Appendix 2.7 Irrigation and Drainage

Appendix 2.7.1 Irrigation and Drainage

Related Projects Outside the Study area

We also conducted case studies of irrigation and drainage outside the study area: the Kibimba and Doho national large-scale irrigation projects and two farms participating in the Small Scale Irrigation Pilot Scheme implemented by FAO. All are in Iganga and Tororo Districts to the east of the Study area, and all cultivate rice by developing wetlands.

(1) Kibimba Rice Project

This is located in the centre of Iganga District, bordering on the Study area to the east, adjacent to the road running between Kampala and Tororo. It was formed between 1971 and 1973 with assistance from China, and is currently managed by a government-affiliated corporation.

The Kibimba project guarantees irrigation water by creating a dam in the upper reaches of the wetland. The earth-fill dam is 4.5m high, 1,500m long and 3m deep at the crest, while the capacity of the reservoir is 3,000,000 cu.m.

Other irrigation facilities include a manual intake gate, spill way, main canal, irrigation canal and drainage canal, as well as a drainage pump station (one station, two pumps) and farm roads. Directly downstream of the dam, paddy fields stretch out over 532 ha in a rectangular shape.

Large numbers of Chinese agricultural machines were brought in for the project, of which most have now broken down and are out of order.

Apart from this, cultivation growing has become harder with the aging of water canals and partial subsidence of fields, so that currently only 150 of the original 532 ha is still being cultivated.

(2) Doho Rice Project

Situated to the west of Mound Elgon in the north of Tororo, the project was begun in 1976 and completed in 1986 with assistance from China, and is now being managed successfully by the MAAIF with the aim of demonstration and extension of rice cultivation. Farming is entirely manual, by some 4,000 farmers who lease the land free of charge.

Unlike the Kibimba Rice Project there is no reservoir; water is extracted via a manual intake gate installed in the River Manafa which flows from Mt. Elgon. The irrigation and drainage facilities inside the fields are more or less the same as in the Kibimba Project. Intake gates have also been set up at the starting point of each secondary canal.

Siltation in canals and undulation of the fields is currently causing problems.

(3) Olweny Wetland Rice Project

This project is located in the Olweny Wetland, near Lira (capital of Lira District) on the northern edge of the study area. The wetland, with a catchment area of 900 sq. km, is located at the upstream extremity of Lake Kwania, which connects with Lake Kyoga.

In a plan drawn up in 1982, a pump station was to be set up in the lower reaches of Olweny Wetland to pump the entire irrigation water supply to the upstream irrigation area, from where the paddy fields would be irrigation by gravity. The plan was reviewed in 1991 because of the cost of maintaining the pump station. Proposals now being considered include reducing the volume of pumped water by taking water at the upper reaches, and building a dam in the nupstream area.

(4) Others

Rice is already being cultivated by local farmers at two wetland irrigation and drainage projects in the FAO Small Scale Irrigation Pilot Scheme. In the first project, farming is unstable because it depends on flood water from the upper reaches of the wetland. In the second, a drainage canal has just recently been dug by local farmers in the centre of the wetland to support future rice cultivation.

Table A2.7.1.1 Characteristic of Acid Sulphate Soils

Depth (cm)	pH		SO_4 (m.e/1 gram dried soil)	
	Wet	Dry	Wet	Dry
0- 8	2.8-2.9	2.8-2.9	0.26-0.27	0.26-0.36
8-23	2.5-2.7	1.3-2.5	0.37-0.90	0.51-1.88
23-38	3.0-3.6	1.2	0.18-0.25	1.44-2.80
38-60	4.3-5.3	1.6-1.7	0.38-0.45	2.71
60-90	5.6-5.9	1.5-1.6	0.14-0.26	2.32-2.60
0-15	6.4-7.0	3.4-4.8	Trace	N.D
15-30	6.6-7.0	3.4-4.6	Trace	N.D
30-60	6.2-6.6	1.9-3.4	0	N.D
60-90	6.1	1.9	0	N.D

Source : J.F. Harrop (1960), Soils of the Western Province of Uganda, Series 1, No.6.

Note : * Soil samples were dried for a week

Table A2.7.1.2 pH Values of Soils in Swamps in the Study Area

(1/4)

Location	Vegi-tation	Soil	Soil Depth (cm)	Color	Tex-ture	pH		Water Table	Remarks
						Wet	Dry		
Small Scale Irrigation Scheme(FAO) (Mpigi)	Wood shrub	Flat low land soil	0-35	2.5Y4/1 Yellowish gray	CL	4.9	5.0	10 m <	
			35<	2.5Y6/3 Dull Yellow (10YR4/6 Brown mottles)	LiC	5.1	5.2		
Lubigi Swamp on Hoima Road (Mpigi)	Papyrus	No peaty	0-10	10YR6/2 Grayish yellow brown	LiC	6.5	5.2	10 cm	
			10<	10YR7/2 Dull yellow orange (10YR7/6 Yellowish brown mottles)	LiC	6.1	5.4		
Namaya Swamp on Masaka Road (Mpigi)	Papyrus	No peaty	0-10	10YR4/1 Browish gray	SiCL	5.3	5.1	20 cm	
			10-20	- do -	SiCL	5.3	5.1		
			20-80	- do -	SiCL	5.4	5.2		
			80<	10YR7/1 Light gray	SL	N.D	N.D		
Mayanja Swamp near Busega on Masaka Road (Mpigi)	Papyrus	No peaty	0-10	10YR5/2 Grayish yellow brown	SiCL	6.2	5.3	5 cm	
			10-20	- do -	SiCL	6.3	5.1		
			20<	10YR4/2 Grayish yellow brown	SiCL	6.1	5.3		

Location	Vegi-tation	Soil	Soil Depth (cm)	Color	Tex-ture	pH		Water Table	Remarks
						Wet	Dry		
MP-2 : On Kampala - Masaka Road (Mpigi)	Papyrus	No peaty	0-10	10YR4/1 Brownish gray	CL	6.2	6.1	15 cm	
			10-20	- do -	SiCL	6.1	5.4		
			20-30	- do -	CL	5.9	5.5		
			30-70	-	-	-	-		
			70<	10YR6/1 Brownish gray	LiC	6.0	4.5		
MP-3 : On Kampala - Masaka Road (Mpigi)	Papyrus	No peaty	0-10	10YR3/1 Brownish black	CL	6.0	5.1	20 cm	
			10-20	10YR4/1 Brownish gray	SiCL	5.7	5.4		
			20-30	- do -	SiCL	5.8	5.8		
			30-70	-	-	-	-		
			70<	10YR5/1 Brownish gray	LiC	4.8	4.6		
MP-4 : On Kampala - Masaka Road before Kamengo	Papyrus	No peaty	0-10	10YR3/1 Brownish black	CL	5.9	5.5	15 cm	
			10-20	- do -	CL	5.7	5.6		
			20-30	-	-	-	-		
			30-90	10YR3/1 Brownish black	SCL	5.6	5.4		

Location	Vegi-tation	Soil	Soil Depth (cm)	Color	Tex-ture	pH		Water Table	Remarks
						Wet	Dry		
Kyambala (Masaka)	Gugu, Palm, bush	No peaty	0-10	10YR3/1 Brownish black	CL	5.6	5.7	85 cm	
			10-30	10YR5/1 Brownish gray	SiCL	4.8	4.8		
			30-50	10YR5/2 Grayish yellow brown	SiCL	4.6	4.5		
			50-60	10YR4/1 Brownish gray	LiC	4.5	4.5		
			60<	10YR7/1 Light gray 10YR7/4 Dull yellow orange mottles	HC	4.4	4.3		
Kabuka (Masaka)	Papyrus	No peaty	0-20	10YR4/1 Brownish gray	SiCL	5.5	5.2	30 cm	
			20-30	10YR3/2 Brownish black	SiCL	5.1	5.5		
Kitante (Masaka)	Papyrus	No peaty	0-10	10YR3/1 Brownish black	SiCL	5.2	5.2	5 cm	
			10-20	- do -	SiCL	5.2	5.0		
			20-30	10YR4/1 Brownish gray	SiCL	5.4	5.2		
Nabirabusa (Masaka)	Rotundus Papyrus	No peaty	0-20	10YR3/1 Brownish black	SiCL	4.6	4.4	20 cm	
			20-40	- do -	SiCL	4.5	4.5		
			40-80	- do -	SiCL	4.9	4.7		

Location	Vegi-tation	Soil	Soil Depth (cm)	Color	Tex-ture	pH		Water Table	Remarks
						Wet	Dry		
LW-2 Namagombe swamp (Mpigi)	Papyrus	No peaty	0-15	10YR4/2 Grayish yellow brown	SiCL	5.0	4.2	25 cm	
			15-35	10YR3/1 Brownish black	SiCL	5.2	4.2		
			35-60	10YR5/1 Brownish gray	SCL	6.3	5.1		
			60-85	10YR7/2 Dull yellow orange	SCL	6.5	4.9		
LW-3 Nakalere swamp (Mpigi)	Papyrus	No peaty	0-10	10YR3/1 Brownish black	SiCL	6.3	5.4	5 cm	
			10-20	- do -	SiCL	6.0	5.7		
			20-70	- do -	LiC	6.0	5.6		
SEZ-2 Sezibwa swamp upper side (Mukono)	Papyrus	No peaty	0-10	10YR4/1 Brownish gray	SiCL	5.2	5.0	15 cm	
			10-20		SiCL	4.8	4.8		
			20-30		SiCL	4.9	4.9		
			30-70		LiC	5.8	5.4		

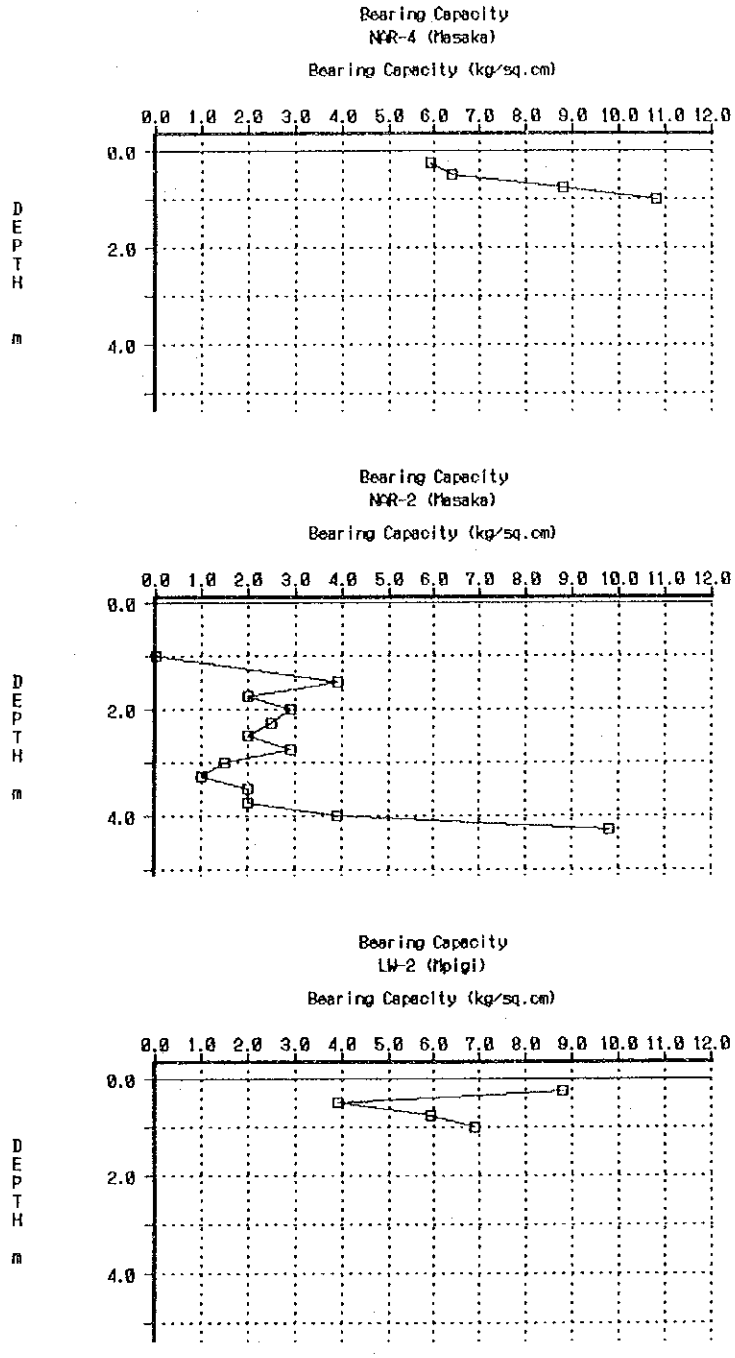
Source : Field Survey by Sampling made by M/P Study Team

Table A2.7.1.3 Bearing Capacity measured in Swamps

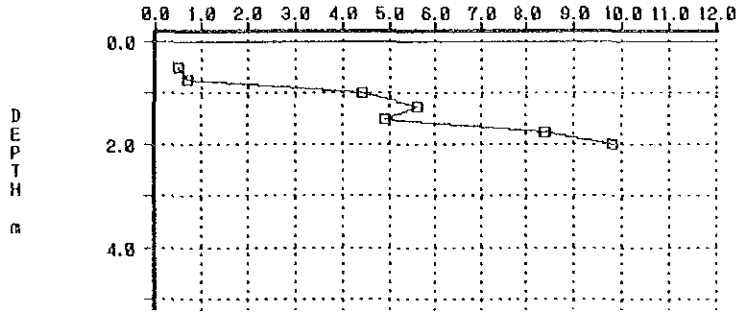
District	Swamp (symb.)	Depth (m)	Gauge	Bearing. Cap. (t/m²)	Remarks
Masaka	NAR-4	0.25	60	5.9	
		0.50	65	6.4	
		0.75	90	8.8	
		1.00	110	10.8	
	NAR-2	1.00	0	0.0	down side
		1.50	40	3.9	
		1.75	20	2.0	
		2.00	30	2.9	
		2.25	25	2.5	
		2.50	20	2.0	
		2.75	30	2.9	
		3.00	15	1.5	
		3.25	10	1.0	
		3.50	20	2.0	
		3.75	20	2.0	
		4.00	40	3.9	
		4.25	100	9.8	
Mpigi	LW-2	0.25	90	8.8	
		0.50	40	3.9	
		0.75	60	5.9	
		1.00	70	6.9	
	LW-3	0.50	5	0.5	
		0.75	7	0.7	
		1.00	45	4.4	
		1.25	57	5.6	
		1.50	50	4.9	
		1.75	85	8.4	
		2.00	100	9.8	
Mukono	SEZ-2	0.25	10	1.0	
		0.50	5	0.5	
		0.75	10	1.0	
		1.00	30	2.9	
		1.25	25	2.5	
		1.50	20	2.0	
		1.75	100	9.8	

Source : Field Survey made by M/P Study Team.

Figure A2.7.1.1 Graphs of Bearing Capacity



Bearing Capacity
LH-3 (Hpigi)



Bearing Capacity
SEZ-2 (Mukono)

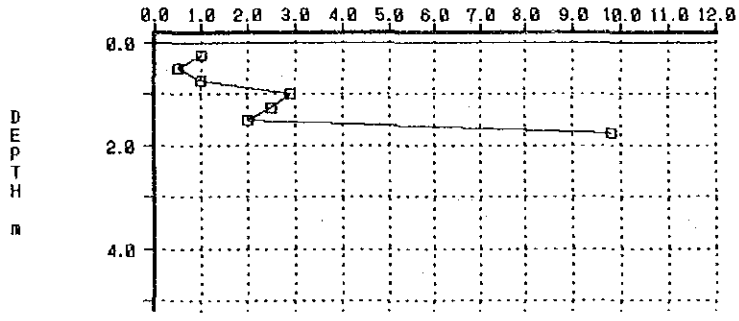


Table A2.7.1.4 Water Quality in Wetlands

Place	Temp. °C	D.O. ppm	EC μs/cm	pH	Remarks
MA-2	20.0	0.4	54.3		at Nkungulutare Namaya Swamp
MA-2	28.6	8.4	NA		Mr.Haji Sebaduka Umat Dev.Agency
MA-3	25.7	NA	223.0		Lubigi on Masaka Rd.
MA-3	24.6	3.8	248.0		Natete right side of the Swamp
MA-4	22.7	NA	460.0		Wakiso Rd.
MP-1	21.4	0.3	61.0		Kasemulamba swamp Nabusanke Nkozi Rd.
MP-1	19.1	0.6	35.4		Kasemulamba swamp Nabusanke-Mitala Maria Rd.
MP-2					Kibukutu swamp Masaka Rd. Stagnant Water
MP-2	20.2	0.6	55.0		Kabiga swamp Mitala Maria Rd.
MP-3					Nawandigi swamp Stagnant Water
MP-4	18.4	0.4	73.8		Nakyetima swamp Masaka Rd.
MP-5	18.6	0.2	64.5		at Bume, Buzingu Kiyanja swamp
MP-6					Ggambinana Karinangoma swamp Stagnant Water
NAL-1	22.0	8.0	29.4		
NAL-2	21.0	3.0	132.1	4.3	
NAL-5	27.5	6.4	67.9		
NAR-2	18.2	0.4	13.5		
NAR-3	24.1	8.0	24.4		
NAR-4	19.5	0.3	48.4		
KYR-1	19.7	1.1	40.8		
LW-1					Partly reclaimed Stagnant Water
LW-2	21.9	6.0	180.2	6.9	
LW-3	20.8	0.4	125.5	6.8	
LW-4	21.0	2.0	74.0	7.2	
LWA-1	22.3	0.3	163.1		
Sezibwa Forest	22.6	10.4	54.7	7.4	
Sezibwa Fall down	21.2	11.5	39.8		
Sezibwa Fall up	20.9	5.0	42.1		
SEZ-2	21.3	9.0	61.2	6.7	Stream outside the papyrus
SEZ-2	21.9	0.5	50.4		Stream inside the papyrus
V-3	21.8	11.5	94.0		Mr.Matovu's Farm
V-5	22.6	6.0	67.4		Mr.Kiyimba's Farm

