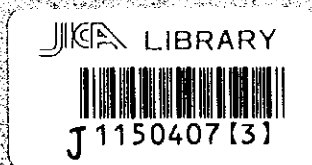


JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)
MINISTRY OF AGRICULTURE (MOA)
REPUBLIC OF KENYA

**THE STUDY
ON
COMMUNITY-BASED SMALL HOLDER IRRIGATION
DEVELOPMENT PROJECT
FOR
PROMOTION OF HORTICULTURAL PRODUCTION
IN
THE FOOTHILLS OF MT. KENYA**

ANNEX-I



MARCH, 1999

SANYU CONSULTANTS INC.

AFA
JR
99-05

**JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)
MINISTRY OF AGRICULTURE (MOA)
REPUBLIC OF KENYA**

**THE STUDY
ON
COMMUNITY-BASED SMALL HOLDER IRRIGATION
DEVELOPMENT PROJECT
FOR
PROMOTION OF HORTICULTURAL PRODUCTION
IN
THE FOOTHILLS OF MT.KENYA**

ANNEX-I

MARCH, 1999

SANYU CONSULTANTS INC.



1150407 (3)



MT. KENYA

STUDY AREA

MASINGA RESERVOIR

GENERAL VIEW FOR COMMUNITY-BASED SMALLHOLDER IRRIGATION PROJECT FOR PROMOTION OF HORTICULTURAL PRODUCTION IN THE FOOTHILLS OF Mt. KENYA

LIST OF ANNEX

- A. SCOPE OF WORK AND OTHERS
- B. SMALLHOLDER IRRIGATION SCHEME (SIS) PROGRAMME
- C. WORKSHOP SEMINARS FOR PDM
- D. CONTRACT-BASED FIELD WORKS
- E. COLLECTED DATA
- F. GOVERNMENT AND LOCAL STAFF INTERVIEWED BY STUDY TEAM
- G. METEOROLOGY AND HYDROLOGY
- H. SOIL, LAND-USE AND HORTICULTURE
- I. GOVERNMENT AND OTHER ORGANIZATION
- J. FARMERS' ORGANIZATION AND AGRICULTURAL SUPPORTING SERVICES
- K. SOCIO AND AGRO-ECONOMY
- L. IRRIGATION AND DRAINAGE
- M. AGRICULTURE AND RURAL INFRASTRUCTURE
- N. MARKETING, POST-HARVEST AND RURAL INDUSTRY
- O. SELECTION OF MODEL AREAS
- P. PHYSICAL PLAN
- Q. PROJECT COSTS
- R. PROJECT IMPLEMENTATION AND O&M
- S. PROJECT BENEFITS AND EVALUATION
- T. ENVIRONMENT

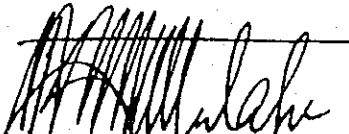
ANNEX A

SCOPE OF WORK AND OTHERS

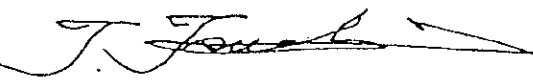
THE SCOPE OF WORK
FOR
THE STUDY ON COMMUNITY-BASED SMALL HOLDER
IRRIGATION DEVELOPMENT PROJECT FOR
PROMOTION OF HORTICULTURAL PRODUCTION
IN THE FOOTHILLS OF MT. KENYA
IN
THE REPUBLIC OF KENYA

AGREED UPON
BETWEEN
MINISTRY OF AGRICULTURE,
LIVESTOCK DEVELOPMENT AND MARKETING
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

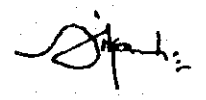
NAIROBI, 28 February 1997



Prof. K. MUTAHI
Permanent Secretary
Ministry of Agriculture,
Livestock Development and Marketing
Republic of Kenya



Mr. TADASHI TSUCHIYA
Leader,
Preparatory Study Team,
Japan International
Cooperation Agency



Mr. J. K. KINYUA
Financial Secretary
Ministry of Finance
Republic of Kenya

I. INTRODUCTION

In response to the request of the Government of the Republic of Kenya (hereinafter referred to as "GOK"), the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct the Study on Community-Based Small Holder Irrigation Development Project for Promotion of Horticultural Production in the Foothills of Mt. Kenya (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan

Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the GOJ, shall undertake the Study in close cooperation with authorities concerned of GOK.

The present document sets forth the Scope of Work for the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are;

1. to formulate Master Plan of Community-Based Small Holder Irrigation Development Project for Promotion of Horticultural Production in the Foothills of Mt. Kenya and select Representative Development Smallholder Irrigation Scheme (hereinafter referred to as "SIS")(s) for the detailed Study,
2. to conduct the detailed Study for selected SIS(s) and
3. to pursue technology transfer to the counterpart personnel of GOK through on-the-job training in the course of the Study.

III. STUDY AREA

The Study shall cover the areas of Kirinyaga and Nyeri Districts of Central Province, and Embu, Meru, Mbeere, Tharaka Nithi and Nyambene Districts of Eastern Province. (See Annex I)

Km J. J. J.

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study shall cover the following:

Phase I : Formulation of Master Plan

1. Collect and review relevant existing data and information in Kenya and the Study area. These include;
 - a. national economy and social features,
 - b. national development plan and district development plans for the Study area,
 - c. agricultural sector policy and recent performance of horticulture,
 - d. existing and planned relevant development program(s) and project(s),
 - e. organizational structure and responsibilities of relevant institutions, and budgetary performance of those relevant institutions,
 - f. data on agriculture-related physical environment including climate, topography, land use, rainfall, soil, and hydrological conditions,
 - g. post-harvest and marketing situation including pricing, collection, transportation and sales system of produce and related facilities, and
 - h. SIS, both existing and proposed as identified in the District Irrigation Profiles.

2. Carry out field survey and investigation supported by Participatory Rural Appraisal for initial exercise to encourage farmers' participation and involvement in the project planning and implementation process. These include;
 - a. natural condition,
 - location, area and topography,
 - meteorology and hydrology,
 - geology,
 - soils,
 - vegetation, and
 - others,
 - b. socio-economic condition

Km Jiriga

J

- economic indices,
 - demographic conditions,
 - physical settings and resources available,
 - socio-economic and institutional settings and structure (vertical, horizontal and gender-wise), and resources available,
 - development needs
 - present condition and readiness of farmers for participation in the development processes, and
 - others,
- c. agricultural and horticultural condition including,
- present land use,
 - farming practices,
 - agricultural economy,
 - postharvest,
 - gender related issue, and
 - others,
- d. agricultural support,
- adaptive research activities,
 - agricultural extension,
 - farmer's organization,
 - credit facilities (including public, private and NGO's),
 - market information provision, and
 - others,
- e. horticultural product market analysis,
- recent trend of export and domestic (national and regional) horticulture markets,
 - prediction of export and domestic (national and regional) horticulture markets, and
 - others,
- f. Smallholder Irrigation Scheme(SIS)
- present irrigation and drainage conditions in the study area,
 - current planning and design criteria and guidelines,
 - irrigation practices,
 - operation and maintenance,
 - institutional arrangements and procedures involved in planning, preparation (including organization of farmers), implementation and monitoring processes,
 - organizational setups, and number and qualification of staffs involved,
 - budgetary situation, recurrent and development,

W. J. King

J

- staff training, and
 - others,
- g. rural infrastructure,
- road network and road inventory by classification, and institutional information on road maintenance/development, and
 - others,
- h. Environmental conditions.
3. Analyze collected data and information and identify major constraints and development potential.
4. Prepare a Master Plan;
- work plan for farmers to organize themselves and manage their organization,
 - work plan for support to SIS participating farmers through better use of resources of IDB, District Irrigation Unit (DIU) and relevant organizations,
 - diversification and improvement of the quality of horticultural products,
 - clarify the availability of irrigation water and irrigable areas for each sub-basin in the Study area based on the existing available information,
 - recommend the measures to strengthen regulatory capacity of a responsible body in coordinating irrigation water use,
 - improvement plan for market facilities, system and accessibility,
 - development plan for major feeder road and O&M Plan for farmers,
 - formulate Project Design Matrix for each suggested program(s) or project(s), and
 - evaluation of expected results in terms of technical soundness, financial viability, economic profitability, social changes, and environmental effects.
5. To select Representative Development SIS(s) for Phase II in accordance with the readiness of farmers, socio-economical and cultural aspect.
2. Phase II : Execution of Detailed Study for Representative Development SIS(s).

M. J. ...

1. Collect detailed data and information through field surveys.
2. Formulate the optimum plan for the Representative Development SIS(s) through further application of Participatory Rural Appraisal,
3. Verify the suggestions made by Master Plan and hold workshops for refining the Project Design Matrix with counterparts, relevant organizations and SIS participating farmers to accelerate the Social Preparation.

V. STUDY SCHEDULE

The tentative schedule of the Study is shown in the attached ANNEX II

VI. REPORTS

JICA shall prepare and submit the following reports in English to the GOK.

1. Inception Report
Twenty (20) copies at the commencement of the Phase I field study.
2. Progress Report (1)
Twenty (20) copies at the end of the Phase I field study.
3. Interim Report
Twenty (20) copies at the commencement of the Phase II field study.
4. Progress Report (2)
Twenty (20) copies at the end of the Phase II field study.
5. Draft Final Report
Twenty (20) copies after Phase II work in Japan. GOK shall submit their comments to JICA Kenya office within one (1) month

1/m J Kenya

after receipt of the Draft Final Report.

6. Final Report

Fifty (50) copies within two (2) months after receipt of GOK's comments on the Draft Final Report.

VII. UNDERTAKING OF GOK

1. To facilitate the smooth conduct of the Study, GOK shall take the following necessary measures:
 - a. to secure the safety of the Japanese study team (hereinafter referred to as "the Team"),
 - b. to permit the members of the Team to enter, leave and sojourn in Kenya for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,
 - c. to exempt the members of the Team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into and out of Kenya for the conduct of the Study,
 - d. to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study,
 - e. to provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into Kenya from Japan in connection with the implementation of the Study,
 - f. to take necessary action to obtain permission for the Team to enter into private properties or restricted areas for the implementation of the Study,
 - g. to secure permission for the Team to take all data and documents including photographs and maps after the authorization by responsible organization concerned, related to the Study out of Kenya to Japan, and
 - h. to provide medical services in case of necessity, and the fees shall be chargeable to the members of the Team.
2. GOK shall bear claims, if any arises, against the members

of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the Team.

3. The Ministry of Agriculture, Livestock Development & Marketing (hereinafter referred to as "MOALD&M") shall act as counterpart agency to the Team and also as a coordinating body in relation with other relevant organizations for the smooth implementation of the Study.
4. MOALD&M shall, at their own expense, provide the Team with the following, in cooperation with other relevant organizations:
 - a. available data and information related to the Study,
 - b. counterpart personnel and supporting staffs,
 - c. suitable vehicles for the Team,
 - d. suitable office space with necessary equipment in Nairobi and the Study area, and
 - e. credentials or identification cards.

VIII. UNDERTAKING OF GOJ

For the implementation of the Study, JICA shall take the following measures:

1. To dispatch, at its own expense, the Team to Kenya.
2. To pursue technology transfer to counterpart personnel in the course of the Study.

IX. CONSULTATION

JICA and the MOALD&M shall consult with each other in respect of any matter that may arise from or in connection with the Study.

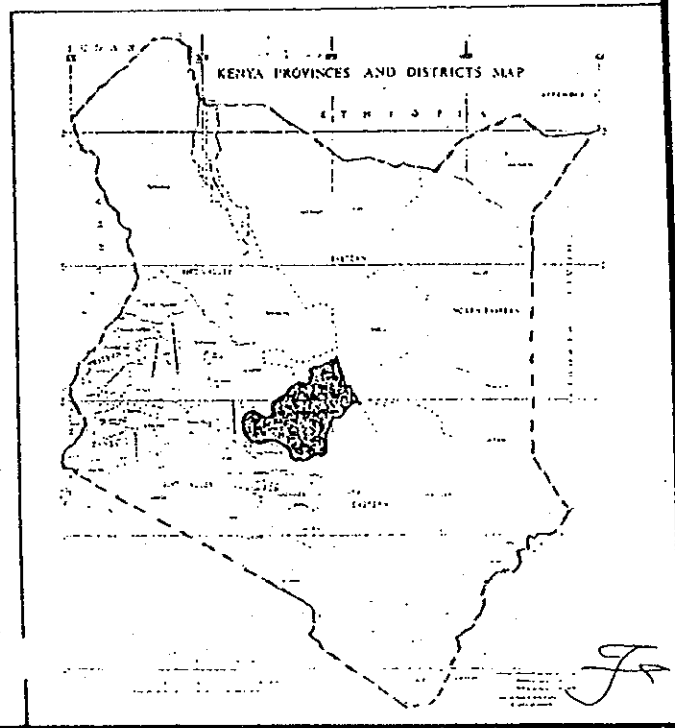
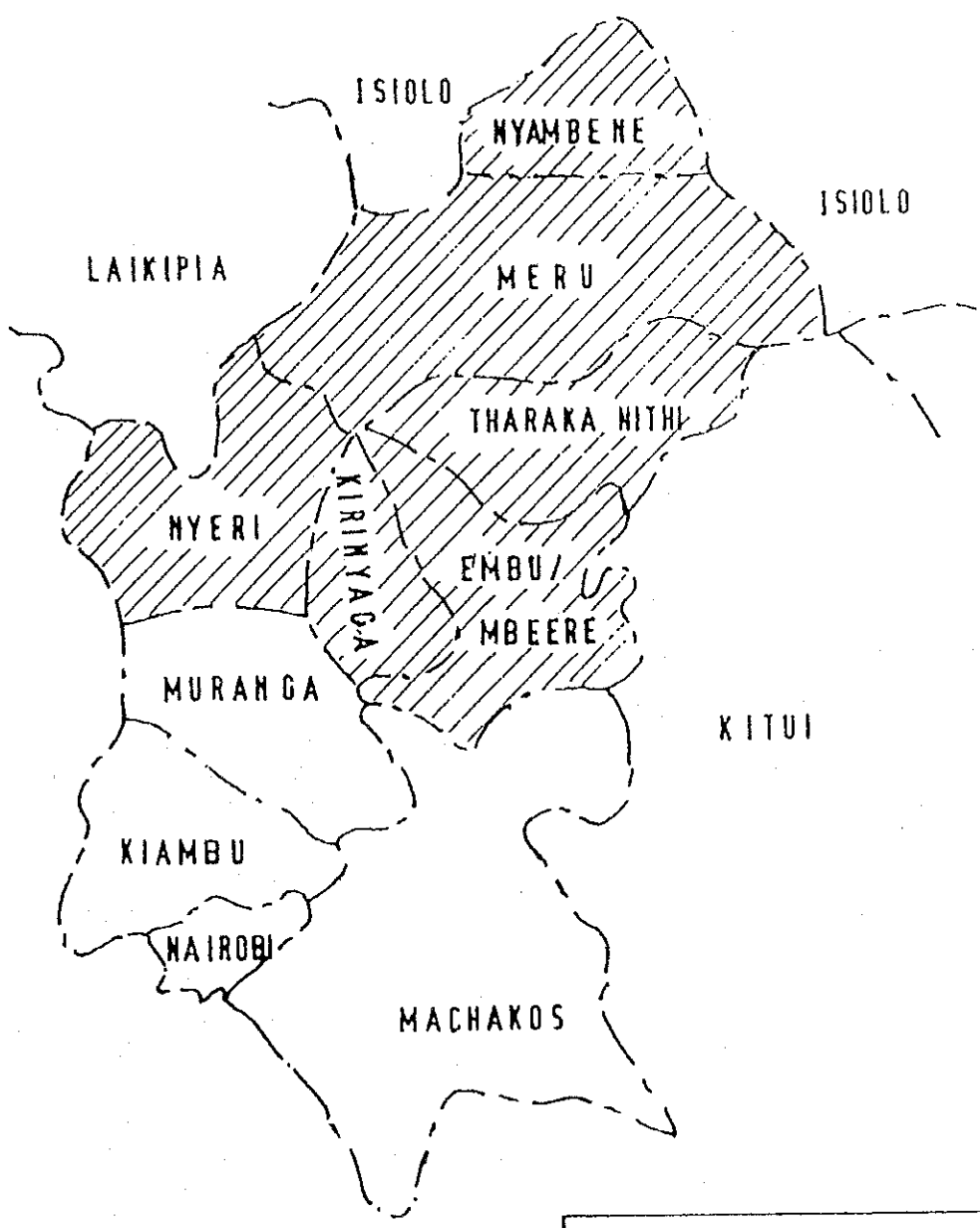
Wm Kingma

