

AFR TZA/S 073/94

**STUDY ON WATER RESOURCES
DEVELOPMENT IN THE
RUVU RIVER BASIN**

FOLLOW-UP REPORT 1995

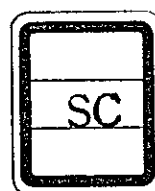
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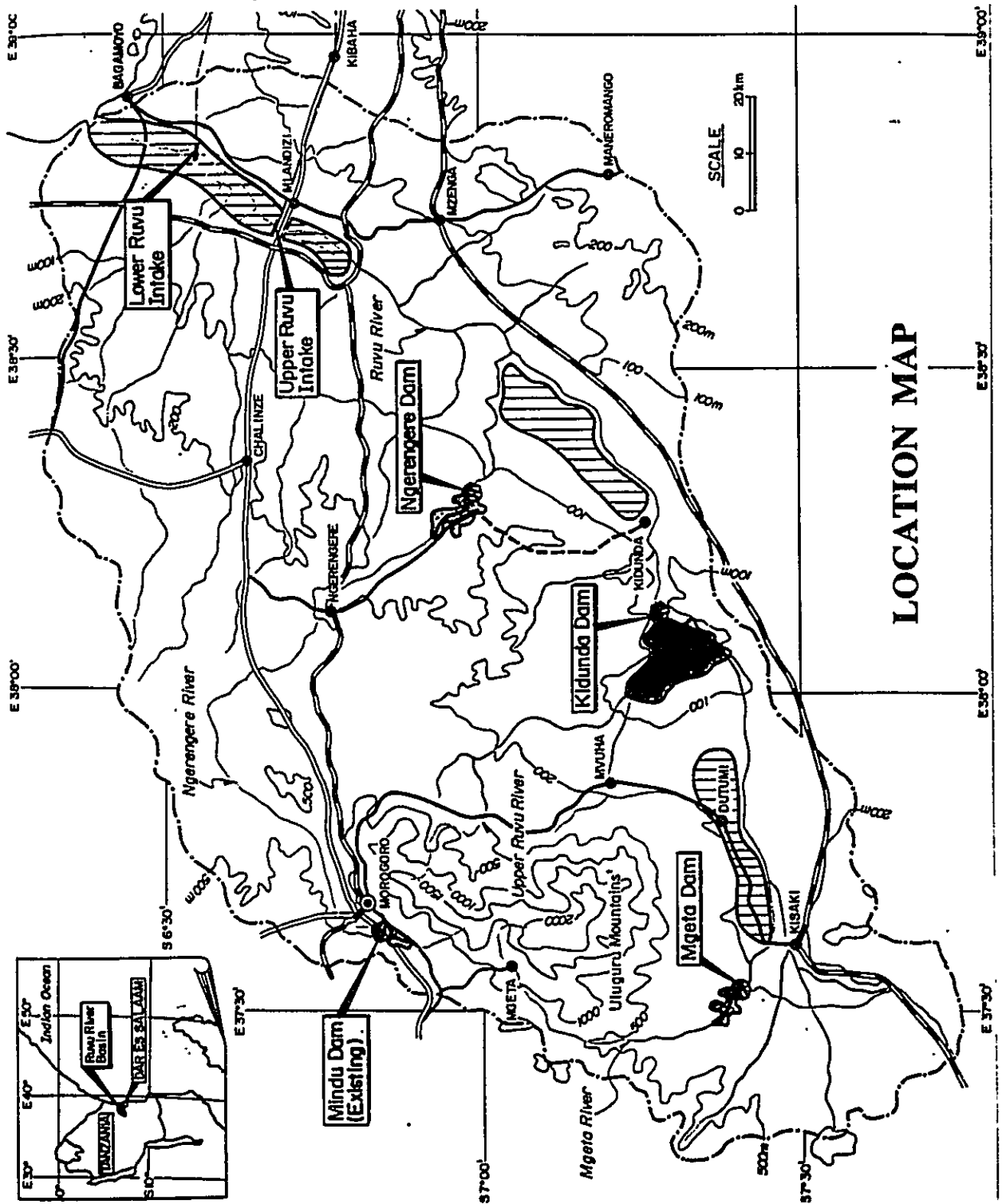
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Project data

