

LEGEND







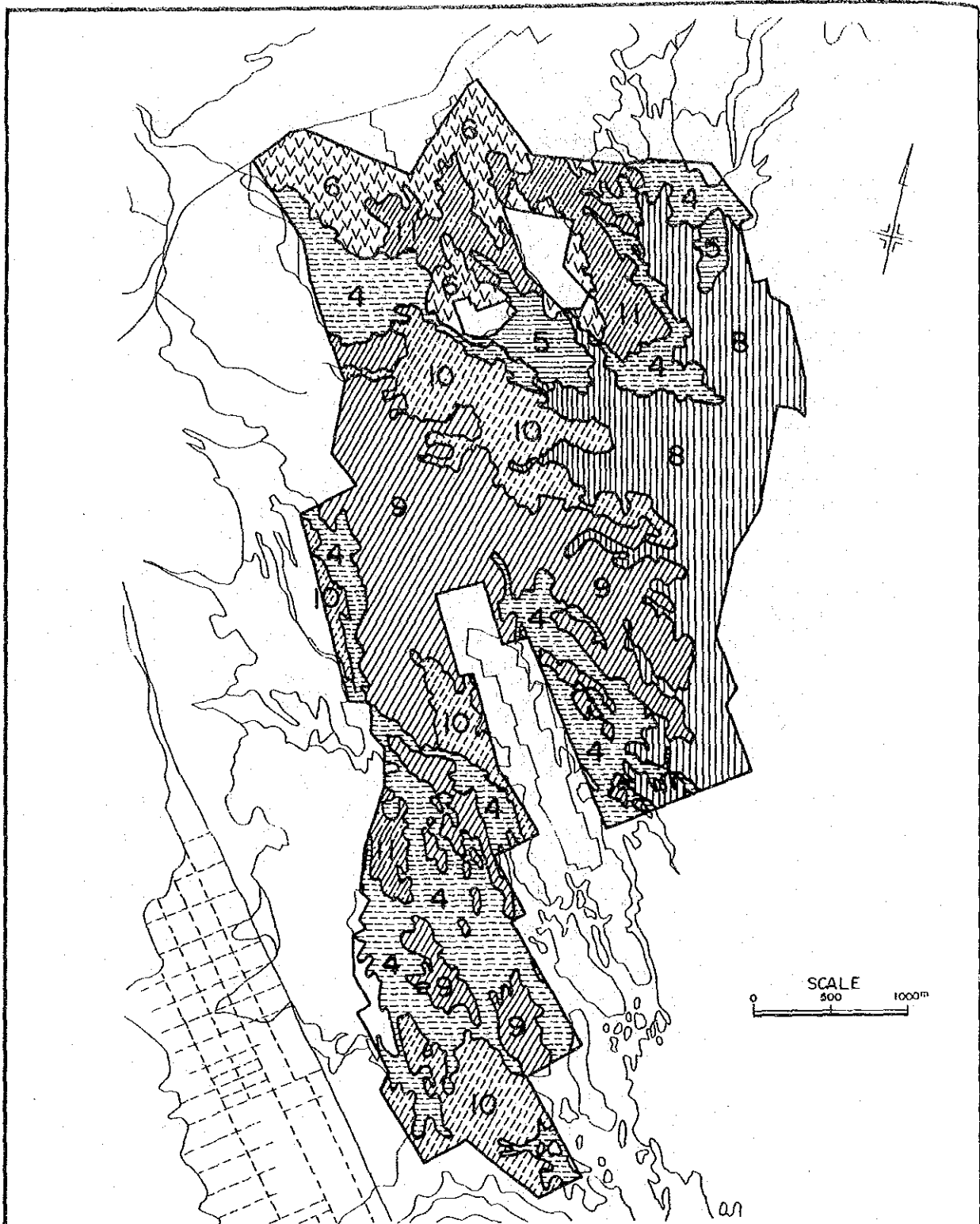
Typic Ustifluvents - Sand mineral soils	1		Typic Ustorthents - Alkaline soil	6	
Vertic Ustifluvents - Clayey, calcareous strong alkaline soils	3		Lithic Ustorthents - Sandy skeletal soils	7	
Mollic Fluvaquents - Clayey, strong alkaline, low humic soils	4		Typic Tropaquents - Clayey, alkaline soils	9	

Fig. C-2 (1/5) SOIL MAP (KISIWANI SCHEME)



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- | | | | |
|--|---|---------------------------------|----|
| Mollic Fluvaquents | 4 | Typic Ustipsamments | 8 |
| - Clayey, strong alkaline, low humic soils | | - Alkaline soil | |
| - Clayey, alkaline/saline, low humic soils | 5 | Typic Tropaquepts | 9 |
| Typic Ustorthents | | - Clayey, alkaline soils | |
| - Alkaline soil | 6 | - Clayey, alkaline/saline soils | 10 |
| | | Fluentic Ustropepts | |
| | | - Clayey mineral soils | 11 |
| | | | |

Fig. C-2 (2/5) SOIL MAP (GONJA SCHEME)

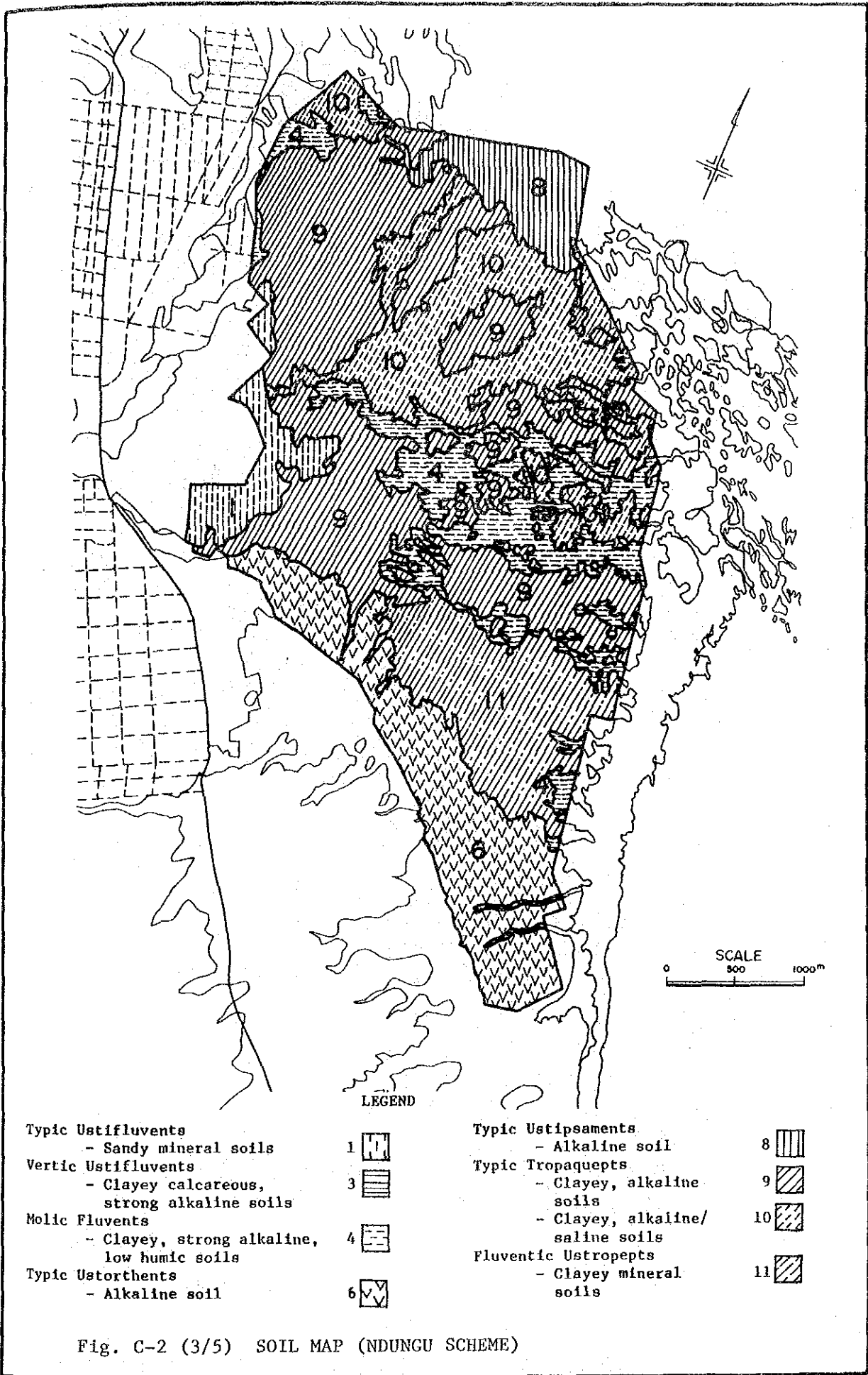


Fig. C-2 (3/5) SOIL MAP (NDUNGU SCHEME)

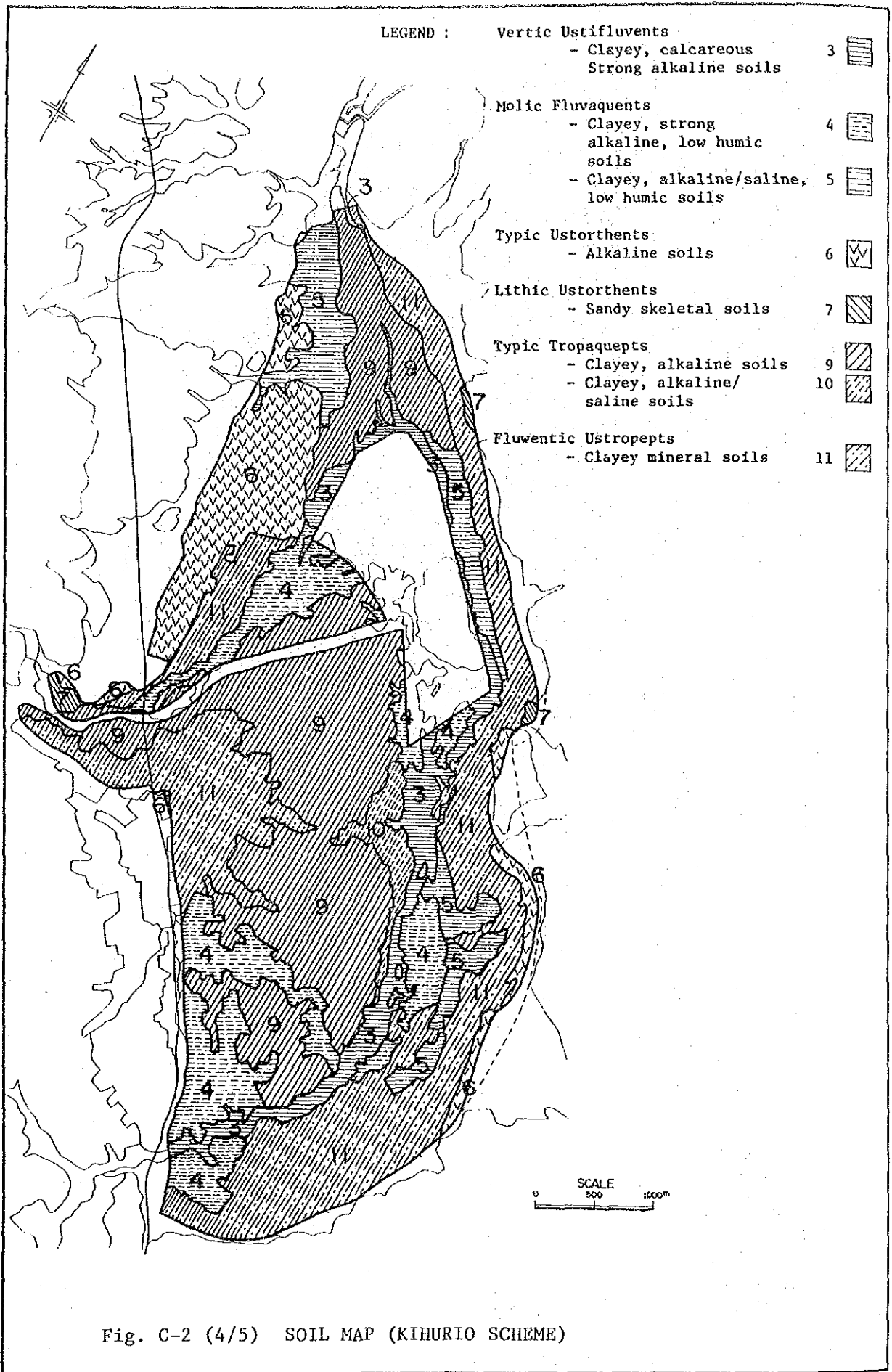
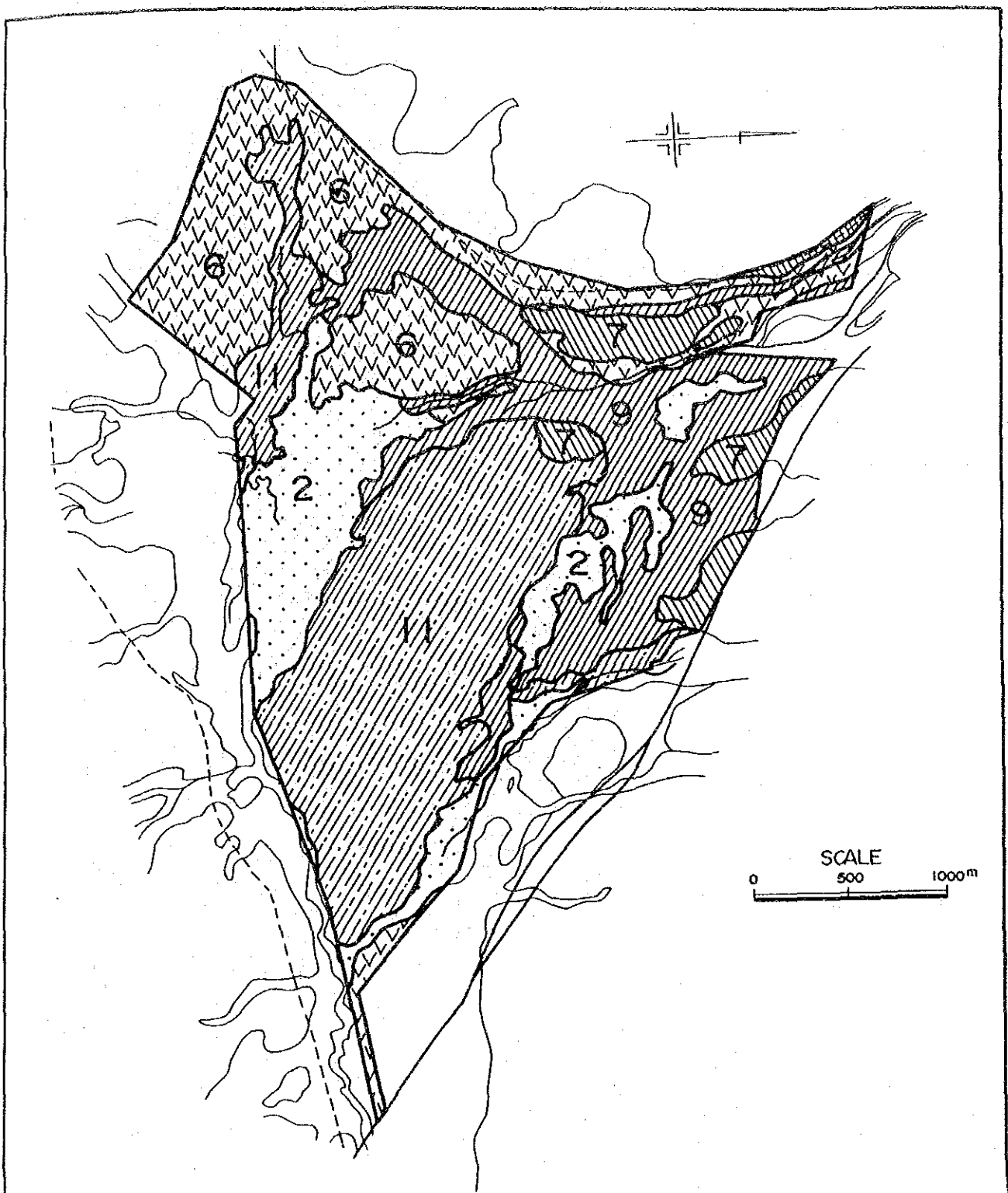


Fig. C-2 (4/5) SOIL MAP (KIHURIO SCHEME)



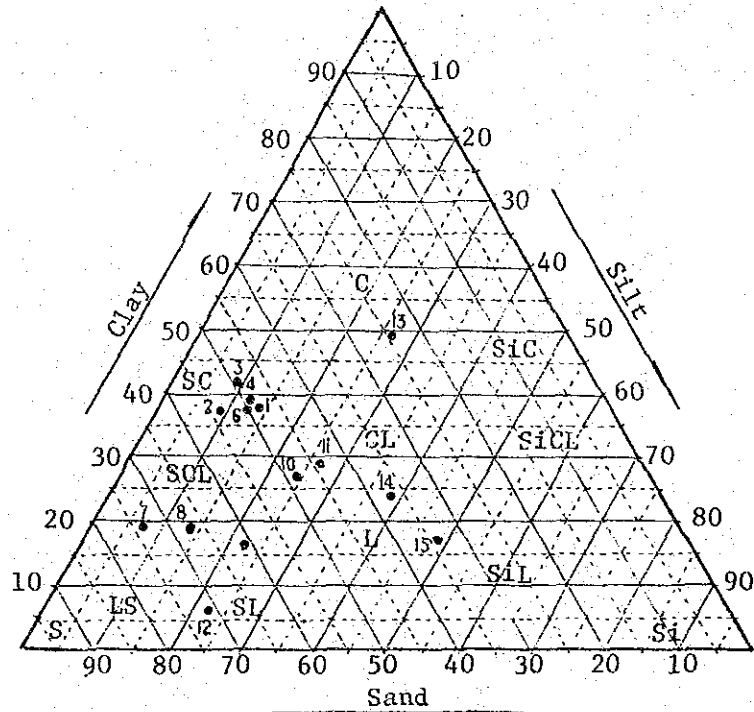
SCALE
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- | | | | | | |
|--|---|--|---|----|--|
| Mollic Ustifluvents
- Lomy, calcareous
low humic soils | 2 | | Typic Tropaquepts
- Clayey, alkaline soils | 9 | |
| Typic Ustorthents
- Alkaline soil | 6 | | Fluentic Ustropepts
- Clayey mineral soils | 11 | |
| Lithic Ustorthents
- Sandy skeletal soils | 7 | | | | |

