500 TSh./bag and 400 TSh./person. While the middlemen can not use any commission agents in Kariakoo due to too small quantity, they sell their goods either through retailers/wholesalers who operate an open space outside the building of Kariakoo market or sell the produce by themselves in the early morning from 5:00 am to 10:00 am.

The market channel for the area along the Morogoro Highway is shown in Fig. 3.3.1.

Leafy vegetables such as amaranthus are the main urban horticultural produce grown for the market. They are usually purchased mainly by retailers at the producer's plots and sold at nearby markets including Kibaha market. These retailers usually buy them by a plot measuring about 50 m^2 to 100 m^2 and harvest them by themselves. Depending on the demand at the market, they either harvest the whole plot at once or piece by piece within seven days.

(c) Other areas

In the urban areas of Mkuranga District as well as in small parts of other districts, vegetables are grown either in home gardens or open places where water is available. In these areas, the vegetables are mainly for domestic consumption. Surplus is sold to the

local markets. Since the quantity produced is too small to be sold outside the districts, the vegetables produced in these areas have not been shipped to Dar es Salaam markets so far.

In these areas, there are many women's groups, and they are all involved in vegetable production. However, actual production and marketing are the responsibilities of individuals. Some women's groups may get loans either from the Government under the Women Development Fund or from foreign NGOs. One of the major objectives for establishing groups seems likely to get such loans.

As shown in the following table, there are 25 divisions, 75 wards and 414 villages in the Region. Almost all towns, divisions, wards as well as villages have their own market places. They can be a permanent building with concrete or open air stalls.

Administrative Partition in Coast Region

District	No. of Division	No. of Ward	No. of Village
Bagamoyo	6	16	82
Kibaha	3	8	44
Kisarawe	4	15	72
Mkuranga	4	10	102
Rufiji	6	19	94
Mafia	2	7	20
Total	25	75	414

Note: Coast Region except Mafia district is as of the end of Dec. 1999, and Mafia is as of 1997.

These markets consist of several sections dealing with grocery, cereals, vegetables and fruit and so forth. In case of vegetables and fruit sections, there are, on the average, about 15 - 30 shopkeepers in a town market located in each division/ward and about 10 - 15 shopkeepers in a village market. Few villages do not have any permanent markets, but at least two or more vendors sell horticultural produce along roadside or at the front yard of their houses. In addition, each town or bigger village market has a regular and specific market day during a week and many vendors including farmers join this market.

While a part of produce is sold at town's markets, almost all of it is sent to Dar es Salaam markets. The traders usually sell their goods to the wholesalers and/or commission agents at Kariakoo market or Tandale public market. When traders entrust commission agents with selling their goods, commission fee is about 10 per cent of the total selling price.

Kariakoo Wholesale Market in Dar es Salaam

Kariakoo is the largest market for horticultural produce in Tanzania. Traders who sell

horticultural produce at Kariakoo wholesale market have to be registered and are required to pay a monthly market fee of between 30,000-90,000 TSh. per trader depending on their volume of trade. In 1996/97 there were about 2,000 traders registered for fruit and vegetables.

There are likewise a lot of small dealers in Kariakoo market and severe competition is made among them. Therefore, it is very difficult for the dealers to make a good profit from the middlemen or the farmers. The commission for the official agents operating in Kariakoo market is just 10 per cent of a total selling price, which is considered to be appropriate.

Other Public Markets in Dar es Salaam

Dar es Salaam city has a total number of 68 public markets out of which 64 are operating in various places and in different sizes, and working under varied conditions. Of all the markets, only 18 have buildings with shade. The rest of the markets are locally created by inhabitants of the area. These markets have no permanent structure at all, and are operating with temporary stalls built by the traders themselves.

The 64 markets accommodate about 7,800 registered traders and a large number of informal traders. More than half of these traders are engaged in the horticultural trade.

2) Farmers' Group for Marketing

There is no farmers' group for horticultural marketing in the study area. Farmers are usually just waiting retailers/middlemen for selling their produce individually. The reasons why farmers have not established farmers' groups for horticultural marketing seem to be (a) a little quantities of commercial produce of vegetables, (b) lack of marketing facilities and farmers' awareness for group marketing.

3) Price of Horticultural Produce

The fluctuations in major vegetable prices in Ubungo market in Dar es Salaam are shown in Fig. 3.3.2. Although these fluctuations vary from produce to produce, higher prices can generally be observed during the dry season starting from January through the successive rainy season up to the end of July. On the contrary, cheaper prices can usually be seen in the period of July to October in which vegetable production in the study area is in a peak season (refer to Table 3.3.4, 3.3.5 and 3.3.6).

According to the results of a study on marketing arrangement for horticultural produce carried out by MAC, the wholesale and retail marketing margins for potatoes, tomatoes, cabbages and onions are within the range of 15 - 40 per cent and 10 - 60 per cent

respectively. There are also considerable differences between retail and farm gate prices for the above vegetable produce. Retail prices are two to five times of the farm gate prices.

The prices of horticultural produce are closely related with its quality. For example, the following table shows the variations in wholesale prices of horticultural produce:

Variations of Wholesale Prices of Horticultural Produce

Vegetables	Tomato	6,000-12,000	TSh./tenga
	Cabbage	13,000-21,000	TSh./sacks
	Eggplant	4,500-10,000	TSh./sacks
Fruit	Lime	4,500-6,000	TSh./sacks
	Pineapple	150-320	TSh./each
	Papaya	110-190	TSh./each

Source: Financial Times; wholesale prices at Kariakoo market on December 22, 1998.

These variations arise from various causes, and a major cause is the quality of produce, in particular sweetness, freshness, size, appearance and damage.

4) Reason for Low Price

Generally, major marketing problems of horticultural produce are symbolised as a low price for the benefit of producing farmers. The low price is principally caused by the following reasons:

- Domestic marketing of horticultural produce except cashew nuts in Tanzania is never under the control of the Government because the horticultural crops are of less priority for the Government. It is individual small-scale farmers and private traders who carry the marketing instead.

- Of a total population of about 27 million in the mainland of Tanzania, more than 80 per cent live in rural areas and are engaged in agriculture. There are a few cities such as Dar es Salaam, Mwanza, Arusha, Tanga, Morogoro and so forth, and the urban area's population of these cities is low except Dar es Salaam city with population of about 3 million. Whereas the urban population is one of the important factors for determining the size of the domestic agricultural market, the limited urban population brings about a small domestic agricultural market in size. On the other hand, a large proportion of agricultural produce grown over the country with 94.5 km^2 is forwarded to Dar es Salaam market. As a natural consequence, prices of agricultural produce are usually forced down at a low level.

– The northern and southern highlands of the country are the traditional vegetable producing areas and these areas steadily supply vegetables to the major agricultural markets located at the urban areas throughout the year. On the other hand, some areas, where vegetable cultivation is carried out as a second crop after harvesting paddy, supply vegetables seasonally to the major agricultural markets particularly in the dry season. Thus, over supply of vegetables takes place chronically in the dry season from August to December in particular.

– Fruit production is carried out throughout the country and shows the tendency to over production similarly to vegetables. Citrus fruit was less produced in volume and was seen as a more advantageous crop relatively in past ten years or more. However, over supply phenomenon with low prices of citrus has brought about recently in proportion as many farmers have increased their citrus production. Presently, passion fruits and pineapples seem to be in same process as citrus.

(2) Food Processing

In the study area, there are no private factories for processing horticultural produce except Kibaha cashew nut processing factory. However, the Study team obtained the following examples and information:

- In Mkuranga town, one women's group processes fruit into jam and wine and sells them to villagers through a glossary shop run by a member of the women's group. The workshop consists of only small rooms with about 10 m^2 attached to a storage. Processing tools are only two big pans and a charcoal-cooking stove.
- Farmers produce mango pickles and reserve them for their family use.
- Passion fruit fresh juice has gradually become popular because small factories have begun to make the juice, which they sell in Dar es Salaam.

3.3.4 Farmers' Organisation

There are very few stable farmers groups in the Region. The groups are very fragile and often disintegrate soon after their formation. Most of the groups exist temporarily during the peak agricultural season. Their binding force is the acquisition of agricultural advice and sometimes combined financial efforts to acquire agricultural inputs. Unless farmers find a group profitable, they have no incentive to form it. In the long span, there are fewer possibilities about further development of grouping. However, since agricultural development cannot be achieved in a short term, farmers' organisation/group has to be made sustainable.

In the Region, there is one group that has been successful in processing agricultural produce, such as jam, pickles, juice and wine, and marketing them. The group consists of about 10 women. It is considered that its leader's ability helps the success. This group is worthwhile being paid attention.

3.3.5 Supporting Organisation for Farmers

(1) Coast Region Cooperative Union (CORECU)

The past performance of the Region Cooperative Union (CORECU) was outstanding but it currently faces serious financial difficulties. Over 70 villages that were members of primary co-operative societies formed CORECU in 1984. The Union acted as sales outlets of the member farmers' produce and was the primary supplier of farm inputs to the farmers. Crops dealt with were cashew nuts, cotton and sesame. CORECU financially protected farmers by sustaining the floor prices of these crops through negotiation with the relevant marketing boards. In 1993, however, the financial crisis started within the Union and 65 societies withdrew from CORECU. Currently, CORECU now remains with 48 primary societies consisting of 14 in Rufiji, 4 in Mafia, 6 in Kibaha and 18 in Bagamoyo. The Union operates, though limited in extent, two (2) cotton ginneries in Mandera and Kilimani, a rice mill plant in Chalinze and three (3) godowns in Rufiji, Bagamoyo and Mafia Districts.

(2) Farmers' Groups under NGOs

Group formation is promoted in several villages in the Region by obtaining NGOs' assistance. The major NGO projects in the Region are as follows:

1) Grant, SACCOs and Grameen (micro-credit) by Swissaid Tanzania
2) Community Based Initiative (CBI) by UNDP
3) Village Oriented Development Programme (VODP) by Caritas
4) Heifer Project International (HPI)
5) Astro Project
6) Islamic Relief

Among various group activities, the ones under Swissaid and CBI are currently the most operational in terms of promotion of horticulture and other agricultural activities. The current status of both NGOs' projects is summarised below:

<u>Swissaid Tanzania</u>

Swissaid Tanzania introduced the grant support system to Mwendapole in Kibaha district in

1993. With the grant system, nine (9) groups were organized for various community-based income generation activities and eight (8) groups consisting of 58 farmers are currently in operation. The activities include dairy cow raising, carpentry, poultry farming, horticultural farming, etc. The total grant provided to the Umbrella group amounts to TSh. 3.6 million per year. Following the successful grant system for six years from 1993 to 1998, the credit scheme was newly introduced to Mwendapole in 1999. The total credit amount approved in 1999 was TSh. 1.7 million against the loan application of TSh. 3.3 million.
Swissaid has also introduced the grant support to Kisarawe. The group called Mshikamano represents and serves eight (8) groups of 60 members under Mshikamano. The activities include horticultural farming, poultry farming, cattle raising, bee keeping, afforestation, adult education, tailoring and so forth.

The activities of Swissaid are outstanding. Swissaid supports grassroots group formation and activities with awareness raising linked with provision of seed money. Swissaid has identified that the communities, which were covered by their services, are keen to the following aspects.

1) Improving crop productivity and reducing crop losses during post-harvest
2) Ensuring availability of water for domestic use and keeping its stability
3) Constructing own better houses
4) Increasing cash income particularly for school fees for their children
5) Obtaining medical treatment when needed
6) Supporting women and children fighting for their rights and for participation in economic activities
7) Improving channel of communication within village

The followings provide Swissaid projects with success.

1) Members share not only benefits but also responsibilities for the community-based projects that result in enhancement of the project sustainability.
2) Groups are not formed by family members but by neighbours, who discipline each other for laziness and irresponsibility among group members.
3) Community-based projects assisted by Swissaid are formulated and operated through full participation of group farmers (bottom-up approach).
4) Loan repayment is strictly controlled. Members are obliged to secure collateral and make deposit before loan application.
5) Financial size and technical level of the projects are suitable for capabilities of group farmers.
6) Project monitoring is frequently done by Swissaid staff from Dar es Salaam.

Community Based Initiatives (CBI)

Community Based Initiatives (CBI) project is a grass-root programme, which supports Community Based Organisations (CBOs) engaged in productive activities. The project is undertaken by Ministry of Labour and Youth Development with financial assistance from United Nations Development Programme (UNDP). The project is a continuation of Domestic Development Services (DDS) and Partners in Development Programme (PDP) under a more result-oriented manner. The project period is six years from 1998 to 2003. By June 1999, more than 1,500 people in 15 rural districts including three (3) districts of Kibaha, Mkuranga and Bagamoyo in the Region have benefited from the project.

CBI has distributed grants worth TSh. 98.5 million to 113 groups through 12 CBO Councils in 12 districts. Fourteen groups in Kibaha and Mkuranga districts have received a grant of TSh. 13.7 million.

3.3.6 Agricultural Support Services

(1) Agricultural Extension

The nationwide extension services initiated by the National Agricultural and Livestock Extension Rehabilitation Project (NALEARP), commenced in 1989 under a financial assistance of IDA, AfDB and the Government of Tanzania. The project introduced the Training and Visit (T&V) system in five districts and expanded the activities to 16 out of 20 regions of main Tanzania. The project was officially closed in September 1996.

National Agricultural Extension Phase II (NAEP II) was declared effective in October 1996 as the second phase of the long-term extension programme initiated by NALEARP. There are four (4) major components under NAEP II, which are: institutional strengthening, extension education and training, communication support and pilot initiatives. The total project cost will amount to US$ 32.9 million with the implementation period of five years from 1996 to 2001.

The district agricultural extension services are headed by DALDO who is assisted by the District Extension Officer (DEO). There are District Subject Matter Specialists (DSMS) who provide technical advices for Ward Extension Officers (WEOs) and Village Extension Officers (VEOs).

Currently, 137 district officers and 157 extension staff members are engaged in the services. Shortage of extension officers is a chronic problem nation-wide. In the Region, the actual staff members account only for 33 per cent of the requirements, resulting in insufficient delivery of extension services. The staff composition is tabulated below.

Staff Requirement and Existing Staff under NAEP II

Unit: persons

Regional/Division	HQ	DiVEO/WEO	VEO
Regional Office	27	-	-
	(23)	-	-
District Offices	133	70	404
	(137)	(30)	(127)
Bagamoyo	24	25	104
	(37)	(8)	(28)
Kibaha	48	11	46
	(35)	(8)	(44)
Kisarawe	21	10	49
	(29)	(4)	(19)
Mkuranga	13	13	81
	(16)	(4)	(17)
Mafia	7	2	20
	(9)	(1)	(2)
Rufiji	20	9	104
	(11)	(5)	(17)

Source : Coast Region (March, 1998), *Regional Annual Extension Work Plan and Budget 1998/99*, National Extension Services NAEP II
Note : ( ) indicates numbers of existing staff that were clarified through direct interview to DALDO and DEO in each district.

(2) Credit

Any institutional credit schemes are not in operation in the Region, but the micro-credit by NGOs are operated in connection with the promotion of group formation. The major ones are Swissaid and CBI as already mentioned. It is noted that the repayment rates for both credit schemes are as high as over 90 per cent. For CBI, the following loan conditions have to be strictly adhered to:

Borrowers are the group members of CBO's Council in the districts and have to be recognised by village government or ward. Preference is given to youth and women groups. The qualification of borrowers is summarised below.

a. They should be in-groups of five to ten members. Preference will be given to groups of five.
b. They should be of a minimum age of 15 years old and above.
c. They should live in one project area for a minimum period of one year.
d. They should live in that area for a period of not less than one year.

Any lawful productive activity can be applied for a loan. The activity should be viable and active with optimum size for the number of proprietors. The activities should be growing nature and not affect/destroy the environment. Loan limit depends on the project actual needs. The amount of loan to be disbursed depends on the amount of

group's saving or contribution. It does not exceed 600 per cent of savings or contributions. To begin with, CBI provides loans not exceeding TSh. 1.00 million for each CBO group.

Group members secure the loan. They guarantee each other and group properties are part of security. In case a group member fails to repay loan during the repayment period, each member takes responsibilities to contribute for their colleague. In case the group fails to submit its repayments to the Council, the Council takes responsibilities to settle the outstanding amount. The interest rate is set to coincide with prevailing loan interests in the bank. The interest rates are reviewed and adjusted every six months period. The interests are changed on the basis of agreement between the CBI project and CBO's Council. The average interest is currently set to be 15 per cent. The loan repayment period is 12 months. In case the borrower succeeds in repaying loan within the scheduled period, they have the right to borrow the next loan.

The performance of CBI loan is tabulated below.

CBO's Grant and Credit Analysis

Unit : TSh. million

Region	Grant Disbursed to CBO Councils	Number of Group Received Loan	Amount Disbursed to Group	Amount of Dues X	Total Amount Repaid Y	Repayment Ratio Y/X (%)
Coast*	13.7	14	6.4	0.61	0.58	95
Dodoma	27.9	30	11.6	1.11	1.46	132
Kigoma	16.1	20	9.3	0.89	0.81	91
Lindi	40.8	49	9.4	0.90	0.26	29
Total	98.5	113	36.7	3.51	3.11	88

Remark : * Kibaha and Mkuranga

(3) Research

Agricultural research is one of the crucial aspects for a successful horticultural development. However, due mainly to financial constraints, horticultural research has not properly taken off in the Region. The following research activities are to be taken into consideration for technical assistance to officers and farmers involved when the horticultural development is implemented in the Region.

Horticulture Unit, Ministry of Agriculture and Cooperatives

There are about 25 units of orchards of mother trees under the management of MAC. In these units, Preservation of genes and commercial operations of the orchards are undertaken. However, the horticultural development is still very limited due to a number of reasons such as lack of a national horticultural policy, poor funding and less availability of disease free planting materials.

Sokoine University of Agriculture

Sokoine University of Agriculture in Morogoro is the only university with both agricultural research and education functions in the country. The university has three faculties; agriculture, forestry and veterinary medicine. Several departments, such as crop sciences and production, soil science, rural economy, agriculture education and extension, and food sciences and technology deal with horticulture.

The Franco-Tanzanian Horticulture and Development Project has been implemented under the collaboration of Sokoine University and French government/NGOs since 1983. The objectives of the cooperation program are to develop a horticultural unit within the crop science department of the Sokoine University and to promote and develop a research development approach for providing the farmers appropriate research results and recommendations.

3.3.7 Irrigation and Drainage

(1) Irrigation Practice

For sustainable horticultural development in the study area, irrigation is essential and is required in most part of the year except a few months in the long rainy season as shown in the table of comparison between rainfall and calculated evapotranspiration. It is observed that farmers watered horticultural crops during almost all the growing period. The horticultural farmers irrigate their own small plots such as 0.08 - 0.2 ha (0.2 - 0.5 acres) field by hand using a bucket or polyvinyl-tank. In that sense, the farmers' activity of providing water to the crops may not be seen as irrigation but rather as watering.

Water sources for the watering are;

- ponds or water impounding
- shallow pits (kisima)
- stream flow
- potable water provided by water service (observed in urban area)

Among these water sources, private shallow pits owned by individual farmers are the majority

in the study area. Due to the high water table, farmers using these shallow pits can irrigate/water their plots a few months following the end of the long rainy season.

Existing ponds are either natural or semi-natural and are used not only for irrigation but also for domestic water supply. Present horticultural fields are generally located within close distance to some water sources due to the convenience of watering, which is a very tough daily work for farmers and their children. Portable engine pumps for lifting and delivering water are rarely seen in the study area due to the high investment cost involved (about 400,000 TSh. par unit) and the unsuitable shape of the shallow pits.

Actual quantity of watering practised by farmers in the study area is much smaller than the standard values of irrigation requirements, because the farmers water only around crop roots. The actual water applied is estimated about 2.0 mm/day through observation of real practice in the study area. It is because that the farmers decrease the water application by stopping watering when it rains or rain is anticipated besides watering around crop roots only. Since farmers barely obtain its effect of saving water by throwing excessive labours into the watering, the watering practice in the study area is not always the ideal water saving irrigation method.

(2) Existing Irrigation Schemes

There are 21 functioning, non-functioning and proposed irrigation schemes in the Region, covering a total potential area of 23,000 ha as shown in Table 3.3.7. All these irrigation schemes are for food crops such as rice and maize. Considering the objectives of the Study, which target horticulture by small-scale farmers, no sizable irrigation scheme is considered in this Study.

(3) Drainage Conditions

Two types of drainage hazards are observed in the Region. One is the inundation problem during flood in lowland areas and along big rivers such as Wami, Ruvu and Rufiji. The other is the implicit hazard related to drainage problems such as the erosion caused by high rainfall intensity in agricultural fields located in hilly areas.

Big rivers are reliable and perennial water source, on the other hand they cause severe flooding periodically in the lowland areas where rice is cultivated. Horticultural practice has not been seen in such lowland areas.

Horticulture has considerably been practised in sandy upland areas. While these areas are

usually well drained with less diseases incidence, soil erosion occurs frequently due to heavy rains.

3.4 Environmental Issues in Coast Region

3.4.1 General

To address the pressing issues of natural resources use and environmental management, the Government of Tanzania has undertaken a policy and strategy formulation process including an action plan that provides the context for a first step long-term national approach to environmental sustainability.

The Action Plan to implement the environmental policy includes those ministries and agencies responsible in respective environmental preservation activities in the Governmental administration. The ministries with central roles are Natural Resources and Tourism, Agriculture, Water, Energy and Minerals, Lands Health, Education, and Science and Technology. The Planning Commission, Prime Ministries' office, the universities, research institutions and NGOs also have important tasks in this effort. However, the Directorate of Environment under the Vice-President Office has the key-coordinating role, providing guidance for all environmental actions through environmental planning and formulation of programmes, and publishing annual progress report on the implementation progress. The National Environment Management Council (NEMC), in its advisory role to the Government will be responsible for developing the enabling environment/atmosphere. for the implementation of the plan, particularly in monitoring environmental problems and developing the information system relevant both for problem definition and for policy and strategy refinement overtime. NEMC will also keep under review the progress of implementation at the district level, maintain a dialogue with that level, and submit to the Government proposals on strategy and policy measures to support smooth implementation.

Although, there is an environmental policy and an action plan to implement that policy, there is not yet a bill or concrete legislation package setting up the institutional and legal frameworks necessary to fully back up the implementation of the policy. Such legislation is being worked out and is due to come out sometimes in the year 2000. However, the NEMC has prepared an Environmental Impact Assessment (EIA) procedure and guidelines, which involves stakeholders, district authorities and Government officials, and advise developers to follow this EIA procedure.

With regard to the existing legislation related to environmental management, numerous laws and decrees are relevant to the conservation and management of natural resources. Among

these, different acts and codes include land tenure system, forest conservation, hunting, air, waste and water, mining, fishery, etc.

At the international level, Tanzania has signed several global, regional and multilateral Conventions among which the followings can be cited: Protection of World Cultural Heritage, Ramsar Convention on Wetlands, International Convention on Desertification, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and many more.

Within the framework of international cooperation, much analysis has been done on environmental issues for Tanzania, most notably on issues of desertification and land degradation. Many actors are involved in assisting the Government address a broad agenda of environmental challenges, namely, United Nations Environment Programme (UNEP), United Nations Conference on Environment and Development (UNCED), United Nations Development Programme (UNDP), the World Bank, World Wide Fund for Nature (WWF) and International Union for the Conservation of Nature (IUCN).

3.4.2 Land Use Control in Coast Region

Various types of land use exist in the Region, which includes agriculture, forestry, and grazing land required for human settlements. The Region has a total area of 32,407 km^2, and the land use is being controlled as shown in Tables 3.4.1 - 3.4.3.

3.4.3 Afforestation Programme

The Government had established since 1965 a number of afforestation projects to improve wood productivity in the rural areas in order to alleviate fuel-wood and environment degradation. Among these the Ruvu Afforestation Project (1965 – 1984) and the Village Afforestation Program designed and launched in 1967/70 can be cited.

Other current responses to deforestation include the WWF involvement in a community-based afforestation project around various forests in the country and various national laws creating the legal limits on exploitation of the forestry resource.

3.4.4 Environmental Impact Assessment in Tanzania

According to the " Environment Impact Assessment Procedure " issued by the National Environmental Council (NEMC), all project proposals or concept should be registered with the NEMC in Tanzania. After registration, the NEMC will classify the project into one of the following four decisions:

- Full EIA required
- Preliminary Assessment Required (same as Initial Environmental Evaluation (IEE))
- EIA not required
- Project Proposal Rejected (Stop)

EIA is mandatory for projects that are known from previous experience to have potential of causing significant impacts on the environment. For agricultural projects, the following criteria require an EIA:

- Cultivating natural and semi-natural land not less than 50 ha
- Water management projects for agriculture (drainage, irrigation)
- Large scale mono-culture (cash and food crops)
- Pest control projects (tsetse, army worm, quelea quelea, locusts, rodents, weeds, etc).
- Fertiliser and nutrient management
- Agricultural programs necessitating the resettlement of communities
- Introduction of new breeds of crops

EIA is not mandatory for all other developments/undertaking that are either less likely to have serious adverse consequences or are not located within or near Environmentally Sensitive/critical Areas (ESAs) as listed in Table 3.4.4. Horticulture is listed as the one for which EIA may not be mandatory. For such projects NEMC will conduct a screening process to determine whether EIA is required or the project is to be exempted from an assessment. Where there is uncertainty, a preliminary assessment, equivalent to IEE, is to be done to assist in the decision making process.

3.5 Rural Society and Farm Economy

3.5.1 Farm Interview Survey

(1) General

There are little statistical data and information on rural society and farm economy in the Region. To obtain such data and information, the farm interview survey was carried out by employing a know-how of a local consultant on sub-contract basis under the close supervision of the JICA Study team. The survey obtained 500 respondents from representative 25 villages, which were selected by all the attendants of PCM workshop. The PCM workshop was held at Kibaha inviting DOs on 25th and 26th November 1999. (The details of the PCM workshop are described in Annex I.) The village locations selected are illustrated in Fig. 3.5.1. The survey results revealed various information on rural society and farm economy including

characteristics of average farmers with current farming activities and general attitude to participation in community based development.

The followings are the summary of the survey. (The whole picture of this survey is described in Annex G.)

(2) Structure of Villagers

Interviewees are householders, who are selected at random in the relevant villages. Most respondents (476 nos. or 96%) are farmers, while 320 nos. or 64 per cent are males and 180 nos. or 36 per cent are females. Their ages are rather evenly distributed and 79 per cent are married. The educational status is primary level (64%) or no education (24%). Muslim occupies 85 per cent of the total respondents. Significant difference is not identified between the districts except for tribal composition.

The data provided by the farm interview survey and analysed are presented in Table 3.5.1.

(3) Village Life

The main information source for villagers is radio and newspaper, i.e. 79 per cent in total, while 22 per cent do not have any particular information sources. Fish and beans are the major protein sources for 87 per cent and 82 per cent of the total respondents, respectively, while meat consumption is less. Some 92 per cent of households have their own toilets. Fuel woods are used by 83 per cent of respondents followed by charcoal and kerosene. Only 7 per cent of respondents are supplied with electricity. Transport equipment is represented by bicycle (40%), while 49 per cent do not have any.

(4) Domestic Water

In total 320 nos. or 64 per cent of respondents fetch drinking water from wells. Running water is available in seven (7) villages, while the Ruvu River and small streams are main water sources for five (5) villages. Users of rainwater are negligible. The quality of running water and groundwater (well) is acceptable, while river water and pond water are muddy or salty. Some 61 per cent of the respondents accept the water quality. However, the water quality changes from place to place. The charts in Fig. 3.5.2 show relation between water sources and water quality for each village. In general fetching water is women's work. Over 70 per cent of households' replies are that women and daughters are responsible for fetching water. On average, they make 4.4 round trips between home and water source a day and it takes 36 minutes a trip giving 2.6 hrs for fetching water a day.

(5) Village Leaders

The majorities (98%) understand that their village leaders are either Village Chairmen or Village Executive Officers. Besides, they understand that the village planners are village development committees (56%) and village executive officers (34%). Nearly 70 per cent of the respondents replied husbands and/or wives attend village assembly meetings.

(6) Land Tenure

In the Region, like the rest of the country, land tenure is based on customary land rights holdings. Rights to land are mainly vested in the clan elders who pass them on their offspring. Nearly 90 per cent of the respondents have their own plots, which are registered to husband (61%), wives (15%) and both (15%). Some 75 per cent of the land owned is allotted to agricultural purposes.

(7) Farming System

The respondents (98%) generate farm family income from crop production. They produce crops for both home consumption and sale. Out of 500 respondents, 487 nos. and 348 nos. produce vegetables and fruit respectively as important income sources as well as for home consumption. As for farming practices, farmland is generally prepared by hand hoes. About 70 per cent to 80 per cent of seeds are produced by farmers, while 20 per cent are procured at shops. Only 22 per cent of farmers apply chemical fertilisers. Organic manure is also used. Major ones include crop residues (66%), green manure (62%), poultry manure (31%) and cow dung (8%). In Kisarawe, bat manure is used. Nearly 50 per cent of the respondents apply several irrigation methods. Shallow pits (57%), ponds (26%) and rivers (7%) represent their water sources. 10 farmers use portable pumps.

(8) Farm Income

The farm interview survey has revealed that most respondents depend on crop production as a source of income specifically cash. In the two districts of Mkuranga and Rufiji, 100 per cent of the respondents obtain their cash from crop production. In the two districts of Kibaha and Kisarawe, 98 per cent of them get their cash income from crop production while in Bagamoyo district 94 per cent of them obtain their cash from crop production. The six per cent of respondents of Bagamoyo could have other sources like petty shops, fruit/vegetable vending as well as self-employment.

Some 60 per cent to 80 per cent of the respondents generate less than TSh. 50,000 monthly

from maize, rice, vegetables, fruit and other crops. The quite a small fraction is seen as generating TSh. 50,000 to TSh. 100,000. However, production of vegetables, fruit and other crops shows some good signs since some of their farmers get between TSh. 100,000 to TSh. 200,000.

(9) Expenditure and Saving

The farm interview survey has shown that the average monthly expenditure among the respondents is quite well spread with no district extremities. Eight per cent of them spend more than TSh.50,000, nine percent spend from TSh.40,000 to TSh.50,000, 17 per cent spend from TSh.30,000 to TSh.40,000, 27 per cent spend from TSh.20,000 to TSh.30,000, 25 per cent spend from TShs.10,000 to TSh.20,000 and 14 per cent spend less than TSh.10,000. The expenditure is done mainly on the essential needs, which are foremost food that consumes about 29 per cent followed in decreasing order by clothing (24%), medical fees (22%), school fees (16%), other needs (6%), fuel especially for cooking and lighting (3%) as well as housing facilities (1%).

Indication of the respondents has revealed that 36 per cent save at least an amount of less than TSh.10,000 while 23 per cent make a saving between TSh.10,000 and TSh.20,000, 15 per cent save between TSh.20,000 to TSh.30,000, 10 per cent between TSh.30,000 and TSh.40,000, five per cent between TSh.40,000 and TSh.50,000 and other five per cent above TSh.50,000. Only six per cent of the respondents for this case are not able to save at all.

