

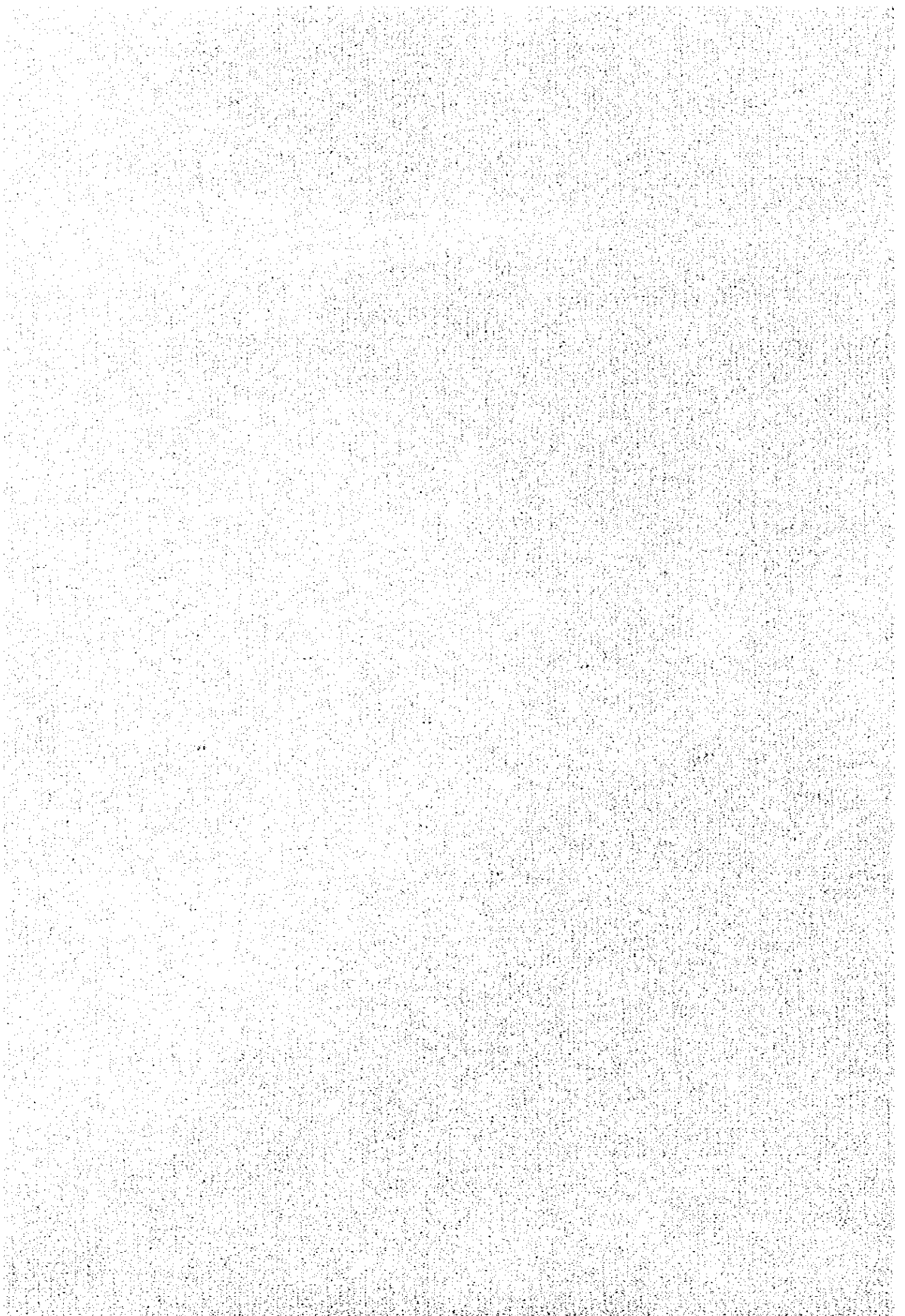
## 添 付 資 料

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2. SCOPE OF WORK
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## 添 付 資 料 1

### ケニア国政府要請書





MINISTRY OF LAND RECLAMATION, REGIONAL AND WATER DEVELOPMENT

PROPOSAL FOR THE AFTERCARE STUDY  
OF THE  
NATIONAL WATER MASTER PLAN

JUNE 1996

## 1. INTRODUCTION

### 1.1 The National Water Master Plan

The Study on the National Water Master Plan (hereinafter referred to as "the National Water Master Plan") was carried out as one of technical cooperation programme of the Japan International Cooperation Agency (hereinafter referred to as "the JICA") during the period from January 1990 and July 1992. The executing agency of the said study was the Ministry of Water Development (now it is organized into as the Ministry of Land Reclamation, Regional and Water Development, hereinafter referred to as "the MLRRWD"). The final report of the National Water Master Plan was released publicly in July 1992.

The National Water Master Plan has elaborated two main outputs. One is Water Resources Development and Use Plan towards the year 2010, which presents directions of future water resources development based on the national water development policy. The said plan indicates that it is time to expedite water resources development to a greater extent if the declared goal of the national socio-economic development is to be attained. The other is the Master Action Plan towards the year 2000, which deals with recommendations of various actions to be undertaken by the Government of Kenya (hereinafter referred to as "the Government") to ensure coordination of relevant activities for the integrated development and management which are one of the essential and most important resources in Kenya for the improvement of people's live and national economic development, while serious water stress has increasingly taken place in various parts of the country. A framework scenario of the proposed implementation programme is also presented.

The National Water Master Plan has indeed worked out very extensive water development plan as summarized below :

- (1) Domestic /Industrial water supply
  - (a) Urban water supply : Implementation of 158 urban water supply schemes (towns having a population more than 5,000 in year 2000).
  - (b) Rural water supply : Provision of safe and sustainable water sources up to 2000 and supply of piped water up to 2010 covering the whole country.
- (2) Sewerage development : Provision of adequate sewage disposal systems including public sewer facilities for 158 urban centers.

- (3) Irrigation development
  - (a) Major irrigation schemes : Implementation of 18 schemes.
  - (b) Small scale irrigation schemes : Implementation of 140 schemes scattered over the country.
- (4) Livestock development and wildlife conservation
  - (a) Livestock water supply : Conservation of surface water and provision of various water resources.
  - (b) Enhancement of nomadic pastoralism : Provision of 560 boreholes/shallow wells in nomadic pasturage area.
  - (c) Wildlife watering : Conservation of natural water resources and existing facilities.
- (5) Hydropower development : Construction of 6 hydropower projects.
- (6) River and flood control works
  - (a) Major flood control works : Implementation of 5 flood control projects.
  - (b) Urban drainage work : Provision of drainage facilities for 47 major towns.
  - (c) Major river improvement work : River improvement work where problems arise, particularly in urban areas.
  - (d) Stabilization of Lower Tana River channel : Rectification of meandering and bank erosion as a pilot work for the long-term improvement.

The National Water Master Plan sets forth the Action Plan to be deployed henceforth achievement of the above water development plan. The basic principles are that all the development targets would be accomplished by the year 2010, meeting development demands in the year 2000 as an intermediate target.

### 1.2 Needs for Aftercare Study of the National Water Master Plan

The Government recognizes that the National Water Master Plan is a very useful and significant for planning and implementation of not only water development but also regional development. In fact the National Water Master Plan contains fundamental data and information related to water resources development but also the latest socio-economic data and forecast such as population, land and water resources, socio-economic framework, agricultural situation, etc. for all districts with in the country.

Since completion of the National Water Master Plan, five years have passed. In spite of the Government's effort during this period, the development projects and actions proposed in the Action Plan of the National Water Master Plan have been realized little. There have been identified various constraints in implementing the proposed Action Plan and the socio-economic conditions of the country have changed to a great extent, resulting in increasing more stress on water resources development.

Although the six components of the National Water Master Plan are equally important each with the other in view of their contribution to and role in the national development, the Government rather places emphasis on achievement of the national targets of the water supply and sewerage development as earlier as possible. The national target of the water supply is "Provision of safe and sustainable water supply towards the year 2010", and that of the sewerage development is "Provision of adequate sewerage facilities in urban centers for people's well-being".

The Government is therefore keen to conduct an Aftercare Study of the National Water Master Plan (hereinafter referred to as "the Study") with an eye to verify the responsiveness of the proposed projects and actions in both the water supply and sewerage development components and select the water supply and sewerage development projects eligible for further study.

## 2. TERMS OF REFERENCE FOR THE STUDY

### 2.1 Objective of the Study

The objectives of the Study will be as follows :

- (1) To verify the responsiveness of the proposed development projects and actions with regard to water supply sewerage development components in the National Water Master Plan.
- (2) To review the Master Action Plan concerning the water supply and sewerage development.
- (3) To undertake transfer of technology to the counterpart personnel through the course of the Study.



## 2.2 Scope of the Study

### 2.2.1 Phase 1 : Data Collection and Field Investigation in Kenya

The scope of the Study under the Phase 1 will be, but not necessarily limited to, the followings

- (1) Collection of data and information to examine the forecast socio-economic parameters applied for formulation of the water supply and sewerage system development plans in the National Water Master Plan.
- (2) Field reconnaissance survey of the representative urban centers proposed for water supply and sewerage system development.
- (3) Preparation of inventory of the development projects and actions, which were actually implemented and/or are in progress after completion of the National Water Master Plan in 1992.
- (4) Identification and analysis of the constraints for the implementation of the proposed water supply and sewerage system development projects and their related actions through discussion with the Government authorities concerned.
- (5) Establishment of criteria for selection of the preferential water supply and sewerage system development projects through discussion with the Government's authorities concerned.

### 2.3.2 Phase 2 : Analytical Works in Japan

The scope of the Study under the Phase 2 will be, but not necessarily limited to, the followings

- (1) Verification of the responsiveness of the water supply and sewerage system development projects, which are presented in the National Water Master Plan, on the basis of the results of the Phase 1, including the review of the socio-economic parameters.
- (2) Revision/modification of the previous water supply and sewerage system development projects, where required.

- (3) Review of the Master Action Plan concerning the water supply and sewerage system developments, on the basis of the criteria to be established under the Phase 1.
- (4) Proposal for improvement of institutional building-up in order to ensure sustainability of the proposed water supply and sewerage system developments.
- (5) Review of financial requirement and economic feasibility for the eligible water supply and sewerage system development projects.

### 2.2.3 Transfer of Technology

The transfer of technology is an integral part of the Study and will be required to be pursued to the Government counterpart personnel throughout the Study. It is proposed to hold a couple of seminars when major outputs of the Study become available.

### 2.4 Reporting Requirement

The following reports will be prepared and submitted to the Government :

#### (1) Inception Report

The Inception Report will present the approach to and methodology of the Study, work schedule and organization. Within one week after commencement of the Study, the report will be submitted in 30 volumes.

#### (2) Progress Report

The Progress Report will be prepared summarizing all results of the Data Collection and Field Investigation in Kenya and criteria agreed upon between the Government authorities and the Study Team, which will subsequently be applied for the Analytical Works in Japan. The report will be submitted in 30 volumes within three (3) months after commencement of the Study.

