

Table C.2-8 Participatory/Stakeholder Analysis for Nkunjumo Water Project

Name	Interests/impact	Power/ potential
Mariara Market / Meru Central county Council	Access to clean water + Sell goods Construction water + Buy horticultural produce +	Horticulture cess collection
Ministry of Agriculture	Improve farming Methods +	Training farmers
Horticultural Buyers	Good quality of horticultural produce + Increased quality of horticultural produce +	To determine product prices
Ministry of water	To manage river water +-	To allocate water
M ukira Youth Polytechnic	Water for domestic use + water for irrigation + Water for construction + training in technical skills +	To prepare training programs
Abothugushi Secondary	Water for domestic use + Water for livestock and irrigation +	
Nkando coffee Society Coffee Mukiria Society	Selling farming inputs +	To stock farming inputs To provide farming inputs credits
Provincial Administration	Harambee Money + Maintenance of law	Authorize the meetings
Mukami Women Group 20 Naitore women Group 20 Karwirwa Women Group 15 Turia Women Group 25 Kanja Women group	Assist members to buy utensils + Assist members to hire farm plots + Paying fees for member's children + Meeting hospital fees + Consoling member during grief + communal labour + Buying of construction material + livestock +	Planning group activities Enforcement of by laws. Operate bank accounts
Kairima S/H Group 52 Kagaru HE S.H.G. 25 Kiorche Self-help Group 10 Mailu Kenda self-help Group 12 Aboleta Self help Group 20	- Buying plots for building shops/lodging for the group + - Raising school fees (loan With Interest) + Hospital fees + - Ensure continuity of the abogeta clan - Loaning members money for school fees (payable with interest) - Helping members with money for emergencies + - Organising X-mas parties for members + - Raising school fees + - Raising medical fees +	Group has coffee number/account Contribution in form of coffee cherry Plans to buy land/plot for the group

Name	Interests/impact	Power/ potential
mwimenyeri (mixed)Self -Help Group 9 Tirimbili Self Help Group (mixed) 10 Kanjetu Self Group Karukutha (mixed) self Group 15	-Raising school fees for members children. (loan but no interest) + - Organizing x-mas parties for members +	Group has coffee number/account Leasing coffee plots Bringing together the youth for social and group activities
Nkunjumo youth Darts Club 25	- Occupy youth during leisure time + - Raising money for buying sports equipment/visits to other clubs +	Planning for monthly contributions
Other River water Users	-Possibility of joining the water project + -Enough water in the river +	Hope of joining the water project
Nkuu- Njumo water project	-To supply water + -To supply irrigation water + -Watering livestock + -Poverty alleviation + -Spraying coffee + -Construction works + -Improve health of the people through better - nutrition hygiene (for youth) ++ -Employment generation ++ -Control soil erosion +	Able to plan Important discipline 106/140mm
Private input Suppliers	-Selling chemicals +	To determine input prices
Kirimene Church Nyweri A.I.P.C.A	-Water for cleaning church + -Water for construction + -Water for irrigating flowers and vegetables +	To give religious services
Kienine Dip Self-help Group	-Increase Membership + -Improve payment of dip charges + -Increase the number of livestock + -Improve payment of DIP charges + reliable water supply +	to recruit member to operate DIP
SISDO		

Table C.2-9 Project Design Matrix (PDM) for Nkunjumo Water Project

	Objectively Verifiable Indicators	Means of Verification	Key Assumptions
<p>Overall Goal</p> <p>Uplift standard of living</p>	<ul style="list-style-type: none"> - Health of people generally improved - Housed made by stone - School attendance rate - Youth enrollment rate increased - No complaints among members themselves 		
<p>Project Purpose</p> <p>Sufficient irrigation water</p>			
<p>Results/Outputs</p> <ol style="list-style-type: none"> 1. Proper intake installed 2. Adequately sized pipes installed 3. Adequate storage tank constructed 4. Arrangements for maintenance & operation in place 			<p>(a) Ministry of Water allocates them water</p>
<p>Activities</p> <ol style="list-style-type: none"> 1.1. Design of intake 1.2. To construct intake 2.1. To design the storage tank 2.2. To procure materials 2.3. To construct the tanks 3.1. Discussion of water supply area among farmers 3.2. To modify by-laws to fit the situation 3.3. To apply for JICA & GOK loan assistance 3.4. To ask for Engineering support to MOA. 3.5. To establish maintenance fund 3.6. Planning designing of irrigation system through assistance of relevant agency. 3.7. To employ water guard 3.8. To raise money through sale of produce 			<p>(b) JICA will accept loan</p> <p>(c) Nkunjumo water projects stays as strong organization</p>

Table C.2-10 List of Members and Relevant Information for Ruungu/Karocho Irrigation Project

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Tabitha Ngoki	Farmer	(10) 4 boys, 6 girls	? 10	Millet	mostly
John Kimandu	Farmer, business	(5) 3 boys, 2 girls	5	Maize, Millet	sometimes
Basilia Karimi	Farmer	(5) 3 girls, 2 boys	6	Maize	sometimes
Andrew Nyamu	Teacher	(11) 7 girls, 4 boys/ counselling	10	Millet	sometimes
Isaiah Makala	Councillor	(8) 5 girls, 3 boys/ visiting	8	Millet	sometimes
Agnes Kithure	Farmer	(9) 6 girls, 3 boys	7	Millet	sometimes
Reuben Muthengi	Chef, Farmer	(1) boy/ football, music	3 1/2	Maize	sometimes
Regina Kibui	Farmer	(3) 1 boy, 2 girls	5	Millet	mostly
Jacob Mwathi	Farmer	(3) 1 boy, 2 girls/ chatting, P.T.A	6	Maize	sometimes
Stanley Kaigongi	Community health dept.	(7) 3 boys, 4 girls/ advising	5	Maize	sometimes
Jackson Meeni	Pastor, Farmer	(5) 3 girls, 2 boys/ chatting	4	Maize	sometimes
Bernard Makala	Pastor	(9) 4 girls, 5 boys? reading bible	3	Millet	sometimes
Ziporah Kabiru	Farmer	(6) 3 girls, 3 boys	10	Maize	sometimes
Mary Marigu	Farmer, business	(3) 1 boy, 2 girls/ Playing	7 1/2	Maize	mostly
John Kirianyama	Farmer, Asst. Chief	(10) 6 girls, 4 boys/ herding cattle	10	Millet	sometimes
Nathaniel Ndalo	Farmer	(5) 3 boys, 2 girls	8	Millet	sometimes
Immanuel Mugira	Asst. Teacher	none/ football, chatting	3	Maize	sometimes
Julia Mugira	Farmer, business	(3) 1 girl, 2 boys/ singing, reading	4 1/2	Maize	mostly
Isaac Kiria	Farmer	(6) 5 girls, 1 boy/ reading bible	5	Millet	mostly
Jeremiah Makala	Farmer	(4) 2 boys, 2 girls	6	Millet	sometimes
Laurenza Njagi	Farmer	(3) 2 boys, 1 girl/ weaving baskets	3	Millet	sometimes
Felix Kabeni	Farmer	(2) 1 girl, 1 boy	3	Millet	sometimes
Nyaga Bwera	Farmer	(3) 3 boys	2 1/2	Millet	sometimes
Francis Mwirichia	Farmer	(5) 2 boys, 3 girls	6	Millet	mostly
Daniel Nthiga	Farmer/Teacher	(2) 2 girls	4	Maize	sometimes
Henry Mburugua	Farmer	(5) 3 boys, 2 girls	7	Millet	mostly

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Josephine Katui	Farmer	(5) 3 girls, 2 boys	6	Millet	sometimes
Charity Karimi	Farmer	(9) 4 girls, 5 boys	3	Millet	sometimes
Mary Kirugi	Farmer	(9) 5 girls, 4 boys	6	Maize	sometimes
Mutinda Nthiga	Farming/ knitting	(5) 3 boys, 2 girls	4	Millet	mostly
Peter Ndara	Farming	(2) 2 boys/ grazing	3 1/2	Millet	mostly
Lydia Murugu	Farmer	(7) 3 boys, 4 girls	5	Millet	mostly
Sabina Mutiria	Farmer	(9) 3 boys, 6 girls/ knitting	6	Maize	mostly
Mutegi Kigwaya	Farmer	(6) 3 boys, 3 girls	4	Millet	mostly
Philip Kimandu	Farmer	(7)	5	Millet	mostly
Phenehas Kinyua	Teacher/ Farmer	(1) boy	1	Maize	sometimes
James Kinyaki	Farmer	(3)	4	Millet	sometimes
Daniel Muechege	Farmer	(1) boy	3	Millet	mostly
Dvid Gitonga	Farmer	none/ grazing	3	Pigeon peas	mostly
Andrew Nthiga	Student	none/ grazing	0	none	mostly
Jerina Nyaga	Farmer	(5) 2 boys, 3 girls/ knitting	6	Maize	sometimes
Samuel Ruungika	Farmer	(1) boy	3	Sorghum	mostly
Murigembwe Kainyiru	Farmer	(9) 2 boys, 7 girls	8	Millet	sometimes
Ruth Jeremiah	Farmer	(8) 5 girls, 3 boys	3	Maize	mostly
Lucy Kagere	Farmer/ community health	(3) 2 boys, 1 girl	3	Maize	mostly
Evans Kithaka	Teacher/ Farmer/ business	(8) 3 girls, 5 boys	8	Maize	mostly
Ezekiel Murige	Farmer	(4) 3 boys, 1 girl	4	Maize	sometimes
Jessica Nyaga	Farmer/ Business	(5) 4 boys, 1 girl/ reading bible	5	Maize	mostly
Penina Mutega	Farmer	(7) 1 boy, 6 girls	6	Millet	mostly
Estha Ngosi	Teacher/Farmer	(1) boy/ reading bible	3	Maize	mostly
Paul Gichore	Teacher (Adult Educ.)	(4) 1 boy, 3 girls	4	Maize	mostly
Christopher Kyalo	Farmer	(4) 1 boy, 3 girls	2	Millet	mostly
Jemima Julius	Farmer	(6) 5 boys, 1 girl/ knitting	3	Millet	mostly
Jane Kanono	Farmer	(6) 2 boys, 4 girls	4	Millet	mostly

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Wamalwa Khisa	Area Manager SISDO	(2) 2 boys/ Football, travelling	0	none	mostly
Ziporah Kibaara	Clerk (M. of Educ.)	(5) 3 boys, 2 girls	10	Maize	sometimes
Lucy Muriungi	Farmer	(4) 3 boys, 1 girl	7	Maize	sometimes
Munyambu Rimbeeria	Tailor, Farmer	(7) 3 boys, 4 girls	5	Millet	mostly
Silas Mutia	Farmer	(5) 4 boys, 1 girl	5	Maize	mostly
Sarah Kanono	Farmer	(5) 3 boys, 2 girls	4	Green grams	mostly
Titas Muchiri	M. of Agric. (PUC)/ Farmer	(2) 2 boys	5	Maize	mostly
Agnes Makanya	Teacher/Farmer	(3) 1 boy, 2 girls	10	Maize	sometimes
Mary Nyaga	Farmer/Teacher	(2) 1 boy, 1 girl/ singing, reading	3	Maize	mostly
Joel Nthiga	Farmer	(2) 1 boy, 1 girl	4	Maize	mostly
James Kanyalu	Farmer	(1) 1 boy	4	Maize	mostly
Lydia Mageu	Teacher/ Farmer	(3) 2 boys, 1 girl/ singing, reading bible	5	Maize	mostly
Simon Nkerani	Business/Farmer	(5) 3 boys, 2 girls	4	Millet	sometimes
Priscilla Kalundu	Farmer	(6) 3 girls, 3 boys	5	Millet	mostly
Ngochi Festus	Teacher/Farmer	(4) 3 girls, 1 boy	10	Maize	sometimes
Priscilla Kithaka	Farmer	(8) 3 girls, 5 boys	8	Maize	mostly
Nkonge Ignati	Teacher/ Farmer	(2) 1 boy, 1 girl	2 1/2	Maize	mostly
Margaret Selasio	Farmer	(6) 3 boys, 3 girls	7	Millet	mostly
Stephen Mutiria	Mason	(6) 3 boys, 3 girls	4	Millet	mostly
Andrew Makala	Farmer	(2) 1 boy, 1 girl	3	Maize	mostly
Joseph Mugwika	Farmer	(9) 8 boys, 1 girl	8	Millet	sometimes
M' Rukiri Ciakabece	Trader	(7) 4 boys, 3 girls	7	Millet	mostly
Mutiria Nyaga	Mason/Farmer	(3) 3 girls	5	Millet	sometimes
Hellen Kinyua	Farmer	(1) girl	2 1/2	Maize	mostly
Mary Njeru	Farmer	(2) 1 boy, 1 girl	2	Maize	mostly
Domicio Kilema	Machinist	(6) 4 boys, 2 girls	15	Millet	sometimes
Gideon Kithaka	Driver/ Farmer	(5) 4 girls, 1 boy	6	Millet	sometimes
John Njeru	Mason/Farmer	(4) 3 boys, 1 girl	4	Millet	mostly
Peter Kirimi Misheck	Farmer/Preacher	(3) 1 boy, 2 girls	4 1/2	Millet	mostly
Julius Kirongo	Farmer	(5) 4 boys, 1 girl	3	Millet	sometimes
Salesio Muthengi	Farmer/ Pastor	(8) 4 girls, 4 boys	4	Millet	mostly
Johnson Kirebu	Business	(8) 4 boys, 4 girls	8	Millet	mostly
Betty Muriiki	Business	(3) 1 boy, 2 girls	3	Millet	mostly
Mwangangi Ndicii	Farmer	(10) 4 girls, 6 boys	10	Maize	sometimes

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Muriungi M'Rwanda	Farmer	(11) 5 boys, 6 girls	2	Millet	sometimes
Boniface M'Ndicii	Farmer	(9) 5 boys, 4 girls	13	Millet	mostly
Severino Mugambi	Farmer	(8) 4 girls, 4 boys	6	Millet	mostly
John Kiria	Farmer	(4) 2 boys, 2 girls	3	Millet	mostly
Solomon Njeru	Student	none/ visiting, movies	1/4	Cassava	none
John Kadia	Student	none/movies	0	none	none
Jeremiah Kithetu	Farmer	(7) 3 girls, 4 boys	3	Millet	sometimes
David Mutheri	Farmer	(1) boy	10		
Grace Mungatia	Farmer	(6) 5 girls, 1 boy	10	Millet	mostly
Nakarina Nkuru	Farmer	(4) 2 boys, 2 girls	8	Millet	sometimes
Charles Kajiita	Student	none/ visiting	0	none	none
Judith Gakunyi	Farmer	(6) 3 boys, 3 girls	8	Maize	mostly
Catherine Nyaga	Farmer	(1) girl	5	Maize	sometimes
Jessica Ikunga	Farmer	(6) 3 girls, 3 boys	6	Millet	sometimes
Samuel Mugambi	Farmer	(5) 4 boys, 1 girl	5	Millet	mostly
M'Rumuri Kiige	Farmer	(3) 1 girl, 2 boys	5	Millet	mostly
Peter Makembo	Teacher/Farmer	(2) 1 boy, 1 girl	4	Maize	mostly
Ruth Nyaga	Farmer	(8) 5 girls, 3 boys	6	Millet	mostly
Justus M'Bitu	Farmer	(5) 2 girls, 3 boys	5	Millet	sometimes
Elizabeth Karigu	Farmer	(9) 3 girls, 6 boys/ reading bible	11	Maize	sometimes
David Njue	Farmer/Mason	none	visitor		
Moses Gaichu	Farmer/Health promoter	(5) 3 boys, 2 girls/ promoting health, grazing cattle	5	Millet	mostly
Jelina Karimi	Farmer	(8) 3 girls, 5 boys/ grazing cattle	6	Millet	mostly
Samuel Giatu	Farmer	(7) 5 girls, 2 boys	15	Millet	sometimes
Anastasia Nyamu	Farmer	(6) 3 boys, 3 girls/ making ciondos	4	Millet	mostly
Mucee M'Kiara	Farmer	(5) 3 boys, 2 girls	3 1/2	Millet	mostly
Tabitha Kathulre	Farmer	(2) 1 boy, 1 girl	6	Maize	sometimes
Eunice Kariamburi	Farmer	(5) 2 boys, 3 girls	7 1/2	Maize	mostly
Gason Giciambu	Farmer	(7) 3 boys, 4 girls	3 1/2	Maize	mostly
Jeremiah Nyaga	Farmer	(8) 5 girls, 3 boys	8	Millet	sometimes
Salome Mutugi	Teacher	(3)	3	Millet	mostly
Mutano Riungu	Farmer	(10) 7 boys, 3 girls	7	Millet	mostly
Nthiga Okabi	Mason/Farmer	(4) 2 girls, 2 boys	5	Maize	mostly
Geoffrey Marigu	Farmer/ Carpenter	(6) 2 girls, 4 boys	6	Millet	mostly

Table C.2-11 Participation/ Stakeholders Analysis for Ruungu/Karacho Irrigation Project

Name	Interests	Power/Potential
Ruungu/Karacho Irrigation Scheme	<ul style="list-style-type: none"> ◆ Good farming ◆ Good roads ◆ Water for irrigation ◆ To uplift standard of living ◆ To strengthen group ◆ Good schools ◆ To stop importing food from outside ◆ To contribute to the country's economy ◆ To establish farmers co-operatives ◆ To have cattle dips ◆ To promote good neighborhoods ◆ To introduce zero grazing ◆ To reduce poverty ◆ To develop market centres ◆ To promote tree planting ◆ To eradicate famine ◆ To improve standard of living ◆ To have knowledge on suitable crops ◆ To have health facilities ◆ To promote health ◆ To introduce new crops ◆ Good bridges ◆ To improve household income ◆ To generate employment opportunities ◆ To educate children ◆ To improve nutrition ◆ To have electricity and telephone 	<ul style="list-style-type: none"> ◆ have shamba (land) ◆ Strong organization ◆ Knowledge to seek assistance ◆ Strength to work ◆ Thingithu river ◆ good terrain ◆ climatic condition is good for horticulture ◆ have some roads ◆ fertile soils ◆ committed groups ◆ willingness to work ◆ have schools ◆ plenty of construction materials ◆ private health facilities ◆ hydropower generation potential ◆ have few cows & goats ◆ plenty of public land ◆
SISDO	<ul style="list-style-type: none"> ◆ generation of employment facilities by irrigation farming ◆ To facilitate irrigation water for food security ◆ Training for farmers on irrigation technology, horticultural farming, entrepreneur culture, leadership and organization ◆ promotion of education ◆ good roads network 	<ul style="list-style-type: none"> ◆ Train good organization ◆ Create awareness of importance of irrigation ◆ Facilitate groups to open bank accounts ◆ Publicized "Ruungu" groups ◆ Soliciting potential collaborators to reduce loan burden to the farmers ◆