(10) Decision-Making on Income and Expenditure

It seems the situation in terms of decision-making with regard to income generation and expenditure is a bit different but still resembles that of the above item of land tenure whereby male spouses highly dominate. The survey respondents have indicated through their responses that 50 per cent of decisions on income and expenditure are made by male spouses.

(11) Problems and Opportunities

The survey respondents came up with some kinds of problems. Among the respondents, 65 per cent face problems concerning agricultural input, followed in descending magnitude of percentage by low income 63 per cent, irrigation difficulties 62 per cent, marketing difficulties 52 per cent, pests and diseases 51 per cent, vermin 46 per cent and finally poverty 38 per cent.

Generally, these problems are quite interrelated whereby some of them could be found as

causes or effects of each others. Some of these problems could be within others hence a solution to one may be a way out from another.

3.5.2 Participatory Rural Appraisal

(1) Objectives

The Participatory Rural Appraisal (PRA) was conducted at the selected four (4) priority sites as mentioned in Chapter 6, Viziwaziwa, Mwanabwito, Vigama and Mwanambaya. The main objectives of the PRA are to verify needs among horticultural farmers in the villages and to select necessary measures to realise their needs under the Action Plans. Therefore the JICA Study team paid its particular attention to development needs in their current horticultural farming and possible solutions. In view of poverty alleviation, the efforts were also directed to identify any of basic needs in the village life. The PRA under this study is particularly envisaged;

1) To observe and assess the land and water resources of the villages from the viewpoint of horticultural development;
2) To identify constraints and needs in horticultural farming;
3) To discuss necessary actions to solve constraints;
4) To achieve mutual understanding and consensus of development efforts to be made by the community and
5) To identify basic needs in the villages.

Three-day session of PRA was programmed for each village with selected techniques and tools mentioned below.

(2) PRA Team, Participants and Daily Activities

1) PRA Team

   The PRA team was organised by all the members of the JICA Study team and three (3) qualified Tanzanian researchers, who had been the supervisors of the Farm Interview Survey carried out in the Phase I study in the period from November to December 1999. All the practices of PRA were carried out in Kiswahili. Tanzanian researchers acted as PRA facilitators as well as translators for the JICA Study team. In addition, District Officers and Village Extension Officers also attended to provide more information to villagers.

2) Participants

The official requests for participation in the PRA were sent the villages through Regional Office or District Offices in advance. In parallel to this, the JICA Study team visited the villages and made the direct request to Village Chairmen. In order to reflect a wide range of opinions and consensus of the PRA, the Study team requested Village Chairmen to select some 20 to 30 villagers, but not limited, who represented each group of men, women and youth. Consequently, average daily attendants reached 65 persons giving 775 persons in total.

The number of women who attended the session was always less than that of their male participants. It was observed that the villagers who attended were men only with just two to three members of women village government committee at the beginning of the meeting. However, when the village leadership was informed of the importance of women's attendance to that meeting, they went house to house to call more women to the meeting. This could be attributed to lack of information about the meeting among women in the village. There is a general tendency that when men attend meetings, their spouses and other women do not see the need to attend these meetings. The socio-cultural attributes in the Region where Islam is the dominant religion dictate that the husband is the head and representative of the family affairs in the public. The Study team took note this gender issue and observed carefully in focus group discussions.

3) Daily Activities

As aforementioned, three-day session of the PRA was held in each village. The entire programme was performed in the period from 10th to 22nd April 2000.

4) Appraisal and Discussion

The results of the PRA are discussed for each of four (4) villages in Chapter 5 on Action Plan. This PRA exercise could easily lead us to conclude that the farmers have well participated in process of project cycle education in the past and they seemed to know quite a lot about the participatory development projects. They revealed current problems, concerns and needs, and ultimately suggested appropriate and sustainable solutions to them.

① Villagers listed their problems in order and proposed relevant solutions. In the discussion, villagers pointed out necessity of group formation as the first step for participatory development activities.

② Unsecured water resources are the most important issues in these villages for both watering crops and drinking purposes. Fetching water is the heaviest domestic work for women, who are also main work force for crop production.

③ Other basic needs, i.e. primary health care and education, are also raised. These components are supported by NGOs to a certain extent. Needless to say, urgent needs are less where NGOs' activities are observed.

④ Women and youth need more empowerment through awareness creation and training. During focus group discussions it was recognised that there is enormous lack of confidence for each of these two, i.e. women and youth.

⑤ The input credit facility proposed under the Master Programme was appreciated and farmers basically accepted the proposed operation system. However, they requested the Study team to make more consideration on timely delivery and flexible selection of input and quantity. During the discussion, some farmers commented the bureaucracy of the government body.

⑥ Farmers stated that unstable market conditions and lack of extension services are crucial for horticultural farming. Theoretical solutions, i.e. group marketing and strengthening the extension programme, were well known by most of the attendants. Further in-depth study are required to solve these constraints.

⑦ Necessity of multi-purpose sheds is extremely high in Vigama, where neither village office nor school is yet built. Several ideas for use of sheds are raised by the attendants form the community, e.g. vegetable markets, nursery, store of villagers' common assets, etc. They also reminded how to maintain the shed.

The topics in the PRA exercise are widely ranged by village and by gender. The results of focus group discussion and preliminary community planning are fully taken into consideration in formulation of Action Plans for the priority sites.

3.5.3 Hearing on Verification Study

The Master Programme proposes new development ideas under the Project. It is important for policy makers and donors to examine and confirm their technical and financial viability and sustainability before final decision-making especially for new development ideas with unforeseeable factors.

Under such circumstances, it is recommended to carry out a sort of verification study within the framework of the master programme study. The verification study is expected to prove the viability of the programme components and reveal unforeseeable constraints, if any, in order to finalise the Master Programme and the Action Plans for the priority sites, fully reflecting the study results.

The verification study is expected to be carried out not only at the selected four villages but also at other villages in the Region. However, PRA was conducted only at the four villages in

order to discover the villagers' needs and to determine what kind of verification study would be useful there. Therefore, at other villages nearby selected for the verification study for comparison, village meetings were held in order to determine what kind of verification study was required and adequate there discovering the villagers' needs. The villages, which were involved with such meetings, are Mwendapole/Kwa Mfipa (Kibaha), Ruvu Darajani and Magomeni (Bagamoyo) as well as Mkuranga B (Mkuranga).

(1) Mwendapole/Kwa Mfipa

The meeting was held with 4 village and group leaders and 14 representative farmers from four sub-villages namely Mwendapole, Kwa Mfipa, Galagaza and Simbani. The table below summarises the situation.

Crops produced in Mwendapole/Kwa Mfipa

Group 1		Group 2	
Cash Crops:	cashews, citrus, coconuts and vegetables	Cash Crops:	cashews, citrus, coconuts and vegetables
Food Crops:	cassava, legumes, maize, paddy and sweet potatoes	Food Crops:	cassava, legumes, maize, paddy and sweet potatoes

The table below shows the problems, causes, and solution/opinions in a nutshell.

Problems, Causes, Solution and Suggestions in Mwendapole/Kwa Mfipa

	Problems	Causes	Solution	Opinion
Group 1	Agricultural input (tractor, fertilisers, agro-chemical)	Lack of capital	To be provided with agricultural input on credit	Credit should be provided for a group of 5 people
	Market	Lack of reliable market Low price in the village	To produce good quality and have group marketing To have factory within the village	Capacity building of groups on how to produce good quality of vegetables
	Water for irrigation	Low income	To be provided with water pumps	Request the donor to provide pumps to each group and dig ponds

	Problems	Causes	Solution	Opinion
Group 2	Pests, Fungus	Farmers can not afford to buy agro-chemical	Requesting credit to curb the problem	The prices of agro-chemical are too high, the government should control the influx of the prices in the market
	Market	No market within the village High charges for transport to Dar	The donor to provide market within the village	The donor to find market strategies
	Water for irrigation	Ponds are seasonal	To request donor to dig ponds for long period for irrigation and pumps	Farmer should be provided with credit in order to curb their problems
	Extension services		The donor to provide frequent seminar on agriculture	Government to increase a number of Extension officers

(2) Ruvu Darajani

The meeting was held with 3 village and group leaders and 25 representative farmers. They produce both food and cash crops. They are also engaged in fishing, petty trading and food vending as well as vegetables/fruits stalls, which is shown in the table below.

Socio-economic Activities in Ruvu Darajani

Women's Group		Men's Group	
Cash Crops:	paddy, tomatoes and okras	Cash Crops:	paddy and vegetables
Food Crops:	pumpkins, legumes, millet, maize and paddy	Food Crops:	maize, paddy and legumes
Other Activities:	food vendors	Other Activities:	petty trade and fishing

The table below shows the problems, causes, and solution/opinions in a nutshell.

Problems, Causes, Solution and Suggestions in Ruvu Darajani

	Problems	Causes	Solution	Opinion
Women's Group	Vermin	Ruvu river (hippos and pigs)	Requesting the government to help	The government to provide them with game scouts
	Pests	Agro-chemical not available in their village	Get loans from the donor	
	Low income	Poor agricultural production	Get assistance from the donor	Capacity building of groups on how to produce good quality of vegetables
	Watering tools	Low income	Get assistance from the donor	Request the donor to provide pumps for each group and dig ponds
	Milling Machine		Get assistance from the donor	
	Health facilities		Get assistance from the donor	
	Market	No market in the village	To build a market within the village	Help from donor and community
	Extension services	No agricultural extension officer	Requests the government to provide one	
Men's Group	Lack of agricultural input and equipment (tractor)	Low income	Credit for tractor and other input	
	Vermin	River Ruvu	The government should provide the game scouts	The government
	Market	No reliable market in the village	The donor to build market shed	
	Extension services	The Extension officer is a veterinary	The government to provide an agricultural extension office	The government
	Lack of irrigation water	They can not divert water from the river at the same time there are crocodiles and hippos around	The donor to provide an irrigation facilities (canal or pumps)	The government and donor to assist
	Lack of health facilities		The government to provide one	

(3) Magomeni

The meeting was held with the village chairman and 9 representative farmers. Both men and women are engaged in various petty trades like operating food stalls, fruit/vegetable vending and small retail shops as the table below shows.

Socio-economic Activities in Magomeni

Men and Women	
Cash Crops:	paddy, coconuts, tomatoes and okras
Food Crops:	paddy, legumes, and cassava
Other Activities:	petty trade, livestock keeping and fishing

The table below shows the problems, causes, and solution/opinions in a nutshell.

Problems, Causes, Solution and Suggestions in Magomeni

Problems	Causes	Solution	Opinion
Lack of agricultural input (hoses pipes, seeds, fertiliser, wheel barrows etc.)	Prices are too high for normal farmer to afford and use	Price control for all the input in order for a farmer to be able to buy	Donor to sell agricultural input at low costs
Land	Land belongs to Mission and Sharif	Village government to provide land for the groups	When the project take over the village government to consider the provision of land to the groups
Marketing	Market is seasonal	To build market within the village To build fruit/vegetable factory in the village	Donor to build processing factory for their products
Knowledge	Farmers have never attended any training for agriculture, formal or informal	Extension agents should be provided with transport in order to reach the farmers	Donor to provide bicycles or motorbikes for extension officers
Water for irrigation	They are using DAWASA water and it is very expensive	To construct shallow wells and pumps	Donor to assist.

(4) Mkuranga B

The meeting was held with the village chairman, the sub-village chairman and 39 representative farmers. The most predominant socio-economic activity is agriculture. They produce both food and cash crops. They are also engaged in petty trading and food vending as the table below shows.

Socio-economic Activities in Mkuranga B

Women's Group		Men's and Youth's Group	
Cash Crops:	paddy, okras, amaranthus, tomatoes, spinach, pineapples, citrus, passions, cashews and coconuts	Cash Crops:	citrus, coconuts, cashews, pineapples, watermelons, mangoes, passions and vegetables
Food Crops:	cassava, legumes, sweet potatoes, millet, maize and paddy	Food Crops:	cassava, legumes, sweet potatoes, millet, maize and paddy
Other Activities:	food vendors	Other Activities:	petty trade

The table below shows the problems, causes, and solution/opinions in a nutshell.

Problems, Causes, Solution and Suggestions in Mkuranga B

	Problems	Causes	Solution	Opinion
Women's Group	Water for domestic		Donor to assist with bore hole	
	Agricultural input			
	Market			
Men's Group	Poverty			
	Agricultural expertise		Extension services should be near to the farmer	Frequent training to the farmers Study tours to the other farmers to learn from them
	Agricultural input		Farmers should be provided with agricultural input at low cost	Requesting input credit from the donors
	Market	There is no reliable market in the village and solidarity	Build market in the village	Production of good quality
Youth's Group	Lack of expertise	Poverty		
	Lack of inputs			
	Low education			
	Market			
	Lack of capitals			

Chapter 4 Development Constraints and Potentials

4.1 Development Constraints

4.1.1 Structural Constraints

Social infrastructure that is the basis of human life, such as roads, facilities of water supply, electricity and telecommunication, school and medical facilities, is not sufficiently provided in the Region. This constrains proper development there. Moreover, there exist sociocultural constraints besides constraints that directly hamper agricultural development such as limitation of market demand and irrigation water and so forth. Among these constraints, horticultural development hardly contributes to immoderate poverty alleviation.

This project aims at poverty alleviation to farmers by means of horticultural development, and the Study was carried out to perform in line with the above-mentioned.

Improvement of the social infrastructure is beyond the frame of this project and a detailed study has not been done on this issue, even though the farmers' desire for it is apprehended.

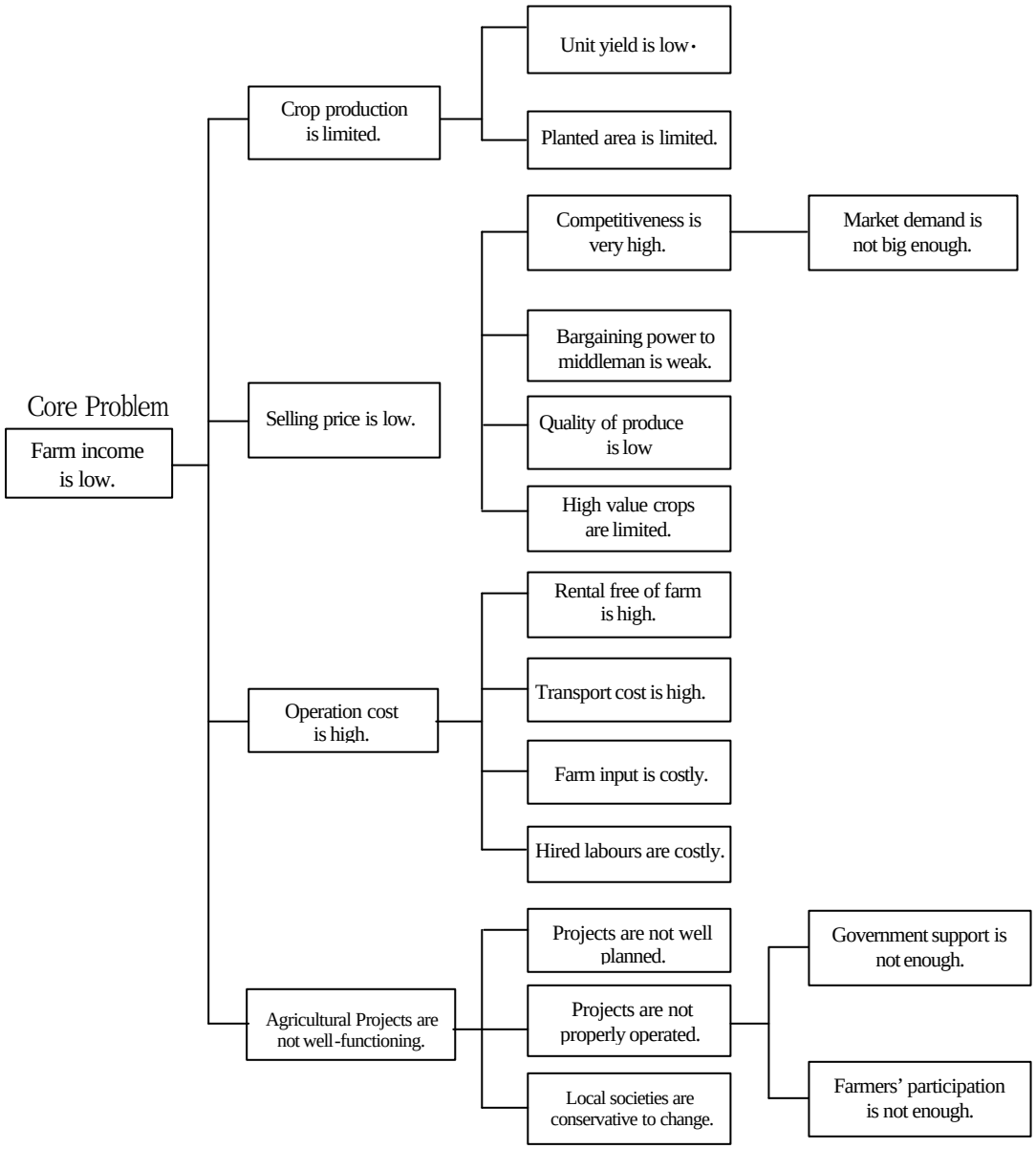
The sociocultural constraints concerning community and local government administration are shown as follows, and the measures to counter them are included in this project as much as they would be adopted in a capacity building programme.

Constraints concerning community:
- hesitation at making new action (lack of positive attitude, traditional and social restriction)
- distrust against local government administration
- ignorance of administrative services and a variety of supports
- insufficient means to access the administrative services
- insufficient information concerning the administrative services

Constraints concerning local government administration:
- insufficient budget
- delay of staff allocation
- improper and inadequate facilities
- incomplete comprehension of administrative targets
- spread of inefficient bureaucracy
- improper administrative functioning (inappropriate way of access to communities)
- insufficient capability for monitoring and evaluation

4.1.2 Problems of Agriculture

The problem tree summarised below gives the essence of PCM workshop and the results of in-depth field surveys, farmers' interview surveys, PRA and so forth. Problem trees derived from the PCM workshop are illustrated in Fig. 4.1.1 and 4.1.2.



Through the PCM workshop and other studies, the following region-specific reasons are identified.

1) Hot and humid climate that makes selection of suitable vegetable species difficult
2) Low soil fertility except the areas along riverbanks that are seasonally flooded
3) Sporadic vegetable production that does not allow keeping regular market business
4) Occupation of markets by vegetables produced in the west high land area

5) Small market demand causing high competition and low selling price
6) Relatively high opportunities for alternative businesses

4.2 Zoning by Farming System in Horticulture

The farming systems are confirmed focusing on the vegetable and fruit crop production. Two types of vegetable production are recognised in the region. The one is high-input cultivation of vegetables in the limited area along the road. The area with easy access to market and to water source can have advantage in vegetable cultivation, even though the production costs are high due to low soil fertility and pest and disease control. The farmers in such area cultivate vegetables throughout the year using chemical fertiliser, organic manure and agro-chemicals.

The other is low-input cultivation of vegetables in the plains along the Ruvu and Rufiji river. The vast river basins are used for food crop production during the rainy season. The farmers plant vegetables once a year starting just after the long rain season. Most of the farmers in these areas do not use any chemical fertiliser, organic manure or agro-chemicals. The yield of tomatoes in the area, however, is usually higher than the high-input vegetable area, because of higher natural soil fertility as well as low occurrence of pest and disease damages.

Besides vegetable cultivation, the vast areas are used for fruit crop production. This is also a type of horticulture and commonly practised in the Region. Food crops are produced between or under the fruit crops for home consumption or local market. Some kinds of vegetables are also planted in home garden.

The division zoning is made from the viewpoint of cropping system in horticulture, as shown in the following table. The map attached as Fig. 4.2.1 illustrates the location of each cropping system.

Zoning by Cropping System in Horticulture

Zone	Characteristics	Location	Divisions
1. High-input vegetable zone	Intensive cultivation with high farm input level for commercial purposes. Mono-cropping in a plot in limited place. Major vegetables are tomatoes, okras, eggplants and cucumbers. Selling the farm produce to local and central markets.	Scattered. Along road. Bottoms of small valleys. Densely populated areas.	Part of Mwambao (Bagamoyo) Kibaha, Part of Mlandizi (Kibaha)
2. Low-input vegetable zone	Food crops (paddy, maize, etc.) are mainly planted during the rainy season. Vegetables are usually grown as a secondary crop without fertiliser and chemicals. Main vegetables are tomatoes, pumpkins and okras.	Major river basins (Ruvu and Rufiji rivers). Fertile soils.	Part of Mwambao, Yombo (Bagamoyo) Part of Mlandizi, Ruvu (Kibaha) Mzenga (Kisarawe) Ikwiriri, Part of Mkongo (Rufiji)
3. Fruit crop zone	Kinds of fruit, cashew and coconut trees are planted as cash crops. Food crops like cassava are mainly cropped between tree crops. Homegarden-style vegetable cultivation is scarcely found. Amaranthus is a dominant leaf vegetable for local consumption.	Widely located in undulating land.	Miono, Kwaruhombo, Msata, Msoga (Bagamoyo) Sungwi, Maneromango, Cholesamvula (Kisarawe) Mkuranga, Mkamba, Kisiju, Shungubweni (Mkuranga) Kibiti, Kikale, Mbwera, Part of Mhoro (Rufiji) Kaskazini, Kusini (Mafia)
4. No horticulture zone	Little vegetable and fruit production is observed, mainly for home consumption.	Remote areas. Scarcely populated areas.	Part of Mkongo, Part of Mhoro (Rufiji)

Source: JICA Study Team

4.3 Development Potentials

The following four items, i.e. land conditions, water conditions, labour conditions and marketing, are to be considered when assessing horticultural development potentials.

(1) Vegetable Development

Land conditions: There is ample room for vegetable development in the Region as the cultivated area devoted to vegetable production is still very small today.

Water conditions: Vegetables are cultivated after paddy harvest using residual soil moisture or where there is water source in the dry season. As there are only few areas where farmers can get water from ponds or groundwater, there is a constraint in obtaining water.

Labour conditions: A labour shortage is observed in the Region due to the following reasons. Average labour force per farmhouse counts only two persons. Women, who plays important

roles in agriculture here, have many other domestic jobs and have a little time left to devote to agriculture. Landless workers tend to go to Dar es Salaam to find other jobs.

Marketing: High land regions and other areas hold the monopoly for non easily perishable produce such as onions, carrots and potatoes, leaving small rooms for the Region. Also, farmers in the Region have to compete with farmers in Dar es Salaam regarding perishable and leafy vegetables. With these considerations in mind, one can say that there are big constraints in marketing.

Judging from the above conditions, there are potentials associated with land conditions, but big constraints exist regarding water, labour conditions and marketing. Except the area along Morogoro highway, development potentials for vegetables in the Region appears not so high. However, 1) To keep a consumption demand of vegetables large and 2) to make effort to expand the share of market in Dar es Salaam and other markets after improving quality of produce and keeping a sufficient quantity constantly, could give a higher possibility to horticultural development.

(2) Fruit Development

Land conditions: There is plenty of land suited for fruit development.

Water conditions: Fruit is normally cultivated in rain-fed conditions and precipitation in the Region is sufficient enough for fruit cultivation.

Labour conditions: Labour conditions are almost as same as that of vegetable development. Furthermore, as fruit does not need much labour for day to day basis fertiliser application and tohers, labour conditions may be better than for vegetables.

Marketing: The Region has an advantage of fruit development as it holds a certain share already in the fruit market located in the vicinity of Dar es Salaam. In the future, even export may be possible if quality is properly controlled and sufficient quantity is produced.

It can be said that to build a collecting and shipping system of fruit with quality and quantity control should contribute to their development.

Chapter 5 The Master Programme

The Master Programme is formulated based on community participation, as its basic concept is to respect farmers' will and support self help effort. It is normal for a project to base itself on community participation when a managing body of the project does not have enough capital to secure its sustainability. Taking community participation into account, the Master Programme shows the development concepts and programmes through grasping and analysing constraints and problems on horticultural development in the study area, and finding their solutions. At the same time, priority sites are selected, and formation of priority programmes is prepared, which are explained in the following chapters.

5.1 Development Concept

Judging from the results of the field studies, an abrupt leap for development cannot be expected. Thus, a practical direction of development is sought. For this purpose, three development concepts are formed. These concepts aim at improving farmers' income. On the other hand, solving structural poverty that is described as lack of access to necessary information and secvices is also included in the concept of this Programme since it is also the main factor of poverty alleviation

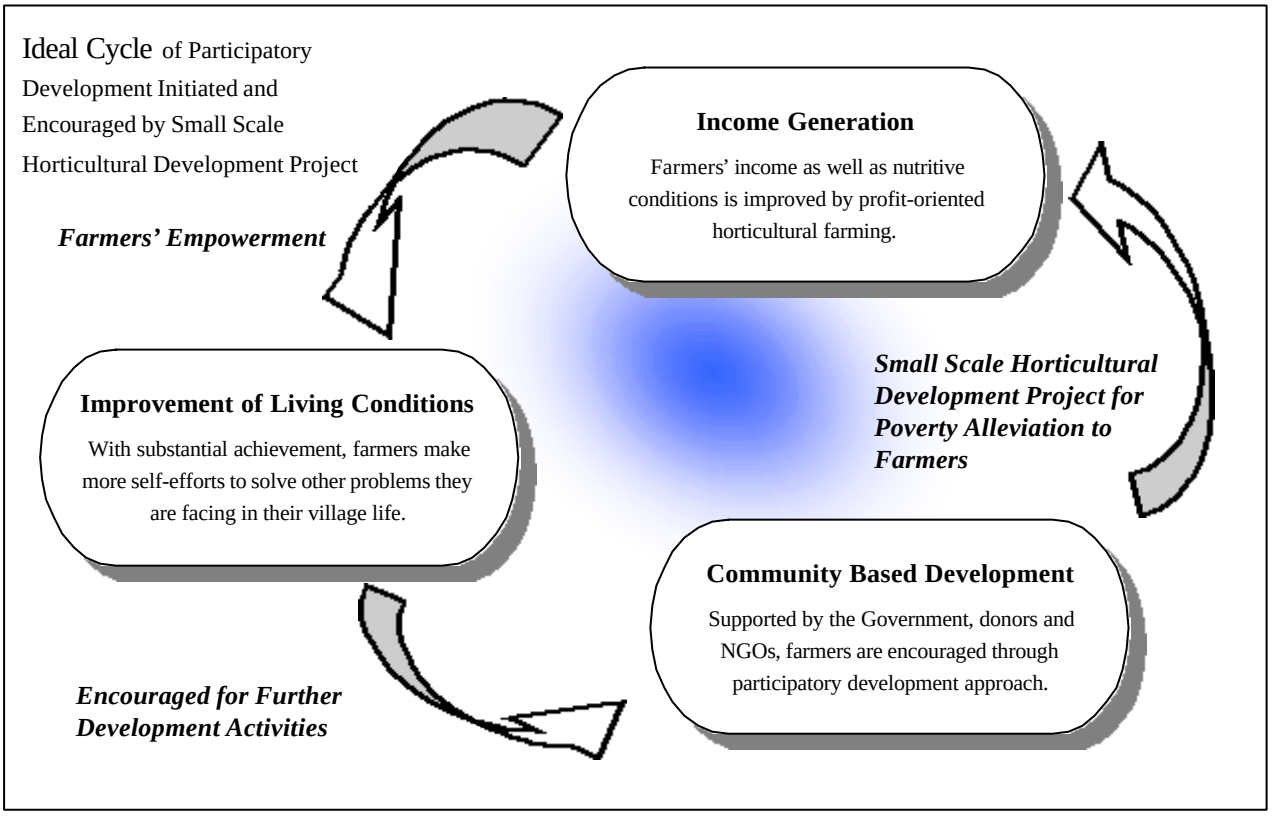
5.1.1 Profit-Oriented Development

Poverty manifests itself in society through poor health, ignorance, environmental destruction, low education, unemployment, malnutrition, short life expectancy and high mortality ratios both for mothers and children and so forth. Therefore, poverty alleviation may be defined as improvement of important amenities of life including land, housing, food, employment, education, other social services as well as the ability of decision making on important matters in life.

Poverty problems prevailing in the Region widely range with the complex structure of cause-effect relationships. In other words, several approaches are required even for solving a single problem. For instance, overload of domestic work such as fetching water tends to reduce average daily working hours of farmers, females in particular, on farm. This results in insufficient crop maintenance causing low crop yield and consequently low farm income. This implies needs of a comprehensive approach to improvement of crop yield.

In view of limited resources and urgency, however, it is crucial for both the Government and communities to select the most effective measures, which are urgently required and quickly contribute to poverty alleviation. In the Study, a priority is given to the profit-oriented

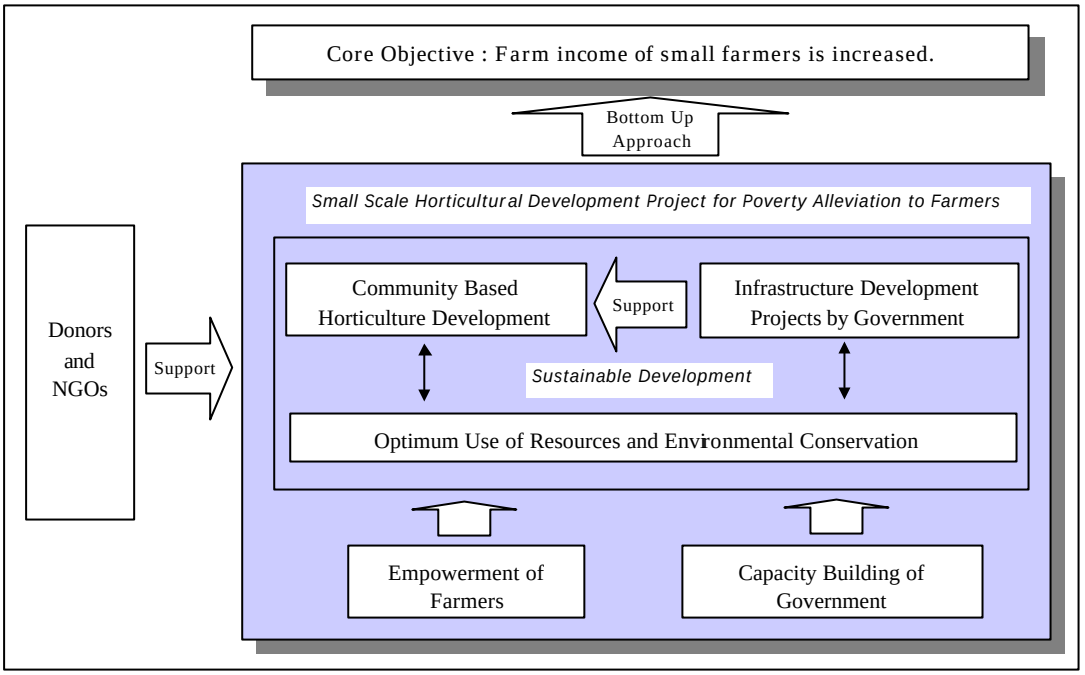
approaches, which directly break the vicious cycle of the problem tree. First of all, farmers are to be empowered by increased income through the community based horticultural development, i.e. the Project. Empowerment of farmers thus initiated directs them to further initiatives for improvement of their living conditions. Supported by the Government, donors and NGOs, farmers are encouraged to proceed to next development activities. Efforts of communities are expected to continue for improvement of "quality of life" along the cycle as illustrated below.