F



LOCATION OF STUDY AREA

Annex I



M. J. King

JF

TENTATIVE SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Item																									
Works in Kenya		■	■	■	■						■	■	■	■			■	◎							
Works in Japan	□					□	□							□					□						
Phase	←					→				←											→				
Report	Ic/R				P/R (1)					It/R		P/R (2)				Df/R				F/R					

(Remarks)

- Ic/R : Inception Report
 P/R(1) : Progress Report (1)
 It/R : Interim Report
 P/R(2) : Progress Report (2)
 Df/R : Draft Final Report
 ◎ : Comments on Df/R by Kenya side
 F/R : Final Report

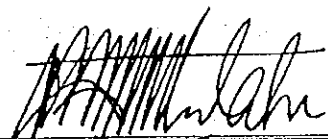
Handwritten mark

Handwritten signature

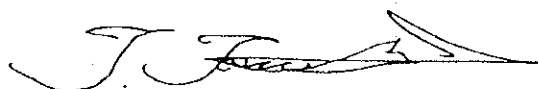
THE MINUTES OF MEETING
OF
THE SCOPE OF WORK
FOR
THE STUDY ON COMMUNITY-BASED SMALL HOLDER
IRRIGATION DEVELOPMENT PROJECT FOR
PROMOTION OF HORTICULTURAL PRODUCTION
IN THE FOOTHILLS OF MT. KENYA
IN
THE REPUBLIC OF KENYA

AGREED UPON
BETWEEN
MINISTRY OF AGRICULTURE,
LIVESTOCK DEVELOPMENT AND MARKETING
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

NAIROBI, 28 February 1997



Prof. K. MUTAHI
Permanent Secretary
Ministry of Agriculture,
Livestock Development and Marketing
Republic of Kenya



Mr. TADASHI TSUCHIYA
Leader,
Preparatory Study Team,
Japan International
Cooperation Agency



Mr. J. K. KINYUA
Financial Secretary
Ministry of Finance
Republic of Kenya

Based on the official request of the Government of the Republic of Kenya (hereinafter referred to as "GOK"), the Government of Japan decided to dispatch through Japan International Cooperation Agency (hereinafter referred to as "JICA") the preparatory study team (hereinafter referred to as "the Team") headed by Mr. Tadashi TSUCHIYA, from 19th to 28th February, 1997

The Team discuss and exchange views on the Study on Community-Based Small Holder Irrigation Development Project for Promotion of Horticultural Production in the Foothills of Mt. Kenya (hereinafter referred to as "the Study"), with the Ministry of Agriculture, Livestock Development & Marketing (hereinafter referred to as "MOALD&M") and the organizations concerned. The Team also carried out field visits/reconnaissance from 21st to 24th February, 1997.

Through these discussions and observations, MOALD&M and the Team mutually agreed to the Scope of the Work for the Study.

The following minutes were prepared to confirm the main issues discussed and matters agreed upon by both sides;

1. Both side agreed that the Study will aim at Small Holder Irrigation Scheme which shall be constructed, operated and maintained by smallholder organization under the principle of cost recovery by smallholder. Also the Study aim to promote horticultural production in order to increase income of smallholder.
2. Japanese study team shall provide MOALD&M with basic data and information on environmental issues in the course of the Study. MOALD&M shall prepare the Environmental Impact Assessment(EIA) if required under Kenyan laws and regulations.
3. MOALD&M requested the counterpart training in Japan. The Team promised to convey the request to the Government of Japan.

Km *T. Kinga*

LIST OF PARTICIPANTS

Kenyan Side

he Ministry of Agriculture, Livestock Development & Marketing
Prof. Karega Mutahi Permanent Secretary
Mr. T. K. Twei Director, Department of Agriculture(DA)
Mrs. R. A. Arungah Deputy Secretary/A
Mr. Muema Deputy Director, Horticulture Division,DA
Mr. C. M. Osoro Deputy Director, Land Development Division
(LDD), DA
Mr. H. K. Mwathe Head, Irrigation and Drainage Branch(IDB)
LDD, DA
Mr. J. O. Nyaguti Engineer, IDB, LDD, DA

The Team

Preparatory Study Team

Mr. Tadashi TSUCHIYA	Leader
Mr. Yoshihiro DOI	Member
Mr. Tsuyoshi USUI	Member
Mr. Kozo ITO	Member
Mr. Takayoshi ITOIGAWA	Member

Km Jkinya

Implementation of the Study

The following Study Team with close cooperation of GOK officers implemented the Study from August 1997 to January 1999.

Advisory Team

- Dr. Kunihiro Tokida : Advisory Team leader

JICA Study Team

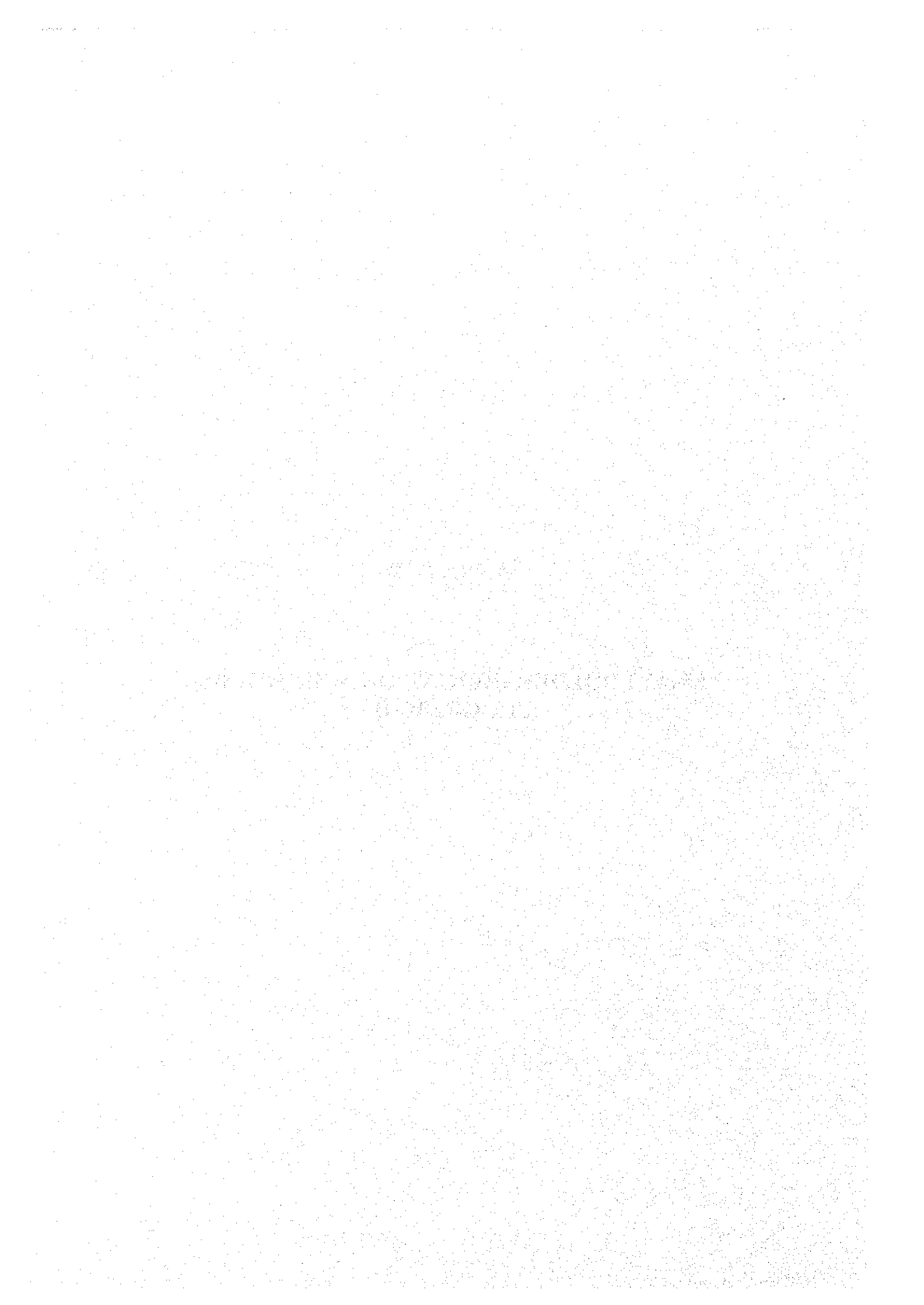
- Mr. Seiji Takeuchi : Team Leader
- Mr. Toyotaka Niwa : Small-scale Irrigation
- Mr. Akira Namae : Rural Community
- Mr. John K. Kimani : Farmer's Organization / Agri. Supporting Services
- Mr. Jonathan Greenham : Horticulture
- Mr. Shunichi Hosono : Agriculture / Rural Infrastructure
- Mr. Shinichi Arai : Marketing
- Miss. Sachie Oikawa : Environment
- Mr. Kensuke Iriya : Agro-Economy / Project Evaluation
- Mr. Izumi Atsuta : PDM Management

GOK Officers

- Mr. C. M. Osoro : Deputy Director, Land Development Division (DLD), MOALD
- Mr. H. K. Mwathe : Head, Irrigation and Drainage Branch (IDB), MOALD
- Mr. N. M. Kamau : Senior Agricultural Officer, IDB
- Mr. Mosoti Andama : Senior Agricultural Officer, Project Development, Monitoring, Evaluation Division (PDMED)
- Ms Zaweria Thuku : Agricultural Officer, Horticultural Division, MOALD
- Mr. Iregi Rashid : Economist, Development & Planning Division (DPD), MOALD
- Mr. P. W. Muchangi : Irrigation Engineer, IDB
- Mr. P. K. Ragwa : Agricultural Officer, IDB
- Mr. J. O. Nyaguti : Irrigation Engineer, IDB
- Mr. Jacop Mutua : Marketing Officer, Marketing Branch, NOALD
- Mr. S. M. Kioni : Hydrologist, MLRRWD
- Mr. P. P. Ilovi : Chief Superintendent Engineer, Unpaved Road, MOPWH
- Mr. Anthony M. Maina : Environmentalist, MENR
- Mr. Kenji Tsujishita : JICA Advisor for Smallholder Irrigation
- Mr. Kiyoshi Kita : JICA Advisor for Smallholder Irrigation

ANNEX B

**SMALLHOLDER IRRIGATION SCHEME (SIS)
PROGRAMME**



ANNEX B. SMALLHOLDER IRRIGATION SCHEME PROGRAMME

B.1 History of Smallholder Irrigation System Project

The Smallholder Irrigation Schemes (SIS) Project was initiated in January 1977 with a technical assistance by Netherlands and ended in June 1994. In the courses of these periods, smallholder irrigation schemes could be classified in to two project names in accordance with its implementation stages, that is, Small Scale Irrigation Development Project (SSIDP) for Phase-1 to Phase-4 stages and Smallholder Irrigation and Drainage Project (SIDP) for Phase-5 stage.

The Plan of Operation of the SSIDP was prepared in April 1976 by the project Formulation mission, and was accepted in June 1976 by the both Governments, Ministry of Agriculture of Kenya Government and Ministry of Finance and Planning of Netherlands Government.

Phase-1 Stage (1977-1980)

The Phase-1 stage of SSIDP has started in January 1977 for the duration of four years ending on December 1980. In June 1978, an agreement of the SSIDP between both Governments was reached to establish four Provincial Irrigation Units in Kisumu, Mombasa, Nakuru and Nyeri, in order to reinforce the institutional and operational arm of the already on-going SSIDP. And, also the Irrigation and Drainage Branch (IDB) in Land Development Division was physically assisted to start as an executing organization with office, transport and logistic support for Nairobi Headquarters.

The Netherlands Government committed the amount of Dfl 1.6 million for the implementation of small scale irrigation projects in Rift Valley, Nyanza and Coast Province. Two schemes were implemented, namely Ishiara in Nbeere District in Eastern Province and Kibirigwe in Kirinyaga District in Central Province.

Phase-2 Stage (1981-1984)

The Phase-2 stage of SSIDP has formulated for a period three years from 1981 to 1983, and its budget was used from July 1981 and ended in June 1984. The technical assistance during the Phase-2 stage has been limited to Headquarters and three Provincial Irrigation Units. During the Phase-2 stage of the project, several irrigation and drainage schemes have been supported technically and financially. These schemes are Kibirigwe Irrigation Scheme, the Lower Tana Village Irrigation Programme (LTVIP), and the Kisii Valley Bottom Development Programme (KVDP).

The objectives of the Phase-2 stage is to promote SIS development in Kenya, to

assist in the establishment of an irrigation and drainage service within Ministry of Agriculture, and to train Kenya staff at all level. The number of expatriates involved in these project and SSIDP totaled 25 in 1982. They were involved in all project formulation, design and implementation activities. Contribution to the project amounted at Dfl 11.5 million by Netherlands and Ks 2.6 million by Kenya Government, respectively.

Phase-3 Stage (1984-1987)

The Phase-3 stage of SSIDP has formulated for the period three years from July 1984 to June 1987) to assist the MOALD with development of smallholder irrigation and Drainage in Kenya and also to train staff. During the Phase-3 stage, activities have been concentrated in three Provinces; Nyanza, Rift valley and Coast, and the number of expatriates was reduced, and emphasis was on the job training, formulation of guideline, course development and preparation of manual. The presence of headquarters expatriate staff number was twice the Kenya staff number, and in absence of a clear approach staff productivity was relatively low.