Name	Interests	Power/Potential
	<ul style="list-style-type: none"> ◆ Environmental awareness for sustainable development ◆ Provision of loans for infrastructure, inputs, zero grazing. ◆ Group pressure ◆ promotion of self-help groups. ◆ Promotion of co-operation and organization abilities ◆ Uplifting living standards of small-holders ◆ Sustainable development ◆ Improve quality and quantity of horticultural produce ◆ 	<ul style="list-style-type: none"> ◆
JICA	<ul style="list-style-type: none"> ◆ To know family size and potential of irrigation farms ◆ To know the potential for horticultural production ◆ To empower people ◆ To establish practical application models for type E through working with "Ruungu" ◆ Words and Action ◆ To understand problems of this community ◆ Interaction with community to know how they live and sources of livelihood ◆ Promoting good health in community ◆ Road improvement ◆ Assist to install irrigation system ◆ To know which crop to grow ◆ sustainable development through capacity building ◆ To promote crops for urban market including Japan ◆ Exchange ideas of technology JICA - community 	<ul style="list-style-type: none"> ◆ Enough capability to meet identified problems with community support. One leg of a three legs stool. (community, SISDO, JICA) ◆ ◆
MOA.	<ul style="list-style-type: none"> ◆ Promoting community participation in projects ◆ To advise on the use of fertilisers and good livestock management 	<ul style="list-style-type: none"> ◆ Has personnel ◆ management of resources allocated fro agricultural development ◆ To establish farmers training centres, tree nursery

Name	Interests	Power/Potential
	<ul style="list-style-type: none"> ◆ To give information on crops suited to the area, and advise on disease control. ◆ Soil and water conservation ◆ Good crops husbandry ◆ Eradication of poverty and famine ◆ Forestation ◆ To train farmers on crop rotation ◆ Soil characteristic ◆ Commercial agriculture ◆ ◆ 	<ul style="list-style-type: none"> ◆ Formulate agri. policies ◆ Organize agricultural shows ◆
Women Groups (20)	<ul style="list-style-type: none"> ◆ Buying utensils for members ◆ Try to be independent ◆ Girls counseling ◆ Consult with groups on development issues ◆ Counseling members to make sure of family peace and harmony ◆ Using local materials (e.g. soap from sun-flowers) ◆ Contribute money to buy milk, cows and water tanks ◆ Provide communal labour of farms of members ◆ Buy presents for lady who has new-born ◆ Contribute school fees for members ◆ train members on hygiene and public health matters ◆ 	<ul style="list-style-type: none"> ◆ United ◆ Commitment ◆ knowledge to plan ◆ Have their men ◆ Registered social service ◆
Youth Groups(18 ~ 35)	<ul style="list-style-type: none"> ◆ Transfer wisdom from elders to juniors ◆ To support members on day to day needs ◆ To assist other people on difficult tasks e.g. making houses, ◆ good roads for cycling ◆ Involved in preparation of community ceremonies. ◆ Playing games ◆ Generate employment for youth ◆ Socialize youth ◆ To promote obedience to parent 	<ul style="list-style-type: none"> ◆ To educate community on hygiene and public health ◆ Able to borrow from bank ◆ Have by-laws to govern operations ◆ Have their parents ◆ Strong body ◆ Wisdom ◆ Registered in S.S ◆
Men's Groups (10+)	<ul style="list-style-type: none"> ◆ To construct bridges across the river 	<ul style="list-style-type: none"> ◆

Name	Interests	Power/Potential
	<ul style="list-style-type: none"> ◆ To assist members to buy things like cows , farm tools ◆ To provide communal labour for difficult tasks ◆ Making bee-hives ◆ Harambee for school fees, etc. ◆ Sharing ideas on development issues 	<ul style="list-style-type: none"> ◆ Members are co-operative ◆ Physically strong ◆ Contribution of money for various activities ◆ To make decisions ◆ Counseling ◆ Wisdom ◆ To bring harmony in homes ◆ They have their ladies ◆ Registered in S.S ◆

Other stakeholders include :

NGOs	Churches	Community Organizations	Other GoK Agencies
<ul style="list-style-type: none"> • SIDA • CARE Kenya • Canadian Save the Children 	<ul style="list-style-type: none"> • Full Gospel Church of Kenya • East Africa Pentecostal Church • Seventhday Adventist Church • Catholic Church Mission • Salvation Army • Maranatha Mission of Kenya • Anglican Church of Kenya 	<ul style="list-style-type: none"> • Students Association • Handy pump Groups 	<ul style="list-style-type: none"> • Community Health Department • M.o.H • Provincial Administration of Water Resources & Public Works • County Council • Primary Schools

Table C.2-12 Project Design Matrix (PDM) for Ruungu/Karocho Irrigation Project

	Objectively Verifiable Indicators	Means of Verification	Key Assumptions
OVERALL GOAL 1. Increased yields 2. Better nutrition 3. Uplifting living standards	1. Incidence of Diseases 2. Education level improved 3. No. of houses stone 4. No. of people who can not pay school fees 5. % of school enrollment increased	1. Community health workers report 2. School headmasters record	
PROJECT PURPOSE Sufficient Irrigation Water Available	1. All members of the project are irrigating 2. No. of complains from farmers	1. Water attendant's report	1. Farm inputs available 2. High quality seeds available 3. Agricultural extension services available
RESULTS/OUTPUT 1. Organization in place 2. Prepared design with technical. experts 3. Donor identified 4. Money availed 5. Qualified contractor identified 6. Pipes and building material available 7. Intake installed 8. Canal system installed			
ACTIVITIES 1.1 Formulate rules 1.2 Organize groups 1.3 Elect group leaders 1.4 Establish scheme committee 1.5 Train groups 2.1 Send committee to local M. o A office 2.2 Identify demonstration farm 3.1 Send chairman to SISDO 3.2 Write letters to donors 3.3 Send proposal to donors 3.4 Send letters to M. of Culture & Social Services on possible donors			1. Donors have money to lend 2. Ministry of Water give water permit

<p>4.1 Organize farmers contribution 4.2 Open bank account for project 4.3 Negotiate for loan with identified donors</p> <p>5.1 Advertise tender 5.2 Interview and select contractor with machinery to excavate rocky parts</p> <p>6.1 Prepare ballast 6.2 Committee to ensure contractor brings necessary material</p> <p>7.1 Get supervision engineer from M. o A or Donor</p>			
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Figure C.2-1 Problem Tree for Rupingazi Ngerwe Irrigation Scheme