Basic Concept 1: Ideal Cycle initiated by the Project

5.1.2 Bottom-Up Development

Farmers have different interests and problems depending on their own natural and social conditions. Even within a society, farmers have different problems and face conflicting interests. It is highly important to clarify the interests of the target farmers so as to formulate more beneficial and sustainable project for them. This is why "bottom up approach" is the most appropriate for community based development.



Basic Concept 2:Bottom-Up Approach

In principle, the Project is planned to be implemented by initiatives and self-efforts of farmers. The Government is to support such farmers' efforts by infrastructure development, which is too costly to realise by farmers' financial resources only. The project sustainability is dependent not only upon farmers' empowerment (capability to solve the problems facing them) but also upon the logistic supports and other services. Capacity building for both the Government and community is another essential input to enhance the project sustainability.

Therefore, the following three (3) inputs shall be considered in the formulation of the Project.

(1) Community based horticultural development as the prime component of the Project
(2) Infrastructure development projects involving the Government and community
(3) Capacity building for both the Government and community

The well-balanced combination of these inputs constitutes the core objectives. In this regard, the Study carefully selects the methodology of the plan formulation. To learn local experiences and identify needs among community members, all the possible tools for participatory development planning are fully applied.

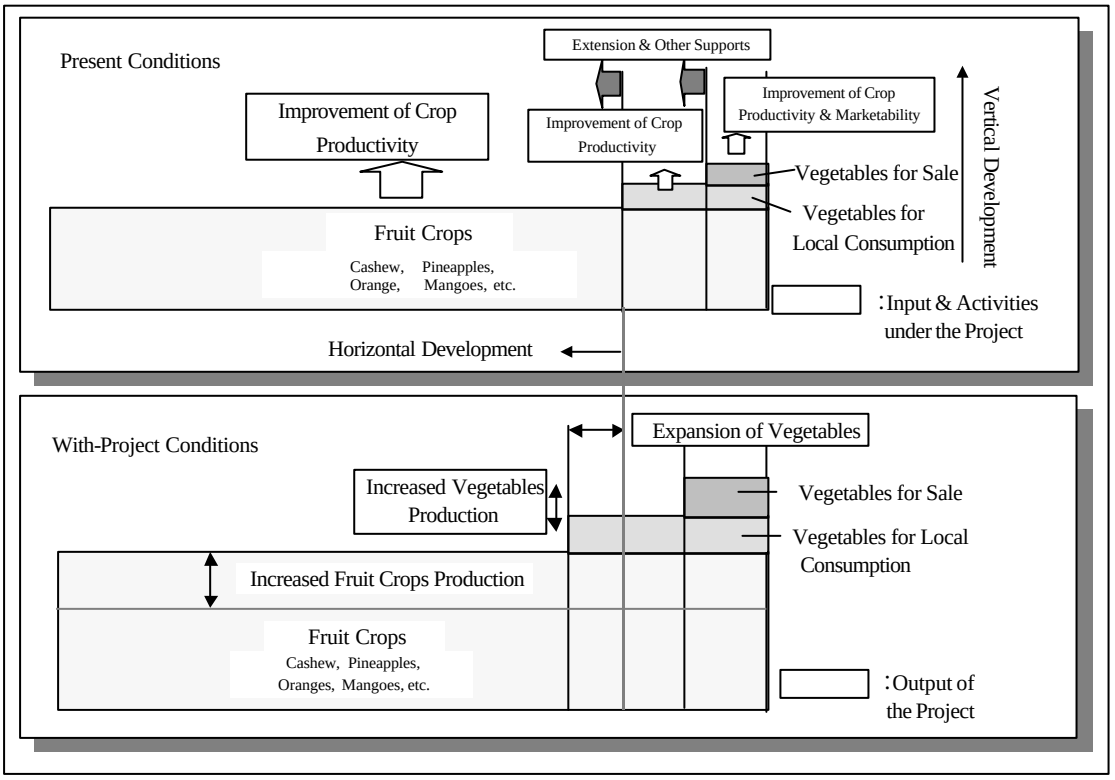
5.1.3 Vertical Development

The Region is recognised as one of the leading fruit producers in Tanzania. The horticultural sector in the Region is characterised by overwhelming expansion of fruit and tree crops.

According to the 1997 census, the planted area of cashew reached over 100,000 ha followed by coconut for 84,000 ha, pineapple for 1,200 ha, orange for 900 ha and mango for 400 ha. They are highly competitive in the country and some of the fruits have high market potential for export in future. In principle, therefore, the Master Programme pursues the fruit-based horticulture under the Project.

Vegetables are recognised as non-traditional cash crop in the Region. Their planted areas are limited. Even for tomato, i.e. a primary vegetable, their total planted area is only 400 ha in the whole Region. They are produced basically for home consumption. Vegetable farms in the Region do not form commercial producing zones of appreciable size but are sporadically located at the areas where water is available along the valleys near the trunk roads.

The constraints in horticultural development are represented by unforeseeable market prospect compared to the secured market of staple crops such as rice and maize. Because of perishable nature of crops, farmers always take a risk in marketing and price fluctuation. Under such circumstances, abrupt expansion of horticultural crops is not recommended. The Project shall be formulated upon the concept of "vertical development" rather than "horizontal development". After the Project could achieve some success, then the Region should go for horizontal development.



Basic Concept 3: Vertical Development

The present land use patterns of farming area will be maintained under the Project. Improvement of crop productivity and profitability will first be targeted there. Only a little expansion of vegetables will be allowed where farmers are willing to embark on. With long-term strategies, vegetable production can be optimised with several crop alternatives for diversification but initally aiming at home consumption.

5.1.4 Structural Poverty

The National Poverty Eradication Strategy implemented under the leadership of the Vice President's Office shows that one of causes of poverty is "insufficient support to the agricultural sector" which means poor rural infrastructure, lack of modernisation, inaccessibility to credit, unavailability of critical farm inputs, inefficiency of the marketing system and post harvest losses. As the Study targets to clear most of these constraints, it would be able to contribute to the poverty alleviation.

The poverty is described as "structural poverty" as well as "income poverty" in the Study. Structural poverty means that people live in a situation of limited chance or the situation shut out from the possible opportunities, while income poverty means simply economical difficulties.

Farm income in the Study area is normally very low and it could be increased by income oriented project in the horticultural development. However, the Study should not concentrate only on the income oriented project, for it could raise another problem that advanced farmers seize a bigger chance whereas poorer farmers have less. In addition, the life of self-support farmers cannot be evaluated only with the amount of income as they can obtain goods by themselves without paying cash. Income alone can not always show the standard of poverty.

Therefore, "structural poverty" is more focused on in the Study. The situation of poverty in the Study area is that the farmers cannot have a chance or have only a limited chance to access social services. The limited chance arises from two constraints; one is that the farmers have difficulties to access the existing services of the Government and the other is that the Government does not extend the services effectively. Under such circumstances, both sides need capacity building. Through the capacity building, the farmers are to be able to access the services of government, and the Government are to be empowered to provide the services effectively.

This project is based on farmers' participation, in which a suitable access to the social services and supporting staffs is essential. In Tanzania, the Government prepares some administrative services, even if not sufficiently, and there is a lot of assistance from NGO and

other donor organisations. It is very difficult to achieve development without any involvement of the above-mentioned NGO and other donor organisations. If the cause of structural poverty is that people cannot access the organisation, improvement of the situation must be given the first priority. The Study also regards this as a part of capacity building.

The development components should be within the range of farmers' capacity, but this does not necessarily mean that the plan is limited to the level where the farmers do all works. The plan should aim at utilising the access to any measures available for development as much as possible.

5.1.5 Development Strategy of Horticulture

(1) General Strategy

Basic development strategies of small-scale horticulture are thus established in consideration of horticultural zoning, development constraints and potentials. These strategies are applied to their objective horticultural zones mentioned in Section 4.2, and their applicability is shown below.

Applicability of Development Strategies of Horticulture by Horticultural Zone

Development Strategies	High-input vegetable zone	Low-input vegetable zone	Fruit crop zone	No horticultural zone
(a) Improvement of profitability of horticultural crops	Applicable	Applicable	Applicable	Not Applicable
(b) Expansion of off-season vegetable production	Applicable	Partly Applicable	Partly Applicable	Not Applicable
(c) Diversification of varieties and crops	Applicable	Applicable	Partly Applicable	Not Applicable
(d) Improvement of farming practices	Applicable	Applicable	Applicable	Not Applicable

1) Improvement of Profitability of Horticultural Crops (quantity and quality)

The main direction to increase horticultural crop production is not expansion of the cropped area but improvement of yields of vegetables and fruit crops. The higher yields of the crops may directly contribute to farm income generation, as long as market prices of the produce do not significantly fall. Improvement of quality of vegetables, fruit and nuts is expected to bring about higher prices in trading. Especially in the high-input vegetable zone, therefore, the farmers should adopt more advanced and intensive farming practices in the vegetable production, such as use of certified seeds, proper spacing, fertiliser and chemicals, crop management, watering and post-harvest. The recommended farming practices and labour

requirement for main vegetables are shown in Table 5.1.1.

Some information on yields of horticultural crops is indicated in the following table.

Yield of Horticultural Crops

Crop	Present Yield*1 (ton/ha)	Maximum Yield*2 (ton/ha)	Target Yield*3 (ton/ha)
Cashew	0.1	0.8-0.9	
Coconut	3.6	40-60nut/tree	
Orange	15.9	90-130kg/tree	
Mango	11.5	200-500fruit/tree	
Pineapple	15.8	100	
Tomato	19.4*4	20-100	17.5
Cucumber	-	30-50	21.0
Eggplant	-	-	14.0
Okra	-	20-25	13.0
Pumpkin	-	20-30	

Notes: *3 Tentative target yield for high-input vegetable cultivation.
*4 It seems to be over estimate, based on the field reconnaissance survey.
Source: *1 Coast Region Socio-economic Profile 1997
*2 Fruit and Vegetable Technical Handbook, Agricultural Information Centre (Kenya)
*3 JICA Study Team

2) Expansion of Off-season Vegetable Production

The dominant cropping calendar of vegetables, in which common vegetables are sowed in June and then harvested in September, is very economical especially in watering, but the produce is to be sold at the very low prices due to oversupply. Shifting of harvesting time from July-September to the late dry season or rainy season brings about much higher market prices during the off-season. Therefore, the off-season vegetable cultivation should be encouraged in the suitable areas with some reliable water sources. The farmland where water source is not sufficient or not economical cultivation of off-season crops is not recommended because of much risk of losing high investment.

3) Diversification of Crops and Varieties

Introduction of new kinds of vegetables should be considered to substitute the inter-regional import of the crops, such as onion, carrot and cabbage, and to export to Dar es Salaam of high value crops such as sweet melon. In addition, some vegetable and fruit varieties suitable for variable local conditions should be selected based on such characteristics as drought tolerance, pest and disease resistance, high yielding and high quality, and then be planted in the smallholder farmers' fields.

4) Improvement of Farming Practices

The present local farming practices from land preparation to marketing have lots of room to

be improved towards lifting up farm profitability. For example, certified seeds or seedlings should be used more frequently in all horticultural farmland in place of self-production seeds/seedlings. The old trees in orchards should be replanted due to low productivity and poor quality. More manufactured fertiliser and chemicals should be applied to high-value vegetable production by the commercial horticulturists. In most farmland, the use of organic manure, especially animal drops should be increased, although that requires the promotion of the mixed agricultural system with crop and animal husbandry in the Region. The improvement of watering methods should be reconsidered from technical and financial aspects because it can significantly reduce labour input in vegetable production. The harvesting, processing and transport of the horticultural crops should be improved for the purpose of better trading conditions.

(2) Development Strategy by Farming System

The high input vegetable zone, which has better access to the markets, needs financial and technical support by the government in order to promote the further development in commercial vegetable production. The input credit is an effective measure to achieve this goal. The farmers in this zone are enforced to practise high input production of vegetables, because of low soil fertility and inappropriate land applicability. To minimise the risks on the market price, crop diversification is also recommended. The district extension services should be strengthened through capacity building. The model case of such kind of development can be found in Mwendapole Village in Kibaha District.

The low input vegetable zone, which lies on the river plains, is blessed with higher soil fertility and land availability. The farmers in this zone can enjoy favourable natural conditions for vegetable production so far. To sustain such productivity, the farmers should apply organic manure and appropriate crop rotation. The crop diversification is recommended to minimise the risks of low production and low market prices. The modern farming methods should be introduced here gradually through district extension services.

The fruit crop zone, which spreads over the Region, needs technical improvement in fruit production. The fruit trees with low productivity or low quality should be replaced with certified seedlings introduced through district seedling farms. The proper orchard management including pruning and weed control is strongly recommended to be practised to improve productivity and quality of marketable produce.

5.1.6 Improvement Measures for Marketing of Horticultural Crops

In order to promote the horticultural production for mitigating the poverty of farmers in the

Region, a market development plan shall be established taking the aforementioned marketing situations into account.
The development plan is divided into both of short-term and long-term ones.

(1) Short-term Development Plan

The short-term development plan consists of the following two categories:

1) The first category is of a plan associated with horticultural productions. Crops to be promoted in the Region shall be selected among the best crops with less marketing and pricing problems. At present, the following two crops are considered to have good potential in the Region:

   - Cashew nuts: The cashew nut is a traditional cash crop in Tanzania. Production volume, however, has been decreased from the highest of 143,000 ton in 1973/74 to 93,000 ton in 1997/98 due mainly to extensive farm management problems. Mtuwara region is the major cashew producing region followed by Coast and Lindi regions and has a good potential to increase its production. Furthermore, even if the production of cashew nuts increases drastically, there is nothing serious because cashew nuts have a good opportunity for increasing the amount of export. In recent years, the international price of cashew nuts has showed an upward tendency with some fluctuations.

   - Indispensable vegetables for Tanzania's cuisine are potatoes, onions and tomatoes. Of these, potatoes and onions have not yet been produced in the Region. Therefore, almost every market located in the Region imports these vegetables from Kariakoo market, and every inhabitant including farmers purchases these vegetables. If these vegetables are grown in the Region, production of these will help farmers' household economy and will be a useful measure to mitigate the poverty of farmers. In order to encourage these vegetables, however, verification study is thought indispensable.

2) The second category is a plan consisting of the following measures on the side of farmers and middlemen as well as of the agencies concerned. Although each measure has some weakness for implementation, these measures shall be introduced as early as possible.

   (Farmers and middlemen)

   - As a fundamental problem, the low price of horticultural produce during the

period of over supply shall be understood as a given condition. Therefore, except for farmers whose cultivation are mainly of commercial purpose with a high-risk and high-return basis, subsistence farmers should produce them within their bearable risk taking into account quantities for private use as well as for safer commercial sale. At the same time, those farmers shall make effort to minimise their production cost as low as possible.

- When any middlemen don't want to buy produce or their price offers are extremely low, farmers have to sell their produce by themselves at some places such as nearby public markets, open markets, road side and so forth.

- Farmers and/or middlemen, individually or in groups, shall be encouraged to sell their produce directly to 64 public markets in Dar es Salaam. (In this case, some transport facilities owned by farmers and/or middlemen are absolutely indispensable.)

- Examine the possibility of improving the selling prices by standardising horticultural produce. (In this case, it will be necessary to verify two items; a) the extent of traders in Kariakoo market who appreciate the sorting of horticultural produce in size and colour, and b) the extent of farmers/middlemen who expect increase of their revenue through the sorting.)

- Middlemen/farmers shall be encouraged to promote jointly use of transport facilities such as truck, pick-up, etc.

- Existing poor collection points including those along the national roadside shall be improved, particularly with roofing.

- Direct sell depots of horticultural produce, irrespective of facilities belonging to districts or farmers' groups, shall be established as many as required.

(Agencies concerned)

- The Ministry of Agriculture and Co-operative shall improve the agricultural marketing information system. The information including the basic marketing information (receipt quantity, wholesale prices, retail prices and so forth) in Kariakoo market, major public markets in Dar es Salaam and public markets in major towns in Tanzania shall be broadcasted weekly.

- Each district should make effort to improve the existing public markets as much

as possible. The improvement shall include the expansion of farmers' direct selling space.

(2) Long-term Development Plan

The long-term development plan is formulated based on the hypothesis that the horticultural production will be considerably increased through the implementation of the above short-term plan.

- With the increment of cashew nut production, the existing cashew nut factory located at Kibaha district shall be rehabilitated with private sector participation.

- As for vegetables, when the vegetable production in villages reaches at the full development stage, the farmers engaging in vegetable production for sale shall examine the possibility of mass shipping by bringing production crops together through a farmers' organisation as well as utilising the official agent in Kariakoo market.

- As for fruit, the Region is one of the major fruit producing area and has a good potential for expanding fruit production. In order to compete successfully with other producing areas, the Region shall develop local specialities through stringent specifications, which include variety and other characteristics constituting the desired quality demanded by extremely discriminating consumers, strengthening of storage and packing facilities as well as standardisation. Furthermore, Tanzania shall encourage exporting fruit to the neighbouring countries, Middle East and Europe in order to overcome the constraint of the narrow domestic horticultural market. In this context, the Government shall continue to carry out market surveys to identify exportable produce.

The present conditions of Kariakoo market and its surroundings are extremely bad due mainly to its narrowness and congestion. The Government should examine possibility of new agricultural wholesale market equipped with more modern facilities as well as marketing systems.

5.1.7 Development Strategy of Related Infrastructure

(1) Irrigation and Drainage Development

1) Irrigation Development

Taking into consideration the findings of the field surveys and the physical and socio-economical development constraints of the Study area, basic directions of irrigation promotion of the Project have been established as follows:

- The irrigation method of "Watering", which is a practice applied in the whole Study area, is recommended to be improved in line with the small horticultural unit, covering from 0.08 to 0.2 ha (0.2 - 0.5 acres), and its suitability of scattered watering. Surface irrigation methods for food crops such as border, furrow and basin irrigation are not recommended in the Master Programme in principle from the viewpoint of water saving.

- Much modernised irrigation facilities and equipment, which involve high investment and special care for operation and maintenance, are not proposed in the Master Programme. Provided that the present level of labour force is maintained, methods for improving the present practices to increase yields within the limit of such labour force level are searched.

- Water impounding and shallow wells are the most probable types of water sources to be developed. However, careful consideration shall be taken with regard to the availability of finance and the possibility of good maintenance when new construction of water sources is intended (if there is any doubt, an agricultural development plan to meet the capability of present water use shall be established). The strategy for irrigation water source development is to utilise water sources within their possible limits. These limits will be improved as long as an expansion of the availability of water is possible without involving an excessive improvement cost.

- In the area that holds less possibility and poor feasibility to develop more irrigation water source rather than presently used, it is recommended to search the agricultural development direction with limited supplementary irrigation.

In line with the irrigation development directions mentioned above, improvement measures by horticultural zones mentioned in Section 4.2 are proposed as follows:

Basic Measures in Irrigation Development

Zone	Present Condition			Plan		
	Water Source	Irrigation Method	Irrigation Facilities	Water Source	Irrigation Method	Irrigation Facilities
High-input vegetable zone *	Ponds, Wells, Stream flow	Watering by hand	Partly installed hose	Improved ponds, improved wells *	Watering by hand	Removable pumps, installed hose
Low-input vegetable zone **	Ponds, Shallow wells (seasonally limited use)	Watering by hand	No facilities	Improved ponds, shallow wells **	Watering by hand	No facilities
Fruit crop zone ***	Rain water	Not applicable	No facilities	Water harvesting tank, Shallow pits ***	Watering by hand if necessary	No facilities

*: Farmland categorised into High-input vegetable zone holds water sources with sufficient quantity of water. The present water sources of ponds and/or wells will be improved so as to make water fetching easier, and to secure irrigation for vegetables over the full cultivating period.

**: Farmland categorised into Low-input vegetable zone holds water sources at best enough to cultivate vegetables by September. The present water sources of ponds and/or wells will be improved so as to make water fetching easier, and to slightly enlarge cultivating period of vegetables.

***: Farmland categorised into Fruit crop zone holds no water sources available for irrigation. While vertical development of Fruit crop zone will aim to develop tree crops cultivation without irrigation, spare water sources could be installed for providing multipurpose water where water exploitation is possible.

2) Drainage Plan

In upland fields, no serious drainage problems were observed during the field surveys. Therefore, the drainage plan in the Master Programme proposes minor improvement only such as adjusting the direction of the field ridges so as to line them up along contour lines.

However, there are some drainage hazard areas in the flood plains of big rivers, which require substantial river training works for improving the drainage conditions there. As intensive horticultural activities have not been seen in the lowland areas of the flood plains, any sizable drainage improvement plan is not considered in the Master Programme.

(2) Roads

Major roads classified into trunk roads and regional roads are not considered in the development plan of the Master Programme, because those are to be dealt with by the Tanzania Government. Minor improvement of district roads and feeder roads is included in the Master Programme as far as the present conditions of these roads obviously limit horticultural development. Development and Financial Plan for Rural Road Improvement in 1999/2000 of the concerned Districts are described as follows:

Financial Plan for Rural Road Improvement of Concerned Districts in 1999/2000

District	Rehabilitation		Routine Maintenance		Others		Remarks
	(km)	(TSh. 000)	(km)	(TSh. 000)	(km)	(TSh. 000)	
Kibaha	74.0	119,868	40.0	9,200	-	-	The actual requirement of maintenance is more than TSh. 60 million. About 91% of rehabilitation works were financed in last year.
Kisarawe	69.5	47,542	66.0	10,603	-	-	The actual requirement of maintenance is more than TSh. 70 million. The actual requirement of rehabilitation is about TSh. 228.4 million.
Mkuranga	193.6	2,592,475	-	514,640	212.0	1,666,280	The action plan in 1999/2000 has not been specified. The required amount is whole requirements for future. Available budget in the physical year is at T Sh. 236 million.

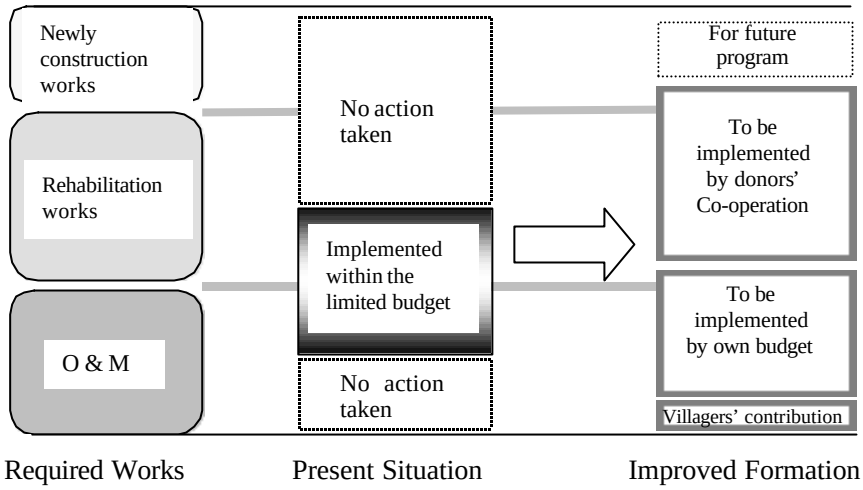
The proposed works in the annual improvement plan above do not cover all actual required tasks but ones decreased so as to be within the allowable budget as mentioned in the remarks. None of donors' co-operation for fulfilling the rural road improvement plan has been emerged so far. Therefore, the only financial sources available are the Road Tool Fund and their own budget. Under such financial circumstances, allowable budget for routine maintenance of rural roads appears to be less than 20 per cent of the total amount required for all tasks.

The Ministry of Works that is fully responsible for national transport has directed their policy to road improvement rather than other duties, giving the highest priority to carry out road maintenance. At the same time, the Ministry has set the strategies below, in order to push forward their policy:

- Road Surface Material Control
- Prioritising Roads for Routine Maintenance
- Improvement of Road Camps
- Improvement of Maintenance Unit
- Villagers' Participation in Road Maintenance

However, their policy is not achieved even for the national roads that consist of trunk roads and regional roads, let alone for rural roads. Horticultural development is highly related with the good function of rural road, as mentioned in Chapter 6. Therefore, in order to keep the rural roads suitable conditions, beneficiaries' participation in road maintenance is indispensable. Additionally, major rehabilitation works and new construction of rural roads shall be assisted by very positive involvement of NGOs and external donors under an agricultural/rural development sector programme, thus saving the limited district budget for the routine road maintenance works. Moreover, remaining maintenance works put off for future years shall be supported by beneficiaries' participation. Capacity building of district

officers concerned is required for the success of such practice.



Schematic Diagram of Improved Formation for Rural Road Development

(3) Domestic Water Supply

Any new schemes focussing on only domestic water supply improvement, either covering some individual farmers or certain farmers groups, are not proposed in the Master Programme, as its main objective is to promote horticultural development. In the case that new water sources have to be developed to accommodate for irrigation, it may be appropriate to consider domestic water supply. Some instances of water supply improvement within the community-based horticulture development are examined for the priority sites. Farmers' involvement could be expected at the beginning stage of water supply development.

It is considered that the essential problem related to water supply in the Study area is a lack of reliable water sources. Thus, enlightening easy methods of water harvesting that can be practised by each farmer without big investment is focused. The water harvesting is a method to collect rainwater directly from the roof and to store the water in the water tank, which can be often seen in the northeastern Thailand. Exhibiting such typical models of water harvesting is planned as an important trial in the Verification Study that will hopefully follow.

5.2 Development Approaches and Programme Selection

5.2.1 Development Approaches

Attempts have been made for identifying the best-suited development approaches on the objective tree (Fig. 5.2.1) that was developed from the problem tree mentioned in Chapter 4 Development Constraints and Potentials. The development approaches, which are shown below, not only describe needs for the horticultural development but also guide courses to be

taken to solve the problems, and the programmes are then made through sorting out and combining the courses suggested.
Social infrastructure such as hospitals and schools is also included in the villagers' needs, but they are not included in the Master Programme as they are beyond the frame of this Project.
The programmes are described as aggregate of sub-programmes and tools that are defined as the concrete development means to achieve certain goals and are included in the programmes.

(1) Agricultural Extension Service Reinforcement Approach
(2) Watering Method Improvement Approach
(3) Horticulture Farming Technique Improvement Approach
(4) Community Development and Leaders Training Approach
(5) Farm Inputs Procurement Approach
(6) Crop Diversification Approach
(7) Rural Roads Improvement Approach
(8) Capacity Building of District Offices and Officers Approach
(9) Farmers Training and Education Approach

5.2.2 Programme Selection

Four programmes are formulated; each of which consists of either one or several development approaches mentioned above.

Development of site-specific farm management is focused on under the Master Programme, whereas strengthening farmers' capacity and improving relationship between farmers and local government are also targeted in order for horticultural development to be implemented effectively.

I. Community Based Horticultural Development Programme

This programme is to support targeted farmers both financially and technically. A development tool used on financial aspect is input credit under which farmers can borrow agricultural input such as seeds, fertiliser, pesticide, sprayer and so forth, on the other hand, watering, crop protection, quality control, crop diversification and soil management are tools on technical aspect.

II. Participatory Development Capacity Building Programme

For horticultural development, improvement of agriculture itself alone is not enough. Farmers should be adequately trained and institutions concerned are to be strengthened. This is the purpose of this programme, which consists of three parts as follows:

Part 1 Training for District & Extension Officers
Part 2 Training for Group Leaders
Part 3 Community Awareness Creation

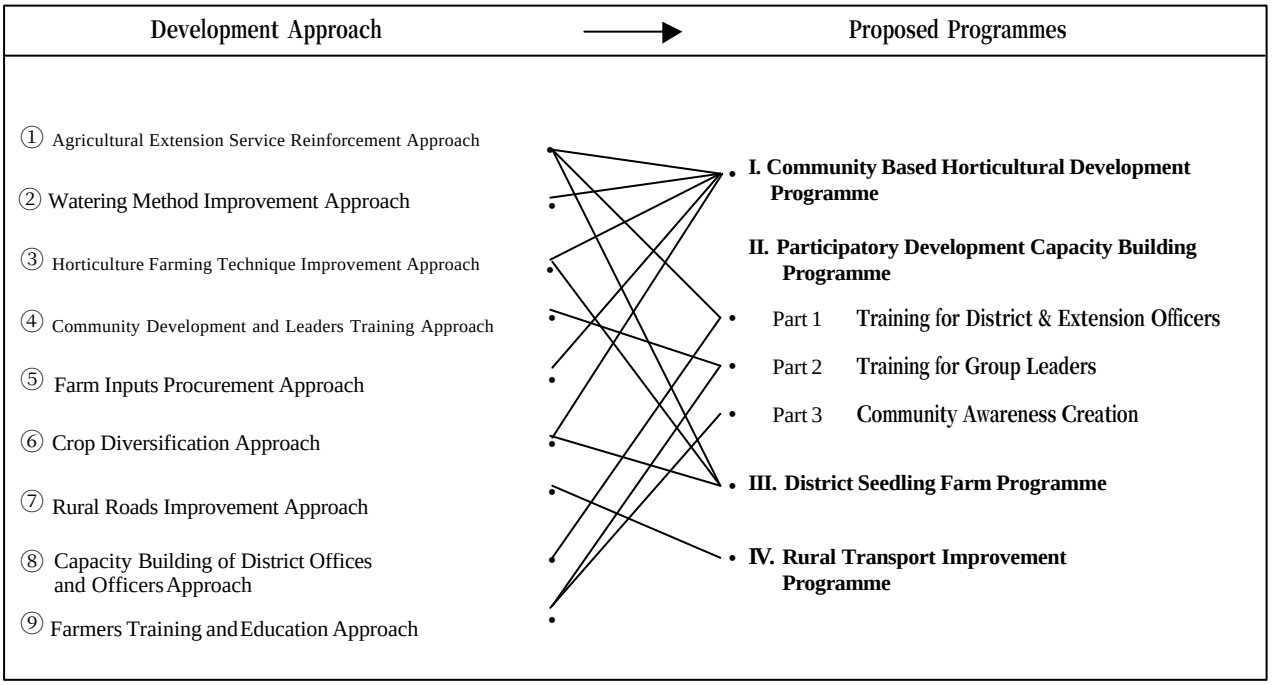
III. District Seedling Farm Programme

Certified seedling is produced and distributed under this programme. Introduction of new varieties of vegetable is examined as well. This programme supports Programme I in regard to farming technology.