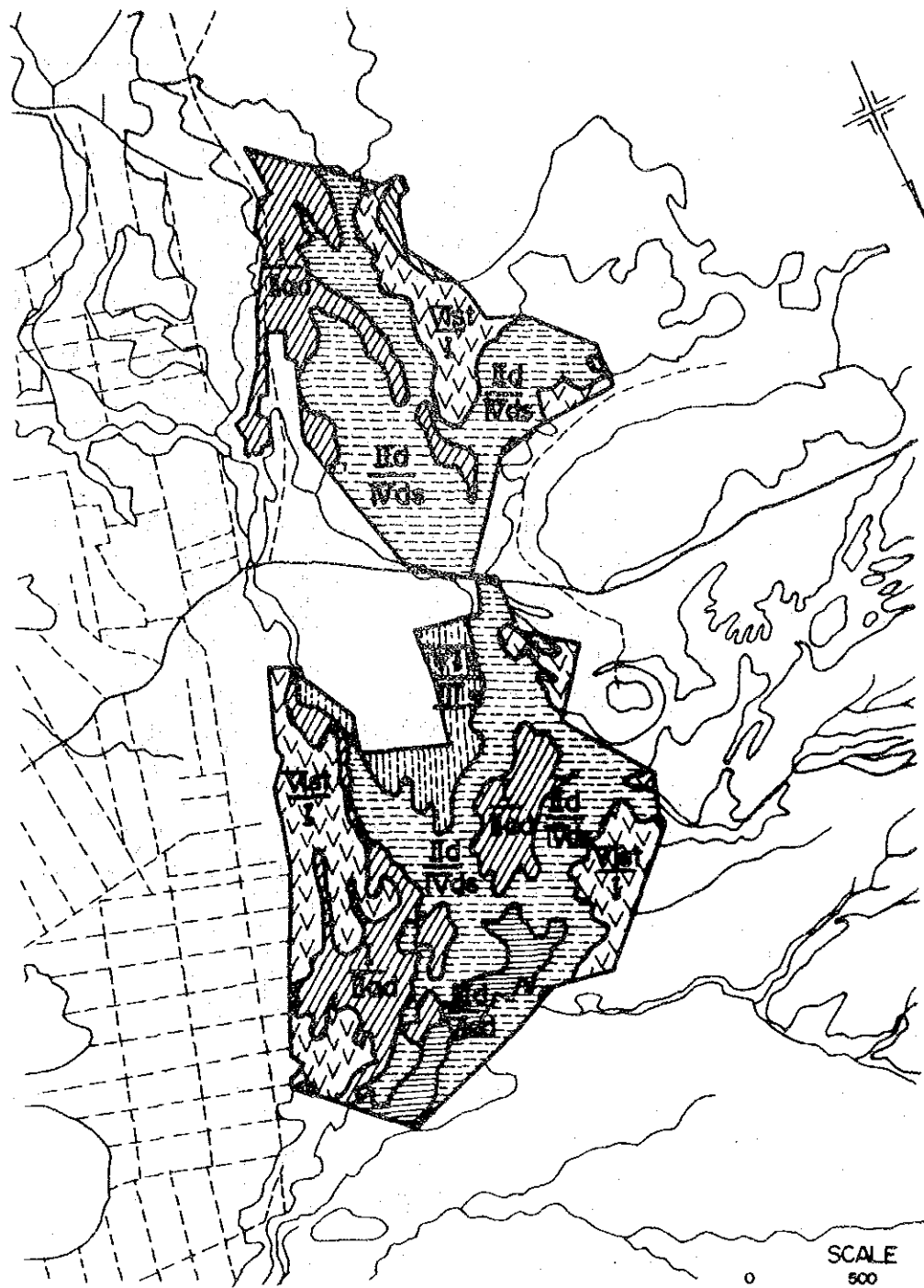
Fig. C-2 (5/5) SOIL MAP (IGOMA SCHEME)

(U.S.D.A. STANDARD)



Serial No.	Sample No.	Particle Size Distribution (%)				Texture Quality	Specific Gravity
		Coarse Sand	Fine Sand	Silt	Clay		
1	9-1	20.0	27.98	14.33	37.49	Sandy clay	2.366
2	9-2	23.67	29.60	9.90	36.84	Sandy clay	2.411
3	10-1	22.09	27.35	9.04	41.52	Sandy clay	2.393
4	10-1(S)	19.54	27.73	13.61	39.13	Sandy clay	2.410
5	10-2	23.27	24.63	17.29	34.81	Sandy clay loam	2.424
6	10-3	25.79	23.22	13.31	37.68	Sandy clay	2.424
7	20-1	23.81	43.22	13.62	19.35	Sandy loam	2.601
8	20-2	28.53	44.41	8.35	18.71	Sandy loam	2.621
9	20-3	25.26	35.42	16.25	23.07	Sandy loam	2.575
10	28-1	9.61	38.53	24.46	27.40	Sandy clay loam	2.511
11	28-2	6.24	38.20	27.15	28.41	Clay loam	2.535
12	28-3	28.17	42.18	23.36	6.295	Sandy loam	2.367
13	36-1	4.32	20.09	26.69	48.90	Clay	2.193
14	36-2	5.39	31.15	39.06	24.40	Loam	2.231
15	36-3	6.94	27.15	49.81	16.10	Loam	2.517

Fig. C-3 SOIL PARTICLE SIZE DISTRIBUTION AND TEXTURE CLASSES

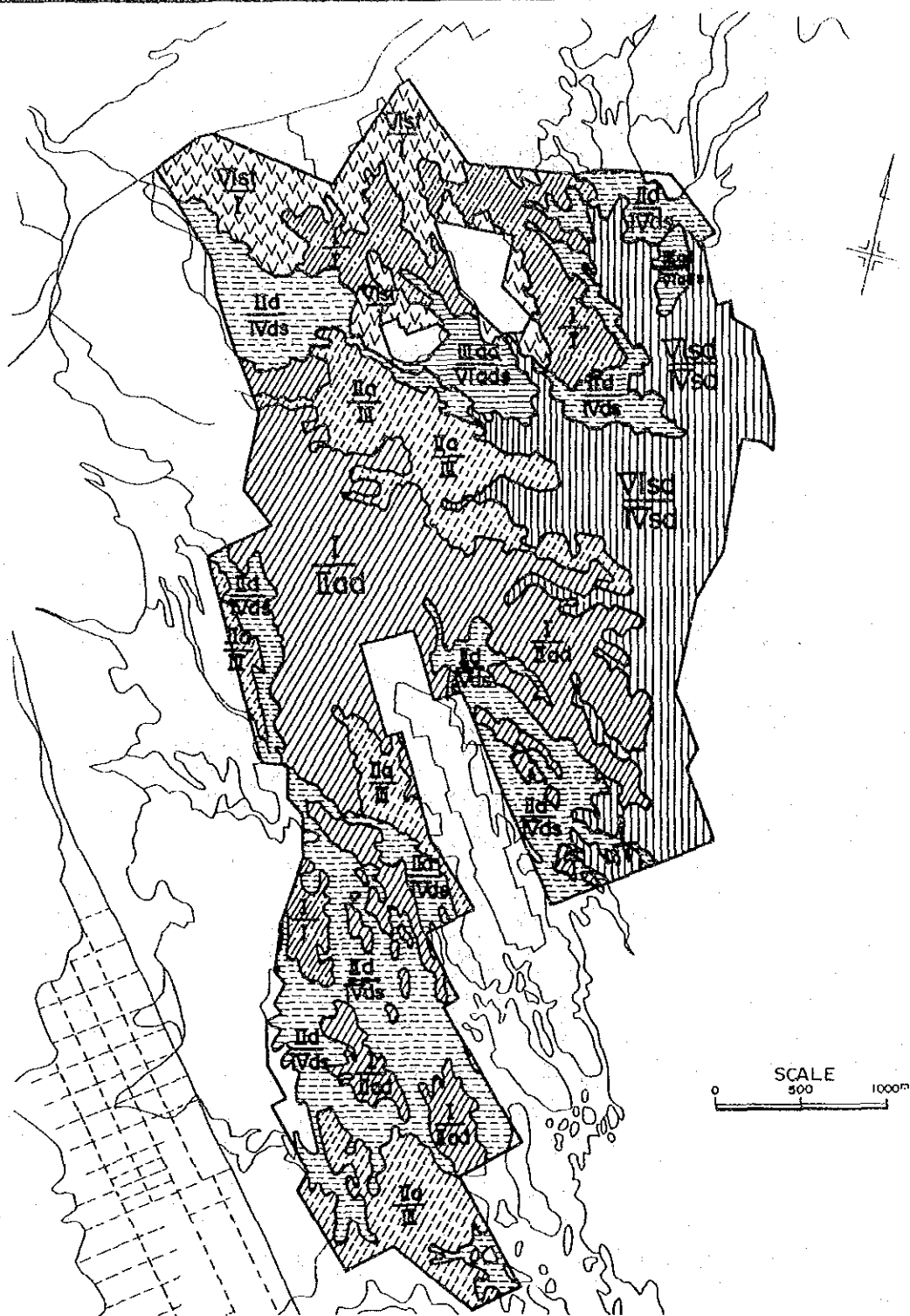


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Soil Families (Soil No.)	Land Classification		Acreage (ha)	Soil Families (Soil No.)	Land Classification		Acreage (ha)
	For Paddy	For Upland crop			For Paddy	For Upland crop	
1	VIIs	VIIs	25	6	VIs	I	75
3	IIIId	VIad	20	7	VIs	VIs	5
4	IIId	IVds	200	9	I	IIId	95
				Total			420

ex.) VIs - For Paddy
 I - For Upland crop

Fig. C-4 (1/5) LAND CAPABILITY MAP (KISIWANI SCHEME)

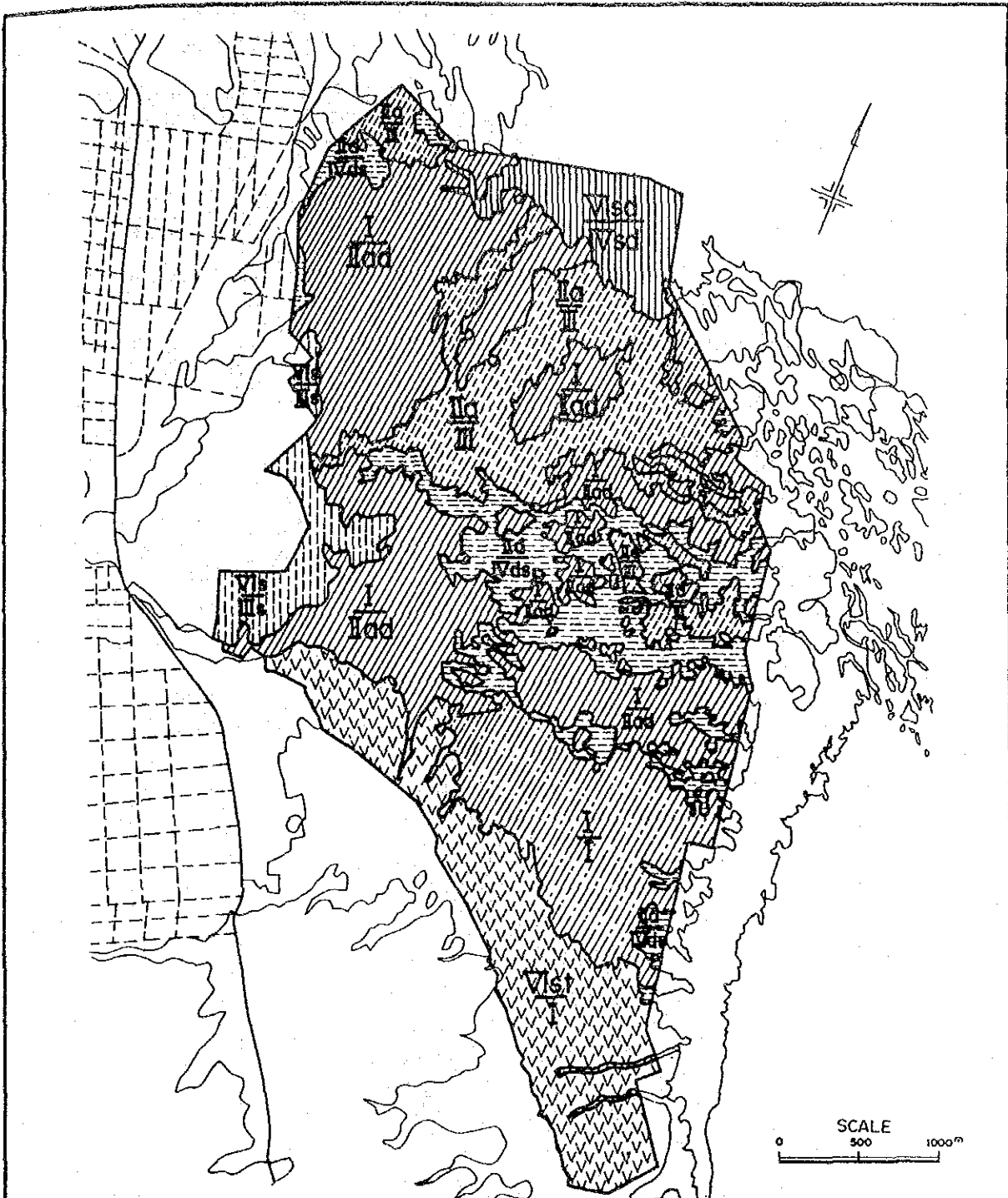


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Soil Families (Soil No.)	Land Classification		Acreage (ha)	Soil Families (Soil No.)	Land Classification		Acreage (ha)
	For Paddy	For Upland crop			For Paddy	For Upland crop	
4	IId	IVds	335	8	Vist	IVsd	255
5	IIIad	VIads	40	9	I	IId	340
6	Vist	I	105	10	IIa	IIIad	180
				11	I	I	105
			Total			1,360	

ex.) Vist - For Paddy
 I - For Upland crop

Fig. C-4 (2/5) LAND CAPABILITY MAP (GONJA SCHEME)



LEGEND

Soil Families (Soil No.)	Land Classification		Acreage (ha)	Soil Families (Soil No.)	Land Classification		Acreage (ha)
	For Paddy	For Upland crop			For Paddy	For Upland crop	
1	VIe	IIIs	55	8	VIst	IVsd	60
3	IIIId	VIad	5	9	I	IId	475
4	IId	IVds	160	10	IIa	IIIad	210
6	VIst	I	205	11	I	I	170

ex.) VIst - For Paddy
 I - For Upland crop

Total 1,340

Fig. C-4 (3/5) LAND CAPABILITY MAP (NDUNGU SCHEME)

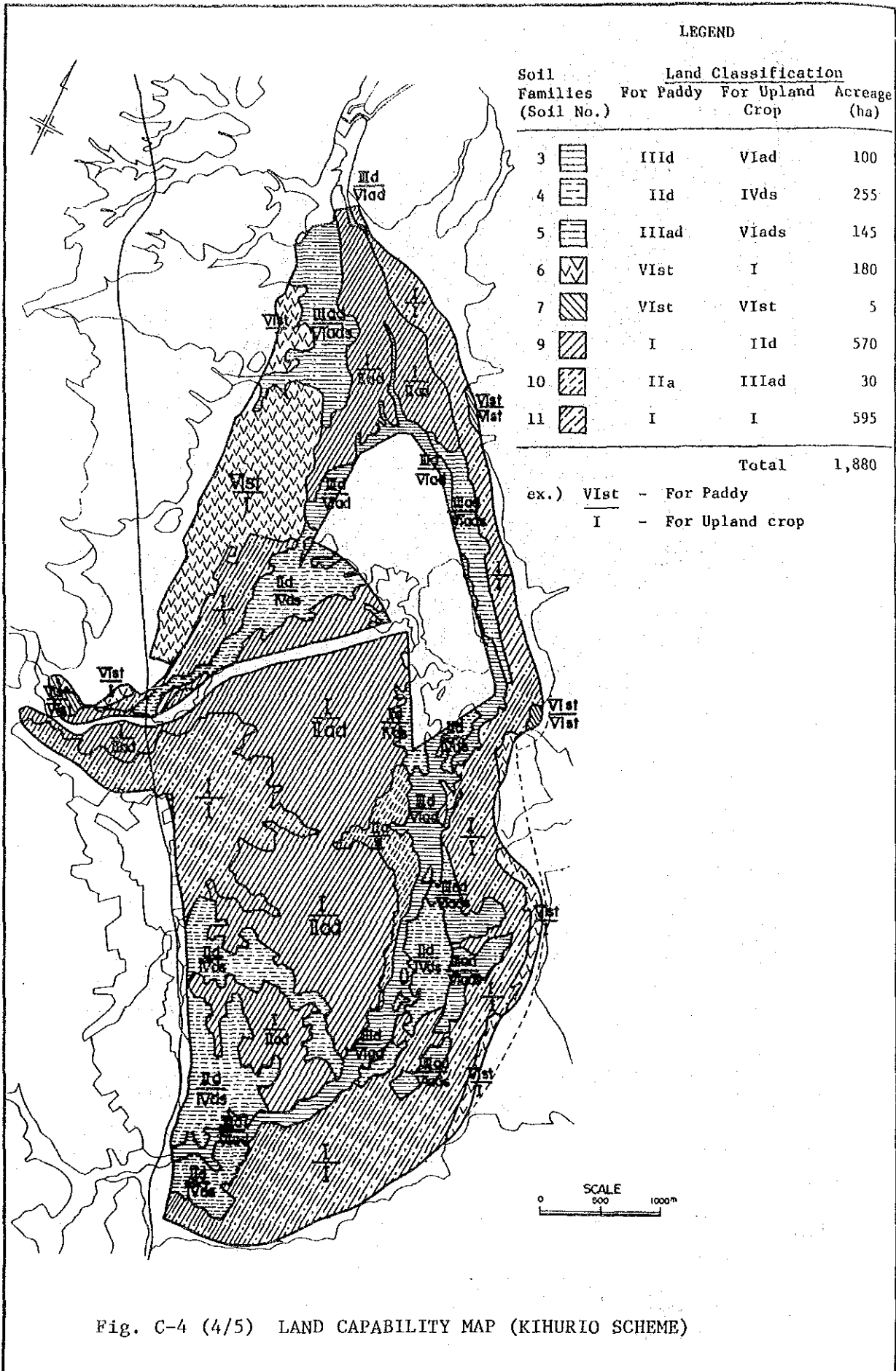
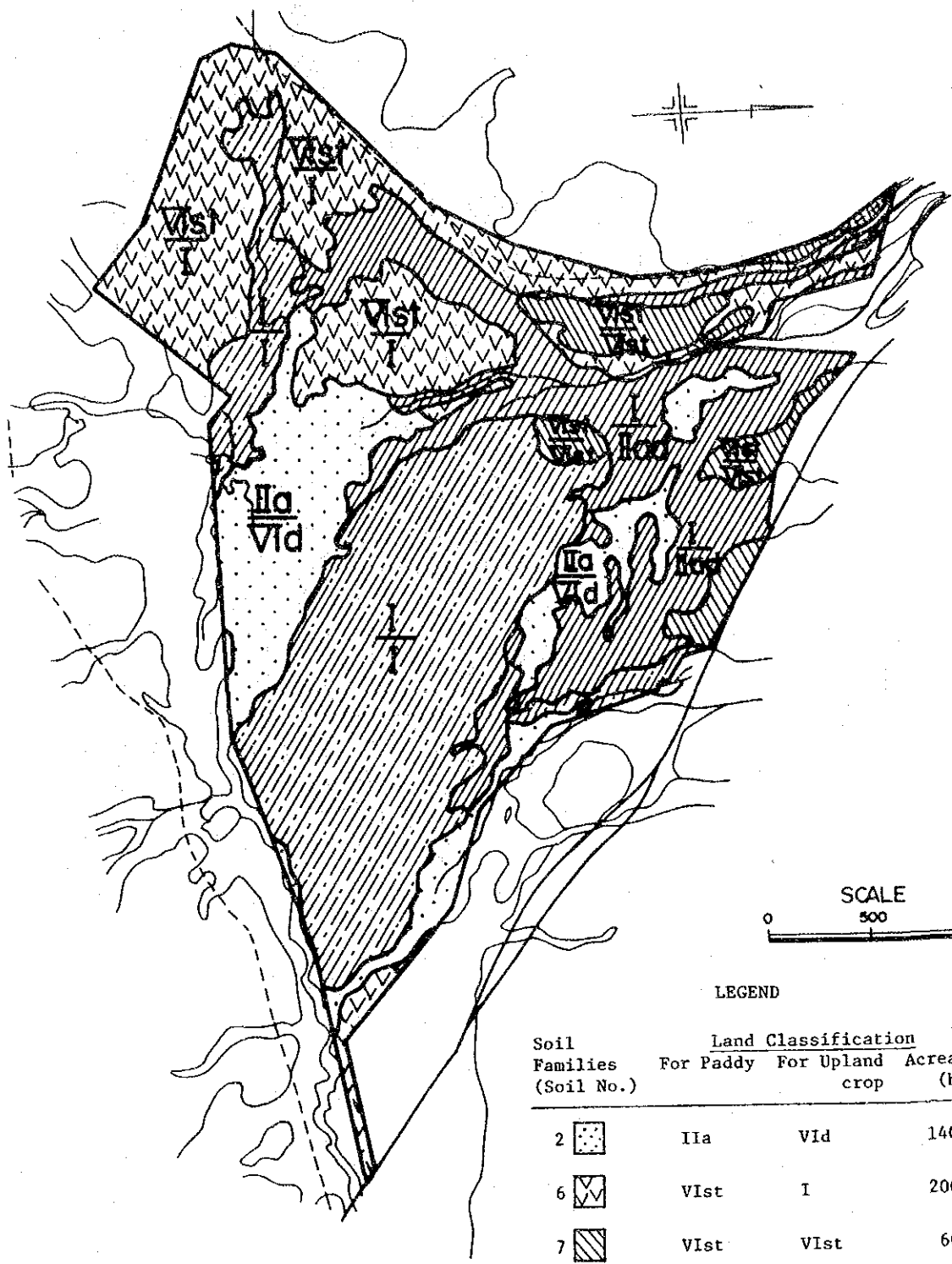