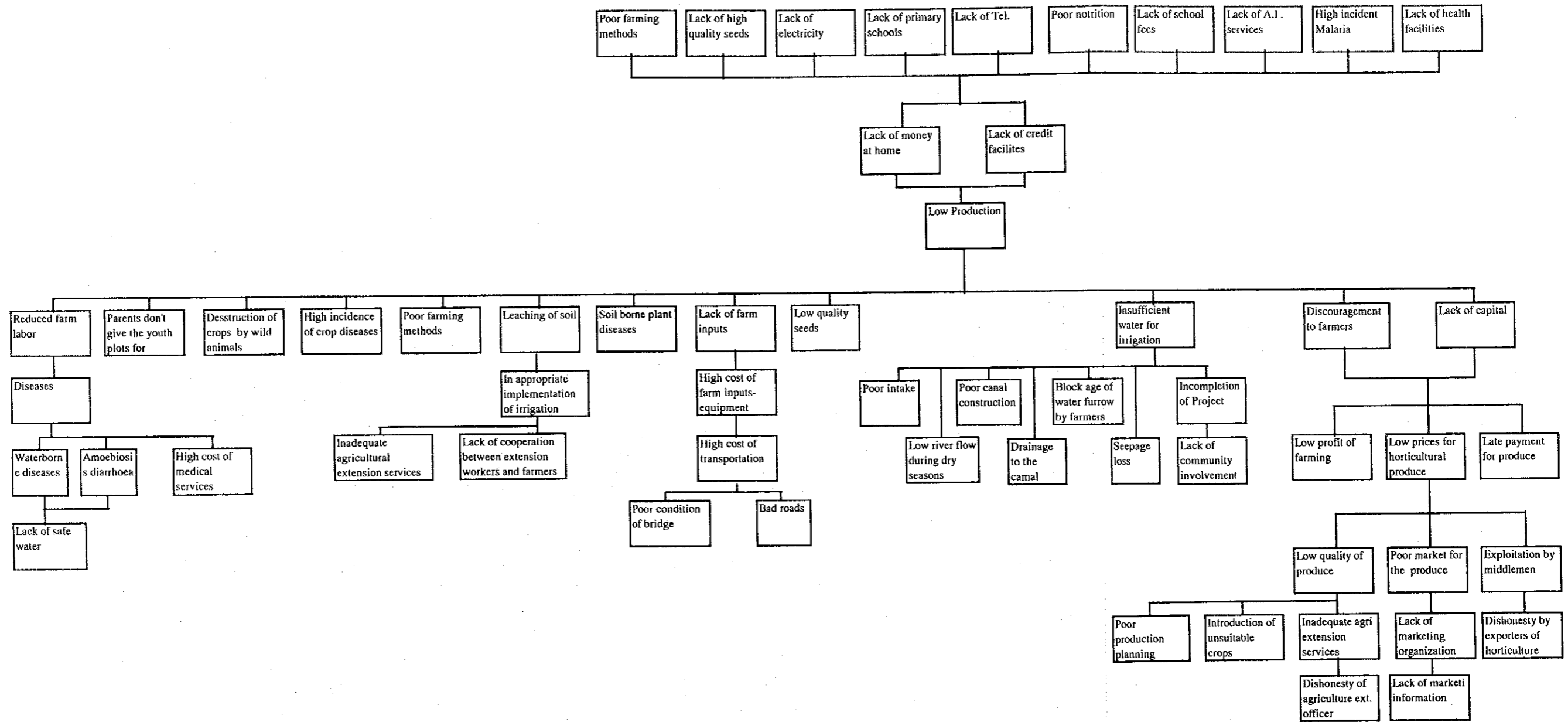


Figure C.2-2 Objective Tree for Rupingazi Ngerwe Irrigation Scheme

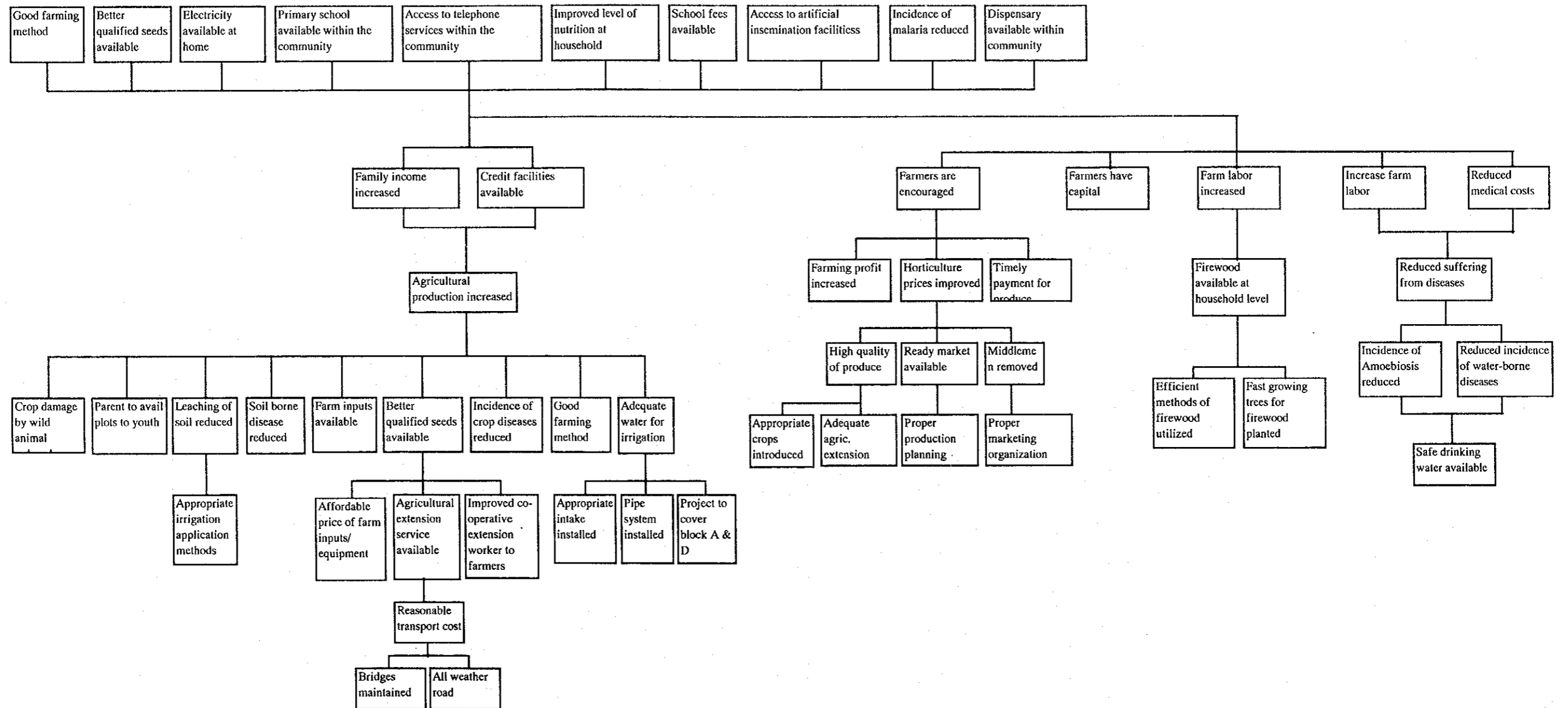


Figure C.2-3 Mapping for Rupingazi Ngerwe Irrigation Scheme

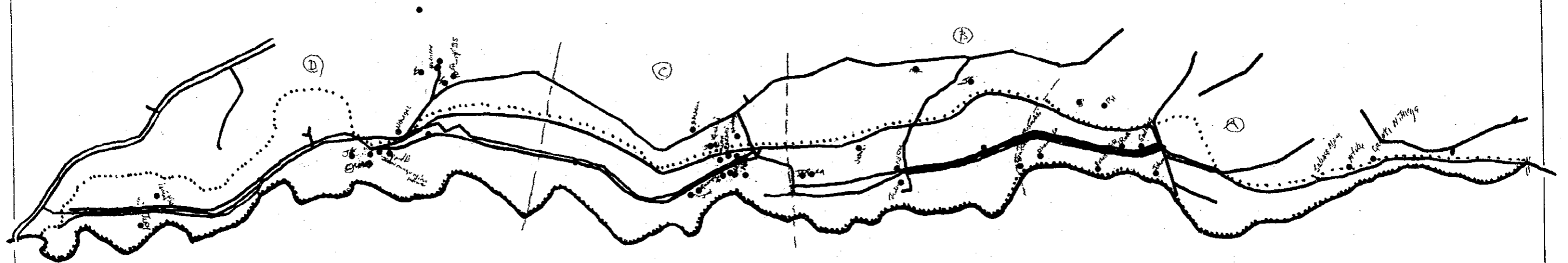


Figure C.2-4

Problem Tree for Ngomano/Nyangati Water Project

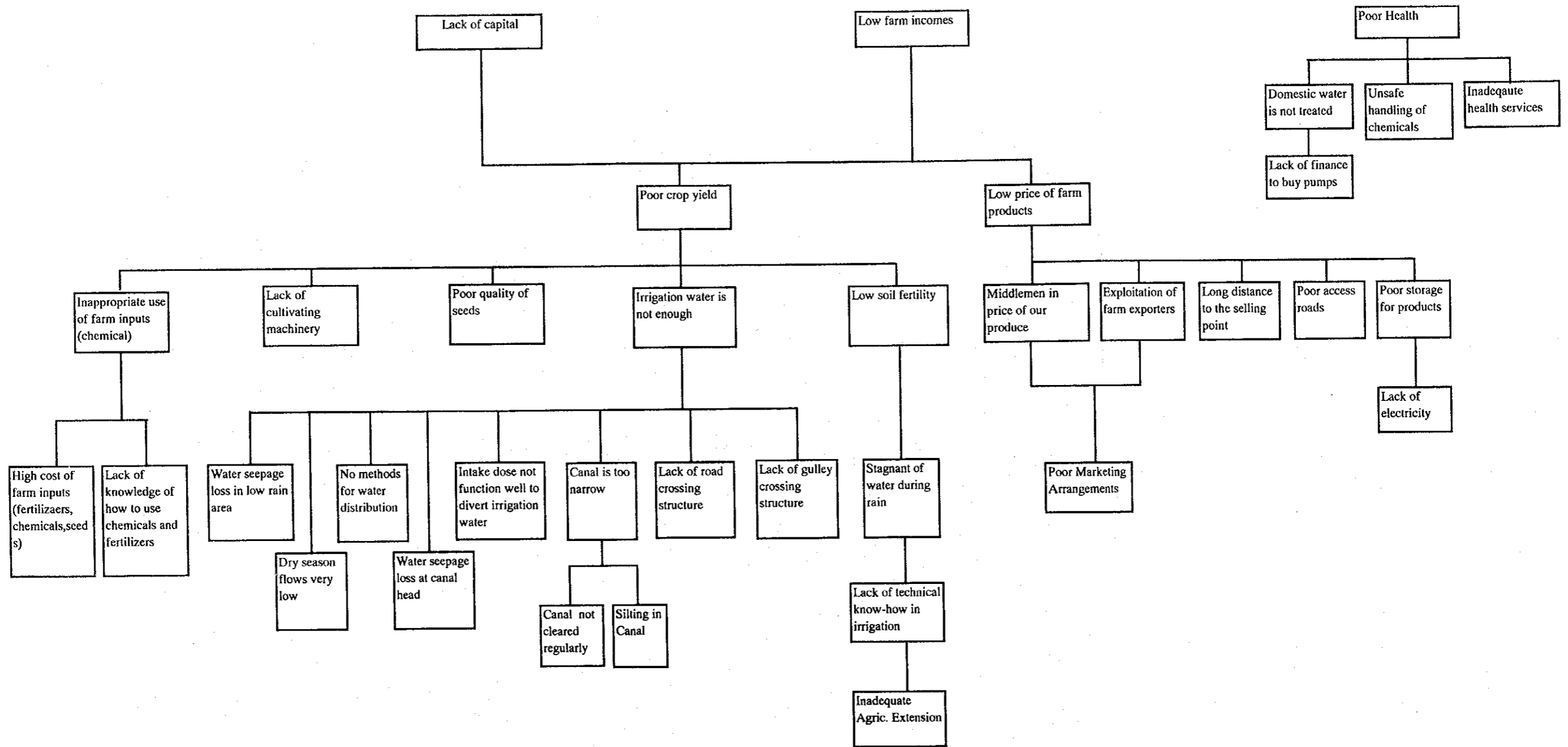


Figure C.2-5 Objective Tree for Ngomano/Nyangati Water Project

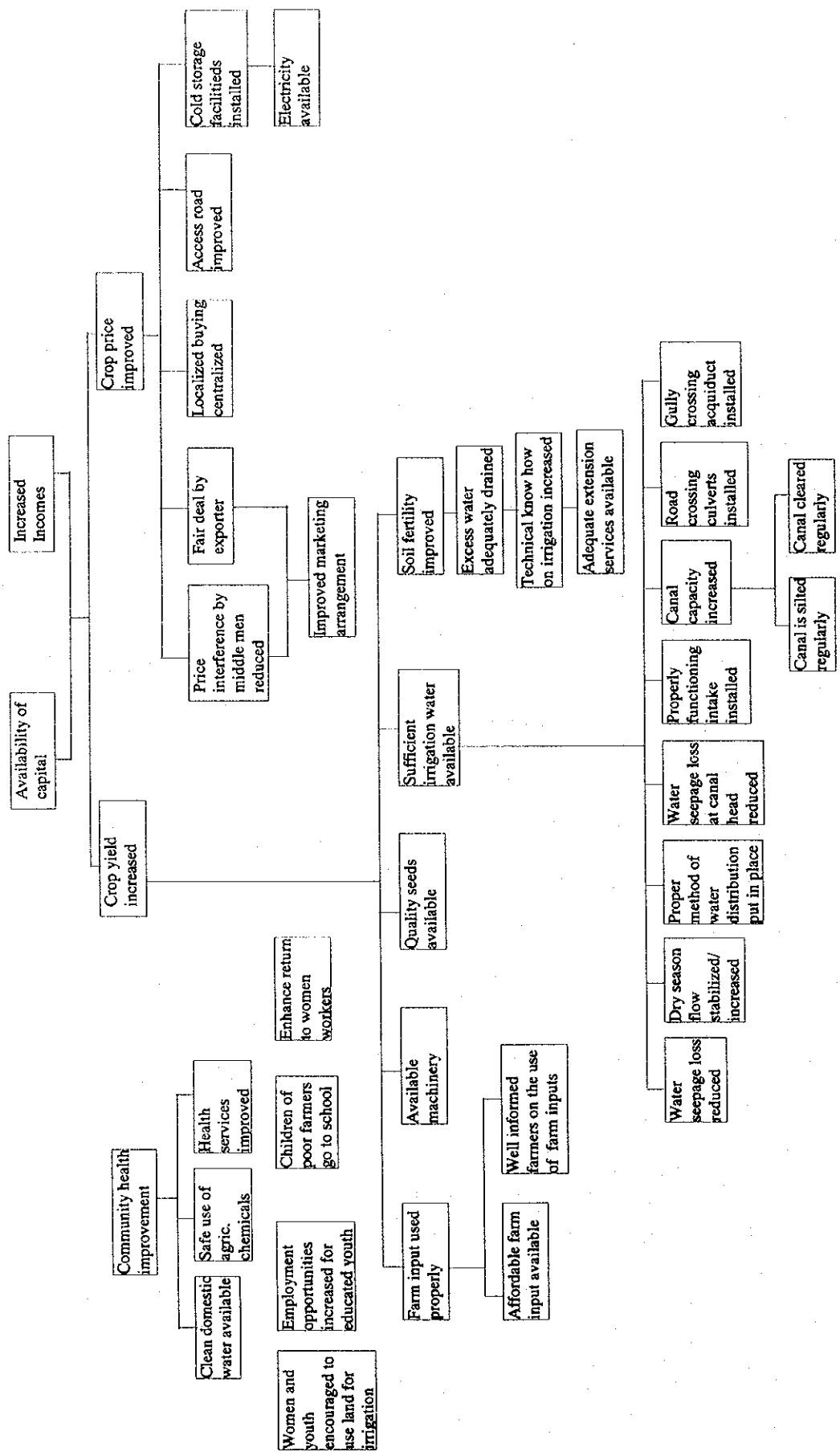


Figure C.2-6 Mapping for Ngomano/Nyangati Water Furrow Project

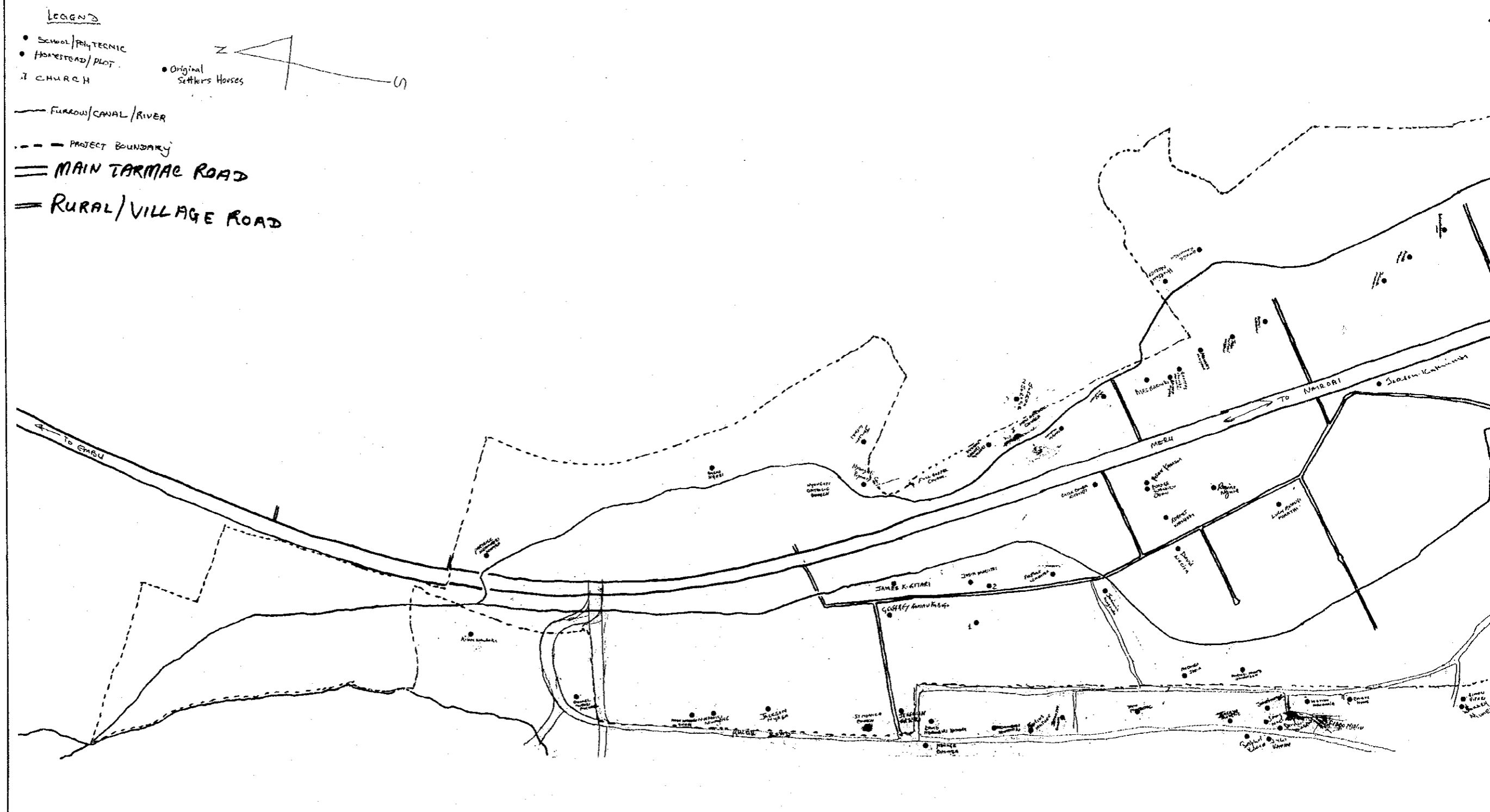


Figure C.2-7 Problem Tree for Nkunjumo Water Project

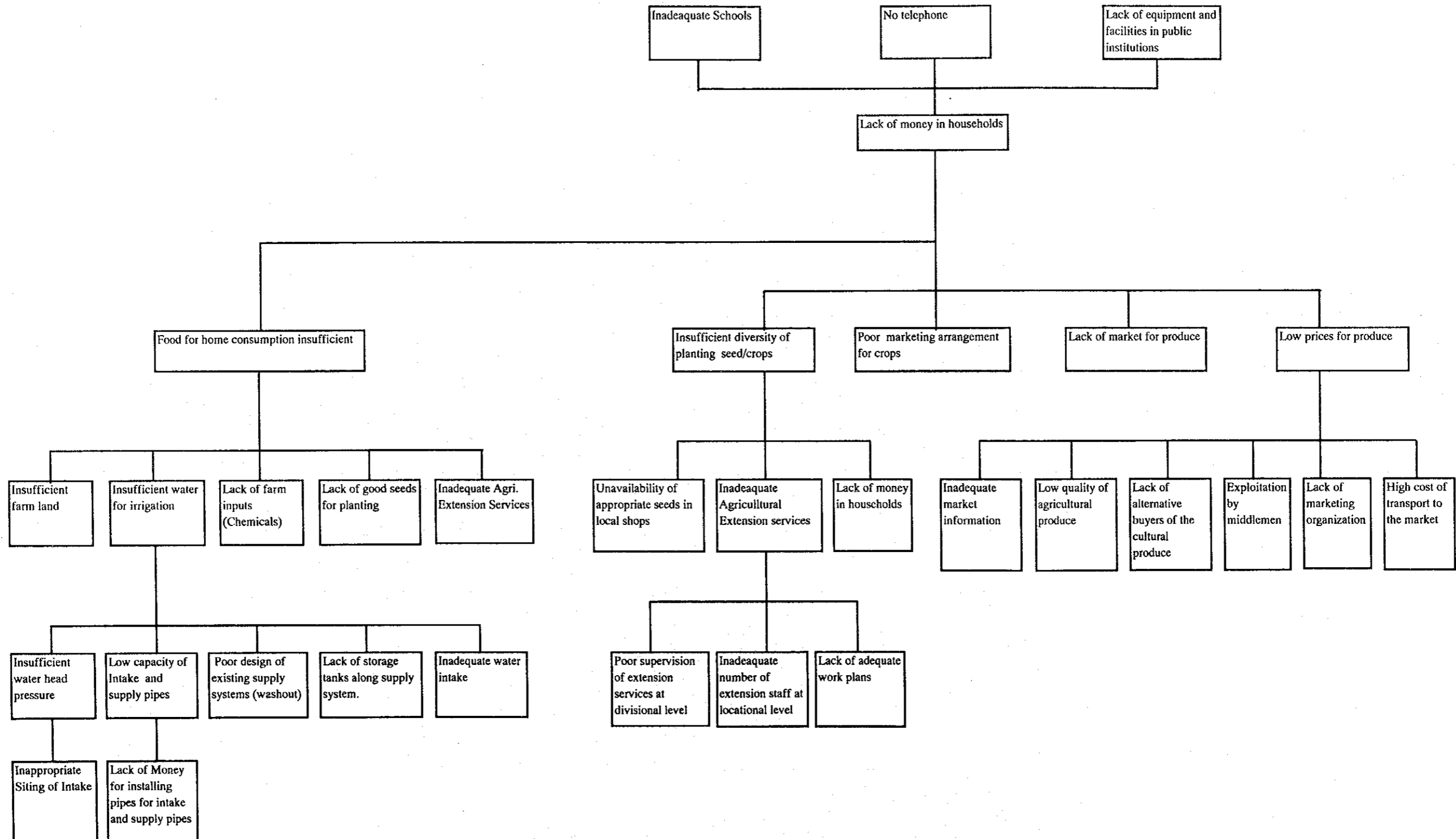


Figure C.2-8 Objective Tree for Nkunjumo Water Project

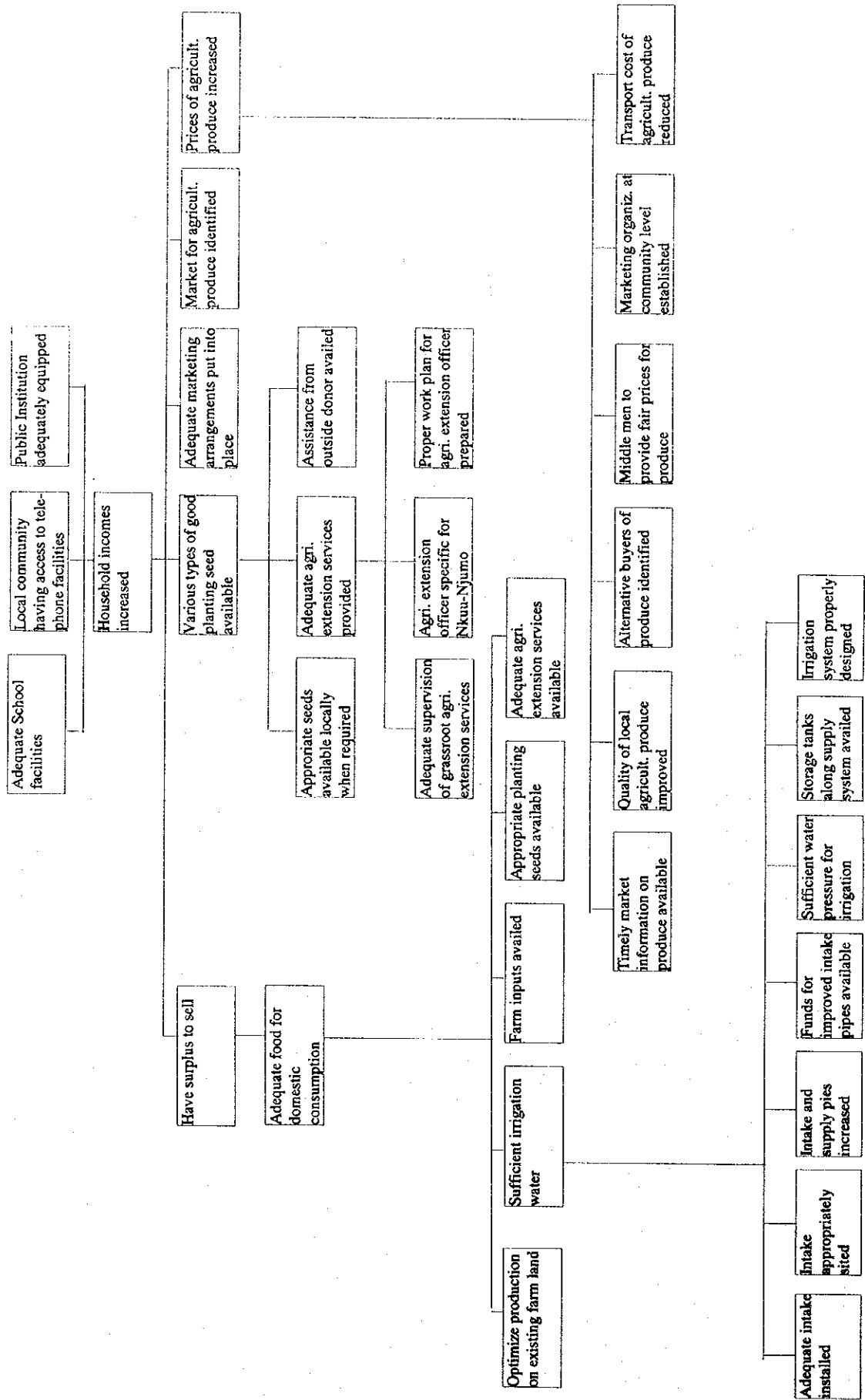
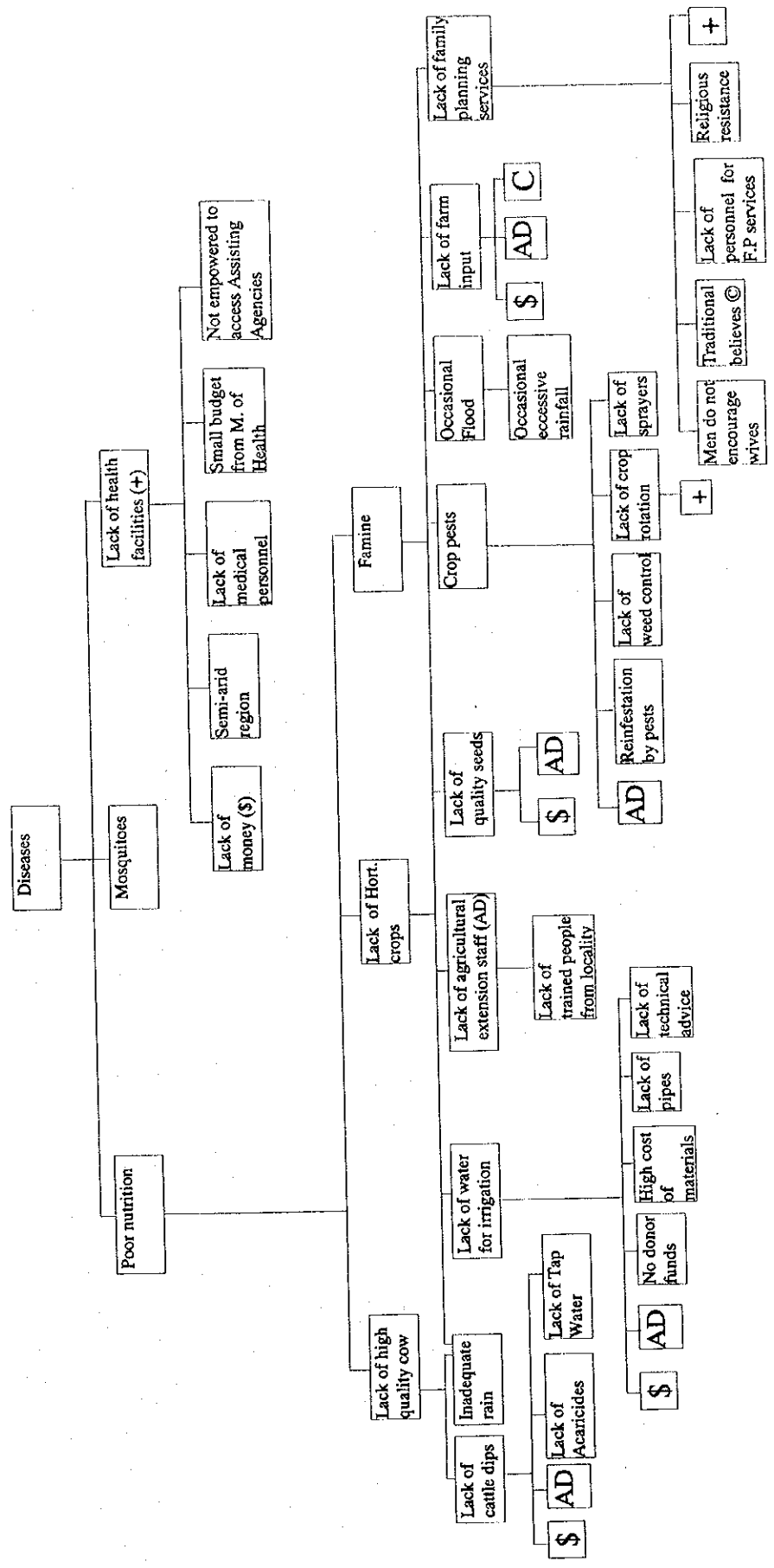