Region:	Africa
Country:	United Republic of Tanzania
Sector / Subsector:	Social Infrastructure/Water Management
Code No:	AFR TZA/S 073/94
Type:	Master Plan
Counterpart Agency:	Ministry of Water, Energy & Minerals
Fiscal Year Completed:	1994
Consultants:	Nippon Koei Co., Ltd Pacific Consultants International
Expenditure:	Unknown (¥,000)
Present Status:	Promoting



Project site map / location





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1 Executive Summary

Summary of survey results

The JICA Master Plan to develop the water resources of the Ruvu River Basin through the construction of dams has been stalled pending an Environmental Impact Assessment (EIA) of the dams and irrigation schemes. The JICA Master Plan specifically mentioned that an EIA be carried out and this proposal was followed by the participating ministries. The Ministry of Water, acting as coordinating ministry, and the Ministry of Tourism, Natural Resources and Environment, requested that an EIA be performed because of the predicted disturbance to environment bordering on the Selous Game Reserve.

In 1994 a formal proposal was lodged with cabinet to locate funding for an EIA. The Ministry of Water has also informally approached the Embassy of Japan, but at present no donor group has expressed interest in funding the EIA. A formal proposal for funding will require a decision at cabinet level, and this process has been disturbed by the recent elections.

Conclusions

As the JICA Master Plan clearly states, the only clearly attractive development strategy in the Ruvu River Basin depends on the feasibility of the Kidunda dam. The survey team had the bare minimum of hydrometric material to work from, and the geological survey of the dam sites is inadequate for anything more than a very tentative proposal.

However, such is the demand for water in Dar es Salaam, the Master Plan received immediate attention and is the subject of contention by different Ministries.

In the light of the technical and environmental uncertainties surrounding the Kidunda dam, it may be necessary to review other issues and options such as:

- exploiting other sources of water; eg, the Rufiji river;
- reducing the losses of water in conveyance and distribution to and within Dar es Salaam;

- improving overall water-use efficiency by appropriate water-pricing and increasing the availability of water-saving technologies.

Recommendations for JICA

Due to the critical nature of the subject the master plan is an extremely important study. JICA has a lead role in the development of the water-resources of Dar es Salaam, and is ideally placed to take a prominent role in assisting the Government of Tanzania implement a strategy to alleviate the water shortages in Dar es Salaam.

An Initial Environmental Examination (IEE) is the next step. This should lead to an Environmental Impact Assessment (EIA). JICA may consider the cost of funding the IEE which may not need to be highly complex. Meanwhile, the master plan needs to be discussed by a group drawn from the relevant ministries, and, if necessary, further surveys or detailed design studies can be made. This cannot be carried out before the completion of the EIA. As sponsor of the master plan, JICA may wish to take a central role in facilitating these discussions.

Dissemination and following action

In addition to the JICA UK Office, it is anticipated that this report will be distributed among the relevant authorities participating in the project: The Ministry of Water, the National Urban Water Authority (under the Office of the Ministry of Water), the Ministry of Tourism, Natural Resources and Environment, the Ministry of Agriculture and Livestock Development, the Ministry of Energy and Minerals, the Planning Commission, the Ministry of Health, the Ministry of Community Development, Womens' Affairs and Children.

The report is intended to stimulate positive discussion among the authorities concerned, particularly with a view to enhancing future cooperation.

2 Results of survey: Project Design

Identification and outline of project rationale

The project was identified by the National Urban Water Authority (NUWA) who are responsible for urban water supply to the Municipality of Dar es Salaam. They prepared a proposal which was presented to the Government of Japan via the Prime Ministers' Office to the Ministry of Planning and the Ministry of Finance.