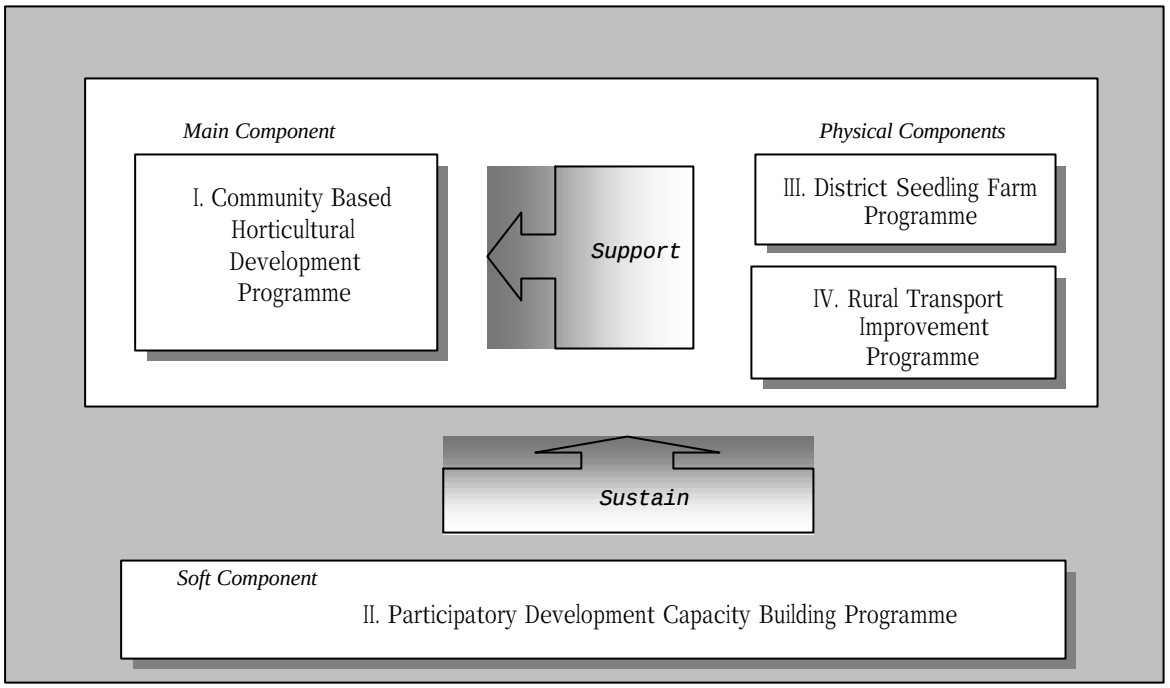
IV. Rural Transport Improvement Programme

Transport means is included and improved. This programme is inevitable for proceeding efficient implementation of Programme I, II and III.

The relationship between each development approach and each programme is shown in the diagram below:



The relationship among the proposed programmes is illustrated below:



Relationship among Projects under the Master Programme

The basic features and details of the Master Programme are spelled out in detail in the following sections.

5.3. Community Based Horticultural Development Programme

5.3.1 Objectives

There are three horticultural zones in the Region such as High-input Vegetable Zone, Low-input Vegetable Zone and Fruit Crops Zone. Vegetables are mainly cultivated in the first two zones while fruit is mainly cultivated in the third zone. However, it is difficult to draw a clear boundary between these three zones as few farmers cultivate simply vegetables or fruit. As the farmers are able to select the development tools complying with their own needs for vegetable farming or fruit farming, it is meaningless to divide the programmes into vegetables and fruit. Therefore, this programme is made in such a way applicable to both farming types.
This programme would produce good results when it is integrated with other programmes. District Seedling Farm Programme is needed to support distribution of superior seedlings to fruit farming farmers and introduction of new kinds of vegetables for vegetable farming farmers. Since supports by agricultural extension services are inevitable in most cases of implementation of this programme, Participatory Development Capacity Building Programme, especially Training for District & Extension Officers, deeply contributes to this programme.

5.3.2 Input Credit

(1) Principles

The proposed input credit aims at supporting the small horticultural farmers as a whole by supplying farm input with the following specific features.

1) The credit is made available not for individuals but for groups. The repayment is under the collective (joint) responsibility of the group.
2) The credit is supplied only in kind, i.e. seeds, fertiliser, chemicals, sprayers and the essential implements.
3) Items and quantities of farm input are selected by farmers according to their needs. Suitable input and standard application rates are set up and informed by District Offices in advance.
4) Extension services are provided to credit borrowers not only for improvement of crop productivity and quality but also mitigation of negative impact to the environment.

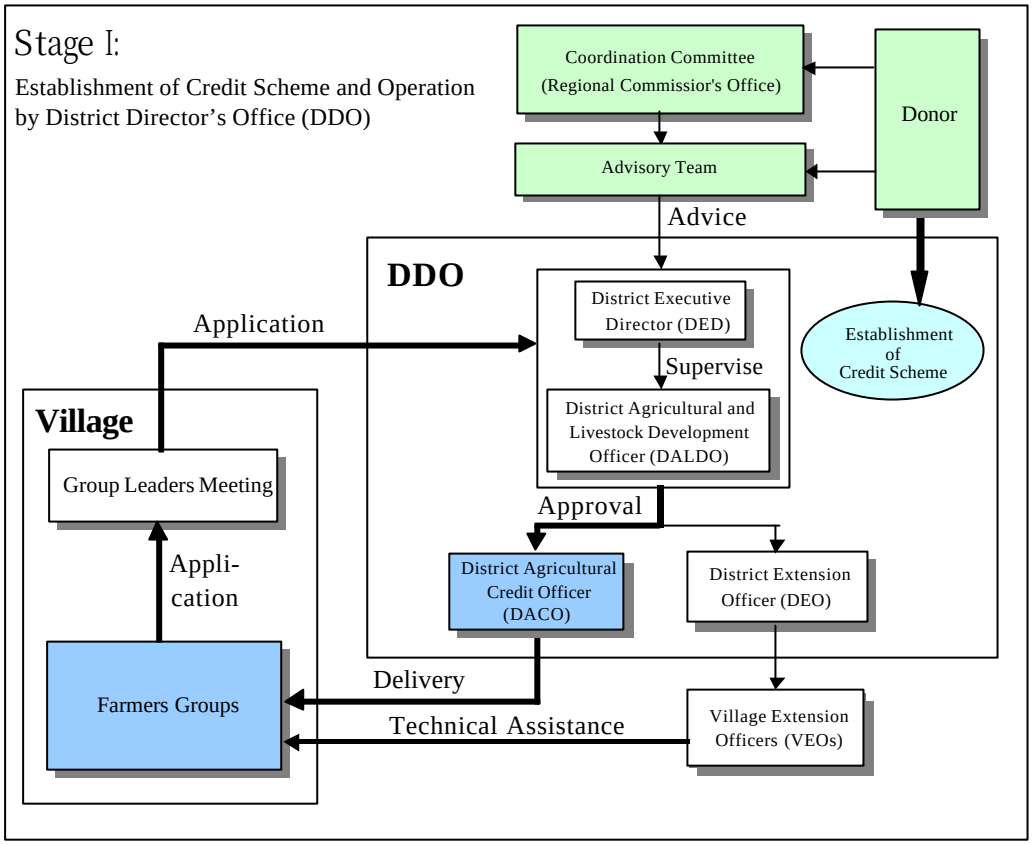
(2) Phased Development Plan

The District Director's Office (DDO) shall be the executing body of the proposed credit operation at initial stages. The District Agricultural Credit Office (DACO) is established in DDO to receive farm input from a donor and deliver them to farmers groups. Repayment by farmers groups forms a revolving fund. The following credit operation is continued with this revolving fund. Financial support by the government subsidy should be minimised. DACO is finally restructured to District Cooperative.

The proposed input credit is introduced and established through the following three (3) stages.

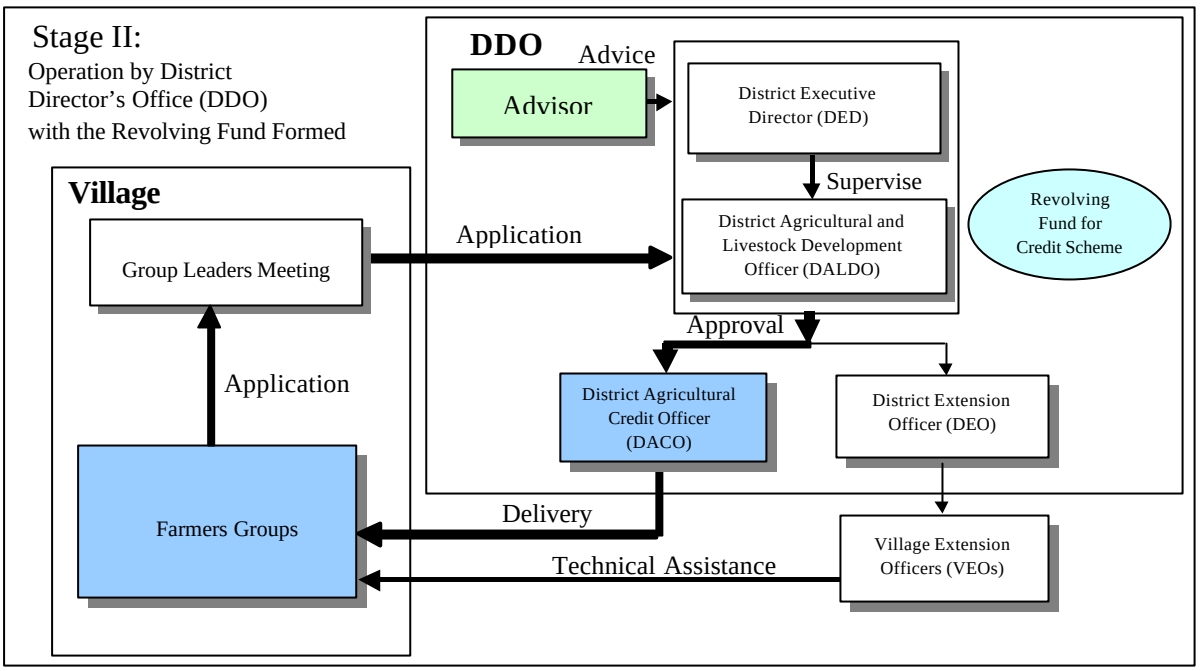
Stage I : Establishment of Credit Scheme and Operation by DDO
Stage II : Operation by DDO with the Revolving Fund Formed
Stage III : Operation by Cooperative

To ensure the national and regional logistic support, the Coordination Committee is set up in the Regional Commissioner's Office at Stage I as illustrated below.

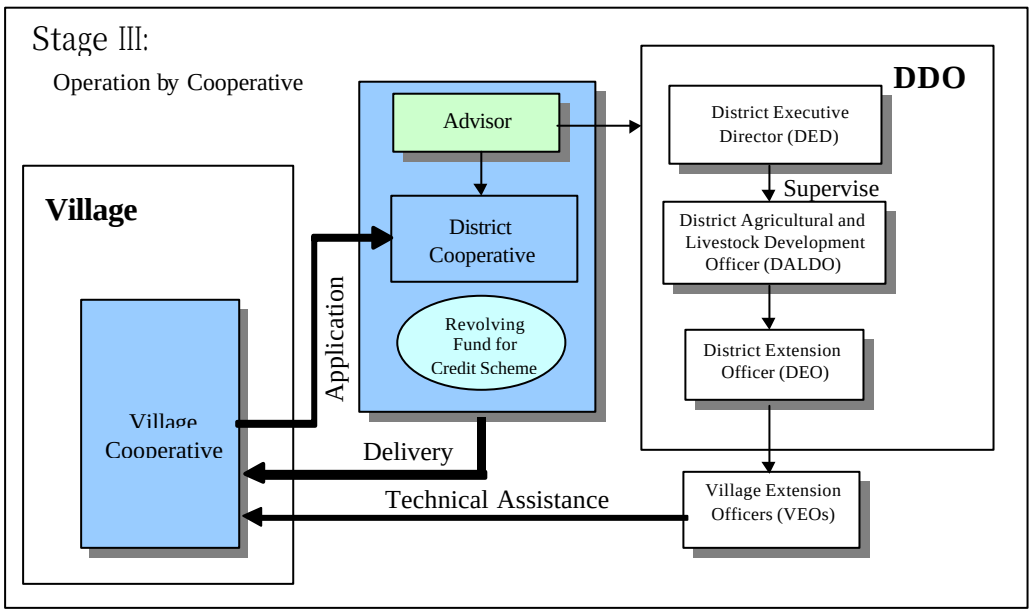


The funds for the proposed credit are to be sought from donors as either seed money or in kind. Under the Committee and an advisory team, day to day credit operations is undertaken by DACO under the control of DALDO in Stage I. On the other hand, farmers' groups are organised and all the group leaders join a group leaders meeting as a representative body of groups at village level. The group leaders meeting is responsible for coordination of all the groups within a village.

At Stage II, the credit scheme is operated with a revolving fund to be generated by farmers' repayment for input credit. The operation procedure is to be simplified. Under the control of DALDO, DACO continues the credit operation. An advisor stays in DDO to keep a close communication with DALDO. The Coordination Committees at national and regional level entrust the responsibility of the credit scheme to the Regional Consultative Committee (RCC). Instead of the Committee, RALDO monitors the credit scheme and advise DALDO more frequently.



At Stage III, DACO is dissolved and an independent body is established outside DDO as District Cooperative for credit operation. The revolving fund is transferred to it on this occasion. The organisation is registered trustees under the Trustees Incorporation Ordinance (Cap.375). The District Cooperative operates the credit scheme with Village Cooperatives (branches of the District Cooperative).



DDO does not take responsibility of the credit scheme, but continues monitoring and assisting the cooperative business in association with the district internal auditor, who directly reports to DED. RALDO and Regional Co-operative Officer (RCO) are appointed as technical and management advisors for the programme monitoring. The performance is reported to RCC.

During the course of the credit operation, some modification or improvement is required to adjust its effectiveness and efficiency, meeting changes in circumstances surrounding cooperatives and farmers. Decisions made by cooperative members should be given a high priority to sustain flexible cooperative operation. It is also important for a donor agency to be periodically reported by RCC for further necessary assistance with sufficient data and information about the situation of the credit operation.

(3) Operation Cycle

Since farmers themselves select carefully harvesting period of vegetables taking into account marketability and price fluctuation, the credit should be made available anytime throughout year. However, the credit operation is seasonal at Stage I in order to simplify the operation at the initial stage of the programme, therefore the operation cycles are made twice a year for the crop seasons starting in June and October. With the progress of capacity building of project staff and farmers, the operation system is made more flexible to meet actual requirement, and the farmers are able to procure farm input depending upon their farming schedules at and after Stage II.

(4) Standard Application Rates and Credit Amounts

The preliminary crop expenses for the representative four (4) vegetables are presented in Table 5.3.2. The standard application rates of seeds, fertiliser, fungicide and insecticide are summarised below.

Standard Application Rates of Agricultural Input

Unit : per 0.4 ha (1 acre)

Input	Unit	Tomato	Cucumber	Eggplant	Okra
Seeds	gram	100	200	100	500
Fertiliser					
Urea	kg	50	50	50	50
CAN	kg	100	100	100	100
Fungicide					
Mancozeb	kg	2	0	0	0
Copper compound	kg	0	3	3	1
Insecticide					
Cyhalothrin	kg	1	1	1	1
Total Cost	TShs.	101,000	93,500	88,500	96,500

The credit amount ranges from TSh. 88,500 for eggplants to TSh. 101,000 for tomatoes at full use of each input. According to the choice by farmers, the credit amount further ranges widely.

(5) Deposit, Interest and Repayment

All the farm input under the credit scheme are supplied to group farmers on credit basis. The prevailing micro-credits put conditions loan borrowers to start repayment in 6th month after onset of loan disbursement and complete within six months. The loan interests range between 12.5 per cent and 15 per cent per annum after onset of the credit disbursement. The conditions of the proposed input credit are made softer than ones of these prevailing micro-credits. However, group members are requested to share an advanced deposit in a bank account in the name of a group leaders meeting in order to secure the fund and remind their individual responsibility for the programme. The representative of the group leaders meeting is officially registered as trustee and open a bank account for loan repayment purposes.

(6) Operational Flow under Action Plan

Under the Action Plan for four (4) priority sites, the proposed input credit is introduced. The operational flow at the initial stage (the Action Plan stage) is set up as illustrated in Fig. 5.3.1.

In line with the flow of official procedures, necessary transaction at each step was studied. Necessary forms for each transaction shall be prepared preliminary at the onset of the programme.

The overall operational procedure is listed below.

1) The credit conditions are announced on the village notice board. The information to be provided includes the followings.
   i. Standard application rates of farm input
   ii. Price list of farm input and implements
   iii. Delivery date and repayment period (within 24 weeks after delivery date)
   iv. Advance deposits required
   v. Interest rates
   vi. Other information concerned

2) A group is formed to participate in the Input Credit Programme. Group members fill up Application for Group Registration and submit it to a village leaders meeting, and it is further forwarded to the District Agricultural Credit Office (DACO) for its registration.

3) Individual group members prepare input credit applications by filling Application for Input Credit in which the farming plan and farm input requirement are stipulated. The applications for input credit are summarised into Summary for Input Credit Application

by a group leader and submitted together with Application for Input Credit of each group member to DACO through the village leaders meeting.

4) DACO receives Application for Input Credit and the Summary for Input Credit Application, and examines the repayment schedule.

5) DACO and a group leader sign Input Credit Agreement.

6) DACO sums up the farm input requirement by village. DACO places an order to farm input suppliers, who are selected according to the official procedure of contractor selection.

7) The supplier delivers farm input to the group leaders meeting, which inspects the input and transfer it to each group. All the record is kept on Good Received Note.

8) Each of group leaders collects repayment from group members and deposits them in the bank account of the representative of the group leaders meeting. The representative fills Credit Monthly Monitoring Form and submits to the district office. Bank statement and pay-in-slips are attached to the form.

9) The repayment is transferred to the bank account for the Credit Fund under the district office.

(7) Organisation of District Agricultural Credit Office

The District Director's Office (DDO) establishes the District Agricultural Credit Office (DACO). At the initial stage, the DACO is organised by District Agricultural Credit Officer, Assistant Agricultural Credit Officer and Creditors Ledger Clerk, who are supported by other junior and subordinate staff.

5.3.3 Watering

In some villages, especially categorised into High-input vegetable zone and Low-input vegetable zone in the Study Area, improvement on crop watering, which is one of physical upgrading in horticulture practice, seems to be essential for fulfilling a development target. For these areas, improvement and advancement of crop watering must be a key tool for success of Community Based Horticultural Development Programme.

As described in the development concept of the Master Programme, Community Based

Horticulture Development Programme heavily relies upon a spontaneous development through self-reliance of farmers. Accordingly, the improvement of crop watering should be projected and accomplished not with extensive hardware installation, but with simple facilities harmonised with local conditions and should be based upon farmers' initiative through establishing an Action Plan by themselves.

The Master Programme for improvement of crop watering does not intend to cover the whole Study Area. However, each village where it is required is proposed to make its own improvement plan following the basic policy described in "5.1.7 Development Strategy of Related Infrastructure".

5.3.4 Crop Protection

The horticultural crop production in the Region is likely to have pest and disease damages on plants due to its humid tropical climate. There are two ways of measures for pest and disease control with and without agro-chemicals. The proper use of agro-chemicals is a future target for the high-input vegetable growers. The agricultural extension system should be strengthened to achieve this target. For the fruit crops except cashew, the limited farmers use agro-chemicals only for young trees.

Most of the farmers are recommended to adopt cultural methods of the crop protection, judging from their technical level and market conditions. The main cultural control of pests and diseases are listed below. Some methods are more effective when the farmers' group takes the same action at a certain extent of farmland. This crop protection should be carried out through the strengthened agricultural extension services.

- Planting crops at the optimum time: It is recommendable to plant each crop at the right time in order to get good growth and good yields. Early-planted crops usually grow more vigorously than late-planted ones because of lower population of disease and other pests.
- Field hygiene: All plant residues and seed lying about from an infected crop should be destructed and burnt soon after the completion of harvesting. For trees, cutting off and burning of damaged or diseased branches is essential.
- Close season and crop rotation: The close season, which is a particular season when nobody is allowed to grow given crops, aims at breaking the life cycle of the pests. Crop rotation also controls these pests by breaking their life cycle and also by resting land under completely different crops.
- Weed control: Weeds, which may harbour pests and diseases, should be removed from farmland including orchard.
- Use of 'clean' planting materials: All planting materials, including seeds, cuttings,

rootstocks, scions and even buds, must be free from all possible disease and pests to ensure a healthy start for the plants. The resistant varieties should be introduced, if possible.

5.3.5 Quality Control of Produce

Individual farmers manage quality control of the horticultural produce by their own judgement at present, as producers or traders have not set any standards of vegetables and fruit. The proper quality control of the produce is recommended to trade their produce in favourable conditions when the production amount of the certain crop from the area becomes large enough. Standardisation of variety and quality is effective only when the marketing system is improved to accept such qualified produce. For the standardisation, the farmers should prepare grading places, storage facilities and proper containers.

5.3.6 Crop Diversification

Diversification of horticultural crops is very important to reduce the risks caused by those unreliable marketing prices and unstable yield. The smallholder farmers in the high-input vegetable zone usually cultivate several kinds of vegetables in their farm plots, reducing such risks. On the other hand, the farmers in the low-input vegetable zone plant only a few kinds of vegetables for the commercial purpose with some risks. This is the reason why they do use little farm input. However, the crop diversification should be introduced to such farmers to minimise the risks in future. Only the private small traders in the Region supply the limited kinds of vegetable seeds at present. The supply system of the seeds should be improved to expand the farmers' selection.

The vegetables to be introduced should be investigated concerning their adaptability to the local conditions, and then distributed to the farmers with the necessary knowledge, technique and materials through agricultural extension system. The possible kinds of vegetables are those imported from other regions to the villages, such as onion, carrot and potato, and also those to be marketed at high prices in urban areas, such as melon and garlic. Considering farmers' intention and market needs, the crop adaptability tests should be carried out by the district agricultural officers and extension officers at the District Seedling Farms as mentioned in section 5.5. It is believed effective for the villagers to provide the extension officers with their farm plots for experiments of some promising vegetables.

As for fruit, some improved varieties are to be introduced to the smallholder farmers. Since most of farmers pay money only to seedlings throughout the production process of fruit, it is a possible way toward fruit development to replace local seedlings with improved seedlings.

The distribution system of the seedlings is to be undertaken by district governments under District Seedling Farm Programme. The farmers group is required to propagate such seedlings by themselves in future.

5.3.7 Soil Management

Increased use of organic fertiliser is generally recommended for vegetable cultivation. The application rate of 20 ton/ha is the standard rate of farmyard manure in the tropical conditions. The farmers in the Region often use crop residue as a green manure, but seldom use farmyard manure so far. The production and distribution of farmyard manure need to be developed in future, together with livestock development.

The following table shows standard application rates of fertiliser, although they may vary with crop requirement and soil fertility. The farmers in the Region apply fertiliser on this rate as basal dressing, and put additional fertiliser when necessary.

Standard Application Rates of Fertiliser by Vegetable Group

Vegetable Group	Application(kg/ha)			Main Vegetables
	N	P	K	
Leaf Vegetables	168	112	168	Lettuce, Cabbage, Spinach
Fruit Vegetables	112	112	168	Tomato, Melon, Chilli
Root Vegetables	168	112	280	Sweet Potato, Carrot, Table Beet
Leguminous Vegetables	56	84	56	Bean, Pea

Source: Tropical Vegetable Production Handbook (in Japanese), AICAF, 1993

For fruit production, almost all farmers except plantation-style large farmers do not use any fertiliser. The limited farmers put chemical fertiliser three times a year, i.e., half amount at the dry season, small amount at early fruiting stage and the rest after harvesting. Common farmers may use only farmyard manure once at a planting of seedlings.

The standard application rates of chemical fertiliser and effects of continuous organic manure application should be examined at the experimental farms under District Seedling Farm Programme, as mentioned in section 5.5. The extension officers disseminate such experimental results to their servicing farmers.

In addition, some sloping farmland requires soil conservation measures to reduce topsoil erosion. The measures, such as contour cultivation, contour ditch and mulching, are to be investigated and introduced by the extension service system.

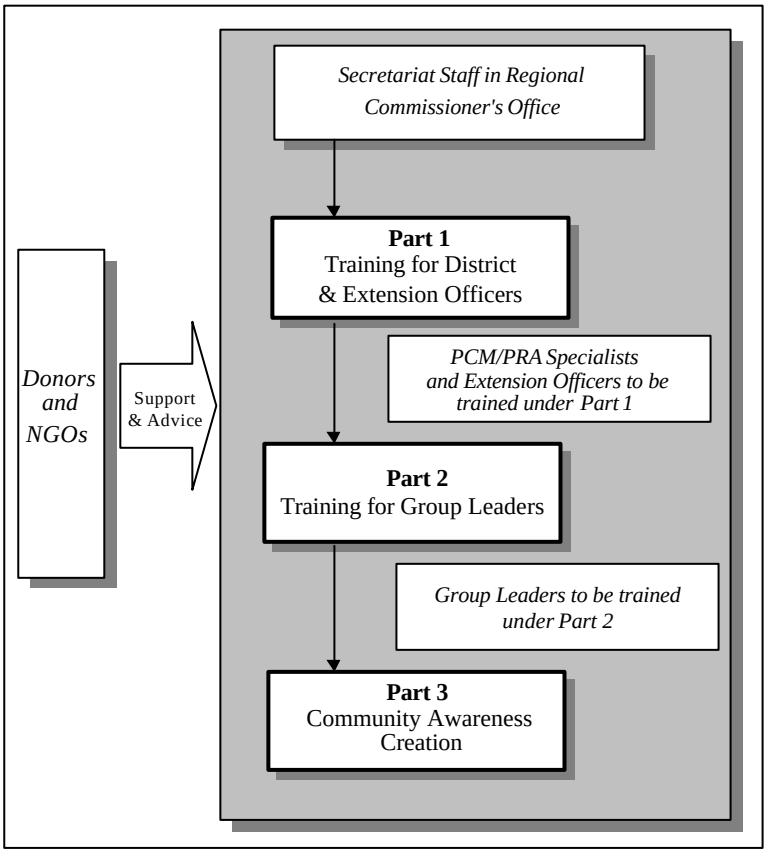
5. 4 Participatory Development Capacity Building Programme

5.4.1 General

The great emphasis is placed on the capacity building of the government staff as well as the communities to ensure effective and efficient project implementation and further development activities. This is because adequate follow up is of the utmost importance even after completion of the Project. Therefore, the programme is formulated to encourage Training of Trainers (TOT) by a full use of internal skills available in the Region rather than provision of passive training courses only by expatriates. Their basic concepts of the programme are On-the-Job Training (OJT) and Learn-by-Doing. Participatory Development Capacity Building Programme consists of the following three (3) parts with a close linkage each other.

Part 1 : Training for District & Extension Officers
Part 2 : Training for Group Leaders
Part 3 : Community Awareness Creation

The Regional Commissioner's Office takes full responsibilities in Part 1 for training both district and extension officers. Part 2 is promoted under the initiatives of the District Offices. For this purpose, PCM and PRA specialists are trained up from the district officers under Part 1. Part 2 is envisaged to promote the leadership training. The group leaders trained under Part 2 play important roles in Part 3 being supported by extension officers at village level.



Concept of Capacity Building

Donors and NGOs are expected to assist the entire course of the programme by dispatching an advisory team, which ensures professional guidance and supports. An advisory team is proposed to consist of (i) Institutional Expert (Leader), (ii) Participatory Development

Specialist and (iii) Horticultural Expert.

Under three (3) Parts mentioned above, the following 16 sub-programmes are formulated taking into account the training aspects essential not only for the project implementation but also for promotion of any of rural development activities for poverty alleviation.

Part 1 : Training for District & Extension Officers

1-1 Preparation of Training Materials

1-2 Seminars and Workshops

1-3 Training Courses for PCM Moderators and PRA Facilitators

1-4 Skill Training of Horticultural Farming Techniques

1-5 Training for Management Techniques of Community-Based Horticultural Development Programme

1-6 Training for Management of Participatory Rural Development Projects for Poverty Alleviation

1-7 Training for Project Benefit Monitoring and Evaluation (PBME) Techniques

Part 2 : Training for Group Leaders

2-1 Preparation of Training Materials

2-2 Seminars and Workshops

2-3 Skill Training of Horticultural Farming Techniques

2-4 Leadership Training in Group Leaders' Committee

2-5 Training for Group Operation through Actual Activities with Members

Part 3 : Community Awareness Creation

3-1 Empowerment of Poverty Group including Women and Youth

3-2 Group Formation and Establishment of Group Operation Rules

3-3 Participation in Small Scale Horticultural Development Project

3-4 Promotion of Group Activities by means of Community Facilities

The details of each sub-programme are presented in Table 5.4.1. The entire programme is completed in two (2) years as illustrated in Fig. 5.4.1. The main features of three (3) parts are summarised below.

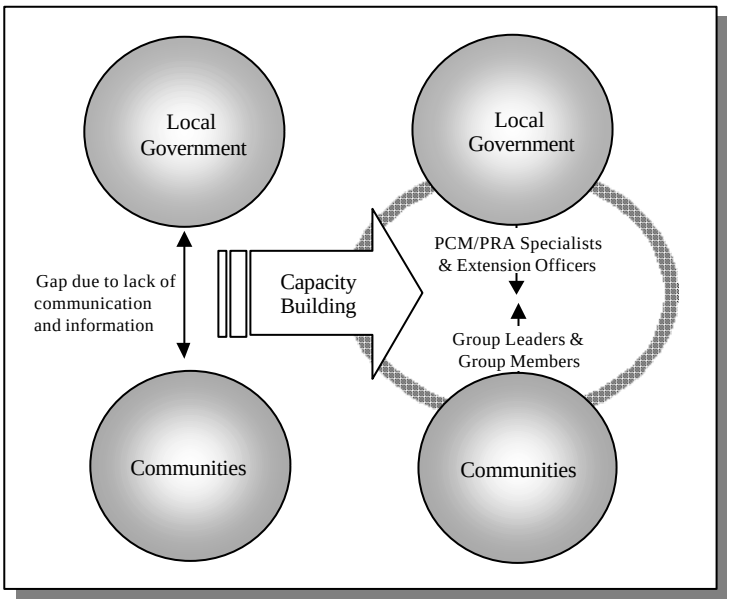
5.4.2 Part 1 : Training for District & Extension Officers

Training for District & Extension Officers in Part 1 aims at capacity building of DOs, WEOs and VEOs. Under the on-going local government reform, the roles and responsibilities of the district offices are rapidly expanding. The roles of DALDO and his/her agricultural staff members play extremely important roles in agricultural and rural development in the Region where agriculture is a mainstay of the regional economy by absorbing over 80 per cent of the regional population.

District Offices (DOs) are required to control effective administrative and logistic supports for the communities. DOs have to be able to plan, design, budget, implement, operate, maintain and monitor development projects, although some process yet needs some arrangement with the central and regional governments to fit DOs' activities to the conditions set under the current local government reform.