Figure C.2-10 Problem Tree for Ruungu/Karocho Irrigation Project



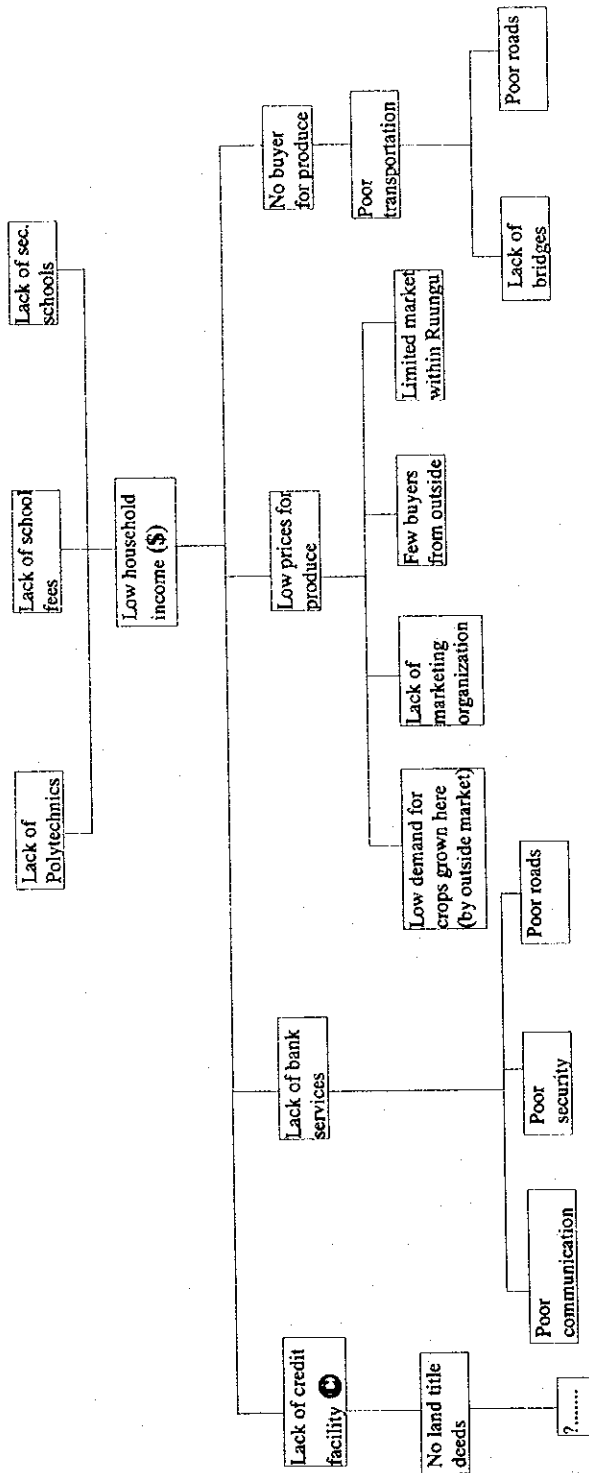
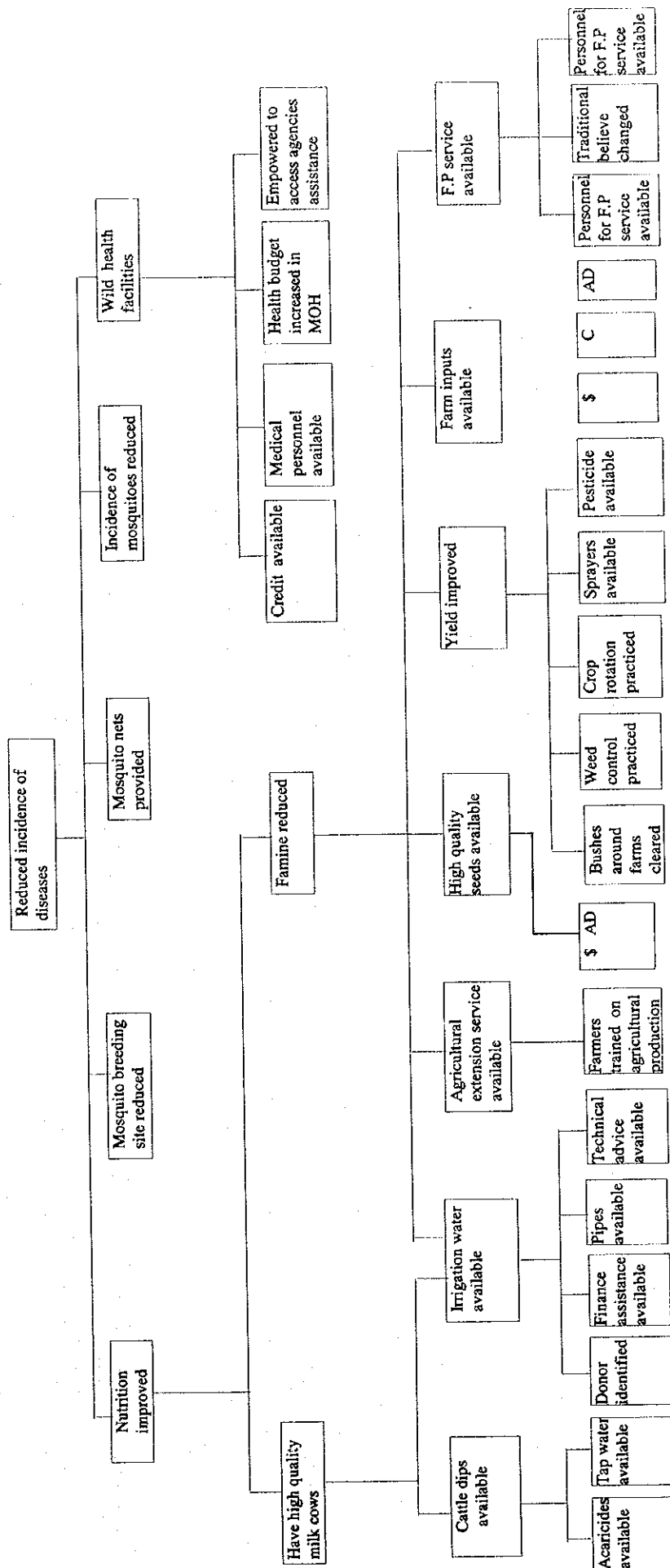
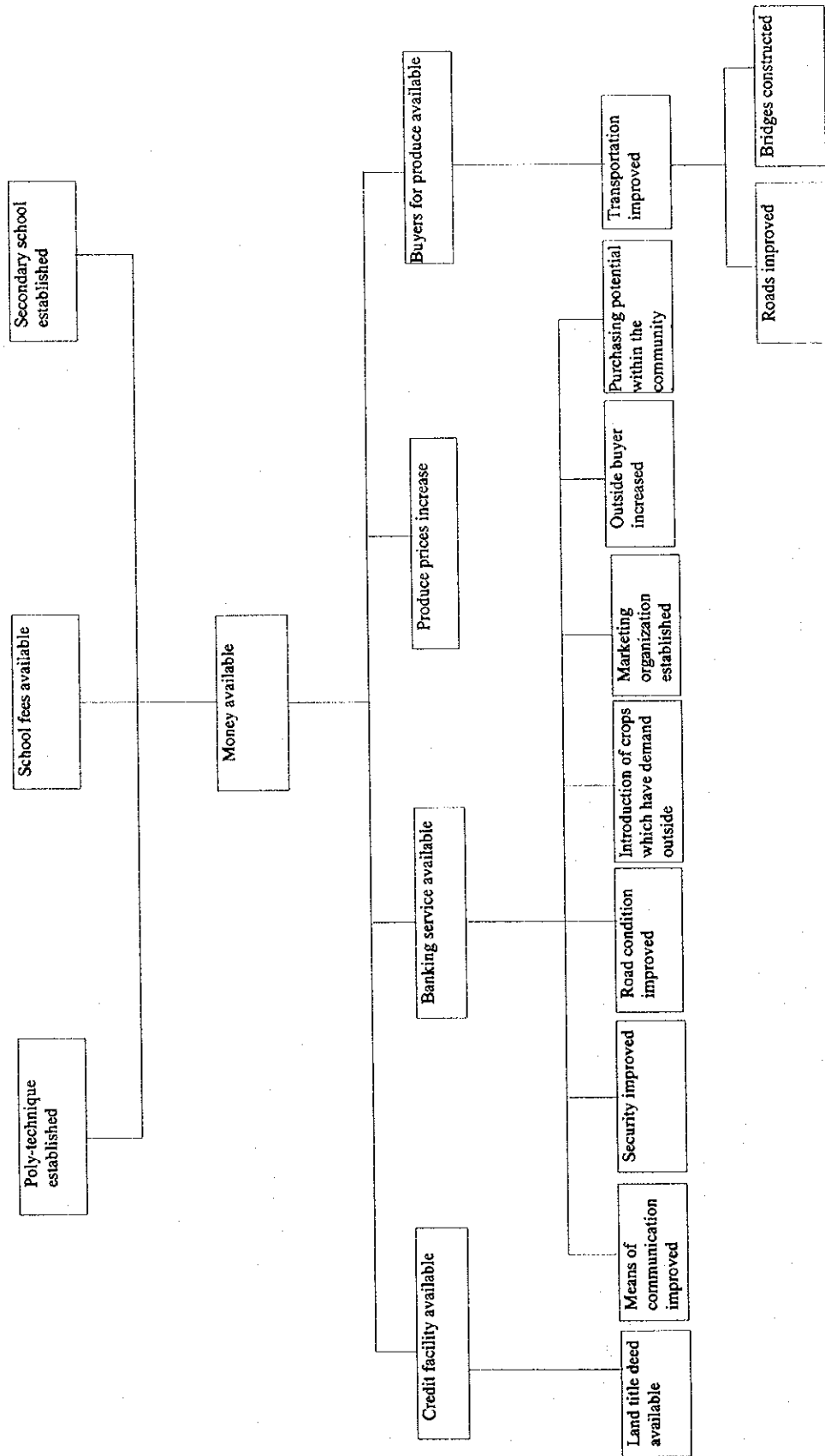


Figure C.2-11 Objective Tree for Ruungu/Karocho Irrigation Project





ANNEX D

CONTRACT-BASED FIELD WORKS

PHASE-I STUDY

Page

D.1	SOCIO-ECONOMIC SURVEY	D-1
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PHASE-II STUDY

D.5	TOPOGRAPHIC SURVEY	D-40
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**TERMS OF REFERENCES
FOR
SOCIO-ECONOMIC SURVEY WORKS
ON
COMMUNITY-BASED SMALLHOLDER IRRIGATION DEVELOPMENT PROJECT
FOR
PROMOTION OF HORTICULTURAL PRODUCTION IN THE FOOTHILLS
OF MT. KENYA**

1. BACKGROUND

The Government of Kenya in collaboration with the Government of Japan is conducting a study on irrigated horticultural development in seven districts located in the foothills of Mt. Kenya (Nyeri, Kirinyaga, Embu, Mbeere, Tharaka-Nithi, Meru, Nyambene). As part of this study, it is planned to carry-out a base-line Socio-Economic survey that will assist in delineating an appropriate development plan for irrigated horticulture. It is expected that the seven sites of socio-economic survey will be given to the Contractor when the Contractor is commissioned. However, about hundred (100) respondents will be selected at random in each of the seven sites.

2. SUMMARY OF WORKS

2.1 Objectives of the Socio-Economic Survey

The main objective of the study is to collect base-line data and information within the study area. Such data and information will include family structure, intra-household resource use as well as indigenous arrangements for using community owned resources. In addition the survey shed some light on current social stratification (on the basis of income or other social attributes) and on the community's attitudes and perceptions on development in general and irrigation in particular.

2.2 Scope of Works

While maintaining liaison with the team carrying out a separate PRA assignment, the Contractor will be expected to carry out the following tasks:

2.2.1 Field Surveys

1) Administration of a Socio-Economic Questionnaire

Using an appropriate questionnaire (to be developed by the Contractor), data and information will be collected on:

- Family member composition and family division of labour
- Agricultural and non-agricultural labour deployment
- Labour availability in relation to seasonal labour requirements

- Land use patterns including crop and livestock enterprises
- Farm production inputs and associated costs
- Crop and livestock yields, sales value and marketing arrangements
- Household incomes and income disposition including levels as well as patterns of domestic consumption
- Range of social amenities (electricity, telephone, domestic water supply, health facilities etc.).
- Status of irrigation activities
- Farmers practices and attitude towards irrigation, farmer participation, cost sharing and farmers organisation
- Differentiation of the farming community by age, gender, literacy, marital status etc.
- Land tenure analysis including user owners, tenants and other user rights

2) Other Informal Sources of Information

Apart from the questionnaire, the Contractor will be expected to gather information on the socio-economic aspects of the community by contacting local GOK representatives, informal leaders as well as by arranging "focused discussion groups" with representative groups of the community (young people, women, men, etc.)

2.2.2 Information and Data Analysis

The Contractor will analyse and collate information and data collected in the field with a view to deriving conclusions on:

- General household income levels
- Labour availability and present deployment
- Family structure and lineage patterns
- Resource status & control, household activities, gender division of responsibilities
- Socio-logical aspects of the community including mutual responsibilities and obligations among different members of the community as well as their respective value systems

2.3 Survey Location

The socio-economic survey shall be carried out in seven district as shown below;

- | | |
|-----------------------|--|
| 1) Central Province : | <ul style="list-style-type: none"> - Nyeri District - Kirinyaga District |
| 2) Eastern Province : | <ul style="list-style-type: none"> - Embu District - Mbeere District - Tharaka-Nithi District - Meru District - Nyambene District |

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2.4 Contractors' Staffing

It is expected that the socio-economic survey team will include experts in the following disciplines:

- Agricultural economics
- Socio-anthropology
- Agriculture

2.5 Work Schedule

It is anticipated that the selected Contractor will complete the socio-economic survey within a period of 5 weeks. Therefore, all the survey works are expected to be completed by beginning of October, 1997. The Contractor shall prepare and submit the plan of operation for the survey works, detail work schedule and staffing schedule to the Consultants prior to the commencement of the works.

A draft report (five copies) on the out-come of the field survey will be expected four weeks after commencement of the works. After discussion and commenting by the Consultants, a final report (10 copies) will be submitted to the Consultants one week later.

3. SURVEY OUT-PUT

The main out-put of the socio-economic survey assignment is a report that will inform on important socio-economic features of the study area (income, social structure). In particular the report will show present social relationships as well as differentiation of roles and mutual obligations within the community and existing value systems. Such a sociological perspective will permit judgement to be such issues as the capacity of the local community to sustain a farmer managed irrigation project.

4. CONDITIONS OF COST ESTIMATION FOR THE WORKS

Cost estimate for carrying out the works will be made in the following items

- 1) Data/information collection, questionnaire, processing and analyses
- 2) Transportation
- 3) Preparation of report

5. LIAISON WITH CONSULTANT

The selected Contractor is expected to work closely with the Consultants during all the stages of the survey assignment.