Fig. C-4 (4/5) LAND CAPABILITY MAP (KIHURIO SCHEME)



LEGEND

Soil Families (Soil No.)	Land Classification		Acreage (ha)
	For Paddy	For Upland crop	
2	IIa	VIId	140
6	VIst	I	200
7	VIst	VIst	60
9	I	IIId	70
11	I	I	290
Total			860

ex.) VIst - For Paddy
 I - For Upland crop

Fig. C-4 (5/5) LAND CAPABILITY MAP (IGOMA SCHEME)

ANNEX D

PRESENT

SOCIO-ECONOMIC CONDITIONS

ANNEX D

PRESENT SOCIO-ECONOMIC CONDITIONS

CONTENTS

	Page
1. GENERAL	D-1
2. GENERAL SOCIO-ECONOMIC CONDITIONS	D-2
2.1 Socio-economic Indices of Tanzania	D-2
2.2 Socio-economic Features of Kilimanjaro Region	D-3
2.2.1 Land and population	D-3
2.2.2 Administrative organization	D-3
2.2.3 Infrastructure	D-5
3. AGRICULTURAL ECONOMY	D-7
3.1 Agricultural Setting and Production	D-7
3.1.1 Agricultural setting	D-7
3.1.2 Crop production	D-7
3.1.3 Livestock	D-8
3.2 Land Tenure and Land Settlement	D-9
3.3 Marketing and Food Balance	D-10
3.3.1 Marketing and price	D-10
3.3.2 Foreign trade and food balance	D-10
4. AGRICULTURAL SUPPORTING SERVICES	D-12
4.1 Researches	D-12
4.2 Training	D-12
4.3 Extension	D-13
4.4 Credit	D-14
4.5 Farm mechanization programme	D-14
4.6 Farmers' organization	D-16
4.7 Supply of farm inputs	D-16

LIST OF TABLES

		Page
D-1	Gross Domestic Product of Tanzania	D-19
D-2	Gross Domestic Product at Factor Cost by Industrial Origin (at 1966 Prices)	D-19
D-3	Proportion of Agricultural Products to Tanzania Trade in Value	D-20
D-4	Basic Socio-Economic Data in Kilimanjaro Region and Same District	D-21
D-5	Comparison of Land and Population between Highland and Lowland Area of Same District	D-22
D-6	Number of Medical Personnel in Kilimanjaro Region in 1976 and 1981	D-23
D-7	Number of Medical and Health Facilities in Kilimanjaro and Same District in 1981	D-23
D-8	Annual Precipitation and Land Utilization in Kilimanjaro ..	D-24
D-9	Food Crop Production in Tanzania	D-24
D-10	Coffee Production in Kilimanjaro Region	D-25
D-11	Cotton Production in Kilimanjaro Region	D-25
D-12	Area Cultivated, Yield and Production of Major Food Crops in Tanzania and Kilimanjaro Region in 1979	D-26
D-13	Major Crops Collected by National Milling Corporation in Kilimanjaro Region and Same District	D-27
D-14	Production and Trade of Major Crops in Tanzania from 1978 to 1980	D-28
D-15	Trade Balance of Agricultural Products in Tanzania	D-28
D-16	Crop Balance of National Milling Corporation for Major Crops in Kilimanjaro Region	D-29
D-17	TRDB Total Loan Disbursement to Sectors in Kilimanjaro Region and Same District (1971/72-1981/82) ..	D-30
D-18	TRDB Total Loan Disbursement to Borrower in Kilimanjaro Region and Same District (1971/72 - 1981/82)	D-30
D-19	Seed Distributed to Kilimanjaro Region from Tanzania Seed Company (1979/80 - 1981/82)	D-31

LIST OF FIGURE

	Page
D-1 Seed Distribution Channel in Kilimanjaro Region	D-32

1. GENERAL

This study on the socio-economy is made with the aim of clarifying the background of agricultural development in the project area as a base for assessing the future conditions attributable to the project. For this purpose, the data and information are collected concerning the present demography, agricultural setting and production, activities of agricultural supporting services, marketing and price of major agricultural products, etc. The data and information are obtained mainly from the Kilimanjaro Regional Development Director office and Same District Development Director office concerned as well as the branch offices of the National Milling Board. In addition, such FAO publications as the Trade Yearbook and Production Yearbook in 1982 are referred to for the national conditions of agriculture, particularly from the economic viewpoint.

2. GENERAL SOCIO-ECONOMIC CONDITIONS

2.1 Socio-economic Indices of Tanzania

The United Republic of Tanzania consists of Mainland, Zanzibar island and Pemba island and the physical area is about 939,700 km² in total. The total population was estimated at about 17.5 million (19 persons/km²) in 1978. During the years from 1967 to 1978, the population increased by an annual growth rate at 3.3% on average. At present, the land developed for agricultural production is only about 4.11 million ha, corresponding to about 4.4% of the total land. The great remainder still lies as savanna, forest, game reserve, etc. The economy of Tanzania has grown steadily through the decade of 1968 - 1978, and the Gross Domestic Production (GDP) attained to about TSh. 33,580 million (US\$4,365 million equivalent) at the end of 1978. An annual growth rate of GDP was estimated at about 5.5% on an average during the said period. Per capita GDP in 1978 was about TSh. 770 in terms of 1970 constant price. However, because of the population increase and the contrasting crop production decrease due to the problem of drought, the national economy suffered a depression in 1979 and 1980. Annual growth rates for these respective years were -2.9% and -18.7%, as seen in Table D-1.

The agriculture is the largest sector in the national economy, dominating about 39% of GDP. The industrial sector (including mining, quarrying, manufacturing, handicrafts, electricity, water supply and construction) shares 15% of which manufacturing and handicrafts occupy about 10% of the total share. Public services and commerce share 28% and 21% of GDP, respectively (See Table D-2).

The trade balance of Tanzania has considerably worsened in the recent four years. The deficit of balance grew increasingly year by year and attained to TSh. 5,880 million in 1980 as shown in the following table.

	Unit: TSh. 10 ⁶						
	1974	1975	1976	1977	1978	1979	1980
Export	2,990	2,770	3,860	4,460	3,670	4,480	4,170
Import	5,810	5,700	4,750	6,160	8,790	9,070	10,050
Balance	-2,820	-2,930	-890	-1,700	-5,120	-4,590	-5,880

Source: FAO Trade Yearbook in 1980

The major imports in 1980 were of industrial machinery, transportation equipment, crude petroleum and petroleum products. This amount corresponded to about 50% of the total imports. The major exports were of agricultural products, such as coffee, tobacco, sisal, etc. with the amount corresponding to 70% or more of the total export as shown in Table D-3.

2.2 Socio-economic Features of Kilimanjaro Region

2.2.1 Land and population

The Kilimanjaro region occupies approximately 13,210 km² of land, which corresponds to about 1.4% of the entire territory of Tanzania. The total population inhabited in the region is estimated at about 902,000 persons as of 1978. The regional population density is at 68 persons per km². This is the second highest density in the country following to that in Dar es Salaam, the capital of Tanzania. The annual growth rate of the population for in the past decade is approximately 3.0% (See Table D-4).

In general, the land of the region is broadly divided into the two distinctive areas of a Highland area and a Lowland area, according to the natural environment particularly specified by climate and topographic conditions as well as the present conditions of socio-economic exploitation. The highland area estimated to be 2,200 km² is primarily the mountainous slope land mainly lying an altitude between 1,000 and 1,800 m of the Mt. Kilimanjaro and the Mt. Pare Chain. Owing to the quite favorable temperature and plentiful rainfall of this highland area, the land has been developed to its possible maximum for producing coffee, the most important export crop of Tanzania, and plantain banana, a staple food crop of the local inhabitant. Recently, the population of this area has been rapidly increased, and the population density has become to about 255 persons per km² or more. In fact, the highland area faces a serious food problem caused by such a population increase.

In contrast, the lowland area, where the land extends over the Arusha Chimi Plateau, as well as the Pangani and Mkomazi river basins, is characterized by a dry and hot climate. Very recently, these lands have been reclaimed by spontaneous transmigrants in certain extent, but the great remainder still lies as waste fallow from the economic activities. The present population of this area is then a scarce 300,000 persons or less at present.

The Same district, where the project area is located, has a population of 133,600 persons, and has a Same similar conditions to that in the Region. Namely, the highland in the Mt. Pare Chain is highly populated with the density about 232 persons per km² and the arable land has been reclaimed to the possible maximum with such plantation crops as coffee, banana, citrus, etc. In the lowlying area, the population is scarce at 17.4 persons per km², as shown in Table D-5.

2.2.2 Administrative organization

The Kilimanjaro Region administratively comprises the five districts of Hai, Rombo, Moshi, Mwanza and Same. Same and Mwanza districts are new settlements, which were established in 1979. Their territories were previously managed under the district so-called Pare District. These Districts are further divided into the following 25 Divisions, 117 wards and 358 villages at present. Village is the

smallest unit in the present organization.

District	No. of Division	No. of Ward	No. of Village
Hai	4	11	60
Rombo	5	21	55
Moshi	6	41	129
Mwanga	4	21	49
Same	6	23	65
<u>Total</u>	<u>25</u>	<u>117</u>	<u>358</u>

Moshi Town, regional capital, is also the administrative center of Moshi District. The other administrative centers of the respective Hai, Rombo, Mwanga and Same Districts are located at Sanya Jun, Mkuu, Mwanga and Same, respectively.

The Kilimanjaro Regional Development Director (KRDD) office is given primary responsibility for regional development. Under the direction of RDD office, such 12 technical departments are organized as the sectoral regional development offices, i.e. Agriculture, Livestock, Construction, Land Development, Water Development, Health, Education, Trade, Natural Resources, Rural Development, Culture and Cooperatives. At the district level, the District Development Director (DDD) office has been stationed and same organization structures are also organized so as to perform the development of district area, smoothly and effectively. Administrative affairs of the Divisions, Wards and Villages are played by the respective offices concerned in each unit under the jurisdiction of DDD in accordance with regional policy.

To smoothly operate the administrative services, each village organizes a Village Committee. These Committees are composed of 5 sub-Committees, i.e. Planning and Finance, Defence, Production, Education and Social Welfare, and Transportation and Communication and responsible for all the administrative affairs related to the village. In most case, the village committee consists of 25 representative members who are elected by villagers and all the activities of committee is properly steered by three core positions such as village chairman, secretary and village manager.

2.2.3 Infrastructure

(1) Education

The education system in Tanzania basically consists of 7 years primary school, 4 years secondary school, 2 years high school and 3 years university. In general course, students can be admitted continuously from primary to high school but, before entrance of university they have to be occupied in the military services and affair of the rural Government for at least one year, respectively. Besides, several vocational training courses are also provided for the students after the completion of primary education.

To realize higher educational constitution in the country, the Government has paid great effort for consolidation of the schooling facilities. The numbers of schools and teachers have remarkably increased in the recent years.

In Kilimanjaro Region, consolidation of the educational structure has been well progressed in the recent years. The primary schools have been established at some 684 locations and about 236,640 pupils, corresponding to 97% of school-aged children in 1981 were engaged in schooling. The number of school teachers also increased from 1,980 to 4,490 during the period from 1977 to 1981, and hence, the ratio of pupils by teacher attained to a reasonable range at about 53:1. Besides, 18 vocational schools having 2,880 chairs were established until 1981. In Same District, there exist 131 primary schools with a total enrollment of about 40,000 pupils. Almost 100% of school-aged children are being engaged in the primary schooling. The number of teachers employed in the District is 1,068. The balance of pupils/teacher is estimated at 40:1.

It is considered that there are sufficient numbers of schools and teachers in the area. However, it seems that their quality is still far from adequate, because of an acute shortage of qualified teaching staff as well as a lack of instruction materials.

(2) Medical and health service

As far as the urban area such as Moshi town and capitals of each district is concerned, the medical and health services are well organized at present. However, the facilities of medical and health control such as hospitals, health centers and dispensaries have an extremely large disparity in the rural area.

Diseases spread over the rural area include are measles, malaria, bilharzia, diarrhoea and typhoid. Measles are very troublesome with babies and children, and diarrhoea and typhoid are epidemic diseases. Both diseases are largely caused by extremely contaminated drinking water and are the major causes of the high infant mortality rate in the rural area.

The shortage of modern health care is one of the main reasons for the low standard of the public health in the Region. Although small dispensaries have been recently constructed in certain areas, no

operation is being effectively made due to the lack of adequate facilities and medical personnel. The number of medical staff and the average population to be charged by the staff are shown in Table D-6. As seen in the Table, the service staff gradually increased in number; at the rate of 18% for medical doctor, 56% for medical assistant and 46% for rural medical aid during the period from 1976 to 1981. Expansion of these medical personnel is still not sufficient to meet the present population increase in the Region. The facilities of medical and health services established in the Kilimanjaro Region and the Same District as of 1981 are shown in Table D-7.

(3) Transportation

Kilimanjaro Region is forming a part of the traffic axis in northern Tanzania and is relatively well served by a road network which links the population clusters and provides easy communication with the surrounding areas. The Dar es Salaam/Tanga-Moshi-Arusha highway is an artery of the regional road network. The condition of highway within the Region is paved, wide enough for heavy traffic and well maintained under the supervision of the National Transport Corporation (NTC). Passenger transport service is rendered mainly by the Dar es Salaam Motor Transport Company and the National Bus Company (KAMATA).

The railway line from Tanga to Moshi was constructed in 1911, and a connection to Mombasa - Nairobi line was completed in 1916 from Kahe. The Moshi - Arusha line was constructed during the mid-1920s and its commercial operation was started in 1929. Recently, railway transport has been increasingly extended especially for carrying the freight commodities. On the present operation programme, trains run once a day to Arusha and Dar es Salaam and twice a day to Tanga. The Kenyan line from Kahe to Nairobi via Mombasa is not operated at present.

The Kilimanjaro International Airport (KIA), which has the most modern facilities in Tanzania, is located at the mid-way from Moshi to Arusha. Domestic and international air traffic use KIA. Moshi, capital of Kilimanjaro Region, has an airfield inside the township boundary. Now, the airfield is used only for small planes.

3. AGRICULTURAL ECONOMY

3.1 Agricultural Setting and Production

3.1.1 Agricultural setting

Agriculture in Kilimanjaro Region has played an important role in both the national and regional economies. More than 90% of the regional population is either directly or indirectly engaged in the agriculture. Agriculture in the Region is characterized by two types of farming, i.e. Plantation of perennial crops and cereal crop cultivation. The type of these farming is settled in the distinctive two areas reflecting the difference in rainfall according to the elevation. The plantation of perennial crops has been developed since long mainly in the slope land (so-called highland) of the Mt. Kilimanjaro and the Mt. Pare Chain. Owing to relatively abundant in rainfall and moderate temperature, it makes possible to plant coffee, a typical export crop of Tanzania, and bananas, a staple food crop of the local inhabitants. On the other hand, cereal crop cultivation is rather new in the lowlying area, where the land lies under little rainfall and hot temperatures. In the settlement, food crops as maize, millet, beans and somewhat paddy are the staple production. With exceptions, sisal and sugarcane estate are exploited to a certain large extent in this lowlying area. Livestock grazing is also practiced extensively in this area, using wild grasses reserved in savanna.

