

# THE ROLE OF IRRIGATION IN AGRICULTURE, FOOD SECURITY AND POVERTY REDUCTION

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**Abstract:**

*Irrigation has a multi-faceted role in contributing to food security, self sufficiency, food production and exports. In order to achieve good returns to investment, effort must be made to change from subsistence to commercial farming. In smallholder farms, irrigation assists with both food production and cash crops enabling farmers to benefit directly and indirectly from crops produced. In large scale commercial farms it enables crop production for local and export markets with significant impacts on the country's economy.*

*There is therefore need to expand land under irrigation while intensifying crop production. These efforts, coupled with good market arrangements will result into increased profits from farm produce and thereby reducing poverty at both household and national levels.*

## 1. Historical Development of Irrigation Development in Tanzania

Irrigation is said to have been practiced in Tanzania as early as the Iron Age. Traditional irrigation systems were developed by peasants in various parts of the country and were given a considerable importance as irrigation was seen as a means of protecting crops against droughts and stabilizing crop production.

Modern irrigation was first introduced in 1930's at Tanganyika Planting Company (TPC) near Moshi town for sugar cane. The colonial Government got more involved in irrigated agriculture after the second World War II by establishing a 1000 hectare rice farm at Kilangali, Morogoro in 1948. Unfortunately the initiative failed and was abandoned in 1951. In 1958. The colonial Government observed that the whole of East Africa was characterized by unreliability of rainfall which was a constraint to agricultural production and recommended formation of the then Water Development and Irrigation Division (WD & ID).

In 1975, the Irrigation Division of the Ministry of Agriculture and Cooperatives (MoAC) was established and functions of WI & ID reverted to MoAC with professional staff strength of only two Agronomists living all technical staff with WD & ID. The functions of the Irrigation Division were to provide services to smallholder farmers, identify potential areas for irrigation development, carry out feasibility studies, design irrigation projects and undertake construction of irrigation projects.

In 1980 the National Village Irrigation Development Programme (NVIDP) was initiated to promote irrigated agriculture at village level [1,p.2].

Following the liberalization of Tanzania's economy and the implementation of the Government strategy on National Agricultural Policy that permitted institutional changes focusing at grassroots level, in 1994 the National Irrigation Development Plan (NIDP) was launched. The NIDP aimed at stability in crop production and increased food.

Since 1994, some development has been made but there are still some constraints to be alleviated before meaningful irrigation development is achieved. There have also been a number of government policies formulated after the preparation of NIDP. Some of the policies relevant to irrigation are shown in section 2 under table 2 of this paper.

In 2002, the Government prepared the National Irrigation Master Plan (NIMP), taking into account the relevance of the new policies to the irrigation subsector. The NIMP is now in use and is available for all stakeholders interested in investing in irrigated agriculture.

Major strengths of the irrigation section to date includes well-trained manpower with 43 professional engineers and plant and equipment obtained through government and donor funding.

## **2. Role of Irrigation in Promoting Food Security and Poverty Eradication.**

### **2.1 Irrigation Outcomes**

#### ***Food production and Productivity***

Irrigation has a multi-faceted role in contributing towards food security, self-sufficiency, food production and exports. It encompasses a wide range of interventions that enhance productivity and result into profitability for the rural farming population and the nation as a whole. For the substantial areas managed by smallholder farmers through traditional irrigation systems or water harvesting, it assists with both food production and cash crops enabling farmers and surrounding communities to benefit both directly and indirectly from the crops produced. In large-scale commercial farms, it enables crop production for local and export markets with significant impacts on the country's economy.

#### ***Poverty reduction at household level***

When approached holistically, with equal levels of support for both the software and hardware aspects, irrigation has major positive impacts at household and village level and contributes significantly to Poverty Reduction Strategy (PRS) objectives. When examined purely in investment terms, it seems that irrigation development requires high investments that benefit relatively few people. This ignores the substantial spin-off effects to the surrounding communities who not only become involved in direct activities, but who also benefit from the improved irrigation facilities and supporting services.

#### ***Reduced migration from country to Town***

Government wishes to reduce the migration of rural population, especially the youth, from country to town. This can only be achieved if both existing productivity in the rainy season is increased and made more reliable and if the returns to dry seasonal casual labour exceed the opportunity cost of alternative casual urban or construction employment. With the highly unpredictable rainfall patterns, the absence of irrigation for agricultural production makes intensification as a growth strategy a risk if not losing proposition.