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**TERMS OF REFERENCES
FOR
PARTICIPATORY RURAL APPRAISAL (PRA) SURVEY WORKS
ON
COMMUNITY-BASED SMALLHOLDER IRRIGATION DEVELOPMENT PROJECT
FOR
PROMOTION OF HORTICULTURAL PRODUCTION IN THE FOOTHILLS
OF MT. KENYA**

1. BACKGROUND

The Government of Kenya in collaboration with the Government of Japan is conducting a study on irrigated horticultural development in seven districts located in the foothills of Mt. Kenya. As a part of this study, it is planned to carry out a Participatory Rural Appraisal (PRA) whose output will assist in delineating an appropriate development plan for irrigated horticulture. It is expected that the seven sites of PRA will be given to the selected Contractor, when the Contractor is commissioned.

2. SUMMARY OF WORKS

2.1 Objectives of PRA

There are two main objectives of PRA: (a) to establish a better understanding of the local community, from the perspective of the community itself (b) empowerment of the community in analysing their needs and assuming responsibility for pursuing available opportunities.

In facilitating the community's discussion, the Consultant will gain an insight into the following aspects:

(a) Modes and patterns of daily household and productive activities

The activities of various members of the community should be depicted and should be differentiated by:

- Various attributes of the community members (gender, age, marital status, socio-economic stratum, occupation, kinship groups or other indigenously affiliated groups)
- Purpose (subsistence, risk avoidance, cash generation) and by seasonal variation.

(b) Ownership and Management Patterns of House-hold Resources

The mode and pattern of control, mobilization, management and disposal of house-hold capital/assets/resources should be brought out. This should include such resources as time, land,

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labour, income, livestock, technology, etc. available to a household and/or an individual, differentiated by gender, age, marital status, socio-economic stratum, occupation, kinship groups or other indigenous affiliated groups.

(c) Ownership and Management Patterns of Communally Held Resources

The local community will discuss existing modes and patterns of organization, mobilization and management of communally held resources, both traditional and developmental. The discussion should focus on the nature of the managed resources/assets, membership and leadership of the organization concerned, its rules and norms, and different roles assigned to constituent members of the organization.

(d) Inter-and Intra-Community Conflict Management

The community will be expected to define existing conflict management systems, detailing nature of conflict handled, type of solution reached, membership and leadership of adjudicating bodies as well as modalities of consensus creation within the community.

(e) Community's External Relations with the External Environment

The community will be encouraged to discuss the nature of its interaction (at the individual and community level) with the external environment particularly with regard to:

- Access to the outer market for acquiring implements/information/credit, etc. and disposing surpluses
- Access to social services both governmental and non-governmental, differentiated by personal attributes, social strata and intra-community social groups.

In the course of the PRA and subsequent social analysis, the following issues and concerns will be addressed among others:

(a) Requirement for Additional Inputs

In the event that irrigated horticultural production is anticipated, what are the expected additional inputs required from the farmers, in terms of labour, capital, time, land, etc.? And how and from where does the community plan to obtain those additional inputs? If these inputs are not available within the community, what facilities and services are needed to enable farmers to obtain those additional inputs from outside?

(b) Changes Arising From Planned Irrigated Production

With the on-set or intensification of irrigated horticultural production, what is expected to happen to the community's way of life within household and to the community, in terms of income level (rise and disparity), additional labour load and allocation, chances of non-farm employment? And what would the community plan to do about their food crop production?

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(c) Need for Necessary Adjustments

What are the likely burdens, concerns and fears in joining an irrigation farmers association, in terms of time allocation within a day/year, interaction with other members of the community, management of the organization?

(d) Relationship with an Existing Community-Based Organization

If there is already an existing community-based organization that manages communally owned resources (including intra and inter-community conflicts) what adjustments would be required by the community in order to accommodate and irrigation association?

(e) Implications of Limited Access to Irrigation Opportunities

In a situation where only a limited group of the community is eligible to have access to irrigation and chances of income increase, how would other members of the community react? Apart from the geographical location of farm plots/residence, what do people regard as a decisive factor affecting eligibility to join in the irrigation association?

(f) Distribution of Irrigation Benefits

Is there any system by which surplus created by farmers under irrigation could be redistributed to the benefit of the rest of the community? If there is not any, what interventions and adjustments can be made to minimize adverse development of social stratification?

2.2 Scope of Works

In facilitating PRA, the Contractor will be expected to do the following:

- To conduct informal interviews and discussion in seven areas
- To support a series of discussion sessions where the community will generate data and information on (see appendix):
 - Community history and trend lines
 - Main socio-cultural features of the community
 - Community organization such as characteristic of member, objectives, main activities, rules, etc.
 - Status of key resources used by the community
 - Linkage of other organization and access to the administrative organization, resources, information, marketing, etc.
 - Local institutions
 - Resource situation, ownership, use and disposal
 - Differentiation of the local community by wealth status, gender and age sets
 - Prevailing mutual responsibilities and obligations of various components /strata of the local community
 - Farmers perception of the development process

- Visualisation of (irrigation) development opportunities and (irrigation) constraints
- Preparation of a community development plan focused on irrigated horticultural development

In carrying out the PRA assignment, it is expected that the Contractor will maintain liaison with a separate Contractor which will be conducting socio-economic surveys within the study Area.

2.3 Survey Location

The PRA survey shall be carried out in seven district as shown below;

- | | |
|-----------------------|--|
| 1) Central Province : | - Nyeri District
- Kirinyaga District |
| 2) eastern Province : | - Embu District
- Mbeere District
- Tharaka-Nithi District
- Meru District
- Nyambene District |

2.4 Contractors' Staffing

To successfully facilitate the PRA assignment, the Contractor will have demonstrated competence in carrying out similar work in the recent past. The Contractor team is expected to be multi-disciplinary and will include:

- Sociology (team leader)
- Agriculture
- Community Mobilisation.

2.5. Work Schedule

It is planned that the PRA assignment will be completed within six (6) weeks time after commencement.

A draft report (5 copies) on the out-come of the PRA is expected to be submitted to the Consultant five (5) weeks after commencement. After commenting and approval by Consultant the final PRA Report (10 copies) will be compiled.

3. PRA Out-Put

The Consultants is expected to compile a report that documents all the key PRA events. In addition, the report will include influences on community social structure, resources situation and access by different strata and elements to these resources.

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Furthermore, the report will bring out the community's experience in managing "common properties" such as community owned rural water supply systems, marsh-land ,co-operative factory, school, etc. The report should make an assessment of the community capacity to organise themselves for group irrigation and recommend any desired intervention to strengthen community organisation.

4. CONDITIONS OF COST ESTIMATION FOR THE WORKS

Cost estimate for carrying out the works will be made in the following items;

- 1) Data/information collection, questionnaire, processing and analyses
- 2) transportation
- 3) Preparation of Reports

5. LIAISON WITH CONSULTANT

The selected Contractor is expected to work closely with the Consultants during all the stages of the survey assignment.

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APPENDIX

SURVEY FORMAT FOR PARTICIPATORY RURAL APPRAISAL (PRA)

1. Introduction

Participatory Rural Appraisal (PRA) and Participatory Rural Planning (PRP) are techniques that allow rural communities to make a meaningful contribution to rural development of which they are a part. These techniques differ from the earlier top-down approaches which perceived rural communities as mere recipients of ideas and plans from government and donor experts.

In the formulation of a "Master Plan of Community-Based Horticultural Smallholder Irrigation Projects" on the foothills of Mt. Kenya, PRA techniques will be used to obtain planning information from the local communities. Hence, in the course of field surveys and investigations, PRA techniques will be employed in gathering information relating to:

- Natural conditions of prospective irrigation development areas
- Social-economic characteristics
- Labour mobilization
- Existing cropping patterns
- Present irrigation activities
- Marketing structures
- Institution arrangements
- Rural infrastructure
- Environmental status
- Present irrigation production constraints and development opportunities
- Proposals for model Smallholder Irrigation Schemes (SIS)

2. Possible Outline of PRA Approach during Field Survey and Investigation

2.1 Selection of Irrigation Development Sites

The criteria for selecting sample areas for PRA is the background of the establishment of the schemes such as government initiated, NGO initiated, farmer initiated, and new or proposed. The secondary criteria are agro-ecological zone, irrigation technology, access to market, and size of group. These sample areas will be selected at least one from each district.

2.2 Preliminary Site Visits

The Consultants will visit each of the selected irrigation sites and carry out the following:

(a) Informal Data Gathering

This will entail initial familiarization with the physical and social attributes of the irrigation site at an informal level. The main aim of this informal data gathering is not only to get preliminary information on the site but also to get known by the local community. At this stage, the Consultants will explain the purpose of the visit as preparing the community for a later compilation of a "Community Action Plan" for irrigation scheme development in the area.

(b) Community Review Meetings

After the initial visit, the Consultants will pick up informal categorized small groups for intensive group interviews/discussions. In addition, the consultant will arrange a number of informal meetings with local community leaders (provincial administration, agriculture extension officers, other representatives of government and NGOs etc).

The community leaders and the Consultants will then review the PRA approach with regard to the information and data requirements for the prospective irrigation development.

(c) Planning Meetings

Planning meetings will constitute the most critical element of the PRA technique. They will involve participation of local community leaders and the Consultants in deliberating on:

- Analysis of problems and opportunities (with bias to irrigation)
- Community action plan (CAP)
- Strategies for data gathering

3. Plan Adoption

A final meeting will be arranged with the aim of informing the whole community about the envisaged irrigation development and adoption of the "Community Action Plan". The adoption will be done during public "barazas" in close consultation with community leaders, local NGOs and government officers. The venues for such "barazas" may be located at several zonal centers depending on the size of the expected irrigation development area.

4. Types of Field Survey Data and Information

PRA techniques will be employed for gathering limited but useful data as well as for obtaining insights into the realities of local communities. Data gathering will primarily aim at encouraging the local community to think systematically about their resources (land, water, labour, knowledge, institutions, etc.). In addition, PRA data gathering will assist the

Consultants to understand the local problems better and hence offer options that address these problems more effectively.

Several types of PRA assisted data and information will be collected as follows:

(a) Spatial Data

The community will be facilitated to draw a sketch map of their area. Subsequently, they will be encouraged to carry out multi-variate data collection along a transect using their map (soil, water, vegetation, socio-economic, problems, opportunities).

(b) Time Related Data

The community will be facilitated to define a time line consisting of key events in their history. Such events should help to identify past trends, events, problems and achievements.

A time line will help the Consultant team to understand what local, national and international events have influenced the community's history and how the community has coped with crises in the past. The documentation of these events will be documented by using a combination of cards and flip charts.

(c) Trend Lines

Equally important is the need for the community to deliberate on significant changes over time. Such changes include population, habitation, rainfall, surface water regimes, soil loss, vegetation cover, etc.

(d) Seasonal Calendar

A seasonal calendar will identify activity cycles that occur within the life of a community on a regular basis. The calendar will be important in highlighting such issues as labour availability, timing for project activity, cash flow availability and capacity of the community to absorb development initiatives.

5. Additional Social Data Gathering

Apart from PRA assisted data gathering, the Consultants will collect further information through use of household interviews using semi-structured questionnaires.

The focus of the interview will be farm resource management as well as the interviewees' perception of existing problems and the role of irrigation in addressing such problems. The questionnaire will therefore feature such items as: personal data, socio-economic data (intra-

household division of labour), resource inventory and usage, water resources, health and health facilities, existing infrastructure and institutions, development prospective.

The above format, like PRA itself, is fairly flexible and will depend on the number of irrigation development sites in relation to available Consultant resources. The main objective of PRA technique is to use the beneficiary community as a source of planning data while empowering them to assume responsibility for planning, implementing as well as operating and maintaining irrigation projects.

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**TERMS OF REFERENCE
FOR
DISTRICT PROFILE UP-DATE SURVEY WORKS
ON
COMMUNITY -BASED SMALLHOLDER IRRIGATION DEVELOPMENT
PROJECT FOR PROMOTION OF HORTICULTURAL PRODUCTION IN THE
FOOTHILLS OF MT. KENYA**

1. GENERAL

This document presents Terms of Reference for district profile up-date survey works required for the study on Community-Based Smallholder Irrigation Projects for Promotion of Horticultural Production in the Foothills of Mt. Kenya.

2. SUMMARY OF WORKS

2.1 Objectives

The objectives of the district profile up-date survey works are to collect latest data/information on smallholder irrigation project in the study area to be use for planning and formulation of the Master Plan. The obtained data/information will be utilized for studying the potentiality of water and land resources in the areas and also prioritized development schemes for smallholder irrigation schemes. The work include data processing, analysis and evaluation.

2.2 Scope of Works

The district profile which contains the past, present and future smallholder irrigation and drainage schemes in respective district was prepared by the Irrigation and Drainage Branch of the Ministry of Agriculture, Livestock Development and Marketing in 1992 and 1995. The up-date works of district profile survey shall be carried out based on existing district profiles. The scope of works is shown below;

- 1) To review previous seven district profile reports,
- 2) To update all data and to survey present status/conditions of some 330 schemes listed in the existing district profile survey report and to add data/information of newly identified 100 schemes through interview to district /division staff at each district/division office. The schemes will be categorized in five(5), namely; partly operated but with proposal for rehabilitation and/or expansion , planed but with change(s), planed with no change(s), planed but abandoned and newly proposed.

- 3) To verify the data and information obtained from the interview through random field visit and study to selected 43 schemes, of which main part shall be partly operated schemes but still with an intention of improvement or expansion. The Contractor shall submit the short list of the scheme to be studied to The JICA Consultants after initial preparation works. The Contractor shall take the following actions and study at selected scheme sites:
 - to confirm social, financial and farmers organization condition through an interview to leader of community,
 - to confirm obtained data/information which will be collected at district and division offices through an interview to scheme leader,
 - to confirm dimension of existing and proposed irrigation facilities such as intake structures, canals and water application devices/methods,
 - to survey present discharge of river flow, soil texture, soil depth and farmland slope etc.
 - to clarify brake-down of proposed project cost
- 4) To analyze and evaluate water availability for the irrigation schemes on the sub-drainage area basis by utilizing available hydrological data,
- 5) To hold a workshop at district level for priority ranking to all schemes, and
- 6) To prepare and submit the report to the JICA Study Team.

2.3 Survey Location and Number of Schemes

The district profile up-date survey shall be carried out in the following seven districts, and total number of schemes is estimated around 430.

- | | | |
|---------------------|---|--|
| 1) Central Province | : | - Nyeri District (61 schemes)
- Kirinyaga District (32 schemes) |
| 2) Eastern Province | : | - Embu District (47 schemes)
- Mbeere District (54 schemes)
- Tharaka-Nithi District (44 schemes)
- Meru District (148 schemes)
- Nyambene District (40 schemes) |

2.4 Contractors' Staffing

The Work shall be carried out through interview/discussion, workshop, data collection and hydrological investigations, and the survey results shall be tabulated in the attached form. As the key staff of the work, following experts should be assigned;

- Team Leader cum Irrigation Engineer (more than 10 years of relevant experience in similar study)
- Hydrologist (more than 7 years of relevant study)

2.5 Work Schedule

All works shall be completed by the end of October, 1997. The tentative work schedule is shown below. The Contractor shall prepare and submit the plan of operation for the survey, detailed work schedule and staffing schedule to the Consultants prior to the commencement of the works.

- Total period for survey : 1.5 months from September to November 1997
- Data compilation : 1.0 month from September to October 1997

3. STUDY REPORTS TO BE SUBMITTED

The results of the district profile up-date survey shall be put in a form of a report and diskette, according to the "Scheme Format and Appraisal Report" of the District Profile as shown in Attachment-1. Location map including all schemes and general layout map (sketch) for each of the schemes with a high priority of the five schemes in each district shall be attached. Furthermore, location of all Smallholder Irrigation Schemes(SIS) shall be marked out on the topographic map of 1/250,000 in scale.

The Contractor will prepare and submit the following report in English to the Consultants

- 1) Progress Report
Five (5) copies on 25th of October, 1997 (when the data compilation will be completed)
- 2) Draft Report
Five (5) copies on 3rd of November, 1997
- 3) Final Report
Five (5) copies on 10th of November, 1997

The content of the progress report shall include the following items:

- 1) Summary of data collection, processing and analysis including present situation of SIS at district level
- 2) Location map of all Smallholder Irrigation Scheme (SIS)
- 3) Criteria for priority ranking to SIS
- 4) Table of content for Final Report

4. CONDITIONS FOR COST ESTIMATION FOR STUDY

Cost estimate for carrying out the survey will be made in the following items:

- 1) Data collection, processing and analyses
- 2) Workshop
- 3) Transportation
- 4) Preparation of Reports

Attachment-1 : Items/Subjects to be studied in Scheme Format and Appraisal Report(2/2)

Scheme Format Report No 7

Item to be studied	
- Number of scheme	
- Scheme location code	
- Scheme location code number	
- Enterprise type	
- Constraint on water distribution	
- Tail enders problem	
- Time table followed adequately	
- Water stealing > 5% of farmers	
- Adequacy of control structures	
- Other problems (specified)	
- Solution to constraint	
- Constraint on low yield level	
- Lack of crop rotation	
- Poor water management	
- Non use of recommended inputs	
- Other reasons for problem	
- Solution to constraint	

Scheme Format Report No 8

Item to be studied	
- Number of scheme	
- Scheme location code	
- Scheme location code number	
- Enterprise type	
- Constraint on soil problems	
- Solution to constraint	
- Other constraint	
- input supply	
- extension by MOA	
- land tenure	
- percentage of farmers settled	
- Solution to constraint	
- Constraint on marketing	
- Nos. of times a week middlemen come	
- Nos. of times a week exporters come	
- Contract made with middlemen and/or exporters	
- Solution to constraint	

Scheme Format Report No 9

Item to be studied	
- Number of scheme	
- Scheme location code	
- Scheme location code number	
- Enterprise type	
- Evaluation of Constraint	
- Constraint of rank 1	
- Constraint of rank 2	
- Constraint of rank 3	
- Constraint of rank 4	
- Constraint of rank 5	

Scheme Appraisal Report No 1

Item to be studied	
- Number of scheme	
- Scheme location code	
- Scheme location code number	
- Enterprise type	
- Scheme name	
- Flooding and drainage hazards	
- Water borne disease occurrence	
- Pollution due to disposal of domestic waste	
- Pollution of river water	
- Encroachment of natural significance	
- Loss of grazing land due to overgrazing	
- Land use conflicts due to obstruction	
- Soil erosion due to bush clearing	
- Flooding and drainage hazards	
- Disruptive effects on migrating fish	
- Crop damage by pests	
- Insufficient supply of woodfuel	

Scheme Appraisal Report No 2

Item to be studied	
- Number of scheme	
- Scheme location code	
- Scheme location code number	
- Enterprise type	
- Scheme name	
- Strength of farmer organisation	
- Land tenure system	
- Farmer initiative	
- Accessibility to markets	
- Increased gross margins	
- Cost per household	
- Equitable water distribution	
- Availability of inputs	
- Farmers level of technical knowledge	
- Level of farmers income	
- Benefit to district/national development	
- Additional benefit	
- Total score	

**TERMS OF REFERENCE
FOR
THE HORTICULTURAL PRODUCE MARKETING SURVEY
FOR
THE STUDY ON COMMUNITY-BASED SMALLHOLDER IRRIGATION
PROJECT
FOR
PROMOTION OF HORTICULTURAL PRODUCTION
IN
THE FOOTHILLS OF MT. KENYA**

1. OBJECTIVES

The objectives of this survey are to i) describe the marketing routes for the major horticultural crops; the main factors influencing crop prices; and how marketing information is acquired in the rural areas, ii) to outline the main factors influencing marketing, including the provision, operation and maintenance of support services such as market information, roads, and post-harvest facilities, iii) to clarify the current problems from the view point of each of the stakeholders, farmers/farmers groups, middlemen, government organization, etc., iv) to analyze the current and future trends of horticultural produce marketing for both the domestic and export markets, and also v) to determine and list the current constraints on establishing and operating farmers' marketing groups.