The capacity building for the local government is broadly categorised into two (2) sections, namely (i) technical skilfulness and (ii) administrative and logistic supports. As for agricultural skill training, the substantial parts are covered by National Agricultural Extension Programme II (NAEP II, 1996-2001). Since the NAEP II attaches more priority to staple crops rather than horticultural crops, however, few extension officers are specialised with horticultural farming in the Region. Therefore, the Part 1 focuses on the skill training for horticultural farming among the extension officers. District Seedling Farm Programme functions not only as fruit seedling sources but also simple demonstration farms for establishment of standard farming practices and crop (variety) selection, which are to be transferred to local farmers though the extension channel.

The administrative and logistic supports to local farmers are under full responsibilities of DOs. The channel of communication between the government and the communities needs to be strengthened. Part 2 proposes to introduce more positive participatory development activities at the village level in association with the government staff. In this regard, the PCM and



PRA techniques are believed to be the most suitable tools. Local government staff and villagers discuss, learn from previous lessons and try to find out approaches to solutions through PCM and PRA. For this particularly important objective, PCM and PRA training is promoted under Part 1.

5.4.3 Part 2 : Training for Group Leaders

Training for Group Leaders is conducted under the control of DOs. PRA is employed at village level as a tool to motivate group leaders including candidates. They are expected to learn the following aspects through actual community planning by PCM and PRA.

1) Concept of community based development
2) How to identify problems facing farmers in a community
3) How to motivate farmers to join a group formation
4) How to lead farmers to community based development
5) How to reach disadvantaged people and creates awareness

In Part 2, attempts are made to involve target groups in decision-making and ownership of project. In most of the development projects, they tend to end the programme and services when a project phases out. Capacity building is the utmost importance to enhance sustainability of participatory development project, in this context.

Part 2 is conducted in parallel to Community Based Horticultural Development Programme, in which the proposed input credit and group activities are promoted. This combination facilitates accumulation of more pragmatic experiences among community and group leaders simultaneously. In particular, the following leadership spirit and skills are cultivated under both programmes.

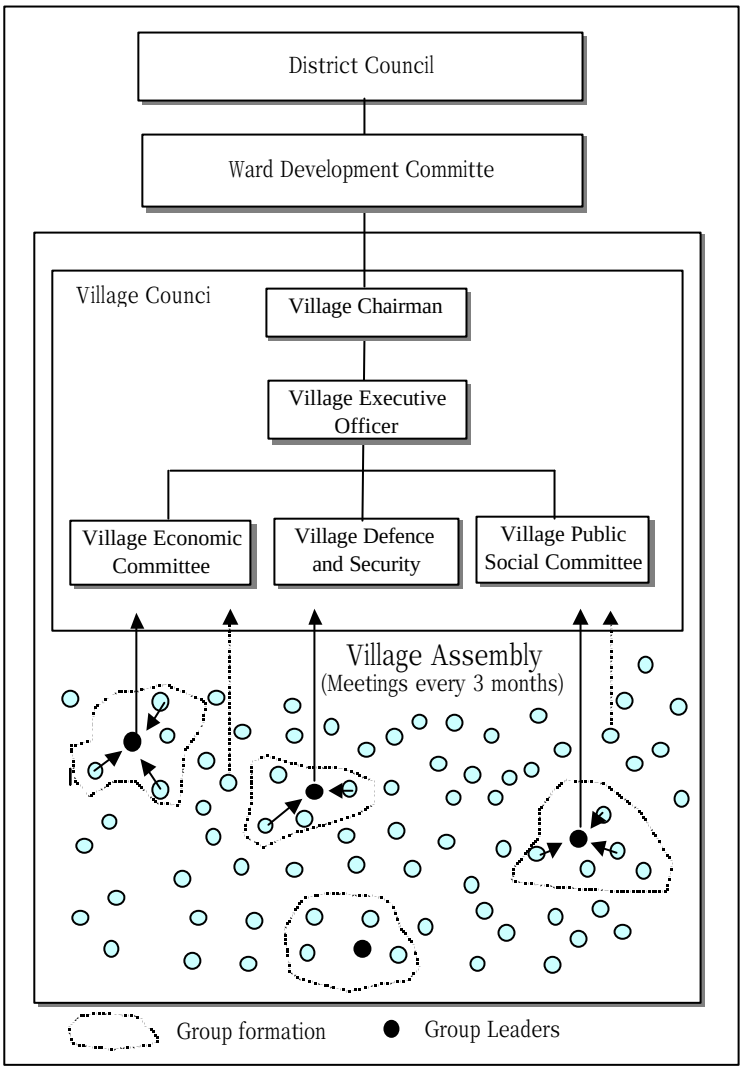
1) Self discipline and cost effective group operation
2) Cultivating sense of ownership and building responsibility to stakeholders
3) Standardisation and uniformity of operations
4) Strengthening solidarity bonding
5) Getting more power in negotiation for various services
6) Sharing of experience and knowledge
7) Identifying gender gaps in access to labour and technology
8) Timely loan repayment
9) Transparent accounting and record keeping

Part 2 focuses on improvement of channels of communication between District Offices and

rural societies. In this regard, frontline extension workers and group leaders are expected to play roles as interface for both sides. Part 2 proposes that the skill training is carried out at District Seedling Farms together with the training programme for extension officers to create close relationship between both groups.

5.4.4 Part 3 : Community Awareness Creation

Community Awareness Creation aims at reviewing quality of life among villagers. The programme for villagers is formulated to tackle poverty alleviation by uniting their efforts in evaluating their past efforts and in planning new initiatives to solve common social problems. Solidarity of group members is believed to strengthen power of individuals in fighting poverty. In order to promote solidarity, villagers make an attempt to identify their rules and traditional customs to accommodate each other. In the process, they are to be made aware of democracy in both form and content. The programme finally envisages strengthening solidarity and equity in their community.



The system of decision-making at village level is democratic. It is fully based on village assembly held every three months. Villagers are in a position to discuss all the social and physical problems in and around their village. If village chairman recognises the needs of further information, he/she instructs executive officer and village development committees to undertake necessary investigation and survey. The survey results are reported and confirmed in the next assembly meetings and finally used to develop the village's decisions. Village chairman submits official request upward. Through the farm interview survey and PRA, it was clarified that the assembly was not regularly held and attendants are limited. This implies that opinions of poverty groups including women and youth are hardly reflected to the assembly resulting in lower accessibility to public services for them.

Part 3 promotes participatory community planning by the PRA specialists from District Offices with WEOs and VEOs. PRA is carried out according to the following procedures.

1) Review of past meeting records of Village Assembly
2) Transect walks
3) Participatory village resource mapping
4) Focus group discussion
5) Preliminary participatory planning

Prior to PRA, the past meeting records are reviewed by DOs and an advisory team in order to clarify development constraints and needs among the villagers. The advisory team includes experts from a donor side, if funds are raised from the donor. It is recommended to avoid focussing only on the issues arising from the assembly. Anticipated goals of Part 3 are (i) empowerment of farmers and (ii) formation of close relationship between community and the government staff.

The performance of NGOs' assistance is essential in terms of awareness raising. Swissaid supports grassroots group formation and activities in awareness raising, linking with provision of seed money. They have directed special attention to the communities, which are keen to the following aspects.

1) Improving crop productivity and reducing crop losses in post-harvest processing
2) Ensuring availability of water for domestic use and facilitating watering (micro-irrigation)
3) Constructing own better houses
4) Increasing cash income particularly for school fees for their children
5) Obtaining medical treatment when needed
6) Supporting women and children fighting for their rights and for participation in economic activities
7) Improving channel of communication within village

Through Part 3, farmers identify more problems encountered not only in crop production but also in insufficient basic human needs (BHN) such as aspects identified by Swissaid. Experiences of NGOs have been fully reviewed and taken into consideration for formulation of Part 3.

5.5 District Seedling Farm Programme

5.5.1 Objectives

The wide fruit crop field in the Region requires a number of seedlings for re-plantation to keep its productivity and marketability. Furthermore, some fruits such as citrus show a trend toward expansion in its planted area in parallel with increasing demand of urban consumers. The demand of the fruit crop seedlings is provisionally estimated on the assumptions of cropped areas, average spacing, and average economical useful life span. As shown in the following table, the seedling demands of cashews, coconuts, oranges and mangoes are 165,000, 168,000, 14,000 and 1,000 per annum, respectively.

Estimate of Demand of Fruit Crop Seedlings

Crop	Present Cropped Area (ha)	Average Spacing (m)	Average Life Span (year)	Annual Demand (Nos/year)
Cashew	100,000	11x11	50	165,000
Coconut	84,000	10x10	50	168,000
Orange	880	6.5x6.5	30	7,000
Orange (New establishment)	30	6.5x6.5	-	7,000
Mango	435	12x12	30	1,000

Source: JICA Study Team

Most fruit growers prefer improved seedlings such as high-yielding, high-quality, early-mature and virus-free, but it is difficult for common farmers to get such seedlings at present. Most farmers raise seedling by themselves or purchase from their neighbours. The advanced technique of and easy access to improved seedlings are necessary for them.

To meet the demand, the Ministry of Agriculture and Cooperatives (MAC) operated seedling production at its own farms, and distribution of seedling to farmers at the subsidised rate. Each district had several seedling farms under MAC operation, for example Zegereni farm in Kibaha, Mkualia Kitumbo farm in Mkuranga and Mengwa farm in Kisarawe. All of them were transferred from MAC to District Executive Directors (DEDs) in the middle of 1990's, and then the operation was abandoned in almost all seedling farms because of their insufficient resources.

The research on horticultural crops including fruit and vegetables is necessary to extend new variety and new crops as well as advanced farming practices. The crop adaptability tests are to be carried out in the similar conditions to target areas.

The objectives of District Seedling Farm Programme are to establish or rehabilitate the seedling farms for the purposes of improved seedling production and distribution,

demonstration of advanced techniques and research on fruit and vegetables. In addition, the farms offer the suitable place for the training to extension officers and leading farmers (refer to Participatory Development Capacity Building Programme).

5.5.2 Programme Components

Total five district seedling farms (one for each district) are established or rehabilitated in the Region under assistance to initial investment and technical support by some supporting organisations. The district offices operate the seedling farms by their own fund. The nominated farms are listed up in the following table.

Name and Location of District Seedling Farms Nominated

Name	District	Village	Remarks
Zegereni	Kibaha	Zogowale	Former MAC farm. 30 km west from capital.
Mengwa	Kisarawe	Mengwa	Former MAC farm. 60 km southwest from capital.
Mkualia Kitumbo	Mkuranga	Kitumbo	Former MAC farm. 4 km south from capital.
Chambezi R.S.S	Bagamoyo	Kiromo	Research sub-station of Mikocheni Research Institute under MAC. 10 km south from capital.
Kibiti	Rufiji	Kibiti	Under MAC operation. 35 km northeast from capital.

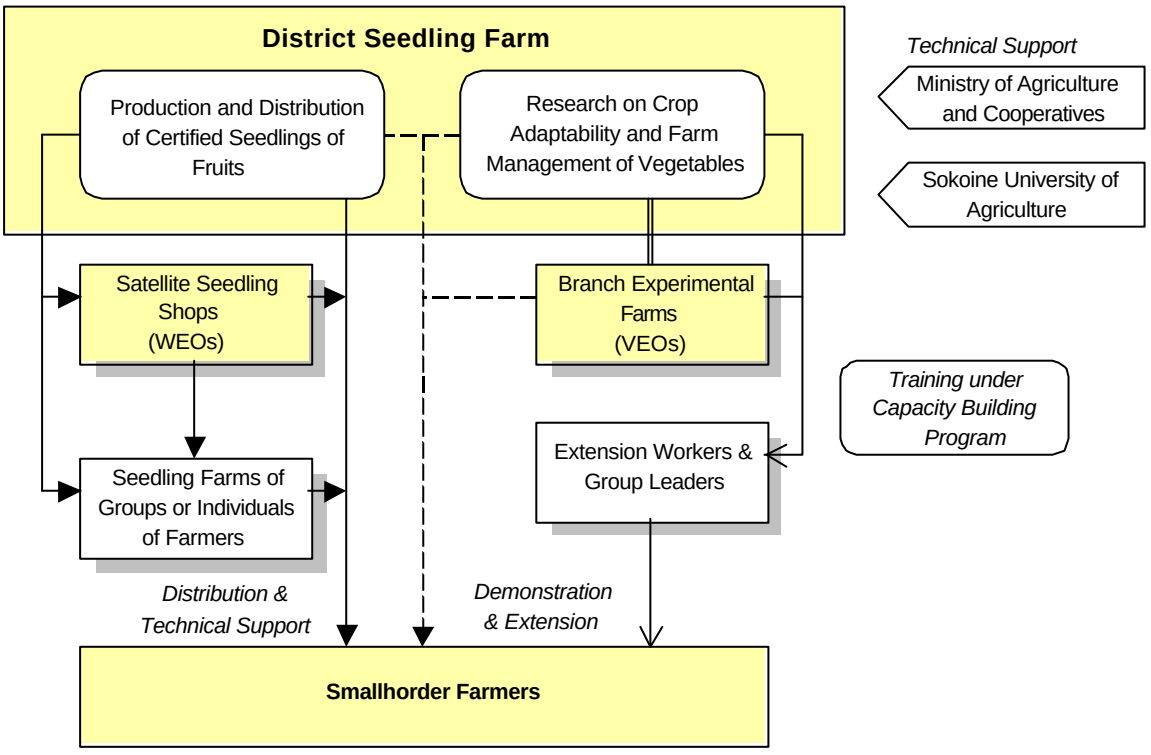
Source: JICA Study Team

The main function of the district seedling farms is production and distribution of high-quality seedlings. The target fruits are coconut, citrus, mango, passion fruit, and cashew. Although the production and supply plan of the seedlings has to be formulated taking the local demand into account, the target number of the total seedling supply is tentatively set at 20,000 a year. The several varieties of fruit trees are planted as mother trees to provide scion and rootstock on grafting. The certified seedlings are purchased at the Sokoine University of Agriculture, Mikocheni Research Institute of MAC and so forth, then planted and multiplied in the orchard. The University as well as the Ministry of Agriculture and Cooperatives provide the technical support to the district specialists.

For the distribution of seedlings to the remote areas, the WEOs and VEOs play the key roles. The extension officers, at first, inform their farmers of the advantages to plant such improved seedlings. The produced seedlings are sold to the smallholder farmers at the district seedling farms themselves and satellite shops managed by the WEOs. The seedlings are distributed to the satellite shops and the WEOs multiply them near the shops as their requirement. The multiplication by farmers' groups is also recommendable under technical support by the extension officers.

The farmers purchase the certified seedlings at the reasonable prices that are set at the same rate as the local seedlings, taking the farmers' purchasing power into account. Together with the seedlings, the extension officers provide some plain technical guidance. The beneficial farmers plant the seedlings between old trees in order to keep their production until fruiting of new trees. Then, the old trees are cut down for replacing with the new trees.

Apart from fruit crops, the vegetables are planted on the experimental plots attached to the seedling farms for the crop adaptability test and the demonstration. The district specialists investigate the adaptability of the new kinds or varieties of vegetables, and examine the appropriate farming methods in the course of the experiments as well. The experimental farms demonstrate advanced technique such as appropriate spacing, organic or chemical fertiliser use, disease control, integrated pest management, watering, and soil conservation. For this purpose, it is highly preferable to set up several branch experimental farms in the various agro-ecological zones.



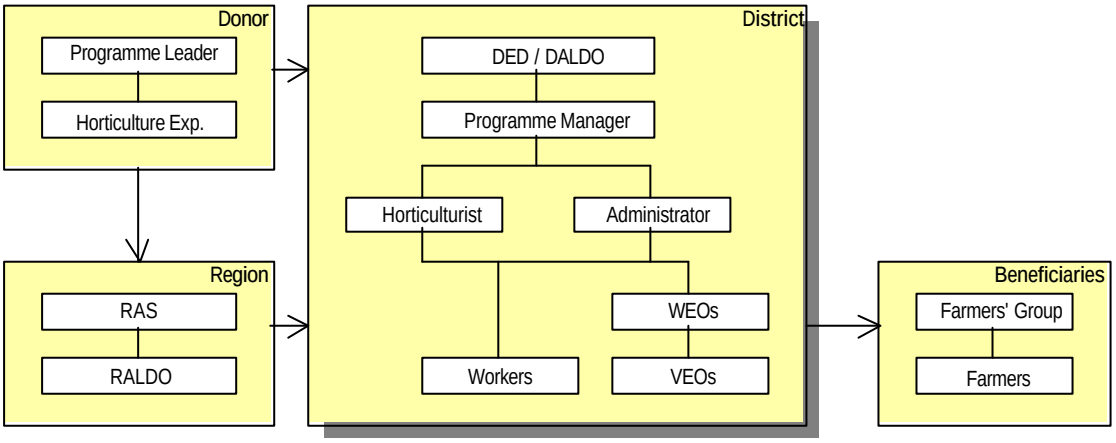
Proposed Functional Structure of District Seedling Farms

At the establishment of the seedling farms, the farmland and working space are to be prepared tidily. The district seedling farm requires an office lot, nursery garden with shade/net house, orchard for mother trees and experimental plots for vegetables. The farms are to provide with necessary equipment and materials, such as farming tools and materials, experimental equipment, transport facilities and so forth.

5.5.3 Operation and Management of the Project

The district governments are the implementing agencies of District Seedling Farm Programme. Donors or district offices arrange the necessary funds for facilities and equipment at the initial stage.

The core personnel required for the farm are a programme manager, a horticulturist, an administrator and five permanent workers assigned by each district. District Executive Director (DED) or District Agriculture and Livestock Development Officer (DALDO) plays a roll of supervisor of the farm, and Ward and Village Extension Officers (WEOs and VEOs) are supporting staff in the operation of the farm. Under a circumstance that a donor could support this programme, the donor dispatches a programme leader and horticulture expert at the initial stage. In this case, the regional government functions as a coordinating agency between the donor and the district government. Regional Office coordinates the donor with the district. The organisation structure District Seedling Farm Programme is proposed as shown below.



Proposed Organisational Structure of District Seedling Farms

The earnings from the sales of seedlings are to be properly used for an operation and loan repayment on the farm. To keep this cycle of funds is a crucial condition for sustainable operation of the programme.

The preliminary financial analysis was made in order to evaluate sustainability of District Seedling Farm Programme (refer to Annex A. Agriculture). Zegereni farm in Kibaha District was taken for this analysis as a model case. As a result shown below, the district governments is expected to operate their seedling farms by their sales income, as far as they do not have to repay for the initial investment and donor's technical cooperation.

The sales of the coconut, mango and citrus seedlings, a main income source, are expected to amount for TSh. 6.25 million a year, assuming unit rate of TSh. 300 to 350 each and total handling number of 20,000 seedlings. The additional income may amount TSh. 2.54 million from vegetable (tomatoes, onions, carrots, garlic and melons) sales from the experimental farms (1 ha). Total annual income is estimated at TSh. 8.79 million, although further income can be expected from fruit production from the orchard. The necessary annual expenditure is estimated at TSh. 7.30 million, consisting of TSh. 5.10 million for basic salary, TSh. 1.00 million for material costs and TSh. 1.20 million for other costs (transport cost, communication cost, etc.). The net revenue of the Zegereni farm is finally estimated at TSh. 1.50 million per annum, which can be used for the operation, maintenance and replacement for the programme components.

Preliminary Financial Balance of District Seedling Farm Programme

(Unit: TSh./year)

Item	Unit	Volume	Unit Rate	Amount
Income				8,790,000
Sales of Seedlings				6,250,000
Coconut	nos	10,000	300	3,000,000
Mango	nos	5,000	350	1,750,000
Citrus	nos	5,000	300	1,500,000
Sales of Vegetables				2,540,000
Tomato	kg	3,000	100	300,000
Onion	kg	2,000	200	400,000
Carrot	kg	2,000	200	400,000
Garlic	kg	800	800	640,000
Melon	kg	1,600	500	800,000
Expenditure				7,295,000
Basic Salary				5,100,000
Programme Manager	man-month	6	120,000	720,000
Horticulturalist	man-month	12	100,000	1,200,000
Administrator	man-month	6	80,000	480,000
Worker	man-month	60	30,000	1,800,000
Temp. Worker (Veg.)	man-month	30	30,000	900,000
Material Costs				995,000
Fertilizer(mango, citrus)		10,000	2.5	25,000
Rootstock & scion (do)		10,000	40	400,000
Pot (do)		10,000	10	100,000
Seed (5 vegetables)				242,000
Fertilizer (do)				114,000
Agro-chemical (do)				74,000
Pole and rope (tomato)				40,000
Other Costs				1,200,000
Revenure				1,495,000

Source: JICA Study Team

5.6 Rural Transport Improvement Programme

5.6.1 Objectives

For the development of horticulture, the improvement of roads, especially district roads and feeder roads, is a prerequisite. It is shown in the study result in Chapter 6 that the success of horticultural development is closely related to the conditions of road network. The present road conditions in the Study area have been critically affected by lack of adequate maintenance and a notably deficient progress in new road construction. In the light of this critical situation, this programme puts emphasis on the improvement of the operation and maintenance of the existing roads. Moreover, the programme deals with district and feeder roads that directly affect horticulture development, leaving trunk and regional roads improvement to their own sector programme because such major road improvement is out of the scope of this programme. Rural Transport Improvement Programme is formulated from the viewpoint of horticulture development as shown in the following table. This programme assumes that other necessary improvement, besides components considered within the programme, is implemented on schedule by the Ministry of Works and other related agencies.

Components of Rural Transport Improvement Programme

Programme Component	Dealing Direction
Acceleration of beneficiaries' participation	1. To lighten beneficiaries' sense of road values and its usefulness, and accelerating their participation in maintenance through improving transport means 2. To promote beneficiaries' participation in maintenance by means of strengthening their capacity building
Introduction of NGO and/or Donors' Cooperation on rehabilitation work	To fulfil rehabilitation work on schedule through objectively applying NGO and/or Donors' cooperation
Appropriate operation of district's own budget	To concentrate the limited inside budget into periodic maintenance routine work

5.6.2 Promotion of Road Rehabilitation Work through External Supports

Even though the rural road improvement is the highest priority issue for rural development in the Region, the rural road improvement works are not sufficiently executed, as the works require a huge amount of budget. Local governments, who always confront shortage of budget, maintain the rural roads in collaboration with farmers, participating in the maintenance and offering their labour. However, farmers' participation is only a means to supplement the budget, and is not a fundamental solution. The rural road improvement in the Region should be promoted urgently, and the Regional Office should draw up concrete improvement plans involving external supporting organisations and donors.

The overall rural road improvement plans are too big in scale for the horticultural development project to include the plans in the project, and it is beyond the limits of the entire project to solve the rural road improvement issue. Therefore, even though the rural road improvement is recognised as one of the most important issues for the horticultural development, this programme only recommends the local governments to promote the rural road improvement with assistance of the external supporting organisations and donors.

5.6.3 Promotion of Participation in Maintenance Work

The programme deals solely with district and feeder roads, and aims at improving road maintenance routines. Although the Tanzania Government has intended to undertake the road maintenance through beneficiaries' participation, beneficiaries' involvement has been unsuccessful. The reasons for this are explained below:

- lack of awareness of villagers on the importance of road maintenance,
- lack of awareness of beneficiaries on the usefulness of roads,
- difficulty in identifying beneficiaries of the roads,
- low progress in road maintenance system or beneficiaries organisation, and
- difficulty in procuring necessary equipment for road maintenance.

The Study Team considers that these are not brought about by lack of villagers' public or moral sense of responsibility, but by certain causes related to their rural life. The villagers' participation in the road maintenance is not sustainable unless the beneficiaries are motivated by a solid sense of benefit from the roads, or directly affected or inconvenienced by the ill conditions of the roads. As related to transport in the Study area, most villagers transport their produce on foot or by bicycle at the most, while a few in more urban areas utilises vehicles or motorcycles. That is, they do not regard roads to be useful because they do not benefit from them.

Roads are effectively utilised through not only the improvement of road facilities but also the improvement of transport means. The Study Team considers that the improvement of transport means is an important key factor for the Study area. Through such improvement, it is expected that beneficiaries' participation in road maintenance will be activated since villagers find roads useful. Therefore, it is proposed to introduce new cart/trolley to villages for the transport of horticultural produce and input.

The systematisation of road maintenance by villagers can be achieved by the farmers' organisations formed in the other programmes. The procurement of maintenance equipment is considered in line with the present administrative system for road maintenance, such as the Road Improvement Unit of the Ministry of Public Works.

5.7 Preliminary Environmental Assessment (IEE) and Protective Measures

5.7.1 Objectives

The objective of preliminary assessment is to show whether the development will have significant impact to environment or not. The report must therefore show whether it is necessary to conduct a full impact Assessment or if the identified impacts can be mitigated to the extent that their impacts are reduced to insignificant levels.

EIA is mandatory for a great number of projects that are likely to induce harmful effects on the environment. According to the NEMC's EIA criteria, a small-scale horticulture development project is classified as a project for which EIA is not mandatory, but a preliminary assessment equivalent to IEE is to be carried out to assist in the decision making process either exempting the project from an assessment or determine whether EIA is required.

5.7.2 Preliminary Environmental Impact Assessment (IEE)

In view of the facts related above, a preliminary assessment has been carried out based on the field works and the evaluation of the collected data and information. The assessment has been made following the "Report Requirements for Preliminary Assessment" defined by NEMC and using the JICA screening and scoping procedures and the category of environmental impacts as a reference. The results have to be submitted to the appraisal of the NEMC before project implementation.

The improvements foreseen in this project are not expected to induce major harmful impacts on the environment as the implementation sites are already under farming and the expected scale of development is very small. Consequently, EIA would not be required; instead some protective measures regarding these impacts are proposed. The main issues of interest regarding these impacts have been summarised in Tables 5.7.1. The Table of the Matrix of Impact on Environment below re-evaluates some issues that are of importance for this project and summarises the corrective measures, which are discussed in detail in Chapter 5.7.3.

Matrix of Impact on Environment

Period and Impacts	Meaning of Impacts		Corrective Measures	Importance of Impacts				JICA Category of Envir. Impacts Ref.#
	Posit.	Neg.		Non signif.	Significant			
					Less	Moder	High	
A. Construction Period								
Changes in Vegetation		○	Afforestation		○			22
Erosion due to clearing		○	Flat areas and wind break	○				30
B. Operational Period								
HUMAN ASPECTS								3, 12
Integration in credit system	○	○	Judicious choice of credit system			○		
Development of farmers sense of solidarity	○		Reinforcement of farmers groups					3
Improvement of food self-sufficiency and income	○						○	3
Risk of debts contracting by farmers		○	Crop intensification and promotion of groups in dynamic economic role				○	3, 12
Relationship of dependence of farmers		○	Promotion of group in dynamic economic role			○		3, 12
Health problems related to pesticides and fungicides and water		○	Monitored used of recommended products and Improvement of health system		○			14, 16,17
EFFECTS ON WATER								
1/ Pesticides								14, 17, 43
a) Surface water quality, including closed water bodies		○	Monitoring water quality And use of recommended products		○			
b) Groundwater quality		○	Sampling and observation of ground water		○			
2) Fertilisers								14, 17, 43
a) Surface water quality, including closed water bodies		○	Monitoring water quality And extension of application techniques		○			
b) Groundwater quality		○	Monitoring water quality And extension of application techniques		○			
EFFECTS ON SOIL								
1/ Pesticides		○	Use of recommended products	○				14, 17,32, 33
2) Fertilisers	○							14, 17, 32, 33,
3) Salinization and Alcanisation		○	Carry out observations and sampling analysis, flushing		○			31
EFFECTS ON AIR								
1/ Pesticides	○		Monitoring application and use of recommended products		○			47

This project, which is to promote horticulture including some tree crops development on a small-scale in the whole Coast Region, will mainly put emphasis on the strengthening of farmers groups to help alleviate and/or eradicate poverty.

Horticultural lands are located either along rivers where vegetable growing takes place after the harvest of wet season rice, or in depression areas down valleys close to a water source such as a pond or open small surface well, or on highlands where fruit crops are mixed with food crops such as cassava, maize, etc.

5.7.3 Protective Measures for the Conservation of Environment

To establish and offer the integrated conservation measures for the farmers, a pilot farm should be operated in cooperation with other sectors involved at district and regional levels, especially those dealing with natural resources, water quality and health.

The measures of environmental conservation/protection referred to in the above are tentatively summarised in the table depicting the matrix of impacts on environment and relate mainly to both the natural and socio-economic environments, which include potential land degradation through erosion and vegetation loss, impacts related to the increase use of agrochemicals and a series of other issues that will be dealt with through the monitoring and mitigation measures proposed below.

(1) Natural Effects

1) Improvement of Vegetation and Ligneous Cover

   The installation of windbreak should be encouraged especially around vegetable gardens to limit soil erosion.

   This activity can only be carried out through full involvement and participation of the communities on the one hand, and through the production of plants in village nurseries on the other. Consequently, some nursery specialists should be trained.

2) Improvement of Water Quality and Soil

(a) Water quality

   Corrective measures related to the use of agrochemicals are closely dependant on the negative impacts occurring from the projected increased use of these products.

   (i) Pesticides

   Products of higher toxicity such as some organochlorine compounds and those with lesser toxicity as some organophosphorus compounds, which would exceed the norms prescribed by WHO or which are not properly registered under the Tropical Pesticide Research Institute (TPRI), should be traced in collaboration with TPRI and systematically controlled by the organisation managing the project. Farmers should first get an authorisation for the use of this pesticide. They should give the date, name and the dose. The application must be strictly controlled.

Some precautionary measures to be undertaken include:

- use of protective equipment
- minimisation of the losses by applying these chemicals when there is no wind and/or no rain (no risk of runoff and dispersion)
- minimisation of dispersion by washing the body and cleaning the spraying material at the site in an isolated pan.

(ii) Fertiliser

On poor soil, the effects caused by fertiliser would be positive and result in an increase of nutrients content of the soil. However, it is proposed to include in the plan some type of training on fertiliser application methods to avoid over dosage and potential discharge in water through runoff and contamination of groundwater.

(iii) River water

The type and quantity of pesticide used by farmers should be monitored. Pesticide constitutes a health risk for anybody working in the area of application as long as the products can be disseminated by water. The monitoring of pesticide application should be a common interest, and it is proposed that farmers' groups, with the help of the organisation managing the project, create a monitoring unit to which every farmer has to declare the quantities and types of pesticide he/she has utilised and consult with it whenever it is deemed necessary to exceed the dose initially prescribed.

The population living in the area must be informed of the kind of risks incurred by pesticide particularly for the domestic use of water from ponds or rivers in order to mitigate these risks.

Data on concentration observed as a result of analysis carried out in the area must be made available to the farmers' groups and informed to the public.

Fertiliser application should be monitored in the same way as pesticide even though their toxicity is minor. Their negative effects include water eutrophication and proliferation of aquatic plants. Farmers should be trained in the correct use of fertiliser through good land preparation as well. The farmers groups should take charge of this training and sensitise individual members in the correct management of fertiliser use; this would consequently result in a substantial saving of them.

(iv) Underground water

Taking into consideration the small risks to contaminate underground water, the measures proposed above concerning river water would be largely enough to mitigate any risk of contaminating underground water.