#### ***Returns on Investment***

For the smallholder farmers, the use of fertilizers for rainfed crops is on the decline as they are proportionally very expensive for them and in many cases they borrow to purchase. If rains fail then they suffer both from lack of production as well as from cash losses or increased indebtedness. If farmers have both irrigated and rainfed land, they will make their investments in fertilizer for the irrigated rather than the rainfed. They are thus more likely to achieve the projected yields than they will for rainfed land through their risk aversion measures.

Irrigation has thus an extremely important role to play. Increases in agricultural production will not be achieved through area expansion of rainfed crops, but through intensification and improvements in production from the existing cultivated lands. Current yield levels on unassisted irrigation projects are well below potential, although still above rainfed production. Recent support for irrigation has shown that with full beneficiary involvement, these yields and returns can be significantly increased.

In irrigation projects doubling and tripling of yields within three years of the first project interventions are achievable and as well as contributing significantly to food production and security. The returns to labour amount to between \$3 to \$5/day [5,p2], thereby providing alternatives to casual off farm labour. Where perennial water sources are not available but water harvesting techniques are utilized<sup>16</sup>, then this return is lower, but still sufficient to encourage many to stay in their home.

## 2.2 Economic Costs and Benefits of Irrigation

Examples of economic costs and benefits given below are based on experiences of Implementation of the River Basin Management and Smallholder Irrigation Improvement Project (RBMSIIP) in the Pangani and Rufiji River Basins. The project was jointly implemented by the ministries of Agriculture and food security and Water and livestock development from 1996 to 2003.

### Project Benefits

The Implementation Completion Report (ICR) of the RBMSIIP identifies two categories in which project benefits fall. In the first case returns accrue from increased yields due to rehabilitation of irrigation structures and factors including improved water management, access to inputs etc. In the second case returns have come from increased irrigation efficiency giving rise to water saving and water release to a variety of intersectoral uses downstream.

### Production Benefits

Production benefits of rehabilitation of irrigation infrastructure can be explained in terms of increased crop yields. For example, rice yields rose from 1.5 tons/ha to 4.1 tons/ha in Rufiji basin and from 2.0t/ha to 5.3t/ha in the Pangani Basin. Estimates from the RBMSIIP Project Coordinating Unit show that yields for tomatoes and onions have also risen significantly as shown in table 1.0 below [4,p24].

**Table 1.0: Production Impact of Smallholder irrigation Improvement**

Average Yields (t/ha)	SAR		ICR	
	Baseline	With Project	Baseline	With Project
<b>Rufiji Basin</b>				
Rice	1.8	4.0	1.5	4.1
Maize	...	...	1.1	3.3
Tomatoes	...	...	2.0	3.0
Onions	...	...	2.5	3.5
<b>Pangani Basin</b>				
Rice	2.0	5.0	2.0	5.3
Maize	...	...	1.1	4.9
Tomatoes	...	...	2.0	4.0
Onions	...	...	2.5	4.0

SAR: Staff Appraisal Report

Source: ICR, Report No. 30929, The World Bank, Dec. 2004.

### **3. IRRIGATION DEVELOPMENT SCENARIO FOR 2017**

#### **3.1 Irrigation development Potential**

The Government has prepared the National Irrigation Master Plan – NIMP (2002) which has revealed that Tanzania has a total irrigation development potential of 29.4 million hectares at varying levels. 2.3 million hectares have a high development potential, 4.8 million hectares, medium potential and 22.3 million hectares, low potential. The area under irrigation is currently estimated to be only 227,486 hectares.

The Government aims at achieving sustainable irrigation development through effective use of national resources with a view to increasing agricultural production and productivity. The planned development focuses on improvement in quality and expansion in area. The development programme is set up in three steps for short, medium and long terms based on stagewise development scenarios as follows: [3,p8-13].

**Table 2.0 Basic Objective for Each Term**

<b>Term</b>	<b>Basic Objective</b>
Short Term (2003-2007)	To reform the existing institutional setting for better performance of participatory irrigation development responding to the decentralization policy.
Medium Term (by 2012)	To support farmers-oriented irrigation development through the Local Government Authorities' initiatives and assistance.
Long Term (by 2017 and beyond)	To support self-reliant irrigation development through the PPP (Public Private Partnership).