### (3) Draft Final Report

The Draft Report is a final output of the Study and will cover the results of the Data Collection and Field Investigation in Kenya and Analytical Works in Japan and recommendations derived from the Study. The report will be submitted in 30 volumes within six (6) months after commencement of the Study.

### (4) Final Report

The report will be prepared upon receipt of the Government's comment on the Draft Final Report and submitted in 50 volumes within one (1) months after receipt of the comments.

## 3. SCHEDULE

The Study, in principle, will be carried out in accordance with the tentative study schedule as presented in the attached figure.

## 4. ORGANIZATION AND EXPERTISE INPUT

### 4.1 Organization

Similar organization as the previous study is proposed for the Study. The executing agency within the Government will be the MLRRWD in collaboration with the National Water Conservation and Pipeline Corporation (hereinafter referred to as "the NWCPC") and the MLRRWD will organize a Steering Committee by other water-related agencies in order to proceed with the Study efficiently and smoothly.

### 4.2 Expertise Input

For executing the Study, the following expertise will be required :

- (1) Team Leader
- (2) Water Supply Planning
- (3) Sewerage System Planning
- (4) Socio-economist
- (5) Institutional Expert

## 5. UNDERTAKINGS OF THE GOVERNMENT OF KENYA

To facilitate smooth conduct of the Study, the Government shall take the following necessary measures :

- (1) to secure the safety of the Study Team ;
- (2) to permit the members of the Study Team to enter, leave and sojourn in Kenya for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees ;
- (3) to exempt the Study Team from taxes, duties, and other charges on equipment, vehicles, machinery and other materials brought into Kenya for the implementation of the Study ;
- (4) to exempt the members of the Study Team from income tax and other charges imposed on or in connection with any emoluments or allowance paid to the members of the Study Team for their services in connection with implementation of the Study ;
- (5) to provide necessary facilities to the Study Team for remittance as well as utilization of funds introduced into Kenya from Japan in connection with the implementation of the Study ;
- (6) to provide medical services as needed. Its expenses will be chargeable on the members of the Study Team ;
- (7) to secure permission for the Study Team to take all data and documents (including photographs) related to the Study out of the Kenya to Japan ;
- (8) to secure permission for entry into private properties and/or restricted areas for the conduct of the Study ;

The Government shall bear claims, if any arises against the members of the Study 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 arises from gross negligence or wilful misconduct on the part of the members of the Study Team.

The MLRRWD shall, at its own expense, provide the Study Team with the following in cooperation with other relevant organization :

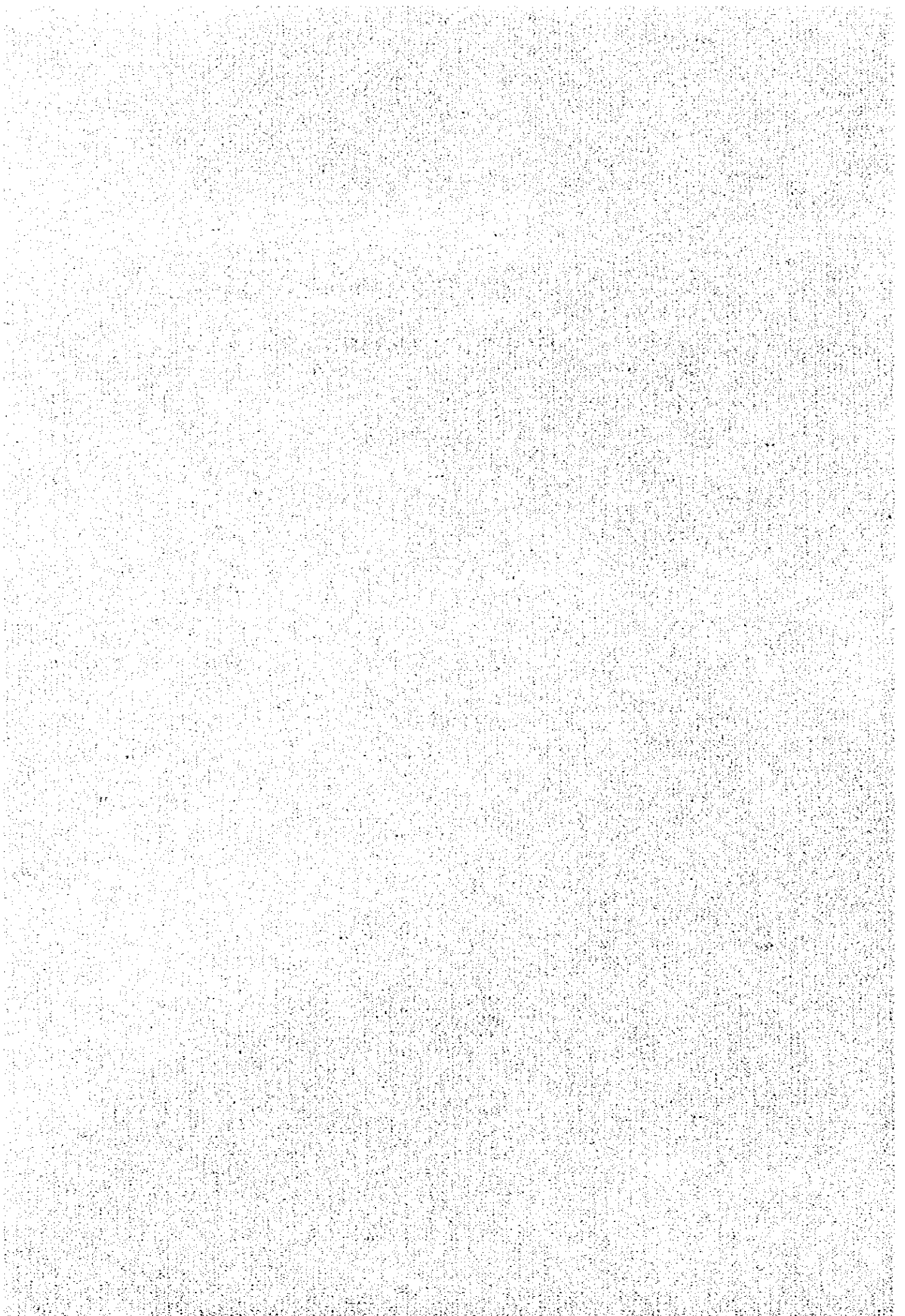
- (1) Available data and information related to the Study ;
- (2) Necessary number of counterparts including a project coordinator throughout the Study period ;
- (3) Suitable office space with necessary normal office equipment and clerical services ;
- (4) Credentials or identification cards ;
- (5) Permission to use walkie-talkie for execution of the field surveys.

AFTERCARE STUDY OF NATIONAL WATER MASTER PLAN  
TENTATIVE WORK SCHEDULE

Description	1	2	3	4	5	6	7	8
Data Collection and Field Works in Kenya								
Analytical Works in Japan								
Inception Report	▽							
Progress Report			▽					
Draft Final Report						▽		
Final Report							▽	

添 付 資 料 2

SCOPE OF WORK

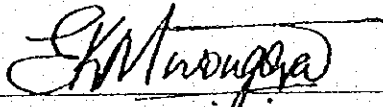




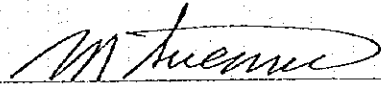
SCOPE OF WORK  
FOR  
THE AFTERCARE STUDY  
OF  
THE NATIONAL WATER MASTER PLAN  
IN  
THE REPUBLIC OF KENYA

AGREED UPON BETWEEN  
MINISTRY OF LAND RECLAMATION, REGIONAL AND WATER DEVELOPMENT  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Nairobi, May 20, 1997



Mr. ERASTUS K. MWONGERA, EBS, OGW  
Permanent Secretary,  
Ministry of Land Reclamation, Regional  
and Water Development



Mr. MITSURU SUEMORI  
Leader of the Preparatory Study Team,  
Japan International Cooperation  
Agency (JICA)

countersigned by



Mr. SIMEON S. LESRIMA, CBS  
Permanent Secretary,  
Ministry of Finance

## I. INTRODUCTION

In response to the request of the Government of the Republic of Kenya (hereinafter referred to as "the Government of Kenya"), the Government of Japan has decided to conduct the Aftercare Study of the National Water Master Plan in the Republic of Kenya (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study, in close cooperation with the authorities concerned of the Republic of Kenya.

The present document sets forth the Scope of Work with regard to the Study.

## II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to review water supply and sewerage development in the National Water Master Plan in the Republic of Kenya (hereinafter referred to as "the National Water Master Plan").
2. to recommend institutional build-up concerning management, institution, operation and maintenance, in review of water supply and sewerage development in the National Water Master Plan.
3. to transfer technology to the counterpart personnel in the course of the Study.

## III. STUDY AREA

The Study shall cover the whole area of the Republic of Kenya.

## IV. SCOPE OF THE STUDY

### Phase I: Basic Study

1. Collection and review of related data and information
  - (1) natural conditions, including meteorological, hydrological and geological data
  - (2) social and economic conditions
  - (3) health conditions
  - (4) national, urban and regional development plans
  - (5) laws, regulations, policies and customary practices relevant to water development and management, and to sewerage development
  - (6) water use and water rights
  - (7) present institutions, organizations, administration and their function relevant to water development and management, and to sewerage development
  - (8) on-going and planned projects relevant to water supply and sewerage
  - (9) land use
  - (10) existing water supply and sewerage facilities
  - (11) on-going and planned projects relevant to the Study
  - (12) water quality

*EM*

*Q*

- (13) environment
  - (14) other relevant data and information
2. Field reconnaissance
    - (1) existing water supply and sewerage facilities
    - (2) present conditions of operation and management concerning water supply and sewerage
    - (3) natural, social, environment and economic conditions relevant to water supply and sewerage
  3. Analysis and examination of the present conditions
    - (1) review of existing water resources
    - (2) review of water demand and supply balance
    - (3) institutions, organizations, administration, their function relevant to water development and management, and sewerage development
  4. Review and confirmation of Macro-Framework
    - (1) socio-economic conditions such as population projection, GDP and economic growth
    - (2) water demand
    - (3) water demand and supply balance
    - (4) waste water
  5. Preliminary confirmation of basic policy and criteria for review of the National Water Master Plan

**Phase II : Review of the National Water Master Plan and Recommendation of Institutional build-up**

1. Confirmation of basic policy for review of the National Water Master Plan
2. Confirmation of criteria for review of the National Water Master Plan
3. Review of the National Water Master Plan
  - (1) review of the National Water Master Plan
  - (2) operation and maintenance
  - (3) cost estimation
  - (4) formulation of institutional build-up plan
4. Evaluation
  - (1) social evaluation
  - (2) technical evaluation
  - (3) financial evaluation
  - (4) economic evaluation
  - (5) environment evaluation
5. Formulation of implementation plan
6. Identification of priority project(s)
7. Recommendation of institutional build-up and legal framework

*JM*

*BA*

## V. STUDY SCHEDULE

The study will be carried out in accordance with the tentative schedule as attached in the appendix 1. The schedule is tentative and subject to be modified when both parties agree upon any necessity that arise during the course of the Study.

## VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of the Republic of Kenya.

1. Inception Report:

Fifty (50) copies at the commencement of the first work in Kenya. This report will contain the schedule and methodology of the Study as well as outline of the field survey.

2. Progress Report:

Fifty (50) copies at the end of Phase I. This report will contain the results of the Phase I survey and outline of the Phase II study program.

3. Draft Final Report:

Fifty (50) copies at the end of the analytical work in Japan. the Government of Kenya shall submit its comments within one (1) month after the receipt of the Draft Final Report.

4. Final Report:

One hundred twenty (120) copies within one (1) month after the receipt of the comments on the Draft Final Report.

## VII. UNDERTAKINGS OF THE GOVERNMENT OF KENYA

1. To facilitate the smooth conduct of the Study, the Government of Kenya will take the following necessary measures:
  - (1) To secure the safety of the Japanese study team (hereinafter referred to as "the Team")
  - (2) 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
  - (3) To exempt the members of the Team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into Kenya for the conduct of the Study

- (4) 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
  - (5) 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
  - (6) To secure permission for the Team to enter into private properties or restricted areas for the implementation of the Study
  - (7) To secure permission for the Team to take all data and documents (including photographs and maps) related to the Study out of Kenya to Japan
  - (8) To provide medical services as needed, expenses for which will be chargeable to the members of the Team.
2. The Government of Kenya 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. Ministry of Land Reclamation, Regional and Water Development (hereinafter referred to as "MLRRWD") shall act as a counterpart agency to the Japanese Study Team and also as a coordinating body in relation with other governmental and non-governmental organizations for the smooth implementation of the Study. MLRRWD shall, at its own expense, provide the Team with the followings, in cooperation with other organizations concerned:
    - (1) available data and information related to the Study
    - (2) counterpart personnel
    - (3) suitable office space with necessary equipment in Nairobi
    - (4) credentials or identification cards
    - (5) an appropriate number of vehicles with drivers.

## VIII. UNDERTAKINGS OF JICA

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

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

## IX. CONSULTATION

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



## APPENDIX-1

## LIST OF ATTENDANTS

### KENYAN SIDE

(MLRRWD)

E.K. MWONGERA

P.N. MACHIRI

N. MUTURI

D.N. STOWER

J.R. NYAORO

T.W. KIBAKI

V.Y. JANI

J.M. OMWENGA

A.M.K. GACHANJA

F.M. MUIRURI

N. MUREITHI

P. OLOO

B.M. MULWA

Katsuyoshi KITAGAWA

Permanent Secretary

Director of Water Development

Deputy Chief Economist

Senior Deputy Director, Water Resources Development  
Branch

Registrar of Water Rights

Assistant Director of Water Development, Technical Planning  
Section

Assistant Director of Applied Water Research and Water  
Technology

Assistant Director of Water Quality Surveillance

Assistant Director of Hydrogeology Research Section

Assistant Director of Ground Water Development Supervision

Assistant Director of Water Development Design Section

Assistant Director of Surface Water Project Coordination  
Section

Water Apportionment Board

Programme Coordinator (JICA Expert)

### JAPANESE SIDE

(Preparatory Study Team)

Mitsuru SUEMORI

Masayuki WATANABE

Tetsuya IKEDA

Katsuyoshi SAITO

Takashi INOUE

Eiichi YOSHIDA

Team Leader

Water Resources Management

Surface Runoff Development

Coordinator

Water Resources Development

Socio-Economist

(JICA Kenya Office)

Yoshiharu YAMADA

Assistant Resident Representative



## APPENDIX-2

### The Function and Composition of the Steering Committee

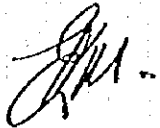
#### I. Function

In view that the Aftercare Study of the National Water Master Plan in the Republic of Kenya (hereinafter referred to as "the Study") will cover a wide range of subjects handles by other water-related organization and agencies, Ministry of Land Reclamation, Regional and Water Development (hereinafter referred to as "MLRRWD") will establish a Steering Committee consisting of other water-related organizations and agencies for overall management of the Study.

A Technical Sub-Committee (hereinafter referred to as "TSC") comprising the staff of MLRRWD and the other concerned agencies will also be formed as an organization responsible for day-to-day management of the Study. The Study Team will maintain close liaison and contact with TSC on all matters. The TSC will dispatch to the Study a project coordinator and appropriate number of counterpart personnel, to assist the Study Team in arranging for access to available data, in deterring special problem areas and in conducting field survey and study activities.

#### II. Composition

1. MLRRWD
2. Ministry of Local Government
3. Ministry of Commerce and Industry
4. Ministry of Energy
5. Ministry of Planning and National Development
6. Ministry of Environment and National Resources
7. Ministry of Agriculture, Livestock Development and Marketing
8. National Water Conservation and Pipeline Corporation
9. Tana and Athi River Development Authority
10. Lake Basin Development Authority
11. Kerio Valley Development Authority
12. Ministry of Tourism and Wildlife
13. Permanent Presidential Commission on Soil Conservation and Afforestation
14. National Irrigation Board

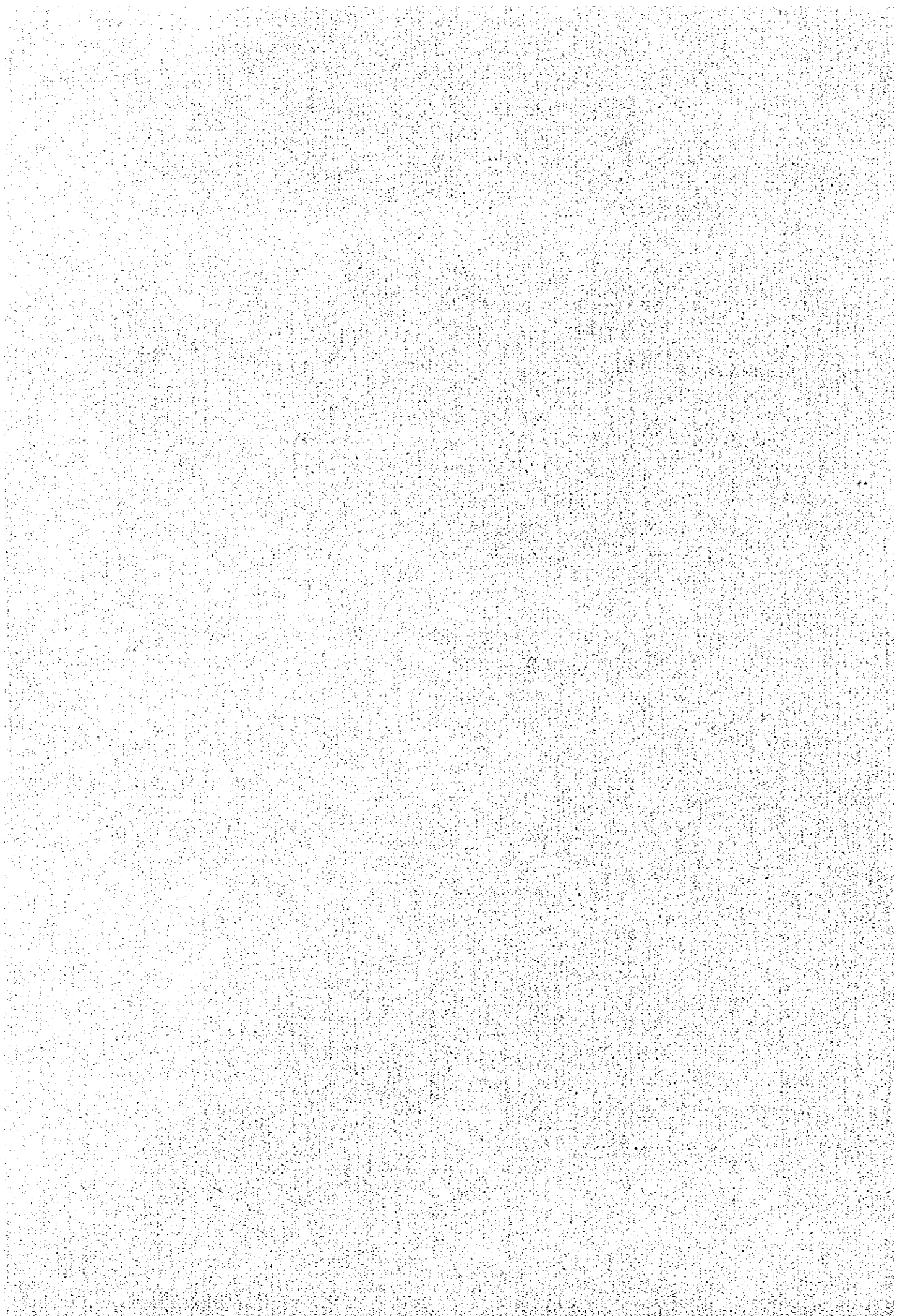






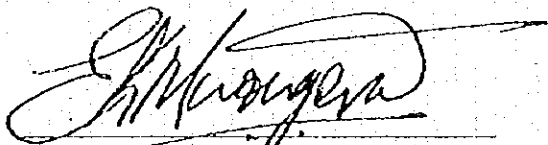
添 付 資 料 3

MINUTES OF MEETINGS

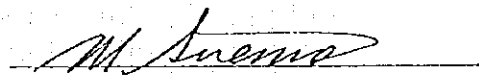


MINUTES OF MEETINGS  
ON  
SCOPE OF WORK  
FOR  
THE AFTERCARE STUDY  
OF  
THE NATIONAL WATER MASTER PLAN  
IN  
THE REPUBLIC OF KENYA  
  
AGREED UPON BETWEEN  
MINISTRY OF LAND RECLAMATION, REGIONAL AND WATER DEVELOPMENT  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Nairobi, May 20, 1997




Mr. ERASTUS K. MWONGERA, EBS, OGW  
Permanent Secretary,  
Ministry of Land Reclamation, Regional  
and Water Development



Mr. MITSURU SUEMORI  
Leader of the Preparatory Study Team,  
Japan International Cooperation  
Agency (JICA)

countersigned by



Mr. SIMEON S. LESRIMA, CBS  
Permanent Secretary,  
Ministry of Finance

## 1. Introduction

In response to the request of the Government of the Republic of Kenya (hereinafter referred to as "the Government of Kenya"), the Preparatory Study Team (hereinafter referred to as "the Team") of the Japan International Cooperation Agency (hereinafter referred to as "JICA") visited Kenya from May 11 to May 22, 1997 to discuss the Scope of Work (hereinafter referred to as "S/W") for the Aftercare Study of the National Water Master Plan in the Republic of Kenya (hereinafter referred to as "the Study").

The Team carried out field surveys of the study area and held a series of discussions with the authorities concerned of Ministry of Land Reclamation, Regional and Water Development (hereinafter referred to as "MLRRWD") and other organizations.

The list of attendants is shown in the Appendix I.

The Minutes of Meetings have been prepared for the better understanding of S/W agreed upon between the MLRRWD and the Team on May 20, 1997, summarizing main points of the discussions made in the course of the preparation of S/W.

## 2. Necessity of the Study

As the result of the evaluation of the present situations of the National Water Master Plan (including Domestic/Industrial water supply, Sewerage development, Irrigation development, Livestock development and wildlife conservation, Hydropower development, and River and flood control works), the necessity to review water supply and sewerage development in the National Water Master Plan is identified.