(b) Soil

(i) Salinisation/alcalinisation

It is proposed to flush the paddy field plots when vegetables are about to be grown after rice at the end of the dry season to prevent salinisation/alcalinisation. This is of particular importance for Vertisols where the salt concentrations are relatively high. Flushing may be efficient, even though vegetables are presently cultivated without it every year after paddy.

(ii) Loss of soil fertility

The followings should be carried out to minimise loss of soil fertility.

- adequate application of fertiliser and manure
- organisation or improvement of the credit system for the acquisition of fertiliser
- introduction of manure collecting pits for better conservation of nitrogen and organic matter

(2) Socio-economic Effects

The planned horticulture development ultimately aims at improving the communities' living standards. These communities will participate only when they foresee their well-being.
Therefore, the measures to be taken along that line consist of:

① helping them to better manage their production farms through the provision of necessary responsibilities for the purpose.
② making them accessible to the new production techniques and production means.
③ ensuring them the conditions for the diversification of their production in order to reach food as well as income security.

This supposes that farmers have to be well trained and be able to adequately manage the means of production by themselves. On an economic standpoint, options to reduce operation costs or economise the use of given input have to be closely examined. It means reducing the quantity of input to be used without reducing production, which can be done when the calendar and modality of application of these input, is scrupulously followed. This reduction has two advantages:

1. a positive impact on the natural environment;
2. a positive impact on the socio-economic environment.

(3) Measures Related to Health

1) Disease Prevention and Fight against Vectors

   Disease prevention and fight against vectors can be realised through spraying chemicals. The organochlorine compounds that have been the main fighting tools against malaria are cheaper but have relatively high toxicity risk, making their use as domestic insecticide no more applicable. Some organophosphorus compounds such as Fenthion, Fenitrothion can be used as insecticide by pulverisation in anti- malaria campaign. They are less toxic for human beings and fishes. There are several other organophosphorus compounds presenting very low toxicity with a high LD_{50} value (quantity of product necessary to kill 50 per cent of a population under study) that can be used in the fight against malaria. Some other measures include:

   - use of molluscicide plants: numerous plants present some molluscicide characteristics; their use can be considered.
   - use of predators such as larva eating fishes
   - drainage of permanent and semi permanent reservoirs
   - deflection of vectors by setting housings away from shelters for domestic animals; mosquitoes will be taking their daily blood feeding from the animals (animal shelters established between villages and larva sites)

2) Extension and Sensitisation at Village Level

   These are necessary namely concerning the mechanical prophylactic measures to take regarding the fight against vectors, the dangers of bathing in infected water of ponds or the preparation of re-hydration salts in case of diarrhoea.

3) Logistics for Health Centres and Dispensaries

   Logistics need to be reinforced to allow the health institutions to adequately carry out the allocated tasks and prevent the spread of diseases. In addition, an adequate supply for medicine that cannot be easily out of stock should be ensured: anti-malaria tablets, injection materials, serum, anti-parasites, antibiotics, etc.

5.8 Standard Implementation Schedule

Standard Implementation Schedule of the Master Programme is shown below.

Standard Implementation Schedule of the Master Programme

Programme & Sub-Programme \ Year and Month in Order	Year 1												Year 2												Year 3				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	.....
Community Based Horticultural Development Programme																													
(1) Organizational Set-Up and Preparatory Works for Input Credit																													
(2) Group Formation																													onward
(3) Operation of Input Credit Scheme																													onward
(4) Project benefit Monitoring and Evaluation																													onward
Participatory Development Capacity Building Programme																													
Programme 1 : Training for District & Extension Officers																													
1-1 Preparation of Training Materials																													
1-2 Seminars and Workshops																													
1-3 Training Courses for PCM Moderators and PRA Facilitators			(Kibaha)			(Kisarawe, Mkuranga)			(Bagamoyo, Rufiji)																				
1-4 Skill Training of Horticultural Farming Techniques																													
1-5 Training for Management Techniques of Community-Based Horticultural Development Programme																													
1-6 Training for Management of Participatory Rural Development Projects for Poverty Alleviation																													onward
1-7 Training for Project Benefit Monitoring and Evaluation (PBME) Techniques																													onward
Programme 2 : Training for Group Leaders																													
2-1 Preparation of Training Materials																													
2-2 Seminars and Workshops																													
2-3 Skill Training of Horticultural Farming Techniques																													
2-4 Leadership Training in Group Leaders' Committee																													
2-5 Training for Group Operation through Actual Activities with Members																													
Programme 3 : Community Awareness Creation																													
3-1 Empowerment of Poverty Group including Women and Youth																													
3-2 Group Formation and Establishment of Group Operation Rules																													
3-3 Participation in Small Scale Horticultural Development Project																													
3-4 Promotion of Group Activities by means of Community Facilities		(Construction of Facilities)																											
District Seedling Farm Programme																													
Seedling Distribution Programme		(Construction of Facilities)																											
Crop Diversification (Research)																													
Rural Transport Improvement Programme																													

Chapter 6 Selection of Priority Sites

6.1 Significant Factors of Development Potential in Horticulture

In order to enhance horticultural development, some demands have to be met in several relevant aspects, which include adequate road network for transport, available water for irrigation and so forth. With the aim of identifying more significant factors of development potential in horticulture, correlation analysis was conducted between actual horticultural data and different independent variables. The necessary information related to horticultural practice was collected and analysed based on Division data, as these data were the most closely related to horticulture. The said information has to be available and meaningful for the purpose, and is presented as follows:

Factors Closely Related to Development Potential in Horticulture

Promising Factors	Variables	Characteristic of the Information
A	Population Density	It seems to relate to local needs of horticultural crops.
B	School Enrolments	Education may be an important motivation for horticultural practice. It is an indicator of education status.
C	Intensity of Extension Service	It seems to highly relate to activity and production of horticultural crops.
D	Road Density	It seems to relate to production of horticulture crops and transported quantity of the same
E	Surface Water Availability	It seems to relate to horticulture acreage
F	Groundwater Availability	It seems to relate to horticulture acreage
G	Rainfall Availability	It seems to relate to horticulture acreage
H	Soil Classification	It seems to relate to horticulture acreage and quantity of the crops
I	Land undulations	It seems to relate to horticulture acreage
J	Distance from Dar es Salaam	It seems to relate to production of horticulture crops and transported quantity of the same.
K	Distance by Road (1)	It is an actual distance by road between Dar es Salaam and the centre of Division.
L	Distance by Road (2)	It is an actual distance by road weighted by road classification between Dar es Salaam and the centre of Division.
M	Cropped Area in Horticulture	It is actual production of horticulture crops

Information from A to M from the Divisions concerned shown in Table 6.1.1, were utilised for correlation with the data of present horticultural crop area. The factors for which there were no significant correlation with the present cropped area in horticulture, were eliminated from a group of factors related to horticultural development potential. Through the correlation analysis, correlation coefficients relating each variable or factor to the cropped area in horticulture were obtained as shown in the following table.

Correlation Coefficients Matrix of the Promising Factors

	A	B	C	D	E	F	G	H	I	J	K	L	M
A	1.00	-0.33	0.82	0.81	-0.40	0.34	0.56	-0.05	-0.24	-0.57	-0.49	-0.48	0.64
B	-0.33	1.00	0.06	0.06	-0.32	-0.21	-0.33	-0.36	-0.46	-0.26	-0.30	-0.29	-0.31
C	0.82	0.06	1.00	0.78	-0.40	0.11	0.04	0.11	-0.32	-0.67	-0.65	-0.65	0.68
D	0.81	0.06	0.78	1.00	-0.24	0.09	0.16	-0.03	-0.27	-0.62	-0.62	-0.61	0.69
E	-0.40	-0.32	-0.40	-0.24	1.00	0.31	0.21	0.16	0.73	0.56	0.49	0.49	-0.15
F	0.34	-0.21	0.11	0.09	0.31	1.00	0.69	0.39	0.52	0.07	0.06	0.09	0.05
G	0.56	-0.33	0.04	0.16	0.21	0.69	1.00	0.01	0.43	0.05	0.20	0.14	0.10
H	-0.05	-0.36	0.11	-0.03	0.16	0.39	0.01	1.00	0.33	-0.04	-0.10	-0.09	0.10
I	-0.24	-0.46	-0.32	-0.27	0.73	0.52	0.43	0.33	1.00	0.61	0.57	0.57	-0.01
J	-0.57	-0.26	-0.67	-0.62	0.56	0.07	0.05	-0.04	0.61	1.00	0.95	0.94	0.42
K	-0.49	-0.30	-0.65	-0.62	0.49	0.06	0.20	-0.10	0.57	0.95	1.00	0.97	0.44
L	-0.48	-0.29	-0.65	-0.61	0.49	0.09	0.14	-0.09	0.57	0.94	0.97	1.00	0.44
M	0.64	-0.31	0.68	0.69	-0.15	0.05	0.10	0.10	-0.01	0.42	0.44	0.44	1.00

Significant factors of development potential in horticulture could be selected based on the significance of the correlation coefficient computed in the above analysis result. In this manner, significant factors of development potential in horticulture were picked up as follows:

Significant Factors of Development Potential in Horticulture

Significant Factor	Contents of Information	Results	Remarks
A	Population Density	Correlation coefficient with M is calculated at 0.64	
C	Intensity of Extension Service	Correlation coefficient with M is calculated at 0.68	
D	Road Density	Correlation coefficient with M is calculated at 0.69	
L	Distance from Dar es Salaam	Correlation coefficient with M is calculated at 0.44	Though factors J,K show significant coefficient, factor L can represent them.

Through the correlation analysis about the significant factors for horticulture development, following points were clearly unveiled.

- Horticulture is rather applicable in higher population density area than depopulated area.
- School enrolment does not always affect horticultural development. Indicator of school enrolment may not specify farmers' motivation for horticultural cultivation.
- Extension service plays significant role for horticultural development.
- Adequate road network is absolutely necessary for horticultural development.
- Though the availability of water is an important factor for horticultural development,

spotted availability of water at different points of farmland seems to be more significant than a single source of water covering wider areas.

- Soil is not a key factor for horticultural development. Since horticulture is usually practised in small farm plots, artificial treatment such as applying fertiliser or other input can be easily carried out.
- Land slope is not a crucial factor for horticultural development for the same reason described for soil.
- Horticultural development seems to be related to distance from certain market like Dar es Salaam. This relation has been observed in the case of analysis applying even present data. This distance factor will become more conspicuous in the future if some other constraints for horticultural development are improved.

6.2 Area Classification of Development Potential in Horticulture

Furthermore, a multiple regression analysis between the data of present horticultural crop area and the data of the chosen significant factors was carried out. The parameters multiplying regression function can be regarded as weight of significance in the potentiality of horticultural development. One can identify the potentiality of horticultural development for any target area taking the parameters affected by each of the significant factors into consideration and analysing its weight.

Weight Value of Significant Factor for Horticultural Development

Items	Factor A	Factor C	Factor D	Factor L
Subject	Population Density	Intensity of Extension Service	Road Density	Distance from Dar es Salaam
Constants in the multiple-regression function	0.059	0.369	0.404	0.08
Weight Value	6.5 %	40.5 %	44.3 %	8.7 %

Furthermore, farmers' motivation for horticultural development is an essential factor besides the other quantitative significant factors. Though magnitude of the farmers' motivation is not easy to measure directly, the present activity of farmers' group is supposed to indicate such farmers' motivation.

Another factor of significance expressing farmers' motivation and represented by the data of farmers' group activity was added to the selected significant factors for quantifying the potentiality of horticultural development.

Applying the above mentioned study result for significant factors for horticultural

development, the potentiality of horticultural development in the divisions is estimated. Potential Value of Horticultural Development by Division (P) are estimated by the following equation:

(P) = 0.059x(Factor A*)+0.369x(Factor C*)+0.404x(Factor D*)
+0.08x(Factor L*)+(Farmers Motivation**)

*: Standardized values of every factor in Table 6.1.1, as to be valued within from 0.0 to 10.0.

**: Quantified values of Farmers Group Activity in Table 6.1.1 as A=3.0, B=1.5 and C=0.

The Potential Values of Horticultural Development by Division (P) estimated by the above equation were obtained as follows:

Potential Values of Horticultural Development by Division

Bagamoyo		Mkuranga		Kisarawe		Kibaha		Rufiji	
Division	(P) Value	Division	(P) Value	Division	(P) Value	Division	(P) Value	Division	(P) Value
Kwaru-hombo	2.52	Kisiju	4.52	Chole Samvula	1.93	Kibaha	10.00	Ikwiriri	1.64
Miono	1.62	Mkamba	2.80	Sungwi	3.84	Mlandizi	3.91	Kibiti	3.33
Msata	3.48	Mkuranga	5.08	Maneromango	3.30	Ruvu	3.84	Kikale	0.56
Msoga	3.70	Shungubwei	9.35	Mzenga	3.09			Mkongo	0.11
Mwambao	5.47							Mbwera	0.18
Yombo	3.68							Mhoro	0.22

The area classification of development potential in horticulture examined through the above procedure can be classified into four classes as Class I; above 7.5, Class II; from 7.5 to 5.0, Class III from 5.0 to 2.5, and Class IV; below 2.5. The classification by Division is illustrated in Fig. 6.2.1. Comparing the said area classification with present situation in horticulture (refer to Fig. 4.2.1), it is revealed that rooms for horticultural development still exist in several Divisions in the Region.

6.3 Methodology of Selection for the Priority Sites

In this study, priority sites will be selected as pilot-models for small-scale horticultural development in the Region. The pilot–model should be an example for easier success of the development, which has its own characteristics in a given group of horticultural practice, and it should have certain replicability of development for other sites with similar entity.

The priority sites of the Study are to be the pilot-models for the respective horticultural zones. The horticultural zones are High-input vegetable zone, Low-input vegetable zone and Fruit crop zone as mentioned before.

Priority sites are considered at the village level in this early stage. The priority sites might be selected in the village inventory that included all the necessary village information. However, difficulties for the preparation of such inventory were recognised due to the lack of detailed information at village level in the concerned area. The priority sites will be selected from the villages of chosen target divisions depending on the horticultural zone, which shows typical attributes.

According to the potentiality of horticultural development in the Divisions, high potential Divisions (Target Divisions) were picked up as shown in the following table. The priority sites were selected among villages investigated in the farm interview survey carried out during Phase I field survey taking into consideration characteristics found from the Study.

Priority Sites for Horticulture Development

Horticultural Zone	High Potential Divisions (Target Divisions)	Priority Sites
High-input vegetable zone	Kibaha	Viziwaziwa
Low-input vegetable zone	Ruvu, Mzenga	Mwanabwito
Fruits crop zone	Sungubweni, Mkuranga, Sungwi	Vigama, Mwanambaya

Selection of the priority sites among interview-surveyed villages located within the target Divisions was made as explained in Table 6.3.1.

Chapter 7 Action Plans for the Priority Sites

7.1 Character of Action Plan

Priority sites were selected among the villages in the chosen target divisions referring to opinions of counterparts and the results of farm interview survey carried out during the Phase I study. The selected sites are the following four villages: Viziwaziwa and Mwanabwito in Kibaha District, Vigama in Kisarawe District and Mwanambaya in Mkuranga District.

Detailed surveys were performed in these priority sites in the Phase II Study. PRA meetings were also held there. Through these surveys and meetings, a lot of information, data and the villagers' opinions were collected, which were studied and analysed, then a development prospect was formed for each priority site. In order to raise the living standard of each site to the expected level, Action Plans have been formed.

In the Action Plans, the present conditions of the villages especially on horticulture were studied. The result of PRA meeting was also analysed. After that, development prospects were proposed. Finally Action Plans were concluded in the tables, which contain items, methods, procedures and so forth. Implementation schedule of Action Plan was also studied. Period of the plan is set for five years.

7.2 Viziwaziwa

7.2.1 Village Outline

The village is administratively called as Viziwaziwa village, Kibaha ward, Kibaha division, Kibaha district. Viziwaziwa village consists of three sub-villages, namely Viziwaziwa, Sagale and Mikongeni. The village is located at about 6 km south from Kwa Mfipa village along the Morogoro Highway. The distance to Dar es Salaam is about 60 km.

The total population is 1,599 and the total number of households is 403. The population at 1988 population census was only 548. Many families have migrated to the village in this decade. The population growth rate is very high at about 9 per cent per annum due to some social factors, probably such as a release of the abandoned estate lands. The main tribe is Zaramo accounting for more than half of the population and over 80 per cent of the villagers are Moslem.

Demographic Condition in Viziwaziwa Village

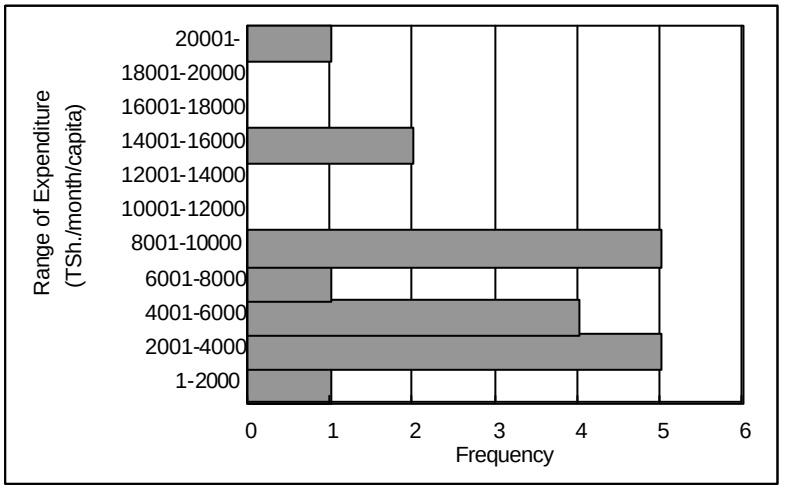
Item	
Total Population	1,599
Total Number of Households	403
Average Family Size	4.0
Total Land Area (ha)	2,000
Population Density (nos/km^2)	80

Source: JICA Study Team

Their staple foods are cassava ugari, complemented with rice and maize. Sources of protein are beans and dried fish followed by animal protein from poultry.

Almost all households engage in farming. About 100 households cultivate paddy, and 200 households cultivate vegetables. Earnings of the farmers could be from vegetable production, fruit production and also supply of labour force to other farmers. The fruit production, however, is of the least importance.

The economic situation of villagers was studied in the farm interview survey to 20 farm households. The average per capita expenditure is roughly estimated at TSh. 8,200 per month. The low expenditure group dominates in Viziwaziwa, as shown in the following chart. The monthly expenditure of 50 per cent of the farmers is less than TSh. 6,000, and that of 80 per cent is less than TSh. 10,000.



(Source: Farm Interview Survey by JICA Study Team in Phase I)

Distribution of Monthly Expenditure Per Capita in Viziwaziwa Village

The total area of Viziwaziwa is about 2,000 ha. The village is on the land with gentle slope. There are some small valleys and many small natural ponds. The elevation ranges from 140 m to 170 m above sea level.

About 20 per cent of the land is used for agricultural production. The area of upland field and orchard is estimated at 354 ha (875 acre) and that of paddy field is 50 ha (125 acre). Besides those farmlands, there is a considerably large area of estates of sisal, bushes and thickets that is owned by the village.

Agricultural Land Use in Viziwaziwa Village

Land Use	Area (ha)		Percentage (%)
Total Land Area	2,023	(5,000 acre)	100
Total Farmland	405	(1,000 acre)	20
Upland Field and Orchard	355	(875 acre)	17
Paddy Field	50	(125 acre)	3
Others (including sisal estate)	1,618	(4,000 acre)	80

Source: JICA Study Team

The annual rainfall in this area is about 1,000 mm. The soil of the farmland is greyish loamy sand with good drainage. Soil capability is relatively high without severe limitation for cropping, but soil fertility and water retention capacity is poor.

There are four routes of road to approach Viziwaziwa. Characteristics of the roads concerning Viziwaziwa are overviewed as follows.

Existing Roads concerning Viziwaziwa Village

Road	Route to Viziwaziwa	Distance	Present Condition
(A)	From Mwendapole to north Viziwaziwa	4.7 km	It is vehicle passable with less than 3 m road width. It is a foot path without adequate maintenance cares.
(B)	From Mwendapole to north Viziwaziwa	5.5 km	It is vehicle passable with about 3 m road width. It is a major transporting route from Mwendapole.
(C)	From Mkuza to east Viziwaziwa	7.2 km	There are narrowed sections near the village. However, vehicle is passable.
(D)	From Kibaha to south Viziwaziwa	15.0 km	It is good way with sufficient road width until entrance of the village.

Among above four routes of road, route (B) is a major transporting way for input and output. The present means of transport for farmers or their traders are only by shoulder and by bicycle. Though the route (B) is relatively kept in good condition rather than others, it is difficult to pass by vehicle in all days due to inadequate shape and poor conditions of the road.

The village is not electrified, and electrification plan has not been made yet. Two new tube wells have been constructed in and around the village by NGO of Plan International, besides the existing seven shallow wells among which four wells are not functioning due to sand accumulation. One primary school is in operation, but no dispensaries and any public service

facilities are available in the village.

One cooperative for cashew nut sales was once formed as a kind of farmers' organisation, but it has stopped functioning due to its managerial problem. Although there have been some trials for forming a farmer's group by themselves, all were dissolved because of financial and personnel problems.

7.2.2 Present Conditions of Horticulture

Viziwaziwa village is classified into the high-input vegetable zone. The average farmers cultivate 0.53 ha (1.3 acre) for food crops, 0.08 ha (0.2 acre) for vegetables and 0.32 ha (0.8 acre) for fruit.

Main vegetable crops are cucumbers, tomatoes, okras and eggplants. These four vegetables possibly occupy more than 80 per cent of the total vegetable shipment from the village. Especially cucumbers are the most important vegetables increasing their production in these years. Such commercial vegetable production is carried out in the limited valley area using water of natural ponds and man-made shallow pits (kisima). Therefore, the farmers cultivate vegetables and food crops in such farm plots continuously. Other vegetables such as amaranthus and challis are also cultivated at scattered small plots mainly for home consumption.

The standard cropping calendar of the vegetables is from the end of the long rainy season to the end of the dry season (May/June to November/December) after harvest of rice and maize. The vegetables can be grown with residual soil moisture of the long rainy season. Some farmers exercise also the rainy season vegetable cropping, which requires much care to prevent plant disease using high amount of agro-chemicals.

Most vegetable growers use certified seeds, organic manure, chemical fertiliser and agro-chemicals for the cultivation. Some advanced farmers already use them at a recommendable rate. The two private shops at the adjacent village Kwa Mfipa are the main suppliers of these farm input except manure. The most farmers use chicken manure bought at outside of the village, while few farmers use cow manure bought from some cow keepers in the village. For the application of liquid chemicals, the small-scale farmers rent knapsack-type sprayers from some large-scale farmers at a rate of TSh. 500 per day. The same kind of vegetables is usually planted at a plot.

Fruit crops, such as cashew, coconut, citrus and mango are grown in the upland of 121 ha (300 acre). The areas covered by these fruit trees are estimated at 73 , 12, 12 and 6 ha (180, 30,

30 and 15 acre) respectively, although these fruit trees are planted in the form of mix-cropping with either different types of three crops or sometimes, cassava and maize. For the fruit production, the farmers do not use any fertiliser. Some farmers use Sulphur dust as a fungicide for cashew, but the low price of the cashew nuts lowers the dusting practices.

All farmers cultivate food crops of paddy, cassava or maize at least for their home use. Some farmers sell their surplus to market, but the food crop production is not enough for the demand of the village. Paddy is cultivated in the lowland along the small valleys during the rainy season. Cassava and maize are planted in the upland field mainly for home consumption. Maize is grown during the rainy season. Cassava is planted during the rainy season and grows throughout a year. Other crops, such as sorghum, sweet potatoes and cowpeas also planted in small area.

Estimates of Cropped Area in Viziwaziwa Village

Crop	Area (ha)		Percentage (%)
Food Crops	202	(500 acre)	100
Paddy	50	(125 acre)	25
Cassava	71	(175 acre)	35
Maize	71	(175 acre)	35
Others	10	(25 acre)	5
Vegetables	25	(60 acre)	100
Tomato	5	(12 acre)	20
Cucumber	6	(15 acre)	25
Okra	4	(9 acre)	15
Eggplant	4	(9 acre)	15
Others	6	(15 acre)	25
Fruits	121	(300 acre)	100
Coconut	12	(30 acre)	10
Cashew	73	(180 acre)	60
Citrus	12	(30 acre)	10
Mango	6	(15 acre)	5
Others	18	(45 acre)	15

Source: JICA Study Team

There is a village extension officer (VEO) under district government. VEO takes care of all fields of agricultural support at the village.

Most of the horticultural farming is done along the valleys or surrounding of the ponds. In the farmland located at the three valleys, vegetables are cultivated watering by water obtained from *Kisima* (shallow pits). Those valleys rise from the existing ponds that collect rainwater from those catchment areas.

Valleys Concerning Viziwaziwa Village

Name of Valley	Source of Water	Catchment Area* (km^2)	Number of *Kisima**	Cultivated Area in Horticulture* (ha)
Viziwaziwa	Viziwaziwa pond	1.20	15	4.5
Mdugaro	Ngerengere pond	2.80	-	-
Sagare	Sagare pond	0.55	-	-
Mnuwano	Mbuzini pond	0.50	-	-
Mtibetini	Lugologolo pond	0.60	20	3.5
Mvije	Mauzauza pond	1.05	5	1.0
Mdung'u	Chatope pond	2.50	-**	-
Bwawa la taka	Mdungu pond	8.25	-**	-

*: Estimated by the JICA Study Team

**: Not observed because of out of village boundary

There are nine existing ponds in the village. Dimensions of these ponds are overviewed as follows.

Existing Ponds in Viziwaziwa Village

Name of Pond	Catchment Area (km^2)	Surface Area* (m^2)	Capacity of Water* (m^3)	Covered Area for Watering* (ha)	Related Valley
Viziwaziwa	1.20	10,600	20,000	2.5	Viziwaziwa
Ngerengere	2.80	18,000	35,000	2.8	Mdugaro
Sagare	0.55	-	-	-	Sagare
Mbuzini	0.50	1,500	3,000	0.5	Mnuwano
Lugologolo	0.60	2,800	6,000	1.0	Mtibetini
Mauzauza	1.05	14,000	21,000	1.2	Mvije
Chatope	2.50	-	-	-	Mdung'u
Mdungu	8.25	18,000	40,000	1.5	Bwawa la taka
Mvinjeni	0.50	7,000	11,000	1.0	-

*: Estimated by the JICA Study Team

Total 19.5 ha of farmland are estimated under watering conditions in both rainy and dry seasons in Viziwaziwa, in which 10.5 ha are irrigated by pond water, and the remaining 9.0 ha are watered by *kisima*, respectively.

As mentioned above, major vegetables shipped from Viziwaziwa village are cucumbers, tomatoes, eggplants and okras. Fruit is seldom shipped to Dar es Salaam markets except neighbouring traders come to buy a little quantity at odd times. There are about 15 middlemen engaging in vegetable trade in the village. Almost all of middlemen are farmers. In addition, some farmers in the vicinity of 20 forward their produce directly to the nearby markets and/or Kariakoo market, and a few traders sometimes come to buy vegetables to the village from Dar es Salaam or the neighbouring villages.

The negotiation for buying vegetables is usually done at farmers' field. Payment is done either in cash or by clearing off after selling. While farmers prefer the former, middlemen

usually use both. After farmer's harvesting, the vegetables are packed with a bag/tenga and transported by bicycle to the collection points located at the roadside of Morogoro highway in Kwa Mfipa sub-village of Mwendapole. The middlemen in Viziwaziwa village usually forward 5 times with 5 bags each per week in production season and twice with 2 - 3 bags each per week in off-season.

At the collection point, the bags/tenga of vegetables are loaded to pick-up that is operated at 8.30 p.m. regularly between Mlandizi and Kariakoo by a small transport agent. The transport costs including packing, bicycle, loading/unloading and Kariakoo market fee are as follows:

Transport Costs

Items	Transport Costs
Cucumber	TSh.4,500/bag (130kg)
Tomatoes	TSh.2,700/tenga (30kg)
Eggplant	TSh.2,700/bag (80kg)
Okra	TSh.4,200/bag (50kg)

The middlemen receive their vegetables at Kariakoo market. Then, they always negotiate with a number of small traders in Kariakoo market to seek for more profitable trade. Therefore, the time occupied for the negotiation is more than three hours. In the season of vegetables, the middlemen occasionally neither receive enough money to meet the price agreed with the producer nor lie produce on their hands. In this case, they have to be charged with all responsibility themselves. Thus, the prices offered by middlemen have a tendency to be rather moderate.

When a farmer feels discontented with the price offered by the middleman, he can look for other traders. The price showed by other middlemen, however, is usually no remarkable difference. Although any farmer can sell his/her produce at any market being subject to observe regulation of the market, number of farmers to do so is generally not so much.

The approximate prices of cucumbers, tomatoes and okras in production season in each marketing stage are as follows.

Average Prices of Crops in 1999/2000

(Unit: TSh./bag)

Products	Farmer's Price	Middleman's Price	Consumer's Price
Cucumber (130kg)	3,500-3,500	5,000-6,000	8,000-9,000
Tomatoes (30kg)	1,800-2,000	3,000-4,000	6,000-7,000
Okra (20kg)	800-1,000	1,500-2,000	3,000-4,500

The reasons why the middlemen in Viziwaziwa village do not like to sell their produce to the neighbouring markets such as Mlandizi and Kibaha are: a) demand in these markets' is not big due to a small number of consumers; b) almost all of inhabitants of the districts are farmers; and c) they do not expect the prices same as in Kariakoo market.

The constraints of the marketing pointed out by farmers are: a) low selling prices; b) relatively high transport and input costs compared with vegetable prices; c) capital shortage of farmers; d) poor packing materials; and e) lack of pertinent forwarding facilities.

7.2.3 Development Prospect

(1) General

In Viziwaziwa, staple crops like paddy and cassava are main crops and vegetables are cultivated after harvest of paddy. This pattern is suitable for the area and may not change in the near future.

The advantageous characters of Viziwaziwa village are as follows:

- The village is in the vicinity of Mwendapole village where horticulture is a most advanced in the Region. It can get and study techniques, information and systems easily from Mwendapole.
- The village is relatively near to Morogoro Highway, about 6 km away.
- The village has more water source compared with other areas.

On the other hand, there are no such social infrastructures as electricity, communication facilities, tap water and medical facilities in the village now. Accordingly, the living standard of villagers is not high.

(2) Participatory Rural Appraisal (PRA)

In PRA, the following techniques and tools were used: Village Resource Mapping, Transect Walk, Focus Group Discussion by Gender and Age, Community Needs Ranking and Participatory Community Planning. The result of PRA is reflected in the Action Plan.

The followings are the problems found in PRA.

- Lack of water for irrigating fields especially vegetable plot
- Lack of capital for purchase of farm input and implements
- Poor marketing system/unstable market prices
- Unreliable extension services

- Poor communication and transport facilities for their produce (Road)

There are some differences of opinion between genders. Normally women have opinions more realistic than men because they actually work in the field farming and fetching domestic water. Women also ranked realistic problems in PRA, like lack of domestic water and health facilities, as their main ones.