2 SCOPE OF WORK

2.1 Introduction

One goal of the community-based smallholder irrigation project is to increase farmers' income from horticultural production by improving the marketing conditions.

This survey is intended to identify, analyze and prioritize the existing constraint to horticultural marketing. The main issues to be addressed are listed below. The items in brackets are the primary responsibility of the Consultant.

Production Level

- Organization and operation of farmers' marketing groups
- Contract conditions between farmers and traders / exporters
- Obtaining market information to assist in selecting crops and choosing a suitable harvesting period
- (Financing)
- (Irrigation system)
- (Farm inputs)

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- (Introduction of new varieties)

Collecting/Grading/Cooling/Transporting Level

- Marketing routes and charges
- Marketing facilities and their operation
- Post-harvest losses
- (Rural road infrastructure)

Consumption Level

- Consumers' demand, both domestic and overseas
- Maximum residue levels (MRLs), plant diseases and insects
- Increase in value of Kenyan branded produce in exporting countries

2.2 The Main Components of the Survey

1) Status of the Major Domestic Markets

The major markets in the study area, plus Nairobi, shall be described. Descriptive information is required on their management, operating methods, size, and facilities. Quantitative data is required on the number of retailers, their trading volumes per year, charges to retailers, the volumes sold by crop, and the production area serving the markets. The flow of product within the domestic marketing system will be diagrammed, showing who is concerned with the various levels, such as farmers' groups, enterprises, retailers and transporters (refer to the attached sheet 1).

2) Seasonal Fluctuation in Retail Prices of Horticultural Produce by Market

Price information for each crop shall be collected from the Market Information Branch, Department of Agriculture, the Ministry of Agriculture and Livestock Development and the District Agricultural Offices. The data shall be presented by monthly average over at least the last three (3) years. The survey will include monthly fluctuations and pricing differences between the major markets at Nairobi and Mombasa and the markets in the production areas at Meru and Karatina. Furthermore, the data shall be presented to indicate the price index at the farmgate (=100), the transport, middle men and retailers' margins (refer to the attached sheet 2).

3) Post-Harvest Facilities

The post-harvest facilities for grading, packing and collecting in the study area will be identified on a 1/50,000 topographic map. Associated details such as funding, operation, function and produce handled will be collected from the District Agricultural Offices. The Consultant shall propose new construction or improvements to the post-harvest facilities, with operation methods corresponding to the farmers' demand (refer to the attached sheet 3).

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4) Domestic Consumption for Horticultural Produce

The domestic consumption figures shall be estimated by production and surplus in the districts in the study area. The consumption of the main crops including cereals in the study area shall be compared both with Nairobi and the whole of Kenya (refer to the attached sheet 4).

5) Domestic Demand for Horticultural Produce

The domestic demand for horticultural produce both in metric tonnes and in kilogramme per capita by crop (legume, fruit, leaf and root vegetables) over the next ten (10) years for the whole of Kenya will be estimated. The calorie requirements per capita shall be estimated using the data issued by the Ministry of Health. Using these results, the demand for horticultural produce by district, and in Nairobi shall be estimated (refer to the attached sheet 5).

6) Exports of Fruit, Fresh Vegetable and Cutflowers

The export volumes, FOB prices and unit prices by crop, month and country shall be collected and analyzed. The trends in export, including consumers' needs for particular varieties, grades (shape), colours, the exporting peak period, etc shall be presented by crop and by country (refer to the attached sheet 6).

7) Imports of Fruit and Fresh Vegetable

The import volumes, CIF prices at Nairobi and unit prices by crop and country shall be presented. The main crops imported shall be identified (refer to the attached sheet 7).

8) Export-Oriented Horticultural Production Areas in the Foothills of Mt. Kenya

The main irrigation schemes and production organizations shall be listed with details of their current production and future potential.

9) Production and Export of Processed Horticultural Crops

The flow of raw produce from farmers to processing companies shall be surveyed, and data collected and presented on seasonal purchase prices by crop and by production areas (refer to the attached sheet 9).

10) Exports of Horticultural Produce from other African Countries to the EU

The data on exports for the last three (3) years from competitive countries will be presented and analyzed.

11) Maximum Residue Levels (MRLs), Plant Diseases and Insects

The EU regulations and details of inspection systems and organization in Kenya regarding MRLs, plant diseases and insects shall be presented.

12) Constraints and Potential Improvements in Coffee, Tea and Dairy Produce Marketing

The institutional and economic problems in the coffee, tea and dairy produce marketing system have already been clarified by other studies. The consultant will summarize and suggest ways to avoid similar problems in the development of the horticultural produce marketing system.

13) Farmers' Cooperatives

The background and current situation of farmers' cooperatives involved in agricultural production, collection, marketing and financing to small-scale farmers shall be presented. The obstacles to operating and re-organizing the societies shall be clarified.

14) Marketing Promotion Projects in Horticultural Sector

The development project "Eastern Province Horticulture and Traditional Food Crops Project, IFAD" and other related reports in the marketing sector shall be reviewed.

15) Introduction of New Varieties of Horticultural Crops

The status of the Accession to the International Plant Breeders Association and Union for Protection of Plant Varieties by the Government of Kenya shall be surveyed. The role of Kenya Agricultural Research Institute regarding introduction of new varieties shall be clarified.

16) Price Determination System and Activities of Middlemen

The major middlemen shall be identified by name, area covered, crops handled, their margins, financial services, farm inputs provided, etc. The trading conditions including how price is determined between a farmer and a middleman shall be surveyed.

17) Interview of Exporters

The export destination, product, contract conditions for small-scale farmers, consumers' requirements in terms of price, quality, variety and size shall be surveyed for at least ten (10) major exporters.



18) Comparison of Airfreight Tariffs

The costs to the major EU capitals and the loading volumes shall be surveyed.

19) Rural Road Improvement Plan

In the study areas, the rural roads to be improved shall be prioritized from the consideration of value of produce transported from the production areas to the local markets. The information and conditions of minor roads can be referred to in Annexes of the District Profile or Minor Roads Programme of Ministry of Public Works and Provincial/District Road Offices.

2.3 Analysis of the Survey Results

1) Current Constraints in Marketing

The constraints and prospects regarding the marketing of horticultural crops shall be clarified through the survey items (1)-(19) above.

2) Suggested Countermeasures for Improvement of Marketing Systems

The countermeasures for improvement of marketing systems shall be clarified at each level of government, parastatal, NGO, farmers' group or individual farmers.

2.4 Survey Location

The survey shall be carried out in Nairobi and seven districts located on foothills of Mt. Kenya, as shown below :

- | | |
|--------------------|--|
| Central Province : | - Nyeri District
- Kirinyaga District |
| Eastern Province : | - Embu District
- Mbeere District
- Tharaka-Nithi District
- Meru District
- Nyambene District |

2.5 Contractor Staffing

The following key staff for the works shall be required :

- Chief Surveyor : 1 person x 2.0 months (15 years experience)

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- Marketing Expert : 1 person x 1.5 months (10 years experience)
- Export Affairs Researcher : 1 person x 1.0 months (5 years experience)
- Horticulturist : 2 persons x 1.5 months (5 years experience)

2.6 Work Schedule

The work shall be completed by the 30th October, 1997. The tentative work schedule is shown below :

- Submission of the Draft Report : Middle of October, 1997
- Submission of the Final Report : End of October, 1997

3. REPORTS TO BE SUBMITTED

The results of the survey shall be included in "The Survey Report on Horticultural Produce Marketing for Smallholder Farmers in the Foothills of Mt. Kenya". The documents shall be typed by "Word" and "Excel" of Microsoft.

- Collection of Available Data
- Field Survey results
- Analysis of current situation, constraints and future trend of horticulture produce in domestic and export marketing
- Clarification of the problems to be solved
- Preparation of Summary

4. COST ESTIMATE FOR SURVEY WORK

The cost estimation shall include the following items :

- Data collection
- Transportation
- Documentation of the Report

The Contractor shall provide the methodology of survey and questionnaire in the proposal.

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Study on Horticultural Marketing

1. Status of Major Domestic Market including Mapping of Marketing Routes by Produce (Investigated to Department of Agriculture in each District)

District	Division/Area	Market	Access Road	Facility (mf)	No of Retailers	Scale Trading Volume (ton/y)	Market Charge (Kshs)	Production Area and Tonnage							Avocado	Others	
								Cabbage	Irish Potato	Onion	Carrot	Kale	Chilli	F. Bean			Mango
Neru	Municipality	Gakoromone Market	B6														
Nyabene	Rhubu	Rhubu Market	D6														
Tharaka-Nithi	Other District	Isioto Market	A2														
Embu	Chuka	Chuka Market	B6														
Mwaree	Municipality	Embu Market	B6														
Kirinyaga	Included above.																
	Ndia	Kerugoya Market	C74														
	Kiene East	Sagana Market	A2														
Nyeri	Karatina Township	Karatina Market	A2														
	Municipality	Nyeri Market	B5														
Nairobi	City Centre	City Market															
	Westland	Sarit Centre															
	Argwings Khuduk Rd.	Yaya Centre															
	Waringham	Waringham Centre															
	Ngara Rd.	Nyayo Market															
	Parklanc	Hawkers' Market															
	Nairobi West	Kenyatta Market															
	Haile Selassie Ave.	Wakulima Market															
	Kariokor	Kariokor Market															
	Landhies Rd.	Machakos Market															

2. Monthly Fluctuation in Retail Prices of Horticultural Produce by Market (1995~1997) (Investigated to Department of Agriculture in Maru and Nyeri Districts and MUALDSM)

Market	Produce	Variety	Consist of Price (Index)															
			Jan	Feb	Mar	Apr	May	Jun	Jul	AUG	Sep	Oct	Nov	Dec				
Rhubu Market (Neru)	Cabbage																	100
Karatina Market (Nyeri)	Irish Potato																	100
Nairobi Markets (Nairobi)	Onion																	100
Mombasa Markets (Mombasa)	Carrot																	100
	Spring Onion																	100
	Kale																	100
	Chilli (Capsicum)																	100
	French Bean																	100
	Fresh Pea																	100
	Compeo																	100
	Green Gram																	100
	Pigeon Pea																	100
	Avocado																	100
	Mango																	100
	Banana																	100
	Orange																	100
	Pineapple																	100
	Passion Fruit																	100
	Macadamia Nut																	100
	Others																	100

Attached sheets

3. Postharvest Facilities (Collecting for Middleman's Purchase, Grading and Sacking)
(Investigated to Department of Agriculture in each District)

District	Division	(Sub-)Location	Facility (nt)	Fund	Operating Organisation	Function	Target Produce
Meru							
Nyambone							
Tharaka-Nithi							
Embu							
Mberere							
Kirinyaga							
Nyeri							

4. Domestic Consumption of Horticultural Produce
(Investigated to Department of Agriculture in each District)

District	District	District	Annual Consumption of Produce (ton/year)												Total										
			Horticultural Produce						Others																
			Cabbage	Potato	Cassava	Onion	Carrot	Kale	F. Bean	Mango	Banana	Avocado	Others	Cooking Banana		Rose Coco	Dry Maize	Rice							
Meru		Imenti, Tigania, Igoji																							
Nyambone		Igenbe, Tigania																							
Tharaka-Nithi		Tharaka, Chuka																							
Embu		Embu																							
Mberere		Mberere																							
Kirinyaga		Kikuyu, Ndia																							
Nyeri		Kikuyu																							
Nairobi		N.A.																							
Whole Kenya																									

5. Demand
(Investigated to Ministry of Health)

Country	Produce	Demand (kg/person/day)			Calorie (kcal/day)
		Legume Veg.	Fruit	Leaf Veg.	
		Root Veg.	Volume (kg)	Unit Price (Kshs/kg)	
Whole Kenya					

6. Export of Fruits, Fresh Vegetables and Cutflowers by Produce (1991--1997) and Country (1994--1997)
(Investigated to Horticultural Crops Development Authority)

Country	Produce	1991		1992		1997	
		Volume (kg)	Unit Price (Kshs/kg)	Volume (kg)	Unit Price (Kshs/kg)	Volume (kg)	Unit Price (Kshs/kg)
UK	Fruits						
Holland	Pineapple						
France	Mango						
Germany	Avocado						
Switzerland	Strawberry						
Belgium	Passion Fruit						
Saudi Arabia	Melon						
Djibouti	Pawpaw						
Others	Lime/Lemon						
	Miscellaneous Fruits						
	French Bean						
	Bobby Bean						

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Runner Bean								
Capiscum								
Okra								
Aubergine								
Karella								
Wooli								
Dadhi								
Chilli								
Valore								
Guwar								
Other Asian Vegetables								
Cougette								
Tomato								
Leek								
Carrot								
Miscellaneous Vegetables								
Miscellaneous Root Crops								
Carnation								
Statice								
Roses								
Lillies								
Ilephiro								
Papyrus								
Strelitzia								
Trachelyum								
Astromeria								
Orinis								
Solidaster								
Molucella								
Delphinium								
Euphorbia								
Beliperium								
Cymbrianthemum								
Heliconia								
Orchid								
Ferzezi								
Tuberose								
Cocoflex								
Miscellaneous Outflowers								
Outflowers								

Import of Fruits and Fresh Vegetables by Produce (1991~1997) and Country (1994~1997)
(Investigated to Horticultural Crops Development Authority)

Country	Produce	1991		1992		1997	
		Volume (kg)	Unit Price (Kshs/kg)	Volume (kg)	Unit Price (Kshs/kg)	Volume (kg)	Unit Price (Kshs/kg)
South Africa	Fruit						
	Mandarin						
	Strawberry						
	Apple						
Uganda	Vegetable						
Egypt	Fruit						
	Banana (Matoka)						
	Mandarin						

List of Export-oriented Horticultural Production Areas for Export in the Foothills of Mt. Kenya
(Investigated to Department of Agriculture in each District)

District	Division	(Sub-)Location	Name of Growers Group	Irrigated Area (ha)	Total		Produce 1		Produce 2		Produce 3		Other Crops
					Crop	Output (kg/y)	Crop	Output (kg/y)	Crop	Output (kg/y)	Crop	Output (kg/y)	
Meru	Miiringa Mieru East	27 loc. 74 sub.											
	Miiringa Mieru West												
	Abothuguchi East												
	Abothuguchi West												
	Mkuene												
	Abogeta												
	Igoji												
	Timbu												
	Iembe Central												
	Iembe South												
Iembe North													
Nyanbene	Laare	33 loc. 78 sub.											
	Mutuati												
	Tigania Central												
	Tigania East												
	Tigania West												
	Tigania North												
	Uringu												
	Ndoleli												
	Chuka												
	Mwinbi												
Muthambi													
Tharaka-Nithi	Tharaka South	28 loc. 58 sub.											
	Tharaka North												
	Tharaka Central												
	Igambangombe												
	Siakago												
	Evurore												
	Manyalla												
	Membure												
	Ronyenjes												
	Kyeni												
Embu Municipality													
Embu	Mwea	24 loc. 86 sub.											
	Mavuria												
	Mbeti South												
	Makima												
	Karaba												
	Mwea												
	Ndia												
	Gichugu												
	Kerugoya Municipality												
	Xieni East												
Xieni West													
Mathira													
Tetu													
Othaya													
Mukurweini													
Nyeri Municipality													
Mberes	Embu Municipality	Included in Embu											
	Mwea												
	Mavuria												
	Mbeti South												
	Makima												
	Karaba												
	Mwea												
	Ndia												
	Gichugu												
	Kerugoya Municipality												
Xieni East													
Xieni West													
Mathira													
Tetu													
Othaya													
Mukurweini													
Nyeri Municipality													
Kirinyaga	Embu Municipality	20 loc. 77 sub.											
	Mwea												
	Mavuria												
	Mbeti South												
	Makima												
	Karaba												
	Mwea												
	Ndia												
	Gichugu												
	Kerugoya Municipality												
Xieni East													
Xieni West													
Mathira													
Tetu													
Othaya													
Mukurweini													
Nyeri Municipality													
Nyeri	Embu Municipality	20 loc. 77 sub.											
	Mwea												
	Mavuria												
	Mbeti South												
	Makima												
	Karaba												
	Mwea												
	Ndia												
	Gichugu												
	Kerugoya Municipality												
Xieni East													
Xieni West													
Mathira													
Tetu													
Othaya													
Mukurweini													
Nyeri Municipality													

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9. Production and Export of Canned (Processed) Products of Horticultural Crops
(Investigated to Department of Agriculture of MOALD&M and Central Bureau of Statistics)

Company	Produce	Tonnage or Price					Factory's Purchasing Price (Kshs/kg)						
		1991	1992	1993	1994	1995	1996	1997	Jan/Mar	Apr/Jun	Jul/Sep	Oct/Nov	Ave.
	Juice												
	Pineapple												
	Mango												
	Passion Fruit												
	Orange												
	Tomato												
	Pineapple												
	Ripened Tomato												
	Sweetcorn												
	Sweetcorn												
	Green Pea												
	Carrot												

Export

Country	Produce	Tonnage or Price					FOB Price (Kshs/case)
		1991	1992	1993	1994	1995	
	Juice						
	Pineapple						
	Mango						
	Passion Fruit						
	Orange						
	Tomato						
	Pineapple						
	Ripened Tomato						
	Sweetcorn						
	Mixed Vegetables						

10. Data Collection regarding Export Situation of Horticultural Produce from African Countries to EU including Monthly Fluctuation.
(Collected from COLEACP (Comite de Liaison Europe-Afrique-Caribes-Pacifique)) *also for importing countries including EU*

11. Regulation and Inspection Organization of Maximum Residue Levels for Export to EU Countries
(Investigated to Fresh Produce Export Association of Kenya and Kenya Agricultural Research Institute in Nairobi)

12. Current Constraints and Prospect in Domestic Market
(Investigated to Department of Agriculture in each District)

13. Current Constraints and Prospect in Overseas Market
(Investigated to Fresh Produce Export Association of Kenya and Private Exporters such as Sulmac, Oceanian, Home Grown, Sher, NIFE, etc.)