Irrigated farming is a long practice in Kilimanjaro Region particularly in the plantation areas. Out of the total arable land of 200,000 ha in the Region, about 28,000 ha or 14% are irrigated at present. This is quite good exploitation if compared with only 4% in the case of Tanzania as a whole. The irrigation development in most lowlying areas is still limited in extent, and almost all of the cereal cultivation is practiced under rainfed conditions.

The rainfall and land utilization of each agricultural area is summarized in Table D-8. Whereas coffee and banana are cultivated in highland areas with an annual rainfall of 1,000 mm or more, such cereal crops as maize, beans, etc. are cultivated with an annual rainfall of less than 1,000 mm. Crop yield vary widely year by year depending on the rainfall conditions. In most case where the annual rainfall is less than 700 mm, no production is obtainable sometimes.

3.1.2 Crop production

The crop production in Tanzania in the past decade of 1971 to 1980 is summarized in Table D-9. The figures indicate that the food crop production has increased remarkably during the first eight years from 1971 to 1978, although rather large fluctuation is observed year by year. For instance, production of maize which is the main staple food in Tanzania increased at an annual rate of 5.5% on the average during the said period and attained to 1,041,000 tons in 1978. In the later two years of 1979 and 1980, however, the tendency of crop production decrease was observed particularly on maize, paddy and wheat. The drought may be the main causes for this production decrease.

The Kilimanjaro Region is one of the main products of cash crops grown in Tanzania such as coffee, sugarcane, sisal, cotton etc. Among them, coffee is the most dominant production in the region. At present some 14,000 to 29,000 tons of a mild quality Arabica coffee is harvested annually. This production is accounted for about 50% of the total national production. Besides, the Region produces about 300 tons of cotton (lint) and about 1,600 tons of sisal. The production of coffee and cotton in the Region are as shown in Tables D-10 and D-11, respectively.

The cultivated lands, yield, and production of each major food crops in the whole country and those in the Kilimanjaro Region are summarized in Table D-12. In the table, it is observed that the yielding conditions of food crop in the Region are higher than that of the country's average, though these are still standing at low level. This means that better crop yield in the Region might result in a better climate and the development of sustainable irrigation system to large extent.

3.1.3 Livestock

Various kinds of livestock are raised in the Region and contribute significantly to the domestic income. Cattle is the main product followed by goats and sheep. Swine and chickens are also grown in this region, but their production is still small at present. According to the statistical data provided by the Regional Livestock Development Office, there are about 474,700 cattle, 490,800 goats and 292,000 sheep in the Region.

The following table shows the comparison of livestock population per capita between the Region and Same District. As seen in the following table, per capita heads of livestock in Same District is about two times larger than that in the Region.

Livestock	Region		Same District	
	Population	Per Capita Heads	Population	Per Capita Heads
Cattle	474,700	0.5	147,000	1.0
Goats	490,800	0.5	146,700	1.0
Sheep	292,000	0.3	87,900	0.6

Livestock productivity is low caused by inadequate disease control, frequent prolonged drought, inadequate supplies of quality fodder crops due to competition for cereal and food crops and inadequate supplies of irrigation water, lack of trained extension services, lack of organized credit facilities and the problems faced with the tenant farmers in

providing adequate and acceptable guarantees for loans. With these constraints, annual cattle production to be marketable is estimated at 10% of the total population and annual milk yield at about 200 liters/head per lactation. Production of sheep and goats including unrecorded domestic slaughtering is estimated at 20% of the population, and the annual milk yield is 17 liters per lactation. The average meat yield is estimated at 110 kg for small Zebu cattle, 15 kg for goats and 12 kg for sheep on an average.

Livestock marketing in the Region is poorly developed. Animals are sold in primary markets, and outlying villages often make up a small herd for sale at the nearest market which is sometimes two or three days trek away. Cattle traders are the main buyers although trade is done with butchers on account. Livestock sales are made by independent bargaining between sellers and buyers. Road transport is used extensively to move animals to larger urban markets.

3.2 Land Tenure and Land Settlement

Under the land registration programme, the Government of Tanzania specified two land tenure systems, i.e. Kihamba and Shamba. The Kihamba is in principle the free-holding type of tenure. The land of this tenure is freely inherited, and bought/sold with the price depending on the farm conditions to be appraised by the existence of irrigation facilities, productivity of crops, etc. Shamba tenure is primarily referred to the cultivation right which is granted by the local authority, for instance, the village committee.

In the Kilimanjaro Region, Kihamba type of tenure is mainly registered on the mountainous area where the land has been cultivated for such perennial crops as coffee, banana and fruit tree since long. On the other hand, Shamba tenure is only found in the lowlying areas where the land has been very recently exploited by spontaneous farmers. Cereal crops, such as maize, sorghum, millet and somewhat paddy are the main production on this land tenure. At present, the registration of Shamba tenure has covered only 45 villages, out of the total 358 villages in the Region. Therefore, the greater remains of local farmers are still cultivating the land by traditional right.

According to the statistical data provided by the Regional Agricultural Office, the land holding size in the Kihamba tenure is rather large at 1.5 ha on an average. The land registered as the Shamba is estimated about 1.0 ha per farm family on an average, but is being gradually fragmented by generation changes. As for the land holding under the traditional cultivation right, no statistical data is available. However, it is considered that the unit land holding is as small at less than 1.0 ha due to the serious land fragmentation.

3.3 Marketing and Food Balance

3.3.1 Marketing and price

Tanzania operates a single marketing channel called "Parastatals" (state-owned or controlled marketing board or corporation) as the principal focus of the national system. Each parastatal is responsible for marketing the different kind of crops. For instance, the National Milling Corporation (NMC) is for main food crops such as maize, paddy, wheat, sorghum, beans, etc., the Tanzania Cotton Authority (TCA) for cotton, the Coffee Authority of Tanzania (CAT) for coffee, and the General Agricultural Products Export Corporation (GAPEX) for cardamon and oil crops such as groundnuts, sunflower, castor beans, etc. In the Kilimanjaro Region, all the parastatals have head or zonal or regional offices and station their branch offices in the Same District.

Generally, the Parastatals collect their respective products from the farmers through buying posts and/or village cooperatives. CAT owns buying posts having enough capacity of godown facilities in the production areas. NMC, TCA and GAPEX collect the crop products through village cooperative in common. Some 3 - 5% of the collection is paid as a handling charge to the village cooperative. Most of the village cooperatives have the primary godown in the village yard for trading of the production.

Table D-13 shows the record of food collection in the region provided by NMC, Kilimanjaro Region. As seen in the table, the collection of food crops in the Region rapidly decreased in 1980/81 and 1981/82. For instance, 5,955 tons of maize in 1979/80 decreased to 44 tons in 1981/82; 2,976 tons of wheat to 879 tons; and 166 tons of paddy to 48 tons. The same situation was also recognized in the Same District, especially on paddy and beans.

The Parastatals' buying and selling prices are set by the Central Government under approval of the Economic Committee of the Cabinet. Farm gate prices for a particular harvest are set in advance of the planting season and are uniform in principle within the low and high priority zones, over the entire country. Parastatals' buying prices vary from region to region according to differences in costs of collection and handling; their selling prices are uniform.

Other than the above food crops are sold directly to the local market by farmers themselves, though it is limited to small quantity.

3.3.2 Foreign trade and food balance

Although the government made a great effort on the agricultural development, an attainment to self sufficiency of food is not realized yet until now. Moreover, since the current production of food crops decreased remarkably due to the unfavorable weather conditions, and this, along with the increase in population was made the trade position in agricultural products and food balance of the country worsen in recent years.

Table D-14 shows the past records of production, trade and domestic consumption of major crops in Tanzania. Table D-15 shows the trade balance of agricultural products in value. According to both tables, import constitute of food crops extends to 395,000 tons or US\$112.4 million equivalent in 1980. Out of the food crops imported, maize increased to 230,000 tons which was worth US\$53.0 million in 1980. Although the amount of food production occupies small at several percent of the total import, shortage of food production causes the present social precariousness. To cope with above situation, roots and tubers crops as cassava and potatoes are still important staple food particularly for the rural population. It is considered that the consumption of these roots and tubers crops shows an increasing tendency for supplement the cereal crops to be required in the country.

Cash crops such as coffee, sisal, cotton and tobacco are the very important sources for earning the foreign currency of Tanzania. In 1980, 45,000 tons of coffee, 55,000 tons of sisal, 50,000 tons of cotton and 10,000 tons of tobacco were respectively exported and amounted to US\$281.5 million in total or about 60% of the total exports.

The food balance in the Kilimanjaro Region is estimated on the basis of the data obtained from NMC as shown in Table D-16, and summarized in the table below:

Year	Unit: ton					
	Inflow			Outflow		
	Pur- chased Within	Imported from	Total	Exported to other	Sold Within	Total
1979/80	9,302	4,425	13,727	3,828	9,899	13,727
1980/81	2,603	13,324	15,927	-	15,927	15,927
1981/82	1,084	12,457	13,541	-	13,541	13,541

The total 9,302 tons of main food crops were purchased within the Region in 1979/80 by NMC, while it decreased to 1,084 tons in 1981/82. As the results, the quantities exported to other regions became nothing in 1980/81 and 1981/82. On the other hand, the import from the outside was increased from 4,425 tons in 1979/80 to 12,457 tons in 1981/82.

4. AGRICULTURAL SUPPORTING SERVICES

4.1 Researches

All the agricultural research programmes are controlled by the Ministry of Agriculture. The research network covers the major agro-economic zones and all important crops in Tanzania. The annual national research conference serves as policy advisory committees, as coordinating links between individual research institute and also as a forum for the exchange of information among research workers, regional agricultural development officers and other extension staff.

There are eight major agricultural research institutes in Tanzania. These are responsible for general research especially on food crops. Besides, three essential commodity research station perform the specific examination and experiment on such cash crops as tea, tobacco, sisal and coffee.

In Kilimanjaro Region, there exists Lyamungu Agricultural Research Institute in Hai District out of three essential commodity research stations of the country. The main activities of this institute centre on coffee research, engaging more than half of its 100 staff members. Lyamungu Institute has 5 sub-stations within its jurisdiction: Tengeru, Miwaleni, West Kilimanjaro, Basuto and Sembwa. Miwaleni substation carries out the basic research mainly on food crop cultivation techniques.

4.2 Training

The Government is proceeding with a training programme so as to meet the production needs of the rural area. One long-term target is to provide a formally trained Assistant Field Officer (AFO) for each village. Recently, the training content has been changed to fit the multi-disciplinary nature of the extension service, while originally veterinary and agricultural assistant field officers were trained separately and often in separate institutions. In this sense, the two courses have been combined into one at present, and all the agricultural and veterinary extension workers have to go through the same course. These two year agro-veterinary courses are run at "certificate" level to produce AFO's.

The Kilimanjaro Agricultural Development Centre (KADC) in Chekereni, Moshi District, has been newly established in 1981 under the technical assistance and financial aid of the Japanese Government. The following are the main objectives of KADC.

- (1) To carry out research on cultivation techniques to be applicable to the lowlying area of Kilimanjaro Region, and
- (2) To train the farmers in modern farming practices including farm mechanization and proper water management of irrigation.

The Center institutes some 10 ha of farm land with irrigation facilities and accommodates dormitories for 40 trainees. The training programme is just started in 1983.

The Folk Development Colleges under the Ministry of National Education also provides training courses for growing up the leadership of rural villages. Short courses lasting two to three months are offered to anyone over 19 years old. Training in practical operations in all phases of agriculture occupies most of the training time. There are three such colleges in the Kilimanjaro Region.

In addition to the above, many religious organizations in the Region also provide several kinds of training courses which a great number of trainees have successfully completed. For instance, the YMCA Farm Training School has been set up to train village leaders. It is a two years schooling in which anyone, who has graduated primary school is qualified to enter. Emphasis is put on the acquisition of basic agricultural knowledge.

4.3 Extension

The extension work is carried out through a four-tiered system of village level, ward level, district level and regional level. The supervisory chain works from regional down to village level. The gross manpower resources of extension system include some 3,000 professionally trained Assistant Field Officers and some 3,500 Field Assistants. These two cadres are supposed to cover upwards of 7,000 development villages in the country. About half of the staff works under the parastatal extension programme and the other half works in the general extension service, directly under the District or Regional administration.

The following table shows the number of extension personnel in the Kilimanjaro Region:

Station	Administ.	Extension	Total
Regional Agr. Development Office	17	-	17
Same District	7	37	44
Other four Districts	44	153	197
KADC	6	-	6
Nationalized Farms	3	-	3
<u>Total</u>	<u>77</u>	<u>190</u>	<u>267</u>

Out of the 267 personnel in total, 77 staff work in administration in DDD or RDD as the senior officials. The remaining 190 extension staff work at the district field level. An average number of farm households commanding per extension worker in the Region and Same District will come to approximately 910 and 730, respectively.

4.4 Credit

The Tanzania Rural Development Bank (TRDB) was created in 1971 through reorganizing the National Development Credit Agency, to assume responsibility for rural credit. TRDB provides a dynamic mechanism for promoting rural development through financing of production, processing, storage and transport of products of agriculture, forestry, fishing and other productive activities pursued in the rural areas and primarily serving the rural population.

As regards loan usage, a large proportion of loans given to the Ujamaa Village Cooperative Societies have been for agricultural inputs, farm machinery, storage and rural transport, ranching and dairy development and loans given to Parastatals and public companies have been for rural transport, ranching and dairy development. Out of the total loan disbursement of TSh. 77.3 million for the entire country in 1976/77, the loans for above two types of borrowers occupied TSh. 52.8 million or 68.3%.

TRDB provides three different terms of loan, i.e. short, medium and long term loans. Short-term loan is usually repayed within one crop season, generally for purchase of farm inputs such as improved variety seeds, fertilizers and chemicals. Medium-term loans cover farm machinery, transport, fishing boats and their accessories. Their repayment period is between one and five years. The long-term loan covers livestock, storage, farm development and small industries. TRDB has increased its efforts to identify long-term development project.

Table D-17 shows the total loan disbursement of TRDB for each sector in Same District and Kilimanjaro Region during the period from 1971/72 to 1981/82. The amount of loan for Same District is TSh. 2.3 million, corresponding to about 9% of that for the Region. Most of the loan disbursement was made for transport section. No loan for the agriculture, livestock and storage sectors was provided. Table D-18 shows the total loan disbursement according to type of borrowers during the same period. Out of the loan of TSh. 2.3 million for Same District, TSh. 1.3 million or 55% of total loan was given to the Cooperative Societies while no loan was made for the individuals.

4.5 Farm mechanization programme

The Regional Agricultural Development office, Kilimanjaro has established the Farm Mechanization programme as one of the agricultural supporting services to the regional agricultural development. On this programme, the land preparation by the use of tractor is taken up as the main objective for promoting the agricultural production increase particularly of food crops.

The tractors used on this programme were provided to the RDD office by the Government of Japan under his technical and financial aid programme. At present, there are 84 tractors on this programme. Of them, 61 tractors are being operated for cultivating farm land in the entire regional area. The remainder is not serviceable due to a shortage of spare parts. The operation of tractors is basically the rental basis with the rent varying on the soil conditions, i.e. hard, stony, wet, etc. and is about TSh. 650/ha for plowing and TSh. 250/ha for harrowing in 1983/84 season on an average.

In the Same district, 10-20 serviceable tractors are stationed during the cultivation season under the programme. To smoothly operate these tractors, District Agricultural Development Office (DADO) established 4 service stations in the respective areas, i.e. Kisiwani, Gonja, Ndungu and Mvure, and the main garage in the DDD office yard for repair and maintenance.

The activities of tractor service in both the Kilimanjaro Region and Same District are summarized as follows:

	Total Area Cultivated (ha)	Service Area (ha)	Proportion (%)
Region			
1980/81	200,000	6,530	3.3
1981/82	200,000	6,260	3.1
1982/83	200,000	5,550	2.8
Same District			
1980/81	44,000	1,550	3.5
1981/82	44,000	1,170	2.7
1982/83	44,000	1,340	3.0

Source: Regional Mobile Unit, RADO, Kilimanjaro

According to the above records, the land cultivated by tractors is quite limited to small extent, compared with the total acreage of arable land, mainly due to the shortage of serviceable tractors. The present less services are mainly due to inadequate supply of fuel and oil as well as spareparts, lack of farm road network, and poor drainage particularly in the lowlying area. Payment by cash on the tractor rent also restricts this mechanization programme.

4.6 Farmers' organization

The Tanzania Farmers' Association (TFA) was established in 1955 aiming to support the crop operation more effectively, and to upgrade the farmers' economy. In qualification of the membership, it is regulated that a farmer should own more than 2 ha of farm land, enter the association and acquire 10 association shares, at TSh. 5.00 each. The primary role of this association is the smooth distribution of farm input, with cheaper price and arrangement of farmers' credit for the member farmers.

Up to present, seven TFAs have been organized over the country. The member farmers entered in these associations are still limited to a small extent. Besides, rather large disparity in the member distribution is also observed in the areas. In the Kilimanjaro region, a branch office of TFA Arusha is stationed in Moshi town, and some 550 members corresponding to about 0.4% of the total farmers in the region, entered in this association. Out of them, about 470 members or 85% are from Moshi district, while only 3 members from Same district.

Other than the above, the Village Cooperative has been organized in each village. In principle, all the villagers are members of this cooperative. The cooperatives generally undertake a distribution of farm inputs as well as other commodities and collection of farm products to be marketable for the National Milling Board (Parastatals) under the guidance of the Village Committee.

4.7 Supply of farm inputs

For the purpose of increase of agricultural production, several crop authorities and many branches of Tanzania Rural Development Bank (TRDB) have been established with a view to consolidating the development, collecting and selling as well as basic input supply service activities related to major agricultural crops.

The Tanzania Seed Company Limited (TANSEED) has a responsibility for produce foundation seeds of major food crops such as maize, paddy, beans, etc. Multiplication of the extension seeds are done by contract farmers, and these multiplied seeds are distributed to farmers thereafter processed in TANSEED factory. Distribution of the extension seeds to farmers is made by the village cooperatives through the institutional channel of TRDB or Tanzania Farmers Association (TFA) or Regional Agricultural Development Office (RADO) or stockist in each district. The chart for seed distribution channel in Kilimanjaro Region is shown in Fig. D-1 and the amount of seed distributed in the Region is summarized in Table D-19.

In Tanzania, 82-107 thousand tons of fertilizers are supplied by Tanga Fertilizer Company (TFC) of which some 70-80 thousand tons are imported per annum in recent 3 years. Most of the fertilizer used in Kilimanjaro Region is supplied by TFC. The large consignees of fertilizers in the Region are TRDB, CAT and TFA. Recently, the fertilizers supplied by TFC do not meet the consignees' demand. According to the data obtained from TFC, in spite of 11,130 tons of total orders were made by the Kilimanjaro Region in 1982, only 5,950 tons or half of the total orders were supplied by TFC.

