

AFR TZA/S 301/80

LOWER MOSHI
AGRICULTURAL DEVELOPMENT
PROJECT

FOLLOW-UP REPORT 1995

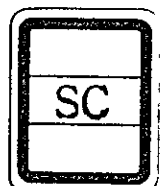
Project data

Region:	Africa
Country:	United Republic of Tanzania
Sector / Subsector:	Agriculture / General
Code No:	AFR TZA/S 301/80
Type:	Feasibility Study
Counterpart Agency:	Regional Development Director, Kilimanjaro Region
Fiscal Year Completed:	1980
Consultants:	Nippon Koei Co., Ltd
Expenditure:	231,639 (¥'000)
Present Status:	Partially completed

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Annex D: References & reports used in survey

JICA (1980) Feasibility Report on Lower Moshi Agricultural Development Project, Draft Main Report, August 1980

JICA (1980) Feasibility Report on Lower Moshi Agricultural Development Project, Main Report, October 1980

JICA (1980) Feasibility Report on Lower Moshi Agricultural Development Project, Drawings, October 1980

JICA (1980) Feasibility Report on Lower Moshi Agricultural Development Project, Annexes, October 1980

Nippon Koei Co., Ltd (1988) Lower Moshi Agricultural Development Report, Project Completion Report, Volume I Main Report, March 1988

Nippon Koei Co., Ltd (1988) Lower Moshi Agricultural Development Report, Project Completion Report, Volume II Main Report, March 1988

KADP (1994) Project Outline, October 1994



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Project site map / location

1 Executive Summary

Summary of survey results

Of the projects outlined in the original feasibility study of October 1980, only the the Rau River system (now called the Lower Moshi Agricultural Development Project) has been implemented. This formal scheme comprises 2,300ha of land under gravity-fed irrigation. The Lower Moshi Agricultural Development Project (ADP) is a highly productive and influential project that now faces a crisis as a result of its success.

Rice yields now obtained by the farmers exceed the original JICA estimates by 165%. Original estimates predicted a potential yield of 5.5 tons/ha. Farmers presently yield 7 tons/ha and in exceptional cases 8-9 tons/ha. Profits from sales of rice have greatly improved the standard of living of those directly involved within the project, and many more in other rice-growing areas and the peripheral marketing structures. Technologies in rice production that were adapted, developed, tested and refined at Lower Moshi have been adopted over a wide area outside the scheme.

The critical problem in the Lower Moshi ADP is water supply. Enterprising farmers have copied the technology of the Lower Moshi ADP and now utilise up to 800ha land upstream of the project. The impact on water supply has seriously affected the performance of the Lower Moshi ADP which now implements a rotation of water supply within the scheme. Only 40% of farmers receive adequate water to irrigate one crop of rice per year. This cut in water and productivity has led to occasional bitter clashes between rival groups of farmers over the water resources.

Existing Tanzania riparian law is not effectively enforced. The optimum solution presently available is to develop an alternate water source adjacent to the Lower Moshi ADP and to convey extra water to the scheme via a short canal. The very high costs involved in developing and implementing the scheme reduces the attractiveness of the project if compared to less capital-intensive developments such as improved traditional irrigation. Alternative schemes in the region have also benefitted from the Kilimanjaro Agricultural Development Project, especially through the introduction of IR54 high-yielding rice seed and improved agronomic management.

Conclusions

The project is a good example of hydraulic Darwinism - the survival of the highest. In retrospect, there are strategies and decisions that may have alleviated the present situation and there are valuable lessons to be drawn from these. For instance, there is a need to predict the social response to profitable resource-use. If land and water are available, people may use the resources to their advantage. A strategy to protect water resources for a vulnerable scheme would be to

The scale and complexity of the Lower Moshi ADP may be questioned with regard to overall sustainability. However, a significantly large investment may have been necessary to develop the marketing structure. The burgeoning market for rice has provided an incentive for agricultural change in the region. The large number of people involved on the scheme has also undoubtedly helped disseminate improved irrigation agronomy and related skills over a wide area.

Recommendations for JICA

The overall sustainability of the Lower Moshi ADP must be carefully examined before any following actions are taken. Short-term sustainability may be reduced by withdrawing donor support and technical expertise too fast.

The ability of the scheme to review and, if necessary, raise internal water charges is critical. The water-charges must adequately maintain an internal cost-recovery that will cover the cost of operation and maintenance in the long term. One village, Chekereni, has raised a commercial loan to cover the relining of canals and extend its network. The Tanzanian management may need training and support in replicating this achievement over the whole scheme. Specialist training is needed in developing co-operative structures to raise and manage loans for performing operation and maintenance tasks.

JICA may wish to consider comparing the cost-efficiency of providing a few long and short-term JICA experts with providing JOCV volunteers to work more closely with the co-operatives and to cover a wider area.

