

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF AGRICULTURE AND FOOD SECURITY



IRRIGATION AND FOOD SECURITY

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IRRIGATION AND FOOD SECURITY

1. INTRODUCTION

1.1 The Concept of Food Security

The concept of food security covers several components. The concept embodies supply sources, availability, accessibility to households and adequacy. By and large important food security components include:

- Availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports;
- Access by households and individuals to appropriate foods for a nutritious diet; and
- Optimal uptake of nourishment.

Although food supply in a country can be met through imports, it is vital that local food demand be met by local food production for many reasons:

- Agriculture is a source of income not only for rural farm workers but also for those employed in related trades and small industries.
- To some extent agriculture deter people from migrating to already over crowded cities.
- Rural development cannot take place without a flourishing agriculture.
- Meeting the food requirements of developing countries based on imports is not logically feasible;
- Large investment in manpower and logistics to monitor and control possible importation of exotic harmful pests in the wake of massive importation of grains.
- Inadequate foreign exchange reserves to pay for imports.
- Unsustainability of massive food imports through food aid.

1.2 Increased Population and Food Supply

It is estimated that the population of Tanzania is increasing at the rate of 2.8 percent. It should be noted that increased population is accompanied by increased food demand. If the demand is to be met through domestic production, food crop output should as a necessity be increased to meet the challenge. However, FAO studies have indicated that food production per capita in Africa is decreasing. Therefore for Tanzania to attain national food security through local production per capital food production should be increased. The possible ways for increasing food crop output in Tanzania could be through:-

- Increasing arable land and irrigation systems;
- Cropping intensification;
- Lowering post-harvest losses

While increasing cultivated land could be an option it should be noted that increased output would depend much on rainfall availability in each year. It should also be noted that fertility in major grain producing areas is low and there is high population pressure in high fertility and high rainfall areas. This calls for massive expansion of irrigation in all parts of Tanzania. This is particularly so, as many parts of the country have highly variable, erratic rainfall; frequent severe droughts; rising population pressure accompanied by declining farm size; falling soil productivity and land degradation; and the existence of substantial, untapped irrigation potential.

1.2 Irrigated Agriculture for Food Security

Irrigation can be simply defined as the application of water to soil for the purpose of supplying the moisture essential for plant growth.

Almost 800 million people in the developing world do not have enough to eat, and another 34 million people in the industrialized countries and economies in transition also suffer from chronic food insecurity. According to UNDP in year 2030 three billion more people will be on the earth and thus the need for more food to feed on. For the past six months, July 2000 to January 2001 our country has imported maize (39,365 tons); Rice (80,144 tons) and wheat (149,095 tons). Around 80% of the extra demand of food source world wide would have to come from irrigated land. Further more, little land will be available, so the increased output will have to come mainly from efficiently managed irrigation systems where improved yields could be realized.

1.3 Importance of Irrigation Historically and Currently

Historically civilization has followed the development of irrigation, it has risen on irrigated land. Most ancient cultures that were depending upon irrigated agriculture declined because of lack of political and community stability so essential to irrigated agriculture. Genesis mentions Amraphel, King of Shinar, a contemporary to Abraham, who is probably identical with Hammurabi, sixth king of the first dynasty of Babylon who developed laws indicating that the people had to depend upon irrigation for existence. That was about 2000 BC.

Irrigation practice in Tanzania dates back from the Iron Age. Traditional Irrigation Systems, which were by then practiced in various parts of the country, were of considerable local importance as irrigation was always seen to provide protection against drought and as means stabilizing crop production and promotion of food security.

Modern irrigation was first introduced in our country in the 1930's by then Tanganyika at the Tanganyika Planting Company (TPC) near Moshi town for sugar cane. However the Colonial government got involved in Irrigated agriculture after the Second World War. In 1948 a 1,000 Hectare rice farm was initiated at Kilangali in Morogoro Region. Unfortunately the venture failed and was abandoned in 1951.

Before the 1950's government involvement in irrigation concentrated on the provision of advice and assistance to traditional irrigation by agricultural field officers.