The rationale for the project is to try to optimise the development of the water supply for the growing population of Dar es Salaam. Two proposals were put forward, both provide an increased available offtake from the Ruvu River. The main proposal can be tabulated as below:

	Mean Daily Demand	Mean Daily Supply	Surplus or Shortfall
Year	Figures in cubic metres per second		
1994	3.5	3.16	-0.34
1995*	4.7	3.16	-1.54
2020	11.2	28.2†	+12.2

* Source: Interview with NUWA, this figure accounts for the water rationing in most parts of Dar es Salaam.

† With Kidunda project operating

Potentially, and if developed according to the JICA plans, the Ruvu River catchment could provide a mean daily supply of 9.1m³/sec of water. Since the Ruvu is the nearest and most viable water source for Dar es Salaam and the water treatment and conveyance infrastructure exists, this scenario is attractive, even if the shortfall is still significant.

Short description of project

Using existing data and limited field surveys, the JICA survey examined twenty-three dam sites and quickly concentrated on four preferred sites of which one was not economically feasible. The remaining three dam sites are viewed as two options. Option 1 involves the construction of one large shallow dam at the confluence of the Mgeta and Ruvu rivers near Kidunda. Option 2

involves the construction of two dams further upstream upstream at Mgeta and Ngerengere. (See map on page 2).

Name	Option 1	Option 2		
	Kidunda	Mgeta	Ngerengere	Both
Dam height (m)	26	45	36	
Reservoir area (km ²)	158.5	10.5	30.0	40.5
Storage volume (million m ³)	1,665	57	84	92
Cost US\$m	101.1	110.6	90.8	201.4
Construction cost /dependable discharge (US\$/m ³ /sec)	3.6	15.6	50.4	33 (avg)

Option 1, was the preferred option in terms of cost and water supply. However, all the dam sites are open to question.

- Mgeta dam site is situated on or near a main geological fault line. This brings into question the safety of the dam. A full geological survey would be needed before a detailed design study was carried out.
- Kidunda dam site is potentially situated on limestone that is prone to seepage and piping. A full geological survey would be needed before a detailed design study was carried out.
- Ngerenegere dam site is small, and relatively expensive in relation to size of reservoir.

A major consideration in deciding between the options was that of developing irrigated agriculture downstream of the dams. At present, very little irrigated agriculture takes place in the Ruvu River Basin. It is estimated that option 1 (Kidunda dam) could supply 12.27m³/sec for irrigation in downstream sites in a limited . Option 2 (Mgeta and Ngerenegere dams) would not provide surplus water for irrigation. It is also reasonable to assume that under a regulated streamflow, informal extraction from the river for irrigation could increase significantly. Because there is 305 km of river between the NUWA offtakes and the damsites, informal irrigation could pose a problem. At present riparian law does not effectively control access to water.

The JICA study, as with the preceding FAO and French surveys was hindered by lack of reliable and comprehensive data in a number of critical areas:

- hydrometric data was taken from eleven gauging stations. Hydrographs used in preliminary design were extrapolated from three stations providing 21, 8 and 7 yrs of data, this is a minimum range of real data and a model was not constructed to test the accuracy of predicted streamflow in a following year. Therefore the hydrographs extrapolated from this data should be viewed with caution;
- sedimentation data was taken from three stations, but is generally lacking. To provide data on the useful life of the proposed dams, this area of analysis requires careful survey;
- geological data on the proposed damsites is incomplete. At Kidunda, the test bores analysed by the French survey were from a different site to that chosen by the JICA survey.
- environmental surveys were minimal, and while the report made a strong proposal for building a dam, it also called for a more comprehensive environmental survey;
- the detailed planning of the proposed irrigation schemes is minimal, particularly in the area of project management.