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 Regional Development Director, Kilimanjaro Region, and The Ministry of Water Resources and Irrigation.

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 1977 Kilimanjaro Regional Integrated Development Plan outlined the future development of the Lower Moshi as a priority in the development of Kilimanjaro Region. The report proposed the development of areas adjacent to Njoro, Miwaleni, Chekereni and Mabogini.

At the request of the Government of Tanzania, the Government of Japan funded a feasibility study of the Lower Moshi. The Feasibility Report on the Lower-Moshi Agricultural Development Report was completed in October 1980. The aims of the study were to increase and stabilise food production from the lowland areas of the Kilimanjaro Region. The lowland areas have relatively poor land-use potential and suffer from drought, saline soils and flooding. The study aimed to plan the optimal use of the available water in the Lower Moshi valley by developing the water resources and growing crops that would enable the population to derive a higher level of income and nutrition. The project aimed to raise the total productivity under irrigation from 1.8 - 2 tons of paddy/ha to 5.5 tons/ha.

The Kilimanjaro Agricultural Development Centre, which operated a research farm at Chekereni, provided some baseline data from which the Feasibility Study was produced.

Short description of project

The Feasibility Study for Lower Moshi proposed four schemes:

- Rau River System comprising four irrigation systems. The Upper Mabogini, Mabogini, Rau ya Kati and Chekereni. These would cover 2,300 ha in total. These areas were already used by traditional farmers;
- Miwaleni Springs, already in use by commercial farms, it was planned to expand the present area by 600ha;
- Himo River System, comprising two irrigation systems at Makuyuni and Ghona/Kileo. Up to 1,000ha could be developed;
- Groundwater System, up to 1,020ha of irrigable land was projected in two areas.

These nine systems total 6,320ha of irrigated land.

Detailed Design

Of the schemes outlined in the Feasibility Report of October 1980, only the Rau River system was developed under an OECF loan from the Government of Japan. Under this funding a detailed design study was carried out by Nippon Koei Co., Ltd between July 1982 to March 1983.

Funding

The Feasibility Study was contracted to Nippon Koei Co., Ltd for 231,639 (¥'000) in 1980.

The Construction of the Lower Moshi ADP was contracted to Nippon Koei Co., Ltd under an OECF loan to the government of Tanzania for ¥3.3 billion.

Review of project design

The scope of the Feasibility Study was very broad and the final decision to prioritise the development of the most attractive component was not difficult.

3 Results of survey: Project Implementation

Implementation and monitoring

No significant changes have taken place on three components of the Feasibility Report. The following points can be noted:

- At present, Miwaleni Springs has expanded by 110ha, significantly, 500ha are now planted to rice instead of sugar.
- At the Himo River System only 180ha of land is irrigated.
- Groundwater System, no development other than the KADC.

The Rau River system, (now called the Lower Moshi Agricultural Development Project) has been completed. Construction took place between June 1984 and May 1987. A Project Completion Report was produced by Nippon Koei Co., Ltd, in March 1988.

Development to date

The Lower Moshi ADP comprises:

- intakes from the Rau river at Mabogini and Njoro (river upstream of Mabogini which feeds the Mabogini system and Upper Mabogini Scheme). These fixed concrete intakes include parshall flumes, silt traps, flushing gates and trash racks;
- gravity-fed levelled irrigated areas of 955ha and 1,345ha. The average size of irrigation block is 25ha;
- 10.1 km of concrete lined main canals, 24.6 km of concrete lined secondary canals, 65.6km of tertiary canals and 138 concrete division boxes;
- 16.2km of main drainage canals, 32km of secondary drains, 40.9km of tertiary drains, 64.4km of field drain;
- 16.1 km of trunk road, 18.1km of main road, 38.5km of secondary road and 35.6km of tertiary road, 77.8km of field road;
- post-harvest facilities including accommodation, warehousing, and barns, electric driers, solar drying areas, rice cleaners, threshers, polishers, screens, and bagging /weighing machines;
- workshops for tractor maintenance and repair, including warehousing and hardstands;
- tractors and implements, combine harvesters and transport for staff;
- plant including backhoes, center-pivot loaders and motor graders.

Operation

In the dry season between 1,000 and 1,100ha per year is irrigated under paddy rice, while 1,200 to 1,300ha is planted to upland crops including maize and beans. Small quantities of sugar and vegetables are grown informally in small corners within the scheme.

The most significant crop from the Lower Moshi ADP is the annual production of around 7,495 tons of rice. The irrigation interval is every five days in the growing season. If sufficient water resources were available, the advantageous climate would provide two growing seasons. There are no significant crop pests due to the low night-time temperatures, and salinity is only a problem in one area of the scheme. Fertilization is controlled, and the use of tractors when preparing paddy is mandatory to obtain level paddy fields and optimise water use.