After independence the government continued to develop irrigation practice in the country. In 1970's Irrigation expatriates were recruited mainly from India in an attempt to overcome the lack of indigenous expertise.

The Irrigation Division was formed in 1975 as a successor of the Water Development and Irrigation Division (WDID which was formed in 1955) through a recommendation by the Royal Commission (in 1953). The Royal Commission noted the seasonality and unreliability of rainfall over much of the East African land as a big constraint for agricultural production.

In 1975 following the national food crisis (1974/75) the National Village Irrigation Development Programme was formed in a bid to develop and rehabilitate village smallholder irrigation schemes. To ensure proper implementation of NVIDP taking into account the human resource (Irrigation Experts) available, six Zonal Irrigation Units were established in the early 1980 each covering three or four region.

It will be noted that throughout the 1980's the adopted irrigation investment strategy was for full rehabilitation of traditional irrigation schemes and the construction of new high input/output modern schemes in both parastatal and smallholder sectors. This strategy has proved expensive and unsuccessful with respect to the objectives of the country as was proposed in the 1983 Agricultural Policy. More over this crucial existing smallholder sector received a meagre share of the total irrigation investment during that period although it is the leading producer of the irrigated staple grains like rice. Although some large- scale irrigation projects have been implemented the government emphasis has been to improve the smallholder ones with the objective of raising food production for self sufficiency and food security at a household and national level.

1.4 Exploited Irrigation Potential

Out of the total 43 million hectares suitable for agricultural production in our country only 6.3 million hectares are under cultivation and out of this cultivated land only 157,000 Hectares are under "developed irrigated agriculture" despite the irrigation potential estimated at a minimum of one million hectares (see Figure 1.1). The irrigated area is mostly for rice, maize and horticulture.

The developed irrigated potential being only 15% of the total potential, it poses a big question as to how we are going to develop sustainably in the remaining over 85% and how we are going to use efficiently and effectively, the developed 15% land for to increase food production.

1.5 This paper

This paper is addressing the irrigation development approach in the context of overall national food security issues. As through irrigated agriculture, one

could measure the potentialities which exist in Tanzania for solving the problem of food deficit in the country.

2.0 IMPORTANCE OF IRRIGATION ON CROP PRODUCTION

2.1 Water Requirement for Crop

As we all know water is important for crop production whether it is directly from rainfall or irrigation from several sources (lakes, rivers, underground etc.). Irrigation in particular which is the application of water to the soil for the purpose of supplying the moisture essential for plant growth is important as it provides crop assurance against short duration droughts, cools the soil and atmosphere thereby making more favourable plant growth environment. It also dilutes hazard salts in the soil while softening tillage pans and clods.

Dependency on rainfall is more risky for water assurance for crop as it is very erratic and unreliable in terms of time and quantity.

Many places in the country receive small amount of rainfall less than the crop water requirements, which is a limiting factor for effective agricultural production under rainfed conditions.

Based on rainfall station records, rainfall varies from 400mm to 2000mm in this country. Estimates show that about 80% of the country receives less than 700 mm. Average rainfall days is put at 80 days for most areas with very big margin ranging from 33 days in Dodoma to 160 days in Bukoba station. Generally most parts of Tanzania receive erratic and highly unreliable rainfall. Under such circumstances supplementary irrigation is necessary for effective crop production. Water resources in Tanzania comprises of rivers, lakes and ground water. The minimal exploitable volume has been estimated to be 110 billion cubic metres, of which over 75% comprises surface water. These resources can be exploited for irrigation and represent a great potential for irrigated agricultural development. Further, water harvesting technologies are now available and can be used to arrest and conserve run-off water from slopes and ephemeral streams.

Therefore efficient Irrigation and Drainage Systems are important to provide optimum irrigation water requirement and draining out excess water from the farm that could otherwise be detrimental to the crop.