Following guidelines and manual were published in this stage;

- Guideline for Smallholder Irrigation Projects in Rural Development (IDB 1986), and this was later followed by the document "Criteria, Guidelines, Procedures, Design and Proposal Formats" (IDB 1990)
- Schematic Identification and Evaluation ; Manual for Senior Staff on Gravity-fed Schemes with Basin Irrigation Operated by Farmers (IDB 1986),

Contribution to the project amounted at Dfl 10.9 million by Netherlands and Ks 14.2 million by Kenya Government, respectively

Phase-4 Stage (1988-1990)

Phase-4 stage of SSIDP has implemented for two and a half year from January 1988 to June 1990, and during this stage expatriates were not involved in the management any more, and became advisors. Expatriate technical assistance to Provinces and Programmes was terminated during this stage. Major developments in Phase-4 were as follows;

- Avoiding deterioration of schemes, where farmers were not maintaining their own schemes. This was achieved by contracting professional community organizers,
- Commencing NGOs activities to assist farmers in their scheme organization,
- Developing practical steps to enable farmers to participate fully in the design, implementation, operation and maintenance of their new or rehabilitated

scheme,

- Financing design and starting implementation of a large scale scheme with an intensified participation of farmers at all stages of scheme development,
- Investigation the profitability of various irrigated crops in smallholder irrigation and drainage representative areas all over Kenya,
- Developing guidelines for farmers contribution (cost-sharing) towards implementation of own schemes, based on the expected profitability,
- Creation of professional body, the Panel, with representatives from IDB and other staff of MOA, as well as from Nairobi University to assess project proposal,
- Preparation of a programme to assist individual farmers with pump-fed irrigation by giving technical advise as well as stating a loan programme for acquiring pumping equipment through commercial loan.

Contribution to the project amounted at Dfl 6.8 million by Netherlands and Ks 1.7 million by Kenya Government, respectively.

B.2 Achievement of Smallholder Irrigation Development Project (SIDP)

Phase-5 (1991-1994)

As mentioned in the previous paragraph, Smallholder Irrigation Development Project (SIDP) classified as Phase-5 of SIS was formulated for three years from July 1991 to June 1994. The objectives of SIDP could be itemized as follows;

- Institutional strengthening of IDB by restructuring IDB to a professional executing agency providing services to smallholder irrigation and drainage,
- Formulating and starting a loan programme to assist individual smallholders to acquire irrigation equipment,
- Formulating cost recovery approach for group-based gravity horticultural schemes, following a profitability study carried out in 1990,
- Introduction of step-wise implementation along with farmers increased awareness of demand and participatory of farmers in the scheme development (excavation) and its operation and maintenance (water fee),
- Expecting high quality of designs with their alternatives. In order to achieve efficiency and quality control in designing of irrigation schemes, a computer assisted design programme should be developed.

Contribution to the project amounted at Dfl 9.0 million by Netherlands and Ks 2.2 million by Kenya Government, respectively

ANNEX C

WORKSHOP SEMINARS FOR PDM

List of Tables and Figures

C.1 Master Plan Study

- Table C.1-1 Stakeholder Analysis
Table C.1-2 Project Design Matrix (PDM) for the Study

- Figure C.1-1 Problem Tree for the Study
Figure C.1-2 Objective Tree for the Study

C.2 Feasibility Study

- Table C.2-1 List of Members and Relevant Information for Rupingazi Ngerwe Irrigation
Table C.2-2 Participation/Stakeholder Analysis (Rupingazi Ngerwe Irrigation Scheme)
Table C.2-3 Project Design Matrix, PDM (Rupingazi Ngerwe Irrigation Scheme)
Table C.2-4 List of Members and Relevant Information (Ngomano/Nyangati Water Project)
Table C.2-5 Participation/Stakeholder Analysis (Ngomano/Nyangati Water Project)
Table C.2-6 Project Design Matrix (PDM) for Ngomano/Nyangati Water Project
Table C.2-7 List of Members and Relevant Information for Nkunjumo Water Project
Table C.2-8 Participatory/Stakeholder Analysis for Nkunjumo Water Project
Table C.2-9 Project Design Matrix (PDM) for Nkunjumo Water Project
Table C.2-10 List of Members and Relevant Information for Ruungu/Karocho Irrigation Project
Table C.2-11 Participation/Stakeholders Analysis for Ruungu/Karocho Irrigation Project
Table C.2-12 Project Design Matrix (PDM) for Ruungu/Karocho Irrigation Project
- 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.2-9 Mapping 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

Table C.1-1 Stakeholder Analysis

<u>Stakeholder</u>	<u>Interests</u>	<u>Potential Project Impact</u>	<u>Relative Priority of Interest</u>
1. Government			
a) District Irrigation Office	<ul style="list-style-type: none"> • Increase of Revenue • Obtain Recurrent Cost (Budget) • Much Engineering Survive • Demand in Design Service • Implementation of Irrigation Project 	<ul style="list-style-type: none"> (+/-) (+/-) (+/-) (+/-) (+) 	2
b) Provincial Irrigation Unit	<ul style="list-style-type: none"> • Assistance of District Irrigation Units in Project Identification/Preparation • Supervision & Monitoring of Irrigation Project 	<ul style="list-style-type: none"> (+/-) (+/-) 	2
c) MOPWH	<ul style="list-style-type: none"> • Budget for Road Improvement and Equipment • Road Maintenance Selection Criteria 	<ul style="list-style-type: none"> (+/-) 	2
d) NIB	<ul style="list-style-type: none"> • Operation and Maintenance of Large Scale Irrigation Project 	<ul style="list-style-type: none"> (+/-) 	3
e) MOALD HQ Staff	<ul style="list-style-type: none"> • Training Opportunities • Successful High Profile Project under their Control • Power & Prestige • Study Tours • Mode of Funding (Direct or through Normal Authority to incur Expenditure) 	<ul style="list-style-type: none"> (+) (+/-) (+/-) (+/-) 	2
f) MOALD	<ul style="list-style-type: none"> • Vehicles • Needs Budgets • Project Development Strategy • Operational Costs • Improved Irrigation Development Strategy • Horticultural Production; Horticultural Guideline, Extension & Coordination • Household Food Security and Self-Sufficiency 	<ul style="list-style-type: none"> (+) (+/-) (+/-) (+/-) (+) 	2
g) IDB. MOALD	<ul style="list-style-type: none"> • Projects to Implement • Need Assistant by more Donors • Field Allowance Increased Budget • Capability Build-up of IDB. to Promote Smallholder Irrigation and Drainage Development 	<ul style="list-style-type: none"> (+) (+/-) (+/-) (+) 	1

<u>Stakeholder</u>	<u>Interests</u>	<u>Potential Project Impact</u>	<u>Relative Priority of Interest</u>
h) Kenya Plant Health Inspection services	• Improved Quality of Export Produce (+/-)		3
i) Agricultural Extension Officer	• Professional Satisfaction • Vehicle • Improvement of Production • Participation of Farmers • Improved Extension Methods • Money for Transport	(+) (+) (+) (+) (+/-) (+/-)	1
j) TARDA Uaso Nyiro North	• Water Resources Utilization and Control (Data Bank)	(+/-)	4
k) Market Information Branch	• Information Improvement • Training of Staff • Information of Tanzania Products (Potato, Onion) • Transport & Communication Equipment • Expansion of Data Collection • Accurate Weighing on Transaction	(?) (+) (+/-) (?) (?) (+/-)	3
l) MOA Land Development Division.	• Share in any Donor Fund Available • Promote coordination with Other Parties	(+/-)	3
m) Division Irrigation Unit	• Empowerment by Training • Engineering Support • Project Identification and Preparation • Sensitization and Mobilization of Farmers	(?) (+)	2
n) District Office	• Meet Local Demand of Vegetable • Increase in Revenue from Tax • Improvement of Social Infrastructure	(+) (+) (+)	3
o) Provincial Government	• Rural Development	(+)	3
p) Provincial Aqri. Office	• Increased Role in Horticulture Marketing • Support and Coordination of Irrigation Activities	(-)	3
q) District Aqri. Office	• Greater Share of Provincial Budget • Strengthening of Extension Staff • Enrich of Statistics	(+/-) (+) (+)	2
r) District County	• Increase of Road O&M Activities	(+)	

<u>Stakeholder</u>	<u>Interests</u>	<u>Potential Project Impact</u>	<u>Relative Priority of Interest</u>
Council	• Improvement of Market Facilities (Increase of Cess)	(+/-)	4
s) District Water Office	• Increase of Support Services for Rural Water Supply • Water Permit Application Assessment • Control and Regulation of Water Use	(+/-)	3
t) District Works Office	• Increase of O&M Activities	(+)	2
u) National Environmental Secretion	• Environment Impact Assessment • Monitoring/Enforcement of Environmental Guideline	(+)	4
v) HCDA	• Buyers/Sellers Contract • Improvement of Exporter Produce Return • Export Produce Market Information • Facilitation of Produce Packaging, Collection, Storage	(+/-) (+/-) (+/-) (+/-)	2
2. Community			
a) Farmers Groups	• Low Prices of Agricultural Input • Improvement of Soil • Disease of Vegetables • Counter Measures for Drought • Safe Water Supply for Domestic • Easy Access to Safe Water • Alleviation of Poverty • Improvement of Illiteracy • Irrigated Agriculture on Hort. • Social Cohesion • Increased Profits • Selling their Products • Cheaper Farm Input Purchasing	(+/-) (+) (+/-) (+/-) (+/-) (+/-) (+) (+/-) (+) (+/-) (+) (+) (+) (+)	1
b) Farmers' Marketing Groups	• Many Marketing Channels • Cold Storage facilities for Short Supply Period • Market Information on Volume, Price, Variety • Strong Leadership • Techniques on Grading & Harvesting (Extension Services) • Transparent Decision-Making • Road Improvement for All Weather Accessible Roads	(+) (+) (+) (+) (+) (+) (+)	1

Stakeholder	Interests	Potential Project Impact	Relative Priority of Interest
	<ul style="list-style-type: none"> • Increase Income • Minimizing Opportunities for Fraud • Grading-up Position on Transaction • High Prices for Horticultural Produce 	<ul style="list-style-type: none"> (+/-) (+) (+) (+/-) 	
c) Water Users Association	<ul style="list-style-type: none"> • Controlling Equitable Water Distribution • Harmonizing among Farmers • Effective Water Use by Sprinkler System • Reliable Water Supply for Irrigation • Available Water • Adequate Irrigation Water 	<ul style="list-style-type: none"> (+) (+) (+/-) (+) (+) (+/-) (+/-) 	1
d) Irrigated Smallholders	<ul style="list-style-type: none"> • Credit for Farm Inputs • Adequate & Reliable Water Supply • Increased Irrigation Efficiency • Increase of Production • Low Cost Sharing, Long Repayment Period • Implementation Fund • Increased Income • Obtain Grant 	<ul style="list-style-type: none"> (+) (+/-) (+) (+) (+/-) (+/-) (+) (+/-) 	1
e) Women Groups	<ul style="list-style-type: none"> • Reduction in Agricultural Labour • Family Nutrition • Domestic Water Supply • Income Share with Husband • Opportunity to Join the Group 	<ul style="list-style-type: none"> (-) (+) (+) (+/-) 	3
f) Non-Irrigated Smallholders	<ul style="list-style-type: none"> • Maintain Living Standards • Irrigation Water • Access to Irrigation • Employment Opportunities • Expansion of Income Differences between Irrigated & Non-Irrigated 	<ul style="list-style-type: none"> (+) (+/-) (+/-) (+) 	3
3. Private			
a) Farmer	<ul style="list-style-type: none"> • Irrigated Agriculture • Create Sense of Ownership for Irrigation Facility 	<ul style="list-style-type: none"> (+) (+) 	

<u>Stakeholder</u>	<u>Interests</u>	<u>Potential Project Impact</u>	<u>Relative Priority of Interest</u>
	<ul style="list-style-type: none"> • Decrease Migrant Works of Men (+) • Suitable/Appropriate Use of Farm Inputs (+) • Staple Crop Production (+) • Raise of Living Standard (+) • Reduced Labour on Farm (-) • Better Farming Methods (+) • Increase of Agricultural Profit (+) • Damage by Insects (+/-) • Increase in Income (+) • Soil Conservation (+) • Improvement of Subsistence Farming (+) • Improvement of Access to Safe Water (?) • Higher Cropping Intensity (+) • Damage by Wildlife (+/-) • Improved Crop Yields (+) 		1
b) Local Consumer	<ul style="list-style-type: none"> • Cheap Available Produce (+/-) • Low Produce Prices (+/-) • Good Quality of Produce 		5
c) Households	<ul style="list-style-type: none"> • Access of Marketing (+) • Improvement of Basic Social Infra. (+) • Food Security (Maize and Beans) (+/-) • Collection of Firewood (-) • Safe Drinking Water (+/-) • Increased Income (+) • Improvement of Nutrition Conditions (+/-) • Availability of Firewood (+) 		1
d) Local Private Credit Providers	<ul style="list-style-type: none"> • Profit (+) • Increased Demand for Credit (+) • Security for Credit 		5
e) Input Stockists	<ul style="list-style-type: none"> • Increased Demand for Input (+) • Good Profit Margins 		4
f) Middlemen	<ul style="list-style-type: none"> • Increased Margins (-) • Increased Security of Supply (+) • Market Information in Nairobi Retail Markets (+/-) • Grading Technique of Farmers (+) • Information of Farmers (Products, Location etc.) (+) • Stable Supply of Produce (+) • Road Improvement (+) 		4

<u>Stakeholder</u>	<u>Interests</u>	<u>Potential Project Impact</u>	<u>Relative Priority of Interest</u>
g) Wholesalers/ Retailers	<ul style="list-style-type: none"> • Improvement of Marketing Facilities (+) • Profit Margins 		5
h) FPEAK	<ul style="list-style-type: none"> • Collection of Membership Fee (+/-) • Increased Operation of Member Firms (+/-) • Quality of Produce (+) • Look for Export Market (+/-) • Producer/Exporter Contracts (+/-) 		4
4. NGOs			
a) SISDO	<ul style="list-style-type: none"> • Improved Operation Procedures (+) • Participation to Assist SIS Program (+) • Fund for Their Activities (+/-) • Access to Additional Loan Funds (+/-) • Acquisition & New Office Equipment (Computers) (+/-) • Budget Obtain (+/-) 	(+/-)	4
b) Plan International	• Project Sustainability		
c) Catholic Relief Services			
d) World Vision			
e) Care Action Aid			
f) DIOCESE			
5. Public			
a) Markets	<ul style="list-style-type: none"> • Improvements of their Physical Infrastructure (+) • Improvement of Facility (Roof, Floor, Store) (+) • Enough Operation Money (+/-) • Marketing Information (+) • Generating Revenue from Sales (+) 		4
b) Cooperative Bank of Kenya	<ul style="list-style-type: none"> • Crediting for Small-Scale Irrigation (+) • Close Coordination of Donors (+/-) • Lending Money to Safe, Profitable Investments (+/-) 		2
c) KBC	<ul style="list-style-type: none"> • Minor Interest in Project (+/-) • Easy Access to Broadcastable Information and News (+) • Sponsorship from JICA for Programme (+/-) 		3