14. Routes and Constrains of Coffee Marketing
(Investigated to the Coffee Board of Kenya and The Kenya Planters Cooperative Union)

15. Routes and Constrains of Tea Marketing
(Investigated to The Kenya Tea Development Authority and The Kenya Tea Growers Association Union)

16. Ongoing or Future Marketing Promotion Projects in Horticultural Produce Sector
(Investigated to Department of Agriculture of MOALD&M and Eastern Province Horticulture and Traditional Food Crops Project by IFAD)

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- 17. Extended and Developing Varieties of F1 Seeds of Horticultural Produce in Kenya (Investigated to Kenya Agricultural Research Institute in Thika and Seed Companies)
- 18. Proposed Road Improvement Plan in the Foothills of Mt. Kenya (Investigated to Department of Agriculture in each District)
- 19. Activities of Middlemen (Investigated to Department of Agriculture in each District)
- 20. Comparison of Airfreight Tariff (Investigated to Kenya Airways and other carriers)

Origin	EU								Dubai								
	London	Amster- dam	Paris	Frank- furt	Copen- hagen	Rome											
								Month (1997)									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1993	1994	1995	1996	
East Africa Kenya Tanzania Uganda																	
South Africa SA Zimbabwe																	
West Africa Ivory Coast Senegal																	
Middle East Egypt Israel																	
Kenya																	
	from Nairobi to London to Paris to Amsterdam																

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Technical Specification for Environmental Impact Assessment Survey

1. Objective Of The Survey

The objective of the Survey Work is to prepare an Environmental Impact Assessment (EIA) Report based on the EIA guidelines of Kenya and JICA for the Model Areas selected in the Study on Community-based Smallholder Irrigation Development Project for Promotion of Horticultural Production in the Foothills of Mt. Kenya to be conducted by JICA Study Team.

2. Survey Area

The Survey Area covers the following areas in accordance with the instructions and the map by the Consultant.

- 1) Model Area No. EMB-34(Rupingazi) and the neighboring area, Embu District
- 2) Model Area No. KIR-22(Kirinyaga) and the neighboring area, Kirinyaga District
- 3) Model Area No. MER-10(Nkuu-Njumo) and the neighboring area, Meru District
- 4) Model Area No. THA-40(Ruungu) and the neighboring area, Tharaka Nithi District
- 5) Tana River and its head stream in the foothills of Mt. Kenya

3. Scope of Works

Current conditions in the Survey Area shall be analyzed and both positive and negative impacts to be caused by the implementation of the Project (hereinafter referred to as the "Project") shall be assessed. For the negative impacts, the mitigation measures shall be proposed.

3.1 Collection and Analysis of Existing Data

- 1) Natural conditions
- 2) Health and sanitary conditions
- 3) Use of agro-chemicals
- 4) Damage of crops by wildlife and the countermeasure in the Foothills of Mt. Kenya

3.2 Analysis of Other Related Projects

Other related projects for the rural development including agriculture, sanitation, soil and water conservation, etc., which have been carried out in the four Model Areas in the past ten years shall be analyzed.

- 1) Project name, executing agency, period and cost
- 2) Target and the method
- 3) Result and problems

3.3 Water and Aquatic Ecology Analysis

Samples of water and aquatic ecological resources in the Survey Area shall be collected. Water quality analysis shall be performed and the suitability of water quality shall be checked.

(1) Locations for the sample collection:

1. Tana River:
 1. Upstream
 2. Downstream (refer Annex 1)
2. Rupingazi River:
 1. Intake place of the Model Area EMB-34
 2. Downstream of the Model Area EMB-34
3. Murubara/Gakuo River
 1. Intake place of the Model Area KIR-22
 2. Downstream of the Model Area KIR-22
4. Mariera River
 1. Intake place of the Model Area MER-10
 2. Downstream of the Model Area MER-10
5. Thingithu River
 1. Intake place of the Model Area THA-40
 2. Downstream of the Model Area THA-40
6. Four shallow wells in or the nearest from four Model Areas
(Water level in dry and rainy season, and the purpose of use shall be recorded.)
7. Four deep wells in or the nearest from four Model Areas
(Water level in dry and rainy season, and the purpose of use shall be recorded.)
8. The map of each Model Area shall be drawn with sampling locations.

(2) Number of samples: Total 18 samples

(3) Parameters for analysis

- 1) Physical water quality; temperature, dissolved oxygen, suspended solid, turbidity
- 2) Chemical water quality
(pH, EC, TDS, HCO_3^- , SO_4^{3-} , NO_3^- , Mn^{2+} , Fe^{2+} , Na, Ca, Mg, K)
- 3) Biological water quality (coliform bacteria)
- 4) Pollution water quality (BOD, COD, heavy metals, agro-chemicals)
- 5) Aquatic ecological resources (flora and fauna)

3.4. Survey of the Neighboring Forest

- 1) Forest condition and forest resources around the Survey Area
(Trees and other plants, animals, edible resources, etc.)
- 2) Responsible agency, regulation for the forest use and problem of illegal act
- 3) Relation with the farmers around the forest
 - Benefit from the forest,
 - Problem with the forest including the damage of crops by wildlife and the mitigation by the responsible agency
- 4) Function as water conservation

3.5. Survey of the Protected Areas

Change in quality and quantity of water sources, change in number of endangered animals and plants, and other natural conditions shall be surveyed in the following areas:

- 1) Mwea National Reserve
- 2) Meru National Park

3.6. Survey for the Condition of Soil and Water Conservation

Survey shall be made for activities and problems of the soil and water conservation of private and public lands through the meeting with the village committee and the questionnaire to farmers in each Model Area. Evaluation of the impacts by the Project implementation shall be made in consideration of economic and managerial capability of the farmers for the soil conservation.

3.7. Survey for the Health and Sanitary Conditions

- 1) Questionnaire to the health center that is used by farmers of each Model Area (Number of main diseases past five years)
- 2) Questionnaire to 15 farmers (not neighboring) in each Model Area (refer Annex 4)
- 3) Kind and condition of drinking water sources (Distance, method and effect of the protection, maintenance, problem, etc.)

3.8. Survey of the Use of Agro-chemicals

- 1) Questionnaire in the meeting of each village committee (refer Annex 3)
- 2) Individual questionnaire to 15 farmers in each Model Area (refer Annex 4)
- 3) Recommended quantity and time of agro-chemicals being used in each Model Area (refer Annex 2)

3.9. Survey for the Damage of Crops by Wildlife

- 1) Questionnaire to a public concern, e.g. KWS/Forest Department
- 2) Questionnaire in the meeting of each village committee (refer Annex 3)
- 3) Individual questionnaire to 15 farmers in each Model Area (refer Annex 4)

4. Surveyor's Stuffing

To successfully facilitate the EIA assignment, the Surveyor will have demonstrated competence in carrying out similar work in the recent past. The Surveyor term is expected to be multi-disciplinary and will include the experts of agriculture, sanitation and rural environment. The work items of the experts are as follows:

Items	Experts		
	Agriculture	Sanitation	Natural Environment
3.1 Collection and analysis of existing data	X	X	X
3.2 Analysis of other projects	X	X	X
3.3 Water analysis		X	
Aquatic ecology analysis			X
3.4 Survey of the neighboring forest			X
3.5 Survey of the protected areas			X
3.6 Survey of the soil and water conservation activities	X		
3.7 Survey for the health and sanitary conditions		X	
3.8 Survey of the use of agro-chemicals	X		
3.9 Survey for the damage of crops by wildlife	X		

5. Supply of Documents

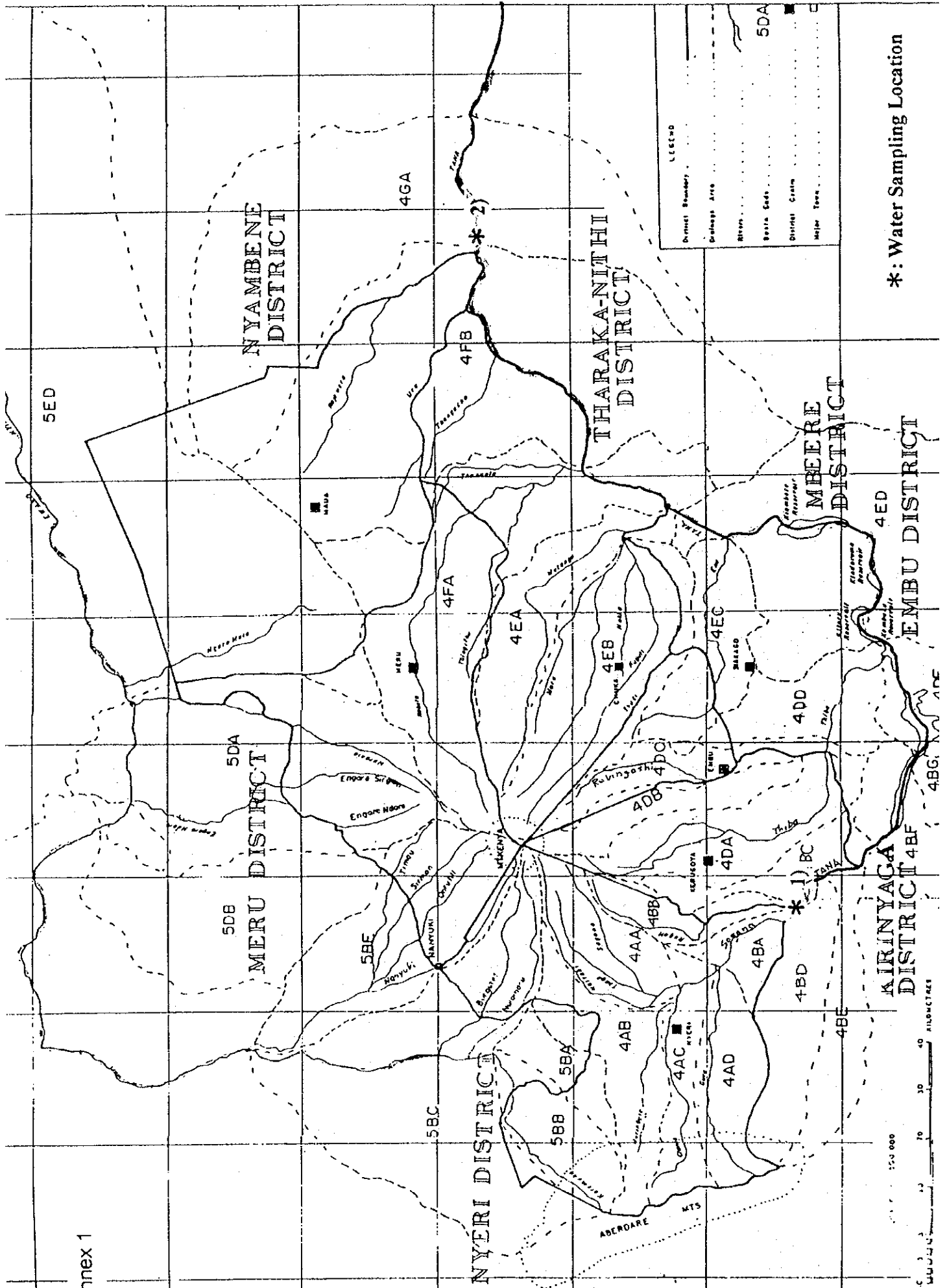
The documents to be supplied by the Consultant to the Surveyor are;

- 1) A copy of project location map
- 2) A copy of Interim Report (Main Report) of the Study
- 3) A copy of Interim Report (Annex) of the Study
- 4) A copy of Progress Report (II) of the Study
- 5) A copy of District Profile Up-date Survey Report

6. Reports

The following reports shall be submitted by the Surveyor to the Consultant printed on both sides of the paper. Detailed data of questionnaires and meetings with villagers shall be listed in the Appendix.

- (1) Inception Report: Four (4) copies in English at the commencement of the Survey. Schedule and methodology of the Survey, outline of the field survey including the questionnaires, and the contents of EIA Report are to be described in this report.
- (2) Draft EIA Report: Four (4) copies in English at the end of the Survey. Collected data, photographs and others are to be included in the Appendix.
- (3) EIA Report: Six (6) copies in English with the floppy disk of format 1.44 MB within seven (7) days after the receipt of the comments from the Consultant on the Draft EIA Report.



Agro-chemicals Being Used in the Model Areas

Name (example)	Agro-chemical		Effect	Name of Crops	Name of Diseases/Pests	Recommendation for the Use			Remarks
	Effective Element					Method/Dilution	Period	Time	
Smilex	Procymidone		Sterilization	Tomato Onion	Gray mold Gray mold	Spray / 1,000-2,000 times	more than 3 days before harvest	less than 3 times	
						Spray / 2,000-3,000 times	more than 1 day before harvest	less than 5 times	

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Annex 3

The questionnaire includes at least the following items, and shall be modified and added for the facility of the Surveyor. In case that a model area includes several villages, all of these villages shall be surveyed.

Questionnaire to the Village Committee - Village Name: _____
 District Name: _____

1. Outline of the Village

- 1.1. Population past five years :
 1993 (), 1994 (), 1995 (), 1996 (), 1997 ()
- 1.2. Number of household past five years:
 1993 (), 1994 (), 1995 (), 1996 (), 1997 ()
- 1.3. Whole land : () ha
 Farm land: () ha
- 1.4. Public land:

Public lands	Area (ha)	Use of public lands (Mark with an X.)			
		Cattle grazing	Sheep grazing	Others (Fill in the purpose.)	No use
Forest with tall trees					
Bushland					
Grassland					
Others ()					

Public lands	Condition of public lands (Mark with an X.)		
	No change for many years	Changed	In case of changed, fill in the reason.
Forest with tall trees			
Bushland			
Grassland			
Others ()			

- 1.4.1. Is there a rule for the management of public lands?
 Yes.
 What is it? ())
 No.
- 1.4.2. Are villagers doing something to conserve the public lands?
 Yes.
 What are they doing? ())
 No.

2. Health and Sanitary Conditions

2.1. Distance and condition of the health facilities being used by villagers.

Health Facilities (add other facilities, if any)	Dis- tance (km)	User in village (%)	No. of Doctors	Medical Fee		Supply of Medicine		Charge for Medicine		Other Comments from the Village Committee
				Pay	Free	Yes	No	Pay	Free	
Health Center										
Dispensary										
Hospital										

2.2. Kind of drinking water source in the village:

Drinking Water Source	Users (% of villagers)	
	Rain season	Dry season
Deep well		
Shallow well		
Irrigation canal or river		
Tap water by non treated river water		
Others ()		

How do the villagers manage the drinking water source?

- Water committee takes part in the management.
- Villagers protect the well by fence
- Villagers protect the river from livestock
- Others ()

3. Use of Agro-chemicals

3.1. For what crops do villagers use agro-chemicals?

- Commercial crops : ()
- Home consuming crops: ()

3.2. Do villagers follow the instructions of agro-chemicals?

Use of Agro- chemical	Villagers follow the Instructions?					In case of "A few" or "Nobody", the reason
	All	Majority	Half	A few	Nobody	
Dilution						
Period						
Time						

3.3. Do you know about the pesticide maximum residue levels (MRL)?

- Yes
- No

3.4. Do you know that you must keep the pesticide maximum residue levels (MRL) when you product crops?

- Yes
- No

4. Damages of Crops by Wildlife

Were there damages of crops by wildlife in your village past three years?

Yes No

In case of yes.

4.1. When, how many times and by what kind of animals?

(Fill in the number of frequency on the table below.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Animal
1995													
1996													
1997													

4.2. Degree of damages of crops by wildlife last three times in your village.

Month/ Year	No. of Household	Area (ha)	Kind of Crops	Average Crop Loss (%)	Range (%)	Kind of Animals

4.3. Mitigation measures by villagers.

- _____
- _____

5. Soil and Water Conservation Activities

5.1. How do the villagers get organic fertilizer?

- Only buying: ()% of villagers
- Buying and making: ()% of villagers
- Only making: ()% of villagers
- No use: ()% of villagers

5.2. Do the villagers know the effect of crop rotation?

- Yes, ()% of villagers know.
What is the effect? ()
- No.