## 3. Study Title

Both sides agreed that the title of the Study would be "the Aftercare Study of the National Water Master Plan in the Republic of Kenya" as described in S/W.

## 4. Objectives of the Study

Both sides agreed that objectives of the Study are as follows.

- (1) Urban water supply :  
to review criteria, to formulate implementation plan and to identify priority project(s) in the 158 urban water supply schemes, and others to be selected in the course of the Study
- (2) Rural water supply :  
to review criteria for selection of priority project(s)
- (3) Sewerage development :  
to review criteria, to formulate implementation plan and to identify priority project(s) in the 158 urban centers and others to be selected in the course of the Study
- (4) Recommendation on institutional and legal framework :  
to recommend institutional and legal framework for securing the sustainability for water supply and sewerage development

## 5. Criteria for Review of the National Water Master Plan

Both sides discussed criteria for review of the National Water Master Plan. The following criteria are provisional for the Study and those will be confirmed in the course of the Study.

- (1) availability of water sources
- (2) population size and growth rate
- (3) cost for development / operation and maintenance
- (4) cost recovery



- (5) willingness and capability to pay water tariff
- (6) water supply and sewerage coverage
- (7) environment
- (8) health conditions
- (9) water quality
- (10) institutional build-up (including human resources)
- (11) water rights
- (12) industrial development
- (13) others

#### **6. Counterpart Agency**

MLRRWD shall act as the counterpart agency as described in S/W.

#### **7. Coordination with Other Ministries and Organizations**

The Team requested MLRRWD to coordinate with other ministries and organizations concerned such as the Ministry of Local Government, the Ministry of Environment and Natural Resources to get maximum cooperation from these organizations as well as to avoid any duplicated works. The Team also suggested to establish a steering committee and a technical sub-committee to achieve the above mentioned coordination. MLRRWD agreed to this point and promised to set up the committee and invite representatives from relevant ministries and organizations for the smooth implementation of the Study. The function and composition of the steering committee is shown in Appendix 2.

#### **8. Undertakings of the Government of Kenya**

- (1) It was confirmed that the MLRRWD would secure the full support and participation of organizations concerned in the course of the Study.
- (2) It was confirmed that MLRRWD would assign the appropriate number of counterpart personnel to the JICA Study Team. The number and fields of counterpart personnel will, however, be finalized by MLRRWD and the JICA Study Team in discussions at the commencement of the Study.
- (3) The Team requested that MLRRWD would provide suitable office space with necessary equipment in Nairobi, and sufficient numbers of vehicles with drivers for the Study. MLRRWD accepted to provide suitable office space with necessary furniture (desk, chairs, filing cabinets, and other appropriate office furniture), electricity and telephones, but MLRRWD expressed concern that, due to budgetary constraints, it would be difficult to provide office equipment (necessary number of facsimiles and photocopy machines), telecommunication fees and vehicles with drivers. The Team promised to convey the request to JICA H.Q. for consideration.

#### **9. Counterpart Training**

MLRRWD requested that JICA conduct counterpart training in Japan, in addition to on-the-job-training, for the purpose of the smooth transfer of technology during the Study. The Team agreed to convey the request to JICA H.Q. for consideration.












#### **10. Technology Transfer Workshop**


MLRRWD requested that JICA hold a workshop as a part of the technology transfer in the course of the Study. The Team recognized the necessity and promised to convey the request to JICA H.Q. for consideration.




APPENDIX-1

TENTATIVE SCHEDULE

MONTH	1	2	3	4	5	6	7	8	9	10
DESCRIPTION										
WORK IN KENYA										
WORK IN JAPAN										
PHASE OF THE STUDY	←		PHASE 1		→ <			PHASE 2		→
REPORT PRESENTATION	▲ ICR				▲ P/R			▲ D/R		▲ F/R

 : JICA Study Team's Work in Kenya

 : JICA Study Team's Work in Japan

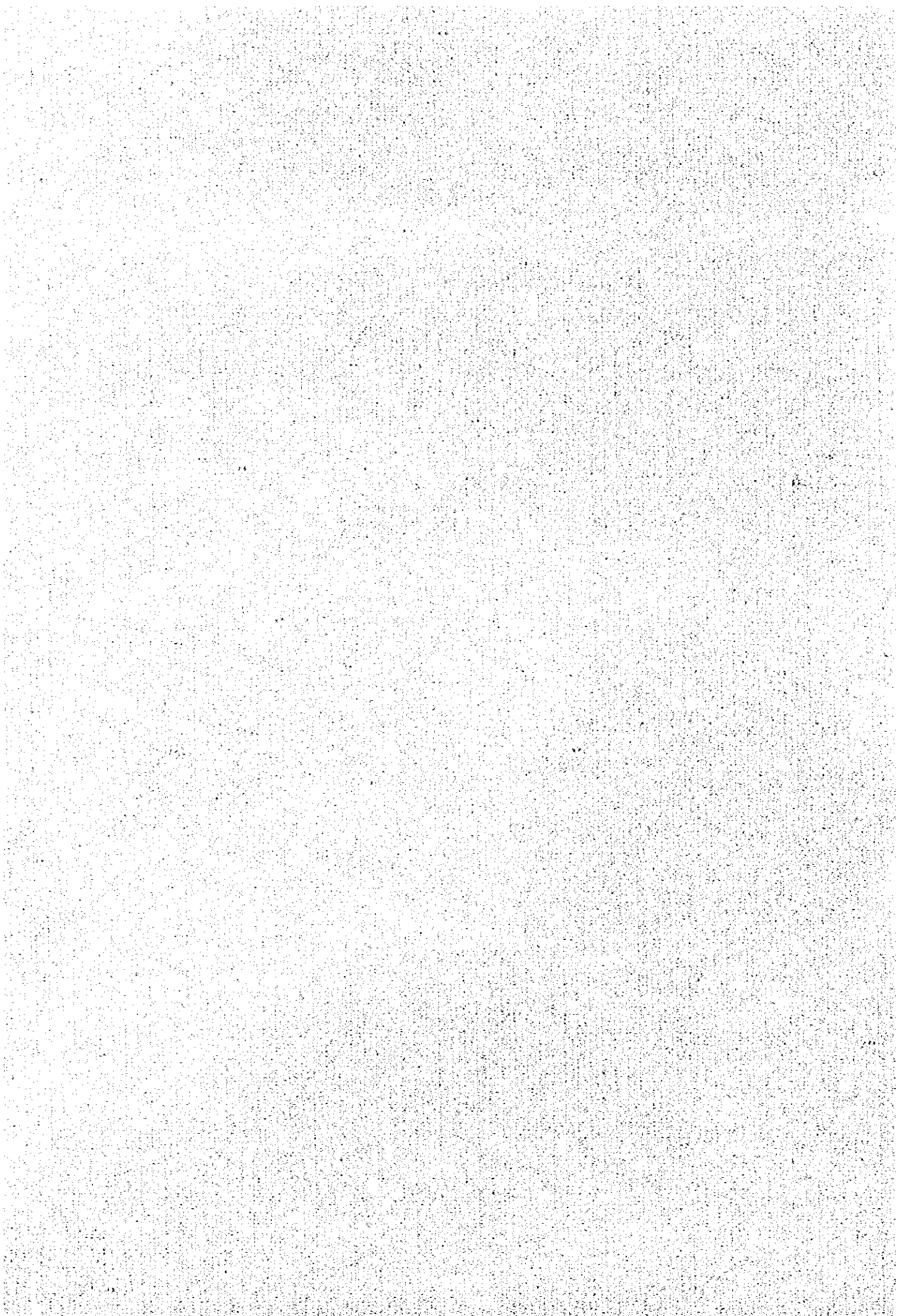
ICR : Inception Report      F/R : Final Report

P/R : Progress Report      D/R : Draft Final Report




## 添付資料 4

### 質問表及び回答





QUESTIONNAIRE LIST  
AFTERCARE STUDY OF THE NATIONAL WATER MASTER PLAN

## 1. BASIC DATA

Q Items	Description	Data Availability (Y/N)	Data issuer/publisher (Please note)	Name of materials (Please elaborate)
[Macro economy]	GDP and GNI <sup>1</sup> trend and forecast by 2010	Y	M of Com & Industry	Seasonal Paper on Industry by 2025
	GDP share by sector and by region	Y		Economic Survey 1995, Statistical Abstract 1995
	GDP per capita per region	Y		
	Balance of payment	Y	Central Bank of Kenya	Quarterly Economic Review
	Inflation rate/Consumer price index	Y	Central Bank of Kenya	Quarterly Economic Review
	Government reserves	Y	Central Bank of Kenya	Quarterly Economic Review
	External finance and its share by donor institutions	Y		Budget Booklet
	National budget by sector and current/investment structure	Y		Programme Review and Forward Budget 1997-2000, Public Investment Programme
[Labour market]	Labour market new entrants per year	Y		Statistical Abstract
	Job creation and unemployment rate	Y		Statistical Abstract
	Average wage by sector	Y		Statistical Abstract
[Development planning]	National development plan	Y		8th National Development Plan
	Regional development plan	Y		District Development Plan
	Urban development plan	Y/N	Municipal Council/Town Clerk	
	Industrial development plan and recent locational trend	Y	M of Com & Industry	
	Land use change	Y	Dept of Remote Sensing, M of Planning	