Table C.1-2 Project Design Matrix (PDM) for the Study

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal - Improvement of socio-economic well-being of communities around Mt. Kenya - Sustainable regional development of communities around Mt. Kenya	- RGDP increase by 10-20 %	- Record /Statistic of DAO	- EU will not legislate in ways that significantly alter the possibility of export production by smallholder. - Kenya will maintain or expand its share of the EU horticultural market. - Promotion of Kenya produce in Middle East markets.
Project Purpose - Small farmer development in the rural communities around Mt. Kenya.	- Farm household income increases by 10 % at least	- Financial analysis by sampling household - Economic survey	- Production for local market will continue to be competitive and profitable vis-a-vis alternative production areas within Kenya and neighboring countries, ie, the demand will continue.
Results/Outputs 1) Active community	- Number of registered water user's association increase by 50 %. - Zero percent increase of water related diseases.	- Records of Ministry of Culture and Social Services - District Health Office	- The exporters will continue to purchase the output of small farmers. - NGOs will provide resources for irrigation development.
2) Improved irrigation, planning, development and operation	- 4-300 new hectares of irrigation in the Study Area after 15 years.	- District Profile Survey - District Irrigation Unit Record - District Health Records	
3) Improvement in allocation of water resources	- Over 80% of new water permits per year will be given on the basis of proper water assessment situation.	- District Irrigation Unit Records - IDB district profiles and Crop Statistic of Horticultural Officer	
4) Effective water management on-farm level	- Increase in irrigated area of existing schemes of 20 percent.	- Data from DAO and Annual Report	
5) Sufficient supporting services to farmers	- Prices and availability of inputs in the rural area improve against base yearly data.	- Statistics of DAO	
6) Increased production of crops by smallholders	- Irrigated production increases by 100 % in the Study Area - Average yield in the Study Area increase by 5-10 %	- Baseline Survey followed by Mid-Term End of Project Survey	
7) Improved linkages between supply and demand in the Study Area	- Trading volume in the largest market in district increase 10 %. - Coefficient of variation of target produce price decrease from 0.5 to 0.4. - Amount of horticultural crops dealt with exporter increase 10 % at least.	- Amount of Cess Levies of Market/County Council - Data from Market Information Branch - Record of Exporters/Traders	

Activities	Inputs	Soft Aspects:	Hard Aspects:
<p>1) - Identify communities to participate in project activities</p> <p>- Conduct community preparation sessions using PRA methods</p> <p>- Train community leaders</p> <p>- Train community members (males and females)</p> <p>- Facilitate study tours for community leaders both male and female within Study Area</p> <p>- Organize communities to avoid and control water born diseases</p> <p>- Train farmers committee on maintenance</p> <p>- Organize bulk purchase of inputs by communities</p> <p>- Promote saving groups within Study Area</p> <p>- Train women's groups for business</p>	<p>Strengthening of related government agencies in terms of technical and financial view points,</p> <p>Training of related government staff and farmer' representative,</p> <p>Community development and strengthening present community organization,</p> <p>Establishment of water resources allocation in the basin,</p> <p>Effective water management on-farm level under equitable water distribution among farmers,</p> <p>Efficient supporting services to farmers, including credit systems and loan repayment conditions,</p> <p>Increased crop production for small farmers for both home consumption and income generation,</p> <p>Improvement of gender issues in rural community,</p> <p>Improvement of marketing system and supply of marketing information to farmers,</p> <p>Population control in rural community,</p>	<p>Planning, designing, construction and operation for improved irrigation systems,</p> <p>Improvement of farm-to-market roads in the vicinity of areas,</p> <p>Improvement of rural infrastructures of village water supply, health, education, rural electrification,</p> <p>Improvement of environmental situation,</p>	<p>Water demand for other uses such as domestic large flour farms, industrial, etc. will not replace irrigation</p> <p>Private sector works actively in marketing produce and inputs.</p> <p>Prepare EIA for the project.</p>
<p>2) - Examine and determine appropriate roles for the public and private sectors in smallholder irrigation</p> <p>- Streamline number of agencies/organization involved in irrigation schemes</p> <p>- Survey existing irrigation schemes in Study Area</p> <p>- Hold workshops at district level during project implementation</p> <p>- Prepare design standard for irrigation facilities</p> <p>- Select implementing partners for each district schemes</p> <p>- Arrange easier access to credit</p> <p>- Undertake O&M works</p>	<p>Government avails fund for extension support services</p> <p>The GOK will devolve the responsibility and the funding for maintenance to the local level.</p> <p>Political stability will continue.</p> <p>Decrease in high interest.</p> <p>The available data regarding the water resources is collect.</p> <p>The exchange rate will not significantly change, and the price of imported inputs will not increase.</p> <p>Provide farm inputs at lower price under subsidies system.</p>	<p>Develop strategy for water resources allocation and use in the area</p> <p>Produce district level irrigation profiles based on available water by sub-basin</p> <p>Promote establishment of coordinating mechanism for irrigation water use at district level</p> <p>Strengthen monitoring and training section of IDB</p> <p>Assist government to monitor water abstraction</p>	<p>Irrigation development in the Study Area will be controlled.</p> <p>Government avails fund for extension support services</p> <p>The GOK will devolve the responsibility and the funding for maintenance to the local level.</p> <p>Political stability will continue.</p> <p>Decrease in high interest.</p> <p>The available data regarding the water resources is collect.</p> <p>The exchange rate will not significantly change, and the price of imported inputs will not increase.</p> <p>Provide farm inputs at lower price under subsidies system.</p>
<p>3) - Prepare guideline for water management</p> <p>- Develop water management groups in each scheme</p> <p>- Train extension staff on irrigation water management</p> <p>- Train NGOs staff in water management techniques</p> <p>- Train farmers on water management</p> <p>- Coordinate water use within sub-basin between schemes</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>
<p>4) - Prepare guideline for water management</p> <p>- Develop water management groups in each scheme</p> <p>- Train extension staff on irrigation water management</p> <p>- Train NGOs staff in water management techniques</p> <p>- Train farmers on water management</p> <p>- Coordinate water use within sub-basin between schemes</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>
<p>5) - Support and encourage NGO involvement in irrigation by smallholders</p> <p>- Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>- Strengthen operational procedures of SISDO on credit</p> <p>- Initiate on-farm demonstrations</p> <p>- Organize with KBC an improved horticultural news programme</p> <p>- Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>	<p>Support and encourage NGO involvement in irrigation by smallholders</p> <p>Provide NGOs with access to crop and price information for distribution to smallholders</p> <p>Strengthen operational procedures of SISDO on credit</p> <p>Initiate on-farm demonstrations</p> <p>Organize with KBC an improved horticultural news programme</p> <p>Provide vehicles and motorcycle for extension service use</p>

<p>6) - Review irrigated horticulture and identify key constraints by crop, develop and disseminate solutions</p> <ul style="list-style-type: none"> - Review opportunities for processing in Study Area - Develop crop production guidelines for use in Study Area - Develop soil conservation afforestation programme for irrigated areas - Train crop and farm budgeting to smallholders - Train export producers in safe pest control and MRLs - Develop profitable models of farming and encourage young people to adopt - Demonstrate on farm storage for key crops - Reduce chemical hazard <p>7) - Train smallholders in grading, post-harvest and marketing</p> <ul style="list-style-type: none"> - Improve access road network in the irrigated areas - Strengthen the price collection and dissemination systems in the area - Expand market information branch activities - Promote marketing groups in each scheme - Coordinate with OECF horticulture produce handling facilities project, and new irrigation is developed. - Improve facilities of major markets at Nyeri and Meru 		
--	--	--

Figure C.1-1 Problem Tree for the Study

Insufficient Level of Welfare in Rural Household/Community

Low Household Income

Low Financial Return from Farming

1) Poor Farm-Gate Prices

- 1-1) Lack of Access to Finance (Credit); Input, Preparation, Marketing
 - Lack of Acceptable Collateral (Security); High Interest Rate, No Knowledge of Information on Available Programme
 - Lack of Organized Groups ; Low Loyal to Their Groups, Highly Perishable Nature of Horticultural Crops, No Central Marketing Agents
 - Heavier Investment Costs in Horticulture than in Other Type of Agriculture

Low Farmers' Return

2) Poor Marketing Systems

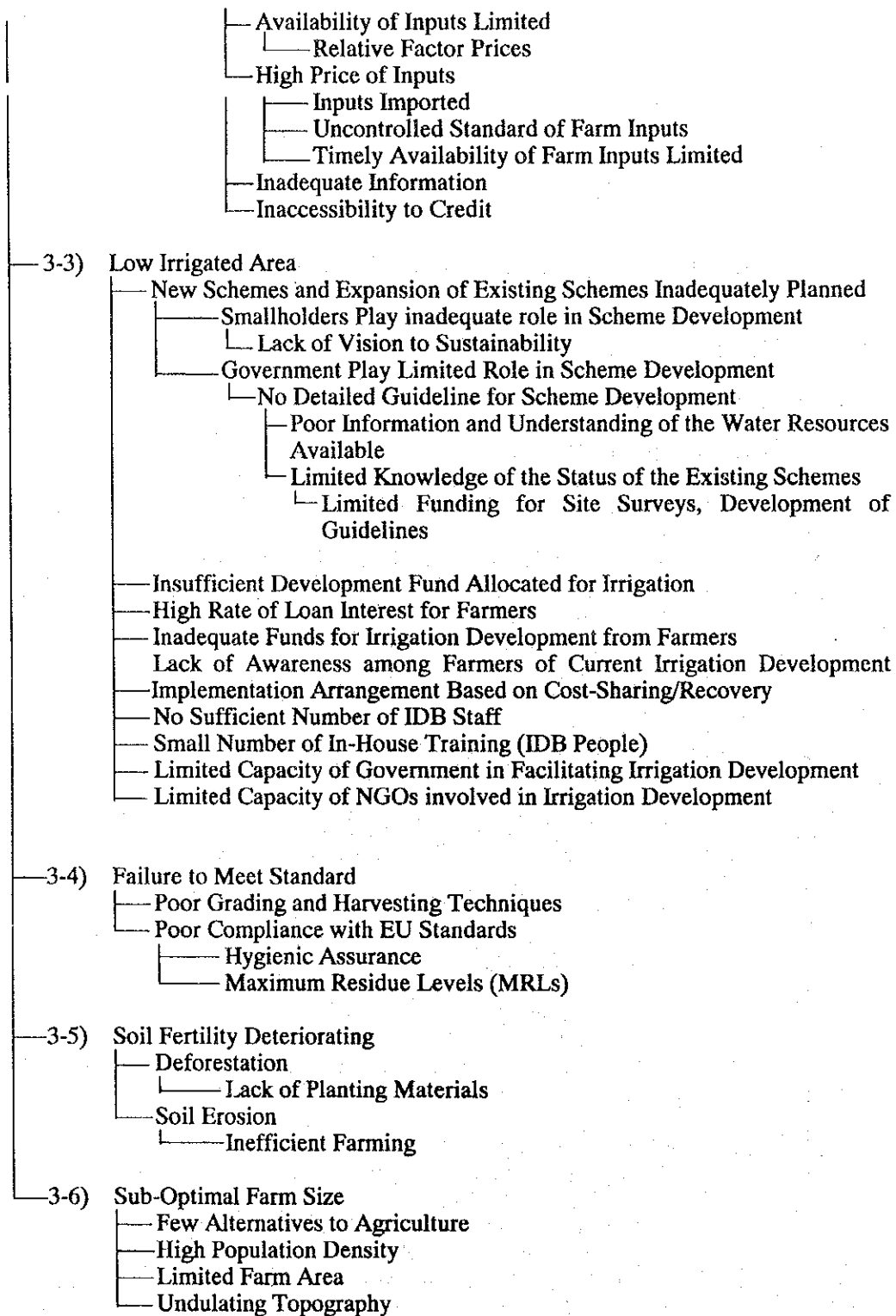
- 2-1) Lack of Information on Production Elsewhere (outside of Kenya)
- 2-2) Weak Bargaining Power of Farmers
 - Collusion between Buyers
 - Lack of Auction Systems
 - No Alternative Marketing Outlet
 - Kenya Eating Habits
 - Risk Selling in Domestic Market (Export Produce)
 - Unequal Partners in Transaction
 - Lack /or Poor Organization of Community ^{1/}
 - Short-Term View, i.e., Little Loyalty - Opportunistic
- 2-3) Lack of Access to Markets
 - Poor Marketing Channels
 - Poor Transportation Systems ^{2/}
 - Restrictive Legal Framework
 - None Legal Binding Contracts
- 2-4) High Margin by Middlemen
 - High Transportation Costs
 - Poor Transportation Systems ^{2/}
 - Lack of Marketing Information for the Farmers
 - Insufficient Level of Market Information Penetration among Farmers
 - Low Rate of Possession/Availability of Electric & Printed Media
 - Difficulty to Access of Marketing Information Provision Points
 - Insufficient Coverage of Market Information by MAO
 - Insufficient Activity of HCDA (Far Export Crops)
- 2-5) Seasonal Gluts (Demand is not equal to Supply)
 - Lack of Marketing Information for the Farmers
 - Lack of Storage in Production Area

- Lack of Processing Facilities
 - Lack of Processing Plants in Rural Area
- 2-6) Failure of Contract Farming
 - Lack /or Poor Organization of Community ^{1/}
- 2-7) Limited and Expensive Air Freight Costs
 - Limited Cargo Spaces
- 2-8) Strong Competition with Other African Countries

Low Yield of Marketable and Self-Sufficient Produce

3) Insufficient Volume of Horticultural Production

- 3-1) Insufficient Water for Crops
 - Unreliable and Inadequate Rainfall
 - Low Efficiency of Existing Schemes
 - Poor Irrigation Design
 - Poor Construction of Irrigation Facilities
 - Inadequate Access to Credit
 - No Adequate Water Management ^{1/}
 - Lack /or Poor Organization of Community
 - Low (Inadequate) Flows during the Dry Period
 - Limited Expansion Possible
 - Limited Water Resources
 - Limited Water Storage
 - Users outside Study Area have Water Rights
 - Inaccessibility Credit for Facility Construction
 - Inadequate Planning of Irrigation Projects
 - Sub-Optimal Water Resources Allocation
 - Weak Government Coordination of Water Allocation
 - Lack of Guideline
 - Water Use Rights are not allocated based on Available Water
 - Control of Water Obstruction is poor
 - Poor Monitoring of Water Abstraction
- 3-2) Poor Farming Management
 - Lack of Agricultural Supporting Services
 - Inadequate Extension Package on Horticultural Crop Production
 - Limited and Declining Government Funds
 - Inadequate Research and Extension Services
 - Farm Managers are not making the Best Decisions
 - Restricted Role of Women in Decision Making about Certain Crops
 - Limited Access to Information by Women
 - Women have Many Alternative Jobs besides Agriculture
 - Poor Crop Husbandry
 - Sub-Optimum Use of Inputs (Fertilizer, Seed, Chemical)