2.2 Irrigated vs. Rainfed Crop Production

As indicated in Table 2.1 crop production for rice, wheat and maize is higher for those under irrigation than for rainfed by between 25% and 500% for different countries in the world. Similarly as indicated in table 2.2 (a) and Table 2.2 (b) crop yield in Tanzania shows that for rainfed agriculture and production ranges from 0.7 tons/ha to 5.3 tons/ha with an average of 1.6 tons/ha whereas for irrigated rice the production ranges from 2.5 ton/ha to 5.5 tons/ha with an average of 4.2 tons/ha. This signifies the importance of irrigation for more crop production in Tanzania and world wide.

Table 2.1 Irrigated vs Rainfed Crop production World wide

S/N	COUNTRY	YILED UNDER IRRIGATION (Tons/ha)	YIELD UNDER RAINFED (Tons/Ha)	PERCENTAGE INCREASE ON IRRIGATED YELDS	CROP
1.	Indonesia	5	4	25	Rice
2.	Thailand	3.2	1.2	166	Rice
3.	Zimbabwe	6 -7	1 -1.5	500 - 367	Rice
4.	Tanzania	3 - 4	0.5 - 2	500 - 100	Rice
5.	Gambia	4 - 7	3	83	Rice
6.	Zimbabwe	2 - 3	0.5	400	Maize
7.	Zimbabwe	2 - 4	0.7	430	Wheat
8.	Australia	8.2	-	-	Rice
9.	Brazil	5	2.7	85	Rice
10.	Cambodia	2.5	1.5	67	Rice
11.	China	5.9	3.0	97	Rice
12.	Columbia	5.0	2.5	100	Rice
13.	Egypt	7.3	-	-	Rice
14.	India	3.6	2 - 4	200	Rice
15.	Japan	5.9	3.0	97	Rice
16.	Korea (DPRK)	9.1	4.6	98	Rice
17.	Korea (ROK)	6.5	3.0	116	Rice
18.	Madagascar (ROK)	4.0	2.0	100	Rice
19.	Nigeria	4.9	1.3	277	Rice
20.	Philippines	3.4	2.0	70	Rice
21.	Sri Lanka	3.5	2.5	40	Rice
22.	Kenya	4.5	-	-	Rice
23.	Malawi	2.5 - 4	-	-	Rice

Table 2.2**(a) Typical Rainfed Paddy Yields in Tanzania Mainland Regions (as per 1994/95 National Sample Census of Agriculture) data.**

LOCATION/REGION	YIELDS (tons/ha)	COMMENTS
ARUSHA	5.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
COAST/DAR ES SALAAM	1.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
DODOMA	1.0	Hand cultivation, Ox – cultivation or Improved ox cultivation
IRINGA	0.6	Hand cultivation, Ox – cultivation or Improved ox cultivation
KAGERA	1.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
KIGOMA	1.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
KILIMANJARO	4.6	Hand cultivation, Ox – cultivation or Improved ox cultivation
LINDI	0.9	Hand cultivation, Ox – cultivation or Improved ox cultivation
MARA	0.7	Hand cultivation, Ox – cultivation or Improved ox cultivation
MBEYA	3.4	Hand cultivation, Ox – cultivation or Improved ox cultivation
MOROGORO	1.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
MTWARA	1.9	Hand cultivation, Ox – cultivation or Improved ox cultivation
MWANZA	1.5	Hand cultivation, Ox – cultivation or Improved ox cultivation
RUKWA	2.5	Hand cultivation, Ox – cultivation or Improved ox cultivation
RUVUMA	1.7	Hand cultivation, Ox – cultivation or Improved ox cultivation
SHINYANGA	2.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
SINGIDA	1.0	Hand cultivation, Ox – cultivation or Improved ox cultivation
TABORA	1.0	Hand cultivation, Ox – cultivation or Improved ox cultivation
TANGA	1.3	Hand cultivation, Ox – cultivation or Improved ox cultivation
AVERAGE	1.6	Hand cultivation, Ox – cultivation or Improved ox cultivation