Agricultural chemicals for food crop cultivation are mostly supplied to farmers through TRDB channel. The chemicals for cotton and coffee cultivation are directly supplied by the Cotton and Coffee Authorities and supplied to farmers with the subsidized price. Sumithion and Thionex are major agricultural chemicals for food crops. Thiodan, Hostation and DDT-Rogor are commonly used for cotton diseases. Blue and Red Copper and Finitrothion being presently for coffee.

Table D-1 GROSS DOMESTIC PRODUCT OF TANZANIA

	1973	1974	1975	1976	1977	1978	1979	1980
Population (10 ³)	14,370	14,760	15,310	16,410	16,920	17,440	17,980	18,520
Growth Rate (%)	2.6	2.6	3.6	6.7	3.0	3.0	3.0	3.0
GDP (TSh million)	13,103	15,994	19,011	23,372	29,293	35,580	36,839	40,426
GDP (TSh million) (at 1970 constant price)	9,720	10,741	10,128	11,651	13,083	13,368	12,985	10,941
Growth Rate (%)	5.6	9.5	-6.1	13.1	10.9	2.1	-2.9	-18.7
GDP/Capita (TSh)	676	728	662	710	773	767	722	610
Growth Rate (%)	3.2	7.1	-9.9	6.8	8.2	-0.8	-6.2	-18.4

Source: Monthly Bulletin of Statistics, July 1982, UN

Table D-2 GROSS DOMESTIC PRODUCT AT FACTOR COST
BY INDUSTRIAL ORIGIN (At 1966 Prices)

Industry	(Percentages)									
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1. Agriculture, Hunting, Forestry and Fishing	43.2	42.6	41.7	39.6	40.1	39.3	36.7	37.7	38.7	38.6
2. Mining and Quarrying	1.9	1.3	1.9	1.9	1.4	1.0	1.0	0.8	0.8	0.8
3. Manufacturing and Handicrafts	8.6	9.3	9.8	10.0	10.0	10.1	10.0	9.4	9.6	9.6
4. Electricity and Water Supply	1.0	1.1	1.2	1.2	1.2	1.3	1.4	1.5	1.4	1.4
5. Construction	4.3	4.0	4.3	4.7	4.7	4.7	4.6	4.1	3.7	3.5
6. Wholesale and Retail Trade, Restaurants, Hotels	12.8	12.6	12.8	12.1	11.6	11.8	11.8	11.2	10.9	10.8
7. Transport, Storage and Communications	8.7	8.9	9.5	10.2	10.2	10.3	10.6	10.4	10.3	10.2
8. Finance, Insurance, Real Estate and Business Services	9.9	10.0	9.7	9.8	10.6	10.2	10.3	9.8	9.6	9.5
9. Public Administration and Other Services	10.7	10.5	11.6	11.9	12.5	13.1	15.1	16.6	16.3	17.0
10. Less Imputed Bank Services Charges	1.2	1.3	1.4	1.4	1.5	1.5	0.8	1.5	1.3	1.4
11. GDP at Factor Cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: The economic survey 1977-1978 Table 4

Table D-3

PROPORTION OF AGRICULTURAL PRODUCTS
TO TANZANIA TRADE IN VALUE

	Unit: TSh 10 ⁶ (US\$ 10 ⁶)					
	1974	1975	1976	1977	1978	1979
Export Total	2,986 (418)	2,765 (373)	3,856 (459)	4,462 (540)	3,670 (477)	4,482 (542)
Agri. Products	2,168 (304)	2,177 (294)	3,413 (406)	3,858 (467)	3,046 (396)	3,248 (393)
Proportion (%)	73	79	89	86	83	72
Import Total	5,808 (813)	5,696 (769)	4,754 (566)	6,158 (745)	8,787 (1,142)	9,068 (1,097)
Agri. Products	1,162 (163)	1,136 (153)	617 (73)	758 (92)	701 (91)	566 (68)
Proportion (%)	20	20	13	12	8	6

Source: FAO, Trade Yearbook, 1980

Table D-4 BASIC SOCIO-ECONOMIC DATA IN KILIMANJARO REGION
AND SAME DISTRICT

	Region	Same District
Population, 1967	650,500	(149,700)/1
1978	902,400	133,600
Population Growth Rate 1967/1978 (%)	3.0	3.0
Area (km ²)	13,209	5,152
Population Density (person/km ²), 1978	68.3	25.9
Total Household, 1978	169,500	24,300
Family Size, 1978	5.3	5.5
No. of Farm Household, 1978	147,500	23,800

Source: 1967 and 1978 Population Census, Preliminary Report,
Bureau of Statistics
Regional Planning Office, Kilimanjaro

Note: /1 = Population in former Pare District

Table D-5

COMPARISON OF LAND AND POPULATION BETWEEN
HIGHLAND AND LOWLAND AREA OF SAME DISTRICT

	Unit	Highland Area	Lowland Area
Administrative land <u>/1</u>	km ²	870	4,282
Land with human settlement <u>/1</u>	km ²	340	3,167
Regulated land <u>/1</u>	km ²	530	1,115
Population <u>/2</u>	10 ³	79	55
Net population density	P/km	232.4	17.4

Source: /1 = District Planning Office, Same

/2 = 1978 Population census, Preliminary Report,
Bureau of Statistics

Table D-6 NUMBER OF MEDICAL PERSONNEL IN KILIMANJARO REGION IN 1976 AND 1981

Medical Personnel	1976		1981		Increase Rate (%)
	No.	Population Per Personnel	No.	Population Per Personnel	
Medical Doctor	45	18,900	53	18,620	18
Medical Assistant	72	11,810	112	8,810	56
Rural Medical Aid	112	7,590	164	6,020	46
Nurse	360	2,360	438	2,250	22

Note: Population in the respective years are estimated at 850,300 in 1976 and 986,700 in 1981 on the basis of 1978 Population Census.

Source: Regional Development Director Office.

Table D-7 NUMBER OF MEDICAL AND HEALTH FACILITIES IN KILIMANJARO AND SAME DISTRICT IN 1981

Medical Facility	Region		Same District	
	No.	Population Per Facility	No.	Population Per Facility
Hospital	11	89,700	2	68,900
Health Center	13	75,900	2	68,900
Bed	1,620	610	150	920
Dispensary	136	7,260	39	3,530

Note: Population in the Region and the Same District in 1981 are estimated at 986,700 and 137,800 on the basis of 1978 Population Census, respectively.

Source: Regional Development Director office, Kilimanjaro District Development Director office, Same

Table D-8

ANNUAL PRECIPITATION AND LAND UTILIZATION
IN KILIMANJARO

Annual Precipitation	Area (thousands of ha)	%	Area	Land Use for Agriculture	Vulnerability to Drought	Remarks
Over 1,000 mm	123	9	Southern & eastern slopes of Mt. Kilimanjaro (97.54 ha) North & south Pare mountain areas (26.14 ha)	Coffee, bananas Vegetables	Little	
1,000-700 mm	257	19	Areas along main roads around Moshi East & west sides of north & south Pare	Maize, beans	Some	
700 - 500 mm	496	38	Other areas	Maize, beans, wheat, sugar cane, sisal	Great	Paddy and cotton are cultivated by means of irrigation.
Below 500 mm	445	34	South & west of Arusha--Dar es Salaam Railway Kibo Peak	Cattle grazing	Maximum	
Total	1,321.0	100				

Source: Kilimanjaro Region Integrated Development Plan 1977, JICA

Table D-9

FOOD CROP PRODUCTION IN TANZANIA

Unit: 1,000 tons

Crop	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Maize	715	863	603	566	825	897	968	1,041	900	800
Paddy	193	171	204	154	150	172	194	260	250	180
Sorghum	149	191	248	128	280	260	240	250	220	220
Millet	130	128	171	63	160	130	150	160	160	160
Wheat	84	98	78	39	46	58	71	73	76	68
Cassava	3,150	3,250	3,350	3,500	3,800	3,900	4,000	4,450	4,550	4,600
Sugar cane	1,134	1,150	1,295	1,311	1,276	1,213	1,297	1,308	1,367	1,304

Source: FAO Production Year book 1973 - 1981

Table D-10 COFFEE PRODUCTION IN KILIMANJARO REGION

Unit: ton

District	Area (ha)	1978/79	1979/80	1980/81	1981/82
Same	2,587	502	586	1,023	767
Mwanga	2,325	365	503	726	726
Moshi	34,708	4,566	5,531	12,055	8,216
Hai	21,190	5,154	4,806	9,360	5,906
Rombo	15,436	3,666	5,225	6,009	5,890
Total	<u>76,246</u>	<u>14,253</u>	<u>16,651</u>	<u>29,173</u>	<u>21,505</u>

Source: Coffee Authority of Tanzania, Zonal Office, Moshi

Table D-11 COTTON PRODUCTION IN KILIMANJARO REGION

District	1979/80		1980/81		1981/82	
	Area (ha)	Production (ton)	Area (ha)	Production (ton)	Area (ha)	Production (ton)
Same	325	68	557	62	179	25
Mwanga	224	36	176	6	569	117
Moshi	405	212	611	106	359	125
Hai	158	14	38	7	26	9
Rombo	-	-	-	-	-	-
Total	<u>1,112</u>	<u>330</u>	<u>1,382</u>	<u>181</u>	<u>1,133</u>	<u>276</u>

Source: Tanzania Cotton Authority, Zonal Office, Moshi

Table D-12 AREA CULTIVATED, YIELD AND PRODUCTION OF MAJOR FOOD CROPS IN TANZANIA AND KILIMANJARO REGION IN 1979

Crop	Country /1			Kilimanjaro Region /2		
	Area (10 ³ ha)	Yield (t/ha)	Production (10 ³ ton)	Area (10 ³ ha)	Yield (t/ha)	Production (10 ³ ton)
Maize	1,300	0.7	900	36.8	1.2	44.2
Paddy	200	1.3	250	3.5	1.3	4.6
Wheat	55	1.4	80	8.7	1.4	12.2
Millet	220	0.7	160	5.8	1.0	5.8
Pulses	480	0.4	210	6.4	0.8	5.2
Banana	n.a.	-	780	35.4	9.2	325.7
Roots and Tubers	1,010	4.9	4,970	3.3	4.3	14.2

Source: /1 = FAO Production Yearbook, 1980

/2 = F/S Report on Lower Moshi Agricultural Development Project, JICA

Table D-13

MAJOR CROPS COLLECTED BY NATIONAL MILLING
CORPORATION IN KILIMANJARO REGION AND SAME DISTRICT

Unit: ton

	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82
Kilimanjaro Region						
Maize	4,354	23,175	13,428	5,955	134	44
Beans	1,259	3,448	3,964	2,785	296	414
Paddy	481	758	124	166	167	48
Sorghum	-	-	-	205	16	113
Wheat	6,434	5,878	3,296	2,976	2,286	879
Millet	7	-	-	-	-	-
Rice	-	983	-	-	-	-
Same District						
Maize	14	20	5	-	-	-
Beans	80	134	500	500	110	240
Paddy	477	746	119	113	166	48
Sorghum	-	-	-	12	1	91
Wheat	-	-	-	-	-	-
Millet	-	-	-	-	-	-
Rice	-	982	-	-	-	-

Source: National Milling Corporation, Moshi

Table D-14

PRODUCTION AND TRADE OF MAJOR CROPS
IN TANZANIA FROM 1978 TO 1980

Unit: 1,000 tons

	Production			Import			Export			Estimated Domestic Consumption		
	1978	1979	1980	1978	1979	1980	1978	1979	1980	1978	1979	1980
Cereals												
- Maize	1,040	900	800	-	-	230	35	40	-	1,005	860	1,010
- Rice	260	250	180	45	25	90	-	-	-	305	275	270
- Wheat	70	80	70	75	35	65	-	-	-	145	115	135
- Others	420	380	380	5	-	-	10	100	-	415	280	380
Total	1,790	1,610	1,430	125	60	385	45	140	-	1,870	1,530	1,815
Roots and tubers	4,870	4,970	5,020	-	-	-	-	-	-	4,870	4,970	5,020
Pulses	210	210	220	-	-	5	15	10	25	195	200	200
Oilseed												
- Seed	245	235	210	-	-	-	15	5	-	230	230	210
- Oilseed cake and meal	-	-	-	-	-	-	35	35	25	-	-	-
- Seed oil	-	-	-	-	-	5	-	-	-	-	-	-
Total	245	235	210	-	-	5	50	40	25	230	230	210
Coffee	50	50	50	-	-	-	50	45	45	-	-	5
Fiber crops												
- Cotton lint	55	60	50	-	-	-	45	40	50	10	20	-
- Sisal	90	80	115	-	-	-	80	75	55	10	5	60
Total	145	140	165	-	-	-	125	115	105	20	25	60
Tobacco	15	15	20	-	-	-	10	15	10	5	-	10

Source: FAO Production Year Book and Trade Year Book, 1980

Table D-15

TRADE BALANCE OF AGRICULTURAL PRODUCTS
IN TANZANIA

Unit: 1,000 US\$

	Exports Value			Imports Value			Balance		
	1978	1979	1980	1978	1979	1980	1978	1979	1980
Cereals									
- Maize	7,100	9,000	-	250	380	53,000	6,850	8,620	-53,000
- Rice	30	-	-	17,230	8,640	34,000	-17,200	-8,640	-34,000
- Wheat	-	-	-	13,190	8,460	18,500	-13,190	-8,460	-18,500
- Others	1,220	13,200	-	-	-	-	1,220	13,200	-
Total	8,350	22,200	-	30,670	17,480	105,500	-22,320	4,720	-105,500
Roots and tubers	130	130	130	-	-	-	-130	-130	-130
Pulses	8,310	7,200	16,000	330	-	3,000	7,980	-7,200	13,000
Oilseed									
- Seed	4,600	2,590	1,290	960	-	-	3,640	2,590	1,290
- Oilseed cake and meal	4,410	5,290	4,780	-	-	-	4,410	5,290	4,780
- Seed oil	-	-	-	1,140	2,990	3,900	-1,140	-2,990	-3,900
Total	9,010	7,880	6,070	2,100	2,990	3,900	6,910	4,890	2,170
Beverages and tobacco									
- Coffee	169,410	148,570	136,520	-	-	-	169,410	148,570	136,520
- Tobacco	28,790	35,270	29,000	-	-	-	28,790	35,270	29,000
- Others	21,880	19,840	24,000	1,580	610	610	20,300	19,230	23,390
Total	220,080	203,680	189,520	1,580	610	610	218,500	203,070	188,910
Fiber crops									
- Cotton lint	54,620	59,520	86,000	10	-	-	54,610	59,520	86,000
- Sisal	28,780	31,060	30,000	-	-	-	28,780	31,060	30,000
- Others	-	-	-	240	80	-	-240	-80	-
Total	83,400	90,580	116,000	250	80	-	83,150	90,500	116,000
Others ₁	66,860	61,530	59,110	56,190	47,370	50,810	10,670	14,160	8,300
Agri. Products Total	396,140	393,200	386,830	91,102	68,530	163,820	305,020	324,670	223,010
(TSh x 10 ⁶ equivalent)	(3,046)	(3,248)	(3,172)	(701)	(566)	(1,343)	(2,346)	(2,682)	(1,829)

Note: ₁ = Including livestock products and vegetables

Source: FOA Trade Yearbook, 1980

Table D-16

CROP BALANCE OF NATIONAL MILLING CORPORATION
FOR MAJOR CROPS IN KILIMANJARO REGION

Unit: ton

	Inflow			Outflow		
	Purchased within Region	Imported from Outside	Total	Exported to other Region	Sold within Region	Total
Maize						
1979/80	5,955	3,073	9,028	3,828	5,200	9,028
1980/81	134	1,060	1,194	-	1,194	1,194
1981/82	44	8,270	8,314	-	8,314	8,314
Paddy						
1979/80	166	-	166	-	166	166
1980/81	167	-	167	-	167	167
1981/82	48	-	48	-	48	48
Sorghum						
1979/80	205	-	205	-	205	205
1980/81	16	-	16	-	16	16
1981/82	113	-	113	-	113	113
Wheat						
1979/80	2,976	-	2,286	-	2,286	2,286
1980/81	2,286	-	2,286	-	2,286	2,286
1981/82	879	-	879	-	879	879
Rice						
1979/80	-	1,352	1,352	-	1,352	1,352
1980/81	-	12,264	12,264	-	12,264	12,264
1981/82	-	4,187	4,187	-	4,187	4,187

Source: National Milling Corporation, Moshi

Table D-17

TRDB TOTAL LOAN DISBURSEMENT TO SECTORS IN
KILIMANJARO REGION AND SAME DISTRICT
(1971/72-1981/82)

Unit: TSh 1,000

Sector	Same District		Total Region	
	Amount	(%)	Amount	(%)
Agricultural Input	-	(-)	8,050	(33)
Agricultural Machinery	-	(-)	200	(-)
Livestock	-	(-)	9,010	(37)
Transport	2,230	(97)	6,260	(25)
Small Scale Industry	70	(3)	900	(4)
Storage	-	(-)	210	(1)
Total	<u>2,300</u>	(100)	<u>24,630</u>	(100)

Source: TRDB, Moshi

Table D-18

TRDB TOTAL LOAN DISBURSEMENT TO BORROWER IN
KILIMANJARO REGION AND SAME DISTRICT
(1971/72-1981/82)

Unit: TSh 1,000

Type of Borrower	Same District		Total Region	
	Amount	(%)	Amount	(%)
Village Cooperatives	420	(18)	9,750	(40)
Cooperative Societies	1,270	(55)	3,390	(14)
Parastatals/Companies	-	(-)	8,650	(35)
Partner Ship	610	(27)	610	(2)
Individuals	-	(-)	2,230	(9)
Total	<u>2,300</u>	(100)	<u>24,630</u>	(100)

Source: TRDB, Moshi

Table D-19

SEED DISTRIBUTED TO KILIMANJARO REGION FROM
TANZANIA SEED COMPANY (1979/80- 1981/82)

Unit: ton

	<u>Maize</u>	<u>Paddy</u>	<u>Wheat</u>	<u>Beans</u>	<u>Sorghum</u>
TRDB					
1979/80	180.5	180.5	-	-	-
1980/81	101.5	101.5	-	-	-
1981/82	4.5	97.5	92.5	-	-
TFA					
1979/80	141.0	141.0	-	-	-
1980/81	143.0	143.0	-	-	-
1981/82	197.5	197.5	-	-	-
Retail Shop					
1979/80	-	-	-	-	-
1980/81	5.5	7.0	-	0.5	-
1981/82	5.0	56.5	-	5.0	-
Stockist					
1979/80	-	-	-	-	-
1980/81	-	-	-	-	-
1981/82	45.5	46.0	-	0.5	-
RADO					
1979/80	30.5	35.5	5.0	-	-
1980/81	67.0	79.5	4.0	2.5	5.0
1981/82	-	-	-	-	-
Total					
1979/80	<u>352.0</u>	<u>357.0</u>	<u>5.0</u>	-	-
1980/81	<u>317.0</u>	<u>331.0</u>	<u>4.0</u>	<u>3.0</u>	<u>5.0</u>
1981/82	<u>252.5</u>	<u>397.5</u>	<u>92.5</u>	<u>5.5</u>	<u>0.5</u>

Source: Tanzania Seed Company Ltd.