Funding

In 1994, the estimated cost of the developments were:

	Option 1 US\$ million	Option 2 US\$ million
Kidunda*	202	
Mgeta & Ngerengere		210.8
River offtakes	459.9	459.9
Total	661.9	670.7

* Dam and downstream irrigation works.

In the short-term, the Government of Tanzania is seeking a donor to fund the EIA.

Review of project design

The project designs contained in the JICA Master Plan are hindered by lack of data in several critical areas. The agricultural and irrigation component along with the hydro-electric feasibility were only briefly covered in the design process and appear to take a supporting role to the proposal to construct a dam at

Kidunda. Both these issues take second place to the development of water supplies for Dar es Salaam. Meanwhile, the proposals put forward have already caused some controversy between the various government departments and ministries involved.

The main objection from the perspective of the Ministry of Tourism, Natural Resources and Environment, is that Kidunda dam would inundate a small (158 km²) but ecologically significant area of marshy floodplain on the border of the Selous Game Reserve. The floodplain is currently a critical resource for four villages and a very large number of wildlife who graze on the pastures growing from the receding floodwaters throughout the dry season.

From the economic perspective, the Selous Game Reserve is a national economic resource that attracts a growing number of tourists and hunters each year in the fastest-growing sector of the Tanzanian economy; any proposed development of that resource should ideally be preceded by an environmental economic appraisal.

The project design now requires an independent EIA in full collaboration with the relevant government departments before a detailed design study is made.

3 Results of survey: Conclusions

General comments on development

The project has attracted a political significance typical of large-scale water development projects. There are several significant unknown variable factors that are currently discussed:

- the effect of the proposed dam on the Selous Game Reserve and surrounding areas;
- the uptake of water in the Ruvu river under informal irrigation;
- the geology of the proposed dam site;
- the hydrometric data and proposed dam design
- the effect of the dam on groundwater recharge in the floodplain, and the resulting effect on floodplain communities and vegetation
- the effect of diminished and regulated flows on the valuable estuarine prawn fishery near Bagomoyo.

Specific comments on JICA's role

The JICA master plan on water resources development of the Ruvu River basin arose from the 1991 JICA study on the rehabilitation of Dar es Salaam water supply. JICA is therefore in a critical and central role in the development of water resources in and around Dar es Salaam.

Requests for further surveys

The Environmental Impact Assessment for the project is awaiting funding. Formal proposals have not yet been received by the Government of Japan.

Annex A: Interview

Interviewees

Mr Hashil, Director of Projects and Implementation,
National Urban Water Authority

Mr Giday G Bhuko, Economist,
National Urban Water Authority

Mr M. Mulagwanda, Senior Executive Engineer,
National Urban Water Authority

Mr Macha, Chief Drafting Engineer *
Ministry of Water, Energy and Minerals:

Mr O.T. Mloka, Acting Water Engineer, Morogoro

Mrs S. Sijaoma, Regional Planning Officer, Morogoro

Mr Mtaita, Regional Water Engineer, Morogoro

Mr Godfrey Nyiru, Agricultural Officer, Ngerenegere

Mr Masija, Assistant Commissioner, Directorate of Irrigation

Mr Mbano, Director of Wildlife, Wildlife Division
Ministry of Natural Resources and Tourism

Mr E. Tarimo, Senior Wildlife Officer, Wildlife Division
Ministry of Natural Resources and Tourism

Interview notes from Mr Macha of Ministry of Water, Energy and Minerals.

Note: Questions given in Italics

What is the present status of the plans?

The Water Resources Development plan is held up pending an Environmental Impact Assessment (EIA) on the Dam site at Kidunda which conflicts with the Selous Game Reserve. The government now requires an EIA.

What is the status of funding?

JICA is not interested in funding the EIA. We thought JICA would be interested, and we tried twice to get funding for the EIA, but there was no response (not a negative response, just no reply).

How do you make the request for funding?

Officially we channel requests through the Ministry of Finance, then Planning, however we also go informally and directly to JICA. We copy our correspondence to the MoF & P to JICA.