Varietal trials and agronomy and management experiments were held in the dedicated experimental farm with the assistance of JICA experts. To date there have been no major crop pests, however, ongoing trials aim to pre-empt any major problems that may occur.

Technical supervision of irrigation water supply is applied and negotiated by the Chawampu Central Co-operative in conjunction with the District Government officers and JICA experts. One infrastructural impact from the water-rights conflicts is that some water control structures were broken during or because of clashes between rival farmers.

The various blocks of irrigated land are managed by village sub-groups of the co-operative. These groups differ greatly in their co-operation with the water authority and in their ability to organise and effect communal tasks such as cleaning canals. Water allocations are implemented on a strict rotational basis, however, relationships between groups of farmers within the scheme become tense when some groups are allocated water and some not.

Tractors and mechanised services were provided by JICA. These are now controlled through the Chawampu Central Co-operative which maintains and operates the tractors. The co-operative also manages a rice mill with cleaner, drier, thresher, and polishers. Rice may be sorted into three grades to optimise sale value.

The mechanical driers at the mill were only used once and the expense of operation was unpopular. Unless there is a very wet year when solar drying is very difficult, solar drying on concrete platforms is preferred. Rice is sold at one grade and one price that varies only on the variety of rice and market demand. The rice grade sorters are therefore largely unused. Local varieties of rice, called 'aromatic rice' have a premium value (about 25% higher than IR54), but most farmers within the scheme choose to grow IR54 because of the higher yield.

Impacts

The project has made a very considerable impact on the local economy. Throughout Kilimanjaro Region there has been spontaneous replication of techniques and practices taught inside the project and many farmers have benefitted from the improved agronomy and water management. The profitability of rice-growing is highly evident in improved housing of farmers and farm labourers.

To expand production, farmers from within the scheme have moved upstream of the project to take water from the Rau river and irrigate up to 800ha. There is no control over the quantity of water they use, and with unlimited water access, they can obtain two to three crops per year to the detriment of the formal scheme downstream. In the Moshi area up to 1,500ha of land has been developed informally since 1990.

In addition to imparting agronomic skills and techniques the project has propelled the development of a labour economy in manual field workers, and marketing elite of rice-buyers (many women included) who operate in and around the scheme. This development must benefit income structures as more people gain marketing skills and women become more integrated into the cash economy.

The income disparity between those farmers with plots of land within the scheme and those outside the scheme must have initially been very high, however, the disparities are now diffuse as farmers invest in land outside the scheme - to secure free access to water - and a market economy provides incomes and opportunities for small investment. However, the final outcome of the water-rights issue may polarise production in limited areas and again accentuate income disparities.

The labour economy is changing as the cost of living rises in and around the project. Farm labourers hired on a daily basis now negotiate a daily rate and small groups assess and perform contract work for specific tasks on set areas of land. The skills and economic organisation involved in these changes is considerable and may have far-reaching consequences beyond the scheme itself.

An annual production of 7,495 tons of rice is a significant asset to national food security and a small amount of foreign exchange earnings are made as some of the rice is exported to Kenya for the Nairobi market.

Sustainability

The key issue is to secure and manage adequate water supplies to maintain productivity within the scheme. In the short-term this will require the development of an alternate water source from springs near the scheme.

The long-term sustainability of the projects lies in obtaining riparian water-rights over water supply and in strengthening the institutions and organisations involved in water-management in the Lower Moshi valley.

The scheme is still largely dependant on Japanese expertise in the critical areas of agronomy and irrigation water management. To a small extent, the JICA experts reluctantly act as third-party mediators in negotiating between rival groups of farmers. This role is of increasing importance as conflicts over water scarcity become more common; it is significant that all parties greatly respect Japanese authority and directives.

4 Results of survey: Conclusions

General comments on development

The implications of the Lower Moshi ADP reach far beyond the scope of the project, and include marketing structures and riparian rights and water legislation. Although rice-growing in the area dates back to the last century, the scheme has become *sub jure* a working school of commercial rice growing. It has produced a multitude of small entrepreneurial and informal rice farmers who take advantage of the skills and markets largely developed by the scheme.

The project itself is not replicable in its original form, any replicate will require a high initial capital investment. This fact is borne out by the lack of formal schemes implemented by the Government of Tanzania. Schemes larger than 150ha have not been built. Meanwhile, 1,500ha of small-scale informal land has been developed by individual farmers in the Lower Moshi area.

The current problems with water access highlight the importance of defining and examining the enforcement of riparian law before implementing a scheme which may be easily deprived of water by abstraction upstream. The lack of socio-economic foresight in predicting the present situation could have been avoided by looking at the historical development of older schemes in Africa and Asia.