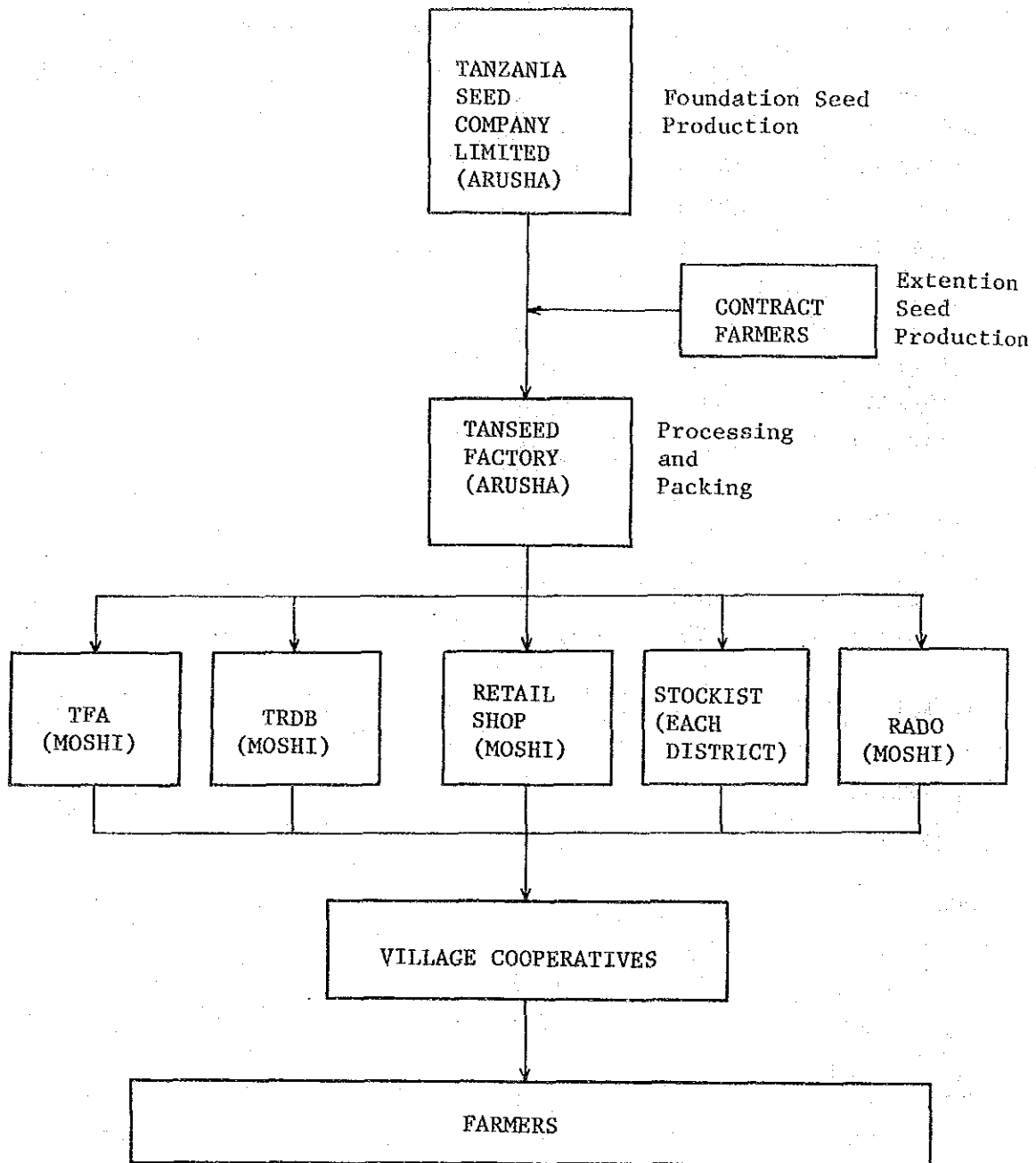


Fig. D-1 SEED DISTRIBUTION CHANNEL IN KILIMANJARO REGION

ANNEX E

AGRICULTURE AND AGRO - ECONOMY

ANNEX E

AGRICULTURE AND AGRO-ECONOMY

CONTENTS

	Page
1. GENERAL	E-1
2. PRESENT CONDITION	E-2
2.1 Rural Organization	E-2
2.2 Population and Labour Force	E-2
2.3 Land Holding and Land Tenure	E-4
2.4 Present Land Use	E-5
2.5 Type of Farming	E-7
2.6 Cropping Pattern and Farming Practices	E-9
2.6.1 Cropping pattern	E-9
2.6.2 Farming practices	E-10
2.6.3 Farm inputs and labour requirement	E-11
2.7 Agricultural Production	E-11
2.7.1 Yield survey for paddy	E-11
2.7.2 Crop yield and production	E-18
2.7.3 Livestock production	E-20
2.8 Agricultural Supporting Services	E-20
2.9 Processing and Storage Facilities	E-22
2.10 Marketing and Prices	E-22
2.10.1 Marketing of agricultural commodities	E-22
2.10.2 Farm gate prices of agricultural commodities	E-23
2.11 Farm Economy	E-24
3. AGRICULTURAL DEVELOPMENT PLAN	E-27
3.1 Basic Consideration for Agricultural Development	E-27
3.1.1 Development policy	E-27
3.1.2 Major constraints for agricultural development	E-28
3.1.3 Specific objectives for development	E-29
3.1.4 Basic strategies for development	E-30
3.2 Change of Demographic Constitution	E-32

	Page
3.3 Forecast Change of Land Holding Size	E-33
3.4 Proposed Land Use	E-33
3.5 Transmigration	E-34
3.6 Selection of Crops and Varieties	E-34
3.7 Proposed Cropping Pattern	E-37
3.8 Proposed Farming Practices	E-38
3.9 Anticipated Yield and Production	E-42
3.9.1 Anticipated crop yield	E-42
3.9.2 Build-up period of target yield	E-42
3.9.3 Anticipated crop production	E-43
3.10 Market and Price Prospects	E-44
3.10.1 Marketing prospects of crops	E-44
3.10.2 Processing and storage facilities	E-45
3.10.3 Price prospects	E-45
3.11 Project Benefits	E-46
3.12 Farm Economy	E-47

LIST OF TABLES

	Page
E-1	Population and Family in the Project Area (1982) E-49
E-2	Demography in Villages Related to the Project Area in 1982 E-50
E-3	Monthly Labour Force in the Project Area E-51
E-4	Results of Survey on Land Holding and Tenure (Farms - Number, by Size) E-54
E-5	Results of Survey on Land Holding and Tenure (Farms - Area, by Size) E-54
E-6	Results of Survey on Land Holding and Tenure (Farms - Number and Area, by Tenure) E-55
E-7	Results of Survey on Land Holding and Tenure (Farms - Number, by Resident and Non-Resident) E-56
E-8	Results of Survey on Land Holding and Tenure (Farms - Area, by Resident and Non-Resident) E-56
E-9	Present Land Use in the Project Area E-57
E-10	Cropping Acreage in the Project Area E-58
E-11	Area Served, by Tractor Hire Service Programme in the Project Area E-59
E-12	Average Dosage of Present Farm Inputs per ha E-60
E-13	Present Labour Requirement E-61
E-14	Cropping Acreage and Production in the Project Area E-62
E-15	Annual Production of Livestock in the Project Area E-62
E-16	Demonstration Farm in the Project Area (1982/83) E-63
E-17	Area Served, by Tractor Hire Service Programme, by Each Cropping Condition E-64
E-18	Number and Capacity of Rice Mills and Godowns in the Project Area E-65

	Page
E-19	Balance of Crop Production in the Project Area (1981/82) E-66
E-20	Farm Gate Price of Agricultural Crops E-67
E-21	Price of Livestock Products in 1982/83 E-68
E-22	Price of Farm Inputs in 1983 E-69
E-23	Financial Balance of Crop Production by Cropping Condition - Summary E-70
E-24	Financial Balance of Crop Production without Project by Cropping Condition E-71
E-25	Gross and Net Production Returns at Present Condition - Financial Price Base E-74
E-26	Livestock Production and Net Return - Financial Price Base E-77
E-27	Population Forecast for 1985, 1990, 1995 and 2,000 in the Project Area E-80
E-28	Proposed Land Use E-81
E-29	Incremental Effect of Land Use E-82
E-30	Proposed Dosage of Farm Inputs per ha E-83
E-31	Labour Requirement with Project E-84
E-32	Monthly Labour Requirement with Project E-84
E-33	Incremental Crop Production E-85
E-34	Calculation of Standard Conversion Rate and Shadow Price Factor E-86
E-35	Prices of Major Farm Inputs and Outputs E-88
E-36 (1/6)	Economic Price of Rice/Paddy E-89
E-36 (2/6)	Economic Price of Maize E-90
E-36 (3/6)	Economic Price of Beans E-91
E-36 (4/6)	Economic Price of Urea E-92
E-36 (5/6)	Economic Price of T.S.P. E-93

	Page
E-36 (6/6) Economic Price of Insecticides and Fungicides	E-94
E-37 Calculation of Economic Cost of Farm Machinery	E-95
E-38 Economic Balance of Crop Production without Project by Cropping Condition	E-97
E-39 Economic Balance of Crop Production with Project by Cropping Condition	E-101
E-40 Gross and Net Production Return in Each Scheme Area without Project - Economic Price Base	E-102
E-41 Gross and Net Production Return in Each Scheme Area with Project - Economic Price Base	E-104
E-42 Annual Incremental Benefit	E-104
E-43 Financial Balance of Crop Production with Project by Cropping Condition	E-105
E-44 Gross and Net Production Return in Each Scheme Area with Project - Financial Price Base	E-106
E-45 Farm Budget with and without Project	E-107

LIST OF FIGURES

	Page
E-1 (1/5) Present Land Use Map (Kisiwani Scheme)	E-108
E-1 (2/5) Present Land Use Map (Gonja Scheme)	E-109
E-1 (3/5) Present Land Use Map (Ndungu Scheme)	E-110
E-1 (4/5) Present Land Use Map (Kihurio Scheme)	E-111
E-1 (5/5) Present Land Use Map (Igoma Scheme)	E-112
E-2 Present Cropping Pattern	E-113
E-3 Numbers of Panicles per hill	E-114
E-4 Numbers of Hills per m ²	E-114
E-5 Numbers of Grains per Panicle	E-114

	Page
E-6	Percentage of Ripened Grains E-114
E-7	Weight of 1,000 Grains E-115
E-8	Potential Yield of Paddy Estimated by Sample Survey July 1983 E-115
E-9	Correlation Between Numbers of Grains/m ² and Yield of Paddy E-115
E-10	Correlation Between Numbers of Grains/Panicle and Yield of Paddy E-116
E-11	Correlation Between Percentage of Ripened Grains and Numbers of Grains/m ² E-116
E-12	Proposed Cropping Pattern E-117

1. GENERAL

An agricultural field investigation and the agro-economic study in the project area were carried out to clarify the present agricultural conditions and to assess the potential agricultural development. The data and information concerning the agricultural and farm economic aspects was collected from the Kilimanjaro Regional Offices and Same District Offices. Statistical data on the specific crops, such as maize, rice, coffee, etc. was collected from the respective offices concerned i.e. the National Milling Corporation (NMC), General Agricultural Production and Export (GAPEX), Coffee Authority of Tanzania (CAT), Tanzania Cotton Authority (TCA), etc. To obtain the practical field information on both crop cultivation and farm economy, the field interview were also conducted with some 165 local farmers and village officers concerned. In addition the land tenure and holding size are confirmed on 1,971 farm households. In the course of the above, a preliminary field check survey on the maize yield was carried out at 25 locations selected in random in order to confirm the yield and productive conditions. The sampling survey for paddy was carried out during the period of May to June 1983 to identify the defects hampering the increase of paddy yields under present conditions. The sampling survey was made for rainy season paddy for 90 sites.

2. PRESENT CONDITION

2.1 Rural Organization

The administrative constitute of the project area has the following 13 villages, all of which belong to the Same District.

Scheme	Respective Village
Kisiwani	Mkonga, Kisiwani
Gonja	Maore, Kadondo, Mpirani, Mheza
Ndungu	Msufini, Ndungu, Kalimawe
Kihurio	Usambara, Kankokoro, Mvure, Mgandu

An administrative area of those villages is practically wider than that in extent herein defined as the development scheme. Except for Mkonga village all the existing cultivated land of each village is included into the demarcated scheme area. In case of the Mkonga village, only one fourth (1/4) of arable land is demarcated as the development area.

All the villages in the project area has been recently registered as smallest administrative units by the Government and managed by the Village Committees as stated in Section 2.2.2 of ANNEX D. Under the direction of the Village Chairman, the so-called Cell is organized so as to convey the Government announcement as well as the Committee determination smoothly, and to perform the communal work effectively. In general, one Cell consists of 10 family members, and the Cell Leader, who is elected by the members, plays role in the intermediate function of administration between the Committee and the member families.

2.2 Population and Labour Force

Certain demography in the project area is still not known at present. Thus, herein the study, such conditions as population, farm household, family size, etc. are preliminarily estimated based on the statistical data prepared by the Bureau of Statistics, Ministry of Finance and Planning as shown in Table E-1 and E-2. In this estimation, the data and informaion obtained from the District Development Director (DDD) office, Same and, village offices concerned are also referred. According to the above estimation, the farm population and total farm families in the project area are about 24,500 persons and 5,020 families in 1982, respectively. The population of males and females is almost balanced at 12,225 and 12,245 persons, respectively. An average family size is about 4.9 persons. Out of total farm population, about 10,590 persons or an average about 2.1 persons per farm family are estimated to be working on farms.

Labour force available for farming in each scheme is estimated on the following assumptions:

- (1) Annual workable days/person: 292 days(80 % of 365 days)
 (2) Total labour force: (Table E-1)

Kisiwani scheme;	1,120 persons
Gonja scheme ;	2,730 persons
Ndungu scheme ;	2,610 persons
Kihurio scheme ;	4,070 persons
Igoma scheme ;	60 persons
Total	;10,590 persons

Then, the labour force available in each scheme is calculated as follows:

Scheme	Man-day/Year	Man-day/month
Kisiwani	326,400	27,200
Gonja	796,800	66,400
Ndungu	762,000	63,500
Kihurio	1,188,000	99,000
Igoma	18,000	1,500
Total	3,091,200	257,600

On the other hand, the actual labour requirement for farming in each scheme is estimated on the basis of present cropping pattern and land use conditions as shown in Tale E-3, and summarized below:

Unit: 1,000 Man-day/year

Scheme	Labour Force Available	Labour Requirement	Balance
Kisiwani	326.4	86.0	240.4
Gonja	796.8	197.3	599.5
Ndungu	762.0	232.0	530.0
Kihurio	1,188.0	313.3	874.7
Igoma	18.0	9.0	9.0
total	3,091.2	837.6	2,253.6

As shown in the table, the balance between the available labour force and the actual labour requirement, or excess of labour force amounts to

2,253,600 man-day/year in total in the project area.

2.3 Land Holding and Land Tenure

To clarify the present status of land holding and land tenure in the project area, the sampling survey was made in the representative four villages in the project area. The selected villages and sample size of farm households in each scheme are as follows:

Scheme	Village	Sample Size		Farm-Area/ Farms-Number (ha)
		Farms-Number	Farm-Area (ha)	
Kisiwani	Kisiwani	540	341.5	0.63
Gonja	Maore	469	339.4	0.72
Ndungu	Ndungu	421	354.3	0.84
Kihurio	Uzambara	541	443.0	0.82
Total		1,971	1,478.2	0.75

The survey results show that the average land holding size in the respective villages are all less than 1.0 ha, i.e. 0.63 ha in Kisiwani, 0.72 ha in Maore, 0.84 ha in Ndungu and 0.82 ha in Uzambara. These survey results of farms-number and farms-area by size in each scheme are as shown in Table E-4 and Table E-5, and the following table shows the total or average figures of the survey results in the four villages.

Size of Farm (ha)	Number of Farm		Total Area	
	(No.)	(%)	(ha)	(%)
Less than 0.5	587	29.8	182.0	12.3
0.5 - 1.0	1,028	52.2	708.0	47.9
1.0 - 1.5	261	13.2	338.8	22.9
1.5 - 2.0	52	2.6	98.0	6.6
2.0 - 3.0	26	1.3	65.2	4.4
3.0 - 4.0	9	0.5	29.0	2.0
4.0 - 5.5	4	0.2	19.0	1.3
More than 5.5	4	0.2	38.2	2.6
Total	1,971	100.0	1,478.2	100.0

As shown in the above table, 52.2% of the total farm households hold the

land ranging from 0.5 to 1.0 ha and they occupy 47.9% of the total area. Generally, these farm lands consist of the small plots, having 0.1 to 0.5 ha in size, scattered in few places to several locations and somewhat in the other village area. Recently, a fragmentation of land holding size is proceeding due to population growth. In the light of the present size of farm families and its constitution of age and sexual groups, it is considered that the fragmentation of farm land will proceed more severely in near future, because of limited labour employment opportunities in and around the project area.

According to the survey results mentioned before, the land tenure conditions, which are shown in Table E-6, are summarized below.

Cultivation right	Farms - Number		Farms - Area	
	Number	%	Area (ha)	%
Holder	1,772	90	1,340.3	91
Borrower	199	10	137.9	9
Total	1,971	100	1,478.2	100

About 90% of farmers have traditional cultivation rights and collectively possess 91% of the total farm area. The remaining farmers do not have cultivation rights and they lease the land from the cultivation right holders. They usually borrow their land from their family members or relatives with free of charge.

In addition to the above, another type of land tenure is found in the project area. It is based upon the traditional cultivation right, but farmers are the seasonal migrants coming from the high land in the South Pare Mountains. The survey results show that 1.3% of total farmers are the seasonal migrants and they occupy 1.4% of total land as shown in Tables E-7 and E-8.

2.4 Present Land Use

At present, the land use survey programme has not been started yet in the Mkomazi Valley Area, and no reliable estimation on the agricultural land is available. Thus, the present survey on land use is carried out aiming to clarify the actual extent of the existing farm land and physical constraints which might restrict the present agricultural production.