Source : Field Survey made by M/P Study team

Figure A2.7.1.2 Relation between DO and Temperature

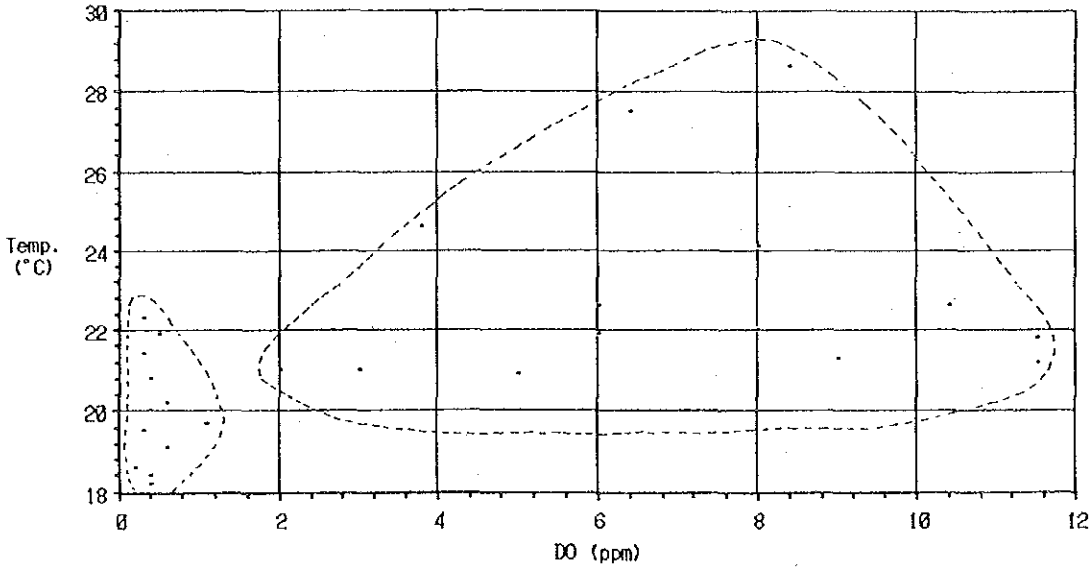


Figure A2.7.1.3 (1) Cylindrical Intake Rate in Mr. Kizza's Farm

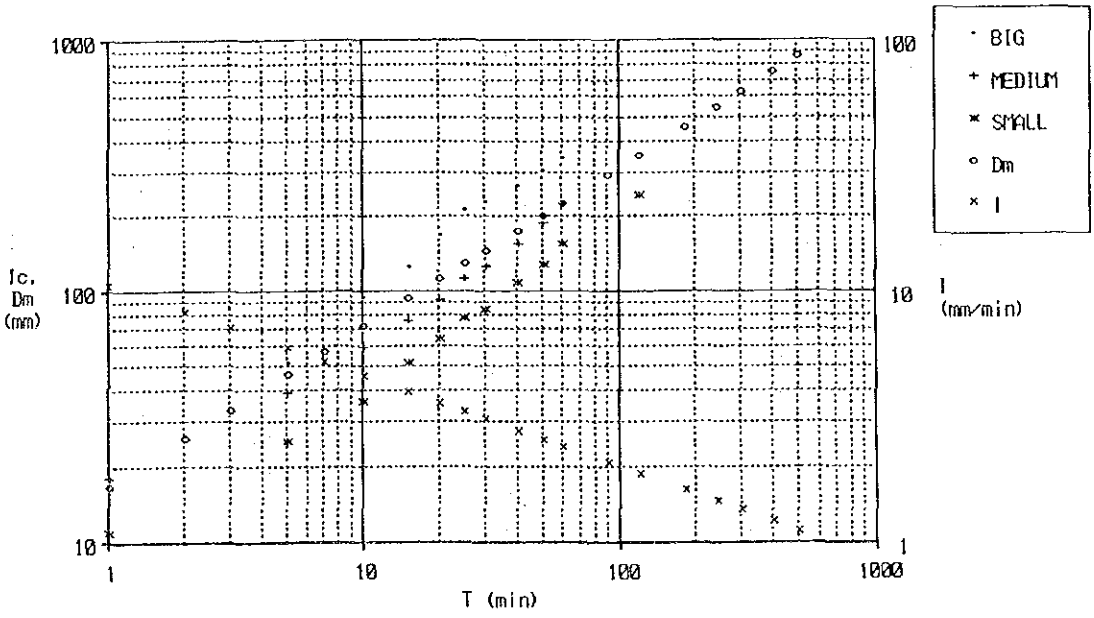


Figure A2.7.1.3 (2) Cylindrical Intake Rate at High Part of Mr. Matovu's Farm

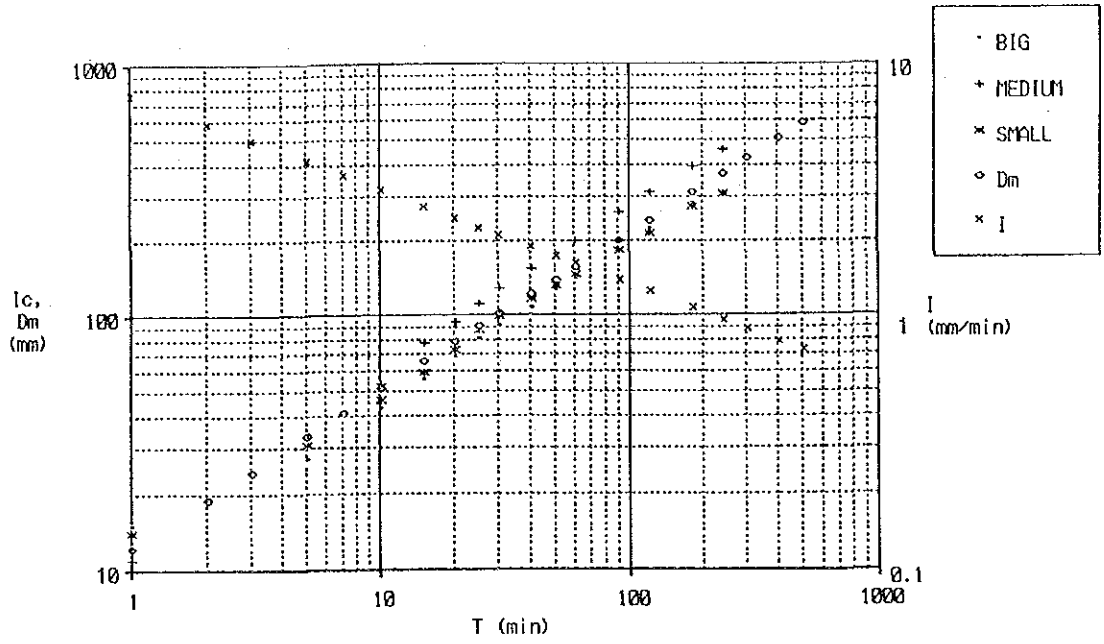
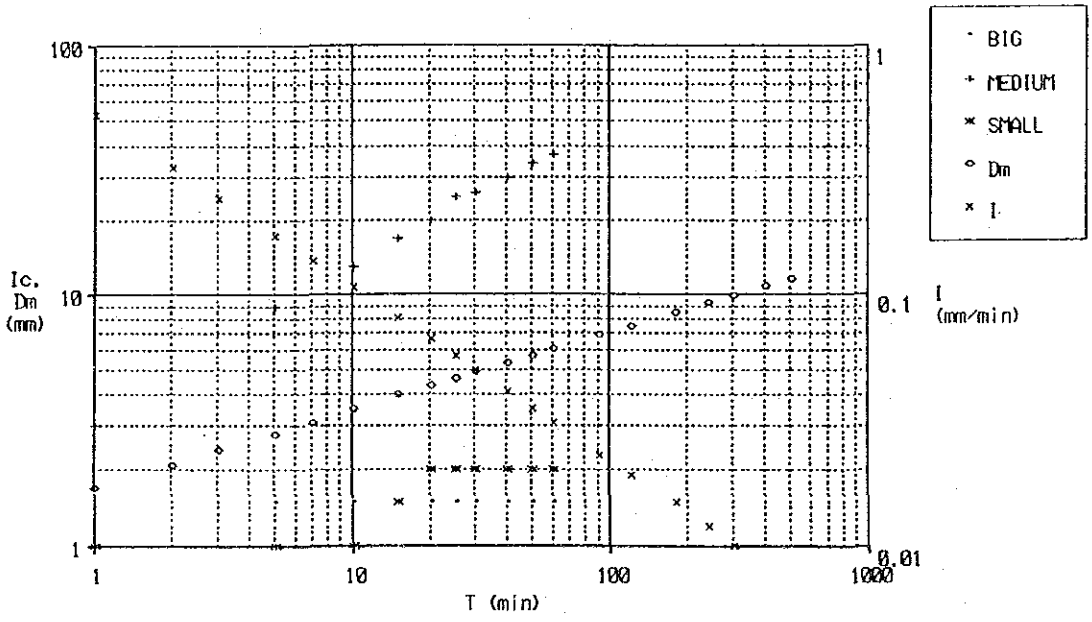


Figure A2.7.1.3 (3) Cylindrical Intake Rate at Low Part of Mr. Matovu's Farm



Appendix 2.8 Rural Social Infrastructure

2.8.1 Water Supplies

Table A2.8.1.1 Population by Type of Water Supply Facility in Rural Area

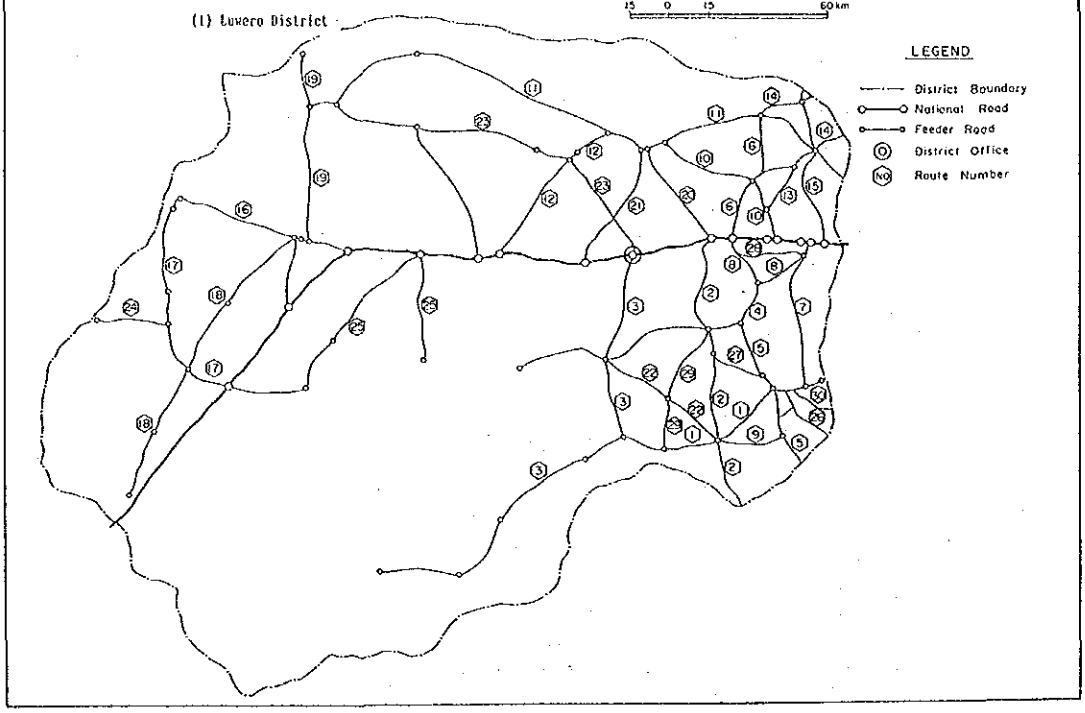
		Luwero		Masaka		Mpigi		Mukono		Total		Remarks
		Population	(%)	Population	(%)	Population	(%)	Population	(%)	Population	(%)	
Protected Water Supplies	Piped Water Inside	74		272		1,911		893				
	Piped Water Outside	756		6,359		11,710		7,495				
	Borehole	94,474		7,850		4,387		11,540				
	Protected Well Spring	13,106		25,818		118,228		54,533				
	Sub total	108,410	26	40,299	5	136,236	18	74,461	10	359,406	3	
Unprotected Water Supplies	Open Well Spring	247,850		511,226		558,188		475,731				
	Stream River	8,223		35,132		18,933		113,340				
	Lake Pond Dam	43,295		153,785		52,459		55,920				
	Other	0		10,473		969		530				
	Not Stated	3,381		7,871		6,790		3,450				
	Sub total	302,749	74	718,487	95	637,339	82	648,971	90	2,307,546	87	
	Total	411,159	100	758,786	100	773,575	100	723,432	100	2,666,952	100	

Source : Population and Household Census,1991

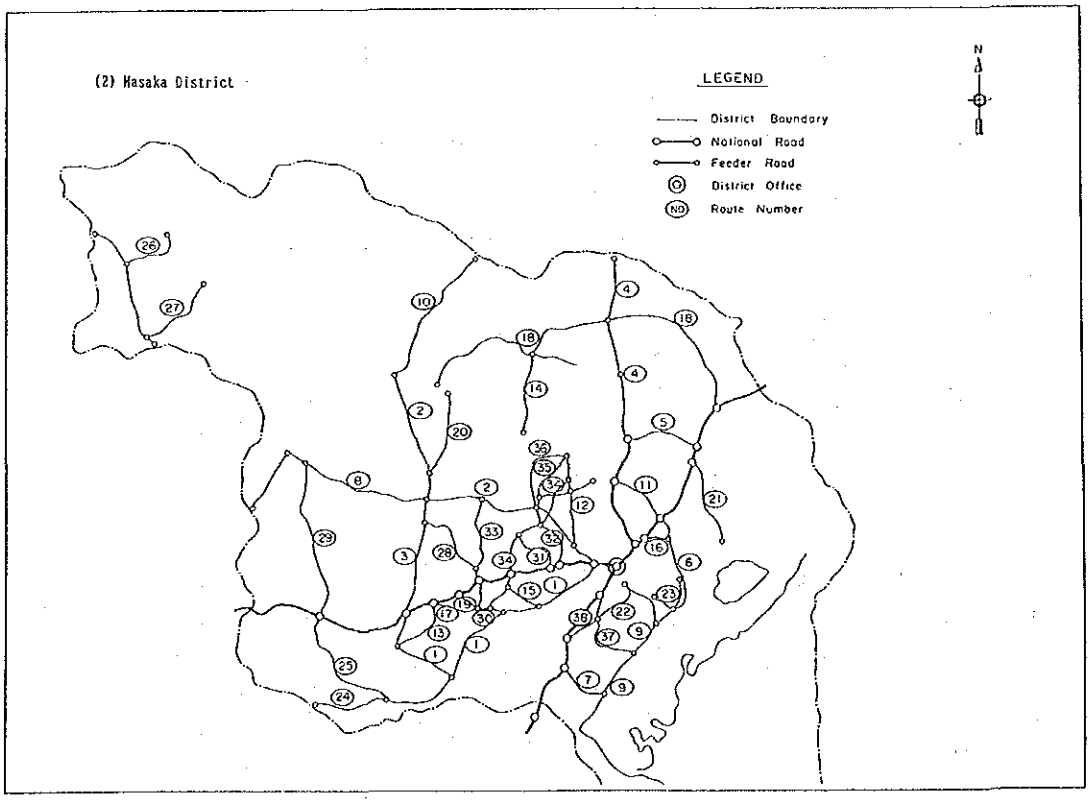
Note : Population is in rural area excluding urban areas.

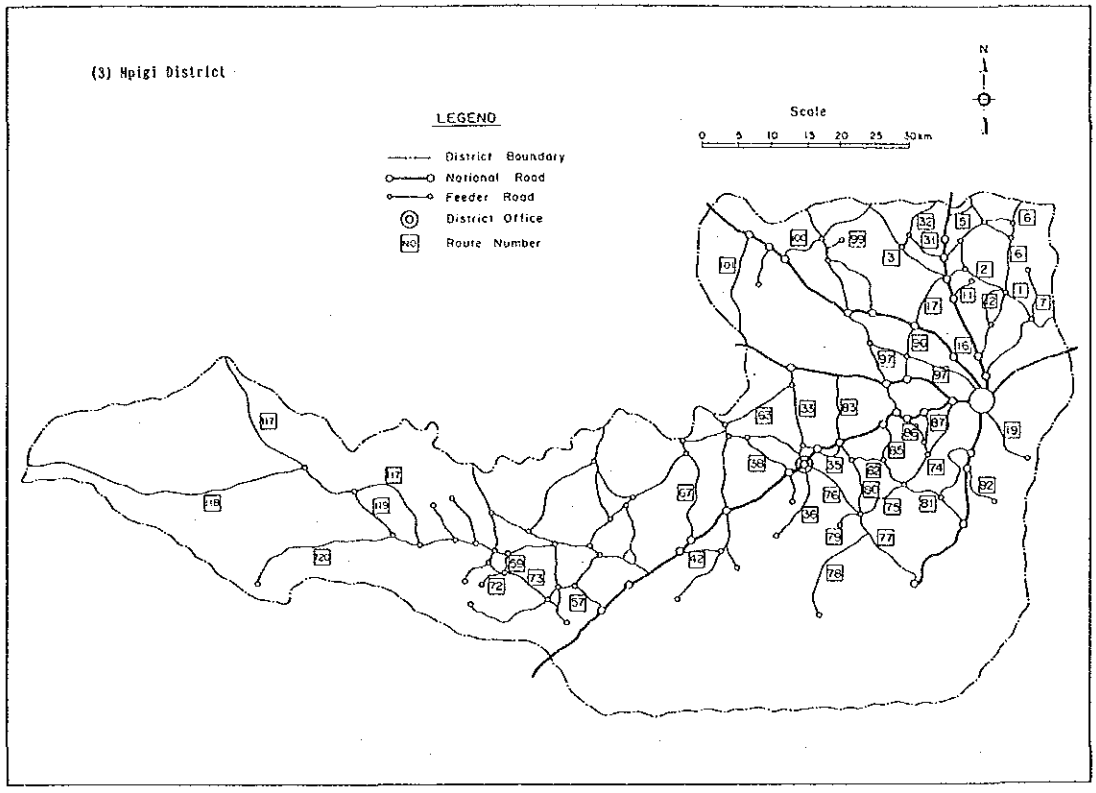
Figure A 2.8.2.1 Rural Road Network

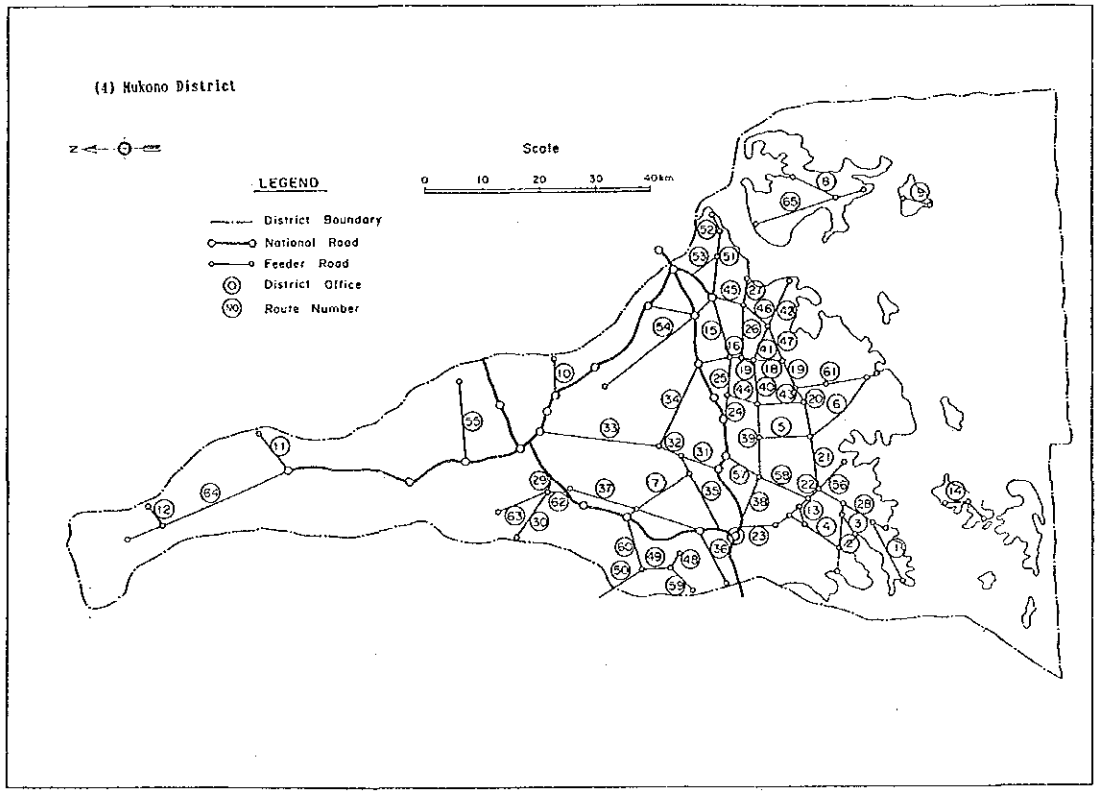
(1) Luwero District



(2) Masaka District




(3) Mpigi District
LEGEND
District Boundary
National Road
Feeder Road
District Office
Route Number
Scale
0 5 10 15 20 25 30km
N


(4) Mukono District
LEGEND
District Boundary
National Road
Feeder Road
District Office
Route Number
Scale
0 10 20 30 40km

Appendix 2.9 Environment

Appendix 2.9.1 Environmental Conservation

Current Situation for Each Environmental Issue

1) Forest Resources, Utilization, and Conservation Measures

(1) Resources

Natural forests in Uganda which consist of high tropical forests and Savannah forests are based on differences in rainfall and to some extent altitude. Other than these, there are relatively small-sized planted forests that encompass both forest types. Overall forests occupied about half of Uganda's land, (10m. ha) at the beginning of the century; however, this has been cut down to a mere one third (3.5m. ha) or 18 percent of the country. Specifically looking at the high tropical forests, which are richest in terms of biodiversity, they have shrunk as shown below basically because of the conversion into farmlands:

1900	3,090,000 ha	estimate of Langdale and Brown in 1960
1958	1,118,000 ha	ditto
1987	730,000 ha	estimate of Forest Department

The current 3.5 million hectors of forest consists of:

a) High Tropical Forest:

Medium Altitude Moist Evergreen Forest (1,200-1,700m high)

Medium Altitude Moist-Semi Deciduous Forest (1,000-1,200m high)

High Altitude Forest (2,000-3,150m high)

Covering about 730,000 ha.

b) Savannah Forests

woodlands

bush lands

grass Savanna

Covering about 2,746 million ha.

c) Planted Forest

Softwood Lands

coniferous forests for the purpose of lumber supply

Peri-Urban Plantations

forests mainly with eucalyptus for the purpose of supplying fuel wood.

Covering about 24,000 ha.

These forests consist of forest reserves and private forests, and their distribution in the country as a whole and in the study area are shown as follows.

Forests area

Item		Forest Reserves			Pri. F	Total	
		T.H.F	S.F	P.F	Total		
Overall Uganda	(t. ha)	730	842	24	1,596	1,904	3,500
Study Area	(ha)	91,178	54,663	5,850	151,691	NA	NA
Luwero	(ha)	-	38,260	3,656	41,916	NA	NA
Masaka	(ha)	13,448	-	47	13,495	NA	NA
Mpigi	(ha)	27,396	8,933	861	37,190	20,777	57,967
Mukono	(ha)	50,334	7,470	1,286	59,090	NA	NA

note : (1) T.H.F, S.F, P.F, Pri. F denote Tropical High Forests, Savanna Forests, Planted Forests and Private Forests respectively.

NA represents not available.

(2) Source for overall Uganda is NEAP, Topic Paper (1993).

(3) According to NFNCP, Work plan (1993), area of the overall Forest Reserves amount to 1.4m. ha for the reason of the transfer of a part of the Forest Reserves to National Parks.

(4) Area of Private Forests, not clarified by kind, are products of balance between Forest Reserves and Total.

(5) Sources of Forest Reserves and Private Forests for the study area are the inventory of Forest Reserves and data of DFO respectively.

(2) Balance Between Supply and Demand of Wood Resources

Most of the wood resources in Uganda are consumed in households and public facilities for cooking and as fuel in bricks making, tea processing, and tobacco curing industries. The percentage of households fuelwood consumption is said to account for 96 percent (World Bank, 1987) or 90 percent (Dr. A. C. Hamilton). The 1991 Population and Housing Census indicates that 89 percent of households depend on fuel wood and partly on charcoal for cooking in the Study area (94% in Luwero, 93% in Masaka, 79% in Mpigi, and 92% in Mukono). In addition, wood is also consumed as poles, building materials, furniture, and others; but this is small compared to its use as a fuel for cooking and is estimated to make up a small percent of the whole consumption (Biomass Study, 1988). Therefore, the balance of wood can be estimated by the amount of supply and demand in fuelwood for cooking.

To get reliable data on the wood demand and supply in the country, it is imperative that we use the National Biomass Study results; However, the study has yet to be finalized.