1/ Lack/or Poor Organization of Community

- └ Awareness of Negative as well as Positive Benefits of Organization
 - Delay of Payment
 - Unclear Pricing
 - History of Unsuccessful Organizations
 - Dishonesty
 - Little or No Legal Control
 - └ Courts are not interested in such cases
 - └ People who are accused being dishonest are either prominent people or have contacts with influential peoples
 - Little or No Social Control
 - └ Community are not organized well enough to put
 - Social Pressure on Dishonest Leaders
 - └ Dishonest leaders could at the same time be local political leaders and hence difficult to apply social control
 - Lack of Communication among Members
 - └ Poor Leadership among Community
 - └ Inadequate Information for Decision-Making

2/ Poor Transportation System

- └ Poor Access Roads
 - Undulating Topography
 - Lack of Road Maintenance
 - High Maintenance Cost
 - └ Heavy Rain in the Rainy Seasons
 - Lack of Fund
 - Low Contribution at Local Level to Maintenance
 - Limited Means of Transportation Available
 - High Costs of Vehicles, Fuel, etc.
 - Limited Demand for Transportation

Figure C.1-2 Objective Tree for the Study

Increased Level of Welfare in Rural Household/Community

Increased Household Income

Increased Production Output

1) Improved Farm-Gate Prices

- 1-1 Provision of Access to Finance (Credit)
 - Provision of Acceptable Collateral (Security); Reasonable Interest Rate, Enough Knowledge of Information on Available Programme
 - Establishment of Organized Groups; Loyal to Their Groups, No Perishable Nature of Horticultural Crops, Provision of Central Marketing Agents
 - Reasonable Investment Costs in Horticulture than in Other Type of Agriculture

Increased Farmers' Return

2) Improved Marketing Systems

- 2-1) Improved Access to External Production Information
- 2-2) Strengthened Power of Farmers
 - Increased Competition among Buyers
 - Promotion of Auction Systems
 - Diversification of Marketing Outlet
 - Reducing Risks of Export Produce
 - Equal Partners in Transaction
 - Community Well-Organized ^{3/}
 - Increased Loyalty
- 2-3) Improved Access to Markets
 - Improved Marketing Channels
 - Improved Transportation Systems ^{4/}
 - Improved Legal Framework
 - Strengthening of Legal Binding Contracts
- 2-4) Reasonable Margin by Middlemen
 - Reasonable Transportation Costs
 - Improved Transportation Systems ^{4/}
 - Market Information Available for the Farmers
 - Sufficient Level of Market Information Penetration among Farmers
 - Possession/Availability of Electric & Printed Media
 - Easy Access of Marketing Information Provision Points
 - Sufficient Coverage of Market Information by MOA
 - Sufficient Activity of HCDA (Far Export Crops)

- 2-5) Better Linkage with Demand and Supply
 - Market Information Available for the Farmers
 - More Storage Options in Production Areas
 - Provision of Processing Facilities
 - Provision of Processing Plants in Rural Area
- 2-6) Successful Contract Farming
 - Strong Organization of Community ^{1/}
- 2-7) Enough and Reasonable Air Freight Costs
 - Enough Cargo Spaces
- 2-8) Cooperation with Other African Country Exporting

Higher Crop Yield of Marketable and Self-Sufficient Produce

3) Improved Production Systems

- 3-1) Sufficient Water for Crops
 - Increased /Improved Efficiency of Existing Scheme
 - Adequate Irrigation Design on Site
 - Improved Water Management
 - Community Well-Organized ^{3/}
 - Optimum Construction of Irrigation Facilities
 - Improved Access of Credit (affordable)
 - Expansion of Irrigation Optimized
 - Provision of Appropriate Water Storage
 - Improved / Easier Access to Affordable Credit
 - Optimum Water Resources Allocation
 - Adequate Control of Water Abstraction
 - Well-Monitoring of Water Abstraction
 - Equitable Water Distribution
 - Improved Coordination of Water Abstraction
 - Development of Guidelines
- 3-2) Improved Farming Management
 - Improved Access to Agricultural Supporting Services
 - Better Research & Extension Services, and Improved Linkage
 - Better Decisions of Farm Managers
 - Role of Women in Decision Making Enhanced
 - Improved Access to Information by Women
 - Reduction of Women Labour
 - Improved Crop Husbandry
 - Optimum Use of Inputs (Fertilizer, Seed, Chemical)
 - Increased Access to Inputs
 - Input Price Reduced
 - More Information Available
 - Easier Access to Credit

- 3-3) Improved Development of New Irrigation
 - Adequate Planning of New /Expansion of Existing Schemes
 - Smallholders to play Appropriate Role in Scheme Development
 - Government to play Appropriate Role in Scheme Development
 - Information and Understanding of Water Resources Available Increased
 - Improved Knowledge of Status of Existing Schemes
 - Increased Funding for Irrigation Planning and Development
 - Horticultural-Credit Product (Tailor Made)-Support by Donor through Guarantee-to Cater for Lack of Security
 - Sufficient Development Fund Allocated for Irrigation
 - Reasonable Loan Interest for Farmers
 - Adequate Funds for Irrigation Development from Farmers
 - Strong Awareness among Farmers of Current Irrigation Development
 - Implementation Arrangement Based on Cost -Sharing /Recovery
 - Sufficient Number of IDB Staff
 - Enough Number of In-House Trading (IDB People)
 - Sufficient Capacity of Government in Facilitating Irrigation Development
 - Sufficient Capacity of NGOs involved in Irrigation Development
- 3-4) Increased Compliance with Standard
 - Improved Grading and Post-Harvest Techniques
 - Improved Compliance with EU Standard
 - Compliance with Hygienic Assurance
 - Compliance with Maximum Residue Levels (MRLs)
- 3-5) Minimize the Rate of Soil Fertility Deterioration
 - Afforestation
 - Enough Planting Materials
 - Wider Adoption of Improved Farming Practices
 - Soil Conservation Increased
- 3-6) Optimal Farm Size
 - Appropriate Population Growth Rates
 - Population of Off-Farm Income

3/ Community Well-Organized

- └ Awareness of Ways to Avoid Negative Aspects of Organizations
 - └ Timely Payment
 - └ Transparent Pricing
 - └ Models of Successful Organization
 - └ Honesty Improved
 - └ Proper Legal Control
 - └ Proper Social Control
 - └ Better Communication Among Members
 - └ Adequate Information for Decision-Making
 - └ Good/Better Leadership

4/ Improved Transportation System

- └ Better Access Roads
 - └ Proper Road Maintenance
 - └ Increased Available Funds
 - └ Improved Contribution at Local Level
- └ Improved Transportation Means
 - └ Increased Demand for Transportation

WORKSHOP SEMINARS HELD AT MODEL AREAS

C.1 Introduction

In the course of Phase-III field work, Study Team conducted workshop seminars at four sites of the selected Model Areas. The subsequent indicates findings and impressed issues through the workshop.

Venues:

Study Team have tried to avoid unnecessary interruption to local people activities. So, the venues were; churches (Ngomano/Nyangati, Ruungu/Karocho), a poly-technic (Nkujomo), and a coffee warehouse (Rupingazi Ngerwe)

Participants:

Exclusively water project or irrigation scheme members except for Ngomano Nyangati at which membership border was not clear enough were in the range from 80 to 180 people in a day. Although the numbers of participants were far beyond the theoretical figures, which were between 8 to 12 ideally, still we could feel no difficulty to handle discussions, because they were excellently behaved at the discussion. They listened to the other people's opinion well, kept order in speech, and did not spend much time to evaluate the atmosphere unlike Japanese meeting.

Time:

Generally we set the workshop from 10 am. to 4 pm. But in African custom, most of the case actual session started as late as 11 am. except on Friday at Ruungu/Karocho, when we arrived at the church most of the members were there waiting for us before 9 am.

Lunch:

Before starting workshop, we asked the project/scheme to provide lunch for participants including us except Tuesday on which the piece of bread with a bottle of soda would provided by the Study Team. It was good not only to observe real organizational capability of the project/scheme, but also to shorten the gap between the external donor and local recipient. Relying on their food, the Study Team was no longer a patron to them, and we were approaching equal partnership realization, full commitment and ownership of the project by them. Sometimes in the workshops or out of, we encountered the words or attitudes as like; "we are week, so please give us something (Ngomano/ Nyangati, a man)", "how can I benefited from you (Nkujomo, a poly-technic officer)", or "only planning, no pipes! We never heard of such an assistance (Rupingazi Ngerwe, a man)". They were not much and majority of the people seemed do not care of them. Every time those words accompanied with fawning smile at the edge of their eyes. After a certain time, enough to realize we are the equal partners, the expressions disappeared with those words and

attitudes, and the sense of pride and confidence returned to their faces. The words "irrigation" and "horticulture" had slightly different interpretation at each Model Areas. You will find the differences by carefully following the problem trees, objective trees and Project Design Matrixes (PDM) they made.

The results of participation analysis, interest analysis, problem analysis, objective analysis and PDM in each Model Areas are referred to Table C.2-1 to Table C.2-12 and Figure C.2-1 to Figure C.2-11.

C.2 Rupingazi Ngerwe Irrigation Scheme (July 14, 1998 - July 17, 1998)

Tobacco smokers, TV antennas, tin-roofs and ways of people dress are some of the indicators that living standard here is relatively high among four of the Model Areas. Even some pieces of meat were found in our lunch dishes. They had irrigation before 1992 when flood destroyed opposite side of the riverbank at the intake. The former chairman with local agriculture officer repeatedly told us that the main reason of malfunction of their irrigation system was lack of maintenance due to poor commitment of the members. It might be true. However the Study Team found out that existing canal alignment imposed extremely heavy burden of maintenance to the farmers. Since 1992, no one had enjoyed a single drop of irrigation water from the system. However the memories of frustration on water distribution are still alive particularly in down stream people such as block D.

In the workshop, somebody raised the issue by stating a problem "some members are selfish", immediately followed by the roar of the audience for a while. At the next session, other young man responded to the question of water adequacy before 1992, with the words "water was not enough at those days and upstream people had just a better chance to use it". The secretary of the scheme sitting in the first row stood up, turned to the man and said, "we don't need to pretend we are one. We have had a dispute." I felt that we are accepted to be a working partner with them. We showed them three alternatives from engineering point of view with rough cost estimation of capital investment and maintenance. The majority preferred to the least in maintenance that means the highest in initial cost. They seemed keeping inflate a dream of irrigation since 1992. Both economic and financial feasibility must be studied in careful manner, because such a coffee dominant crop pattern, shortage of labor, limited farm size, and narrow steep landscape.

The Study Team are still in some questions such as; why the construction stopped at the block C, were the members informed about maintenance burden of the poorly designed canal at the engineering stage, who put the priority on this particular project among others and why?

C.3 Ngomano/Nyangati Water Furrow Project (June 30, 1998 - July 2, 1998)

It was a second workshop following the one in March, 1998 during the Phase-II field works. The participants went and came day by day. For instance, one day young man came and raised the issue of generation gap, and next day he never appeared. During PDM session, the role and responsibility of the Ministry of Agriculture became the issue. Mr. P. K. Ragwa as a resource person from MOA, responded the issue and clarified their questions. A week after the workshop, the chairman with the vice-chairwoman and the secretary visited to us at a hotel, and spend a couple of hours to discuss marketing and other issues.

C.4 Nkunjumo Water Project (July 7, 1998 - July 10, 1998)

The seating position clearly indicated the three sub-groups of the society, which were men, women and youth. It has been also observed in the order of self-introduction. During the problem analysis, people's emphasis was on the marketing issues rather than the irrigation itself. Once we closed the session as it was, and after coffee break, the chairman indicated his interest to return the problem tree and develop somewhat under the irrigation issue.

C.5 Ruungu/Karocho Irrigation Project (July 21, 1998 - July 24, 1998)

"Famine" was the first word they identified during the problem analysis. It was unique among the four Model Areas. This very rural colony was a consumer rather than an agricultural producer. The Study Team found the fact through spending four consecutive nights in the colony. Another quite interesting card was "the government forgot us". Majority of them seemed not like to discuss on the detail of it, but still the influence of it to the community activities was worth to analyze, both in positive and negative side. They once have been working with SISDO and collapsed. We appreciated that an SISDO staff attend whole workshop and participated to the planning in very honest manner, despite some farmers still had something like anger to the SISDO. His sincere manner to address the past issues to the community was quite preferable.

Table C.2-1 List of Members and Relevant Information for Rupingazi Ngerwe Irrigation

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Lucy Wambui (D)	Farmer	3 boys, 1 girl reading bible	2	coffee	sometimes
Alice Wanjiru (D)	Farmer	2 boys, 2 girls reading bible	1	coffee	sometimes
Robert kaguchia (A)	Farmer	6 girls, 4 boys singing	4 1/2	coffee	sometimes
Aroisia Wambogo (D)	Farmer	2 girls, 2 boys reading bible/ visiting	2	M + B	sometimes
Ephantus Mwoga (A)	Farmer	5 boys, 2 girls reading	5	coffee	sometimes
Peter Muriithi (D)	Farmer	1 girl darts	1/4	coffee	sometimes
Mary Lwamba (D)	Farmer	4 boys, 2 girls cooking	1 1/2	M + B	sometimes
Jane Njura (D)	Farmer	5 boys, 3 girls	0.1	coffee	mostly
Aidina Nambeti (D)	Farmer	6 boys, 2 girls cooking/cattle	3	coffee	sometimes
Consolata Wambeti (D)	Farmer	6 boys, 1 girl visiting, reading bible	1	coffee	sometimes
Dominic Njeru (C)	Farmer	4 boys, 3 girls reading	2 1/2	M+B	no
Justus Njogui	Extension Worker	2 boys, 3 girls	4	coffee	sometimes
Cyrus Gachoki (A)	Farmer	single, visiting	1/2	M+B	parents
Caesar Njagi (C)	Farmer	1 boy cycling	1/4	M+B	no
Alvan Nguu (C)	Farmer	4 boys, 5 girls reading bible	6	coffee	sometimes
Stephen Njeru (D)	Farmer	1 girl reading	1	coffee	sometimes
Samuel Njeru (MAO)	Extension Worker	1 boy, 1 girl table tennis, volley ball	3/4	M+B	sometimes
John Kivuti (B)	Farmer	1 boy reading	1/2	coffee	sometimes
Patrick Kamau (D)	Farmer	4 girls visiting, preaching	1/2	coffee	sometimes
Mercy Wawira	Farmer	1 girl, 1 boy livestock, house keeping	1/2	coffee	sometimes
Justus Njeru (D)	Farmer	4 girls, 1 boy reading	3/4	M+B	sometimes
Margeret Wambogo (D)	Farmer	1 boy, 2 girls	1 1/2	coffee & Maize	sometimes