5.3. Do the villagers practice the crop rotation?

- Yes → ()% of villagers are practicing.
- No → Why? ()

5.4. Do the villagers practice the following activities?

- Plantation of trees for the soil conservation: ()% of villagers
- Plantation of Napier grass, etc. for the soil conservation: ()% of villagers
- Contour cultivation: ()% of villagers
- Stone wall along the contour line: ()% of villagers
- Other soil and water conservation activities
(): ()% of villagers

Annex 4

The questionnaire to the villagers includes at least the following items, and shall be modified and added for the facility of the Surveyor. The interviewees will be selected extensively.

Questionnaire to the Villagers -

No. _____

Model Area No. _____

Village Name: _____

District Name: _____

1. Outline of the Farmhouse

1.1. Number of Family Members: () persons

1.2. Farmland: () ha - Rainfed area () ha
 - Rain season irrigation area () ha
 - Dry season irrigation area () ha

1.3. Cultivated crops and consumed or sold livestock products in 1997.
 (Fill in the cultivated area with the unit of hectare, or number of livestock. In case that the cultivated area is very small, mark with an X. Add other cultivated crops.)

Products	Family Use	Selling
Coffee		
Tea		
Cotton		
Cabbage		
French bean		
Maiz		
Millet		
Sorghum		
Green-gram		
Cowpea		
Irish potato		
Tomato		
Onion		
Carrot		
Kale		
Banana		

Products	Family Use	Selling
Mango		
Avocado		
Chicken		
Pig		
Goat		
Cattle		
Milk		
Cheese		
Butter		

1.4. What kinds of food did you buy in 1997?

- Cereals: ()
- Vegetables: ()
- Fruits: ()
- Meat: ()
- Others: ()

2. Health and Sanitary Condition of Family Members

2.1. Fill in the number of family members affected with the following diseases and other serious diseases past three years.

Diseases	1995	1996	1997	Remarks
Malaria				
Amoebiasis				
Typhoid				
Skin diseases				
Intestinal worms				
Other ()				
Other ()				

2.2. Do you know the reason to be affected with the following diseases?

Diseases	Knowledge		Reason to be Affected
	Yes	No	
Malaria			
Amoebiasis			
Typhoid			
Skin diseases			
Intestinal worms			
Diarrhea			

2.3. Condition of the toilet:

- Depth of the hole of toilet: () m
- Depth of the underground water: Dry season: () m
Rain season: () m

3. Use of Agro-chemicals

3.1. Do you know that agro-chemicals are harmful to health?

- Yes No

3.2. Do you use agro-chemicals by yourself?

- Yes
 No, I don't use it in my farm.
 No, I use it in my farm but the traders do it.
 Other ()

In case of yes,

3.2.1. How do you treat agro-chemicals?

- Protection: With a mask
 With gloves
 No special protection of body

- Measurement: Measurement with a measuring cup
 No measurement
- Dilution: Dilution correctly
 Rough dilution

3.3. What kind of agro-chemicals did you use in your farm last year?

Name of agro-chemicals	Name of crops	Name of Diseases/Pests	Method/Dilution	Period and Time (based on the harvest day)
(example) Smilex	Tomato	Gray mold	Spray/1,000	1. Two weeks before harvest 2. One week before harvest 3. 2 days before harvest

4. Damages of Crops by Wildlife

Were there damages of crops by wildlife in your farm past three years?

- Yes No

In case of yes,

4.1. When, how many times and by what kind of animals?
 (Fill in the number of frequency on the next table.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Animal
1995													
1996													
1997													

4.2. Degree of damages of crops by wildlife last three times in your farm.

Month/Year	Area (ha)	Kind of Crops	Crop Loss (%)	Kind of Animals

Handwritten signature

4.3. Mitigation measures:

5. Soil and Water Conservation Activities

5.1. How did you get organic fertilizer in 1997?

Buying: Total () kg. Price () Kenya Pound

Making: Total () kg

How do you make it? ()

No use

5.2. Do you know the effect of crop rotation?

Yes. → What is the effect? ()

No.

5.3. Do you practice the crop rotation?

Yes. → How?

No. → Why?

5.4. Do you know and practice the following activities for soil and water conservation?
(Mark with an X.)

Activities for soil and water conservation	Know	Practicing
1) Plantation of trees		
2) Plantation of Napier grass, etc.		
3) Contour cultivation		
4) Stone wall along the contour line		
5) Other soil and water conservation activities: ()		

Technical Specification for Topographic and Route Survey in Model Areas**1. Scope of Works**

Topographic and route survey shall be carried out by the Contractor by aerial photography survey method and ground survey method, respectively at the following four(4) Model Areas as shown in Figure-1.

- 1) Model Area (Type-B) : Rupingazi Irrigation Scheme, Embu District, A=40 ha
- 2) Model Area (Type-C) : Nyangati/Ngomano Water Project, Kirinyaga District, A=400 ha
- 3) Model Area (Type-D) : Nkuu-Njumo Water Association Meru District, A=100 ha
- 4) Model Area (Type-E) : Ruungu Irrigation Project, Tharaka Nithi District, A=100 ha

Topographic survey shall be conducted for proposed gross areas and the intake site, and route survey which consists of the longitudinal and cross sectional survey shall be for the main canal/pipeline alignment. The longitudinal and cross sectional survey shall be conducted at 100 m interval along the centerline. Distance of the cross sectional survey shall be 20 m for both right and left sides from the centerline. Areas/sites and canal/pipeline alignment to be surveyed shall be directed at the site by the JICA Study Team.

Work volume of the survey works under the Contract will be approximately as shown in the table below. However, these figures can be used as reference only and may be changed by the result of the actual survey works.

Work Item	Mapping Scale	Rupingazi	Nyangati	Nkuu-Njumo	Ruungu
1. Topographic survey					
1) For Total area	S=1/5,000	40 ha	400 ha	100 ha	100 ha
2) For intake site	S=1/200	900 m ²	900 m ²	900 m ²	900 m ²
2. Route survey					
1) Longitudinal profile	S(v)=1/200 S(h)=1/2,000	2.5 km	2.0 km	1.5 km	1.5 km
2) Cross section	S(v)=1/200, S(h)=1/200	26 sec.	21 sec.	16 sec.	16 sec.

2. Unit to be used

Metric system shall be used.

3. Language

Language to be used shall be English

4. Survey Method

All the works shall be executed in accordance with these specifications and instructions which may be given by JICA Study Team when necessary.

Topographic and route survey shall be carried out by the aerial photography and ground survey method, respectively.

5. Bench Mark and Control Point

Principal Bench Mark (PBM) shall be established in each Model Area to be used as a control point in accordance with the drawing shown in Figure-2. The PBM shall be connected with the existing authorized Bench Mark (BM) in the vicinity of the Model Area. Such existing authorized BM to be used for the work shall be proposed by the Contractor for approval of the JICA Study Team.

Temporary Bench Marks (TBM) shall also be established when necessary or as directed by the JICA Study Team in accordance with Figure -2.

6. Instruments to be used

The aircraft, photography, total station, theodolite, geodimeter, distance meter, auto level, measuring tape, survey staff and others

7. Mapping

- 1) For topographic survey
 - Topographic maps for the total area
 - With a scale of 1/5,000 at two (2) meters contour interval.
 - Land use, roads, rivers/streams, houses, existing canals/pipelines, existing structures, etc. shall be drawn on the maps.
 - Topographic maps for the intake site
 - With a scale of 1/200 at one (1) meter contour interval.
 - Spot height shall be plotted at approximately 10 m interval.
 - Height of river/stream bed shall be plotted.
 - Land use, roads, houses, existing structures, etc. shall be drawn.
- 2) For route survey
 - Longitudinal profile
 - With a scale of 1/2,000 in horizontal and 1/200 in vertical.
 - Cross section
 - With a scale of 1/200 in both horizontal and vertical.
- 3) Original mapping sheet

Paper to be used for the original map sheet shall be the polyester paper and subject to approval of the JICA Study Team. Size of mapping sheet shall be A-1 size.
- 4) Title block, symbols etc.

Title block, title of drawing maps, symbols, other information shall be drawn on the maps and subject to approval of the JICA Study Team.

8. Survey Period

The work shall be completed within one and half (1.5) months including the delivery of the final products as hereinafter described. Final delivery date of the final products shall be beginning of August, 1998.

9. Work Schedule

The Contractor shall submit work schedule of the entire survey works under the Contract to the JICA Study Team for approval. The work schedule shall indicate necessary items including the followings:

- Time schedule by Model Area, by work categories and by work stages
- Number of survey teams to be engaged
- Name of surveyors to be assigned
- Contact place during the field works
- Delivery date of draft and final products for inspection

10. Final Products to be delivered

The Contractor shall deliver the following final products to the office of the JICA Study Team in Nairobi, Kenya.

(1) Topographic Survey

- | | |
|-------------------------------|----------|
| 1) Topographic map (Original) | : 1 set |
| 2) - do - (Duplicate) | : 2 sets |
| 3) - do - (Blue copy) | : 5 sets |

(2) Route survey

- | | |
|---|----------|
| 1) Longitudinal profile and cross sections (Original) | : 1 set |
| 2) - do - (Duplicate) | : 2 sets |
| 3) - do - (Blue copy) | : 5 sets |

(3) Others

- | | |
|---|---------|
| 1) Planning survey plan on 1/50,000 map | : 2 set |
| 2) Bench Mark survey result | : 1 set |

38° 30'

37° 30'

37°

0° 30'

0° 30'

0° 30'

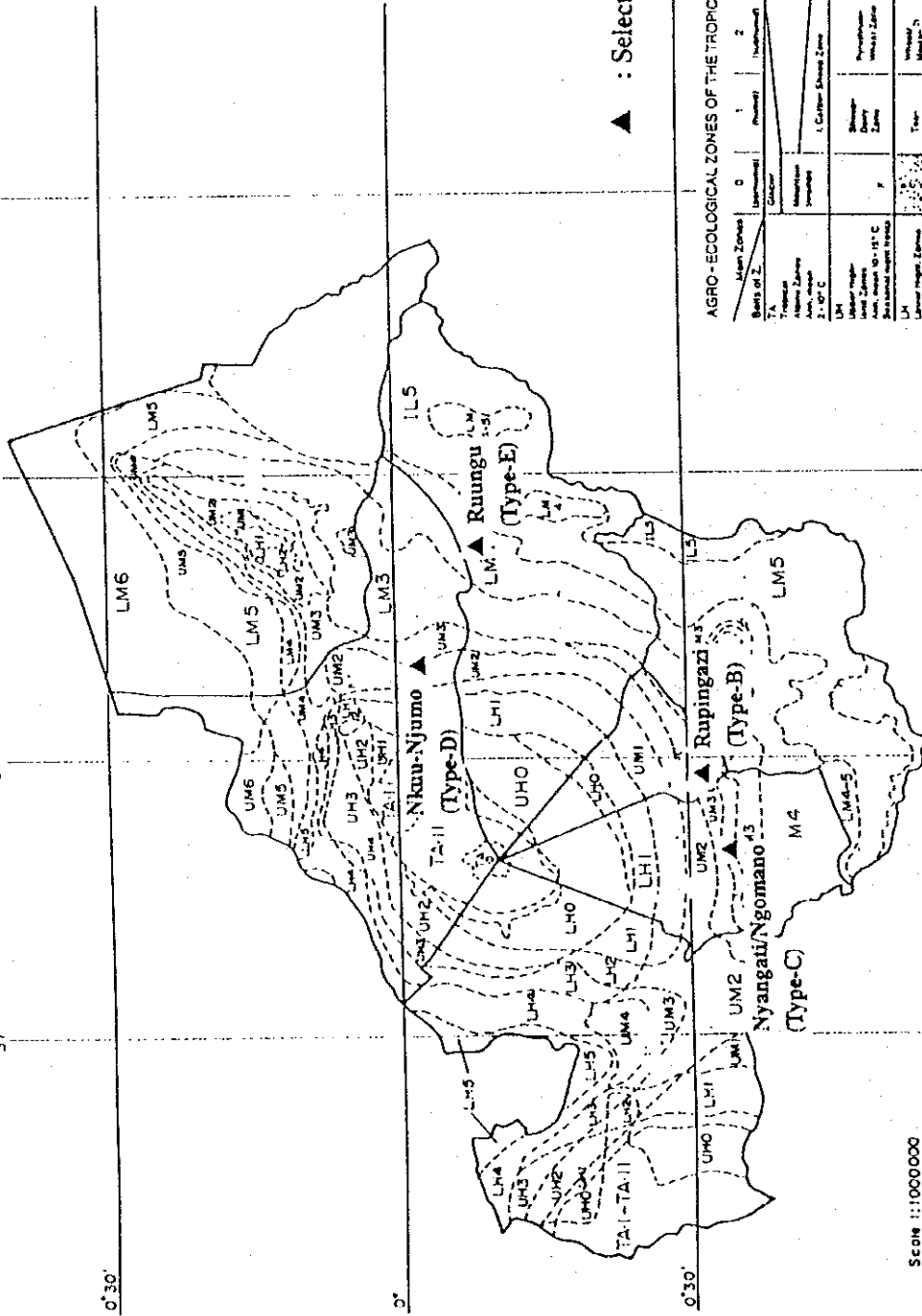
38°

37°

37°

38° 30'

▲ : Selected Model Areas



AGRO-ECOLOGICAL ZONES OF THE TROPICS*

Main Zones	Sub-Zones									
	0	1	2	3	4	5	6	7	8	9
U (Upland)	U.1	U.2	U.3	U.4	U.5	U.6	U.7	U.8	U.9	U.10
L (Lowland)	L.1	L.2	L.3	L.4	L.5	L.6	L.7	L.8	L.9	L.10
M (Marsh)	M.1	M.2	M.3	M.4	M.5	M.6	M.7	M.8	M.9	M.10
U (Upland)	U.1	U.2	U.3	U.4	U.5	U.6	U.7	U.8	U.9	U.10
L (Lowland)	L.1	L.2	L.3	L.4	L.5	L.6	L.7	L.8	L.9	L.10
M (Marsh)	M.1	M.2	M.3	M.4	M.5	M.6	M.7	M.8	M.9	M.10

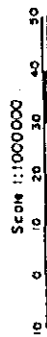
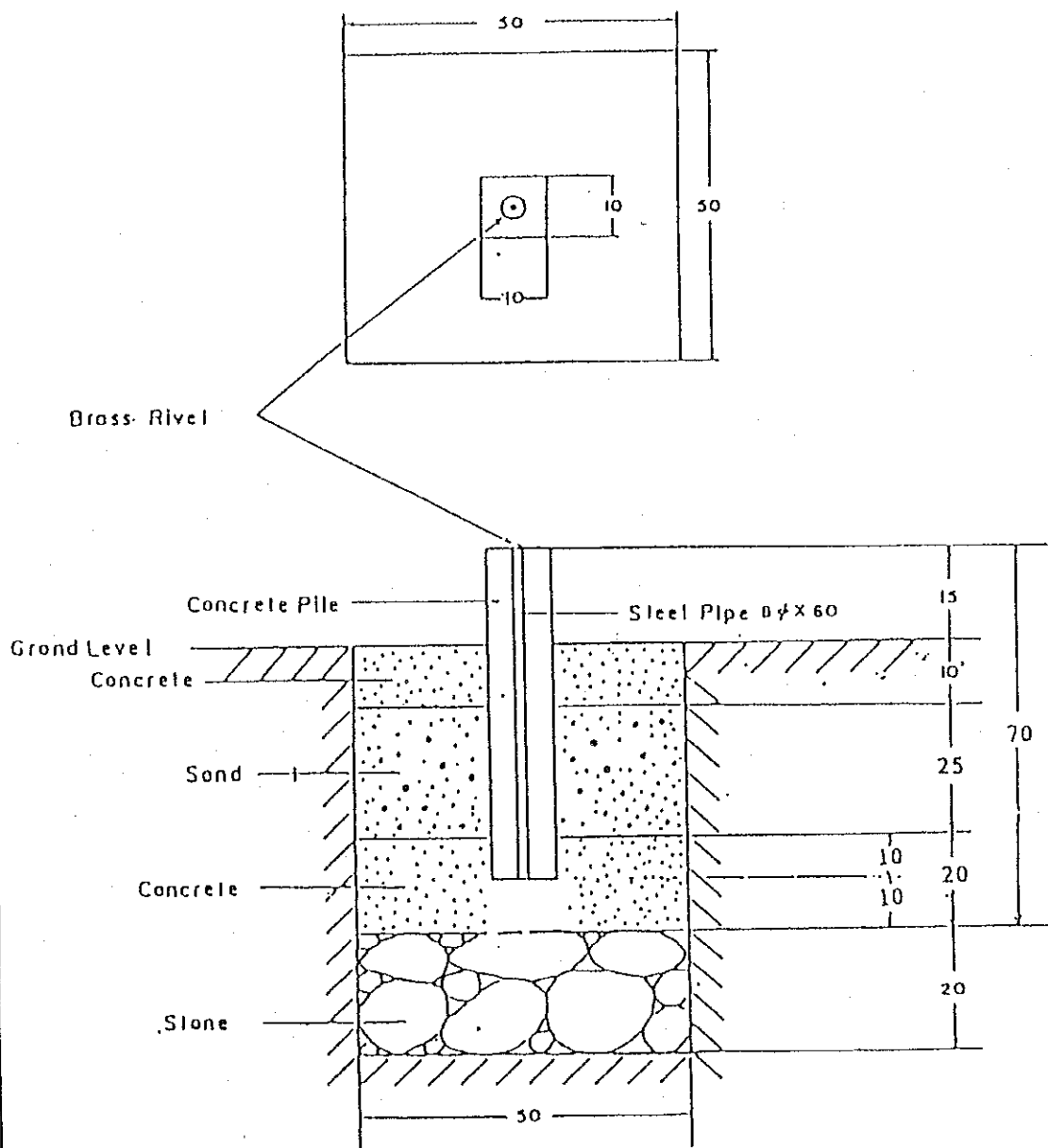


Figure-1 Location map of Model Areas

Figure 2 Principal Bench Mark (PBM) and Temporary Bench Mark (TBM)



cm
Scale 1 : 10