Preliminary estimate made by the Study shows that the demand is between 15 and 20 million tones while the supply is about 17 million tones annually. According to these estimate, the annual demand and supply is balanced. However, this balance holds true if it is possible to harvest, gather, distribute and utilize all the wood resources appropriately. In real terms, this is not the case: a number of shortfalls occur at every stage of the process above. For example, some areas in Masaka district have severely depleted their wood resources to the extent that the frequency of cooking is said to have dropped and the methods of cooking have been changed due to fuel wood shortage.

(3) Forest Conservation

The conservation of forests that were degraded during the recent civil unrest is an urgent problem for the current government to solve. To deal with the problem. the Forest Rehabilitation Program (FRP) was set up mainly with the assist of World Bank in 1987. Currently six sub-projects mentioned below are underway.

A) National Forest Management and Conservation Project (NFMCP)

This sub-project is undertaken with aid from the EEC and it tackles the problems of management and conservation in the forest reserves. It has achieved the following results since the start in 1987 to June, 1993:

-Clearance of the forest reserves boundary--6,000km

-Maintenance and management of forest reserves boundaries--5,000km

-Rehabilitation of encroachment--98,000ha (Eviction of squatters)

-Reforestation of illegal crop lands--2,800ha

-Supplemental fore station within the Forest Reserves--900ha

-Policing illegal lumbering within the Forest Reserves--in all the Forest Reserves

-Setting up nurseries--four major stations and 36 substations.

-Training staff.

B) Softwood Plantation Rehabilitation

This sub-project with aid from the World Bank is intended to conserve the existing coniferous tree plantations and plant trees to increase the supply of lumber for building materials and other uses. This has achieved the conservation of a 15,000ha area of the existing planted forests and the reforestation of 135ha.

C) Peri-Urban Plantation

This is undertaken with aid from NORAD and has conserved a 900ha area of the existing planted eucalyptus forests and others in order to increase mainly the supply of poles, fuelwood, as well as to supply seedlings.

D) Farm Forestry

This is undertaken with aid from DANIDA and CARE for the purpose of promoting the recovery of private forests and reforestation of private lands. It has aided the recovery and new installation of private nurseries and supplied seedlings to private sectors.

E) Training

The purpose of this sub project is to improve the quality of the staff in the Forest Department with cooperation from UNDP.

F) Forest Department Rehabilitation

This sub-project maintains equipment such as off-road vehicles used for patrolling the forest areas and constructs housing for Forest Department staff.

Besides the above mentioned FRP sub-projects, the following two projects are noteworthy.

(a) Tree Seed Project:

In this project, seed centers have been set up in three location nationwide to collect and preserve indigenous seeds, and develop and supply superior seeds. This is aided by UNSO.

(b) National Biomas Study:

This project aims at the mapping (1:50,000(vegetation of the whole country using spot pictures supplemented by on-site studies in order to understand the amount of bio-resources and create a basic document to help build future forestry policies.

2) Wetlands

(1) Extent and Current Utilization of Wetlands

As to the wetlands, which are said to cover about 15 percent of the Ugandan land, accurate data about their extent, size of each area, their hydrological mechanisms, and inhabiting animals and plants are very limited. Finding out the content and characters of each wetland is prerequisite for making wetland conservation policies more concrete. However, a lock of funds has been preventing a plan to compile an inventory from NWCMP. Therefore, we must supplement data by field studies based on limited information such as a vegetation map (1:500,000) compiled by Langdale in 1964.

According to Langdale, Ugandan wetlands can be roughly categorized into the following three types by vegetation. The largest is the impeded drainage wetlands. They are seasonal grasslands covered with miscanthidium and echinochloa. Permanent wetlands, where papyrus and miscanthidium grow thickly, follow next. Wood grown seasonal forest wetlands are existent in a very small scale. They are shown below.

wetlands with impeded drainage--20,392km^2
wetlands----------8,832km^2
wetlands forests---------- 365km^2
total---------- 29,589km^2

In this study, we compiled present land use maps (scale 1:250,000) based on Landsat images taken in December 1992 and calculated areas classified by land use. These maps identified wetlands where lush grass is distinguished in low lying areas in reference to topographic maps. The total wetlands in the study area in the maps amounted to 376t. ha

without distinguished by vegetation. The field study revealed that only a few areas are used for agriculture as shown in the section 3.4, "Irrigation and Drainage".

Wetlands in the study area are categorized hydrologically into the following four systems:

a) Lake Victoria System

This is a group of wetlands starting from inland to Lake Victoria. All of them are independent of each other, and most of them are located in Mpigi District. They join the lake with the difference of 25 to 30 meters in height at the upper most points of wetlands. Other than these, some low, flat wetlands exist along the lake, and have a close relationship with the lake in terms of hydrology and soil.

b) Lake Kyoga System

Sezibwa wetlands and those which are located along Lake Kyoga belong to this system. The mainstream of Sezibwa divides Luwero District and Mukono District, and the watershed consists of the 3t. ha tropical high forests (Mabira forest reserve). This system is a typical permanent wetland. Many of the tributaries that pour into the trunk of Sezibwa are located in Mukono, Luwero, and Mpigi Districts. These tributaries in southern parts of Mukono and Luwero and in Mpigi are permanent, while those in northern parts of Mukono and Luwero are seasonal, most of which are filled only tentatively even in rainy seasons.

c) Kafu System

This system consists of the permanent wetlands of Mayanja and Lugogo that pour into Kafu. Many of the tributaries are in Luwero and Mpigi Districts. The tributaries are categorized into permanent ones and seasonal ones governed by hydrological conditions.

d) Katonga System

The Katonga River, whose water shed occupies most of Masaka District, and pours into Lake Victoria, has two major permanent wetlands, Kyoja and Nabajuzi.

(2) Hydraulic Mechanism of Wetlands

Langdale has classified wetlands by their vegetation as discussed above. He has also classified them by whether they are permanent or seasonal. Nonetheless, no one has classified them by hydraulic mechanism. We have reached the conclusion through field studies that it is adequate to classify both permanent and seasonal wetlands into two types as follows from a hydrological standpoint.

a) permanent wetlands

A1 type: Ones that are filled all the time through rainy seasons and dry seasons;

A2 type: Ones that are filled in rainy seasons and can be dried up easily by excavation of drainage in dry seasons;

b) seasonal wetlands

B1 type: Ones that are dried up in dry seasons and can be dried up easily by excavation of drainage in rainy seasons;

B2 type: Ones that are dried up in dry seasons and are filled only temporarily even in rainy seasons.

Among them, ones currently used as farmlands are limited to A2 and B1 type wetlands, which are easy to cultivate and get water.

These types of wetlands are governed by the balance between water supply and water loss. The balance can be expressed as a formula below:

Water balance = Water supply - Water loss

Water supply = Di + R * Aw = f (R, Aca, Vca) + r * Aw

Water loss = ET + P + Do = f (T, Aw, Vw) + P + f (Ls, Vw)

where

Di, Do : inflow and outflow to and out of the wetlands

R : rainfall

ET : evapotranspiration from the surface

P : percolation into the subsoil in the wetlands

Aw, Aca ; area of the wetland and the water shed

Vw, Vca ; vegetation in the wetland and the water shed

T : temperature

Ls : longitudinal bottom slope in the wetland

f ( ) : function

It is clear from the formula above that the more positive the balance of water and the longer this positive balance lasts the more significant characteristics of permanent appears. Yet, it has to be noted that outflow (Do), which most greatly regulates the water balance, is mainly influenced by the longitudinal topographic gradient. The longitudinal gradient of the main stream of Sezibwa Swamp is read from topographic maps (scale 1:50,000) and shown as below.

	All Part	Upper Part	Lower Part
Length(m)	125,000	60,000	65,000
Uppermost altitude (m)	1,220	1,220	1,067
Lowermost altitude (m)	1.037	1,067	1,037
Difference of the altitude (m)	187	153	30
Longitudinal gradient	1/700	1/400	1/2,100

3) Conservation of Water Quality

(1) Scoping of Water Quality

Life and Water are One.

Man needs water not only for his direct body physiological processes but also for his activities such as agriculture, manufacture, mining and many others. Therefore water quality, which may mean very different thing to different people, has to be improved and then conserved to meet the demands of each use.

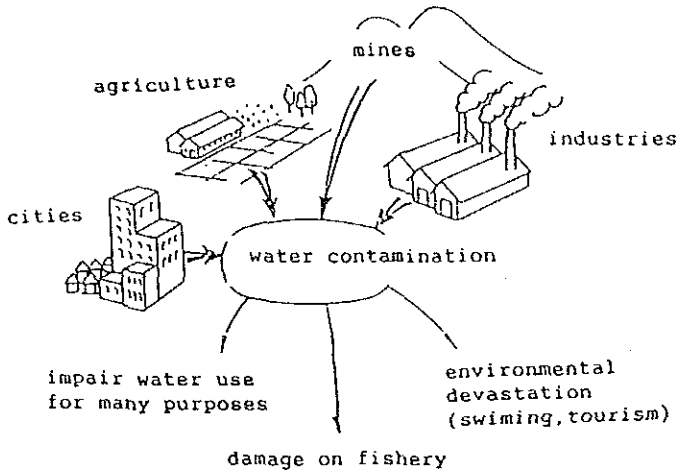
Water quality is determined by the variety of constituents and their concentration. Qualifying water requires to employ proper indices depending on the usage. The indices detect specific constituents in the water. In general, constituents that cause water pollution are categorized into four types as shown in the table below. Each of these is deeply related to people's livelihood.

Classification of Constituents of Water Contamination

Classification	Constituents	Index	Relation with human
1. Toxic matters	heavy metals (Hg, Cd, Pb, As, Cr) toxin (Cyanide, organic phosphate, PCB)		directly harms human health in drinking water
2. Organic matters and others	organic matter suspended materials bacteria (f. coli, others)	BOD, COD, DO, SS, EC, PH, etc.	besides harms human, impairs water sources and water environment
3. Nutritive substances	nitrogen phosphorous	T-N, etc. T-P, etc.	incurs eutrophication
4. Others	salt, oil radioactives		

As implied in Figure A2.9.3.1, these constituents that pollute water come out of cities, mines factories, farmland and grassland and contaminate rivers, lakes, ponds, and sometimes even ground water.

Figure A2.9.3.1 A Variety of Sources for Water Contamination



(2) Toxic Constituents of Drinking Water

The quality of drinking water in Uganda is required to comply with the WHO guideline set in 1984 which was revised from 1974 guideline. This guideline was set flatly for both developed and developing countries. Thus, it can be taken as target values (RUWASA, 1993). For that reason, RUWASA has been using more lenient standards than these in the guideline in order to rapidly increase the population that have access to safe water. These lenient standards seem to be accepted throughout Uganda for the time being.

Table A2.9.3.2 shows water quality standards set by WHO and RUWASA compared with two Japanese standards including one which is set to protect human health imposing on all the Currently, people living around Lake Victoria depend on the water in the Lake and those who live inland depend on wetlands, springs, and ground water wherever they are available. Although none of the toxic heavy metals nor poisons have been reported in the water used in the study area, a lot of water sources such as wetlands and springs are reported to have been contaminated by fecal coil from sewage and waste of animals. The possibility of corroding pipes by high rate of carbon dioxide in the water originated from the organic process in the soil cover has also been pointed out (RUWASA, 1993).

Table A2.9.3.1 Water Quality Guideline

Parameter	WHO Guidelines	RUWASA Max Permissible	Japan		Remarks
			Health	Potable Water	
Min pH	6.5	6.0		5.8	Taste and user acceptance
Max pH	8.5	9.5		8.6	-- do --
Total Dissolved Solids acceptance	1,000 ppm	2,000 ppm			-- do --
Total Hardness	500 ppm	600 ppm		300 ppm	-- do --
Chloride	250 ppm	800 ppm		200 ppm	-- do --
Sulphate	400 ppm	600 ppm			-- do --
Fluoride	1.5 ppm	3.0 ppm		0.8 ppm	Teeth staining and bone damage
Iron	0.3 ppm	5 ppm		0.3 ppm	Taste and user acceptance
Manganese	0.5 ppm	0.5 ppm		0.3 ppm	-- do --
Arsenic	0.05 ppm	0.05 ppm	0.05 ppm	0.05 ppm	
Cadmium	0.005 ppm	0.05 ppm	0.01 ppm	0.01 ppm	-- do --
Cyanide	0.1 ppm	0.2 ppm	None	None	-- do --
Mercury	0.001 ppm	0.001 ppm	0.0005 ppm	None	-- do --
Lead	0.05 ppm	0.1 ppm	0.1 ppm	0.1 ppm	-- do --
F. coil	3/100 ml	2.5/100 ml		None	-- do --
Nitrate	10 ppm	100 ppm		10 ppm	-- do --
Chromium			0.05 ppm	0.05 ppm	-- do --
Organic Phosphate			None	None	-- do --
PCB			None		-- do --

The city water, which is drawn from Lake Victoria is treated and made as safe as the drinking water that is drawn from the ground water sources and used in the rural areas. However, the study shall not remain indifferent to the growing water contamination. This growing hazard will be resulted from the inappropriate use of the harmful mercury and phosphorus substances that commonly constitute the agrochemicals and many other industrial chemicals which will soon be on an increasing demand. Thus, it is necessary to give consideration to the proper usage of agrochemicals.

(3) Eutrophication of Lakes

Lake Victoria (68,800km^2), which is shared between Kenya, Uganda and Tanzania at a rate of 6.43 and 51 percent respectively, is the third largest lake in the world. It has been observed that in recent years, the Lake's water quality has deteriorated to such an extent that it can neither resist the massive growth of the water hyacinth nor support the numerous indigenous fish varieties. These are two clear examples of the Lake's environmental degradation (UNEP 1992).

Some of the reasons named for the deterioration include the inflow of waste water (the water shed of the lake includes 50,000km^2 of highly populated area of Kenya, where 40 percent of its population is concentrated), the weakened purification function of the water caused by a decline in the vegetation around the lake such as papyrus, and recent climatic changes in the East African sub-continent.

As to the water quality of wetlands, because most wetlands are currently covered with papyrus and miscanthidium combined with little agricultural use and limited inflow of agrochemicals, their water purification system is thought to have been kept and functioning adequately so far.

Eutrophication of lake water is detected by growth of water hyacinth and algae. It harms the ecosystem, and causes unfavorable effects on water use for drinking and agriculture. Growth of algae requires many elements such as N, P, Fe, and Mn as well as C, H, and O. Since such elements as Fe, and Mn as well as C, H, and O are usually existent sufficiently in the water of wetlands and lakes the amount of nitrogen and phosphorous are two elements which control the production of algae and influence the eutrophication of lakes based on Lie big's law of minimum.

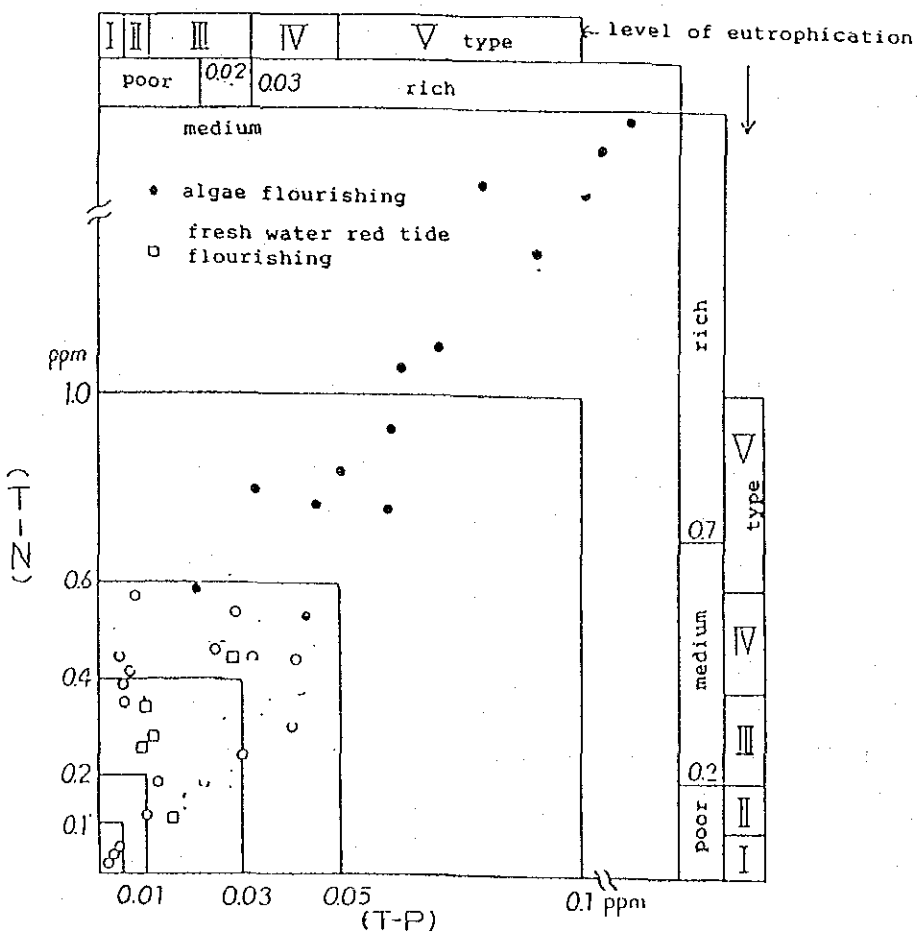
In order to conserve the water quality of lakes and wetlands, Japan currently adopted Total-Nitrogen and Total-Phosphorous as indexes to be imposed depending on the required environmental level of lakes. The indexes are shown in the table below.

Water Conservation Standard for Curbing Eutrophication in Lakes in Japan

Level of water quality	T-N (ppm)	T-P (ppm)	Remarks
1	0.1	0.005	for lakes to be most strictly conserved.
2	0.2	0.01	in descending order the
3	0.4	0.03	standard becomes lenient
4	0.6	0.05	according to the level
5	1	0.1	required.

Figure A2.9.3.2 shows the level of the water contamination reported on the 33 major lakes in Japan represented by the growth of algae in relation with T-N and T-P (Toshio Tabuchi, 1986).

Figure A2.9.3.2 Correlation between T-N and T-P



The following phenomena are learned from the figure.

a) Almost all the lakes in which algae have grown are rich in eutrophicaiton with levels over 0.7ppm in T-N and 0.03ppm in T-P, and many of them are shallower than 10 meters. There is a high correlation between T-N and T-P in these lakes.

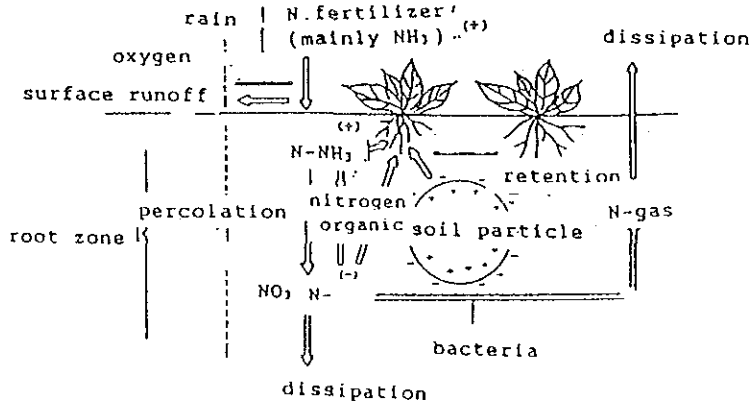
b) Lakes in which freshwater red tide has grown are poor or medium in eutrophication with levels less than 0.4ppm in T-N and 0.02ppm in T-P. Many of them are deeper that 10 meters. The correlation between T-N and T-P is low at those lakes. It is noteworthy that even though T-P is low and water is clean, algae grows when T-N exists moderately.

A high correlation is found between COD and SS at highly eutrophicated lakes. Water quality in Lake Victoria, shown by the value 0.7ppm in $N\text{-}NO^3$ (SWIP) should fall on the borderline of the eutrophicated lakes category by Japanese standards.

Nitrogen and phosphorous come out not only of factories and sewage, but also from farmlands through surface and ground water, in which a portion of agrochemicals and livestock wastes dissolve. It is important to know the outflow mechanism in order to control the amount. The balance between nitrogen outflow and inflow is shown in the figure below.

Nitrogen comes from fertilizers and rain then goes out through crops absorption. ground percolation and dissipation into the atmosphere as nitrogen gas. The same applies to phosphorus except for its dissipation into the atmosphere.

Schematic Flow of N-Fertilizer



The amount of fertilizers dissolved in the water and its runoff depends on a number of factors including amount of fertilizer used type of crops and soils, amount of rainfall, topography etc. Accordingly, many tests have yielded greatly varying results ranging from 5-200 kg/ha in nitrogen and 0-1.5 kg/ha in phosphorus. It is generally expected that the amount of dissolved fertilizer is greatest from the highly fertilized vegetable fields followed by the plowed fields and then by the grasslands.

Many test results show that dissolution ratio (the amount dissolved to the amount of fertilizer) is 20-30% for farmlands and around 10% for grasslands.

(4) Quality of Water Used for Agriculture

Water quality studies for agricultural use are based on compounds that,

a) are directly intervene in the growth of crops like salts of heavy metals (An, Cu);

b) are easily water soluble organic substances which measured using the COD indices; these compounds indirectly harm crops by reducing the soils;

c) are absorbed by and remain in the crops and eventually harm the user (man) eg. Cd compounds.

The harmful extent of these depends on the type of crop and soil, climate, methods of the chemical application and amount of water in use.