The followings are the results of Participatory Community Planning in PRA:

Credit facilities for farm input

On one hand, farmers expressed their feeling that they were always obliged to invest both money and manpower in their horticultural farming which hold marketing risks. On the other hand, they emphasised necessity of credit facilities to purchase farm input.

Group formation

The farmers stressed that grouping was essential as security for credit raising and repayment, as easy access to extension service and as a means of keeping themselves on a better position in market transaction.

Marketing

Small groups work together with larger groups to ensure good quality produce. In this connection, they complained about the poor road conditions from the village to the Morogoro highway.

Fruit tree nursery by women and youth groups

They indicated their willingness to form a group of either women or youth to raise fruit seedlings for sale.

Extension services

The farmers insisted that the present extension services should be strengthened through creating more opportunities for extension staffs to work with farmers and also through providing better transport facilities for extension staff so that the staff could visit villages more frequently.

(3) Development Prospect in Agriculture

In compliance with the aforementioned results of PRA and information and data collected concerning the village, the followings are recommended for this village.

Vegetables

Yield increase, quality improvement, diversification of cropping season, introduction of new varieties and group marketing shall be promoted. The proper use of agro-chemicals is also stressed.

Fruit

Replacement of old trees by certified seedlings, enforcement of proper orchard management and improvement of the grade of marketable produce shall be promoted.

As a conclusion, it is believed that Viziwaziwa has a great potentiality for horticultural development, provided that the aforementioned is realised.

Moreover, social infrastructures, including rehabilitation of access roads, should be equipped and agriculture itself must be strengthened with administrative and donors' support on technology, marketing system, credit, etc. in order to bring the potentiality out. Especially, irrigation water should be utilised as much as possible.

Viziwaziwa should target to become an advanced agricultural village.

7.2.4 Action Plan

The Action Plan for the development in Viziwaziwa is formulated in consideration of present achievement, constraints and potential, as well as the results of PRA. The Action Plan is described in the following table, in which the underlined procedures will be covered in the Project.

Action Plan for Horticultural Development in Viziwaziwa

Sector	Item	Plan	Target	Method	Procedure	Period
Agricultural Development	Vegetable Development	Yield Improvement	To increase unit yield rate of vegetables.	To strengthen farm input supply to smallholders. To provide guidance on varieties and farm management to smallholders.	To introduce input credit to the farmers' groups. To strengthen extension services through capacity building programme.	5 years
		Quality Improvement	To improve quality of marketable vegetables.	To strengthen farm input supply to smallholders. To provide guidance on varieties, farm management and grading to smallholders.	To introduce input credit to the farmers' groups. To strengthen extension services through capacity building programme.	5 years
		Season Diversification	To increase rainy season cropping and early dry season cropping.	To provide guidance on pest and disease control in the rainy season. To develop water source in the early dry season.	To conduct crop management test and demonstration at experimental farms. To strengthen extension services through capacity building programme.	4 years
		Crop Diversification	To reduce risk on low yield and prices of vegetables. To save farmers' expenditure to imported vegetables.	To introduce new kinds or new varieties of vegetables through present extension channel.	To conduct crop adaptability tests at experimental farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening on Watering Practice	To increase at 10 % of cropped area, and extend cultivating term at one month.	To reform and excavate Kisimas, and improve water use availability of pond.	To be assessed the methods by the Verification Study. To be realised through self-reliance of farmers.	5 years
		Proper Use of Agro-chemicals	To prevent misuse and overuse of agro-chemicals.	To enforce proper use of agro-chemicals through present extension channel.	To strengthen extension services through capacity building programme.	5 years
		Strengthening on Marketing	To endow the smallholders with bargaining power.	To support to organising groups. To provide market information.	To install marketing facilities including storage, grading space and container.	Future Prospect
	Fruit Development	Introduction of Advanced Seedlings	To replace old trees by advanced seedlings.	To introduce certified seedlings from Sokoine University.	To provide certified seedlings in District Seedling Farm Project.	4 years
		Proper Orchard Management	To enforce proper orchard management for improvement of products and pest and disease control.	To disseminate orchard management practices such as pruning, slashing and pest and disease control.	To demonstrate proper orchard management at District Seedling Farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening on Marketing	To trade products at a reasonable price.	To provide guidance on standard of grading to smallholders.	To strengthen extension services through capacity building programme.	3 years

Sector	Item	Plan	Target	Method	Procedure	Period
Social Infrastructure Improvement	Improvement of Transport Infrastructure	Rural Road Rehabilitation	To rehabilitate rural road of Route (B) (Mwendapole – Viziwaziwa)	-	To prepare rehabilitation plan in this Study. To improve access to government and donors (Guideline).	2 years
	Improvement of Transport Means	Introduction of New Transport Means	To advance present transport by hand or bicycle.	To introduce new cart/trolley.	To assess and demonstrate suitable transport means.	5 years
	Improvement of Community Activities	Necessary Assembly of Villagers	To provide room for community assembly.	To substitute school building, or construct new assembly hall.	To prepare construction plan of the hall in this Study. To assess its usage through the Verification Study.	4.5 years

Implementation Schedule of Action Plan (Viziwaziwa)

Programme & Sub-Programme \ Year and Month in Order	Year 1												Year 2												Year 3	Year 4	Year 5
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	.....	.....	.....
Site Level																											
Community Based Horticultural Development Programme																											
Agricultural Development																											
Vegetable Development																											
Yield Improvement (Organization & Grouping for Input Credit)																											
Quality Improvement (Organization & Grouping for Input Credit)																											
Season Diversification																											
Crop Diversification																											
Strengthening on Watering Practice																											
Fruit Development																											
Introduction of Advanced Seedlings																											
Proper Orchard Management																											
Strengthening on Marketing																											
Social Infrastructure Improvement																											
Improvement of Transport Infrastructure																											
Improvement of Transport Means																											
Improvement of Community Activities (Construction of Facilities)																											
District Level																											
Participatory Development Capacity Building Programme																											
Part 1 : Training for District & Extension Officers																											
Part 2 : Training for Group Leaders																											
Part 3 : Community Awareness Creation																											
District Seedling Farm Project																											
Seedling Distribution Programme (Construction of Facilities)																											
Crop Diversification (Research)																											

7.3 Mwanabwito

7.3.1 Village Outline

The village is administratively called as Mwanabwito village, Ruvu ward, Ruvu division, Kibaha district. The village consists of two sub-villages, namely Mwanabwito and Kidai. Mwanabwito village is located at about 12 km south from Mlandizi town along DSM-Morogoro highway. The distance to Dar es Salaam is about 80 km.

In this village, there are 870 men and 980 women, amounting to 1950 in total, and the number of households is 273. The average family size is 7.1, which is much larger than the regional average. The population density is estimated at 67 per km^2, which is lower than other villages. They mainly engage in farming and fishery, which accounts for 93 per cent and 5 per cent of the whole villagers, respectively. The major tribe is Zamora, and 80 per cent of the villagers are Muslim.

Demographic Condition in Mwanabwito Village

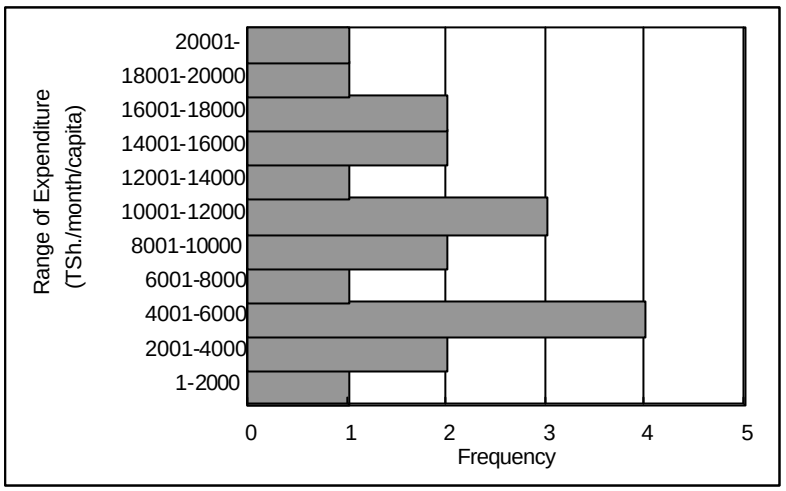
Item	
Total Population	1,950
Total Number of Households	273
Average Family Size	7.1
Total Land Area (ha)	2,800
Population Density (nos/km^2)	67

Source: JICA Study Team

Their staple food is rice complemented with maize ugari. The sources of protein are both raw and dried small fish, beans and, even very little, poultry.

The farmers could earn cash from vegetable production, fruit production and supply of labour force to other farmers. The fruit production, however, is of the least importance. Tomato and okra are their principal income sources. The number of farmers engaging in tomato production is about 600.

The average per capita expenditure is roughly estimated at TSh. 11,400 per month. Distribution of monthly expenditure per capita by TSh. 2,000 interval is shown in the following chart. The expenditure level widely ranges and there are small peaks of low group (TSh. 2,001 - 6,000), middle group (TSh. 8,001 - 12,000) and high group (TSh. 14,001 - 18,000).



(Source: Farm Interview Survey by JICA Study Team in Phase I)

Distribution of Monthly Expenditure Per Capita in Mwanabwito Village

The village lies on the flood plain and river terrace of the Ruvu River. The western part of the village is the riverine of the Ruvu River and its tributary namely the Msua River. The whole land is flat to gentle slope. The elevation ranges from 30 m to 45 m above sea level.

Out of the total land of 2,833 ha (7,000 acre), only about 405 ha (1,000 acre) is used as farmland. The area of paddy field is estimated at 142 ha (350 acre), relatively wide in the Region. Most farmers having land along the Ruvu River cultivate rice, although the size of landholding varies to some extent among those farmers. There are few possibilities to expand the size of paddy field, since around 80 per cent of areas suitable for rice farming have already been cultivated.

Agricultural Land Use in Mwanabwito Village

Land Use	Area (ha)		Percentage (%)
Total Land Area	2,833	(7,000 acre)	100
Total Farmland	405	(1,000 acre)	14
Upland Field and Orchard	263	(650 acre)	9
Paddy Field	141	(350 acre)	5
Others	2,428	(6,000 acre)	86

Source: JICA Study Team

The annual rainfall in this area is about 950 mm. The soils in the flood plain is dark clay to sandy clay loam with imperfect drainage, and relatively fertile in the Region. The fertile soil can bring high crop production to the farmers even without any fertiliser.

There are two routes of road to approach Mlandizi from the village. Characteristics of the roads concerning Mwanabwito are overviewed as follows.

Existing Roads concerning Mwanabwito

Road	Route to Viziwaziwa	Distance	Present condition
(A)	From the Bagamoyo regional road at Kikongo to east Mwanabwito	2.7 km	It is vehicle passable with less than 3 m width. It is a major transporting route from Mwanabwito.
(B)	From Kikongo to north Mwanabwito	6.0 km	It is foot pass along the Ruvu River. Some farmers transport products by bicycle.

Among above two routes of road, route (A) is a major transporting way for input and output. The means of transport for farmers or their traders are only by shoulder and by bicycle. The route (B) holds some difficulties to pass by vehicle due to inadequate shape and poor conditions of the road. Furthermore, Bagamoyo regional road that is a major linking road for Mlandizi is planned to be rehabilitated by the Regional Road Office by 1999/2000 budget.

The village is not electrified, and electrification plan has not been made yet. Three shallow wells were investigated to drill in and around the village by NGO of Plan International, because farmers face much difficulty to obtain drinking water from the Ruvu River with more than 1.5 km distant form the village. One primary school and dispensary is in operation, but no other public service facilities are available in the village. There is also some aid on sanitation from UNICEF.

7.3.2 Present Condition of Horticulture

Mwanabwito village is one of the typical areas of the low-input vegetable zone. Farmers cultivate 0.81 ha (2.0 acre) for food crops, 0.16 ha (0.4 acre) for vegetables and 0.32 ha (0.8 acre) for fruit on an average.

Main vegetables grown in the village are tomatoes and okras. Other vegetables such as pumpkins, chillies and eggplants are minor. Tomatoes are cultivated only after harvesting the rainy season crops in order to prevent plant diseases. Okras are commonly planted as mix cropping with maize during the rainy season and with tomatoes during the dry season. The rain-fed vegetables as succeeding crop of paddy are planted often in different plots year by year, because of much larger paddy fields than vegetable plots.
During the rainy season, the farmers cultivate food crops such as paddy in the river plain and maize in the river terrace. The cropping system of paddy is usually mono cropping, while that of maize is mix cropping with different upland crops. The production of these food crops often does not satisfy the home requirements, but some farmers sells their surplus to market.

All crops are grown without any types of watering. Almost all farmers do not use any

chemical input to the crops. Even organic manure is rarely used for some vegetables. The seeds are prepared from the previous crops by farmers themselves. The varieties of them are not certified at all. These kinds of farm input are hard to obtain for the farmers, because the shop handling agricultural input in Mlandizi, an adjacent village has closed it operation several years ago.

Several kinds of fruit crops are also planted around the houses or in the farmland. The total fruit area is estimated at about 81 ha (200 acre) in the village. The cashew and coconuts are dominant. The commercial activity in fruits is less than that of vegetables.

Estimates of Cropped Area in Mwanabwito Village

Crop	Area (ha)		Percentage (%)
Food Crops	202	(500 acre)	100
Paddy	131	(325 acre)	65
Cassava	10	(25 acre)	5
Maize	51	(125 acre)	25
Others	10	(25 acre)	5
Vegetables	40	(100 acre)	100
Tomato	12	(30 acre)	30
Cucumber	2	(5 acre)	5
Okra	12	(30 acre)	30
Eggplant	2	(5 acre)	5
Others	12	(30 acre)	30
Fruits	81	(200 acre)	100
Coconut	20	(50 acre)	25
Cashew	37	(90 acre)	45
Citrus	8	(20 acre)	10
Mango	8	(20 acre)	10
Others	8	(20 acre)	10

Source: JICA Study Team

VEO for this village is temporarily absent because of the recent replacement. The ward extension officer (WEO) of Ruvu is in charge of all field agricultural support in seven villages within the ward. Therefore, the farmers in Mwanabwito cannot receive the sufficient extension service at present, including farm input supply, technical guidance and market information.

Irrigation is not practiced in the village at all. However, the existing ponds have some potential to provide irrigation water, if villagers so desire. Four ponds exist in the village. Dimensions of these ponds are as follows:

Existing Ponds in Mwanabwito Village

Name of Pond	Catchment Area (km^2)	Surface Area (m^2)	Capacity of Water (m^3)	Remarks
Kiembacmba	60.0	50,000	100,000	Crocodile and hippopotamus live in.
Bomu	3.5	15,000	25,000	Crocodile and hippopotamus live in.
Mwanabwito	5.0	12,000	20,000	Crocodile and hippopotamus live in.
Bomu Kidai	9.0	25,000	45,000	Crocodile and hippopotamus live in.

Source: Estimates by JICA Study Team through field investigation.

As mentioned above, major vegetables shipped from Mwanabwito village are mostly tomatoes and okras with a little hot chillies. While the tomatoes are mainly shipped from the end of August to December, okras are throughout the year. Fruit shipped is very little, of which mangoes are shipped to Mlandizi through the traders operating in the Mlandizi market. There are about 50 middlemen engaging in vegetable trade in the village and they are farmers as well. Almost all of the middlemen handle tomatoes, but only about one third of them deal with okras. Though some traders come to buy tomatoes from Dar es Salaam, but the number is a few.

The negotiation for buying vegetables is usually done at farmer's field. While there are two payment systems of either in cash or by clearing off after selling, the former is dominant due to the farmers' strong request.

The marketing system of tomato is as follows:

- After tomato harvesting, they are packed with a tenga containing 80 kg each and the tengas are carried by a middleman to the one of three collection points located along the Ruvu River. At the collection point, the middleman load his tengas into a truck hired jointly by roughly ten middlemen. One truck is loaded up with about 80-100 tengas, which is equivalent to about 6-8 tons. In the peak season of September to October, plural tracks carry tomatoes to Dar es Salaam three times a day respectively.

- The transport costs of tomatoes per tenga (30 kg) including packing, carrying, loading/unloading and Kariakoo market fee are as follows:

Transport Costs of Tomatoes

Items	Transport Costs
Truck (8 ton) hiring fee	TShs.100,000/day
Packing	TShs.300/tenga
Carrying to collection point	TShs.500/tenga
Loading/unloading	TShs.300/tenga
Kariakoo market fee	TShs.300/tenga

- The middlemen who come to Kariakoo market by bus receive their tomatoes at the market. Then, they consign their tomatoes for sale to their respective official agents under an oral agreement. Each middleman usually selects his agent because the agent sometimes, even under oversupply circumstances, affords convenience to the middlemen. While the middleman can receive his selling money usually 4 - 5 hours later after consigning, sometimes he cannot get the money sufficient to meet the contract because the agent fail to sell the produce with the contract price. In this case, he has to shoulder all the loss. The commission fee is normally 10 per cent of a total selling price.

- Tomatoes become overproduction easily in the peak season. During the last ten years, Mwanabwito's farmers had the experience of the overproduction in 1993/94, 1995/96 and 1998/99, in which tomatoes were left and rotten on the fields.

As for the other vegetables such as okras and chillies, the harvested produce is carried with a fee of TSh. 800 per bag (40 kg) to collection points located along the Morogoro highway in Mlandizi town. The middleman usually transports five bags per trip to Kariakoo market by bus with a single fare of TSh. 500 per parson and per bag, respectively. Then, he negotiates with three to four small traders in the market to seek for more profitable trade. In the season of vegetables, the middlemen occasionally neither receive enough money to meet the price paid to the producer nor leave the produce on their hands.

Although any farmer can sell his/her produce at any market, as far as they observe regulation of the market, the farmers in the Mwanabwito village do not like to sell at Kariakoo market directly due mainly to remoteness from the market.

The approximate prices of tomatoes and okras in production season in each marketing stage are as follows.

Average Prices of Crops in 1999/2000

(Unit: TSh./kg)

Products	Farmer's Price	Middleman's Price	Consumer's Price
Tomatoes	60	100	150-180
Okra	40	75	150-200

The constraints of the marketing pointed out by farmers in Mwanabwito village are: a) low selling prices; b) relatively high transport and input costs compared with vegetables prices; c) capital shortage of farmers; d) poor packaging materials; and e) lack of pertinent forwarding facilities.

7.3.3 Development Prospect

(1) General

Main cultivation area in Mwanabwito village is on the flood plain along the Ruvu River. Staple food like paddy and cassava are main crops and vegetables are cultivated after harvest of paddy. This cropping pattern is favoured in this area; therefore it may not change in the near future.

The advantageous character of Mwanabwito village is that the village has the Ruvu River that provides the villagers with such resources as water and fertile farmland.

On the other hand, there are some weak points.

- The distance to Mlandizi, a main town along the Morogoro Highway, is 12 km and the road conditions to the town are bad especially in the rainy season.
- There are no such social infrastructures as electricity, communication facilities and domestic water in the village now. Accordingly the living standard of villagers is low.

(2) Participatory Rural Appraisal (PRA)

In PRA, the following techniques and tools were used: Village Resource Mapping, Transect Walk, Focus Group Discussion by Gender and Age, Community Needs Ranking and Participatory Community Planning. The result of PRA is reflected in the Action Plan.

The followings are the problems found in PRA.

- Lack of domestic and irrigation water
- Lack of capital to meet costs for purchasing farm input and implements
- Poor marketing system and unstable market prices

- Lack of extension agent
- Distance from the village to the source of input (Kibaha)
- Poor communication and transport facilities for their produce (Road)

The villagers stressed the transport problem besides such problems as shortages of water, capital, and farm input. In Mwanabwito, there are also differences of opinion between genders. Women stressed the lack of both domestic water and milling machines while men emphasise the lack of both capital and water for irrigation.

The followings are the results of Participatory Community Planning in PRA:

Credit facilities for farm input

For they definitely need to purchase input, particularly qualified seeds, they require capital on credit to obtain the input.

Group formation

The farmers stressed that grouping was essential as security for credit raising and repayment, as easy access to extension services and as a means of keeping their better position in the market.

Marketing

Small groups work together with larger groups to ensure good quality produce. They requested the project to improve the road from the village to Morogoro highway.

Fruit tree nursery by women and youth groups

They indicated their willingness to form a group of either women or youth to raise fruit seedlings for sale.

Extension services

Even they need extension officers, no village extension officer is stationed at Mwanabwito.

(3) Development Prospect in Agriculture

In compliance with the aforementioned results of PRA, and information and data collected concerning the village, the followings are recommended for this village.

Vegetables

As the improvement of vegetable production is the key issue of the horticultural development in this village, the main vegetables like tomatoes and okras should be cultivated in modern

farming methods. Yield increase, quality improvement, diversification of variety, introduction of new varieties and group marketing are to be promoted, as well. The proper use of agro-chemicals is also stressed.

Fruit

Replacement of old trees by certified seedlings, enforcement of proper orchard management and improvement of the grade of marketable produce shall be promoted.

As a conclusion, it is believed that Mwanabwito has a great potentiality for horticultural development, provided that the aforementioned is realised.

Moreover, social infrastructures should be provided, rehabilitation of road in particular, and agriculture must be strengthened with administrative and donors' support on technology, marketing system, credit, etc., in order to bring the potentiality out.

The farming of Mwanabwito should target for both home consumption and marketing.

7.3.4 Action Plan

The Action Plan for the development in Mwanabwito is formulated taking into account the present status, constraints and potential, as well as the results of PRA. The Action Plan is described in the following table, in which the underlined procedures will be covered in the Project.

Action Plan for Horticultural Development in Mwanabwito

Sector	Item	Plan	Target	Method	Procedure	Period
Agricultural Development	Vegetable Development	Yield Improvement	To increase unit yield rate of vegetables.	To provide guidance on varieties and farm management (organic manure use, etc.) to smallholders. To strengthen farm input supply to smallholders.	To strengthen extension services through capacity building programme. To introduce input credit to the farmers' groups.	5 years
		Quality Improvement	To improve quality of marketable vegetables.	To provide guidance on varieties, farm management and grading to smallholders. To strengthen farm input supply to smallholders.	To strengthen extension services through capacity building programme. To introduce input credit to the farmers' groups.	5 years

Sector	Item	Plan	Target	Method	Procedure	Period
Agricultural Development	Vegetable Development	Crop Diversifica-tion	To reduce risk on low yield and prices of vegetables. To save farmers' expenditure to imported vegetables.	To introduce new kinds or new varieties of vegetables.	To conduct crop adaptability test at experimental farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening of Watering Practice	To increase at 10 % of cropped area.	To improve water use availability of pond.	To prepare improvement plan and assess the methods by the Verification Study. To be realised through self-reliance of farmers.	5 years
		Strengthening on Marketing	To endow the smallholders with bargaining power.	To support to organising groups. To provide market information.	To install marketing facilities including storage, grading space and container.	Future Prospect
		Proper Use of Agro-chemicals	To prevent misuse and overuse of agro-chemicals.	To enforce proper use of agro-chemicals through present extension channel.	To strengthen extension services through capacity building programme.	5 years
	Fruit Development	Introduction of Advanced Seedlings	To replace old trees with advanced seedlings.	To introduce certified seedlings from Sokoine University.	To provide certified seedlings in District Seedling Farm Project.	4 years
		Proper Orchard Management	To enforce proper orchard management for improvement of products and pest and disease control.	To disseminate orchard management practices such as pruning, slashing and pest and disease control.	To demonstrate proper orchard management at District Seedling Farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening on Marketing	To trade products at a reasonable price.	To provide guidance on standard of grading to smallholders.	To strengthen extension services through capacity building programme.	3 years
Social Infrastructure Improvement	Improvement of Transport Infrastructure	Rural Road Rehabilitation	To rehabilitate rural road of Route (A) (Kikongo – Mwanabwito)	-	To prepare rehabilitation plan in this Study. To improve access to government, NGO and donors (Guideline).	2 years
	Improvement of Transport Means	Introduction of New Transport Means	To advance present transport by hand or bicycle.	To introduce new cart/trolley.	To assess and demonstrate suitable transport means.	5 years

Implementation Schedule of Action Plan (Mwanabwito)

Programme & Sub-Programme \ Year and Month in Order	Year 1												Year 2												Year 3	Year 4	Year 5
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	.....	.....	.....
Site Level																											
Community-Based Horticultural Development Programme																											
Agricultural Development																											
Vegetable Development																											
Yield Improvement	(Organization & Grouping for Input Credit)																										
Quality Improvement	(Organization & Grouping for Input Credit)																										
Crop Diversification																											
Strengthening on Watering Practice																											
Fruit Development																											
Introduction of Advanced Seedlings																											
Proper Orchard Management																											
Strengthening on Marketing																											
Social Infrastructure Improvement																											
Improvement of Transport Infrastructure																											
Improvement of Transport Means																											
District Level																											
Participatory Development Capacity Building Programme																											
Part 1 : Training for District & Extension Officers																											
Part 2 : Training for Group Leaders																											
Part 3 : Community Awareness Creation																											
District Seedling Farm Project																											
Seedling Distribution Programme		(Construction of Facilities)																									
Crop Diversification (Research)																											

7.4 Vigama

7.4.1 Village Outline

The sub-village is administratively called as Vigama sub-village, Kisarawe village, Kisarawe ward, Sungwi division, Kisarawe district. It is one of six sub-villages of Kisarawe village. Others are namely Bomai, Umatumbini, Kibaoni, Sanza and Visegesa. Vigama sub-village is located at about 5 km southwest from Kisarawe township, along the DSM - Maneromango road. The distance to Dar es Salaam is about 30 km. At the southern border there is abandoned Vigama station of Great Uhuru Railway.

There are 6,292 villagers and 1,804 households in Kisarawe village, out of which 525 villagers and 122 households are inside Vigama sub-village accounting for 8.3 per cent and 6.8 per cent respectively. The average family size is 4.3, which is much smaller than the regional average. The population density is about 124 per km^2. There are several tribes in which the majority is Zamora, followed by Ndengereko and Matumbi and so on. About half are Muslim and the others are Christian.

Demographic Condition in Vigama Sub-village

Item	
Total Population	525
Total Number of Households	122
Average Family Size	4.3
Total Land Area (ha)	400
Population Density (nos/km^2)	124

Source: JICA Study Team

Their staple food is mainly cassava, followed by rice and maize. The main sources of protein are beans and dried small fish. Animal protein is seldom taken.

All the households engage in farming. Fruit are grown by almost all households in a manner of mixed farming, as a main income source.

The sub-village lies on the hilly area. There is a peak of the hill at an elevation of 280 m in the north. The south part is a gentle slope area with small valleys.

The sub-village is surrounded by three forest reserves, i.e. Pugu on north, Kazimzumbwi on south and Ruvu South on west. The villagers recognise the border of the reserves, but vermin often attack crops on the farmland.

The present land use is estimated as shown in the following table. About 60 per cent of the land is used for agricultural purpose. Most of the farmland is located in sloping land that is planted with upland crops or fruit crops. Paddy fields of 20 ha (50 acre) are located only at the bottoms of valleys.

Agricultural Land Use in Vigama Sub-village

Land Use	Area (ha)		Percentage (%)
Total Land Area	405	(1,000 acre)	100
Total Farmland	243	(600 acre)	60
Upland Field and Orchard	223	(550 acre)	55
Paddy Field	20	(50 acre)	5
Others	162	(400 acre)	40

Source: JICA Study Team

The annual rainfall in this area is about 1,000 mm. The soil in this hilly area is reddish-brown loamy sand with imperfect drainage. The soil fertility is slightly low. The soil erosion control may be required to conserve topsoil of the sloping farmland.

A regional road of "Kazimzumbwi - Mzenga" runs across centre of the sub-village. No particular difficulty is seen to transport produce to Kisarawe through the road once farmers bring their produce out from their farmland to the main road. Farmers seem to face some difficulties to bring their produce out due to steep slope of present footpaths.

The sub-village is not electrified, and electrification plan has not been made yet. Possibility for construction of tube-wells have investigated in and around the sub-village by NGO of Plan International, however farmers have no reliable water sources for drinking water supply at present within closing distance. No public service facilities, even primary school, are available within the sub-village at all.

7.4.2 Present Conditions of Horticulture

Vigama sub-village is classified into the fruit crop zone. The average farmers cultivate 0.65 ha (1.6 acre) for food crops, 0.04 ha (0.1 acre) for vegetables and 0.65 ha (1.6 acre) for fruit. Almost all farmers produce fruit, and about 20 per cent of farmers cultivate vegetables.

The important fruits in Vigama are several kinds of citrus, such as orange, lime, lemon and tangerine, and also mango. As farmers themselves prepare these seedlings, the farmers do not know about variety, quality or pest resistance. When they plant seedlings in their fields, watering is necessary for taking root, and pest and disease control is preferable. However, the farmers do not care about such plant protection. Coconut and cashew are also planted widely

on the sloping land. Some farmers plant passion fruits using wood poles and wire. The farmers do not use any fertiliser or agro-chemicals. Orchard management, such as pruning and weed slashing is generally not practised well.

The vegetables are produced only in the limited area for home consumption. The marketable surplus is very little. Most vegetables are sown in the fields after harvest of paddy and maize.

Cassava and maize are the main food crops growing in the area. Paddy is also planted at the bottoms of the small valleys or even at the home gardens during the rainy season. The production of the common farmers is not sufficient for their requirement, because of low productivity and plant diseases.

Estimates of Cropped Area in Vigama Sub-village

Crop	Area (ha)		Percentage (%)
Food Crops	80.9	(200 acre)	100
Paddy	12.1	(30 acre)	15
Cassava	40.5	(100 acre)	50
Maize	24.3	(60 acre)	30
Others	4.0	(10 acre)	5
Vegetables	4.0	(10 acre)	100
Tomato	0.8	(2 acre)	20
Cucumber	0.4	(1 acre)	10
Okra	0.8	(2 acre)	20
Eggplant	0.4	(1 acre)	10
Others	1.6	(4 acre)	40
Fruits	80.9	(200 acre)	100
Coconut	12.1	(30 acre)	15
Cashew	12.1	(30 acre)	15
Citrus	32.5	(80 acre)	40
Mango	12.1	(30 acre)	15
Others	12.1	(30 acre)	15

Source: JICA Study Team

There is VEO to provide agricultural supporting services for Kisarawe village. However, VEO does not have any transport facilities to visit this sub-village. Therefore, the present situation of the district supporting services is still poor in Vigama.

No irrigation is conducted in the sub-village. In very minor cases, small water harvesting actions have been observed in the farmland. There are two small ponds of Kamkakire pond and Kirima Chanpunga pond. However, these ponds' water is utilised only downstream paddy production because of small capacity and drying up during the dry season.

As mentioned above, major fruits shipped from Vigama sub-village are citrus, passion fruit, mangoes and cashew nuts. Vegetables grown include amaranthus, tomatoes, okras, and

cowpeas, but these vegetables produce mainly for private use except that, when there is over production, farmers themselves sell the surplus at the Kisarawe market and/or the open market.