2. SOCIAL DATA

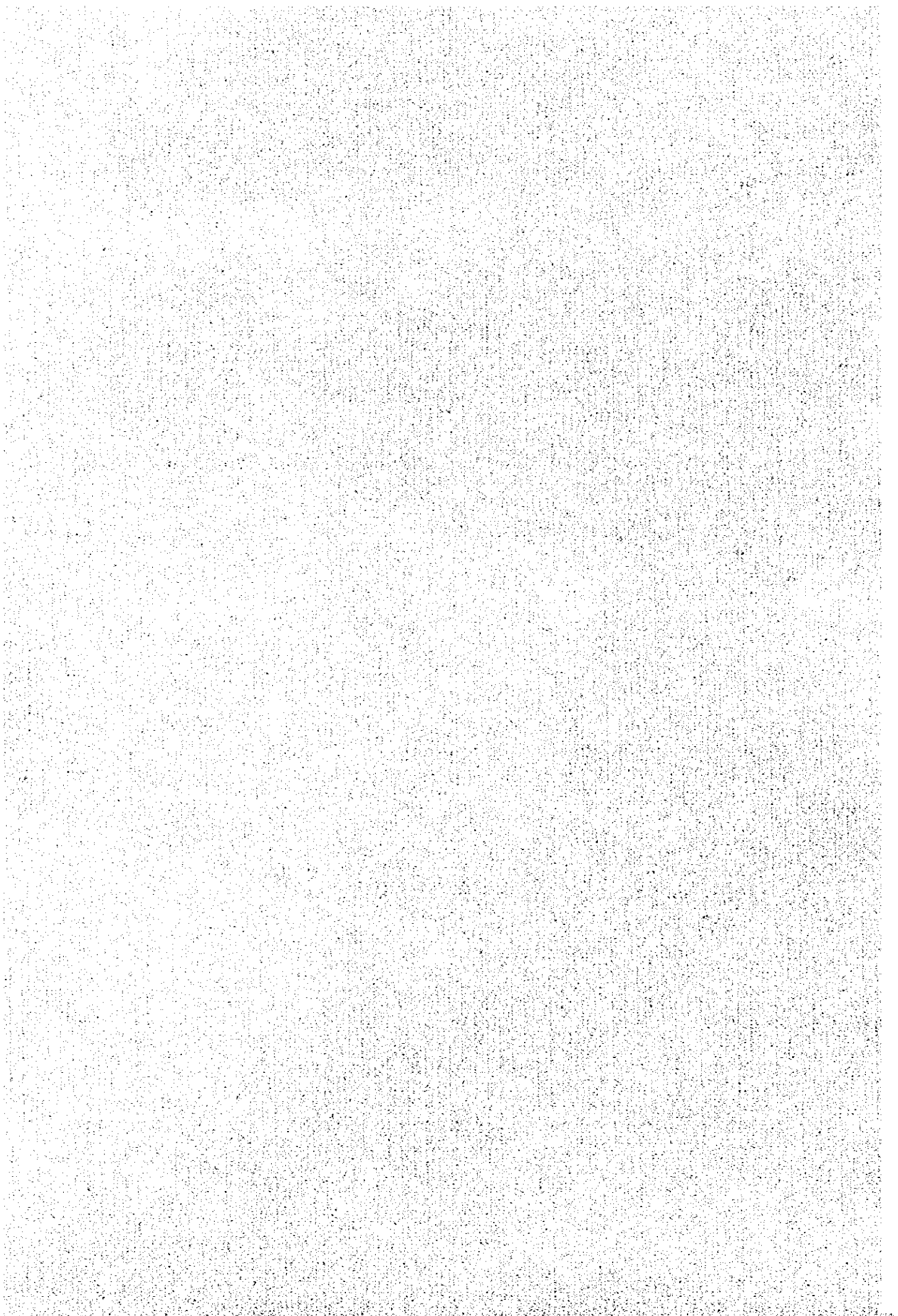
Q items	Description	Data Availability	Data issuer/publisher	Name of materials
[Population]	Population by province, district, municipality, age, sex, race and religion.	Y		Statistical Abstract, Census Analysis vol 2 1989
	Occupational breakdown of population			
	Urbanization trend			
	Migration pattern			
	Population structure by gender and by age class			
	Population density map			
	Household number and expenditure structure urban/rural			
[Institution & organization]	Organization development in the NWCP	Y	NWCP	
	Water act amendment	Y	NWCP	Water Act Review
	Financial structure of NWCP & other water supply agency, financial statement	Y	NWCP	
	Water demand and supply forecast by 2010	Y	MLRRWD	
	Local maintenance structure	Y	MLRRWD	
	Tariff collection system	Y	AC Chamber	Kenya Gazette supplement # 5 1995
	Water demand on National/Region, Urban and rural level	Y	MLRRWD	
	Sewerage treatment capacity on national, region, urban and rural level	Y	MLRRWD	
[Community]	Community social structure	Y		Rural Sociology and Rural Development its application to Kenya
	Land ownership			
	Consumption structure			
	Credit union and financial institution			
	Household income/expenditure structure			
Women's daily chore timegraph				
Access to safe water/toilet	Y	MOH		

	Water supply and sewerage maintenance system	Y	MLRRWD	Need updating
	Tariff affordability	Y	MLRRWD	
	Health consciousness	N	MOH	
	Clean water consciousness	Y	MOH	
	Water born infection consciousness	Y	AG CHAMBER	WATER ACT, CAP 372 REVISED 1972
	Water resource ownership	Y	WATER RIGHTS SEC	
	Water resource and residence location	Y	MLRRWD	MLRRWD WATER PERMITS
	Water resource quantity, quality and seasonal change	Y	MLRRWD	
	Differentiation on water consumption / drinking, cooking, washing, bathing	Y	UNICEF	
	Livestock watering, irrigation, cottage industry	Y	Ministry of Public Works	
	Domestic water storage	Y	NWCPC	
	Water demands domestic / industrial	Y	JICA / WRAP	NWMP, DWDP District Water Development Planning
	Participatory approach awareness	Y	JICA / WRAP	
	History of cooperative work	Y	JICA / WRAP / KERINC	
	Past planning participation	Y	OK Kenya Finland Cooperation	NWMP, DWDP WESTERN KENYA DEV PROJECT
	Village structure legal and traditional / informal	Y	M of Culture and Social Services	Various documents on ASAL programme
	Water interest group	Y	MLRRWD	
	Village leadership and hierarchy	Y	MPMD	
	External liaison person	Y		
	Inner community decision making process	Y		
[Education]	Residents skill level			
	Formal / informal communication system			
	Availability of traditional and modern media and reliability			
	Literacy and language			
	Accessibility to media			
	Educational facility			
[Local Consultant]	Local consultant cost			
	Local consultant firm / NCO			



## 添 付 資 料 5

### 主要面会者リスト



## 面談者リスト

### 国土開拓・地域・水開発省

E.K. MWONGERA	Permanent Secretary
P.N. MACHIRI	Director of Water Development
N. MUTURI	Deputy Chief Economist
D.N. STOWER	Senior Deputy Director, Water Resources Development Branch
J.R. NYAORO	Registrar of Water Rights
T.W. KIBAKI	Assistant Director of Water Development, Technical Planning Section
V.Y. JANI	Assistant Director of Applied Water Research and Water Technology
J.M. OMWENGA	Assistant Director of Water Quality Surveillance
A.M.K. GACHANJA	Assistant Director of Hydrogeology Research Section
F.M. MUIRURI	Assistant Director of Ground Water Development Supervision
N. MUREITHI	Assistant Director of Water Development Design Section
P. OLOO	Assistant Director of Surface Water Project Coordination Section
B.M. MULWA	Water Apportionment Board
JO NYAGUTI	Irrigation Engineer, Irrigation and Drainage Branch
JN GATEI	Senior Economist, Development Planning Division
BM MULWA	Water Board
北川勝義	JICA専門家

### 国家灌漑庁

JP OLUM	Chief Engineer
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### 大蔵省

JK KANITHI	Undersecretary
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### 商工省

MM NZOMO	Deputy Director, Dept. of Industries, Ministry of Commerce and Industry
GM MUNYAO	Senior Industrial Development Officer, Dept. of Industries, MoCI

### 地方自治省

RKA SIELE	Permanent Secretary
FJ Mulli	Deputy Director, Urban Development

エネルギー省

N MUNYU

Principal Economist, Ministry of Energy

文部省婦人局

J MUTIE

Senior Social Development Officer, Research and Evaluation,  
Women's Bureau

U KIOKO

Lecturer, Department of Economics, University of Nairobi

商工省輸出加工区庁

T KIAGO

Manager, Research and Policy Planning, Export Processing Zone Authority

首相府NGO調整局

N IRENE

Programme Coordinator, NGO Coordination Board

ケニア中央銀行

MJP KANGA

Director of Research, Central Bank of Kenya

ニエリ市役所

Joseph NGUIGUTI

Engineer, Nyeri Municipal Council

世界銀行

Tore LIUM

Water Sector Planner, UNDP-World Bank Water and Sanitation Program

M KARIUKI

Regional Specialist, UNDP-World Bank Water and Sanitation Program

ユニセフ

Ali TIFO

Programme Officer, United Nations Children's Fund

エジプト大使館

Dr. A SALOUSSY

Councillor

ドイツ大使館

Dr. Ralf SCHROEDER

Head of Department for Economic Cooperation, German Embassy



NA MacDougall Team Leader, Urban Water and Sanitation Management Project,  
GTZ/Ministry of Local Government

ケニア水研究所

Joset EHRMANN Technical Adviser, GTZ, Kenya Water Institute  
S Muller-Meige Consultant, GTZ  
F FAHRLAENDER Project Adviser, GTZ  
GW GICHURI Consultant, Kenya Water Institute

オランダ大使館

JH CHRISTIAANSE First Secretary, Royal Netherlands Embassy

スウェーデン大使館

Finn FORSBERG First Secretary, Senior Programme Officer Water, Roads and NGOs

NGO

Kamau KARURI Team Leader, Intermediate Technology Development Group  
Hiraku DOI Executive Director, AEF INTERNATIONAL  
Ann MESOPIR Director, Kenya Country Office, Plan International