Therefore, it is difficult to set an overall standard for agricultural water quality. In Japan, however, there is a standard for the water quality of paddy that is thought to be safe under any conditions. No standard for irrigation water for other crops has been set because the required water quality varies from crop to crop and water application does not considerably influence the growth of crops as it is for rice. Yet, the standard for paddy serves as a sufficient reference. This water standard consists of nice indices as shown in Table A2.9.3.2.

Table A2.9.3.2 Standard of Irrigation Water for Paddy in Japan

Index	Required Value	Expected Harms
pH	6.0-7.5	Paddy is resistant to a big range of PH. However, such ill effects like runoff of soil nutrients and activation of aluminum in the soil are caused by acid water; while nutrient unaffordability is caused by alkaline water.
COD DO	<6 ppm >5 ppm	Such harmful materials for crops as H_2SO_4, organic acid and Fe^{++} are formed when organic matters dissolve in the soil, which consumes oxygen and makes the soil reduced.
SS	<100 ppm	SS indicated the volume of organic matters such as plankton and algae and colloidal silt as well in the water. These materials degrade physical soil characteristics and reduce the soil.
T-N	<1 ppm	Excess in nitrogen supply invites the over growing of paddy which makes it bend on the ground, outbreak of diseases and rice quality degradation.
EC	<0.3 ms/m	Excess of nutritious substances hinders paddy growing directly.
As Zn Cu	<0.05 ppm <0.5 ppm <0.02 ppm	These heavy metals suppress the growth of paddy directly.

Appendix 3

Development Plan for Each Sector

Appendix 3.1 Land Use Plan

Table A3.1.1 Synthesized Overall Land Suitability by County

(sq.km)

District / County	I	II	III	IV	V	VI	VII	VIII	IX	Land Area
Luwero										
Buruli	4.0			335.6	1.0	30.4	201.0	2,468.3	348.5	3,388.8
Katikamu	46.5		13.6	36.2	36.8	630.6	15.2	165.8	36.3	981.0
Nakaseke	100.2		13.2	345.0	83.8	551.9	192.6	1,744.2	424.2	3,455.1
Wabusaana	66.4		2.0	68.3	43.0	540.0	72.3	303.0	97.4	1,192.4
Total	217.1		28.8	785.1	164.6	1,752.9	481.1	4,681.3	906.4	9,017.3
Masaka										
Bukomansimbi	27.2		19.7	120.8	33.8	153.2	97.5	120.2		572.4
Bukoto	77.7		31.0	310.8	51.4	343.2	367.3	553.6	394.1	2,129.1
Kalungu	41.7		27.3	142.8	42.4	171.8	241.3	115.3	10.9	793.5
Lwemiyaga			0.0	148.2			85.0	495.9	59.1	788.2
Masaka Mun.	1.0		2.0	3.0	8.0	9.1	1.0	18.1	10.1	52.3
Mawoggola	63.1		24.3	410.1	85.0	26.4	377.5	466.4	76.9	1,529.7
Total	210.7		104.3	1,135.7	220.6	703.7	1,169.6	1,769.5	551.1	5,865.2
Mpigi										
Busiro	46.4		46.4	63.7	87.3	181.1	164.6	120.7	629.0	1,339.2
Butambala	3.1		3.0	49.7	3.1	58.0	37.8	73.1	189.0	416.8
Entebbe Town				18.7				5.6	10.3	35.5
Gomba	37.5		6.6	321.7	19.4	171.2	274.9	652.5	199.5	1,683.3
Kyadondo	47.9		22.5	11.2	49.9	230.3	5.8	39.8	135.9	543.3
Mawokota	27.6		17.8	135.9	27.1	57.9	276.6	101.7	504.8	1,149.4
Total	162.5		96.3	600.9	186.8	698.5	760.6	993.4	1,668.5	5,167.5
Mukono										
Bbale	101.6			42.1	87.8	153.4	20.8	559.4	146.8	1,111.9
Buikwe	62.9		32.6	16.3	31.7	226.0	28.6	111.5	738.1	1,247.7
Buvuma			1.9	112.9				72.0	99.1	285.9
Mukono	22.9		10.9	137.8	32.8	81.2	10.5	113.2	602.0	1,011.3
Nakifuma	132.6				127.6	340.9	6.0	1.0	234.0	842.1
Ntenjeru	52.9		1.1	1.1	45.7	393.7		16.0	31.8	542.3
Total	372.9		46.5	310.2	325.6	1,195.2	65.9	873.1	1,851.8	5,041.2
Grand Total	963.2		275.9	2,831.9	897.6	4,350.3	2,477.2	8,317.3	4,977.8	25,091.2

Source : Mesh Database in Study Area

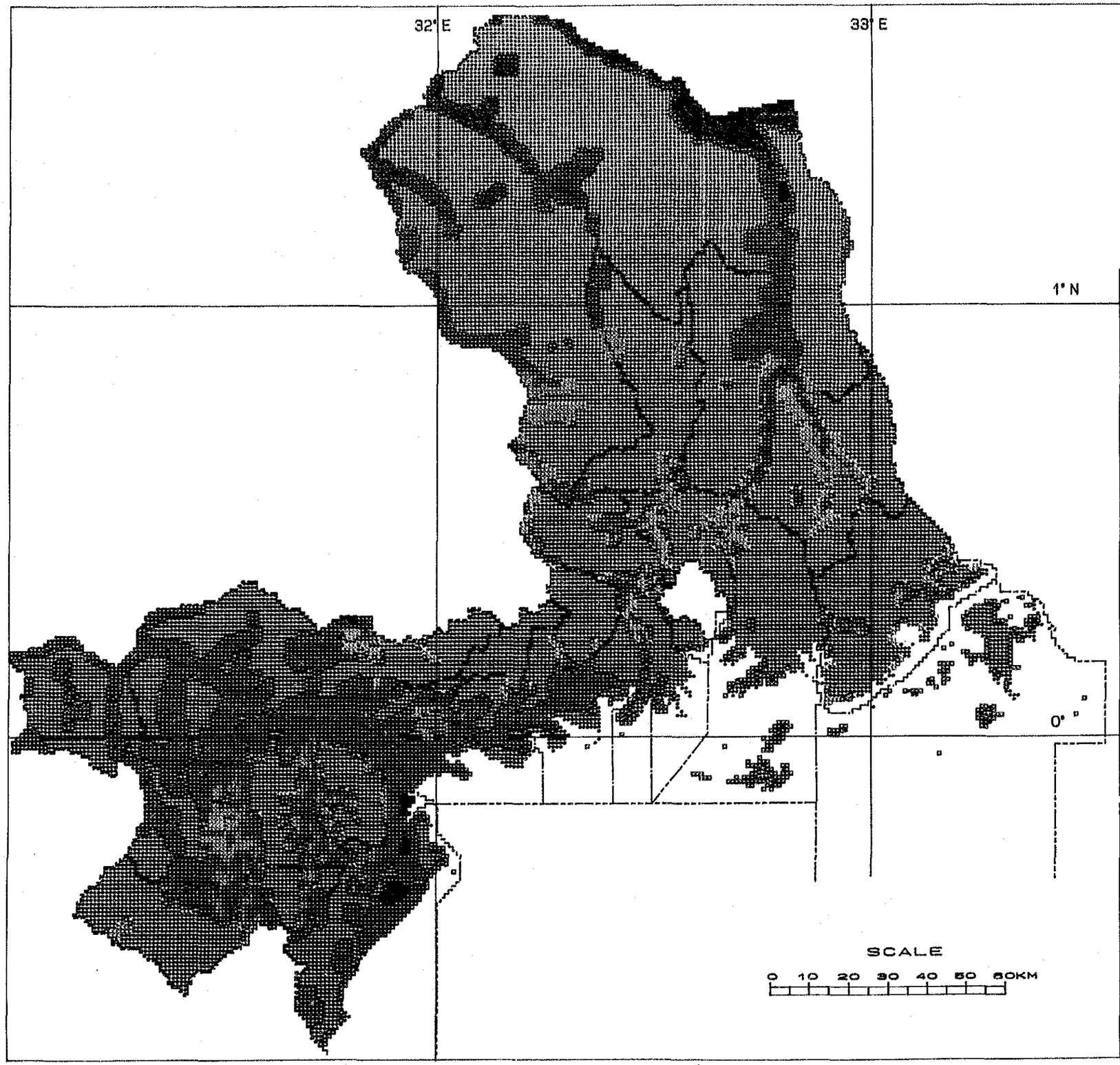
Table A3.1.2 Land Suitability for Farm Fields by County

(%)

District / County	High	Medium	Low	None	Total
Luwero					
Buruli	0.1	1.1	98.6	0.2	100.0
Katikamu	1.2	76.1	22.6	0.1	100.0
Nakaseke		24.1	75.8	0.1	100.0
Wabusaana	21.4	40.6	37.8	0.2	100.0
Total	3.0	23.7	73.1	0.2	100.0
Masaka					
Bukomansimbi		45.4	54.6		100.0
Bukoto		30.1	57.7	12.2	100.0
Kalungu		48.2	51.6	0.2	100.0
Lwemiyaga			100.0		100.0
Masaka Mun.		36.4	63.6		100.0
Mawoggola		11.5	88.4	0.1	100.0
Total		24.8	70.7	4.5	100.0
Mpigi					
Busiro	3.9	55.5	40.0	0.6	100.0
Butambala		34.1	65.4	0.5	100.0
Entebbe Town			100.0		100.0
Gomba		17.9	81.1	1.0	100.0
Kyadondo	3.2	82.2	14.6		100.0
Mawokota		30.0	69.2	0.8	100.0
Total	1.1	36.1	62.1	0.7	100.0
Mukono					
Bbale	15.2	14.5	70.3		100.0
Buikwe	4.5	65.5	27.8	2.2	100.0
Buvuma		1.0	99.0		100.0
Mukono		31.1	67.8	1.1	100.0
Nakifuma	30.8	69.0	0.2		100.0
Ntenjeru	2.8	93.5	3.7		100.0
Total	11.0	46.4	42.1	0.5	100.0
Grand Total	3.3	29.6	65.7	1.4	100.0

Source : Mesh Database in Study Area

Note : Proportion in Forest/Farm-grassland and Savanna/Farm-grassland



L E G E N D

——————— DISTRICT
——·——·—— COUNTY

- High Suitability
- Medium
- Low
- None
- Water areas

THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.1

LAND SUITABILITY CLASSIFICATION MAP
FOR PADDY FIELDS

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY

32° E

33° E

1° N

0°

L E G E N D

——————— DISTRICT

——·——·—— COUNTY

High Suitability

Medium

Low

None

Water areas

SCALE

0 10 20 30 40 50 60KM

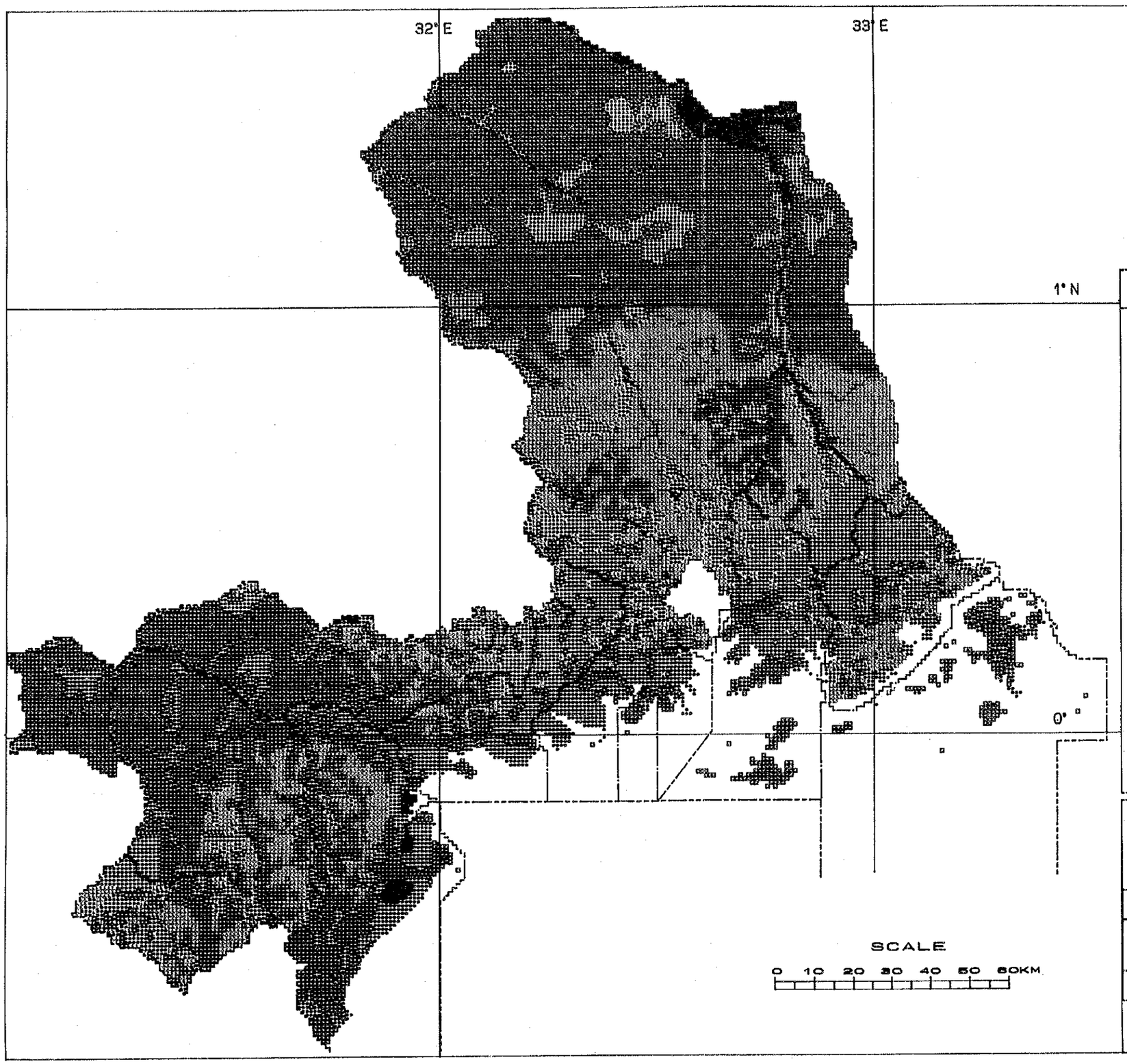
THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.1

LAND SUITABILITY CLASSIFICATION MAP
FOR PADDY FIELDS

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY



L E G E N D

——————— DISTRICT
——·——·—— COUNTY

- High Suitability
- Medium
- Low
- None
- Water Areas

THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.2

LAND SUITABILITY CLASSIFICATION MAP
FOR FARM FIELDS

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY

32° E

33° E

1° N

0°

LEGEND

DISTRICT

COUNTY

High Suitability

Medium

Low

None

Water Areas

SCALE

0 10 20 30 40 50 60KM

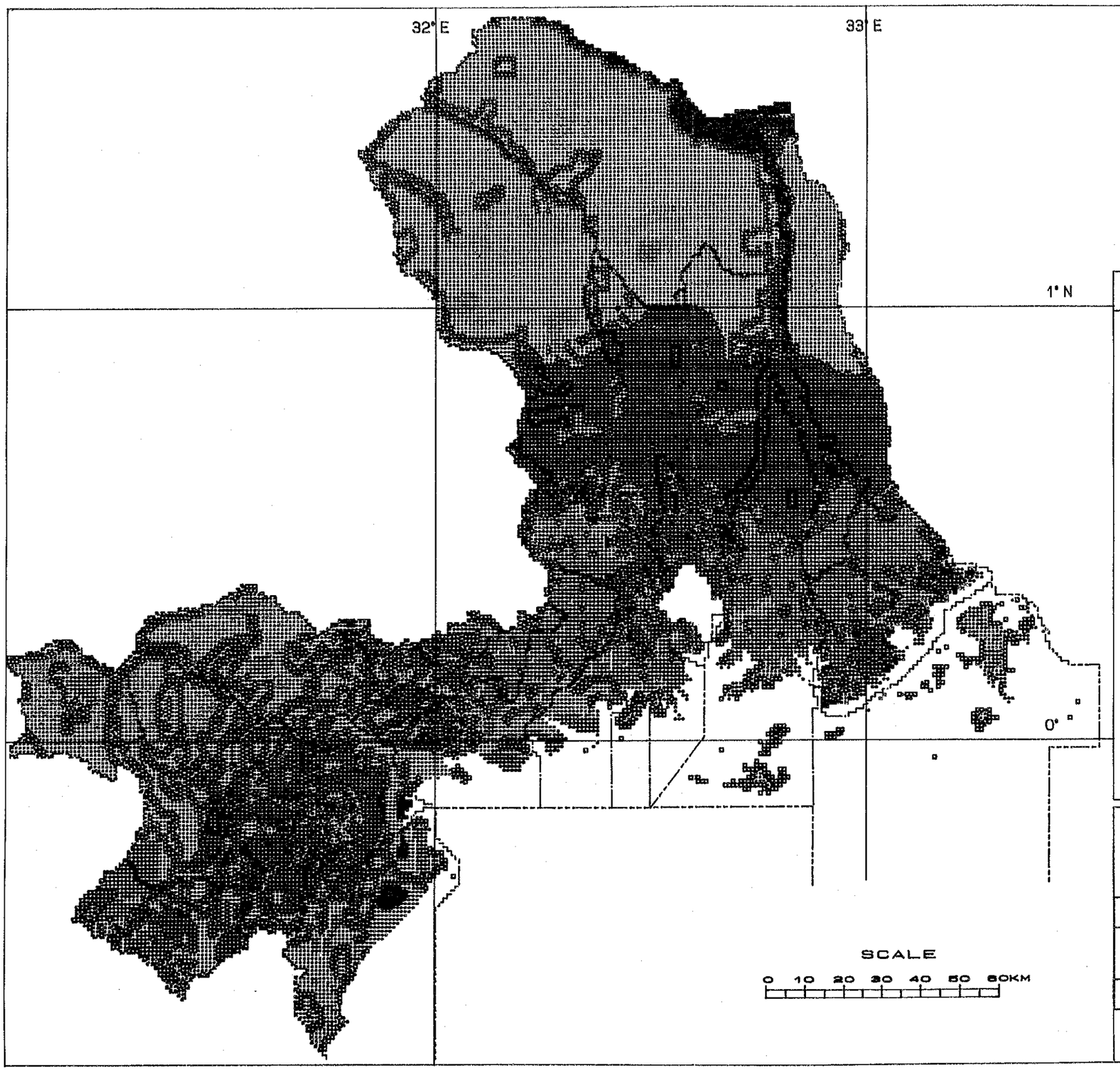
THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.2

LAND SUITABILITY CLASSIFICATION MAP
FOR FARM FIELDS

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY



L E G E N D

- DISTRICT
- COUNTY
- Paddy: above Med.; Farm: above Med.
- Paddy: Low ; Farm: above Med.
- Paddy: Low ; Farm: Low
- Paddy: above Med.; Farm: None
- Paddy: None ; Farm: above Med.
- Paddy: Low ; Farm: None
- Paddy: None ; Farm: Low
- Paddy: None ; Farm: None
- Water Areas

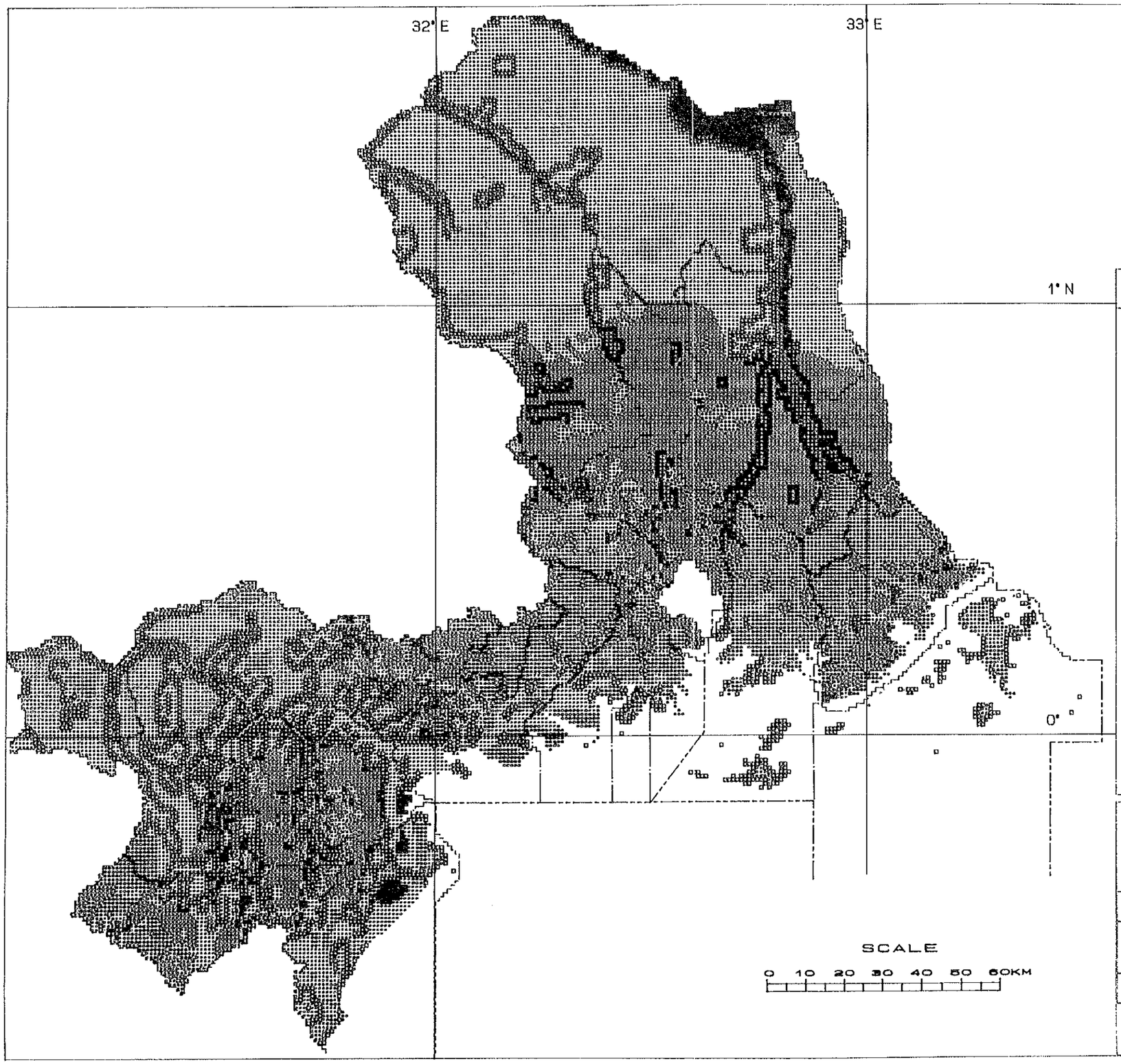
THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.3