The present conditions of land use in the project area are approximated by the use of aerial photographs (1:30,000 of contact prints, shot in July 1982) with the information collected through the field investigation and interview with the local farmers. In this context, the following land categories are established for estimating the area so as to assess the land potential for the future agricultural

development and to assist an appropriate planning on land reclamation. The land categories herein defined are:

A. Arable Land:

- A.1) Irrigated land,
- A.2) Land mainly cropped in later half of the dry season, (Jul. to mid-Dec.),
- A.3) Land mainly cropped in earlier half of the dry season (Mar. to Sep.), and
- A.4) Land cropped in the rainy season (Nov. to Jun.).

B. Non-agricultural Land:

- B.1) Swamp,
- B.2) Seasonal marshes,
- B.3) Grass savanna, and
- B.4) Brush savanna.

C. Road/Rivers/Others

The land herein classified into the land category (A.1) is primarily the irrigated farm land fed by river water through the traditional furrow system. This land mainly extends over along the existing main canals of traditional furrows, i.e. Kisiwani, Gonja, Ndungu and Kihurio. Although annual cultivation acreages largely fluctuate year by year according to the amount of annual precipitation, the local farmers grow maize twice a year and/or paddy in the rainy season followed by maize in the dry season. Because of poor irrigation facilities, a steady supply of irrigation water also is rather difficult even in the rainy season. The extent of this land category (A.1) is estimated at about 1,140 ha or 29.3% of total arable land, of which 490 ha is double cropping area and 600 ha for single cropping area. The remaining 50 ha lies fallow for one to two years to regain its soil fertility.

The land of category (A.2) is cultivable only in the later half of dry season, because of deep inundation during the rainy season and marshy conditions in the earlier half of dry season. The local farmers grow maize in the area of this category. It is estimated that the land used in this area is about 690 ha or 17.7% of total arable land, of which 80 ha a year on an average lies fallow. Shifting cultivation is practiced in certain extent so as to maintain the soil fertility.

The land classified into the land category (A.3) is primarily the rainfed farmland. Since the land lies under seasonal marsh in the rainy

season, cultivation of maize is practiced mainly in the earlier half of the dry season by the use of soil moisture which might be retained in the soil during the rainy season. The total acreage being cultivated in this area is 520 ha or 13.4% of total arable land, and 40 ha of this lies waste fallow from the crop production.

The land defined as the land category (A.4) is typical farmland managed under the rainfed conditions. Some land used for crop production in this land category fluctuates year by year because of the quite irregular rain distribution. An average land extent cultivated in this land category (A.4) is estimated at about 1,540 ha or 39.6% of arable land, consisting of 710 ha of paddy field and 700 ha of upland field. Some 130 ha of land lies fallow from the annual crop operation.

Among the land categories defined as non-agricultural land, the swamp (B.1) and the seasonal marshes (B.2) are primarily the alluvial depressions extending over along the natural drainage channels and old river trails. At present, swamps are densely covered with reed mace while galingale is predominant in the seasonal marshes. In these land areas, the flood water stands for more than eight consecutive months from mid December to mid August. When proper drainage system is provided to these areas, the land will be improved to suitable field particularly for paddy cultivation.

It is considered that the grass savanna (B.3) also has a potential for future agricultural development though the provision of irrigation systems are essentially needed for not only maintaining the soil moisture but also for neutralizing the alkalinity and salinity of soil.

Brush savanna (B.4) extends widely over the elevated slope land at the foot of Pare mountains and the natural levee along the Mkomazi river. The land is rather densely covered with secondary or tertiary forest and shrub which is mainly composed of acacia thorn-trees. The land use category (B.4) demarcated here in the project area will be reclaimed if properly provided with irrigation water. However, it is considered that the most of brush savanna widely existing in the Mkomazi Valley Area is not very suitable for future agricultural development mainly because of soils which are characterized by coarse in texture, shallow soil bottomed by base rock, stony and erodable in soil consistence. It is also recognized that the brush savanna developed along the Mkomazi river is marginally and/or not suitable for agricultural development. The main constraints of this land are the seasonal flood, sandy and saline/alkaline soil. A lack of water resource particularly in the dry season is also the limiting factor to the objective development.

According to the land classification made in the above, the present conditions of the land use and/or natural vegetation are summarized in Fig. E-1. The extent area in each land category is estimated as shown in Table E-9.

2.5 Type of Farming

Recently, the agriculture in the project area has been exploited by spontaneous farmers, and the arable land has been reclaimed close to its potential maximum under the present natural conditions. This

agricultural setting in the project area is primarily characterized by individual and small scale land holding and cereal crop production, in contrast with the perennial crop plantation in the mountainous area.

Until recently, the irrigation facilities, so-called the traditional furrow, have been developed by the farmers themselves. At present, the area corresponding to about 28% of the total arable land is considered to be irrigated in the rainy season. In the dry season, however, irrigated land is limited to 13% due mainly to limited run-off in the feeder rivers. Unfavourable design of intake facilities and poor maintenance of canal system are also the constraints for sustaining the effective operation of irrigated farming. Thus, greater remains lie waste fallow in the dry season at present.

On the contrary, about two thirds of the total cultivated land is more or less affected by the seasonal flooding and/or water stagnation due to lack of drainage system provided. In the lowlying area where the land is submerged by flooding, farmers generally abandon the rainy season cropping and barely cultivate maize in the dry season after recession of a standing water. Farmers use such seasonal flooding effectively for paddy cultivation, with few exceptions.

As explained in the preceding section 2.3 and 2.4, the present agricultural setting in the project area is broadly classified into two farm types, namely:

- (1) Upland crop cultivation, and
- (2) Paddy cultivation.

Upland crop cultivation is primarily the traditional type of farming most extensively prevailing in the entire project area. This type of farming could be further classified into two sub-types, i.e. (1.a) intensive farming (double cropping a year) under irrigated condition and (1.b) extensive farming (single cropping a year) under rainfed condition. In this farming, maize and beans are cultivated as main products.

Paddy cultivation is another type of cereal production in the project area. This type of farming is mainly settled in the lowlying area where the land has been developed as the irrigable land and supply of irrigation water is sustainable for paddy growing. In this paddy cultivation, two types of farming are identified mainly from the viewpoint of production system. The first type (2.a) is primarily the convertible type of (1.a), i.e. paddy is one of the staple products in the rainy season cropping followed by maize in the dry season. The second type (2.b) is characterized by the single cropping of paddy by the use of seasonal flooding supplemented by the irrigation through traditional furrow.

Cattle grazing is the other important element for the rural economy in the Mkomazi Valley Area. Generally, cattle grazing is managed by cattle farmers and is practiced extensively using the wild grasses reserved in savanna. In the project area, cattle grazing is also

practiced by the local farmers, but still on sub-business level in the agricultural sector at present. Livestock such as sheep and goats as well as poultry are also raised by the local farmers. Their production are, however, still limited to the home consumption.

2.6 Cropping Pattern and Farming Practices

2.6.1 Cropping pattern

Owing to the generally favourable climate for crop growth farmers grow maize, paddy and beans as the major staples and other crops such as sorghum, groundnut, sweet potato, cassava, etc.

Out of the various kinds of crops, maize is the most predominant staple food of the local inhabitants. Generally, maize cultivation in the project area is practiced throughout the year. Specifically, however, the major crop season of maize is broadly defined as the following three types.

- (a) First cropping during the earlier half of the rainy season (short rainy season cropping),
- (b) Second cropping during the later half of the rainy season (long rainy season cropping), and
- (c) Third cropping during dry season (dry season cropping).

The first cropping of maize is the most dominant practice prevailing extensively in the elevated area where the land is quite free from the ill-drainage and/or seasonal flood constraints. This cultivation is generally started in November to December and harvested in mid-February to mid-April. Such high yielding varieties as UCA (Ukiliguru Composit A), ICW (Ilonga Composit White), and Katumani, have been increasingly introduced particularly in the supplementary irrigable area where the land is fed by traditional furrows. Farmers grow mainly traditional varieties in the rainfed area, however.

Second cropping of maize is mainly practised in the narrow areas scattered in the lowlying area. Since the seasonal water stagnation makes crop cultivation difficult, farmers cultivate maize after the recession of flooding. Soil moisture to be carried over from the flooding is fully utilized. This cropping is generally started in mid-April to May and harvested in August. The local varieties are mainly used in this practice.

The third cropping of maize is predominant by the cultivation of maize in the lowlying land in the project area. In general, the cultivation is started in July to August when the seasonal stagnation or excessive soil moisture is drained out perfectly, and harvested mostly in mid-October to mid-December. Furrow or border irrigation is practiced to a certain extent for this cultivation. In the cultivation

of maize, high yielding varieties have been recently introduced extensively. In particular case, where the land is regularly fed by the irrigation water throughout the year, the third cropping is continued to the first cropping and/or followed by the paddy cultivation.

Paddy is rather new introduction in the project area, but its production has been recently given priority as cash crop. According to the aerial photo interpretation, about 1,140 ha of land was cultivated in 1982 crop season in the project area of which about 430 ha is fed by traditional furrow and remains are operated in the alluvial depression by the use of seasonal flooding. In this paddy cultivation, farmers grow the traditional varieties, having more than a 150-day growing period. No high yielding varieties of paddy are introduced yet. In the irrigated farming, paddy cultivation is begun in November and harvested in May to June. In case of the paddy cultivation in the alluvial depression, preparation of the nursery is made mainly in December, transplanting to main field in January, and harvesting in May to mid-July in common.

Beans are the second most important food crops in the upland cropping followed by such minor crops as sweet potato, cassava, groundnut, etc. To grow these crops, mixed cropping (or inner cultivation) with maize is a common practice in this area.

Banana and plantains also form an important part of the diet consumption for the local people. Coconut is for the edible oil source. These crops are generally planted close to the living quarters and/or in a small part of the main field.

Vegetable production is quite limited to small extent, mainly in the house-yards. Majority of vegetables to be consumed in the project area are produced in the high land of South Pare mountains at present.

The present cropping pattern stated above is schematized in Fig. E-2, and the cropping acreages estimated based on the aerial photo interpretation and the field information are summarized in Table E-10.

2.6.2 Farming Practices

The majority of farmers still use traditional farming techniques, although irrigated farming has been recently introduced to a certain extent in the project area. Soil preparation for most cropping is made by small hand hoes. Tractors used for soil preparation are rather limited to 650 ha per annum for the past four years on an average, although the agricultural office is promoting mechanization. Use of animal power for soil preparation is not familiar in this area.

Maize seeds are generally sown in small holes prepared by hand hoe. The regular planting spaces are at one hill per m^2 in general. In case of the cultivation of high yielding maize, some farmers sow seeds by 100 cm x 30 cm in plant space, in accordance with the Government recommendation. Most of farmers, however, use the traditional plant spacings.

As for the paddy cultivation, soil puddling and leveling are practiced by the use of hand hoe, althe it is quite rough work in

general. Regular transplanting with 25 cm x 20 cm in plant space is made in common. Nursery is grown up for about one month in a small bed.

Except the above farming practices, attention is paid by the farmers only the weed control. Fertilizer and chemical use is quite limited in the project area at present. Use of these inputs is being demonstrated by agricultural extension officers, but proper practices are still non-effective propagation at present.

Irrigation operation is conducted by farmers individually, while maintenance of facilities is made as communal work in general.

2.6.3 Farm inputs and labour requirement

According to the information obtained from both farmers and local offices concerned, use of fertilizers and chemicals is almost none in the project area at present. The farm inputs, which are purchased by farmers themselves, are only used for the high yielding varieties of maize in the project area. In 1981/1982 crop year, some 9,000 kg of maize seeds, which are to be for 360 ha cultivation, were supplied from the Tanzania Seed Company to the Same District, mainly for the project area. In practice, use of these seeds is generally continued over three to four years cultivation. The proper practices for using the seeds are still limited to effective propagation at present, even though cultivation of high-yielding varieties are being demonstrated by the agricultural extension officers in the area. A lack of working capital also causes on this situation.

Tractor use for soil preparation is limited to 650 ha for the past four years on an average or 13% of the annual cultivation area (see Table E-11). This might be due to lack of farm road network in the area and rather hard rent (TSh.250/ha for harrowing and TSh.650/ha for plowing in 1983/84 season) for farmers. Thus, almost all the farm land is being cultivated by the labour force using the small hand hoes. The family labour force is sufficient for covering some 1.2 ha cultivation. In case of the larger land holders larger than 1.2 ha, the farm owners employ the seasonal labourers for supplement the family labour force.

According to the field information collected through the field interviews with 165 local farmers and village officials concerned, an average utilization of farm inputs and labour force is estimated as shown in Tables E-12 and E-13, respectively.

2.7 Agricultural Production

2.7.1 Yield survey for paddy

At present no statistical data on paddy yield and production are available for the project area. Therefore, the sampling survey for paddy yield is carried out to check, and to clarify its yield components in order to obtain the guiding principle for improvement of prevailing rice cultivation techniques.

(1) Method of yield survey for paddy

The following five yield components are involved in the determination of yield:

- (a) Number of hills per unit area,
- (b) Number of panicles per hill,
- (c) Number of grains per panicle,
- (d) Percentage (%) of ripened grains
- (e) Weight of 1,000 grains

The yield survey is carried out at the field and laboratory to measure and estimate the above yield components in accordance with the method described in "Rice Cultivation for the Million"^{/1}.

The sampling survey are conducted at 82 sites out of 90 selected sites at random on the paddy field in the project area of which 11 sites are located in Kisiwani, 28 in Gonja, 26 in Ndungu and 25 in Kihurio scheme. At the 8 sites, there are no harvest though paddy was grown, because of lodging water.

The field survey is conducted as follows:

- (a) The average number of hills in 1.0 m square (1 m²) is counted at the each site,
- (b) 80 to 90 hills are harvested at each site to estimate the average panicle per hill.
- (c) As the representative samples of hills, 20 hills are taken from hills harvested, which have the nearest number of panicles to the average,
- (d) Panicles of the 20 representative hills are weighed after cutting at neck-node and bundled by each hill. The average weight of panicles of a hill is calculated.
- (e) Out of 20 samples of the panicles bundled, 3 samples which have the nearest weight to the average are selected for laboratory analysis.

^{/1}: S. Matsushima, Rice Cultivation for the Million, Japan Scientific Societies Press, 1980

In the laboratory prepared at the field office of the survey team, the sample panicles of the representative hills selected for laboratory analysis are threshed by hand and all the rachis-branches are removed. The grains thus obtained are dried for a few days under the shade. The dried grains are then put into a salt solution with 1.06 specific gravity and stirred, to classify into two groups, i.e. a floating group and a sunken group. The sunken grains can be taken as fully ripened grains and all the floating grains as non-ripened grains. A sum of the number of ripened grains and the number of floating grains is the number of grains per panicle. The percentage of ripened grains is calculated by dividing the number of ripened grains by total number of grains.

It is considered that all the sunken grains represent the actual yield. The sunken grains are well washed with water and dried up to the moisture content of 14% under the sun. The dried grains are then accurately weighed. The weight of 1,000 grains are calculated by dividing the weight of dried grains by the total number of sunken grains.

Thus, the grain yield of paddy is estimated as the product of a mass of these yield components. The unit yield is expressed by the following equation:

Unit Yield (ton/ha)

= number of hills per m²
x number of panicles per hill
x number of grains per panicle
x percentage of ripened grains
x weight(g) of 1,000 grains
÷ 1,000 (conversion to one grain weight)
x 10,000 (conversion to yield per ha)
÷ 1,000,000 (conversion to metric ton in weight)
÷ 100 (conversion % to ratio)

(2) Result of yield survey for paddy

The results of yield survey are as shown below:

Unit Yield t/ha	Number of Sample Observed				Total
	Kisiwani	Gonja	Ndungu	Kihurio	
0.0-0.4	1	3	3	1	8
0.5-0.9	0	0	0	0	0
1.0-1.4	0	0	1	0	1
1.5-1.9	0	3	1	1	5
2.0-2.4	0	6	4	1	11
2.5-2.9	2	6	4	1	13
3.0-3.4	0	4	6	2	12
3.5-3.9	2	3	4	4	13
4.0-4.4	2	2	1	4	9
4.5-4.9	2	0	1	5	8
5.0-5.4	1	0	1	4	6
5.5-5.9	1	1	0	1	3
6.0-6.4	0	0	0	1	1
Total(Nos)	11	28	26	25	90
Average Yield on Field(ton/ha)	3.8	2.7	2.8	4.0	3.2

Under the present condition, the unit yield of paddy in terms of farm size should be presented by deducting the quantities to be yielded by the areas occupied by boundaries of paddy fields, furrows and footpath, and harvest losses. The percentages to be deducted from paddy yield on field are estimated as follows:

a) Percentage to be deducted for non-cropped area

Items	Kisiwani	Gonja	Ndungu	Kihurio
Boundaries	9	12	9	9
Canals	1	3	3	3
Footpath	some	some	some	some
Total	10	15	12	12

b) Percentage to be deducted as harvest losses

Items	Kisiwani	Gonja	Ndungu	Kihurio
Reaping	3	4	4	4
Threshing	5	5	5	5
Drying	2	2	2	2
Packing	1	1	1	1
Transport	2	3	3	3
Storage	5	5	5	5
Total	18	20	20	20

The present yield of paddy in the project area is estimated at 2.8 tons in Kisiwani, 1.8 tons in Gonja, 2.0 tons in Ndungu and 2.8 tons in Kihurio scheme on an average, by deducting quantities occupied by percentages mentioned in the above tables from yield obtained by field survey.

(3) Yield component and actual yield

The grain yield of paddy can definitely be increased through the improvement of defects involved in each yield component. In order to find the defects of the present paddy cultivation in the project area, except non-cropped area, no harvested area and harvest losses, the relation between unit yield and each of yield component are examined. It is clarified that there is a clear correlation between unit yield and number of grain per m² which is a product of a mass of the number of panicles per hill, number of hills per m² and number of grains per panicle. The percentage of ripened grains shows low correlation. The most important factors for increasing the paddy yield in the project area are two, i.e., to increase the number of grains per m² and percentage of number of grains.

The yield component analyzed by sampling survey and the estimated average yield per hectare on the basis of analyzed yield components give the following results:

	Kisiwani	Gonja	Ndungu	Kihurio	Average
Nos of panicles/ hill	9.2	10.7	10.2	11.4	-
Nos of hills/m ²	24.7	21.1	21.6	18.8	-
Nos of grains/ panicle	100.1	78.7	87.3	119.4	-
Nos of grains/m ²	22,750	17,770	19,230	25,590	21,330
% of ripened grains	80.1	71.3	73.0	73.1	74.4
Weight of 1,000 grains(g)	23.9	24.6	24.3	24.8	24.4
Ave. actual yield (t/ha)	4.4	3.1	3.3	4.6	3.9

A breakdown of the results of sampling survey are illustrated in Fig. E-3 to E-11.