What is the next step to promote the issue?

The master plan was fully funded by JICA, and we are now seeking detailed studies (for the proposals: Dam, water treatment plant, and conveyance). This process is all held up by funding. The possibility of hydro-electric power is there, but it depends on the final design of the dams.

Are the development proposals realistic?

Of the three dams sites, there are three big and one small. If you chose the two small dams only you would not have the capacity to supply water demand in Dar es Salaam. At present we draw 60 million gallons of water per day from the Ruvu, 20 mgpd from the Upper Ruvu Offtake, 40 mgpd from the lower Ruvu offtake. Present demand is around 90 mgpd.

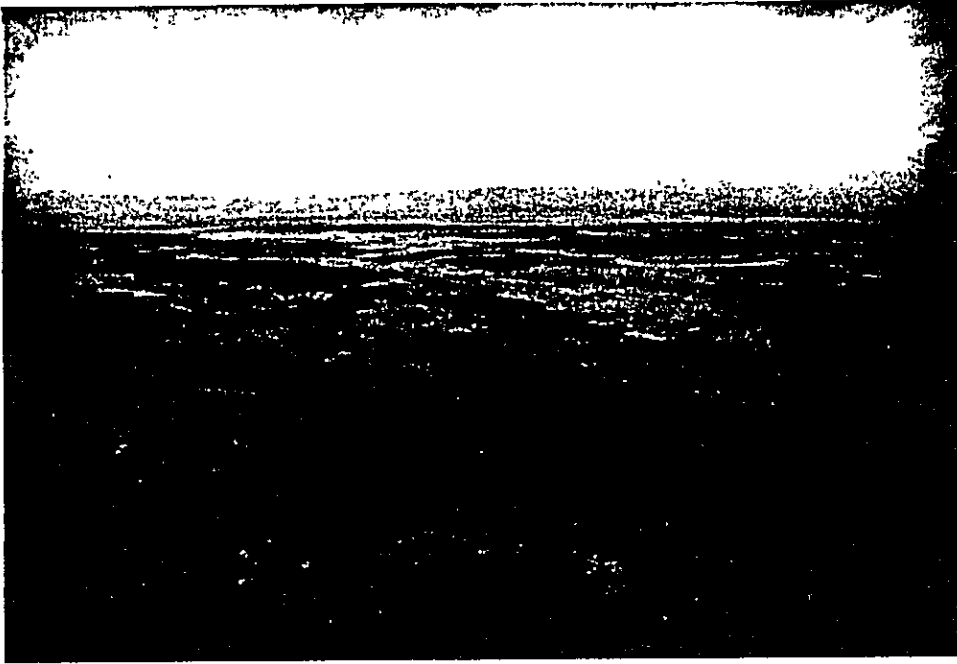
Annex B: Photographs of project



1 Mgeta dam site (valley at rear).



2 Area to be irrigated by Mgeta dam, relatively good soils



3 Kidunda dam site, unusually flat



4 Area to be irrigated by Kidunda dam

Annex C: Terms of reference and purpose of survey

Terms of Reference

- The JICA UK Office has requested the consultants to prepare of an independent follow-up survey in Tanzania.
- It is proposed that the work be a carried out between Thursday 9th November and Friday 22nd December, 1995.
- The survey will comprise a broad evaluation and current appraisal of thirteen (13) Master Plans, Feasibility Studies, and Basic Studies in comparison to the present and future status of the individual projects or studies.
- The scope of work will cover:
 - a) Study on Water Resources Development in the Ruvu River Basin
 - b) Study on Dar es Salaam Road Development Plan
 - c) Natural Soda Development in Lake Natron and Related Transportation Facilities
 - d) Kilimanjaro Region Integrated Development Plan
 - e) Southern Coast Link Road Project
 - f) Proposed Mahale Mountains National Park
 - g) Lower Moshi Agricultural Development Project
 - h) Mkomazi Valley Area Irrigation Development Project
 - i) Expanded Afforestation Work in the Same District of Kilimanjaro Region
 - j) Road Improvement and Maintenaance in Dar es Salaam
 - k) Lower Hai and Lower Rombo Agricultural Development Project
 - l) Rehabilitation of Dar es Salaam Water Supply
 - m) Topographic Mapping of Mwanza-Geita Block in the United Republic of Tanzania
- If possible, the survey will cover recent and relevant developments in the context of each project or study.
- Where appropriate, the reports will comprise questionnaires, interviews and highlight following actions for JICA and/or the Government of Tanzania.
- The reports will contain a detailed itinerary, records of interviews made and sources of information.