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Patrick Mbogo (C)	Techer, Farmer	None, listen to music	2		
Richard Nyaga (C)	Farmer	5boys, 3girls reading		coffee, M+B, bananas	sometimes
Isaac Njeru (ADM)	Assistant Chief	3boys, 2girls	1	coffee	sometimes
Alexander Nduua(C)	Farmer	1girl video, tv	1/2	M+B	sometimes
Gedraph Njeru (B)	Farmer	5girls, 2 boys music, football	7	coffee	sometimes
Elijah Ileri (C)	Building Surveyor	2boys reading	6	coffee	sometimes
Bernard Nduiga (D)	Farmer	3boys, 8girls reading	3/4	coffee	sometimes
David Kinyua (D)	carpenter	1girl, 1boy reading	1/2	coffee	mostly
Jerusha Marigu (B)	Farmer	5girls, 5boys	3/4	coffee	mostly
Eunice Wambeti (B)	Farmer	3boys, 3girls	3 1/2	M+B	sometimes
James Karuuki (A)	Farmer	2girls visiting	1	M+B	sometimes
Juliana Mutitu (B)	Farmer	3boys, 3girls singing	2	M+B	sometimes
Susan Wanjira (A)	Farmer	1 boy, 4girls	1/2	coffee	mostly
Margeret Mutitu (A)	Farmer	5boys, 1girl house keeping	2	M+B	sometimes
Jesinta Wawira (B)	Farmer	3 girls, 1boy singing	1	coffee	no
Edwin Mbogo (B)	Farmer	none, music	1/2	horiculture	no (parents)
Faith Ngendo (A)	Farmer	2girls reading	1	M+B	sometimes
Irene Kiura (A)	Farmer	1girl singing	1/4	horiculture	no (parents)
Evangeline Njeri (A)	Farmer	none, knitting	1/4	horiculture	no (parents)
Morris Nduiga (B)	Farmer	5boys, 3girls singing	3	coffee	sometimes

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
James Njururi (B)	Farmer	5boys, 5girls radio, livestock	3/4	coffee	mostly
Margaret Mumu (B)	Nurse	5girls, 2boys reading	7	M+B	sometimes
Silas Njoka (MAO)	Extension worker	2boys, 4girls reading	3/4	coffee	sometimes
John Munyi (D)	Farmer	2boys, 1girl reading	4	coffee	no
Agapias Muturi (D)	Farmer	none	1/2	M+B	no (parents)
Isiah Njiru (D)	Farmer	1boy, visiting	1 1/2	coffee	no
Julius Gichobi (A)	Farmer	none	1/2	horticulture	no (parent)
Theus Nduiga	Farmer	2boys, 2 girls	2	M+B	sometimes
Richard Gitu (A)	Farmer	6girls, 2boys cattle	3 1/2	coffee	sometimes
Martin Ileri (A)	Farmer	none, reading	1/2	coffee	no (parents)
Ndwiga Mbogo (D)	Farmer	none, reading	0.3	coffee	no (parents)
Jason Njiru (D)	Farmer	1girl, 1boy, kiosk	2	coffee	no
Purity Njagi (C)	Farmer	5boys, 4girls religion	4	Dairy Cattle	sometimes
Salesio Njeru (A)	Farmer	3boys, 2girls conversing	2	coffee	sometimes
Peter Njoka (A)	Farmer	4girls, 2boys, cattle	2 1/2	coffee	sometimes
Sisily Muthanje (B)	Farmer	3girls, 2boys, visiting	1	coffee	sometimes
Phensila Wambeti (B)	Farmer	6boys, 8girls, visiting	6	coffee	sometimes
Ariet Rwamba (D)	Farmer	3 boys plaing with grandchildren	3	coffee, Maize	sometimes
Albert Njiru (C)	Farmer	6 girls, reading	2	M+B	sometimes
Nazario Njeru (C)	Student	none	0		parents
Jackson Rutere (C)	Farmer, carpenter	5boys, 2girls, visit	1 1/4	coffee	sometimes

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Judy Wangiri (D)	Farmer	3girls, 2boys	1	M+B	sometimes
Josphat Njeru (D)	Farmer	3girls, 4boys,			
John Nyaga	Farmer	7girls, 6boys	4	coffee	sometimes
John Mitambo (A)	Farmer	no kid	1/2	maize+B	none
Samuel Njiru (A)	Farmer	none	1	M+B	none
Stephen Njagi (A)	Farmer	Promised	-	Parent	
Simon Nyaga (B)	Farmer	single, Farming	1/4	Hort	none (parent)
Jackson Nyaga (B)	One farmer	None	0.1	Hort	none (parent)
Joseph Ndwiga (B)	Farmer	single	1	M+B	none (parent)
Livingstone Njaco(A)	Farmer	single	1/2	M+B	none (parent)
Clement Mwaniki (B)	Farmer	single	1/2	horticulture	none (parent)
John Njiru (D)	Farmer	1boy, 1girl	1	coffee	sometimes
Sospeter Njeru (D)	Farmer	4girls, 2boys			
Charles Muriithi (A)	Farmer	single, drinking	1/2	coffee	none (parent)
Joseph Nthiga (C)	Farmer	1boy, 3girls, grazing	1/2	M+B	sometimes
Charles Ileri (C)	Farmer	1boy, 4girls	1	M+B	sometimes
David Njeru (B)	Farmer	2 girls, 3boys	1/2	coffee	mostly
Alfred Muriithi (B)	Farmer	2boys, 3girls	1/2	coffee	mostly
Kariuki Njagi (C)	Farmer	1boy, livestock	3 1/4	M+B	sometimes
John Nguu (C)	Farmer	1boy, watching tv	3/4	M+B	sometimes
Evylyn Kariuki (C)	Farmer	none	1	M+B	none (parent)
Simon Nduiga (C)	Farmer	none			
Quinto Njeru (D)	Farmer	5girls, 2boys, reading	1	M+B	sometimes

Name	Occupation	Family/Hobby	Plot Size (acres)	Major crop	Frequency of buying Food from Market
Patrick Njiru (A)	Farmer	1boy, 7girls, conversing	4	M+B	sometimes
Alfred Munyi (C)	Mason	1 boy	1/4	fallow	none (parent)
Silas Njagi (D)	Farmer	single, reading	0.3	M+B	none (parent)
Charles Kariuki (A)	Farmer	4boys, radio	2	bananas	mostly
Patrick Gachoki	Farmer	none, reading bible	1	coffee	none(parent)
Colnerios Nduiga (B)	Farmer	7boys, 5girls, listening music	2	coffee	sometimes
Margaret Nyaga (B)	Farmer	4boys, 2girls	1	coffee	sometimes
Elena Muthane (C)	Farmer	2boys, 6girls	2 1/2	coffee	sometimes
Mercy Wanyaga (B)	Farmer	3boys, 2girls,singing	1/4	coffee	sometimes
Jeremiah Mwando (visitor)	Farmer	2boys, 2girls, evangelist	2.5	coffee & beans	sometimes
Phidelis Kirei (C)	Farmer	none			
Celeste Ileri (C)	Farmer	2 girls			
Silas Wachira (D)	Farmer	2girls, travelling	2	Maize	sometimes
Charles Mugo (A)	Farmer	2boys	1/4	coffee	sometimes
Dionso Njiru (C)	Farmer	5boys, 3girls	1/2	coffee	sometimes
Faith Nyaga (B)	Farmer	2boys, walking	5	maize	sometimes
Agnes Muringo (B)	Farmer	3boys, 5girls	6	M+b	sometimes
Angelina Gazavi (B)	Farmer	3boys, 2girls	1/2	M+B	sometimes

Table C.2-2 Participation/Stakeholder Analysis (Rupingazi Ngerwe Irrigation Scheme)

Name	Interests	Power/Potential
Block A	<ul style="list-style-type: none"> ◆ farming with water ◆ electricity ◆ schools ◆ to sell products at higher price 	<ul style="list-style-type: none"> ◆ land ◆ education ◆ river intake (Rupingazi) ◆ manpower
Block B	<ul style="list-style-type: none"> ◆ farm with water ◆ sell at high prices ◆ better roads ◆ farming tools ◆ chemicals ◆ certified seeds 	<ul style="list-style-type: none"> ◆ better soil for farming ◆ experience on the soil
Block C	<ul style="list-style-type: none"> ◆ domestic water ◆ technical assistance 	<ul style="list-style-type: none"> ◆ trees
Block D	<ul style="list-style-type: none"> ◆ overhead sprinkler irrigation 	<ul style="list-style-type: none"> ◆ forest ◆ close to main road
Rupingazi/Ngerwe (121) S.H Irrigation Project	<ul style="list-style-type: none"> ◆ soil fertility assess ◆ organic manure ◆ cash crop (coffee) ◆ plant bananas ◆ experience on horticulture ◆ growing of domestic food 	<ul style="list-style-type: none"> ◆ well organized ◆ strong enough to work ◆ Majority of members have cows for milk
Gicangai (169) Irrigation Project	<ul style="list-style-type: none"> ◆ farming with water for horticulture ◆ getting a market for it ◆ near to Kibugu market ◆ near main route ◆ have sprinkler system ◆ better access to phone 	<ul style="list-style-type: none"> ◆ have land and farmers ◆ fertile soil ◆ educated
Karangi Irrigation Project	<ul style="list-style-type: none"> ◆ farming with water for horticulture ◆ getting a market for it ◆ sprinkler system ◆ Intake is at high location 	<ul style="list-style-type: none"> ◆ smaller project (30 members)
Ngerwe Coffee Factory (300)	<ul style="list-style-type: none"> ◆ marketing coffee and macadamia ◆ employ youth ◆ provide loans for school fees ◆ working medical bills ◆ capital 	<ul style="list-style-type: none"> ◆ supply farm inputs on credit
Kibugu Farmers Co-op Society (4000)	<ul style="list-style-type: none"> ◆ manage 5 factories and Ngerwe coffee factory ◆ co-ordinate marketing of coffee from 5 factories to KPCU ◆ to build store/factory offices ◆ operate petrol station lorry 	<ul style="list-style-type: none"> ◆ to buy fertilizer at bulk from Nairobi
Forest Department	<ul style="list-style-type: none"> ◆ ensure planting of trees ◆ creating habitat for animals 	<ul style="list-style-type: none"> ◆ growing tree seedlings ◆ selling timber ◆ posts for telephone ◆ give temporary land for cultivation

Name	Interests	Power/Potential
Ministry of education	<ul style="list-style-type: none"> ◆ education of children ◆ adult education ◆ by 2020 everyone educated 	<ul style="list-style-type: none"> ◆ provide teachers ◆ license to private schools
Teachers Service Commission	◆	◆ pays teachers
Ministry of Water	<ul style="list-style-type: none"> ◆ clean water for homes ◆ make money ◆ ensure good environment for fish 	◆ disconnect water for none payment
County Council	<ul style="list-style-type: none"> ◆ good roads ◆ market facilities ◆ making money 	<ul style="list-style-type: none"> ◆ licenses for businesses ◆ issuing plots
<ul style="list-style-type: none"> -St Joseph Church -Catholic Diocese of Embu -Kaugwiri Congregation Church - Full Gospel Church - New Apostolic Church -ACK Diocese of Embu 	<ul style="list-style-type: none"> ◆ evangelism ◆ to build schools, churches, dispensary 	<ul style="list-style-type: none"> ◆ promote general farming ◆ baptise (A.I)
Catholic Women's' Association	<ul style="list-style-type: none"> ◆ uplift standards of living through merry-go-round ◆ give money to a member 	◆ register members
Ministry of Agriculture Extension Officers	◆ promote good farming	<ul style="list-style-type: none"> ◆ provision of extension personnel ◆ loan recommendations ◆ facilitate study tours ◆ train farmers on good input use/safe ◆ methods on chemical use ◆ train on soil conservation
Ministry of Works	◆ none	<ul style="list-style-type: none"> ◆ road construction machinery ◆ have road engineers/ personnel
Ministry of Health	<ul style="list-style-type: none"> ◆ promote good health ◆ revenue collection 	<ul style="list-style-type: none"> ◆ to build health facilities ◆ close unhygienic hotels ◆ inspect meat ◆ train health personnel ◆ prevent/ cure diseases ◆ licensing private clinics
Provincial Administration	◆ ensure security	<ul style="list-style-type: none"> ◆ to arrest law breakers ◆ license meetings
<ul style="list-style-type: none"> -Ngerwe Wendani S.H group -Ngerwe Muungano S.H group -Kianguchu/Gatunduri S.H Women's group -Ngerwe Women's group 	◆ uplift standards of living through merry- go-round	

Table C.2-3 Project Design Matrix, PDM (Rupingazi Ngerwe Irrigation Scheme)

	Objectively Verifiable Indicators	Means of Verification	Key Assumptions
OVERALL GOAL Living standard uplifted	<ol style="list-style-type: none"> Increase in agric. Production High production 	<ol style="list-style-type: none"> Increase in household income Availability of credit facilities 	
PROJECT PURPOSE Horticulture irrigation farming	<ol style="list-style-type: none"> Adequate water for irrigation Extensive horticultural farming 	<ol style="list-style-type: none"> Efficient water system Availability of horticultural crops 	<ol style="list-style-type: none"> Good market available Reliable water source Donor Agencies e.g. J.I.C.A Good farming methods
RESULTS/OUTPUT <ol style="list-style-type: none"> Pipe water system installed Capital available Farming labour available 	<ol style="list-style-type: none"> Regular water flow from A - D Donors available Good farming Labour inflow Money available 	<ol style="list-style-type: none"> Extensive hort farming (A - D) Farm records Donors loan grants Farm implements available Work done on farms Wages paid 	<ol style="list-style-type: none"> Farmers actively involved in horticultural farming Willing donors Advice from MAO Ext. officers Potential job seekers from outside Better wages
ACTIVITIES <ol style="list-style-type: none"> To procure pipes To purchase sprinkler heads To get engineering assistance from MOA To provide pipe installation labour <ol style="list-style-type: none"> Production planning Exporting <ol style="list-style-type: none"> Employ labour <ul style="list-style-type: none"> ◆ Cannery ◆ Transport ◆ Requisitions from buyer 	<ol style="list-style-type: none"> Loans from financial institutions Grants from donors Harambee fund-raising MAO available Active members involvement Extensive farming High production 	<ol style="list-style-type: none"> Organization and co-operation among members Engineers available in MAO Energetic members High production records Production records Direct observation 	<ol style="list-style-type: none"> Financial institutions have lending money Membership registration Project by-laws honored MAO willingness to assist Well organized farmers Capital ready Demand from buyers Export licensing is easy and simple Canneries willing to trade Transport and good roads are available

* Result/ Output matrix continuation (generated by farmers)

RESULTS/ OUTPUT	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
1. Schools	<ol style="list-style-type: none"> Schools are far Late school enrollment High school fees 	<ol style="list-style-type: none"> School dropouts Direct observation 	<ol style="list-style-type: none"> Community involvement Money available Ministry of education
2. Medical clinic	<ol style="list-style-type: none"> High cases of illness and minor accidents 	<ol style="list-style-type: none"> Medical records 	<ol style="list-style-type: none"> Ministry of Health Community involvement
3. Marketing manager	<ol style="list-style-type: none"> Lack of marketing knowledge High production 	<ol style="list-style-type: none"> General exploitation of middlemen Direct observation Production records 	<ol style="list-style-type: none"> Plenty of work Trustworthy managers
4. Access roads and bridges	<ol style="list-style-type: none"> Poor state of access roads and bridges High cost of transportation 	<ol style="list-style-type: none"> Direct observation Frequent accidents Riding bike or walking 	<ol style="list-style-type: none"> Local government Community involvement
5. Telephone and electricity	<ol style="list-style-type: none"> High cost of living 	<ol style="list-style-type: none"> Direct observation KPLC & KPTC records 	<ol style="list-style-type: none"> Ministry of Energy Ministry of transport and Communications. Community involvement