(b) Paddy Yield in different Irrigation Schemes/Projects in Tanzania (Source Irrigation Section Surveys).		
Project/Scheme	Yields (t/ha)	Comments
Bahi (Dodoma)	4.0	River diversion improved land development
Chikuyu (Singida)	4.0	Water harvesting
Nata (Tabora)	3.2	Water harvesting
Nduguti (Shinyanga)	3.5	Water harvesting
Misungwi (Mwanza)	2.5	
Majengo (Usangu)	3.5	Mechanized cultivation, high inputs
Kitivo (Tanga)	5.5	High inputs, modern varieties
Mwamapuli (Igunga)	5.5	High inputs, modern varieties
Average	4.2	

2.3 Utilization of Water Resources in Tanzania

Table 2.3 (a) shows the high utilization of water resource for irrigation purposes for some of the countries in the world. For example Egypt entirely depends on irrigated agriculture and is food self sufficient despite the fact that it hardly rains there. Figure 2.1 shows that water withdrawal for agricultural use for Tanzania is only between 1 – 5% of the internal renewable water resource.

These experiences from other countries are giving us a challenge as to why can't we use our abundant Land and Water Resources we have to increase food self-sufficiency and poverty eradication.

Table 2.3 (a) Irrigated Areas in Countries Having More Than One Million Hectares of Irrigated Land.

S/N	COUNTRY	CULTIVATED LAND 1000 HA	IRRIGATED LAND	
			1000 HA	PERCENT
1.	Afghanistan	7,980	2,900	31
2.	Argentina	26,028	1,555	6
3.	Australia	44,610	1,581	4
4.	Bulgaria	4,516	1,001	24
5.	Chile	4,632	1,500	32
6.	China and Formosa	111,167	76,500	69
7.	Egypt	2,852	2,852	100
8.	India	164,610	38,969	24
9.	Indonesia	18,000	6,800	38
10.	Iran	16,727	5,251	31
11.	Iraq	10,163	4,000	39
12.	Italy	14,409	3,500	29
13.	Japan	5,446	2,626	48
14.	Korea	2,311	1,070	46
15.	Mexico	23,817	4,200	18
16.	Pakistan	21,700	12,400	57
17.	Peru	2,979	1,116	37
18.	Philippines	11,145	1,090	10
19.	Spain	20,626	2,435	12
20.	Sudan	7,000	2,520	25
21.	Thailand	11,200	3,170	28
22.	Turkey	26,068	1,724	7
23.	USA	192,318	21,489	11
24.	USSR	232,609	11,500	5
25.	Venezuela	5,214	1,00	19
26.	Vietnam	5,083	3,040	60
27.	Other countries	<u>463,790</u>	<u>17,848</u>	<u>4</u>
	World's Total	1,457,000	233,637	16

Table 2.3 (b) Sub – Saharan Africa: estimates of irrigated areas in relation to potential, 1991

Country	Irrigation potential (ha)	Area under irrigation (ha)	Total in % of potential
Angola	3,700,000	75,000	2.0
Benin	300,000	10,236	3.4
Botswana	14,640	1,381	9.4
Burkina Faso	164,460	24,330	14.8
Burundi	185,000	14,400	7.8
Cameroon	290,000	20,970	7.2
Cape Verde	2,990	2,779	92.9
Central African Republic	1,900,000	135	0.0
Chad	835,000	14,020	1.7
Comoros	300	130	43.3
Congo	340,000	217	0.0
Cote d'Ivoire	475,000	72,750	15.3
Djibouti	1,000	674	67.4
Equatorial Guinea	30,000	-	-
Eritrea	187,500	28,124	15.0
Ethiopia	3,637,300	189,556	5.2
Gabon	440,000	4,450	1.0
Gambia	80,000	1,670	2.1
Ghana	1,900,000	6,374	0.3
Guinea	340,000	15,541	4.6
Guinea – Bissau	281,290	17,115	6.1
Kenya	353,060	66,610	18.9
Lesotho	12,500	2,722	21.8
Liberia	600,000	2,100	0.4
Madagascar	1,500,000	1,087,000	72.5
Malawi	161,900	28,000	17.3
Mali	566,000	78,620	13.9
Mauritania	165,000	49,200	29.8
Mauritius	20,000	17,500	87.5
Mozambique	3,072,000	106,710	3.5
Namibia	47,300	6,142	13.0
Niger	270,000	66,480	24.6
Nigeria	2,330,510	232,821	10.0
Rwanda	159,000	4,000	2.5
Sao Tome and Principe	10,700	9,700	90.7
Senegal	340,000	71,400	21.0
Seychelles	1,000	-	0.0
Sierra Leone	807,000	29,360	3.6