With the benefit of experience, and in hindsight, it is possible to consider that the scale of the scheme could have been much smaller. The varietal trials which led to the selection of IR54, and the development of optimal crop management techniques are a critical feature of the success of the project. Together with a vigorous marketing structure, the replicability of small-scale irrigation may have produced productivity approaching present levels without the high capital cost and OECF loan. A smaller scheme with a heavy emphasis on training and market development may have produced a similar result in terms of food security and productivity but without the debt burden, income disparities, and water-rights problems associated with the large scheme.

Specific comments on JICA's role

JICA has played a central role in the entire development of the present situation. The success of the Lower Moshi ADP is very unusual in Africa, and has been achieved at considerable expense. The critical long-term factors include the introduction of improved crop management techniques and the high-yielding varieties. These were achieved through on-site adaptive trials under existing and modified conditions, and introduced to farmers through the scheme.

Formal irrigation schemes, coupled with their very high fixed capital costs, are not easily replicable by recipient governments. Small-scale informal schemes, such as those that now threaten the Lower Moshi IDP are obviously within the scope of recipient nations. JICA may wish to pre-empt the operational problems associated with large formal schemes by concentrating on developing smaller informal community-led schemes. However, the scale of operation of the Lower Moshi IDP was probably a critical feature in developing the rice market which in turn led to the development of the informal sector. A detailed study of this scheme, and other similar projects, may outline the optimal scale required to effect a market change that catalyses a shift in agricultural systems to a more productive and profitable use of resources.

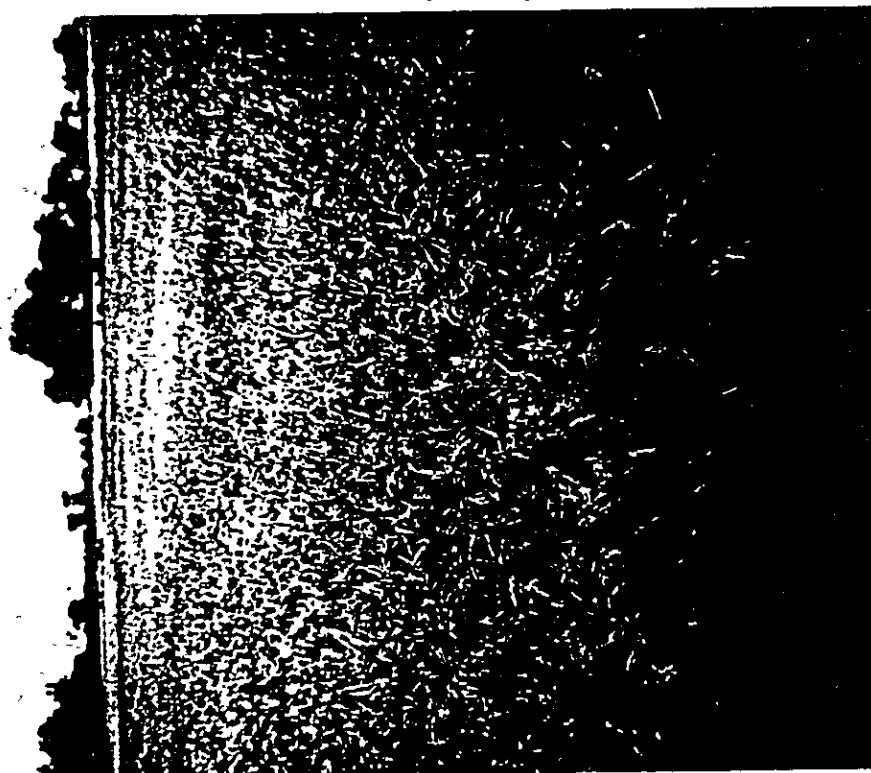
Requests for further surveys

An additional detailed design survey is required for the initiative to bring water from nearby springs into the scheme.

Annex A: Photographs of project



1: Transplanting IR54 at 20x20cm spacings to even paddy.



2: Even field of IR54 in milky stage.



3: Harvesting rice by hand. Stooks set to dry for one day.



4: Paddy ready for sale to merchants or for transport to mill.

Annex B: 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 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 Maintenance 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 C: 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

Wednesday, November 15th

Meeting with Directorate of Irrigation:

Mr Masija, Assistant Commissioner

Tuesday, November 21st

Introductory meeting with RDD Kilimanjaro Region:

Mr Riwa, Acting Regional Development Director

Mr Moshi, Director of Lower Moshi Agricultural
Development Project

Mr Mushi, Regional Natural Resources Officer

Mr S. Sugawara, JICA Expert, KADP

Mr Shiratori, Coordinator of KATC

Dr F.P. Sunguya, Regional Agricultural and Livestock
Development Officer

Wednesday, November 22nd

Field trip to Lower Moshi ADP