SYNTHESIZED OVERALL LAND
SUITABILITY CLASSIFICATION MAP

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY



L E G E N D

——·——·—— DISTRICT
——————— COUNTY

- Paddy: above Med.; Farm: above Med.
- Paddy: Low ; Farm: above Med.
- Paddy: Low ; Farm: Low
- Paddy: above Med.; Farm: None
- Paddy: None ; Farm: above Med.
- Paddy: Low ; Farm: None
- Paddy: None ; Farm: Low
- Paddy: None ; Farm: None
- Water Areas

THE MASTER PLAN STUDY
ON THE INTEGRATED AGRICULTURAL
AND RURAL DEVELOPMENT PROJECT
IN CENTRAL UGANDA

FIGURE A3.1.3

SYNTHESIZED OVERALL LAND
SUITABILITY CLASSIFICATION MAP

DATE: MARCH 1994

JAPAN INTERNATIONAL
COOPERATION AGENCY

Appendix 3.2 Cultivation Plan

3.2.1 Cropping Planning

Table A3.2.1.1 Application Rate of Lime and Phosphorus for Soil Improvement

Soil Fertility	Soil Catena/Series	Soil type	Application rate (kg/ha)	
			Lime Calcium Carbonate	Single Super Phosphate (ssp.)
High	Mabira Catena	"Red" Clay	1,000	100
	Nakabango Catena	"Red" Clay	0	0
	Kaku Series	Clay	3,000	0
Medium	Buganda Catena	Clay Loam	1,000	500
	Mirambi Catena	"Brown Deep" Sancy Loam	1,000	0
	Lukaya Catena	Loam	1,000	500
	Buyaga Catena	"Red Deep" Clay Loam	1,000	200
	Koki Catena	"Red" and "Brown" Clay	1,000	200
	Bukora Series	Clay	2,500	0
Low	Mawogola Catena	"Medium" Gravelly Loam	2,000	500
	Buruli Catena	"Red Deep" Clay Loam	2,000	500
	Kabira Catena	"Medium" Sandy Loam	2,500	100
	Koki Catena	"Yellow" Clay	3,000	500
	Lwampanga Series	Lomy Sand	2,000	500
	Mulembo Series	Sand	1,500	200
	Kifu Series	Sand	2,000	500
	Sango Series	"Deep" Sand	1,500	0
	Sesse Series	"Red" and "Brown" Loam	2,500	0
	Makole Series	Gravelly Loam	1,000	300

Table A3.2.1.2 Standard Application Rate of Fertilizer required by Crops

(1/3)

Crops	Nitrogen fertilizer	Phosphorous Fertilizer	Potassium Fertilizer	Remarks
Bananas	Organic manure	SSP ; 500 g/p (500 kg/ha)	MP ; 500 g/p (500 kg/ha)	Soils in Mukono, Luwero, Mpigi, and Mubende, very deficient in p & k PD ; 2.5 x 4m
Beans	- CF (12 : 12 : 17) : 100 kg/ha			
Cabbage	Organic manure : 5-20 t/ha/year -CF (4 : 7 : 5) : 650 kg/ha			
Carrots	Urea : 100 kg/ha Organic manure should be avoided in low lands cultivation	SSP ; 150 kg/ha or CF (12 : 12 : 17) 30 g/m divide 2 times	MP : 300 kg/ha (750 kg/ha)	
Cassava	N. A	N. A	N. A	Elsewhere used e.g Nigeria 80-120 kg/ha of N. P. K., not in Uganda
Cauli-flower	Organic manure 2.5 - 10 t/ha/year	CF (10 : 10 : 10) 650 kg/ha		
Citrus (Adult tree) Orange / Lemon	N : 74 kg/ha	P_2O_5 65kg/ha	K_2O 74 kg/ha	P. D Orange/Lemon : 165 /ha
Lime/ Tangerine	N : 155 kg/ha	P_2O_5 235kg/ha	K_2O 155 Kg/ha	Lime/Trangerine : 345 /ha
Coffee (Robusta Old trees)	SAN : 450-675 g/tree (336-500 kg/ha), on degrated soils and old tree. or CAN : 675 g/tree 500 kg/ha) on strongly acid soil			P. D : 757 trees/ha
Coffee (Robusta Clonal)	SAN (>pH6) 298 kg/ha/year SA (>pH5.4) 374 kg/ha/year CAN (<pH4.4-5.4) 298 kg/ha/year			P. D : 747 trees/ha

Crops	Nitrogen fertilizer	Phosphorous Fertilizer	Potassium Fertilizer	Remarks
Cacao	No data	No data	No data	
Cotton Luwero Masaka	 SA : 250 kg/ha SA : 125 kg/ha	SSP 125kg/ha		
Cowpeas	CF (12 : 12 : 17) : 200 kg/ha divide 2 times SSP : 100 kg/ha on acid soils			
Egg-plant	Organic manure 20 t/ha/year Urea : 300 kg/ha		MP : 200 kg/ha	
Garlic	Same as for onions			
Grams (green, black)	Same as cowpeas			
Groundnuts		SSP : 120 kg/ha, of TSP : 80-90 kg/ha, in all area other than Mukono, Mpigi Iganga.		
Maize	SA : 125-250 kg/ha or Urea 100kg/ha	SSP : 125-150		
Mulberry	N : 300 kg/ha	P_2O_5 : 150-180 kg/ha	K_2O 180-200 kg/ha	
Finger Millet	SA : 125-250 kg/ha	SSP : 125 kg/ha		
Onions	Organic manure 20 t/ha/year Urea : 250 kg/ha	CF (12 : 12 : 17) 300 kg/ha		Increase N. P. K. from 300kg to 500kg/ha and Urea from 250kg to 350kg, if organic manure is not used
Elephant Grass	SA : 125 kg/ha per cur or alternate	SSP : 400 kg/ha		
Pastures Improved	Urea : 150 kg/ha	SSP : 100 kg/ha		
Irish Potatoes	New land : N 80 Cultivated land : 100 Poor soils : 120	P_2O_5 80 80 100	K_2O 50 kg/ha 80 100	

Rice	CF (25 : 5 : 5 : 60 kg/ha at transplanting urea : 32 kg/ha at 3 to 4 weeks after transplanting.			Source : Kibimba Rice Co.
Sweet Potatoes	Urea : 100 kg/	TSP : 40 kg/ha	MP : 60 kg/ha	
Simsim	SA : 125 kg/ha CAN : 125 kg/ha	SSP : 125-250		
Sorghum	CAN of SA : 125 kg/ha	SSP : 125-250		
Soyabean	N. A.	SSP : 150-200		For nitrogen source its better to use soya bean innoculant (Rhisobium japanicum)
Sugar cane	CAN : 450 kg/ha	SSP : 250 kg/ha	MP : 80 kg/ha	All fertilizer applied should be split into 2 applications, 1st SSP at planting, 2nd N+K at 60 days after planting and apply N+K at 100 days after planting, if necessary.
Spinach Beet	Organic manure 20 t/ha/year Urea : 250 kg/ha	CF (12 : 12 : 17 :) 200 kg/ha		
Pineapples	CAN : 474 kg/ha	SSP : 158 kg/ha	227 kg/ha	Apply all N. P. K. split time (1) planting, (2) established (3) flowering.
Passion Fruit	CF (0 : 5 : 20) : 350 kg/ha			PD : 250 trees/ha
Tomatoes	All organic manure should be avoided SA : 100 kg/ha, 2 weeks after planting + 100 kg/ha at fruit set		M. P. 100 kg/ha	Adjust soil pH to 6.5-7.0 Mulching is important.
Vanilla	N. A.	N. A.	N. A.	

Source : Excepting rice, other crops from KARI and NAARI

Note : Calcium, Ammonium, Nitrate, SAM : Ammonium Sulphate Nitrate
SA : Sulphate of Ammonia, SSP : Single Super Phosphate, TSP : Triple Super Phosphate
CF : Compound fertilizer, MP : Muriate of Pottash, NA : No fertilizers applied
PD : Planting density.

Table A3.2.1.3 Pests and Diseases, and its Control on Main Crops

(1/4)

Crops	Pests	Control	Diseases	Control
Bananas	Banana weevil Burrowing nematode	Miral, Princid Furadan	Panama wilt Leaf Spots	Resistant varieties Fungicides (Too expensive therefore not used)
Beans	Maruga caterpillars American bollworm Bean aphid Thrips, Beetles, Bean fly, moles and Rats	Fenitrothion 50% ML - do - Menazon 70% D. P. Fenitrothion 50% ML)Chemical) control) not given	Anthracnose Bacterial blight, Rust Angular leaf spot Bean common virus	Keep fields weed-free Dithane M45 Macozet) Resistant) varieties) Rotations Clean) seed) Benlate
Finger Millet	Grasshoppers, Caterpillars, Armyworms, Beetles	) Fenitrothion 50% ML	Blast Tar spot	Seed dressing ------
Coffee Robusta	Coffee berry borer Coffee root *mealy-bugs* Leaf eating caterpillars Leaf miners Leoucoptera Coma Mirid bug Cut worms (Agrotis Segatum)	Endosulfan 35% Lindane dust 1kg/tree Perkathion Dimethioate 400g/L Cultural method (weeding, cleaning below coffee primaries) Fenitrothion 50% 1L/ha Cultural method (prunning, desuckering) Fenitrothion 50% 30-50ml/15L or 2L/ha Fenitrothion 30-50ml/15L - do - Fenitrothion cultural method (removal of crop debris)	Red blister (Fungus ceccospora cofferiola) Coffee Leaf-Rust (Hemelia Vastatrix) Bacterial blight or black arm Vascullar wilts	Copper Oxychloride 1.25-2.0kg/ha, every 3 months Benlate 20g/L, every 4 to 6 weeks, or use copper based compounds Seed dressing with copper fungicide Nordox

Cotton	American bollworm	Salut (Dimethoate 222g/L (Chloropyrifos 270g/L Decis (Delthanethrin 10 e. c.) Talstar (Bifenthrin) Sharpa DL		
	Spiny bollworm	Ambush		
	Late bollworm	Early planting		
	Pink bollworm	Uproot, burn		
	Cotton lygus	Plant early		
	Cotton aphids	Ambush		
	Cotton stainers	Prompt picking, uproot and burn		
Cassava	Cassava green mite	Plant early	African cassava	Resistant varieties
		Biological control	Mosaic virus	Clean planting materials
		Resistant varieties		Rogueing
	Cassava mealybugs	Biological control	Bacterial blight	Resistant varieties
	Green hoppers	Ambush		Clean planting varieties
			Cassava anthrocnose	Resistant varieties
				Clean cuttings
Citrus	Citrus scale insects	Fenitrothion 50% M. L, Rogor	Citrus scab	Copper oxychloride
	Citrus aphids	Salut		Benlate or Bacrotin
	False codling moth	Collect and burry fallen fruits	Gummosis or Crown rot	Paste Dithane M45 Alietle
	Citrus blackfly	Salut		Do not allow water logging or mulch to touch trunk
			Citrus brown sot	Dithane M45 or Banlate or Corcobin
			Greening virus	Use resistant root stock
			Quick decline or Tristeza virus	- do-

Maize	Stock borers Termites Striga Maize weevil (storage pest)	Sevin Rotation, Intercrop (cowpeas and groundnuts) Use catch and trap crops (soybean and cotton) Dicamba Resistant varieties Actellic 1% or 2%	Northern leaf blight, Rust, Maize streak	) Resistant varieties) Uproot before seed) Set, plant early
Mulberry	Mulberry scales Mealybugs	Spindon	Mulberry leaf spot Powdery mildew	) Dithane M45
Onions	Onion thrips	Diazinon, Karate can help but not yet recommended	Downy mildews Purple block and Neck rot	Benlate Dithane M45 Antracol 70WP
Passion fruit	Yellow tea mites	Control not yet recommended but Dimethoate can help	Brown spot Alternalia spot	Dithane M45, Antracol, Copper fungicides, Ridomil, Prunning Resistant Varieties, burn diseased debris
Pigeon peas	American bollworm	Fenitrothion 50% ML	------	------
Pineapples	Pineapple mealybugs	Salut	Pineapple wilt Virus	Same as far pineapple mealybugs
Sweet potatoes	Sweet potato butterfly Sweet potato clear wing, moth, Sweet potato weevil	Ambush, pyrethroids, Pick off) not much use) spraying with) insecticide	Virus	Uproot
Simsim	Webworm Gall midge	Fenitrothion 50% ML, Sevin 85 Dimethoate	Angular leaf spots	Dithane
Soyabean	Defoliators Stink bugs	Dimecron, Nemacron Resistant varieties	Bacterial pustule, Leaf spoto Mosaic virus	Rotations, Resistant varieties Rogueing
Sugar cane	Scale insect Stem borer	Field hygiene Steam sterilization of setts Plant hard canes	Eye leaf spots, Smut, Virus, Leaf scold	) Plant clean setts

Cabbage (Brassicas and Lettuce)	Root knot Nematodes	Rotation Ambush, Karate and Decis	Black rot Downy mildew	Rotation Treat seed with water at 50 ℃ for 30 minutes Ridonil M2-63.5 WP Citowett (5ml/20L) Dithane M45 or Antracol 70 WP
Cacao	Capsids Mealy bugs	Lindane 20% ML Gamallin	Verticillium wilt	Provide adequate shade
Cow peas	Maruca	Fenitrothion 50% ML	Ascochyta leaf spot Powdery mildew	------ ------
Grams		Long term storage Actellic 1% or 2%	Mildew, zonate leaf spot	------
Groundnuts	Aphids Thrips	Rogor EC 40 Endosulfan Plant early	Leaf spots by Cercospora Bacterial wilt Rosette virus	Dithane, Benomyl-Close-spacing Resistant, varieties Rotation, Destroy volunteers Resistant varieties Rogueing, Rotation Thiodan
Irish potatoes	Aphids Wire worms, grubs, slug, cutworms, nematodes, root-knot Tuber moth (in field and store)	Plant in aphid free location Remove diseased plants) Dimethioate,) Nematicide,) Furadan Crop rotation, clean, resistant varieties	Viral Early blight Bacterial blight	Clean seed tubers Resistant or tolerant varieties Plant clean seed tubers Resistant or tolerant varieties Dithane M45 2.5kg/ha/week Resistant or tolerant cerified seed Crop rotation with non-host plants Follow strict guarantine measures
Sorghum	Shoot fly Stalk borers Grain moth and Rice weevil (storage pests)	Plant early - do - Actellic 1% or 2%	Smut	Seed dress Uproot and burn
Tea	Capsid bugs Mites	Fenitrothion 50% ML Chlorobenzilate	Armillaria root rot	Remove all stumps and root when clearing land
Tomatoes	Aphids American bollworm	Dimethoate Ambush, Karate, Decis	Phytoghthora blight Altanalia blight	Dithame M45 or Antracol WP Citowett

Source : KARI and NAARI

Note : ML : Miscible liguids, WP : Wettable powders, DP : Dispersible powders, EC : Emulsifiable concentrates

Appendix 3.3 Farm Management Plan

3.3.1 Crop Production

Table A3.3.1.1 Consumption and Production Plan by Crop

(1) Basic Data for Consumption and Production by Crop

	Consumption/Capita				Yield /ha		
	Current		Plan		Current	Goal	Plan
	Rural ton	Town ton	Rural ton	Town ton	ton/ha	ton/ha	2007 ton/ha
Cash Crops							
Coffee (Robsta)					0.86	2.70	1.75
Sugar Cane					50.00	50.00	50.00
Tea					1.50	5.00	3.25
Cacao					0.55	1.00	0.78
Cotton					0.59	1.00	0.79
Vanilla					2.50	2.50	2.50
Staple food	0.415	0.389	0.389	0.364	6.12		
Bananas	0.280	0.263	0.263	0.247	6.20	10.00	8.10
Tubers	0.135	0.126	0.126	0.117	6.04	10.00	8.02
Cassava					5.28	21.25	13.26
Sweet Potatoes					7.17	15.00	11.08
Irish Potatoes					7.99	20.00	14.00
Yams					9.74	10.00	9.87
Cereals	0.096	0.123	0.096	0.123	1.32	2.50	1.91
Maize					1.23	2.50	1.87
Finger Millet					1.07	2.00	1.54
Sorghum					1.91	2.00	1.95
Rice(Paddy)	0.002	0.003	0.003	0.008	1.40	3.50	2.45
Pulses	0.029	0.017	0.029	0.017	1.25	2.00	1.63
Beans					1.26	1.50	1.38
Field Peas					0.48	1.20	0.84
Cow Peas					0.56	0.75	0.66
Pigeon Peas					1.20	1.00	1.10
Oil crops	0.012	0.011	0.012	0.011	1.29	2.00	1.65
Groundnuts					1.27	2.00	1.64
Soyabean					1.37	2.00	1.69
Sunflowers					1.07	1.50	1.29
Simsim					0.71	1.00	0.85
Vegitables	0.020	0.023	0.023	0.026	5.55	9.00	7.28
Tomatoes					6.83	15.00	10.91
Onions					8.23	10.00	9.11
Cabbages					3.96	5.00	4.48
Greens					3.79	5.00	4.40
Fruits	0.030	0.046	0.046	0.069	29.39	40.00	34.69
Pineapples					34.69	40.00	37.35
Passionfruits					7.82	15.00	11.41
Avocado					10.00	10.00	10.00
J. fruit/Paw-paw/Mango					10.00	10.00	10.00
Other (fruits)					6.00	6.00	6.00
Mulberry							

(2) Consumption, Production and Cultivation Area by Crop

Crops	Consumption volume			Production Volume	Cultivated Area		
	Present 1990 ton a	Plan 2007 ton b	Difference ton b-a=c	Plan ton	Plan ha	Present ha	Difference ha
Cash Crops							
Coffee (Robsta)	0	0	0	207,022	118,298	118,298	0
Sugar Cane			2,180,450	4,360,900	87,218	43,609	43,609
Tea			10,707	15,805	4,855	3,399	1,456
Cacao			6,888	10,332	13,307	6,229	7,078
Cotton			3,330	4,270	5,386	1,605	3,781
Vanilla			29,575	29,575	11,830	22	11,808
Staple food	1,551,108	2,362,562	811,454				
Bananas	1,047,222	1,600,624	553,403	1,600,624	197,631	164,082	33,549
Tubers	503,886	761,938	258,052	1,231,701	101,091	161,295	-60,204
Cassava				650,961	49,082	97,545	-48,463
Sweet Potatoes				560,278	50,547	61,782	-11,235
Irish Potatoes				20,462	1,462	1,968	-506
Yams							
Cereals	289,977	469,133	179,156	469,133	244,396	64,406	179,990
Maize				342,751	183,712	52,852	130,860
Finger Millet				29,603	19,261	4,065	15,196
Sorghum				70,366	36,032	7,487	28,545
Rice(Paddy)	7,124	26,413	19,290	26,413	5,390	2	5,388
Pulses	99,457	161,470	62,013	161,470	117,234	65,176	52,058
Beans				161,282	116,997	64,965	52,032
Field Peas				148	177	157	20
Cow Peas				39	60	54	6
Pigeon Peas							
Oil crops	45,910	74,646	28,737	74,646	45,512	19,185	26,327
Groundnuts				44,126	26,960	11,529	15,431
Soyabean				28,077	16,652	6,808	9,844
Sunflowers				2,443	1,900	848	1,052
Simsim							
Vegitables	78,850	145,568	66,718	193,783	25,687	22,894	2,793
Tomatoes				130,586	11,965	12,539	-574
Onions				3,451	379	275	104
Cabbages				59,746	13,343	10,080	3,263
Greens							
Fruits	125,404	310,636	216,296	336,618	11,008	4,094	6,914
Pineapples				318,442	8,527	3,281	5,246
Passionfruits				14,623	1,281	668	613
Avocado				1,399	100	50	50
J. fruit/Paw-paw/Mango				1,399	100	50	50
Other (fruits)				755	1,000	45	955
Mulberry					1,000	50	950
TOTAL	2,190,705	3,524,015	3,595,323		984,453	674,344	310,109