Table C.2-4 List of Members and Relevant Information (Ngomano/Nyangati Water Project)

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?		
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times	None
Virginia Munyi	Farmer	6 kids, 4 girls, 2 boys knitting								
Jonah Nguchu	Teaching	6 kids, 3 boys, 3 girls	6		*					*
Grace Wanjiku	Farmer	5 kids, 2 boys, 3 girls								
Jemima Magondu	Farmer	6 kids/Praising God								
Susan Wankiku	Farmer	2 kids / Cookery								
Jeremiah G. Kabogo	Businessman & farmer	4 kids, 1 girl, 3 boys Singing, driving								
Sarah Munyi	Farmer	4 kids / Weaving	1	*						*
John Njoka	Farmer	8 Kids, 4 boys, 4 girls	3		*					*
James Kabogo	Teaching	6 kids, 3 boys, 3 girls Games, traveling	9	*						*
Patrick Mwara	Farmer	2 boys / Football	3		*					*
Mary Getari	Farmer	3 kids, 2 boys, 1 girl farming	3		*					*
Mary Muthoni	Farmer	6 kids, 3 boys, 3 girls			*					*
Joel Kabogo	Driver	3 girls / Football	2							
Fredrick Nyaga	Farmer	2 boys/Footbal, volleyball	2	*						*
Magondu Matu	Farmer	8 kids, 6 boys, 2 girls								
David Njoka	Farmer	4 kids, 3 boys, 1 girl	5		*					
Danson Kamau	Farmer	6 kids, 3 boys, 3 girls Gardening	7				*			*
Simon Ndambiri	Farmer	4 kids, 2 boys, 2 girls	5	*						*
Symon Muriuki	Farmer	3 kids, 1 boy, 2 girls Singing	1							*
Isaac Gachuiiri	Farmer	2 boys / Football	1 1/2		*					*
Julius Gitari	Farmer	1 girl	1/2		*					*
Zakayo Munene	Farmer	2 kids, 1 boy, 1 girl	3		*					*
Josiah Muriithi	Farmer	None / Football	2		*					*
Joseph Njuki	Farmer	None / Football	2				beans			*

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS					Do you buy food crops from market?		
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times	None	
Jefferson Kimani	Farmer	1 boy / Handball	2	*						*	
Jackson Muchiri	Farmer	None / Football	1	*						*	
Julius Muthee	Farmer	6 kids, 4 boys, 2 girls	5	*						*	
Julius Kirugi	Farmer	1 girl / Singing								*	
Josphat Kinyua	Farmer	None / Football	2	*						*	
Peniel Kithengi	Farmer	3 kids, 2 boys 1 girl Driving	3	*						*	
Julius Mucee	Farmer	2 girls / Football	2	*						*	
Joseph Munge	Farmer	2 kids, 1 boy, 1 girl Football	1 1/2		*					*	
Nancy Mwangi	Farmer	2 boys / singing	2		*					*	
Wanjohi Ngondwe	Farmer	None / Football	1	*						*	
Moses Wachira	Farmer	None / Football	3	*						*	
Glandys Muriuki	Farmer	4 kids, 3 boys, 1 girl Singing	4 1/2		*					*	
Gerald Njuki	Farmer	None	1		*					*	
Julius Gacoki	Farmer	1 boy / Football	1	*						*	
Lucy Mwangi	Farmer	5 kids, 2 boys, 3 girls Farming	4		*					*	
Sicily Karoki	Farmer	6 kids, 4 boys, 2 girls									
Teresia Micere	Farmer	7 kids, 4 boys, 3 girls Touring								*	
Betha Wachira	Farmer	5 kids, 2 boys, 3 girls Women groups	2	*						*	
Wilson Mbugi	Chief Farmer	4 kids									
B. R Muriuki	District Horti. Crops Officer										
Phylis Kiama	Farmer	7 kids, 2 boys, 5 girls Singing									
Gladys Njura	Farmer	Church									
Benard Njiru	Farmer	12 kids, 6 boys, 6 girls									

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?			
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times	None	
Samuel Njagi	Farmer	6 kids, 3 boys, 3 girls Swimming									
Elijah Mithamo	Farmer	4 kids, 3 boys, 1 girl									
Lucia Wangigi	Farmer	8 kids, 3 boys, 5 girls									
Eunice w. John	Farmer	2 boys	1		*					*	
Stephen Kimemia	Agric. Extension	Roasting meat									
Veronica Kabogo	Farmer	3 kids, 2 boys, 1 girl									
Gladys Wambura	Ag.Div. SDA - Mwea	2 boys Talking with community									
Peter Nyamu	Farmer	4 kids									
Julius Gitari	Farmer	4 kids, 1 boy, 3 girls Farming									
Festus Kabogo	Farmer/Driver	1 kid / Music	2		*					*	
Judy Njagi	Farmer	5 kids, 2 boys, 3 girls singing, Knitting									
Josphat Kaara	Farmer	4 kids, 1 boy, 3 girls farming									
Stephen Munene	Farmer	8 kids, 6 boys, 2 girls	6		*					*	
James Muriithi	Farmer	4 kids, 3 boys, 1 girl Farming									
Geoffrey Kamau	Farmer	4 kids, 1 boy, 3 girls Farming	2		*					*	
Flora Warui	Farmer	4 kids / Farming									
Kaiguri Karimi	Farmer	4 kids, 2 boys, 2 girls									
Symon Gatimu	Farmer	3 kids, 2 boys, 1 girl Farming									
Mwaniki Munene	Farmer	8 kids	3		*					*	
Silas Kithinji	Farmer	2 kids	2		*					*	
Julius Mariga	Farmer	4 kids	2 1/2		*					*	
Joseph Njoka	Farmer	Single	1		*					*	
Isaac Kithinji	Farmer/Business	1 kid	2		*					*	
Richard Kariuki	Farm Management Officer - Mwea	No kid Reading Newspapers									

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?				
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times	None		
Beatrice Muriithi	Business	Touring										
Jeniffer Joel	Farmer	Touring	2	*							*	
Regina Nguire	Teacher	2 boys / Farming	2	*							*	
Bancy Muringo	Farmer	Touring										
Rahab Magongdu	Farmer	9 kids, 7 boys, 2 girls Women groups										
Nancy Muriithi	Farmer	3 kids, 2 boys, 1 girl Farming										
Nancy Ciira	Farmer	4 kids, 2 boys, 2 girls Women Groups										
G. W. Kahuro	Distr. Irrig. Engineer	1 kid									*	
Peter Gichobi	Farmer	2 boys / Praising	1/2		*						*	
Julius Kamau	Farmer	4 kids, 3 boys, 1 girl	4		*						*	
Peter Waweru	Farmer	1 girl / Hairdressing	2		*						*	
Daniel Waweru	Farmer	None / Football	1									
Jane Muthoni	Farmer	5 Children / Farming									*	
Sammy Macharia	Farmer	2 boys / 2 girls	1 1/2		*						*	
Jeremia Gichobi	Student - Football											
Martin Tetu	Farmer											
Kamau Nduati	Farmer	Not married										
Gerald Ndambiri	Instructor	11 children 7 girls, 4 boys										
John Kimani	Development consultant	2 boys	4		*						*	
Michael Simba	Agricultural Officer	3 boys, 2 girls										
Benson Bundi	Farmer	music										
George Mabu	Artist											
Lydia Thitu	Deputy Town clerk	3 boys										
Daniel Kamanga	preacher	1 girl, 1 boy, singing									1/2	
Helen Kamaru	Farmer	3 girls, 1 boy	1		*						*	
Eunice Muthoni	Farmer	3 girls, 1 boy	15		*						*	
Rose Muthoni	Business	1 boy	1		*						*	
Lydia Muthoni	Farmer	1 girl, 3 boys singing	1/4		*						*	

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?			
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times	None	
Barnard Mbogo	Farmer	1 girl, 5 boys praising	5	*						*	
Rebecca Wanjiru	Farmer	1 girl, singing	1/4		*					*	
James Bundi	Farmer	dancing	1/4		*					*	
Elias Wachira	Farmer	2girls, 2 boys, football	1		*				*		
Lydia N. munene	Farming	1girl,2boys / business						*		*	
Barnard Mugo	Farmer	Football	2	*						*	
Hildah Wambui	Farmer	1girl,1boy / planning ball			*					*	
Peter Karanja	Agricultural Extension Mwea	1girl / Watching movie									
Jane Wambugu	District Home Economics officer (Kerugoya)	1boy 1girl									
Faith Githinji	Farmer	1girl,1boy praising the Lord	11/2	*						*	
Agnes Wawera Mbugi	Farming	4kids Business Rice Dealer	1/4	*					*		
Philip Nyaga	Farmer	2girls Playing football									
Godfrey Mwangi	Horticulture officer Mwea Division	Jogging & Music									
Agnes W. Njagi	Teacher	2 Kids Travel Sing Farming									
Peter Gachwiri	Farmer	1 Boy									
Patrick Njoka	Farming	Potential parent Sharing Ideas	3		*					*	
Willy Kariuki	Farmer	Hobby Farming	2		*				*		
Festus Muriuki	Farmer	1girl / Running	1/2	*						*	
Jane Wakera Njogu	Teaching	Teaching, Grazing, Farming									
Symon Wachira	Farmer	1boy / Football	2		*				*		
Josphene Waughithi Mbungo	Farmer	1girl,1boy / Farming									
Jamulik Ngure Njoka	Farmer	5children	1 1/2	*						*	

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?	
				Maize & Beans	Horti- culture	S. potatoes	Bananas	Mostly	Some- times
Josphat Wachira	Farmer	1 girl, 3 boys / Farming	1 1/2	*					*
Manaseh N. Nyaga	Farmer	1 boy / Farming		*					*
Jason Munene	Farmer	2 kids	2	*					
Simon Mwangi Kiratu	Assistant chief	5 girls, 1 boy	5	*					*
Cyrus Ngari	Teaching	3 girls, 3 boys	1/2		*				*
Symon Muriuki	Farmer	None / Singing	7		*				*
David Ndambiri	Farmer	7 kids, 4 boys, 3 girls							*
Zachary Munene	Farmer	2 kids, 1 boy, 1 girl Football	2	*					
Boniface Waweru	Farmer	7 kids, 2 boys, 5 girls Hunting	3 1/4					*	
Hudson Ngari	Farmer/Evangelism	2 boys	1 1/4	*					*
Purity Muriithi	Farmer	1 girl	3 1/2		*				*
Julius Gitari	Farmer	2 boys	6		*				*
Julius Kabogo	Farmer	2 kids, 1 boy, 1 girl	1		*				*
Peter Kamau	Farmer	None	1	*					*
Joyce Kariuki	Radiographer	4 kids, 3 boys, 1 girl	7	*					*
Paul Gichira	Farmer	3 kids, 2 boys, 1 girl	3	*					*
Jane Muchiri	Farmer	2 kids, 1 boy, 1 girl Church choir	2		*				*
John M. Nahashon	Farmer	None	2	*					*
Joseph Njoroge	Farmer	5 kids, 2 boys, 3 girls	5	*					*
Beatrice Wanjiru	Farmer	6 kids, 3 boys, 3 girls	7	*					*
Geofrey C. Mwaniki	Farmer	None	1	*					*
Thyaka Mutiga	Farmer	9 kids, 3 boys, 6 girls	7 1/2	Rice 4 acre					*
Benard Nyaga	Farmer	4 kids, 3 boys, 1 girl	3	*					*
Njoki Njoka	Farmer	2 boys	1						*

Table C.2-5 Participation/Stakeholder Analysis (Ngomano/Nyangati Water Project)

	Interest	Power/Potential	Possible Project Impact
Member of Nyangati "Water Project"	<ul style="list-style-type: none"> - Enough water for domestic & farming - Fish farming - Cattle dips - Clean drinking water tapped - Electricity, Dispensary - Market nearby - Good communication - Cold storage - Canning Factory - Welfare bus - Transport vehicle 	<ul style="list-style-type: none"> - Will power and Unity - Land - Manual Labour - Farming Know-how - Basic input, e.g. Manual 	<ul style="list-style-type: none"> (+) (+) (+) (+) (+) (+) (+) (+/-) (+) (+) (+) (+)
Nyangati Primary School	<ul style="list-style-type: none"> - Grow potatoes -horticulture - Tree Nursery -Establishments - Cleaning Classrooms - Clean drinking water 	<ul style="list-style-type: none"> - Manual Labour - Instructors - Land of the whole school 	<ul style="list-style-type: none"> (+) (+) (+)
Nyango Youth Project	<ul style="list-style-type: none"> - Growing export crops - Cold Storage 	<ul style="list-style-type: none"> - Manual labour and land - Basic education 	<ul style="list-style-type: none"> (+) (+)
Karoti Girls School	<ul style="list-style-type: none"> - Fish Farming - General farming-practical - Income generating project e.g farming & dairy 	<ul style="list-style-type: none"> - Land - Instructors - Learned personnel -students - Electricity 	<ul style="list-style-type: none"> (+) (+) (+) (+)

	Interest	Power/Potential	Possible Project Impact
Nyangati Youth Polytechnic	<ul style="list-style-type: none"> - Domestic Use - General Farming - Constructions - Zero grazing - Electricity & telephone - Workshop machinery - Improve building structure , dormitories, workshop - Fencing whole school - Playground fields dispensary - Canteen - Welfare bus, Ambulance 	<ul style="list-style-type: none"> - Land - Instructors- technicians - Manual labour and skilled labour 	<ul style="list-style-type: none"> (+) (+) (+) (+) (+) (+) (+) (+) (+) (+) (+)
St. Monica Nyangati Anglican Church	<ul style="list-style-type: none"> - General Cleaning - Tree Nursery - Electricity & telephone - Music instrument - Furniture 	<ul style="list-style-type: none"> - Prayers to God - Labour 	<ul style="list-style-type: none"> (+) (+) (+) (+/-) (+/-)
Ndiara Green Belt Organization	<ul style="list-style-type: none"> Grow seedlings 	<ul style="list-style-type: none"> - Growing and selling seedlings 	<ul style="list-style-type: none"> (+)
Provincial Administration	<ul style="list-style-type: none"> - Law and Order - Harambee Contribution 	<ul style="list-style-type: none"> - Power to settle disputes 	<ul style="list-style-type: none"> (+)
Teithia Witethie group (Women)	<ul style="list-style-type: none"> - Money for Building plot at Kutus 	<ul style="list-style-type: none"> - Power to collect money among members 	<ul style="list-style-type: none"> (+)
JICA	<ul style="list-style-type: none"> - Support/Assistance to Nyangati W.P. 	<ul style="list-style-type: none"> - To support and develop horticultural production 	<ul style="list-style-type: none"> (+/-)
Karoti Witethie Women Group	<ul style="list-style-type: none"> - Merry Go Round 	<ul style="list-style-type: none"> - Power to collect money among members 	<ul style="list-style-type: none"> (+/-)
Department of Environment and Fisheries	<ul style="list-style-type: none"> - Irrigation without polluting environment 	<ul style="list-style-type: none"> - Power to prosecute water polluters 	<ul style="list-style-type: none"> (+)
Ndiara Cattle dip	<ul style="list-style-type: none"> - Get dip water from the project for free 	<ul style="list-style-type: none"> - Power to collect money from their members 	<ul style="list-style-type: none"> (+)