日本大使館

堀内 伸介 特命全権大使  
植松 龍二 二等書記官

海外経済協力基金ナイロビ駐在員事務所

長峰 美夫 首席駐在員

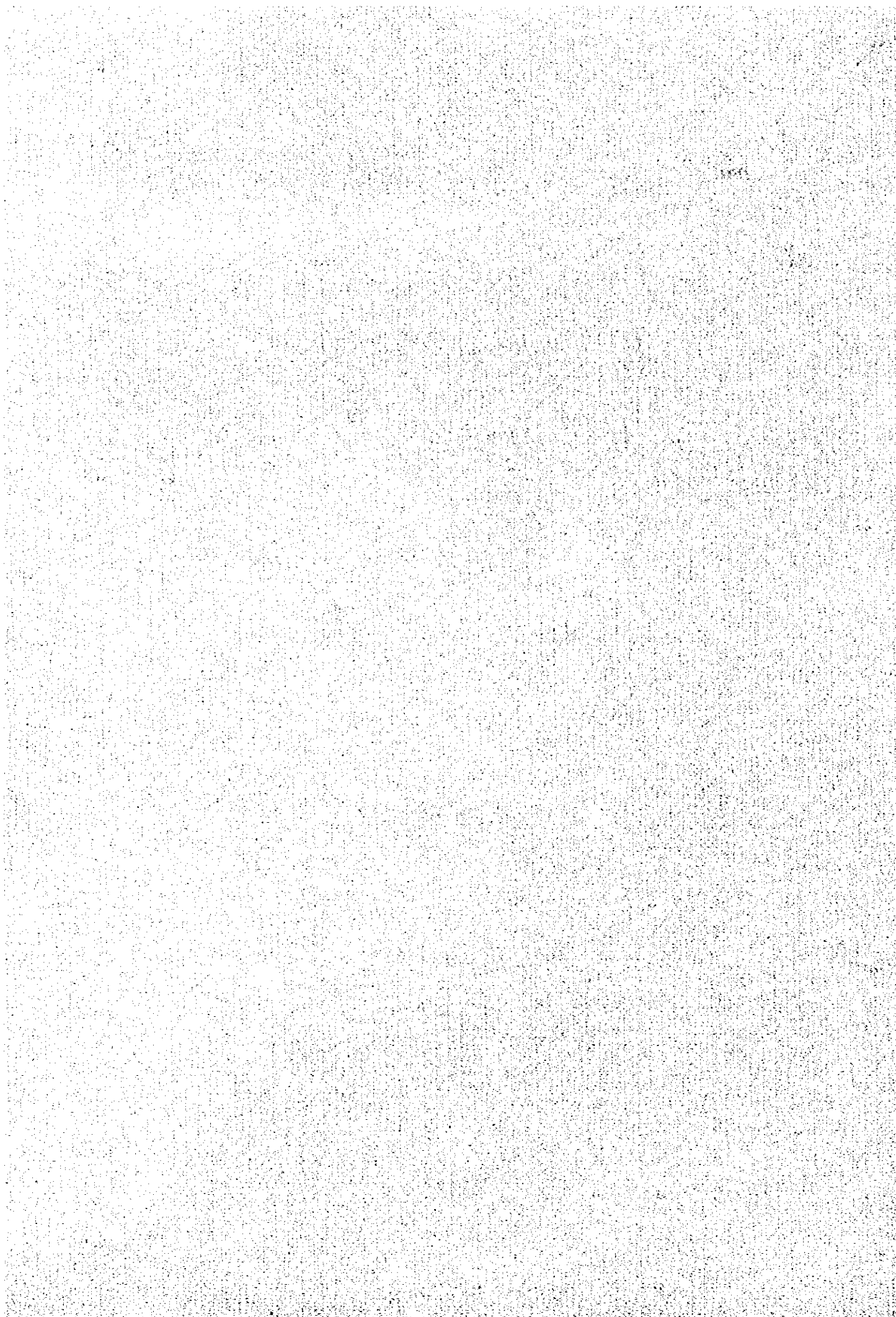
JICAケニア事務所

田上 実 所長  
松本 淳 次長  
山田 良春  
外崎 伸明



## 添 付 資 料 6

### ローカルコンサルタントのリスト



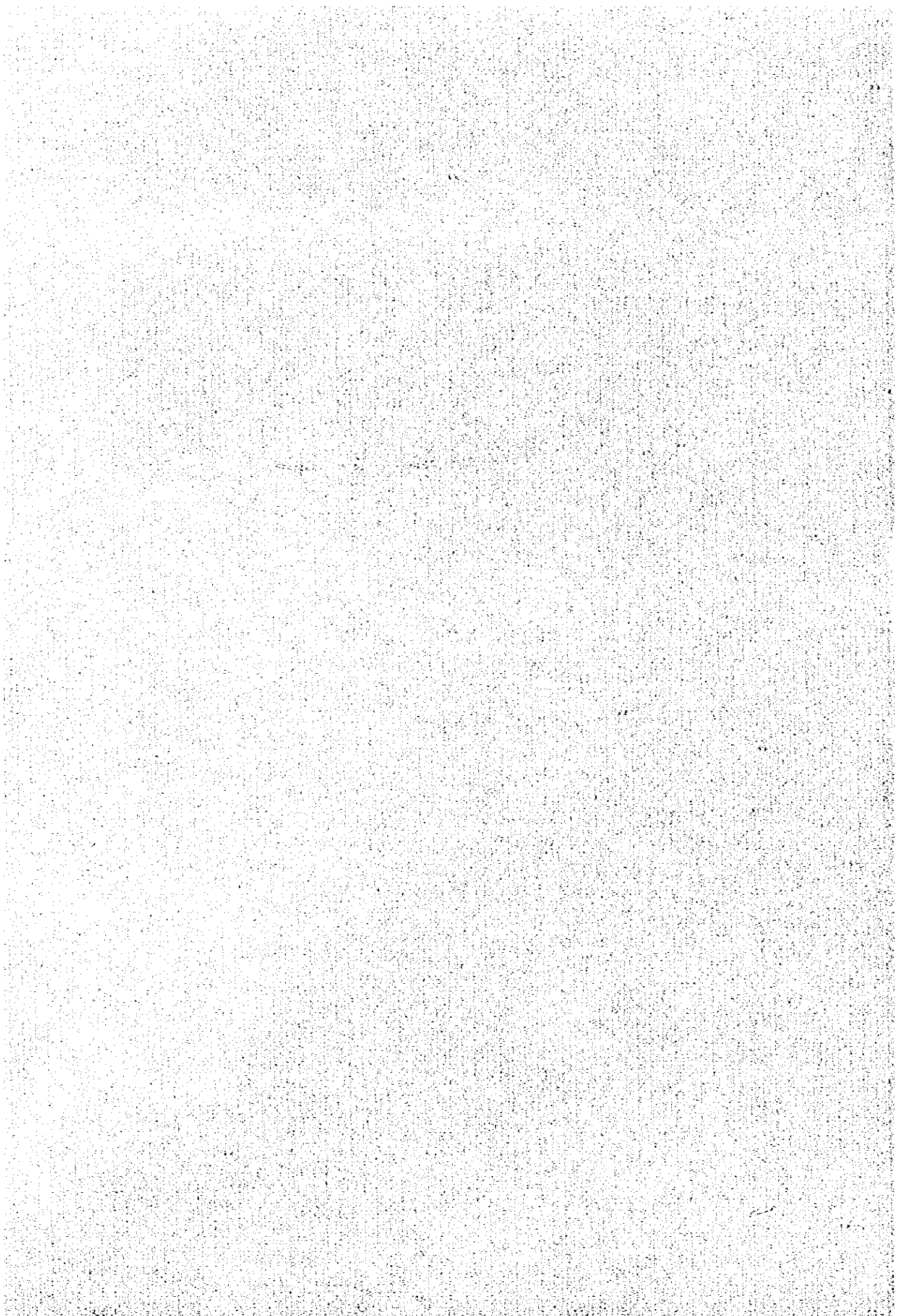
ローカルコンサルタント等一覧

会社名	P.O.BOX	TEL	FAX	担当者	摘要
<b>1. コンサルタント</b>	Nairobi				
GIBB Eastern Africa *	30020	338992	210694	Mr. Karekazi	総合
GAUF Ingenieure	49817	445228	446124	Mr. Laubert	総合
Mangat. I. B. Patel, Partners *	48674	710500	710549	Mr. Mangat	土木、衛生、建物
Otieno Odongo & Partners	54021	570022	570103		総合
Horward Humphreys (Kenya)	30156	729668	729428	Mr. Cameroon	総合
KEIPET	55324	723592	717533	Mr. Ondiege	社会経済
Norconsult A.S	48176	25580			総合
Billtech Environmental C. *	56160	243126	243126	Dr. W.N.Thitai	
Carl Bro Kenya Ltd.	50572	228191	333886		
Oda Management Service	74113	217584	331757		
<b>2. 地質業者</b>					
Mowlem Construction	30078	791241	791244		
Norconsult	48176	25580			
Geodrill		471763			
<b>3. 測量会社</b>					
Geomaps	61071	337167	210624		
Geo-Top Surveys	34763	222620	242979		
Mapsurveys Ltd.	44902	224480	218461		
Survey and Land Services	75195	228792			
Urban-Rural Surveying	62692	336072			
Photomap (K)	43805	726027	726028	Mr. Wiklund	
<b>4. 水質分析</b>					
Jomokenyatta University Agri. & Technology	62000	0151- 22649	0150- 21847	Mr. Nosaka	
Kenya Bureau of Standard	54974	502210	54974		
<b>*は見積徴収会社</b>					