Table A3.3.1.2 Crop Cultivation Plan

(1) Cultivation Plan by Stage Unit : ha

	1991/95	1998/99	2002/03	2006/07	Differencce of Stage			
	a	b	c	d	b-a	c-b	d-c	d-a
Cash Crops								
Coffee (R)	118,297	118,297	118,297	118,297	0	0	0	0
Sugar Cane	43,609	54,492	69,003	87,218	10,883	14,511	18,215	43,609
Tea	3,399	3,885	4,370	4,856	486	486	486	1,457
Cacao	6,229	7,999	10,358	13,307	1,770	2,359	2,949	7,078
Cotton	1,605	2,550	3,811	5,386	945	1,260	1,575	3,781
Vanilla	22	2,974	6,910	11,830	2,952	3,936	4,920	11,808
Staple Food Crops								
Banana	164,082	174,021	183,960	197,630	9,939	9,939	13,670	33,548
Cassava	97,546	81,392	65,237	49,083	-16,154	-16,154	-16,154	-48,463
S.Potatos	61,781	58,036	54,291	50,547	-3,745	-3,745	-3,744	-11,234
I.Potatos	1,967	1,798	1,630	1,462	-169	-169	-168	-505
Cereals								
Maize	41,043	58,715	76,388	171,902	17,672	17,672	95,514	130,859
F.millet	4,065	5,997	7,930	19,261	1,932	1,932	11,331	15,196
Sorghum	7,487	8,941	10,394	36,032	1,454	1,454	25,638	28,545
Rice	2	1,349	3,144	5,389	1,347	1,795	2,245	5,387
Pulses								
Beans	65,152	81,489	94,558	117,212	16,337	13,069	22,654	52,060
F.Peas								
C.Peas								
Oil Crops								
G.nuts	11,530	14,788	17,395	26,960	3,258	2,607	9,565	15,430
S.beans	6,807	8,950	10,664	16,651	2,143	1,714	5,987	9,844
S.flowers	847	1,062	1,234	1,899	215	172	665	1,052
Simsim								
Vegetable								
Tomatoes	12,539	12,129	11,582	11,965	-410	-547	383	-574
Onions	275	293	316	379	18	23	63	104
Cabbages	5,851	6,370	7,061	9,114	519	692	2,053	3,263
L.Vegeta.	4,230	4,230	4,230	4,230	0	0	0	0
Fruit								
P.apples	3,280	4,592	6,340	8,525	1,312	1,749	2,185	5,245
P.fruits	668	821	1,025	1,281	153	204	256	613
Avocado								
Paw-paw	100	125	158	200	25	33	42	100
(Orang)	45	99	170	1,000	54	72	830	955
Mulberry	50	200	350	1,000	150	150	650	950

(2) Incremental Cultivation Area (1991-2007) by District

Unit : ha

	Total	Luwero	Masaka	Mpigi	Mukono
Cash crops					
Coffee (Robsta)	0	0	0	0	0
Suger cane	43,609	15,225	8,818	5,535	14,031
Tea	1,456	0	184	337	936
Cacao	7,078	0	892	1,636	4,550
Cotton	3,781	2,424	1,027	66	264
Vanilla	11,808	3,325	1,935	1,754	4,794
Staple Food Crops					
Banana	33,549	11,713	6,783	4,258	10,794
Cassava	-48,463	-12,674	-12,328	-12,425	-11,036
Sweet Potatos	-11,235	-3,067	-1,844	-4,536	-1,788
Irish Potatos	-506	-237	-86	-177	-6
Yams	0	0	0	0	0
Cereals					
Maize	130,860	42,655	14,673	18,594	54,938
Finger Millet	15,196	7,849	5,899	289	1,159
Sorghum	28,545	12,705	11,421	883	3,537
Rice(Paddy)	5,388	551	1,799	2,380	658
Pulses					
Beans	52,059	18,176	10,526	6,608	16,749
Field Peas	0	0	0	0	0
Cow Peas	0	0	0	0	0
Pigeon Peas	0	0	0	0	0
Grams	0	0	0	0	0
Oil Crops					
Groundnuts	15,431	7,970	5,990	294	1,177
Soyabean	9,844	3,437	1,990	1,250	3,167
Sunflowers	1,052	543	408	20	80
Simsim	0	0	0	0	0
Vegetable					
Tomatoes	-574	-78	-157	-313	-26
Onions	104	75	0	21	8
Cabbages	3,263	442	895	1,780	147
Greens	0	0	0	0	0
Fruit					
Pineapples	5,246	1,497	1,165	731	1,853
Passionfruits	613	173	100	91	249
Avocado	50	17	10	6	16
J. fruit/Paw-paw/Mango	50	17	10	6	16
Others (Orange)	955	612	260	17	67
Mulberry	950	268	156	141	386
Total	310,109	113,618	60,527	29,245	106,719

(3) Cultivation Plan by District

Unit : ha

	Total	Luwero	Masaka	Mpigi	Mukono
Cash crops					
Coffee (Robsta)	118,297	18,091	26,801	17,828	55,577
Suger Cane	87,218	15,302	9,130	10,607	52,179
Tea	4,855	0	819	548	3,488
Cacao	13,307	92	892	2,203	10,120
Cotton	5,386	3,813	1,049	69	455
Vanilla	11,830	3,325	1,935	1,754	4,816
Staple Food Crops					
Banana	197,631	27,802	81,076	40,321	48,432
Cassava	49,083	12,836	12,485	12,584	11,177
Sweet Potatos	50,546	13,797	8,294	20,410	8,046
Irish Potatos	1,207	566	204	423	15
Yams	254	72	0	160	22
Cereals					
Maize	171,903	50,733	20,784	40,105	60,280
Finger Millet	19,261	8,488	7,962	289	2,522
Sorghum	36,032	14,199	15,831	1,789	4,213
Rice(Paddy)	5,390	551	1,799	2,380	659
Pulses					
Beans	117,023	27,598	23,902	38,393	27,130
Field Peas	156	0	96	27	34
Cow Peas	32	0	10	0	22
Pigeon Peas	0	0	0	0	0
Grams	0	0	0	0	0
Oil Crops					
Groundnuts	26,961	11,286	10,876	2,312	2,486
Soyabean	16,651	4,957	3,762	4,511	3,421
Sunflowers	1,635	626	408	20	581
Simsim	264	132	14	15	103
Vegetable					
Tomatoes	11,965	1,620	3,281	6,526	538
Onions	379	273	0	78	28
Cabbages	9,114	2,679	3,440	2,588	407
Greens	4,230	798	3,233	176	23
Fruit					
Pineapples	8,526	2,221	2,674	978	2,652
Passionfruits	1,281	508	287	151	335
Avocado	100	25	24	17	34
J. fruit/Paw-paw/Mango	100	25	24	17	34
Others (Orange)	1,000	641	265	22	73
Mulberry	1,000	275	170	152	404

(4) Incremental Cultivation Area (1991-2007) by County

	Bamuna-	Buruli	Katikamu	Nakaseke	Bukoto	Bukoman-	Kalungu	Lwemiyaga	Mawogola	Busiro	Butambala	Gomba	Kyadondo	Mawokota	BBaale	Buikwe	Buvuma	Mukono	Nakifuma	Ntenjeru
Cash crops																				
Coffee (Robsta)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sugar cane	3,945	3,895	3,951	3,434	4,473	1,600	763	444	1,538	2,683	612	414	590	1,237	1,658	2,463	463	2,981	3,606	2,860
Tea	0	0	0	0	98	58	28	0	0	195	45	9	43	45	36	179	34	217	262	208
Cacao	0	0	0	0	474	283	135	0	0	948	216	44	208	219	176	871	164	1,054	1,275	1,011
Cotton	628	620	629	547	712	0	0	71	245	0	0	66	0	0	264	0	0	0	0	0
Vanilla	1,469	0	1,472	384	833	596	284	50	172	999	228	77	220	230	185	918	172	1,110	1,343	1,065
Food crops																				
Staple Food Crops																				
Banana	3,035	2,997	3,040	2,642	3,441	1,231	587	342	1,183	2,064	471	318	454	952	1,275	1,895	356	2,293	2,774	2,200
Cassava	-4,055	-1,901	-3,168	-3,549	-5,652	-1,555	-1,760	-796	-2,564	-3,729	-994	-1,368	-2,981	-3,354	-541	-367	-163	-2,589	-3,379	-3,998
Sweat Potatos	-613	-1,227	-705	-521	-593	-389	-526	-87	-249	-998	-635	-817	-953	-1,134	-354	-324	0	-297	-355	-459
Irish Potatos	-44	-21	-59	-113	-16	-14	-14	-22	-20	-39	-32	-25	-37	-44	0	0	0	-3	-3	0
Yams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cereals																				
Maize	17,858	293	17,584	6,920	3,469	6,385	3,063	255	1,501	10,417	2,048	122	1,658	4,348	1,911	10,433	2,012	12,580	15,573	12,429
Finger Millet	0	5,447	0	2,401	3,127	0	0	621	2,151	0	0	289	0	0	1,159	0	0	0	0	0
Sorghum	0	8,309	0	4,396	9,541	0	0	568	1,312	0	0	883	0	0	3,537	0	0	0	0	0
Rice(Paddy)	77	0	222	252	832	648	193	0	126	687	193	0	435	1,064	0	242	0	339	77	0
Pulses																				
Beans	4,709	4,650	4,717	4,100	5,339	1,910	911	530	1,836	3,203	731	494	704	1,477	1,979	2,940	552	3,558	4,305	3,414
Field Peas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cow Peas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pigeon Peas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil Crops																				
Groundnuts	0	5,531	0	2,439	3,176	0	0	630	2,184	0	0	294	0	0	1,177	0	0	0	0	0
Soyabean	891	879	892	775	1,010	361	172	100	347	606	138	93	133	279	374	556	104	673	814	646
Sunflowers	0	377	0	166	217	0	0	43	149	0	0	20	0	0	80	0	0	0	0	0
Simsim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable																				
Tomatoes	-17	-4	-35	-22	-69	-37	-32	-7	-12	-78	-56	-44	-66	-69	0	-5	0	-8	-7	-6
Onions	19	4	32	20	0	0	0	0	0	5	4	3	4	5	0	1	0	3	2	2
Cabbages	97	22	199	124	395	211	182	39	68	445	320	249	374	391	0	26	0	46	42	32
Greens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fruit																				
Pineapples	521	0	522	454	591	211	101	59	203	354	81	55	78	163	219	325	61	394	476	378
Passionfruits	76	0	76	20	43	31	15	3	9	52	12	4	11	12	10	48	9	58	70	55
Avocado	5	4	5	4	5	2	1	1	2	3	1	0	1	1	2	3	1	3	4	3
J. fruit/Paw-paw/Mango	5	4	5	4	5	2	1	1	2	3	1	0	1	1	2	3	1	3	4	3
Others (Orange)	159	157	159	138	180	0	0	18	62	0	0	17	0	0	67	0	0	0	0	0
Mulberry tree	118	0	118	31	67	48	23	4	14	80	18	6	18	19	15	74	14	89	108	86
Total	28,883	30,037	29,653	25,045	31,697	11,583	4,126	2,865	10,257	17,901	3,402	1,203	894	5,844	13,233	20,281	3,779	22,505	26,992	19,930

(5) Cultivation Plan in 2007 by County

	Bamuna-	Buruli	Katikamu	Nakaseke	Bukoto	Bukoman-	Kalungu	Lwemiyaga	Mawagola	Busiro	Butambura	Gomba	Kyadondo	Mawokota	BBaale	Buikwe	Buvuma	Mukono	Nakifuma	Ntenjeru
Cash crops																				
Coffee (Robsta)	8,100	270	7,020	2,700	14,135	5,302	2,749	117	4,498	4,815	1,637	1,929	4,455	4,992	4,401	7,067	0	18,462	7,998	17,648
Suger cane	4,002	3,895	3,970	3,434	4,564	1,669	825	485	1,588	3,750	1,680	1,214	1,657	2,305	1,658	36,582	463	4,849	5,413	3,214
Tea	0	0	0	0	477	166	176	0	0	237	87	51	85	87	36	871	34	824	1,515	208
Cacao	69	0	23	0	474	283	135	0	0	1,062	216	44	407	474	243	2,319	646	1,343	3,978	1,590
Cotton	711	1,731	684	686	719	0	3	78	249	0	2	66	0	2	357	0	0	0	21	76
Vanilla	1,469	0	1,472	384	833	596	284	50	172	999	228	77	220	230	185	920	172	1,127	1,345	1,067
Food crops																				
Staple Food Crops																				
Banana	8,665	3,809	7,381	7,947	30,646	19,416	12,324	3,254	15,436	12,162	3,798	4,204	10,192	9,965	2,263	9,185	3,497	17,172	7,608	8,707
Cassava	4,107	1,926	3,209	3,594	5,725	1,575	1,783	806	2,597	3,776	1,006	1,385	3,020	3,397	548	371	165	2,622	3,423	4,049
Sweat Potatos	2,759	5,519	3,173	2,345	2,668	1,748	2,365	392	1,121	4,489	2,855	3,676	4,287	5,102	1,591	1,458	0	1,336	1,596	2,065
Irish Potatos	104	50	142	269	37	33	33	53	49	93	76	59	89	106	0	0	0	7	8	0
Yams	18	18	18	18	0	0	0	0	0	32	32	32	32	32	4	4	4	4	4	4
Cereals																				
Maize	19,603	2,588	19,658	8,884	4,814	7,596	4,728	863	2,783	16,434	4,051	2,659	7,029	9,932	2,634	11,118	2,012	13,266	16,573	14,676
Finger Millet	129	5,705	139	2,514	3,643	258	0	1,395	2,666	0	0	289	0	0	1,933	96	0	35	31	427
Sorghum	374	8,606	374	4,845	10,835	1,091	1,176	901	1,828	200	163	1,009	191	226	3,555	130	0	151	222	156
Rice(Paddy)	77	0	222	252	832	648	193	0	126	687	193	0	435	1,064	0	242	0	339	77	2
Pulses																				
Beans	7,348	6,534	7,260	6,456	9,458	5,286	4,050	1,163	3,945	9,879	5,687	6,664	7,376	8,788	3,468	4,198	2,661	4,784	6,303	5,716
Field Peas	0	0	0	0	35	39	10	5	6	6	6	6	4	6	7	7	0	7	7	4
Cow Peas	0	0	0	0	3	4	1	1	1	0	0	0	0	0	0	7	0	5	3	7
Pigeon Peas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil Crops																				
Groundnuts	576	7,176	582	2,952	5,852	998	656	743	2,627	424	404	597	424	464	1,308	197	0	259	246	476
Soyabean	1,363	1,094	1,251	1,248	1,418	653	542	431	717	1,290	890	778	623	931	447	574	104	696	852	748
Sunflowers	21	390	29	187	217	0	0	43	149	0	0	20	0	0	164	83	83	83	83	83
Simsim	20	67	20	26	3	2	0	5	5	0	0	9	0	6	58	0	0	0	6	40
Vegetable																				
Tomatoes	356	81	729	454	1,447	772	666	145	251	1,631	1,175	914	1,371	1,435	1	95	0	170	156	116
Onions	68	13	117	74	0	0	0	0	0	20	15	10	15	20	1	3	0	10	9	6
Cabbages	710	133	1,120	716	1,345	906	674	192	323	647	466	363	543	569	6	91	0	116	106	88
Greens	319	102	239	137	1,472	433	953	144	231	39	34	26	39	39	3	2	0	7	2	9
Fruit																				
Pineapples	826	68	630	698	1,352	632	303	96	290	422	111	77	138	231	219	428	61	607	542	796
Passionfruits	160	84	160	104	134	90	34	8	22	81	31	10	13	16	10	60	9	98	79	79
Avacado	7	6	6	6	12	5	2	1	4	6	2	2	3	4	3	9	1	6	8	7
J.fruit/Paw2/Mango	7	6	6	6	12	5	2	1	4	6	2	2	3	4	3	9	1	6	8	7
Other (Orang)	160	177	160	145	181	1	1	19	63	1	1	18	1	1	68	1	1	1	1	1
Mulberry tree	120	2	120	33	74	51	24	4	16	83	19	8	20	21	16	80	14	92	112	89

3.3.2 Action Plan of Farm Management

Table A3.3.2.1 Target Number of Advanced Farmers by Farm Management Type

(1) Target in 2007 by District

Unit : Household

Farm Management Type		Total	Luwero	Masaka	Mpigi	Mukono
1-1	Coffee	86,672	13,255	16,691	10,972	45,755
1-2	Vanilla	59,150	2,957	13,568	21,441	21,183
2	Cacao/Tea	10,490	62	878	1,753	7,798
3-1	Sericulture	1,000	348	157	150	344
3-2	Rice	10,776	1,103	3,598	4,759	1,316
4	Vegetable	21,798	2,951	5,978	11,889	980
5	Fruit	17,052	5,290	5,070	1,917	4,776
6	Oil Crop	38,700	15,794	14,574	4,565	3,767
7	Cotton	10,772	8,051	1,630	229	862
8-1	Dairy Cattle	4,000	669	456	1,226	1,649
8-2	Beef Cattle	6,480	5,600	80	80	720
8-3	Beef+Goat	4,000	3,120	80	80	720
8-4	Poultry	1,000	195	220	380	205
Sub Total		271,890	59,394	62,980	59,441	90,075
Large Scale Livestock		5,520	1,839	2,183	782	818
Subsistent Farmers		242,590	23,249	106,229	951,189	17,922
Total Farmers		520,000	84,481	171,392	155,413	108,714
(Reference)						
Total Farmers in 1991		485,181	72,143	163,051	147,837	102,150

(2) Target by Stage

Farm Management Type		Untill 1995	Average per year	1996~ 1999	2000~ 2003	2004~ 2007
1-1	Coffee	17,300	5,781	17,300	17,300	86,672
1-2	Vanilla	50	4,925	19,750	39,450	59,150
2	Cacao/Tea	500	833	3,830	7,160	10,490
3-1	Sericulture	50	79	367	683	1,000
3-2	Rice	-	898	3,592	7,184	10,776
4	Vegetable	1,000	1,733	7,933	14,865	21,798
5	Fruit	800	1,354	6,217	11,635	17,052
6	Oil Crop	2,000	3,058	14,233	26,467	38,700
7	Cotton	500	856	3,924	7,348	10,772
8-1	Dairy Cattle	200	317	1,467	2,733	4,000
8-2	Beef Cattle	-	540	2,160	4,320	6,480
8-3	Beef+Goat	-	333	1,333	2,667	4,000
8-4	Poultry	50	79	367	683	1,000
Total		22,450	20,787	82,473	142,495	271,890

Table A3.3.2.2 Income Plan

(1) Incremental Income from 1991 to 2007 Unit : million USHS

Item	Luwero				Masaka			
	Area (ha)	Gross Income	Net Income	Total P.Cost	Area (ha)	Gross Income	Net Income	Total P.Cost
Coffee (Robusta)	0	4,523	1,169	3,354	0	6,700	1,731	4,969
Sugar cane	15,225	16,748	7,335	9,413	8,817	9,699	4,224	5,475
Tea	0	0	0	0	184	179	112	67
Cacao	0	10	2	8	892	313	166	148
Cotton	2,424	588	226	361	1,027	219	82	137
Vanilla	3,325	19,950	19,512	438	1,935	11,610	11,355	255
Bananas	11,713	12,544	9,238	3,306	6,782	19,609	11,756	7,853
Cassava	-12,674	-488	236	-723	-12,328	-474	229	-704
Sweet Potatos	-3,066	2,813	2,619	193	-1,844	1,690	1,574	116
Irish Potatos	-237	208	229	-21	-86	58	65	-8
Maize	42,655	11,211	4,553	6,658	14,672	4,138	1,709	2,429
Finger Millet	7,849	2,998	2,003	995	5,899	2,433	1,559	874
Sorghum	12,705	5,215	3,870	1,345	11,421	4,714	3,485	1,229
Rice	551	756	690	66	1,799	2,468	2,251	217
Beans	18,176	4,981	3,737	1,244	10,420	3,040	2,285	754
Finger Peas	0	0	0	0	96	25	19	6
C.Peas	0	0	0	0	10	3	2	1
Ground nuts	7,970	4,175	1,940	2,235	5,990	3,396	1,499	1,897
Soybean	3,437	1,234	422	812	1,990	770	249	521
Sun flowers	411	173	60	114	394	153	56	98
Simsim	132	51	19	32	14	5	2	3
Tomatoes	-78	903	660	243	-157	1,829	1,338	492
Onions	75	129	99	30	0	0	0	0
Cabbages	442	1,476	1,195	281	895	2,090	1,681	409
L.vegetable	0	105	52	54	0	427	209	218
Pinapples	1,496	2,312	1,970	342	1,164	1,900	1,559	340
Passion fruits	173	861	776	85	100	491	443	48
Avocado	25	30	27	3	24	29	26	3
Paw-paw	11	13	11	2	-4	-5	-6	1
Orange	612	889	762	127	260	377	323	53
Mulberry tree	268	509	317	192	156	296	185	111
Dairy Catlle	3,623	1,912	818	1,094	2,737	1,444	618	827
Beef Catlle	299,684	19,087	8,174	10,913	27,305	1,739	745	994
Sheep Goat	316,380	1,466	1,272	194	635,942	2,947	2,556	391
Poultry	864,252	8,945	972	7,973	632,449	6,546	712	5,834
Total	0	126,327	74,964	51,363	0	90,858	54,799	36,059
Livestock	0	31,410	11,236	20,175	0	12,676	4,630	8,046
Farm	0	94,917	63,729	31,188	0	78,182	50,169	28,013