Somalia	240,000	200,000	83.3
South Africa	1,445,000	1,270,000	87.9
Sudan	2,784,000	1,946,200	69.9
Swaziland	93,220	67,400	72.3
Tanzania, United Rep.	990,420	150,000	15.1
Togo	180,000	7,008	3.9
Uganda	202,000	9,120	4.5
Zaire	7,000,000	10,500	0.2
Zambia	523,000	46,400	8.9
Zimbabwe	388,400	116,577	30.0
Sub-Saharan Africa	39,366,490	6,181,422	15.7

Source: Irrigation in Africa- a basin approach, FAO (in press).

2.5. Development of Irrigation Infrastructure

The need of utilization of the available Land and Water Resources for irrigated agriculture in our country is obvious. But we are underutilizing these resources.

The underutilizations of these resources as has been elaborated with data in the previous chapters; is due to the fact that the irrigation infrastructure for more than 85% of the potential area is not available. The farmers use the traditional irrigation schemes inefficiently ever since our ancestors put them in place many years' even centuries ago. In addition the potential that currently is not in use is just laying idle as a "sleeping giant". Even if we loudly shout that we have to go for irrigated agriculture, without irrigation infrastructure, then by what means are we going to practice irrigation? It is obvious that investing in irrigation infrastructural development needs a substantial amount of money but that is a fact for one to get a good product, it can not be acquired without investing. Therefore irrigation abrasion or damming structures; conveyance and distribution structures are crucial to be in place for irrigated agriculture.

2.6 Irrigation Water Management

The 15% of the irrigation potential which is already developed also needs to be properly managed so that it is efficiently and effectively utilized for higher crop production. This will be achieved if farmers are properly organized to participate in all stages of the development of their irrigation systems, so that they understand that the development is for them and hence they have a responsibility and accountability for the performance of their irrigation systems throughout their life for sustainability. The farmers have to be organized as Irrigators Associations or Cooperative Societies.

3.0 THE ROLE OF IRRIGATION ON FOOD SECURITY

3.1 The Policy

Irrigation development is an important strategy for achieving the policy objectives envisaged in the Agricultural and Livestock Policy as revised in 1997. The development of irrigation systems is seen as an important aspect of the agricultural development strategy which can help the nation to achieve the basic objectives towards food security and poverty eradication.

3.2. Improvement of Food Self Sufficiency

If developed and properly utilized, the smallholder irrigation systems can play a major role in ensuring Food Self Sufficiency particularly at household level in a country wide perspective. Large Scale irrigation systems if properly designed, owned and managed can as well facilitate a substantial level of food self sufficiency at both levels but more significantly at the national level. It is thus important to note that both small scale and large scale irrigation intervention is important so long as proper planning is done in view of the economic viability and sustainability.

3.3. Improvement of Farmers Productivity and Income.

With Irrigation practice a piece of land and other inputs can be more effectively utilized under crop intensification. The crop can continuously grow without any stress as water availability is ensured by irrigation so long as other inputs are appropriately applied. Irrigation is highly favourable for high value crop production as these can be grown several times per year depending on the variety and the local climate (generally temperature). The crop harvested as a result becomes of higher quality and quantity. Through this the farmer can harvest larger amount of crop per piece of land and get more income from selling the excess produce. In this way the farmer is in an environment of food self sufficiency and higher purchasing power to eradicate poverty.