## 添 付 資 料 7

### 収集資料リスト



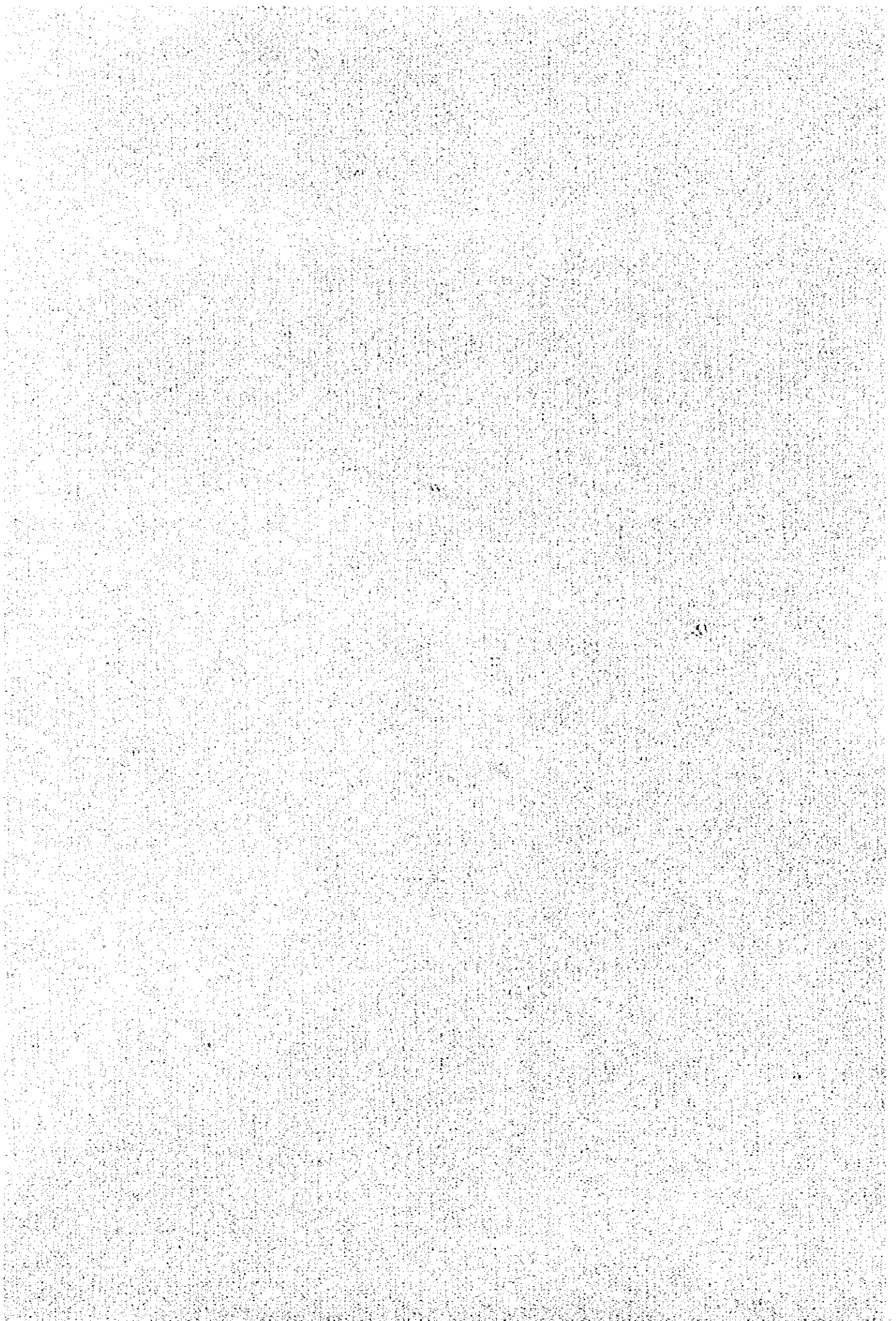


	入手先		資料名
1	NEAP		NEAP News Letter #1, 1996.8
2	JICA Kenya Office	コピー	URBAN and RURAL WATER SUPPLY
3			Budget and Number of Staff
4			MLRRWD Development Expenditure Summary 1996/97
5			Nakuru Sewage Works Rehabilitation and Expansion Project phase 2 1997
6			The Local Government Act Chapter 265 Laws of Kenya 1986
7			「グランドフォールズ水力発電に関する関連資料の送付」
8			東英生霊長類保護専門家によるタナリバー開発についての意見具申
9	購入	ソフトカバー	The 8th National Development Plan 1997-2001
10			Sixth Report of the Public Investment Committee on the accounts of State Cooperations vol 1, 2 1995
11			Economic Survey 1996
12			National Food Composition Tables and the Planning of Satisfactory Diets in Kenya 1993
13			Budget Speech for the Fiscal Year 1996/97
14			Sessional Paper No.2 of 1992 on Small Enterprise and Jua Kali Development in Kenya 1992
15			The Non Government Organizations Coordination act 1990
16			Sessional Paper No.2 of 1996 on Industrial Transformation to the Year 2020, 1996
17			Report of the Controller and Auditor-General on Local Authorities 1981
18			District Focus for Rural Development revised 1995
19			Report of the Presidential Committee on Unemployment 1982/83
20			Development and Employment in Kenya A strategy for the Transformation of the Economy
21	エジプト大使館	コピー	Training courses offered by the Government of Egypt to the Government of Kenya 1996
22		ソフトカバー	Egypt Year Book 1996
23	DCE	コピー	Programme Review and Forward Budget 1997/98-1999/2000
24	購入	ソフトカバー	Development Expenditures II
25	世銀	コピー	The Local Government Act Chapter 265
26			Kenya Local Government Reform Programme Draft
27			Kenya Local Government Reform Programme-A Paper on Intergovernmental Fiscal Relations
28			Kenya Local Government Reform Programme-An outline of the workplan
29			Kenya Local Government Reform Programme Workshop Programme
30	購入	ソフトカバー	Kenya Local Government Reform Programme Micro Project Component
31			Participatory Hygiene and Sanitation Transformation A new approach to working with communities
32			Privatizing Africa's Infrastructure Promise and Challenge
33			Rural Water Supply and Sanitation in Bolivia: From Pilot Project to National Program
34	水資源省	コピー	The Contribution of People's Participation Evidence from 121 Rural Water Supply Projects
35	購入	ソフトカバー	National Water Policy Draft 1996
36			Rural Sociology and Rural Development Its application to Kenya
37	購入		The Sociology of the African Family
38			KENYA FACTSBOOK 15th Edition1
39			Ministrial Rationalization in the Ministry of Land Reclamation, Regional and Water Development vol 1 Policy Review
40			Organization of the Government of the Republic of Kenya 1995,8
41	水資源省	コピー	The Water Act Chapter 372
42			Executive Summary Review of the Water Act Cap 372
43			Review of the Water Act (372) and the Water Amendment Bill 1993
			Reports of the Auditor General on the Accounts of National Water

44			Conservation and Pipeline Corporation 1996
45			The Environmental Management and Coordination Bill 1996
46			Draft Report Environmental Impact Assessment Guideline and Administrative Procedures
47			Minites of the Group Meeting Urban and Periurban Water And Sanitation Projects Working Group Meeting
48	購入	ソフトカバー	Water Supply Projects and Schemes Status Report
49		コピー	Statistical Abstract 1995
50			NYERI MUNICIPAL COUNCIL NYAJI/KIGANJO WATER SUPPLY
51	商工省	ソフトカバー	NYERI MUNICIPAL COUNCIL (by GTZ)
52	水資源省	コピー	KENYA A GUIDE FOR INVESTORS
53			Water Resources Information Water Right and Assesment Section Water Resources Database Unit
54			Kenya Water Institute(KEWI) 調査報告書
55			Alternative management options for water supplies in Kenya', DK Balasa 'Kenya Engineer 18-1'
56	中央銀行		WATER RESOURCES INFORMATION Water Rights & Assessment Section, Water Resources Database Unit
57			Monthly Economic Review Central Bank of Kenya May 1997
58			Central Bank of Kenya Quarterly Statistical Bulletin December 1996
59	ITDG		Quarterly Economic and Business Updates 10-12, 1996 Rehabilitation & Upgrading of Kenya's Infrastrcutre
60	GTZ	リーフレット	Intermediate Technology Kenya Annual Report 1996
61	購入	ソフトカバー	MOLG & GTZ Urban Water and Sanitation Management Project
62			The Participation of Women in Kenya Society
63			Celebrating Women's Resistance
64	Plan International		Local Authorities in Kenya
65			An Introduction to Plan International
66	婦人局		PLAN INTERNATIONAL WORLD WIDE ANNUAL REPORT
67			Women and Men in Kenya Facts and Figures 1995
68	EPZA		Report of the Women Groups Census in Kenya Nairobi Province
69	ニエリ水道局	コピー	EXPORT PROCESSING ZONES IN KENYA
70			Ministry of Land Reclamation Regional & Water Development Nyeri District Water Office Annual Report
71	水資源省		KENYA-SWEDEN RURAL WATER SUPPLY AND SANITAION PROGRAMME
72	ユニセフ	ソフトカバー	Second Monbasa & Coastal Water Supply Corporate Development Plan Water Sector Study Interim Report 1993
73	首相府	リーフレット	Community-based Water Supply and Sanitation Projects Baringo and Kisumu district in Kenya
74	婦人局	コピー	NGOs Coordination Board Kenya Fostering Cooperation and Partnership in Development
75		コピー	Report of the Women Groups Census in Kenya North-Eastern Province
76			Study on Solid Waste Management by JICA
77			NAIROBI CITY COUNCIL STATEMENT OF ACCOUNTS FOR THE YEAR ENDED 30 JUNE, 1995
78	水資源省	コピー	NAIROBI CITY COUNCIL 1995/96 ESTIMATES
			Ministrial Rationalization in the Ministry of Land Reclamation, Regional & Water Development vol 1 policy review

## 添付資料 8

### 現地踏査報告



## 現地踏査報告

### 1. ナイロビ市 KABETE Water Treatment Plant

調査日時 1997年5月16日(金) 9:00~11:00

面談者 Ruth W. Chege : Acting Superintendent II

#### 【調査内容】

- (1) ナイロビ市には4か所の浄水場があり、それぞれ、SAMUSUA、KIKUYU、KABETE、NGETU浄水場である。
- (2) KABETE浄水場は1939年にKenya Railwaysにより創設された。
- (3) 水源は約10km離れたKikuyu springであり、給水量(≒湧水量)約10,000m<sup>3</sup>/日、自然流下でこの浄水場まで導水され、塩素注入のみを行って給水していたが、現在ではこの浄水場を経由しないで、直接給水区域へ送水されている。
- (4) 1940年代初期にRuiru Riverに設けられたRuiru Damを水源として、9インチ(225mm)の铸铁管が布設され、60m<sup>3</sup>/h=1,440m<sup>3</sup>/dの取水量増加がなされた。
- (5) 1940年代後期に上記水源から12インチ(300mm)の铸铁管が布設され、120~150m<sup>3</sup>/hの取水量の増加が図られた。
- (6) 1940年代の末にはさらに15インチ(400mm)の铸铁管の増設とBooster Pump 2台の設置が完了し、400~600m<sup>3</sup>/hの取水増加が図られた。
- (7) 1950年代にSamusua Damでの浄水場が完成し、その浄水場で浄水処理した後、24インチ(600mm)の送水管で最大2,100m<sup>3</sup>/h、平均1,900m<sup>3</sup>/hがこのKABETE浄水場内の配水池へ直接流入し、給水されている。
- (8) 1997年には、ナイロビ市の低地区給水用としてNgetu浄水場からの送水管及びGigili配水池が完成し、自然流下をメインとして給水されている(一部ポンプ加圧により給水している地域がある)。
- (9) 浄・配水池はNo. 1~6まであり、No. 2~4には連絡管が布設されており、No. 5、6をバックアップできる配管となっているが、No. 1は独立している。
- (10) No. 1はタンクを満水にして給水開始すると、約4時間で空になってしまう。
- (11) この浄水場が管轄する給水地域から想定される給水人口は、概略でナイロビ市全人口の約4分の1、約100~150万人であり、Ngetu浄水場はナイロビ市全人口の4分の3に給水している。給水量は約7万m<sup>3</sup>/日(約40ℓ/日/人)である。
- (12) 消毒用塩素として、地方の浄水場でよくみられるさらし粉でなく、取扱いや維持管理がより難しい液体塩素を使用している。
- (13) 沈澱池のスラッジ除去の頻度は原水の水質によって異なり、高濁度の時期には1回/

月、乾期のように低濁度で安定している時期には1回/6か月の頻度で行われる。

- (14) スラッジ除去は、池を空にしてから人力排泥による。
- (15) 浄水場のフロック除去は、水源の水質にもよるが1～2回/月から半年に1回程度。
- (16) 浄水処理方式は、沈澱→塩素処理→ソーダ注入によるpHコントロールである。
- (17) 管路についてはすべて铸铁管である。
- (18) 塩素処理については、0.1～0.5ppmを目途に源水、浄水、給水栓で行っており、浄水は毎時検査を行っている。また、大腸菌については毎日検査を行っている。
- (19) 塩素濃度、検査頻度等に係る規定はない。

※水道料金についてMinistry of Local Governmentの担当者から聞き取り。

- (20) Nairobiの水道料金は、独立採算性(cost-recovery)として、MLRRWDの合意とMOLGの承認を得て、議会在が設定する。
- (21) 水道料金はWater ActのRegulationによって全国一律に設定されているが(National Water Conservation and Pipeline Corporationを含む)、Nairobiのように地域や自治体によって独自に設定している場合もある。
- (22) たとえば、Mombasaでは水道水源が遠く、導水管が長いため、水道料金も高い。

#### 【所感】

- (1) 沈澱池は横流式の凝集沈澱池であるが、フロックのキャリーオーバーが相当ひどい。次の段階であるろ過池の負担がかなり大きいと思われる。
- (2) ろ過池の砂表面は、不陸が大きいと判断できる。近々砂の入れ替えを予定しているということであるが、不陸は今後もこのまま発生するものと予想できる。
- (3) 維持管理レベルを確認するために各種の電気機械設備、水質検査室と設置されている分析機器等の現状を確認したかったが、時間の都合で省略せざるを得なかった。
- (4) ナイロビ市の規定上、保安上の理由により写真撮影が禁止されており、記録として文章しか残せないことも同じく残念である。

## 2. Nyeri District Water Office

調査日時 1997年5月19日(月) 9:00～

面談者 District Water Eng. Mr.S.G.MWANGI  
Superintendent of Water Supply Mr.Peter H.NJENGA

同行者 北川専門家、Mr. Murithi (MLRRWD)

#### 【調査内容】

- (1) 上水プロジェクト件数

MLG…2か所 Kamakwa Water Treatment Plant

## Kiganjo Water Treatment Plant

MLRRWD… 5 か所

NWPCPC… 3 か所 個別接続で、計量メーターが取り付けられているのは、10%以下であり、メーターのない接続はFlat Rateの料金である (90kshs/Month)。

### (2) 人口

District 700,000人

### (3) 給水すべき人口

NYERI市 (Municipal council) 100,000人 ※GTZ

COUNTRY COUNCIL 200,000人

MLRRWD 400,000人

### (4) 普及率

都市部 0.98 地方部 0.3

### (5) 組織

所長のもとに9課があり、全員で300人である。

※水道の徴収料金はいったん全額が政府に納金され、その65%がO/M CostとしてDistrictに返される。

### (6) District Water Officeの開発予算

1,200万シリング (内訳: IFAD 11M、政府 1M)