Continue

Item	Mpigi				Mukono			
	Area (ha)	Gross Income	Net Income	Total P.Cost	Area (ha)	Gross Income	Net Income	Total P.Cost
Coffee (Robusta)	0	4,457	1,152	3,305	0	13,894	3,590	10,304
Sugar cane	5,536	6,090	2,223	3,866	14,031	15,434	3,409	12,025
Tea	336	157	88	69	936	791	487	304
Cacao	1,636	633	314	319	4,550	2,174	943	1,231
Cotton	66	14	5	9	264	66	26	41
Vanilla	1,754	10,524	10,293	231	4,794	28,764	28,132	632
Bananas	4,258	10,301	6,338	3,963	10,795	15,895	10,763	5,132
Cassava	-12,426	-478	231	-709	-11,036	-425	205	-630
Sweet Potatos	-4,536	4,161	3,874	286	-1,788	1,640	1,527	113
Irish Potatos	-177	224	239	-16	-6	19	19	-1
Maize	18,594	6,407	2,754	3,653	54,938	14,012	5,648	8,365
Finger Millet	289	108	73	35	1,159	587	339	248
Sorghum	883	369	271	99	3,536	1,454	1,078	376
Rice	2,380	3,265	2,978	287	657	903	823	79
Beans	6,581	2,451	1,856	595	16,693	4,615	3,463	1,152
Finger Peas	27	7	5	2	34	9	7	2
C.Peas	0	0	0	0	22	6	4	1
Ground nuts	294	359	104	254	1,177	705	301	404
Soybean	1,249	618	169	449	3,167	1,065	382	683
Sun flowers	5	3	1	2	80	64	15	49
Simsim	15	6	2	4	0	9	3	6
Tomatoes	-313	3,638	2,660	978	-26	300	219	81
Onions	21	36	28	8	8	14	10	3
Cabbages	1,780	2,230	1,761	469	147	272	217	54
L.vegetable	0	23	11	12	0	3	1	2
Pinapples	731	1,118	960	159	1,853	2,853	2,438	416
Passion fruits	91	340	306	34	249	854	769	84
Avocado	17	20	19	2	34	41	37	4
Paw-paw	-5	-6	-7	1	-2	-2	-4	2
Orange	17	25	22	4	66	96	82	14
Mulberry tree	141	268	167	101	385	732	456	275
Dairy Catlle	6,644	3,506	1,499	2,007	12,574	6,636	2,838	3,798
Beef Catlle	16,569	1,055	452	603	53,318	3,396	1,454	1,942
Sheep Goat	171,164	793	688	105	178,310	826	717	110
Poultry	1,680,501	17,393	1,891	15,503	905,251	9,369	1,018	8,351
Total	0	80,116	43,427	36,689	0	127,069	71,419	55,650
Livestock	0	22,748	4,530	18,218	0	20,227	6,027	14,200
Farm	0	57,368	38,897	18,470	0	106,842	65,392	41,450

(2) Income in 2007 Unit : million USHS

Item	Luwero				Masaka			
	Area (ha)	Gross Income	Net Income	Total P.Cost	Area (ha)	Gross Income	Net Income	Total P.Cost
Coffee (Robusta)	18,091	6,332	1,485	4,847	26,801	9,380	2,200	7,180
Sugar cane	15,302	16,832	7,379	9,454	9,130	10,043	4,402	5,641
Tea	0	0	0	0	819	290	152	138
Cacao	92	32	17	15	892	313	166	148
Cotton	3,813	807	302	506	1,049	222	83	139
Vanilla	3,325	19,950	19,512	438	1,935	11,610	11,355	255
Bananas	27,802	22,520	18,163	4,357	81,074	65,670	52,966	12,704
Cassava	12,836	11,998	11,025	973	12,485	11,670	10,724	946
Sweet Potatos	13,797	13,453	11,728	1,725	8,294	8,087	7,050	1,037
Irish Potatos	638	956	898	57	204	306	287	18
Maize	50,733	12,523	5,004	7,519	20,784	5,130	2,050	3,080
Finger Millet	8,488	3,163	2,143	1,020	7,962	2,967	2,010	957
Sorghum	14,199	5,814	4,322	1,492	15,831	6,483	4,819	1,664
Rice	551	756	690	66	1,799	2,468	2,251	217
Beans	27,598	7,236	5,420	1,816	23,902	6,267	4,694	1,573
Finger Peas	0	0	0	0	96	25	19	6
C.Peas	0	0	0	0	10	3	2	1
Ground nuts	11,286	5,405	2,666	2,739	10,876	5,208	2,569	2,640
Soybean	4,957	1,642	596	1,046	3,762	1,246	452	794
Sun flowers	626	242	88	154	408	158	57	100
Simsim	132	51	19	32	14	5	2	3
Tomatoes	1,620	2,199	1,700	498	3,281	4,453	3,444	1,009
Onions	273	373	313	60	0	0	0	0
Cabbages	2,679	2,805	2,197	608	3,440	3,602	2,821	780
L.vegetable	798	1,090	914	177	3,233	4,418	3,702	716
Pinapples	2,221	3,318	2,896	423	2,674	3,995	3,486	509
Passion fruits	508	1,571	1,415	155	287	887	800	88
Avocado	25	30	27	3	24	29	26	3
Paw-paw	25	30	27	3	24	29	26	3
Orange	641	926	795	131	265	383	329	54
Mulberry tree	275	523	325	197	170	323	201	122
Dairy Catlle	5,348	2,822	1,207	1,615	3,649	1,926	824	1,102
Beef Catlle	532,359	33,907	14,521	19,386	266,810	16,994	7,278	9,716
Sheep Goat	400,980	1,858	1,612	246	790,742	3,664	3,178	486
Poultry	1,209,952	12,523	1,361	11,162	1,021,649	10,574	1,149	9,425
Total	-	193,688	120,767	72,920	-	198,828	135,576	63,253
Livestock	-	51,110	18,700	32,410	-	33,157	12,428	20,729
Farm	-	142,577	102,067	40,510	-	165,671	123,147	42,524

Continue

Item	Mpigi				Mukono			
	Area (ha)	Gross Income	Net Income	Total P.Cost	Area (ha)	Gross Income	Net Income	Total P.Cost
Coffee (Robusta)	17,828	6,240	1,464	4,776	55,577	19,452	4,563	14,889
Sugar cane	10,607	11,668	5,115	6,553	52,179	57,397	25,161	32,236
Tea	548	194	102	92	3,488	1,236	649	587
Cacao	2,203	773	409	364	10,120	3,552	1,878	1,674
Cotton	69	15	5	9	455	96	36	60
Vanilla	1,754	10,524	10,293	231	4,816	28,896	28,261	635
Bananas	40,321	32,660	26,342	6,318	48,433	39,231	31,641	7,589
Cassava	12,584	11,763	10,809	954	11,177	10,447	9,600	847
Sweet Potatos	20,410	19,901	17,349	2,551	8,046	7,845	6,839	1,006
Irish Potatos	583	873	821	52	37	55	52	3
Maize	40,105	9,900	3,956	5,944	60,280	14,880	5,946	8,933
Finger Millet	289	108	73	35	2,522	940	637	303
Sorghum	1,789	733	545	188	4,213	1,725	1,282	443
Rice	2,380	3,265	2,978	287	659	904	825	79
Beans	38,393	10,067	7,540	2,526	27,130	7,113	5,328	1,785
Finger Peas	27	7	5	2	34	9	7	2
C.Peas	0	0	0	0	22	6	4	1
Ground nuts	2,312	1,107	546	561	2,486	1,190	587	603
Soybean	4,511	1,494	542	952	3,421	1,133	411	722
Sun flowers	20	8	3	5	581	225	82	143
Simsim	15	6	2	4	103	40	15	25
Tomatoes	6,526	8,857	6,850	2,008	538	730	565	165
Onions	78	107	89	17	28	38	32	6
Cabbages	2,588	2,710	2,123	587	407	426	334	92
L.vegetable	176	241	202	39	23	31	26	5
Pinapples	978	1,461	1,275	186	2,652	3,962	3,457	505
Passion fruits	151	467	421	46	335	1,036	933	103
Avocado	17	20	19	2	34	41	37	4
Paw-paw	17	20	19	2	34	41	37	4
Orange	22	32	27	4	72	104	89	15
Mulberry tree	152	289	180	109	403	766	477	289
Dairy Catlle	9,810	5,177	2,214	2,963	18,561	9,796	4,189	5,607
Beef Catlle	124,140	7,907	3,386	4,521	128,625	8,192	3,508	4,684
Sheep Goat	285,164	1,321	1,146	175	454,610	2,106	1,827	279
Poultry	2,352,701	24,350	2,647	21,704	1,267,351	13,117	1,426	11,691
Total	-	174,263	109,495	64,768	-	236,760	140,743	96,017
Livestock	-	38,756	9,393	29,363	-	33,212	10,950	22,261
Farm	-	135,507	100,102	35,405	-	203,548	129,793	73,755

(3) Income of New Ranch

	Luwero		Masaka		Mpigi		Mukono	
	B.Cattle	Goat	B.Cattle	Goat	B.Cattle	Goat	B.Cattle	Goat
Head	216,456	131,976	3,776	3,384	3,776	3,384	33,984	30,456
Gross Income	13,786	612	241	16	241	16	2,165	141
Net Income	5,904	530	103	14	103	14	927	122
Total of P.Cost	7,882	81	138	2	138	2	1,238	19

Table A3.3.2.3 Required Farm Input

(1) Farm Input by District

a) Total (Farm+Livestock)

Unit : Million USHS

Item	Luwero	Masaka	Mpigi	Mukono	Total
Gross Income	193,688	198,828	174,263	236,760	803,538
Net Income	120,767	135,576	109,495	140,743	506,581
Total Production Cost	72,920	63,253	64,768	96,017	296,957
Seed	1,078	969	975	1,418	4,440
Plowing	4,393	2,839	3,022	3,382	13,636
Weeding	953	1,308	808	2,467	5,536
Organic Fertilizer	5,077	5,596	4,192	9,966	24,831
Fertilizer	6,311	6,107	4,990	9,412	26,820
Pesticide	7,421	9,510	8,265	9,654	34,850
Others	26,534	21,778	29,648	45,334	123,294
Harvest	1,784	925	467	584	3,759
Packing	1,265	739	659	495	3,158
Equipment	4,889	4,218	3,874	5,603	18,584
Hired Labor	13,215	9,264	7,869	7,701	38,049

b) Farm

Unit : Million USHS

Item	Luwero	Masaka	Mpigi	Mukono	Total
Gross Income	142,577	165,671	135,507	203,548	647,303
Net Income	102,067	123,147	100,102	129,793	455,109
Total Production Cost	40,510	42,524	35,405	73,755	192,194
Seed	1,078	969	975	1,418	4,440
Plowing	4,393	2,839	3,022	3,382	13,636
Weeding	953	1,308	808	2,467	5,536
Organic Fertilizer	5,077	5,596	4,192	9,966	24,831
Fertilizer	4,492	5,064	3,761	8,071	21,388
Pesticide	5,516	8,216	5,903	7,487	27,123
Others	11,962	10,985	10,128	33,081	66,157
Harvest	107	53	39	105	304
Packing	349	280	445	274	1,348
Equipment	2,757	3,018	2,450	3,698	11,924
Hired Labor	3,825	4,196	3,682	3,805	15,508

c) Livestock

Unit : Million USHS

Item	Luwero	Masaka	Mpigi	Mukono	Total
Gross Income	51,110	33,157	38,756	33,212	156,235
Net Income	18,700	12,428	9,393	10,950	51,472
Total Production Cost	32,410	20,729	29,363	22,261	104,763
Seed	0	0	0	0	0
Plowing	0	0	0	0	0
Weeding	0	0	0	0	0
Organic Fertilizer	0	0	0	0	0
Fertilizer	1,819	1,043	1,228	1,341	5,432
Pesticide	1,905	1,294	2,362	2,167	7,728
Others	14,572	10,793	19,520	12,252	57,137
Harvest	1,677	872	428	478	3,456
Packing	916	459	214	221	1,810
Equipment	2,131	1,200	1,424	1,905	6,660
Hired Labor	9,390	5,068	4,187	3,896	22,541

(2) Farm Input by Stage

Unit;Household,Million USHS

Item	1991/95	1998/99	2002/03	2006/07	Difference			
	a	b	c	d	b-a	c-b	d-c	d-a
Farm Household	485,180	496,780	508,380	520,000	11,600	11,600	11,620	34,820
Advanced Farmers	22,450	105,598	188,746	271,890	83,148	83,148	83,144	249,440
Gross Income	309,995	462,538	605,530	803,539	152,543	142,992	198,008	493,544
Net Income	236,378	313,247	393,685	506,581	76,869	80,437	112,897	270,203
Total Prod. Cost	73,617	149,291	211,846	296,957	75,674	62,555	85,112	223,341
Seed	1,312	1,787	2,724	4,440	475	937	1,716	3,128
Plowing	1,475	2,787	5,859	13,636	1,312	3,072	7,776	12,161
Weeding	150	1,199	3,512	5,536	1,049	2,313	2,024	5,386
Organic Fertilizer	5,541	8,518	15,329	24,831	2,977	6,811	9,502	19,290
Fertilizer	5,750	11,222	17,708	26,820	5,472	6,485	9,113	21,070
Pesticide	7,279	14,100	22,796	34,850	6,821	8,696	12,054	27,572
Others	29,180	64,793	90,695	123,294	35,613	25,902	32,599	94,114
Harvest	29	2,391	2,897	3,759	2,362	506	862	3,731
Packing	1,789	2,880	2,947	3,158	1,091	68	210	1,369
Equipment	8,291	12,591	17,027	18,584	4,300	4,436	1,556	10,293
Hired Labor	12,821	27,024	30,350	38,049	14,203	3,327	7,698	25,228

(3) Farm Input by Crop

a) Luwero

Unit : million USHS

Item	Required Input	Seed	Plowing	Weeding	Org. F	Ferti-lizer	Pesti-cide	Other	Harvest	Packing	Equip-ment	Hired Labour
Coffee (R)	4,847	90	0	724	1,085	362	543	1,574	0	0	362	107
Sugar cane	11,836	96	0	0	1,149	1,724	0	8,621	0	0	192	54
Tea	0	0	0	0	0	0	0	0	0	0	0	0
Cacao	15	0	0	0	4	0	2	8	0	0	1	0
Cotton	534	0	0	0	161	0	121	4	40	0	121	87
Vanilla	568	86	0	0	258	0	0	90	0	0	86	47
Banana	4,569	58	0	0	583	583	1,750	846	0	0	292	458
Cassava	973	13	0	0	0	128	128	193	0	128	128	254
S.Potatoes	1,725	69	552	0	138	138	276	97	0	138	138	179
I.Potatoes	57	3	13	0	6	6	13	3	0	0	6	6
Maize	4,964	201	1,340	0	670	335	1,005	536	0	0	335	543
F.millet	485	12	81	0	81	81	105	20	0	0	40	65
Sorghum	425	20	81	0	81	81	40	8	0	0	40	73
Rice	66	2	0	0	11	17	6	8	0	0	11	13
Beans	1,751	160	0	0	0	0	0	639	0	80	266	607
F.Peas	0	0	0	0	0	0	0	0	0	0	0	0
C.Peas	0	0	0	0	0	0	0	0	0	0	0	0
G.nuts	1,917	39	632	118	158	237	95	276	0	0	158	203
S.beans	796	19	302	15	75	113	75	94	0	0	38	64
S.flowers	127	3	31	0	10	31	26	8	0	0	10	7
Simsim	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	454	10	0	0	30	89	177	32	0	0	30	87
Onions	55	1	0	0	5	15	15	6	0	0	5	8
Cabbages	571	20	0	0	50	151	76	50	0	0	76	149
L.vegetable	177	4	0	0	16	48	48	21	0	0	16	24
P.apples	503	8	0	0	53	53	238	13	0	0	53	86
P.fruits	172	2	0	8	11	17	37	55	0	0	11	30
Avocado	0	0	0	0	0	0	0	0	0	0	0	0
Paw-paw	6	0	0	0	1	0	2	1	0	0	1	1
Orange	37	1	0	0	4	9	5	3	0	0	2	13
Mulberry tree	125	1	0	21	14	0	10	31	44	0	2	2
D.Cattle	1,615	0	0	0	0	211	325	399	17	0	385	278
B.Cattle	19,386	0	0	0	0	1,336	763	4,961	1,641	916	1,565	8,205
Goat	246	0	0	0	0	0	0	228	19	0	0	0
Poultry	11,162	0	0	0	0	272	817	8,984	0	0	181	907
Total	70,164	918	3,031	887	4,656	6,037	6,697	27,810	1,761	1,262	4,550	12,557
Livestock	32,410	0	0	0	0	1,819	1,905	14,572	1,677	916	2,131	9,390
Farm	37,754	918	3,031	887	4,656	4,217	4,792	13,238	84	346	2,419	3,168

b) Masaka

Unit : million USHS

Item	Required Input	Seed	Plowing	Weeding	Org. F	Ferti-lizer	Pesti-cide	Other	Harvest	Packing	Equip-ment	Hired Labour
Coffee (R)	7,180	134	0	1,072	1,608	536	804	2,332	0	0	536	158
Sugar cane	4,850	39	0	0	471	707	0	3,533	0	0	79	22
Tea	138	2	0	33	33	0	0	41	0	0	8	22
Cacao	150	2	0	0	36	0	18	80	0	0	9	5
Cotton	108	0	0	0	33	0	24	1	8	0	24	18
Vanilla	219	33	0	0	99	0	0	35	0	0	33	18
Banana	12,451	159	0	0	1,589	1,589	4,767	2,304	0	0	795	1,247
Cassava	946	12	0	0	0	125	125	187	0	125	125	247
S.Potatoes	1,037	41	332	0	83	83	166	58	0	83	83	108
I.Potatoes	18	1	4	0	2	2	4	1	0	0	2	2
Maize	1,808	73	488	0	244	122	366	195	0	0	122	198
F.millet	462	12	77	0	77	77	100	19	0	0	38	62
Sorghum	604	29	115	0	115	115	57	11	0	0	57	104
Rice	217	5	0	0	36	54	18	25	0	0	36	42
Beans	1,334	122	0	0	0	0	0	487	0	61	203	462
F.Peas	0	0	0	0	0	0	0	0	0	0	0	0
C.Peas	0	0	0	0	0	0	0	0	0	0	0	0
G.nuts	1,769	36	583	109	146	219	87	255	0	0	146	187
S.beans	562	13	213	11	53	80	53	67	0	0	27	45
S.flowers	42	1	10	0	3	10	9	3	0	0	3	2
Simsim	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	919	21	0	0	60	179	359	64	0	0	60	177
Onions	0	0	0	0	0	0	0	0	0	0	0	0
Cabbages	706	24	0	0	62	187	93	62	0	0	93	184
L.vegetable	716	16	0	0	65	194	194	83	0	0	65	99
P.apples	482	7	0	0	51	51	228	13	0	0	51	82
P.fruits	84	1	0	4	5	8	18	27	0	0	5	15
Avocado	0	0	0	0	0	0	0	0	0	0	0	0
Paw-paw	5	0	0	0	1	0	1	1	0	0	0	1
Orange	10	0	0	0	1	3	2	1	0	0	1	4
Mulberry tree	56	0	0	9	6	0	5	14	20	0	1	1
D.Cattle	1,102	0	0	0	0	144	222	272	12	0	263	189
B.Cattle	9,716	0	0	0	0	669	383	2,486	822	459	784	4,112
Goat	486	0	0	0	0	0	0	449	37	0	0	0
Poultry	9,425	0	0	0	0	230	690	7,586	0	0	153	766
Total	57,602	785	1,822	1,238	4,880	5,383	8,793	20,691	899	728	3,802	8,581
Livestock	20,729	0	0	0	0	1,043	1,294	10,793	872	459	1,200	5,068
Farm	36,873	785	1,822	1,238	4,880	4,340	7,499	9,898	28	269	2,602	3,513

c) Mpigi

Unit : million USHS

Item	Required Input	Seed	Plowing	Weeding	Org. F	Ferti-lizer	Pesti-cide	Other	Harvest	Packing	Equip-ment	Hired Labour
Coffee (R)	4,776	89	0	713	1,070	357	535	1,551	0	0	357	105
Sugar cane	6,365	52	0	0	618	927	0	4,636	0	0	103	29
Tea	97	1	0	23	23	0	0	28	0	0	6	16
Cacao	387	5	0	0	94	0	47	206	0	0	23	13
Cotton	15	0	0	0	5	0	3	0	1	0	3	2
Vanilla	220	33	0	0	100	0	0	35	0	0	33	18
Banana	6,213	79	0	0	793	793	2,379	1,150	0	0	396	622
Cassava	954	13	0	0	0	126	126	189	0	126	126	249
S.Potatoes	2,551	102	816	0	204	204	408	143	0	204	204	265
I.Potatoes	52	3	12	0	6	6	12	3	0	0	6	6
Maize	3,994	162	1,078	0	539	270	809	431	0	0	270	437
F.millet	24	1	4	0	4	4	5	1	0	0	2	3
Sorghum	111	5	21	0	21	21	11	2	0	0	11	19
Rice	287	7	0	0	48	71	24	33	0	0	48	56
Beans	2,403	219	0	0	0	0	0	877	0	110	365	833
F.Peas	0	0	0	0	0	0	0	0	0	0	0	0
C.Peas	0	0	0	0	0	0	0	0	0	0	0	0
G.nuts	554	11	183	34	46	68	27	80	0	0	46	59
S.beans	819	19	310	16	78	116	78	97	0	0	39	66
S.flowers	8	0	2	0	1	2	2	1	0	0	1	0
Simsim	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	1,828	42	0	0	119	357	713	127	0	0	119	352
Onions	16	0	0	0	1	4	4	2	0	0	1	2
Cabbages	440	15	0	0	39	116	58	39	0	0	58	114
L.vegetable	39	1	0	0	4	11	11	5	0	0	4	5
P.apples	182	3	0	0	19	19	86	5	0	0	19	31
P.fruits	45	0	0	2	3	4	10	15	0	0	3	8
Avocado	0	0	0	0	0	0	0	0	0	0	0	0
Paw-paw	4	0	0	0	1	0	1	1	0	0	0	1
Orange	2	0	0	0	0	1	0	0	0	0	0	1
Mulberry tree	54	0	0	9	6	0	5	14	19	0	1	1
D.Cattle	2,963	0	0	0	0	388	596	732	32	0	706	509
B.Cattle	4,521	0	0	0	0	311	178	1,157	383	214	365	1,913
Goat	175	0	0	0	0	0	0	162	13	0	0	0
Poultry	21,704	0	0	0	0	529	1,588	17,469	0	0	353	1,765
Total	61,803	863	2,426	797	3,839	4,706	7,714	29,189	448	653	3,667	7,501
Livestock	29,363	0	0	0	0	1,228	2,362	19,520	428	214	1,424	4,187
Farm	32,440	863	2,426	797	3,839	3,477	5,352	9,669	20	440	2,243	3,314