As shown in the above table, average number of grains per m² is 21,330, average percentage of ripened grains is 74.4%, average weight of 1,000 grains is 24.4 grams and average actual yield is estimated at 3.9 tons per hectare under the present condition.

In general, the number of grains per m² have to be more than 35,000 to 50,000 grains and percentage of ripened grain should be more than 80%. For improvement of rice cultivation, attention should be firstly paid to the increase of number of gains per m² and percentage of ripened grains.

The number of panicles per hill is determined in early stages of plant growth, generally before maximum tiller number stage, and the measures to increase the number of panicles per m² are;

- (1) to rise healthy seedlings
- (2) to apply an adequate amount of based fertilizers
- (3) to prevent seedlings from roating damages after transplanting
- (4) to transplant in shallow depth
- (5) to take careful management
- (6) to suppress non-bearing and week tillers

The number of hills per m^2 could also be increased by dense planting. The regular planting with a space of 30 cm x 15 cm, which is recommended by proposed farming practices in later chapter, increases up to 22.2 hills per m^2 .

The percentage of ripened grains is generally determined during the period from the neck-node differentiation stage to the time 30 days after heading. Therefore, the cause of a low percentage of ripened grains must have resulted from the some defect during this period. The shortage of available water during this period is the main reason for low percentage of ripened grains. The method for increasing the percentage of ripened grains is:

- (1) to create favorable conditions during the period from the initiation of young panicle to heading.
- (2) to prevent the production of an excessive number of spikelets.
- (3) to make the rice plant strong and healthy by the heading time
- (4) to make the rice plant head at the optimum time when good weather lasts for 15 days before heading and 20 days after heading, for 35 days in total.
- (5) to apply top-dressing with nitrogenous fertilizers at the full heading time.
- (6) to reduce damage caused by pests and diseases.
- (7) to prevent the plant from lodging
- (8) to select the varieties which yield a high percentage of ripened grains,
- (9) to creat a nice plant type
- (10) to increase root activity

The most decisive factor is the number of grains per panicle, which is generally determined during the period of 30 days before flowering. Any conditions during other growth periods do not affect the spikelet number per panicle. The unfavourable conditions, like shortage of available water, lack of fertilization and too high temperature and low solar radiation during the period of 25 days before flowering make the number of spikelets small. The proper water management, fertilization and cropping schedule, considering the stage of plant growth, should be the key to increasing the number of spikelets, and thereby increasing the number of grains per m^2 .

The problem is how the number of grains per m^2 can be increased without lowering the percentage of ripened grains. Encouraging the growth in the early stage and reduction of emarging non-productive tillers are the key to solving this problem. The generation of non-productive tillers can be minimized by drying practices and proper

fertilization, considering stage of plant growth.

For the future, it is expected that the number of grains per m^2 will be easily increased to 28,000 grains and that the percentage of ripened grains will be 80%, through improved farming practices on the basis of the diagnosis result of sampling survey, and the yield per hectare will be estimated at about 5.5 tons, as shown below.

A. Nos of hills per m^2 (30 cm x 15 cm)	22.2
B. Nos of panicle per hill	11
C. Nos of grains per panicle	115
D. Nos of grain per m^2 (AxBxC)	28,000
E. % of ripened grains	80%
F. Weight of 1,000 grains	24.4 g
G. Yield per hestare (DxExF/107)	5.5 tons

2.7.2 Crop yield and production

To assess the present conditions of the cultivation in the project area, the average unit yield in the respective schemes is estimated based on the results of yield survey stated in the previous section as shown below:

Scheme	Yield (ton/ha)
Kisiwani	2.8
Gonja	1.8
Ndungu	2.0
Kihurio	2.8

Other than paddy, crop yield of major crops at present condition are estimated on the basis of the information collected through the field interview with 165 local farmers.

According to the crop production reported by the local farmers, the unit yield of maize varies from 0.3 to 2.5 tons/ha. These yielding conditions depend on the field conditions whether irrigated or rainfed. The farming practices, such as use of varieties, planting density, introduction of inner cultivation with other crops, etc. are also the essential factors on the present maize production. The unit yield of maize obtained from the different cultivating conditions is summarized as follows:

Unit: ton/ha

Cropping Conditions	Field Conditions	
	Irrigated	Rainfed
- High yielding varieties, single cropping, 100 cm x 30 cm plant space.	2.5	1.6
- High yielding varieties, mixed cropping, 100 cm x 100 cm plant space.	1.5	-
- Local varieties, mixed cropping, 100 cm x 100 cm plant space.	1.0	0.3

The maize yield confirmed in the field is as follows:

Varieties	Field Conditions	Plant Space (cm x cm)	Yield (ton/ha)
Local varieties	Lowlying land	100 x 100	0.4 to 0.6
- do -	Irrigated	100 x 100	0.7 to 1.0
High yielding varieties	Irrigated	100 x 100	1.2 to 1.5
- do -	Irrigated	100 x 300	1.3 to 1.8

No significant differences are observed through a comparison of the above data, although the data is still limited in extent. To assess the present conditions of maize cultivation in the project area, the average unit yield of maize is estimated, as follows:

- High yielding varieties/irrigated: 1.5 tons/ha
- Local varieties/irrigated: 1.0 ton/ha
- Local varieties/rainfed: 0.6 ton/ha

According to the farmers information on the other crops, the production of beans varies from 0.2 to 0.5 ton/ha and about 0.4 ton/ha on an average.

Based on the crop yield assessed above and the cropping acreages in each major crops, an annual production of crops is estimated as shown in Table E-14 and summarized as follows:

Unit: ha						
Major Crop	Scheme					Total
	Kisiwani	Gonja	Ndungu	Kihurio	Igoma	
Maize						
- Rainy season	130	375	365	575	10	1,455
- Dry season	70	95	180	580	-	925
<u>Total</u>	<u>200</u>	<u>470</u>	<u>545</u>	<u>1,155</u>	<u>10</u>	<u>2,380</u>
Paddy	365	660	685	840	-	2,550
Beans	90	165	190	490	10	945

2.7.3 Livestock production

Although livestock grazing is still at the sub-business base in agriculture in the project area, its production plays an important role for the farmers as the major source of not only diet protein but also cash for supplementation of farm economy. Cattle, goats and sheep are the dominant product in the project area. They are generally grazed extensively in the savanna by the way of pasturing with natural grasses and/or weeds in the farmland. During the rainy season, livestock can be fed so well owing to abundant grasses even in the savanna but they reduce flesh during the dry season because of deterioration of pasture due to dry. Small scale poultry is extensively managed by individual farmers. Free-grazing is commonly practiced in the project area.

On the basis of the data provided by the District Livestock Development Office, Same, population of livestock in the project area is estimated at about 4,830 cattle, 13,950 goats and 11,820 sheep at present. Their productivity is low at 15 to 20% per annum for slaughtering. Annual milk yield is at about 200 liters/head for cattle and 17 liters/head for goats and sheep per lactation. Population of chickens in the project area is estimated at about 32,000 and annual slaughtering is to be 20% of total population. The annual production of livestock estimated in the project area is as shown in Table E-15.

2.8 Agricultural Supporting Services

As presented in detail in ANNEX D, the institutional supporting services, i.e. agricultural researches, agricultural extension work, technical training programme (KADC), farmers' credits, farm inputs

supply, etc. have been recently organized in the Kilimanjaro Region. These services are being covered rather extensively in the entire Region.

In the project area, however, activities of the above services are limited to a small extent, and hence the effective modernization of agriculture still has a long way to go.

With regard to the agricultural extension works, a total 5 agriculturalists were assigned in the respective ward offices as follows:

Ward	Extension Officers (No. of personnel)	Farm Families (No. to be contacted)
Kisiwani	1	1,120
Maore	2	2,170
Ndungu	1	1,840
Kihurio	1	1,520
Total or Average	5	1,330

Source: Information of each Ward Office

Under direction of the District Agricultural Development Office, the present extension works particularly on the improved farming practices are served by the said staffs. Very recently, the staff have established the demonstration farms in the respective village areas, and demonstrate such farming practices as the use of fertilizer as shown in Table E-16. In reality, due to substantially under-staffing of the extension officers and also insufficient facilities for the objective works, it is still undesirable to propagate such improved farming techniques, effectively.

In the future, expansion of staffing and strengthening the extension facilities are essential to maximize the development effects to be attributable to the objective project. In this context, KADC facilitates the training these extension staff as well as the leading farmers in the project area.

The respective village committees in the project area provide farm inputs supply services through the production sub-committees. Their service activities, however, are still sluggishly done due to the insufficient operation fund.

No farmers' credits have been introduced in the project area. This is for reasons of that all the farmers cultivate their farm lands by the traditional cultivation right and these lands have not been registered yet under the land reformation programme until now. Accordingly, the implementation of the land reformation and the land registration in

accordance with those on the national programme are one of the essential requirements in view of introducing farmers' credits for supplementing the present shortage of working capital. From the technical viewpoint, this implementation will also be much effective for proper management and operation of the crop cultivation as well as the irrigation and drainage works to be developed in the project.

Under the regional farm mechanization programme, RADO, Kilimanjaro dispatches tractors in accordance with the farmers' request through DADO, Same to the project area for assisting the soil preparation. DADO, Same has a responsibility to smoothly and effectively operate these tractors and to promote the national campaign of food production increase. DADO has established so far the four tractor service stations in the respective area, i.e. Kisiwani, Gonja, Ndungu and Mvure. The tractor operation is primarily based upon the rental system in which farmers are obliged to pay rent by cash at TSh. 650/ ha for plowing and TSh. 250/ha for harrowing (in 1983/84) prior to the operation. In past four years, the service covered about 650 ha per annum or an average which corresponded to be about 13% of the total cultivated area in the project area. The progress of services in each scheme area is as shown in Table E-11 and the acreage served by the tractors from RADO is estimated for each cropping condition as shown in Table E-17.

Because of poor accessibility to the farm land due to the lack of farm road networks and the wet soils in the most lowlying areas, further expansion of the tractor service is hardly expected. The payment system on rent also limits the farmers' intention and motivation on the farm mechanization. The physical constraints in the above will be properly eliminated through the implementation of the project. As for the rent payment, it is recommended to arrange farmers' credit through implementation of the project.

2.9 Processing and Storage Facilities

The number and capacity of rice mills and godowns in the project area are as shown in Table E-18. The total number of rice mills amounts to 20. The milling capacity is estimated at about 35 tons per day of which value would be sufficient at the present output. The total number of godowns is eight, and its total capacity is around 2,000 tons which would be also sufficient at present output.

However, most of processing facilities are very old and primary godowns in the villages are inadequate to keep crop production.

2.10 Marketing and Prices

2.10.1 Marketing of agricultural commodities

For the rough estimation of marketable surplus of the crop production in the project area, balance of crop production is examined on the basis of the following assumptions.

- (1) Waste and seed requirement are taken as 10% of total production,
- (2) Milling recovery rate from paddy to rice is 1: 0.62, and
- (3) Annual per capita consumption of crops is 40 kg for rice, 90 kg for maize and 30 kg for beans taking into consideration of the results of farm economic survey.

The results are shown in Table E-19. The marketable surplus of crops produced in the project area are very small at 715 tons of paddy (28% of total production) and 115 tons of beans (13% of total production). As for maize, production is rather short to meet the home consumption of farm households in the project area.

Out of the marketable surplus of paddy and beans, about 50 tons of paddy or about 7% of marketable surplus and 85 tons of beans or about 70% of marketable surplus are purchased directly by the NMC in 1981/82 crop season.

NMC has a district godown of about 2,100 tons capacity in Same town. Transportation of production from the village to the district godown and further to the regional NMC store in Moshi is managed by NMC himself using his own transportation facilities, such as truck and railway wagons.

2.10.2 Farm gate prices of agricultural commodities

The farm gate prices of staple cereals are controlled as the government fixed-based price under the principal focus of the national food management programme. The current prices given to Same district are as shown in Table E-20. As far as the paddy production in Same is concerned, the price at TSh 6.0/kg of dry clean paddy, which corresponds to about 17% higher than that of other producer districts, is set forth so as to raise farmers' intention and motivation on paddy cultivation and to realize the paddy production increase.

The prices of crop production other than the cereals are in principle the free market-based. In the project area, almost all of the production surplus, except mango fruits, is sold to the local market. The mango fruits, though its production is still small at present, are sold to Moshi town and/or the central market in Dar es Salaam through the intermediate buyers. These prices generally fluctuate seasonally depending upon the supply conditions of those production. An annual average prices obtained from the village offices concerned are as shown in Table E-20. In the case of the marketing of livestock production, it is also priced under the free market system. Generally, farmers sell their cattle to the intermediate buyer through cattle market which is opened seasonally in Kisiwani village. Production surplus of such sheep, goats, etc. is sold, time to time, in the local market individually. The prices of livestock production also fluctuate widely, season by season. An average prices in 1982/83 are summarized in Table

E-21.

The prices of farm inputs are set under the government control. The prices in 1983 are as shown in Table E-22. The labour wages are in principle referred to the minimum wages defined in the labour law. In practical, however, the labour wages are set individually through free contract based on the degree and extent of works. The unit wages for seasonal workers range from TSh. 20 to 35 and TSh. 23 on an average.

2.11 Farm Economy

The study on the present farm economy in terms of production return of both crop and livestock is made based upon the field data and information obtained through the farm economic survey and agricultural investigation in and around the project area.

The financial balance of crop production by cropping conditions is estimated as shown in Table E-23 and E-24. Based on the financial balance of each cropping condition and the total cultivated area in each scheme, gross and net production return are estimated as shown in Table E-25. The following is the summary of crop financial balance in each scheme.

Scheme	Gross Return (TSh.x10 ³)	Production Cost (TSh.x10 ³)	Net Return (TSh.x10 ³)	Net Return per Farm Household (TSh.)
Kisiwani	3,700	558	3,142	5,512
Gonja	7,132	1,216	5,916	4,108
Ndungu	7,820	1,390	6,430	5,358
Kihurio	13,612	2,260	11,352	6,377
Igoma	112	22	90	3,000
Total or Average	32,376	5,446	26,930	5,364

There are no big difference among the net return per farm household in the four schemes except Igoma. Net return of crop production in Igoma scheme (TSh. 3,000) shows less than half of the average net return in the five schemes.

Livestock is another important product as a supplemental cash source in the project area. The financial balance of that production is as shown in Table E-26 and summarized below:

Scheme	Gross Return (TSh.x10 ³)	Production Cost (TSh.x10 ³)	Net Return (TSh.x10 ³)	Net Return per Farm Household (TSh.)
Kisiwani	598	90	508	891
Gonja	1,782	267	1,515	1,052
Ndungu	1,396	209	1,187	989
Kihurio	1,406	211	1,195	671
Igoma	88	13	75	2,500
Total or Average	5,270	790	4,480	892

Among the five schemes in the project area, the evaluated value of net return per farm household in the Igoma scheme is the highest. Among the another four schemes, there are no big differences on this production either.

Annual total net return obtained from both crop and livestock production is, then, estimated at TSh.31,410 x 10³ for the five schemes in the project area, and the average net annual income per farm household is at TSh. 6,260 as shown below:

Scheme	Gross Return (TSh.x10 ³)	Production Cost (TSh.x10 ³)	Net Return (TSh.x10 ³)	Net Return per Farm Household (TSh.)
Kisiwani	4,298	648	3,650	6,400
Gonja	8,914	1,483	7,431	5,160
Ndungu	9,216	1,599	7,617	6,350
Kihurio	15,018	2,471	12,547	7,050
Igoma	200	35	165	5,500
Total or Average	37,646	6,236	31,410	6,260

In addition to the annual income from agricultural production mentioned above, farmers in the project area earn certain cash from off-farm works such as wage earning from farm work and non-farm work, remittance from their family working at Moshi or Dar es salaam, fishing at Kalimawe reservoir or rivers, etc. According to the results of the farm economic survey, these off-farm incomes are estimated at TSh.500 per farm household per annum on an average in the project area. Then, the average annual income level per farm household is calculated at about TSh. 8,000.

Out of the annual income of TSh. 8,000, it is estimated that average farm family having 4.9 family members expend their own production of maize, paddy and beans with the value of TSh. 4,850 for their home consumption annually. Furthermore, they spend about TSh. 500 for other foods such as sugar, salt, oil and tea, and their total food expense are calculated at TSh. 5,350 or about 79% of the annual income. The remaining TSh. 1,410 is considered to use for living expense other than food.

According to the above estimation of the average farm household, it can be said that most farm households in the project area spend all the incomes in keeping their livelihood, and almost no net reserve is expected from their farm management at present.

Based on the farm economy studied in the above, the farm budget of average farm household in the project area is prepared as follows:

	Unit: TSh.
A) Gross Income	8,000
(1) Farm income	7,500
(2) Off-farm income	500
B) Gross Outgo	8,000
(3) Production cost	1,240
(4) Living expenses	6,760
C) Net Reserve (capacity to pay)	0
D) Net Farm Income (1 - 3)	6,760

3. AGRICULTURAL DEVELOPMENT PLAN

3.1 Basic Consideration for Agricultural Developmet

3.1.1 Development policy

The Government of Tanzania has formulated the long term national development plan in accordance with the following 4 principles outlined in the Arusha Declaration.

- (a) Self-reliance; development through the maximum mobilization of domestic resources, particularly through the mobilization of local people,
- (b) Social equality; spreading of the development benefits widely over the society to avoid wide disparities in income and wealth,
- (c) Encouraging the development of socio-economic activities to be undertaken through collective and cooperative efforts, and
- (d) Economic cooperation with other African States.

In this national development plan, it is also defined that one of the principal objectives is to put priority on agricultural development in order to meet the internal demand of food as well as increasing export of agricultural products. The plan emphasizes stimulation of the agricultural activities to increase production and productivity.

In order to realize the above principles, the Government has established and launched the three medium term development plans, i.e. the First, Second and Third Five-Year Development Plans covered the specific period of 1964 to 1969, 1969 to 1974, and 1976 to 1981, respectively. The results of these implementation were, however, still far from meeting the targets anticipated in each plan. The decline in the agricultural production was one of the major reasons for the less progress on the above performance. The decline of production resulted from a combination of various causes, such as drought, flood, insufficient investment and inadequate allocation of such investment. Although an agricultural development is a nucleus for the rural development, the agriculture in Tanzania is susceptible to influences from climate and other environment at present.

The Government has placed the highest priority on food production increases in the development strategy. In the case of the Kilimanjaro Region, RDD office has formulated the re-construction plan of agricultural setting so as to bring about the early realization of the specific objectives envisaged in the national plan. The following programme is set forth in view of the major constraints and development potentials in the region area:

- (a) To improve the production basement by means of irrigation development, drainage improvement, flood control, land and soil conservation particularly against erosion,