### (7) District Water Officeの経常経費

1,600~1,800万シリング (O/M 6~8M…Collected revenueの65%に相当、給料 10M)

#### 1) Mukurweini浄水場 (MLRRWD)

① 1985年ケニア国政府の予算で建設 4,600m<sup>3</sup>/day

2,600戸×5~6人/戸=15,000人

② 重力式で配水 塩素 浄水場の出口 4.0PPM

各家庭のTap 0.1~0.2PPM

③ O/Mコスト 90,000シリング/月 (人件費と薬品代)

砂ろ過は6か月前に閉塞して、現在使われていない (砂を取り除いて原因調査が必要である)。

④ 水源: Chinga Riverをアースダムで貯水池を建設、1956年逮捕された政府反乱分子を動員して建設したようである。

⑤ 平均深は4.0m、最大深 H=12m

雨量の少ない乾期でも0.3m程度の水位低下であり、水量はかなりある。

⑥ 流域面積は10km<sup>2</sup>?程度 水位計なし

上流域に人口、工場が少ないので水質悪化の心配は少ない。推砂問題なし。

## 2) Aguthi Water Supply (NWCPC)

① 原水は13km上流の河川水 (Chinga River) できれいな水である。

1982年 建設 (ケニア国政府とDanishの援助)

1988年 MOWD→NWCPCへ移管

② 重力で配水 7,000戸×10人/戸=70,000人

全個別接続にメーターが取り付けられており、最低料金は95ks/月/10m<sup>3</sup>

料金逦増制 (メーター使用量5シリングを含む)

③ 能力 5,000m<sup>3</sup>/day 6人体制 2人/12hで2シスト制

Schime Officeは全部で25人勤務

※原水がきれいな時は凝集剤 (硫酸バンド) を使用しない。

しかし、浄水池 (浄化後) の水が原水より悪いようで、適切な水処理がなされているとはいえない。

また、水質試験室及び試験器具がまったくない。

## 3. NYERI市役所

調査日時 1997年5月19日 (月) 13:00~

面談者 Enge. Joseph Nguiguti (Acting General Manager)

同行者 北川専門家、Mr. Murithi (MLRRWD)、Mr.N.Jenga

### 【調査内容】

(1) 2カ所の浄水場 6,000+1,000≒7,000m<sup>3</sup>/dayがあり、Current Demandは15,000m<sup>3</sup>/day、2010年をTarget yearとするF/Sを実施中で最終段階にきている (20MKSのGTZの援助)。

(2) 1995年: Water Supply and Sanitation Departmentが設立された。

### 1) KAMAKWA Water Supply (NYERI Municipal Council)

1948年 建設 (ケニア国予算)

1968年 建設 (ケニア国予算)

1989年 建設 (ケニア国予算)

1982年にMOWDからMLGに移管された。

配水池は直径19.6m、深4m、約1,000m<sup>3</sup>容量、6,000m<sup>3</sup>/day能力

取水点はChania Riverより取水口は6km離れている動力式と約900m離れている取水ポンプ場がある。ポンプupは2,800m<sup>3</sup>/dayである。



塩素量 浄水出口で1.5ppm、蛇口で0.4~0.6ppmの計画

拡張計画は2010年目標のF/S完了 1.5MKSの予算で4エーカーの拡張用地を確保している。

- ① 1948、1968年の処理場は沈澱ろ過だけのものであるが、1989年の処理場は凝集沈澱処理を行うものである。  
※見たところ、浄水処理された水質は良さそうであった。
- ② 現在の水需要に応えるためには施設更新が必要であるが、予算不足のため、Kamakwa 浄水場では処理能力を超えて8,000m<sup>3</sup>/日位を処理している。
- ③ 施設拡張については、GTZからの援助を仰ぐべく、現在、F/S調査を行っているところであり、2010年の完成を目指している。
- ④ 水源としては、浄水場から約6km上流のChania Riverから取水して自然流下しているものと、浄水場よりやや下流のChania Riverからポンプアップしているものがある（下流については、Outspan Hotelのやや下流）。
- ⑤ 浄水場内で、古くに建設された処理池からの処理水と、新しく建設された処理池からの処理水はブレンドされることもあるが、基本的には古くに建設された処理池からの処理水はポンプアップされて市内の高台へ配水される。
- ⑥ 塩素処理について、処理場内の浄水について1.5mg/ℓ、給水栓で0.4~0.5mg/ℓとなるようにしている。
- ⑦ 細菌等については、月1回程度、Nairobiへ輸送して検査している。
- ⑧ 郊外の高台（山の中腹等の家屋）については、麓まで配水を行い、そこからは個人負担でプースターポンプを取り付けて給水している。
- ⑨ 水道施設について、古い施設の処理レベルはあまり高くなかったが、新しい施設での処理レベルは比較的高いものと見受けられた。
- ⑩ しかしながら、以下の課題が考えられる。
  - a. 財政状況が厳しいため、浄水処理のための薬品ストックが不十分。
  - b. 水質管理が十分には行われていない（検査機器等が見当たらなかった）。

## 2) 同上ポンプ場

1948年の建設、2台のポンプがあるが、1996年11月と1997年1月に取り替えた。ポンプ場と浄水場の高低差 110m、3,500m<sup>3</sup>/dayの能力がある。

ポンプ 90kw (125hp) イタリア製

モーター 〃 ポーランド製 (1977年)

4. Maragwa District, Makuyu Divisionの井戸

調査日時 1997年5月20日(火) 8:00~

面談者 Mr. Kamau Gacheru Geologist

同行者 北川専門家、Mr. Murithi

【調査内容】

Jakungu Comunity Water Project, Bore Holl No.C9950

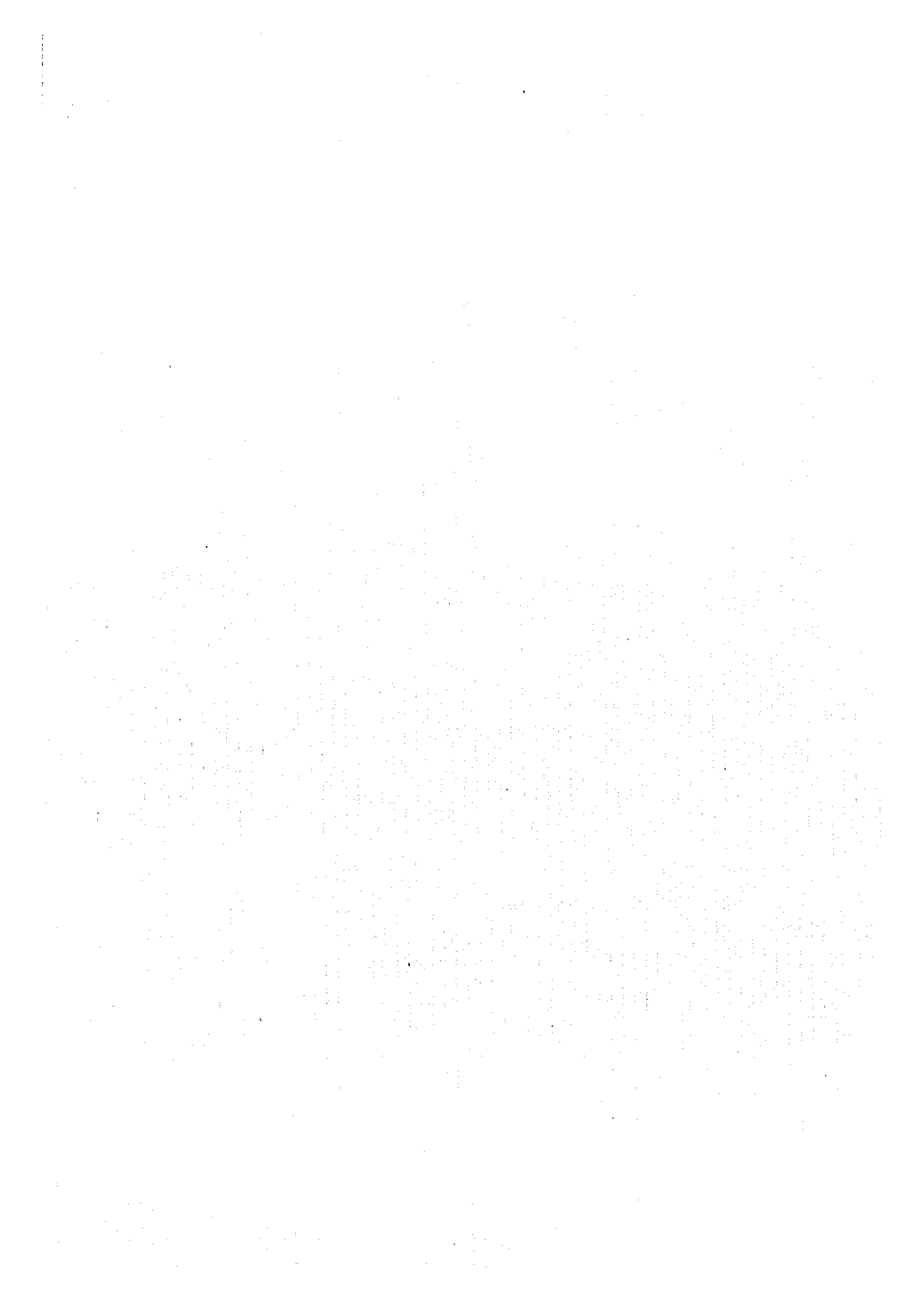
1991年 建設 井戸1 by NGO (WVI:World Vision International)

1992年 ポンプ供給 by NGO (WVI)

- (1) 1991年に掘られた深井戸を水源としており、その深さは75m(掘削深は67m)、水面は0.7mの深さである。38.5mの深さからポンプ取水している。
- (2) 井戸の内径は60~80インチ(1.5~2m程度)である。
- (3) 取水量としては25m<sup>3</sup>/hであるが、もっと出ているように思う。
- (4) World Vision International (NGO) が計画し、施工は民間会社が行った。井戸掘削に当たっての地質調査、適地調査等はDistrict Officeが行った。
- (5) 水道料金は1世帯当たり100ケニアシリング/月で、167世帯に給水している(給水人口はおおむね1,000人くらいで、共同水栓ではなく、各世帯ごとに水道が取り付けられている)。水道未加入者は周辺の川などから水を汲んでいる。
- (6) 水道料金としては月に6,000~7,000ケニアシリング程度回収されているので、回収率は5割程度であろう。
- (7) 水質は非常に良いので塩素消毒は行われていない。
- (8) 井戸からの取水については、毎日9時頃に管理人がポンプ操作機を持ってきて操作を行い、17時まで取水している。取水された水は、いったん貯水槽に貯められ、自然流下で給水されている。
- (9) 経営状況としては、電気代が1,200~2,000ケニアシリング/月、操作員の給料が25,000ケニアシリング/月で、その他の維持管理費もあるが、おおむねcost-recoveryである。







JICA