d) Mukono

Unit : million USHS

Item	Required Input	Seed	Plowing	Weeding	Org. F	Ferti-lizer	Pesti-cide	Other	Harvest	Packing	Equip-ment	Hired Labour
Coffee (R)	14,889	278	0	2,223	3,335	1,112	1,667	4,835	0	0	1,112	328
Sugar cane	30,784	249	0	0	2,990	4,485	0	22,423	0	0	498	140
Tea	582	7	0	138	138	0	0	170	0	0	35	93
Cacao	1,649	20	0	0	399	0	199	877	0	0	100	54
Cotton	57	0	0	0	17	0	13	0	4	0	13	9
Vanilla	527	80	0	0	240	0	0	84	0	0	80	43
Banana	7,151	91	0	0	913	913	2,738	1,324	0	0	456	717
Cassava	847	11	0	0	0	112	112	168	0	112	112	221
S.Potatoes	1,006	40	322	0	80	80	161	56	0	80	80	105
I.Potatoes	3	0	1	0	0	0	1	0	0	0	0	0
Maize	3,174	128	857	0	428	214	642	343	0	0	214	347
F.millet	215	5	36	0	36	36	47	9	0	0	18	29
Sorghum	105	5	20	0	20	20	10	2	0	0	10	18
Rice	79	2	0	0	13	20	7	9	0	0	13	16
Beans	1,379	126	0	0	0	0	0	503	0	63	210	478
F.Peas	0	0	0	0	0	0	0	0	0	0	0	0
C.Peas	0	0	0	0	0	0	0	0	0	0	0	0
G.nuts	457	9	151	28	38	56	23	66	0	0	38	48
S.beans	345	8	131	7	33	49	33	41	0	0	16	28
S.flowers	158	4	39	0	13	39	32	10	0	0	13	9
Simsim	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	151	3	0	0	10	29	59	10	0	0	10	29
Onions	6	0	0	0	1	2	2	1	0	0	1	1
Cabbages	80	3	0	0	7	21	11	7	0	0	11	21
L.vegetable	5	0	0	0	0	1	1	1	0	0	0	1
P.apples	454	7	0	0	48	48	215	12	0	0	48	77
P.fruits	90	1	0	4	6	9	19	29	0	0	6	16
Avocado	0	0	0	0	0	0	0	0	0	0	0	0
Paw-paw	7	0	0	0	1	0	2	1	0	0	1	1
Orange	4	0	0	0	0	1	1	0	0	0	0	1
Mulberry tree	123	1	0	21	14	0	10	31	43	0	2	2
D.Cattle	5,607	0	0	0	0	733	1,127	1,386	60	0	1,336	963
B.Cattle	4,684	0	0	0	0	323	184	1,199	396	221	378	1,982
Goat	279	0	0	0	0	0	0	258	21	0	0	0
Poultry	11,691	0	0	0	0	285	855	9,410	0	0	190	951
Total	86,589	1,080	1,555	2,421	8,780	8,587	8,171	43,265	526	476	5,000	6,728
Livestock	22,261	0	0	0	0	1,341	2,167	12,252	478	221	1,905	3,896
Farm	64,328	1,080	1,555	2,421	8,780	7,246	6,004	31,013	47	255	3,095	2,832

Table A3.3.2.4 Required Credit Amount

(Unit : 000 US$)

Item	Total Project Cost A	Period Project B	Annual Project Cost C=A/B	Req. Credit D
<Long term credit>				
1) Land Improvement and reclamation by Farmers' Groups	148,234	10	14,823	10,376
(1) Farm land reclamation	86,118	10	8,612	6,028
(2) Farm land improvement	35,825	10	3,583	2,508
(3) Small Scale Irrigation	7,798	10	780	546
(4) Paddy field development	18,493	10	1,849	1,295
2) Farm Product Processing Plant				27,554
(1) Jaggary/Cacao	373,913	10	37,391	26,174
(2) Solar drying fruit	5,913	3	1,971	1,380
<Medium term credit>				
1) Crops Introduction				4,567
(1) Coffee	14,617	10	1,462	1,023
(2) Vanilla	16,400	10	1,640	1,148
(3) Tea	198	10	20	14
(4) Cacao	2,083	10	208	146
(5) Sugar cane	14,617	10	1,462	1,023
(6) Passion fruit	255	10	26	18
(7) Pineapple	1,693	10	169	119
(8) Mulberry tree	158	10	16	11
(9) Orange	88	10	9	6
(10) Banana	15,133	10	1,513	1,059
2) Farm machinery service (Purchase, Repair, Sale)	120,917	10	12,092	8,464
3) Farm tools (Bull-cart and Repair)	237,500	10	23,750	16,625
<Short term credit>				
1) Farm input Purchase and Sale				6,151
(1) Seed			175	123
(2) Fertilizer			1,056	739
(3) Pesticide			1,501	1,051
(4) Equipment			758	531
(5) Others			5,298	3,708
2) Handcraft Manufacture and Sale			2,600	1,820
3) Farm Product Sale			5,200	3,640

Table A3.3.2.5 Farm Management by Farming Type

(1) Type 1-1: Coffee

a) Present

	Farmland Aera (ha)		2.74		Perennial crop		2.06
	Family Labor (Person)		3.3		Annuals (ha)		0.68
Kind of Crops/ Livestocks	Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1 Coffee	1.16	0.5	200	116.0	101.0	15.0	5.8
2 Banana	0.9	6.2	100	558.0	58.8	499.2	23.0
3 Beans-1	0.15	1.26	190	35.9	9.1	26.8	2.7
4 Beans-2	0.15	1.26	190	35.9	9.1	26.8	2.7
5 Sweet Potato-1	0.015	7.17	88	9.5	1.4	8.1	0.3
6 Sweet Potato-2	0.015	7.17	88	9.5	1.4	8.1	0.3
7 Cassava	0.1	5.32	92	48.9	6.7	42.3	2.6
8 Sugar Cane	0.2	50	22	220.0	106.0	114.0	1.5
9 Onions-1	0.025	8.23	150	30.9	3.8	27.0	0.6
10 Onions-2	0.025	8.23	150	30.9	3.8	27.0	0.6
11 Beef (1head)	(1Unit)	0.25	704	176.0	100.0	76.0	
12 Polutry (10 heads)	(1Unit)	0.026	4,230	110.0	80.0	30.0	
Total:	2.74	----------	----------	1,381.4	481.1	900.3	39.9

b) Plan

(a) Farm economy

	Farmland Aera (ha)		2.74		Perennial crop		2.06
	Family Labor (Person)		3.3		Annuals (ha)		0.68
Kind of Crops/ Livestocks	Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1 Coffee	1.16	1.75	200	406.0	310.7	95.3	6.8
2 Banana	0.9	8.1	100	729.0	141.0	588.0	14.1
3 Beans-1	0.15	1.38	190	39.3	9.9	29.5	3.4
4 Beans-2	0.15	1.38	190	39.3	9.9	29.5	3.4
5 Sweet Potato-1	0.015	11.08	88	14.6	1.9	12.8	0.2
6 Sweet Potato-2	0.015	11.08	88	14.6	1.9	12.8	0.2
7 Cassava	0.1	10.16	92	93.5	7.6	85.9	2.0
8 Sugar Cane	0.2	50	22	220.0	123.6	96.4	0.6
9 Onions-1	0.025	9.11	150	34.2	5.5	28.6	0.8
10 Onions-2	0.025	9.11	150	34.2	5.5	28.6	0.8
11 Beef (1head)	(1Unit)	0.25	704	176.0	100.0	76.0	
12 Polutry (10 heads)	(1Unit)	0.026	4,230	110.0	80.0	30.0	
Total:	2.74	----------	----------	1,910.7	797.4	1,113.3	32.2

(b) Required Labors

Kind of Crops/ Livestocks	Operation Times (Unit: Man Days)												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1 Coffee	19.0	15.9	16.8	9.1	12.3	10.5	16.7	14.8	3.3	3.3	13.2	15.9	150.8
2 Banana	12.0	14.3	13.9	14.3	14.7	13.0	10.6	12.0	12.0	13.0	13.8	13.0	156.6
3 Beans-1	2.8	2.8	0.9	1.4	2.7	3.2	3.2	3.2	3.2	0.5	0.0	1.4	25.4
4 Beans-2	8.9	1.9	1.9	1.9	1.9	0.0	0.0	0.0	0.0	0.0	1.4	7.5	25.4
5 Sweet Potato-1	0.1	0.0	0.2	0.2	0.2	0.3	0.2	0.0	0.3	0.3	0.3	0.2	2.2
6 Sweet Potato-2	0.0	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.0	0.0	0.0	2.2
7 Cassava	1.5	1.1	2.9	2.1	1.5	1.3	1.1	1.3	2.2	1.5	3.1	2.3	22.0
8 Sugar Cane	0.4	0.3	0.8	1.4	1.1	0.3	4.5	1.6	0.9	0.4	0.4	0.4	12.6
9 Onions-1	0.3	1.0	0.8	0.2	0.1	0.0	0.7	0.9	0.2	0.0	0.0	0.0	4.3
10 Onions-2	0.7	0.9	0.2	0.0	0.0	0.0	0.3	1.0	0.7	0.2	0.2	0.0	4.3
11 Beef	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.0
12 Polutry	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.0
Total:	46.9	39.4	39.7	31.8	35.8	29.9	38.7	36.1	23.8	20.3	33.3	41.8	417.5

(c)Production cost

(Cropping)

Unit; 000USHS

Item	Cropping							Cropping Sub-total
	Coffee	Sugar Cane	Banana	Cassava	S.potato	Beans	L.Vegetabl	
Plant Area	1.2	0.2	0.9	0.1	0.0	0.3	0.1	2.7
Seed	5.8	1.0	1.8	0.1	0.2	1.8	0.3	10.9
Plowing	0.0	0.0	0.0	0.0	1.2	0.0	0.0	1.2
Weeding	49.9	0.0	0.0	0.0	0.0	0.0	0.0	49.9
Org. Fertilizer	92.8	8.0	18.0	0.0	0.3	0.0	1.0	120.1
Fertilizer	23.2	18.0	14.4	0.0	0.0	0.0	3.0	58.6
Pesticide	41.8	0.0	67.5	1.5	0.5	0.0	2.9	114.2
Others	46.3	91.0	16.2	0.0	0.3	4.6	1.3	159.7
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Packing	0.0	0.0	0.0	2.0	0.3	0.9	0.0	3.2
Equipment	44.1	5.0	9.0	2.0	0.6	5.7	1.0	67.4
Hired Labor	6.8	0.6	14.1	2.0	0.4	6.8	1.5	32.3
Total of P.Cost	310.7	123.6	141.0	7.6	3.8	19.8	11.0	617.4

(Livestock)

Unit; 000USHS

Item	Livestock		Livestock Sub-total	Total
	Cattle	Poultry		
Plant Area	1.0	10.0		2.7
Seed	0.0	0.0	0.0	10.9
Plowing	0.0	0.0	0.0	1.2
Weeding	0.0	0.0	0.0	49.9
Org. Fertilizer	0.0	0.0	0.0	120.1
Fertilizer	7.0	3.0	10.0	68.6
Pesticide	4.0	9.0	13.0	127.2
Others	24.4	56.4	80.8	240.5
L. Hyginen	8.6	0.0	8.6	8.6
L. Machinery				3.2
Equipment	13.0	1.6	14.6	82.0
Hired Labor	43.0	10.0	53.0	85.3
Total of P.Cost	100.0	80.0	180.0	797.5

Details of Equipment

Unit; 000USHS

Item	Number	Price	Total Cost	Year Cost	Durable Y.	Bank Rate	Remarks
Tool Store house	1.0	42.8	42.8	35.0	20.0	15%	
Tools set(hoe,etc)	5.0	3.6	17.8	10.0	5.0	23%	
Draft Cattle	1.0	31.5	31.5	25.0	2.0	26%	
Bull Cart	1.0	17.8	17.8	10.0	5.0	23%	
Knapsack sprayer	1.0	3.6	3.6	2.0	5.0	23%	
Total			113.3	82.0			

(2) Type 1-2: Vanilla

a) Present

	Kind of Crops/ Livestocks	Farmland Aera (ha) 1.3 / Family Labor (Person) 3.0 — Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Perennial crop 0.8 / Annuals (ha) 0.5 — Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1	Coffee	0.3	0.5	200	30.0	26.1	3.9	1.5
2	Banana	0.3	6.2	100	186.0	19.6	166.4	7.7
3	Vanilla	0.2	0.5	3,000	240.0	26.4	213.6	4.3
4	Beans-1	0.15	1.26	190	35.9	9.1	26.8	2.7
5	Beans-2	0.15	1.26	190	35.9	9.1	26.8	2.7
6	Sugar Cane	0.2	50	22	220.0	106.0	114.0	1.5
7	Beef (1head)	(1Unit)	0.25	704	176.0	100.0	76.0	
8								
9								
10								
11								
12								
	Total:	1.3	----------	----------	923.8	296.3	627.6	20.3

b) Plan

(a) Farm economy

	Kind of Crops/ Livestocks	Farmland Aera (ha) 1.3 / Family Labor (Person) 3.0 — Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Perennial crop 0.8 / Annuals (ha) 0.5 — Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1	Coffee	0.3	1.75	200	105.0	80.4	24.6	1.8
2	Banana	0.3	8.1	100	243.0	47.0	196.0	4.7
3	Vanilla	0.2	2	3,000	1,200.0	26.4	1,173.6	2.2
4	Beans-1	0.15	1.38	190	39.3	9.9	29.5	3.4
5	Beans-2	0.15	1.38	190	39.3	9.9	29.5	3.4
6	Sugar Cane	0.2	50	22	220.0	123.6	96.4	0.6
7	Beef (1head)	(1Unit)	0.25	704	176.0	100.0	76.0	
8								
9								
10								
11								
12								
	Total:	1.3	----------	----------	2,022.7	397.0	1,625.6	16.0

(b) Required Labors

	Kind of Crops/ Livestocks	Operation Times (Unit: Man Days) Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1	Coffee	4.9	4.1	4.3	2.3	3.2	2.7	4.3	3.8	0.9	0.8	3.4	4.1	39.0
2	Banana	4.0	4.8	4.6	4.8	4.9	4.3	3.5	4.0	4.0	4.3	4.6	4.3	52.2
3	Vanilla	5.0	7.8	5.7	3.5	0.0	0.5	0.5	3.9	4.6	6.6	5.0	5.0	48.0
4	Beans-1	2.8	2.8	0.9	1.4	2.7	3.2	3.2	3.2	3.2	0.5	0.0	1.4	25.4
5	Beans-2	8.9	1.9	1.9	1.9	1.9	0.0	0.0	0.0	0.0	0.0	1.4	7.5	25.4
6	Sugar Cane	0.4	0.3	0.8	1.4	1.1	0.3	4.5	1.6	0.9	0.4	0.4	0.4	12.6
7	Beef	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.0
8														
9														
10														
11														
12														
	Total:	26.6	22.2	18.8	15.7	14.2	11.5	16.6	17.0	14.0	13.2	15.2	23.3	208.5

(c)Production cost

(Cropping)

Unit; 000USHS

Item	Cropping					Cropping Sub-total
	Vanilla	Coffee	Sugar Cane	Bananas	Beans	
Plant Area	0.2	0.3	0.2	0.3	0.3	1.1
Seed	4.0	1.5	1.0	0.6	1.8	4.9
Plowing	0.0	0.0	0.0	0.0	0.0	0.0
Weeding	0.0	12.9	0.0	0.0	0.0	12.9
Org. Fertilizer	16.0	24.0	8.0	6.0	0.0	38.0
Fertilizer	0.0	6.0	18.0	4.8	0.0	28.8
Pesticide	0.0	10.8	0.0	22.5	0.0	33.3
Others	0.8	12.0	91.0	5.4	4.6	113.8
Harvest	0.0	0.0	0.0	0.0	0.0	0.0
Packing	0.0	0.0	0.0	0.0	0.9	0.9
Equipment	3.4	11.4	5.0	3.0	5.7	25.1
Hired Labor	2.2	1.8	0.6	4.7	6.8	13.9
Total of P.Cost	26.4	80.4	123.6	47.0	19.8	297.2

(Livestock)

Unit; 000USHS

Item	Livestock	Livestock Sub-total	Total
	Cattle		
Plant Area	1.0		1.1
Seed	0.0	0.0	4.9
Plowing	0.0	0.0	0.0
Weeding	0.0	0.0	12.9
Org. Fertilizer	0.0	0.0	38.0
Fertilizer	7.0	7.0	35.8
Pesticide	4.0	4.0	37.3
Others	24.4	24.4	138.2
L. Hyginen	8.6	8.6	8.6
L. Machinery			0.9
Equipment	13.0	13.0	38.1
Hired Labor	43.0	43.0	56.9
Total of P.Cost	100.0	100.0	397.2

Details of Equipment

Unit; 000USHS

Item	Number	Price	Total Cost	Year Cost	Durable Y.	Bank Rate	Remarks
Tool Store house	1.0	3.7	3.7	3.0	20.0	15%	
Tools set(hoe,etc)	1.0	3.6	3.6	2.0	5.0	23%	
Draft Cattle	1.0	28.1	28.1	20.0	2.5	26%	
Bull Cart	1.0	17.8	17.8	10.0	5.0	23%	
Knapsack sprayer	1.0	3.6	3.6	2.0	5.0	23%	
Suporting Pole	400.0	0.0	2.0	1.1	5.0	23%	
Total			58.5	38.1			

(3) Type 2: Cacao

a) Present

	Kind of Crops/ Livestocks	Farmland Aera (ha) 3.0 / Family Labor (Person) 4.5 — Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Perennial crop 1.7 / Annuals (ha) 1.3 — Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1	Banana	0.2	6.2	100	124.0	13.1	110.9	5.1
2	Cassava	0.1	5.32	92	48.9	6.7	42.3	2.6
3	Swwet Potato-1	0.1	7.17	88	63.1	9.1	54.0	1.7
4	Swwet Potato-2	0.1	7.17	88	63.1	9.1	54.0	1.7
5	Cacao	1.5	0.55	450	371.3	119.2	252.1	20.2
6	Sugar Cane	1	50	22	1,100.0	529.8	570.2	7.3
7	Beef (1head)	(1Unit)	0.25	704	176.0	100.0	76.0	
8	Poultry (30head)	(3Units)	4.230	4.230	330.0	240.0	90.0	
9								
10								
11								
12								
	Total:	3	----------	----------	2,276.4	1,026.9	1,249.5	38.5

b) Plan

(a) Farm economy

	Kind of Crops/ Livestocks	Farmland Aera (ha) 3.0 / Family Labor (Person) 4.5 — Cultivated Area (ha)	Yield (ton/ha)	Price (USHS/kg)	Gross Income (000USHS)	Perennial crop 1.7 / Annuals (ha) 1.3 — Production Cost (000USHS)	Net Income (000USHS)	Hired Lab. Cost (000USHS)
1	Banana	0.2	8.1	100.0	162.0	31.3	130.7	3.1
2	Cassava	0.1	10.16	92.0	93.5	7.6	85.9	2.0
3	Swwet Potato-1	0.1	11.08	88.0	97.5	12.5	85.0	1.3
4	Swwet Potato-2	0.1	11.08	88.0	97.5	12.5	85.0	1.3
5	Cacao	1.5	0.78	450.0	526.5	248.1	278.4	8.1
6	Sugar Cane	1	50	22.0	1,100.0	617.8	482.2	2.8
7	Beef (1head)	(1Unit)	0.25	704.0	176.0	100.0	76.0	
8	Poultry (30head)	(3Units)	0.026	4,230.0	330.0	240.0	90.0	
9								
10								
11								
12								
	Total:	3	----------	----------	2,583.0	1,269.8	1,313.1	18.6

(b) Required Labors

	Kind of Crops/ Livestocks	Operation Times (Unit: Man Days) Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1	Banana	2.7	3.2	3.1	3.2	3.3	2.9	2.4	2.7	2.7	2.9	3.1	2.9	34.8
2	Cassava	1.5	1.1	2.9	2.1	1.5	1.3	1.1	1.3	2.2	1.5	3.1	2.3	22.0
3	Swwet Potato-1	0.6	0.0	1.1	1.1	1.1	2.2	1.2	0.0	2.2	2.2	1.7	1.2	14.4
4	Swwet Potato-2	0.2	1.1	2.2	2.2	1.7	1.8	2.2	2.3	0.3	0.0	0.0	0.3	14.4
5	Cacao	16.6	0.0	14.9	14.9	16.7	27.1	12.8	2.3	31.4	14.9	14.3	14.3	180.0
6	Sugar Cane	2.2	1.7	3.9	7.2	5.4	1.6	22.7	7.8	4.4	2.1	1.9	2.0	63.0
7	Beef	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.0
8	Poultry	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	18.0
9														
10														
11														
12														
	Total:	25.7	9.1	30.0	32.7	31.7	39.0	44.3	18.5	45.2	25.6	26.1	24.9	352.6