- The quantity and quality of information contained in the reports will reflect the availability and accessibility of information in Tanzania.
- The reports will be prepared in draft form and presented to the relevant implementing Ministries for comments before leaving Tanzania.
- Final report texts and layouts will be completed by Friday 22nd December, 1995.

Purpose of survey

This report comprises a descriptive assessment of the progress of the project against the objectives of the project as described in the original study. The purpose of the survey is to:

1. Describe project achievements to date by their:
 - A. Impacts
 - B. Effectiveness
 - C. Relevance
 - D. Efficiency
 - E. Sustainability
2. If required, produce specific and general recommendations to improve the performance of this and other similar projects
3. Further communication between funding agencies, design consultancies, implementing agencies and project beneficiaries

Annex D: Methodology and chronological itinerary

Methodology

As far as possible, the survey was performed by a structured process:

- Identify the authorities involved
- Identify and locate key informants within the authorities
- Locate adequate documentation and reportage
- Define aims of project
- Conduct interviews on specific and general issues
- Define indicators of achievement and/or progress
- Visit the site
- Analyse the collected data
- Prepare draft report
- Discuss the draft report with key informants
- Edit and prepare final report text

Chronological Itinerary

Tuesday, November 14th

Meeting with National Urban Water Authority:

Mr Hashil, Director of Projects and Implementation

Meeting with Ministry of Water, Energy and Minerals:

Mr Macha, Chief Drafting Engineer

Wednesday, November 15th

Meeting with Directorate of Irrigation:

Mr Masija, Assistant Commissioner

Meeting with Wildlife Division of the Ministry of Natural

Resources and Tourism:

Mr Mbano, Director of Wildlife

Mr E. Tarimo, Senior Wildlife Officer

Thursday, November 16th

Trip to Morogoro and Ruvu River Basin to visit development sites

Meeting with Mr O.T. Mloka, Acting Water Engineer, Morogoro

Meeting with Mrs S. Sijaoma, Regional Planning Officer, Morogoro

Meeting with Mr Mtaita, Regional Water Engineer, Morogoro

Meeting with Mr Godfrey Nyiru, Agricultural Officer, Ngerenegere

Friday, November 17th

Field survey of Ruvu River water supply with NUWA:
Mr Giday G Bhuko, Economist

Field survey Dar es Sallam water supply with NUWA:
Mr M. Mulagwanda, Senior Executive Engineer

Annex E: References & reports used in survey

JICA, Nippon Koei Co., Ltd (1994) Study on Water Resources Development in the Ruvu River Basin. Final Report. Vol I. Executive Summary. June 1994

JICA, Nippon Koei Co., Ltd (1994) Study on Water Resources Development in the Ruvu River Basin. Final Report. Vol II. Main Report. June 1994

JICA, Nippon Koei Co., Ltd (1994) Study on Water Resources Development in the Ruvu River Basin. Draft Final Report. Vol III. Supporting Report. March 1994

JICA, Nippon Koei Co., Ltd (1994) Study on Water Resources Development in the Ruvu River Basin. Inception Report. March 1993

Ministry of Agriculture and Livestock Development (1987) Proposal for Technical Assistance for Study on Ruvu River Basin Development Project. December 1987