In Vigama sub-village, there are about 5 middlemen dealing with fruit. These middlemen are all farmers and they collect and forward more than 90 per cent of the fruit sold by farmers. Traders outside the sub-village occasionally come to buy fruit in the harvesting season from Dar es Salaam, but the number of traders is very few. Farmers never transport their fruit to Dar es Salaam markets due to the lack of transport facilities.

In case of cashew nuts, about 10 traders come to Kisarawe district to collect the produce. Firstly traders have to negotiate with the district, and district authorities deliver permission. The trader pays a levy to the district and also pays for farmer's produce. The levy is TSh. 20 per kg to the district.

The negotiation for buying fruit is usually done at farmers' field. There are three purchasing methods of fruit: whole tree basis, each fruit basis, and volume basis. In case of citrus, the whole tree basis is of dominance and the purchaser has to harvest. In recent years, the price of a tree with mature citrus is about TSh. 8,000 - 15,000. The labour fee for harvesting of TSh. 1,000 - 2,000 per day is needed. Transport is done in two ways: in bulk or packaged (tenga). Only when the middlemen are convinced of selling the produce at the Kariakoo market, they adopt in bulk system. The shipping is done by a pick-up truck hired jointly by 2 - 4 middlemen. One pick-up costs about TSh. 15,000 per one trip, and can load about 2 - 3 ton (20 - 30 tengas). The middlemen usually wish to use the official agents in Kariakoo market due to the agent's reliability, but they usually cannot afford to use the agents because that the shipping volume brought into the market is too small for the official agent to deal with.

Since five years ago, the price of citrus has decreased gradually to about TSh. 5 per each fruit due to over production.

The major marketing constraints in Vigama sub-village are; a) low prices of produce, b) few market except Kariakoo, c) lack of transport facilities, d) few traders except cashew nuts, and e) disease problems particularly in citrus and cashew nuts.

7.4.3 Development Prospect

(1) General

Cassava is a main crop. Paddy and maize are also cultivated but not enough for home

consumption. Poverty may be the main characteristic of Vigama. There are no such social infrastructure as electricity, communication facilities and domestic water in the sub-village now. There are not even cultural facilities as schools, mosques and churches. Accordingly the living standard of villagers is very low.

The advantageous characters of Vigama sub-village are as follows:
A trunk road that reaches Dar es Salaam passes through the sub-village. Vigama is one of six sub-villages of Kisarawe town that has a possibility of development, because Kisarawe District is on the list of 35 local authorities selected in Local Government Reform Phase I.

(2) Participatory Rural Appraisal (PRA)

In PRA, the following techniques and tools were used: Village Resource Mapping, Transect Walk, Focus Group Discussion by Gender and Age, Community Needs Ranking and Participatory Community Planning. The result of PRA is reflected in the Action Plan.

The followings are the problems found in PRA.
For social problems:
- Lack of social services such as schools and health facilities
- Lack of domestic water
- Lack of milling machines
- Lack of transport facilities

For agricultural problems:
- Lack of capital to meet costs for purchase of farm input and implementation
- Lack of vermin protection
- Poor extension services
- Poor marketing system and unstable market prices

This sub-village is poorer than other three (3) villages selected in terms of social infrastructure.

The followings are the results of Participatory Community Planning in PRA:

<u>Credit facilities for farm input</u>
They need capital in credit to obtain input.

<u>Group formation</u>
The farmers stressed that grouping was essential as security for credit raising and repayment, as easy access to extension services and as a means of obtaining stronger bargaining power in

the market. They intend to form two types of group, one is a small group for poor farmers and the other is a bigger group with the combination of small groups.

Meeting and marketing shed

They need a shed for meeting and marketing. The aforementioned bigger group will supervise the overall use of the shed.

Marketing

Small groups work together with larger groups to ensure good quality of produce.

Fruit tree nursery by women and youth groups

They indicated their willingness to form a group of either women or youth to raise fruit seedlings for sale.

Input delivery system

They requested that agricultural input should be supplied at sub-village level. The reason is that they are worried about bureaucracy, which is unavoidable if it is supplied at the District or village level.

Extension services

They have unreliable extension services that need to be strengthened.

(3) Development Prospect in Agriculture

In compliance with the aforementioned results of PRA and information and data collected concerning the sub-village, the followings are recommended for this sub-village.

Fruit

As the improvement of fruit production is a key issue of the horticultural development in this sub-village, replacement of old trees by certified seedlings, enforcement of proper orchard management, improvement of the grade of marketable produce and launch of group marketing shall be promoted. Citrus, mango and passion fruit shall be promoted as main target fruit.

Vegetables

Both increase in production and expansion of the cropping areas shall be encouraged.

Others

Introduction of contour farming shall be promoted.

As a conclusion, it is believed that Vigama has a great potentiality for horticultural development, provided that the aforementioned is realised.

Moreover, any kind of social infrastructure development is promoted and agriculture must be strengthened with administrative and donors' support on technology, extension, grouping, marketing, etc., in order to bring the potentiality out. In other words, this sub-village should strengthen the relationship with Kisarawe municipal office to get more assistance for farming practice.

Vigama should target fruit production development for marketing and farming of other crops for home consumption.

7.4.4 Action Plan

The Action Plan for the development in Vigama is formulated in consideration of present achievement, constraints and potential, as well as the results of PRA. The Action Plan is described in the following table, in which the underlined procedures will be covered in the Project.

Action Plan for Horticultural Development in Vigama

Sector	Item	Plan	Target	Method	Procedure	Period
Agricultural Development	Vegetable Development	Yield Improvement	To increase unit yield rate of vegetables.	To use certified seeds and (organic) fertiliser, reduce water stress and practice pest and disease control. To provide technical guidance to smallholders.	To strengthen extension services through capacity building programme.	4.5 years
		Expansion of Cropped Area	To expand area for vegetable cropping to increase its production.	To provide technical guidance to smallholders.	To strengthen extension services through capacity building programme.	4.5 years
		Provision of Supplemental Water for Cultivation	-	To install water harvesting bunds.	To be assessed the methods by the Verification Study. To be realised through self-reliance of farmers (Guideline).	4 years
	Fruit Development	Introduction of Advanced Seedlings	To replace old trees with advanced seedlings.	To introduce certified seedlings from Sokoine University.	To provide certified seedlings produced at District Seedling Farm or farmers' group in the area.	4 years
		Proper Orchard Management	To enforce proper orchard management for improvement of products and pest and disease control.	To disseminate orchard management practices such as pruning, slashing and pest and disease control.	To demonstrate proper orchard management at District Seedling Farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening on Marketing	To endow the smallholders with bargaining power.	To support to organizing groups. To provide market information.	To strengthen extension services through capacity building programme.	3 years
Social Infrastructure Improvement	Improvement of Transport Means	Introduction of New Transport Means	To advance present transport by hand or bicycle.	To introduce new cart/trolley.	To assess and demonstrate suitable transport means.	5 years
	Improvement of Community Activities	Necessary Assembly of Villagers	To provide room for community assembly.	To construct new community hall.	To prepare construction plan of the hall in this Study. To assess its usage through the Verification Study.	4.5 years
Environmental Conservation	Soil and Water Conservation	Soil Erosion Control	-	To decrease erosion and soil lost and increasing land usability by simple measures.	To assess improvement method by Verification Study. To be realised through self-reliance of farmers (Guideline).	Future Prospect

Implementation Schedule of Action Plan (Vigama)

Programme & Sub-Programme \ Year and Month in Order	Year 1												Year 2												Year 3	Year 4	Year 5
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	.....	.....	.....
Site Level																											
Community-Based Horticultural Development Programme																											
Agricultural Development																											
Vegetable Development																											
Yield Improvement																											
Expansion of Cropped Area																											
Provision of Supplemental Water for Cultivation																											
Fruit Development																											
Introduction of Advanced Seedlings																											
Proper Orchard Management																											
Strengthening on Marketing																											
Social Infrastructure Improvement																											
Improvement of Transport Means																											
Improvement of Community Activities		(Construction of Facilities)																									
District Level																											
Participatory Development Capacity Building Programme																											
Part 1 : Training for District & Extension Officers																											
Part 2 : Training for Group Leaders																											
Part 3 : Community Awareness Creation																											
District Seedling Farm Project																											
Seedling Distribution Programme		(Construction of Facilities)																									
Crop Diversification (Research)																											

7.5 Mwanambaya

7.5.1 Village Outline

The village is administratively called as Mwanambaya village, Tambani ward, Mkuranga division, Mkuranga district. The village consists of seven sub-villages, namely Kiloweko, Namangwa, Mizugu, Kiboneko, Mivule, Madado and Mabatini. Mwanambaya village is located at about 10 km north from Mkuranga township, along DSM-Kibiti highway. The distance to DSM is about 30 km.

There are 992 families living in the village. The total population is estimated at 4,464, with an average family size of 4.5. The population was 1,694 at the 1988 population census. Due to lots of migration, the annual population growth rate is estimated at 8.4 per cent in these 12 years. The present population density is 141 per km^2. Zamro tribe apparently stands first in population, but there are several tribes including Ndengereko in the village. More than two third of villagers are Moslem, and Christian is the second majority.

Demographic Condition in Mwanambaya Village

Item	
Total Population	4,464
Total Number of Households	992
Average Family Size	4.5
Total Land Area (ha)	3,200
Population Density (nos/km^2)	141

Source: JICA Study Team

Their staple foods are cassava and rice. The main sources of protein are beans and small dried fish. Only little animal protein is taken.

Almost all households live on farming. About 400 farmers grow paddy, and 300 farmers cultivate vegetables. Almost all farmers plant fruit trees as a cash income source. Only few villagers run small business such as charcoal dealing.

The land consists of hilly areas and valley bottoms. In the southeastern part of the village there is a peak with an elevation of 150 m. The western and northern parts are a broad valley at 75 m in elevation.

The farmland occupies about 50 per cent of the village territory. Almost all farmland is upland field and orchard. The paddy fields lie on the valley bottoms with the coverage of only 5 per cent of the total land area.

Agricultural Land Use in Mwanambaya Village

Land Use	Area (ha)		Percentage (%)
Total Land Area	3,238	(8,000 acre)	100
Total Farmland	1,619	(4,000 acre)	50
Upland Field and Orchard	1,457	(3,600 acre)	45
Paddy Field	162	(400 acre)	5
Others	1,619	(4,000 acre)	50

Source: JICA Study Team

The annual rainfall in this area is about 1,150 mm. The soil of the sloping farmlands is generally classified into brown loamy sand with good drainage. Soil capability is relatively low due to low fertility and low water availability.

A trunk road T7 "Dar es Salaam - Mkuranga" runs across centre of the village. It is not difficult to transport produe to Dar es Salaam through the road once farmers bring their produce out from farmland to the main road. A district road "Kiguza - Hoyoyo-Mvuti" is branched out from the T7 road passing into northern part of the village. It is also major transport way of the village.

The village is not electrified, and electrification has not planned yet. One tube-well have been constructed in the village by an Iranian NGO of Jihad Sazandeg, however farmers out of covering range of the well have no reliable water sources for drinking water supply at present within closing distance. Schools and dispensaries are available by the cooperation of the same NGO's cooperation.

7.5.2 Present Conditions of Horticulture

Mwanambaya village is classified into the fruit crop zone. The average farmers cultivate 0.53 ha (1.3 acre) for food crops, 0.04 ha (0.1 acre) for vegetables and 1.05 ha (2.6 acre) for fruit. Fruit is the most important for farmers' cash income, while food crops and vegetables are produced mainly for home use.

In the all valley bottoms, paddy is commonly cultivated during the rainy season. On the sloping field, cassava is widely planted. Maize is also planted there. The estimated areas of these three major food crops are 146, 243 and 73 ha (360, 600 and 180 acre), respectively.

Major fruits in this village are orange, lemon, coconut, mango, cashew and pineapple in the area of 1,012 ha (2,500 acre) in total. There are some well-managed mono-cropping fruit farms that are usually owned and managed by absentee landowner. Smallholder farmers' orchards are also relatively well maintained, but majority of them still has a room of

improvement. Some local farmers have started to plant passion fruit due to high demand in Dar es Salaam.

Vegetables, such as tomatoes, cucumbers, okras, eggplants and several kinds of leaf vegetables, are usually sown in the paddy field after its harvest. Almost all vegetables produced are consumed among the villagers. Application of chemical fertiliser and agro-chemicals is rarely practised among the farmers.

Estimates of Cropped Area in Mwanambaya Village

Crop	Area (ha)	Percentage (%)
Food Crops	486 (1,200 acre)	100
Paddy	146 (360 acre)	30
Cassava	243 (600 acre)	50
Maize	73 (180 acre)	15
Others	24 (60 acre)	5
Vegetables	40 (100 acre)	100
Tomato	8 (20 acre)	20
Cucumber	4 (10 acre)	10
Okra	4 (10 acre)	10
Eggplant	4 (10 acre)	10
Others	20 (50 acre)	50
Fruits	1,012 (2,500 acre)	100
Coconut	455 (1,125 acre)	45
Cashew	203 (500 acre)	20
Citrus	152 (375 acre)	15
Mango	101 (250 acre)	10
Others	101 (250 acre)	10

Source: JICA Study Team

The seat of VEO of Mwanambaya has remained vacant since the promotion of the former VEO to WEO of Tambani. WEO is in charge of all fields of agricultural support at 17 villages, of which only 8 villages have VEOs. Therefore, the farmers in Mwanambaya cannot receive the sufficient extension service, including farm input supply, technical guidance and market information.

Irrigation is hardly conducted in the village. In very minor cases, small water harvesting actions have been observed in the fruit crop farmlands when planting new trees and so forth. Rice cultivation is prominent in the valleys without irrigation during rainy season.

As mentioned above, major horticultural crops shipped from Mwanambaya village are citrus, pineapples, coconuts and cashew nuts. In the village, there are about 10 middlemen and almost all of them are farmers. The middlemen deal with all agricultural produce grown in the village except vegetables. Vegetables including amaranthus, tomatoes, okras and beans are produced mainly for private use, and the farmers sell the surplus by themselves at the

Mkuranga market and/or an open market when surplus exists. On the other hand, some traders come from Dar es Salaam, and the volume handled by the traders is about 30 per cent of the produce shipped from the village. The offered price of the traders is generally cheaper than that of the middlemen in the village, but farmers usually sell their produce to the trader/middleman who come to their house first.

In case of cashew nuts, the middlemen only collect cashew nuts and sell them to traders who come from Dar es Salaam with a license of the Cashew Board in Tanzania. In addition to the license fee of TSh. 60,000 per trader per year, traders have to pay a district license and cashew nut's levy. The district license fee and levy are fixed by district by-law.

The negotiation for buying fruit is usually done at farmers' field. There are three purchasing methods of fruit: whole tree basis, each fruit basis, and volume basis. Though pineapples and coconuts are normally traded on each fruit basis, citrus trading is dominated by whole tree basis.

The highest price of a tree with mature citrus is at TSh. 20,000 in the year of 1999/2000. On the other hand the labour fee for harvesting is fixed through negotiation, and is about TSh. 1,000 per day. Usually a truck or a pickup is used for transport with a rental charge of TSh. 30,000 - 40,000 a trip of the 3 - 5 ton truck, and TSh. 15,000 - 20,000 a trip of the pickup.

In case of citrus, large-scale middlemen usually ship about 1-1.5 tons of citrus collected through Mwanambaya and its surrounding villages every day in production season. They also ship pineapples about twice a weak with a full pickup truck in season. Generally, it is required about three to four days for the middlemen to sell out of a full pickup truck load of their fruit.

The approximate average prices of major fruit in each marketing stage in the year of 1999/2000 are as follows.

Average Prices of Crops in 1999/2000

(Unit: TSh.)

Products	Farmer's Price	Middleman's Price	Consumer's Price
Citrus (each)	4 - 5	8 - 12	15 - 20
Pineapple (each)	100 - 150	250 - 300	350 - 400
Cassava (ton)	10,000	20,000 - 25,000	30,000 - 35,000

The major marketing constraints indicated by the farmers in Mwanambaya village are; a) low prices of produce, b) lack of market, only Kariakoo market is available, and c) lack of capital.

7.5.3 Development Prospect

(1) General

Mwanambaya is situated in the vicinity of Dar es Salaam connected by a paved trunk road. Fruit cultivation is relatively advanced. Furthermore, electricity service will start from next year. It can be said that this village has a great possibility for development. The village must utilise this favourable situation.

The advantageous characters of the village are as follows:

- The trunk road to Dar es Salaam
- Abundant precipitation
- Advanced fruit cultivation: One reason for the advanced cultivation is that there are many large-scale farmers who contrive means of farming to benefit more from both cultivation and marketing. Small-scale farmers should learn such means from them.
- Social infrastructure is not enough but has been equipped more than other areas, namely the village has a school and a dispensary, and electricity is coming in the next year.

On the other hand, there are some weak points:

- There are many large farmlands owned by absentee landowners. It means that there are many landless peasants especially in women and young men.
- Soil erosion due to heavy rainfall.

(2) Participatory rural Appraisal (PRA)

In PRA, the following techniques and tools were used: Village Resource Mapping, Transect Walk, Focus Group Discussion by Gender and Age, Community Needs Ranking and Participatory Community Planning. The result of PRA is reflected in the Action Plan.

Followings are the problems found in PRA.

- Lack of input
- Unfavourable marketing conditions and price
- Unreliable extension services
- Existence of vermin/thieves
- Lack of capital as a result of poverty situation in the community
- Poor health services
- Lack of clean and safe domestic water supply
- Presence of landless villagers among youth and women

Landless people are characteristic of this village. It is caused by the existence of many large-scale farmers and patriarchal system of land inheritance.

The followings are the results of Participatory Community Planning in PRA:

Credit facilities for farm inputs

They need credit facilities to obtain the input. They also said that the credit should not be in cash but rather in kind (input).

Group formation

The farmers stressed that grouping was essential as security for credit raising and repayment, as easy access to extension services and as a measure of standing on a better position in the market. They consider that the groups would be small ones at the beginning and later on become bigger ones with the combination of small groups.

Fruit tree nursery by women and youth groups

They indicated their willingness to form a group of either women or youth to raise fruit seedlings for sale. The village leadership reiterated that a plot for the tree nursery could be easily allocated to the groups when everything has been set.

(3) Development Prospect in Agriculture

In compliance with the aforementioned results of PRA and information and data concerning the village collected, the followings were recommended for this village.

Fruit

As further improvement of fruit production and quality management is a key issue of the horticultural development in this village, replacement of old trees by certified seedlings, enforcement of proper orchard management, improvement of the grade of marketable produce and launch of group marketing of fruit are promoted. Citrus, mango and passion fruit shall be promoted as main target fruit.

Vegetables

Both increase in production and expansion of the cropping areas shall be encouraged.

Others

Introduction of contour farming shall be promoted.

As a conclusion, it is believed that Mwanambaya has a great potentiality for horticultural

development, provided that the aforementioned is realised. Electricity to be introduced near future may give a chance for villagers to begin food processing and will contribute to the development in general. Moreover, the followings will contribute to bringing the potential out. 1) This village should utilise the aforementioned advantageous characters to pull up the living standard. 2) Further installation of social infrastructure shall be expedited. 3) Quality standardisation of fruit should be accelerated to obtain more benefit from Dar es Salaam markets where people are relatively aware of quality of goods. 4) Agriculture must be strengthened with administrative and donors' support on technology, marketing, credit, extension, etc. 5) Small-scale farmers should be consolidated in a group activity to compete against large-scale farmers.

Mwanambaya should target more advanced fruit production, together with farming of other crops for home consumption.

7.5.4 Action Plan

The Action Plan for the development in Mwanambaya is formulated in consideration of present achievement, constraints and potential, as well as the results of PRA. The Action Plan is described in the following table, in which the underlined procedures will be covered in the Project.

Action Plan for Horticultural Development in Mwanambaya

Sector	Item	Plan	Target	Method	Procedure	Period
Agricultural Development	Vegetable Development	Yield Improvement	To increase unit yield rate of vegetables.	To use certified seeds and (organic) fertiliser, reduce water stress and practice pest and disease control. To provide technical guidance to smallholders.	To strengthen extension services through capacity building programme.	4.5 years
		Expansion of Cropped Area	To expand area for vegetable cropping to increase its production.	To provide technical guidance to smallholders.	To strengthen extension services through capacity building programme.	4.5 years
		Provision of Supplemental Water for Cultivation	-	To install water harvesting bunds.	To be assessed the methods by the Verification Study. To be realised through self-reliance of farmers (Guideline).	4 years
	Fruit Development	Introduction of Advanced Seedlings	To replace old trees with advanced seedlings.	To introduce certified seedlings from Sokoine University.	To provide certified seedlings produced at District Seedling Farm or farmers' group in the area.	4 years
		Proper Orchard Management	To enforce proper orchard management for improvement of products and pest and disease control.	To disseminate orchard management practices such as pruning, slashing and pest and disease control.	To demonstrate proper orchard management at District Seedling Farms. To strengthen extension services through capacity building programme.	4 years
		Strengthening on Marketing	To endow the smallholders with bargaining power.	To support to organizing groups. To provide market information.	To strengthen extension services through capacity building programme.	3 years
Environmental Conservation	Soil and Water Conservation	Soil Erosion Control	-	To decrease erosion and soil lost and increasing land usability by simple measures.	To assess improvement method by Verification Study. To be realised through self-reliance of farmers (Guideline).	Future Prospect

Implementation Schedule of Action Plan (Mwanambaya)

Programme & Sub-Programme \ Year and Month in Order	Year 1												Year 2												Year 3	Year 4	Year 5
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	.....	.....	.....
Site Level																											
Community-Based Horticultural Development Programme																											
Agricultural Development																											
Vegetable Development																											
Yield Improvement					▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Expansion of Cropped Area					▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Provision of Supplemental Water for Cultivation													▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Fruit Development																											
Introduction of Advanced Seedlings													▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Proper Orchard Management													▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Strengthening on Marketing																									▪▪▪	▪▪▪	▪▪▪
District Level																											
Participatory Development Capacity Building Programme																											
Part 1 : Training for District & Extension Officers	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Part 2 : Training for Group Leaders					▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Part 3 : Community Awareness Creation							▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
District Seedling Farm Project																											
Seedling Distribution Programme		(Construction of Facilities)					▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪
Crop Diversification (Research)							▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▪▪▪	▪▪▪	▪▪▪

Chapter 8 Conclusion and Recommendations

8.1 Conclusion

The Study Team finds it possible to alleviate poverty prevailing in the Region by means of developing horticulture in the area though there are various constraints and difficulties, and years would be required to achieve this goal.

In order to achieve the goal envisaged, the following four programmes are proposed in the Master Programme.

I Community Based Horticultural Development Programme
II Participatory Development Capacity Building Programme
III District Seedling Firm Programme
IV Rural Transport Improvement Programme

Programme III and IV indirectly support Programme I, and Programme II synthetically supports Programme I, III and IV. Each programme consists of some sub-programmes. The sub-programmes are working items and are used as tools to draw up Action Plans.

Viziwaziwa and Mwanabwito (Kibaha District) were selected as priority sites where vegetable farming is promoted, and Vigama (Kisarawe District) and Mwanambaya (Mkuranga District) for fruit farming promotion.

Action Plans were drawn up for the priority sites using the sub-programmes of the Master Programme. Farmers will implement the Action Plans by participatory way. The Action Plans describe models of horticultural development in the priority sites, and will provide farmers living in other places than the priority sites with good information to implement the horticultural development.

8.2 Benefits and Project Impacts

It is expected that the Project will generate indirect benefits and scio-economic impacts, in addition to direct improvement effects such as increase of income, better supporting services, improved transport and others, though not fully quantified at this stage. Some of effect often ignored in ordinary project evaluation are briefly explained below:

(1) Improvement of Farmers' Farming Technique

With the Input Credit Programme, the farmers will be provided with guidance of farming technique, as well as agricultural chemicals, farm implements and others, in order to successfully achieve the programme. It will also contribute to farmers' farming technique.

(2) Farmers' Self-reliance

In this Project, many of the programmes prepared are carried out by farmers in participatory way, and the farmers have to do most of the things by their own effort and resources. Therefore, farmers' stance of self-reliance will be strengthened through implementation of the Project.

(3) Village Invigoration

The Input Credit Programme will substantially realise flourishing horticultural farming in the area, and the Participatory Development Capacity Building Programme will contribute to create farmers' awareness on their rural development. This in turn will vitalise farmers' activity and will provide village invigoration, resulting in poverty alleviation.

8.3 Recommendations

The manpower and financial supports by the Districts are inevitable to implement the Project effectively and efficiently. Adequate allocation of manpower and budget is highly recommended even though taking into consideration the present budgetary conditions of the Districts.
Full supports by the Districts are needed especially for establishment of organisations for input credit, capacity building of districts officers and extension officers and operation of District Seedling Firm Programme.

Insufficient existing basic data in the Districts greatly hampered smooth execution of the Study. Thus collection of basic data is to be taken as an important activity in the Project. Collection of basic data by the Tanzanian Government itself is recommended as such data are inevitable not only for this Project but also for various studies and their evaluations that may follow.

The Master Programme proposes new development ideas and is carried out by farmers with participatory manner. Therefore, verification studies are believed highly required in order to

avoid ineffectiveness and inefficiency at the time of project implementation. The results of the verification studies have to be reflected to the whole of project planning and execution. On the job training is to be carried out through the verification studies, and the counter parts are provided with the excellent opportunity for the technical transfer. It is recommended that the verification studies will be fully utilised for technical transfer.

Improvement of district and feeder roads is very important for rural development, and promotion of farmers' participation in maintenance and rehabilitation of such roads by external aid organisations is emphasised in the Project. However, implementation of road rehabilitation is beyond this Project, and a new project for the rehabilitation, consequently, is recommended to be drawn up separately in accordance with the results of the Study.

Chapter 9 The Verification Study

The Master Programme proposes new development ideas such as input credit, introduction of new produce and formation of groups under the Project. It is important for policy makers and donors to examine and confirm their technical and financial viability and sustainability before final decision-making especially for new development ideas that may include some unforeseeable factors.

The Master Programme has the following salient features:

- The Master Programme will be implemented on the condition of people's participatory development, which requests poor and low technical farmers to share the project cost.
- The Master Programme contains new tools like input credit and group formation of farmers, which may face some difficulties.
- There are tools like input credit or capacity building that will take a long time span before getting the results of the activities.
- Grouping is of great importance in the Master Programme but it is not easy to give farmers the incentive of grouping.
- Some technical issues should be verified; for instance, excavation of watering pits, a contour ditch, rain catch facilities and improvement of water intake.

Under such circumstances, it is recommended to carry out a sort of verification study. The Verification Study is expected to prove the viability of individual project components and reveal unforeseeable constraints, if any, for finalisation of the Master Programme and the Action Plans for the priority sites, providing in-depth study results. The study team proposes the following eight (8) study items as major key components of the Verification Study and urges necessity of administrative and financial arrangement for their implementation.

Summary of the Verification Study is shown next. Contents, scope and details of the study are further to be decided in consultation with the Tanzanian side and JICA.

9.1 Input Credit

Farm inputs as seed, fertiliser and chemicals are supplied in the style of credit in kind to farmers. The following two are main subject to be verified;

- Procedure of application, lending and delivery, repayment, etc.
- Function of organisational institutions

9.2 Improvement of Water Facilities

Kisima

Some typical shallow pits will be selected in the priority sites in order to find the most appropriate shape of Kisima (shallow pit). The operation method better fitted to local conditions will be studied with this pit. Then the existing pits will be modified to such a shape as found for the model pit. Finally a standard design of the shallow pit will be developed.

Intake Facilities

Improved intake facilities will be installed at the existing ponds selected. The service performance of model facilities will be studied through monitoring during the rainy and dry seasons, aiming at finding the best-suited intake facilities to the local conditions.

Removable Pump

The most useful type of removable pump will be introduced in order to take water from the existing ponds, and verify its function including operation cost and others.

9.3 Application of Bund Water Harvesting for Agriculture

Rainwater harvesting bunds with necessary drains will be constructed in typical sloping areas in villages of the fruit crop zone in order to catch the supplemental water and to prevent soil erosion. Then, the effectiveness of a rainwater harvesting and/or runoff farming technology is studied more in detail. Also, through periodic monitoring of the facilities, fitness of this method to the local conditions and its appropriate operation and maintenance will be examined.

9.4 Collection of Basic Village Data

When a development project is implemented, evaluation must be performed periodically and after the project. In this case, basic data are essential because the comparison of situations before and after the project is an indispensable practice of project evaluation. Almost every village in the Region has no basic data at all today. This situation makes such evaluation impossible. Though basic data is required for all over the Region, it is recommended, for the sake of making workload less, to begin such data collection in the four priority sites first. After verifying the effective method of data collection, it should be expanded to other areas. Extension workers should perform this practice, as the study itself is a kind of their capacity building.

9.5 Training for PCM Moderator & PRA Facilitator

PCM and PRA were used as tools for Participatory Development Capacity Building Programme in the Study in many occasions, and PRA was found very effective for capacity building for the villagers. In order to effectively use these tools in the Action Plans, it is an urgent issue to train sufficient number of PCM moderators and PRA facilitators. As a part of Participatory Development Capacity Building Programme, training of 20 officers for PCM moderator & PRA facilitator is carried out during the course of the verification study.

9.6 Promotion of Group Activities by means of Community Facilities (Multipurpose Shed, Rice Polisher, Flour Mill)

A multipurpose shed is one of the most important infrastructure to promote and facilitate the capacity building in a village. In many villages, however, a school building is the main meeting place for villagers. Sometimes a place under trees or an office of a political party is used for that purpose. This situation has to be improved in order to make their assembling easier and frequent by constructing the multipurpose shed. The usefulness of such a shed will be looked into, as well as the consensus and/or decision-making process at village level. Accounting works of input credit will also be done at an office set up in the shed.

In the verification study, the following subjects will be verified:

- Use of the shed
  It is studied whether the shed is used only for the meeting or other usage as shipping works for produce and/or small market.
- Atmosphere of the village
  The study will monitor how the atmosphere of the village changes after the shed construction.
- Gender issue in the village
  It is also studied whether villagers observe the rules about use of the shed. For example, in order to use the shed properly and productively with fair chance to every eligible people, it appears that the schedule of use should give more attention especially to women. The performance is to be monitored. This is an opportunity to verify if they utilise the shed in a proper and democratic manner in a sense and to make village people disciplined.

9.7 Seedling Production and Distribution

For the purpose of distributing better seedlings to farmers, the District Seedling Farm will produce superior seedlings of fruit and cashew nuts. The superior seedlings will be extended through farmers' group nurseries. The procedure and function are to be developed, as well as

identifying best suited seedling to the area..

In order to bring new kinds of vegetables like onions, potatoes, carrots and high price melons which have seldom been cultivated in the Region, adaptability test will be carried out on them. According to the test results, standard cultivation scheme will be established, and will be disseminated through the existing channel of agricultural extension.

9.8 Farmers' Training

Introduction of superior seedlings and new kinds of vegetables is planned in this Project by means of District Seedling Farm Programme. One district seedling farm is made in each district, and is just a spot for the whole district. In order to expand the Project, farmers' training is inevitable. The farmers' training is to be carried out in collaboration with Sokoine University of Agriculture and Tengeru Horticultural Institute in the verification study.