3.4 Promotion of Integrated and Sustainable Management of Natural Resources.

Water for irrigation is as abstracted from the sources which are used by other individual and sector users is vulnerable to lead into water users conflicts. Improving irrigation systems for proper operations encourages dialogue with other users. This provides the opportunity for the society or stakeholders to eventually come up with integrated approaches in developments related to water resources. The water source basins or sub-basins are the appropriate boundaries to base for the promotion of integrated and sustainable management of Natural Resources. Water Users Groups comprising of different users such as Irrigation Associations or Cooperative Societies, Livestock Cooperative Societies etc. could be formed basing on a particular basin or sub-basin.

3.5 Employment Opportunities

As the Agriculture Sector in our country employs around 90% of the labour force, developing the irrigation potential will increase the number of those involved in agriculture since irrigation requires more intensive attention per piece of land than the rainfed agriculture. The new developed area will also considerably increase vacancies for employment in irrigated agriculture.

Improvement of marketing systems through transport infrastructural development in addition to farmers credit accessibility and rural electrification is a complementary environment for encouraging people especially youths to be attracted to enter into agriculture as a normal employment. If this move is seriously implemented we will start observing a considerable reduction of people from rural areas migrating to urban areas.

4.0 IMPLEMENTATION

A number of irrigation schemes have been implemented and others are under implementation. Table 4.1 below shows projects completed, Table 4.2 shows projects whose implementation is ongoing, and Table 4.3 shows projects in the pipeline. These projects are categorized into Smallholder projects and Large Farm Estates.

4.1 Completed Projects.

4.1.1 Smallholder Projects.

S/N	PROJECT NAME	LOCATION (REGION)	AREA (HA)	BASIN	AGENCY/DONAR	COMMENTS
1.	Smallholder Irrigated Rice Project:					
	1.1. Kitivo	Tanga	510	Pangani (Umha River Basin – Mnazi Plains)	GOT/ADB/UNCDF	The Scheme was partly damaged by the 1993 floods, and now more than 60% of farmers not irrigating
	1.2. Mwamapuli	Tabora	600	Lake Tanganyika	GOT/ADB/UNCDF	To be handed over to the farmers/Regional/District authorities.
2.	Usangu Village Irrigation Project:					
	2.1. Majengo Scheme	Mbeya	530	Rufiji (Usangu Plain)	GOT/UNDP/FAO	To be handed over to farmers/District/Regional authorities
	2.2. Mswiswi Scheme	Mbeya	870	Rufiji (Usangu Plain)	GOT/UNDP/FAO	To be handed over to farmers/District/Regional authorities
	2.3. Motombaya Scheme	Mbeya	600	Rufiji (Usangu Plain)	GOT/UNDP/FAO	To be handed over to farmers/District/Regional authorities
3.	Kimani	Mbeya	500	Rufiji (Usangu Plain)	GOT/CIDA	Already handed over to farmers
4.	Hombolo	Dodoma	300	Internal Drainage	GOT/Italian Government	Handed over to Dodoma Municipality
5.	Pawaga	Iringa	2,000	Rufiji	GOT/UNDP	Headwork is completed
6.	Rehabilitation of Traditional Irrigation					

	Project (RTIP):					
	6.1. Ikwiriri Scheme	Kilimanjaro	300	Pangani	GOT/UNDP/FAO/NORAD	Completed
	6.2. Kikafu Chini Scheme	Kilimanjaro	640	Pangani	GOT/UNDP/FAO/NORAD	Under construction
	6.3. Musa Mwijanga	Kilimanjaro	676	Pangani	GOT/UNDP/FAO/NORAD	Initial stages completed
	6.4. Rundugai	Kilimanjaro		Pangani	GOT/UNDP/FAO/NORAD	Initial stages completed
	6.5. Msitu wa Mbogo/Kambi ya Tanga	Arusha	410	Pangani	GOT/UNDP/FAO/NORAD	To be further developed by RBMSIIP
	6.6. Shango/Mbughuni	Arusha	200	Pangani	GOT/UNDP/FAO/NORAD	To be further developed by RBMSIIP
7.	Ndungu	Kilimanjaro	680	Pangani (Uppler Mkomazi)	GOT/Govt. of Japan	Handed over to farmers
8.	Lower Moshi	Kilimanjaro	2,300	Pangani	GOT/Govt. of Japan	Handed over to farmers
9.	Traditional Irrigation Improvement (TIRDEP)	Tanga	600	Pangani	GOT/GTZ	
10.	Bugwema "Giant"	Mara	1,600	Lake Victoria	GOT	Handed over to National Service
11.	Bugwema "Solar"	Mara	40	Lake Victoria	GOT/Italian Government	Completed and handed of to farmers
12.	Butiama	Mara	300	Lake Victoria	GOT/Government of Korea	Completed and handed of to farmers