	Interest	Power/Potential	Possible Project Impact
Ministry of Public Works	- Protection of Road from Furrow	- Power to make roads (repair and Maintain) - Power to prosecute those who damage Roads	(-)
Nyangati Catholic church	-Water for church Cleaning +/- - Irrigation water + - Domestic use	-Public health programs (clinics, health centres, hospitals) - Running of schools	(+) (+) (+)
Jua Kali Rice Growers	- Irrigation water for rice (a lot of water required) - Domesic/livestock use	- Food security - Generation of employment in local rice mills - Casual labour in rice fields	(-) (+)
Nyakangu Youth Project	-Irrigation water - Domestic/livestock use	- Generation of income through sale of Export crops (French beans) - Employment of Casuals	(+) (+)
Wamathina Young Women's Group	-Irrigation water -Domestic/Livestock use -Investment in pig	- Improving standard of living of members by upgrading houses. - Encouraging diversification into other projects e.g. livestock	(+) (+) (+)
Nyangati Ougi Women's Group	-Irrigation water -Domestic/livestock use - Income from irrigated crop used for roof catchment, tanks, installation of solar panels	- Employment of casual labour - Influencing upcoming groups	(+) (+)
Gatuko Women's Group	-Irrigation water -Domestic/livestock use	- Improving nutrition in the community through sale of eggs and mils - improvement of soil by adding manure from livestock and poultry	(+) (+)
Social Development Association	- Groups under S.D.A -Registration, mobilisation -Advise on projects to start	- Assessment of groups and their viability - Registration /de-registration	(+/-) (+/-)

	Interest	Power/Potential	Possible Project Impact
Ministry of Agriculture	-Agricultural extension methods - (advising farmers on farming methods) - Advise on irrigation infrastructure, development & water management.	- Training needs of farmers - Demonstration on good husbandry practical - Imparting agricultural knowledge - Introducing farmers to agents/ NGO's that can assist them - Introducing new technology to farmers	(+) (-/+) (+) (+) (+/-)
Ministry of Water	- Allocation of Water	- Issue of permit to the project. - Water control for use for the project	(+) (-)
Nyangati Football Club	- Sufficient water for farming	- Source of labour to the project whenever needed	(+)
National Irrigation Board	- Selling improved seed	- None	(-)
Mwea Prison	- Minimum water abstraction from Thiba During the Dry Season	- Source of labour when the project and prison require water during drought	(-)
Joseph Njuki Tree Nursery	- To be allowed to get free Water from the Furrow - Selling seedling to us	- None	(+)
Agricultural Extension Workers	- To give technical Advise to farmers	- Advice the farmer on economic use of water - Advice on improved farming methods for soil conservation - Restriction on wastage of water	(+) (+) (+)
Horticultural Exporters	- Expansion of Horticultural production	- Marketing of Horticultural crops - Credit facilities to horticultural farmer e.g. various farm inputs e.g. fertilizer	(+) (+)
Winyitie Women Group	- Increased income from horticultural - production - Increased water availability for livestock purposes	- source of labour - Mobilizing the members of the project	(+) (+)

Table C.2-6 Project Design Matrix (PDM) for Ngomano/Nyangati Water Project

OVERALL GOAL	PROJECT PURPOSE	RESULTS/OUTPUT	Objectively Verifiable Indicators	Means of Verification	Key Assumptions
Increased Farm Income	Sufficient Irrigation Water Available	<ol style="list-style-type: none"> 1. "Water Distribution Guideline" established 2. Permanent good intake 3. Canal system capacity increased (improved) 4. Canal maintained properly (regularly) 5. Farm pond 	<p>Capacity to pay loans Permanent houses Children go to school Way people are dressed</p> <p>According to the "Water Distribution Guideline" no complain from farmers</p> <ol style="list-style-type: none"> (1) Signed booklet distributed to each member (2) It is physically there (3) Volume of water flow (4) Frequency of communal maintenance 	<p>Bank records School attendance records Observation Observation</p> <p>Record maintained by water guide</p> <ol style="list-style-type: none"> (1) Register of booklet issues (2) Visiting the site (3) "Flow Records" (4) Maintenance record kept by water guard 	
<p>ACTIVITIES</p> <ol style="list-style-type: none"> 1.1 To prepare list of members, crops, acreage 1.2 To seek consensus on water sharing methods 1.3 Draw up water distribution guidelines 2.1 To seek for technical advice from MOA 2.2 To design intake 2.3 To secure water rights 2.4 To organize harambee to raise funds 2.5 To procure construction materials 2.6 Employ skilled contractor 2.7 Members contribute construction labour 3.1 To redesign canal 3.2 To seek construction loan 3.3 To mobilize members to contribute 4.1 Prepare annual maintenance schedule 4.2 Establish a mechanism for maintenance fund 4.3 Recruit another water guard 4.4 Mobilize members to maintain canal as per schedule 4.5 Impartial implementation of by-laws 					<p>(a) Construction loan available from NGOs, or Donors</p> <p>(b) Water rights is given by Ministry of water</p>

Table C.2-7 List of Members and Relevant Information for Nkunjumo Water Project

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?		
				Coffee	Maize/ Beans	Bananas	Horti- culture	Mostly	Some- times	None
Nkanata Mutwemeri	Farmer	10 boys, 5 girls	6.7	*				*		
Stanley Kirinyia	Farmer	2 boys, 1girl (sports)	1.33	*				*		
Gatunga Ndlika	Farmer	2 boys, 2 girls	4	*				*		
Paul Nkuru	Farmer	4 boys 3 girls (farming)	1	*				*		
David Kijogi	Farmer	5 boys, 1girl	1 1/2	*				*		
M'ithiji M'atune	Farmer	2 boys	7	*				*		
M'marete Karee	Farmer	5 boys, 4 girls	7.24	*				*		
Silas Muriuki	Farmer	4 girls (planting flowers)	3	*				*		
Frederick M'kiruja	Farmer	3 boys, 4 girls (grazing)	2	*				*		
M'itwamwari Rwigi	Farmer	4 boys, 5 girls	10.27	*				*		
Kubai M'arachi	Farmer	2 boys, 3 girls (football)	1.81	*				*		
Julius Mugaa	Farmer	5 boys + 1 girl (football)	1/2	*				*		
Charles Karenga	Farmer	3 boys, 2 girls farming (talking)	1	*				*		
Francis Kaome	Farmer	4 boys, 1girl (grazing)	1	*				*		
Isaiah Kithakwa	Farmer	5 boys, 3 girls (football)	2.9	*				*		
Reuben Karachi	Farmer	1 boy, 2 Girls (farming)	2 1/2	*				*		
Manene Maitimanga	Farmer	4 boys, 1Girl	4.10	*				*		
Kiboori Rukaria	Farmer	3 boys, 1 Girl Farming (Conversing)	1	*				*		
Samson Gitonga	Farmer	2 boys, 3 girls (farming)	1	*				*		
Gerald Thuramira	Farmer	4 Girls, 5 boys	1.85	*				?		
Ruth Ruteere	Farmer	3 boys, 3 girls, 2 daughters in-law, 6 grand children	5	*				*		
Isaiah Kiogora	Farmer	1 boy, 4 girls (farming)	2 1/2	*				*		
Samson Gauki	Farmer	3 boys, 4 girls	1 1/2	*				*		
Erastus Kiogoria	Administration	3 boys, 1 girl (sports)	1	*				*		
Zakayo Murungi	Police	Not married	?	?				?		
Isaiah Kinoti	Farmer	Not married	1	*			*	Parents	Parents	Parents
David Mwangera	Farmer	Not Married	2	*			*	Parents	Parents	Parents
Moses Kimaita	Farmer	Not married	1	*			*	Parents	Parents	Parents
Caroline Kinyua	Teacher	1 boy, 1girl	5	*			*	*		*

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?			
				Coffee	Maize/ Beans	Bananas	Horri- culture	Mostly	Some- times	None	
Isabellah Nkuene	Farmer	2 girls, 2 boys (P.T.A farming)	1	*						*	
Damaris Nkunja	Farmer	3 boys, 1 girl (singing P.T.A)	2	*				*			
Lucy Mwiti	Farmer	4 girls (P.T.A Farming)	1	*				*			
Teresiah Munyange	Farmer	4 girls, 4 boys	1	*				*			
Jeniffer Kaanda	Farmer	5 girls, 3 boys (P.T.A farming)	9.9	*				*			
Miriam Riungu	Farmer	3 boys, (singing P.T.A)	1	*				*			
Gladys Kithinji	Farmer	2 girls, 3 boys (P.T.A travelling)	1	*				*			
Hellen Kiruki	Farmer	2 girls, 2 boys (P.T.A singing)	1	*				*			
Silas Kaburu	Farmer	1 boy, 4 girls	2	-		*		*			
Joyce Mutea	Farmer	2 boys, 1 girl	2	*				*			
Martin Kinyua	Farmer	Not married	1/2	*				Parents	Parents	Parents	
Joyce Karimi	Farmer	3 boys, 2 girls	1	*				*			
Salus Mwirigi (Grace Kanyai)	Farmer	1 girl, 4 boys	1 1/2	*				*			
Robert Kinoti	Farmer	Single	1	*				*			
Mary Gituma	Farmer	4 boys, 1 girl	1 1/2	*				*			
Samuel Mahene	Farmer	1 boy	1	*				*			
Marioni Nkuru	Farmer	3 boys, 1 girl	2	*				*			
Beatrice Kibunja	Farmer	2 girls, 2 boys	1	*				*			
Susan Muthée	Farmer	1 girl	2	*				*			
Agnes Muthuri	Farmer	2 girls, 2 boys (business)	1/4	*				*			
Catherine Nkuru	Farmer	1 girl, 1 boy	2	*				*			
Muriuki Thuraira	Farmer	2 boys, 2 girls	1	Livestock				*			
Lucy Gerald	Farmer	3 boys, 2 girls	2	*				*			
Gedion Mugambi	Farmer	4 boys, 2 girls	1	*				*			
Judith Muriithi	Farmer	1 boy, 1 girl	1	*				*			
Stella Kibunja	Farmer	3 boys, 3 girls (singing)	3	*				*			

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?		
				Coffee	Maize/ Beans	Bananas	Horti- culture	Mostly	Some- times	None
Joyce Muworia	Farmer	3 girls, 2 boys (singing)	2	*				*		
Japheth Gitonga	Civil Servant (sub-chief)	2 boys, 2 girls (farming)	2	*				*		
Silas Mwebia	Farmer	3 boys, 1 girl	6 1/2	*				*		
Julia Mutua	Farmer/Teacher	2 boys, 1 girl	1	*				*		
Stephen Mwiti	Farmer	2 girls, 2 boys (football)	2 1/2	*	*			*		
Harrison M'ikiao	Farmer	4 girls, 3 boys (herding)	2	*				*		
Josphat Mbaya	Farmer	5 boys, 2 girls	1.85	*				*		
Hendrew Kithinji	Farmer									
Janet Kubai	Farmer	3 girls, 2 boys	3	*				*		
Rose Mwengwa	Farmer	3 girls, 2 boys (singing)	1	*				*		
Beatrice Kinyua	Farmer	1 girl, 2 boys (singing)	2 1/2	*				*		
Susan Parana	Farmer	1 girl, 2 boys (singing)	2	*				*		
Grace Muthuri	Farmer	5 boys, 2 girls	1	*				*		
M'ikirima M'ichunge	Store keeper	4 girls, 3 boys	1.1	*				*		
Julia M'kwaria	Farmer	5 boys, 1 girl	4	*				*		
Stephano Muthami	Farmer	5 boys, 3 girls	2.33	*				*		
Margret Kirimi	Farmer	3 boys, 1 girl	1	*				*		
Julius Mugambi	Farmer	1 girl, 1 boy	7	*	*			*		
Ferusa Maburia	Farmer	4 girls, 3 boys	2	*			*	*		
Judah Mututa	Farmer	2 boys	1	*				*		
Virginia Riungu	Farmer	3 boys	1	*			*	*		
Mary Nkunja	Farmer	3 boys, 1 girl	1	*				*		
Mary John	Farmer	3 boys, 3 girls	2 1/2	*				*		
Lucy Mworira	Farmer	3 girls, 6 boys (singing)	2	*				*		
M'ikirima	Farmer	3 girls, 6 boys (farming)	2.9	*				*		
M'mwamba										
M'ndubi M'itome	Farmer	4 girls, 5 boys	13.75	*				*		
M'noti Mburugu	Farmer	3 girls, 2 boys	2.66	*				*		
Clement Muthomi	Farmer	2 boys, 4 girls	2	*				*		
Jacob Kubania	Farmer	5 boys, 4 girls (herding)	2	*				*		
Jerica M'kiengo	Farmer	5 boys, 2 girls	3.1	*				*		
Joseph Mathenge	Farmer	7 boys, 1 girl (herding)	2 1/2	*				*		
Jeffrey Gikunda	Farmer	4 girls, 4 boys (farming)	3	*				*		

NAME	OCCUPATION	FAMILY/ HOBBY	PLOT SIZE (ACRES)	MAJOR CROPS				Do you buy food crops from market?		
				Coffee	Maize/ Beans	Bananas	Horti- culture	Mostly	Some- times	None
Josphat Murori	Farmer	3 girls, 2 boys	1	*				*		
Jasper Itwamwari	Farmer	3 boys, 5 girls (T. dance)	2	*					*	
Mbaya M'chunge	Farmer	3 boys, 1 girl (sports)	1 1/2	*					*	
Mwanja Gitwoki	Farmer	4 girls (herding)	8	*					*	
M'murithi Manyara	Farmer	4 boys, 5 girls (farming)	6	*					*	
Josphine Kinoti	Farming	3 girls, 1 boy	1	*					*	
Henry Muthomi	Farmer	1 girl, 1 boy (Farming)	1	*					*	
M'mbui M'ichunge	Farmer	3 boys, 5 girls	6.63	*					*	
Japhet Kiambi	Farmer	3 girls playing (Ajua)	1 1/2				*		*	
Andrew Muketha	Farmer	2 boys, 2 girls	5	*					*	
Adward M'ringine	Farmer	4 boys, 1 girl (farming)	5	*					*	
Japhet Magambo	Farmer	3 boys, 4 girls (farming)	4 1/2	*					*	
Jeffrey Gikunda	Farmer	2 boy (farming)	2	*					*	
Misheck Gituma	Farmer	2 boys, 1 girl (sports)	3	*					*	
Daniel M'anyoni	Farmer	4 boys, 5 girls (farming)	3.3	*					*	
Hellen Ambrose	Farming	1 boy, 1 girls	1	*					*	
Mary Mwirangi	Farming	4 boys, 2 girls	1/2	*					*	
Lydia Luka	Farming	2 girls	1	*					*	
Mukindia Mbogori	Farmer	4 girls, 5 boys	4	*					*	
Joseph Mutua	Farmer	1 boy, 5 girls	2 1/2	*					*	