### 3.2 Irrigation development phases.

Based on prioritization of irrigation schemes and projected development budget studied by National Irrigation master Plan, irrigation development areas have been estimated as follows:-

**Table 3.0 Irrigation Development Areas (phases)**

	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>
	<b>2003-2007</b>	<b>By 2012</b>	<b>By 2017</b>
(a) Rehabilitation of Traditional Irrigation Schemes	179,800 ha	216,100 ha	274,600 ha
(b) Development of Water Harvesting Schemes	41,600 ha	57,200 ha	68,200 ha
(c) New Smallholder Schemes	43,800 ha	51,600 ha	62,600 ha
<b>Total</b>	<b>265,200 ha</b>	<b>324,900 ha</b>	<b>405,400 ha</b>

Source: JICA Study Team

The National Irrigation master plan has shown that irrigation development area of 405,000 ha would contribute to achievement of rice self-sufficiency by 2017 at national level. In addition, rice status at regional level should also be examined taking into consideration the policy of "suitable product on suitable land".

A comparison of projected demand of rice and development of selected priority schemes (not given here) shows that rice surplus would occur in 7 regions out of 20 regions in 2017 i.e. Coast, Lindi, Mbeya, Morogoro, Mwanza, Rukwa, and Ruvuma.

### 3.3 . Plans and strategies for irrigation development

In order to achieve the 2017 target, the following interventions have been proposed:-

- Use of appropriate low cost technologies blended with modern affordable technologies like drip and sprinkler irrigation systems and the use of wind and solar power for pumping water.
- Rehabilitation of existing schemes and transferring scheme management responsibilities to smallholder farmers.
- Construction of medium and strategic large-scale irrigation projects.
- Construction of small, medium and strategic large scale dams.
- Adoption and promotion of rainwater harvesting technologies.
- Involvement of private sector in developing cost effective technologies.
- Employment of better techniques of water application, which promote soil infiltration and reduce runoff.

#### 4.0 SELECTED NATIONAL AND SECTORAL DEVELOPMENT POLICIES RELEVANT TO IRRIGATION

The government prepared the National Irrigation Development Plan (NIDP) in 1994. Since then, a number of national and agricultural sector policies have been issued. The Agricultural Sector Development Strategy (ASDS) and the Agricultural Sector Development Programme (ASDP) are the most recent and are superordinates to the NIDP.

A summary of relevant policies and their relationship with irrigation development is given in table below: [6-12]

**Table 4.0 Policies Relevant to Irrigation Development**

<b>Policies</b>	<b>Major Objectives Related to Agriculture/Irrigation Development</b>
Tanzania Development Vision 2025 in 2000	Food self-sufficiency and food security are articulated as top goal of the first attribute, high quality livelihood.
Tanzania Assistant Strategy (TAS) in 2000	Management of external resources to achieve the development strategies.
National Poverty Eradication Strategy (NPES) in 1998.	Encouragement of increased investment in smallholder irrigation systems.
Poverty Reduction Strategy paper, 2000	Development of irrigated farming by communities under support of the government.
Rural Development Strategy (RDS) in 2001	Promotion of profitable irrigation infrastructure.
Agricultural Sector Development Strategy (ASDS), 2002	Encouragement of farmers towards integrated soil and water management by sub-soiling water harvesting, and use of appropriate husbandry practices to promote optimum use of water resources. Formulation of National Irrigation Master Plan.
Agricultural Sector Development Programme, 2003	Reduction of over-dependence on rainfed agriculture through rehabilitation and management of low-cost smallholder irrigation schemes including rainwater rainwater harvesting, to reduce fluctuation in production.

## 5. CONCLUDING REMARKS

The Government has made a distinction between those interventions that it can sensibly and affordably have a major commitment towards in terms of funding and technical support and those that it should not. Government involvement should not go further than its macro function of creating an enabling environment while fulfilling legislative and resource management obligation.

While encouraging farmers and the private sector to develop irrigation, the Government will continue to support development of new irrigation technologies particularly those which aim at increasing crop production, irrigation and water productivity.

Effort will be made to ensure that farmers change from subsistence farming to commercial farming in order to realise profits with a view to reducing poverty.

In areas where there are irrigation developments, yields have more than doubled with returns to labour amounting to between \$3/Day and \$5/day, thereby providing alternatives to casual off farm labour. These returns are sufficient to encourage many people to stay in their villages.

It's probably more informative to express benefits of irrigation in monetary terms to describe what a farmer actually takes home. Thus, to express yields as t/ha alone does not suffice. One should go further and express income in such units as shs/ha, Shs/m<sup>3</sup> of water used to grow crops, shs/day for labour etc.

IRRIGATION → PRODUCTIVITY

PROFITABILITY  
POVERTY REDUCTION



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