13.	Smallholder Development Project for Marginal Areas (SDPMA):					
	13.1 Bahi	Dodoma	605	Internal Drainage	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
	13.2. Chipanga	Dodoma	200	Internal Drainage	GOT/IFAD	
	13.3. Chali	Dodoma	150	Internal Drainage	GOT/IFAD	
	13.4. Chikopelo	Dodoma	150	Internal Drainage	GOT/IFAD	
	13.5. Chikuyu	Singida	400	Internal Drainage	GOT/IFAD	
	13.6. Lusilile	Singida	150	Internal Drainage	GOT/IFAD	
	13.7. Saranda	Singida	150	Internal Drainage	GOT/IFAD	
	13.8. Tyeme	Singida	300	Internal Drainage	GOT/IFAD	
	13.9. ChomaChaNkola	Tabora	300	Internal Drainage	GOT/IFAD	
13.10.Itumba	Tabora	150	Internal Drainage	GOT/IFAD		
	13.11.Nata	Tabora	300	Internal Drainage	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
	13.12.Lusu	Tabora	200	Internal Drainage	GOT/IFAD	”
	13.13.Nsalala	Shinyanga	200	Internal Drainage	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98

13.14.Nduguti	Shinyanga	200	Internal Drainage	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
13.15.Chela	Shinyanga	300	Lake Victoria	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
13.16.Misungwi	Mwanza	150	Lake Victoria	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
13.17.Mahiga	Mwanza	200	Lake Victoria	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98
13.18 Igongwa	Mwanza	200	Lake Victoria	GOT/IFAD	Operating, but some of the infrastructures were damaged by El-Nino in 1997/98

4.1.2 Large Farm Estate

S/N	PROJECT NAME	LOCATION (REGION)	AREA (HA)	BASIN	AGENCY/DONOR	COMMENTS
1.	Dakawa (NAFCO)	Morogoro	2,000	Ruvu/Wami	GOT/ADB/GOVT of Korea	Operational but efficiency low
2.	Mtibwa (SUDECO)	Morogoro	1,880	Ruvu/Wami	GOT	Privatized and operational
3.	Kilombero (SUDECO)	Morogoro	1,670	Ruvu/Wami	GOT	Privatized and operational
4.	Ruvu (NAFCO)	Coast	712	Ruvu/Wami	GPT/GOVT. of China	Operational but efficiency low
5.	Kapunga (NAFCO)	Mbeya	3,200	Rufiji	GOT/ADB	Operational but efficiency low
6.	Mbarali (NAFCO)	Mbeya	3,000	Rufiji	GOT/ADB	Operational but efficiency low
7.	TPC (SUDECO)	Kilimanjaro	6,480	Pangani	GOT	Under privatization & operational.
8.	Kahe (NAFCO)	Kilimanjaro	1,510	Pangani	GOT/FAO	Under privatization & operational
9.	Kagera (SUDECO)	Kagera	4,000	Pangani	GOT	Under privatization & operational

4.2 On-going (under implementation) Projects/Programmes

S/N	PROJECT NAME	LOCATION (REGION)	AREA (HA)	BASIN	AGENCY/DONOR	COMMENTS
1.	River Basin Management and Smallholder Irrigation (RBMSIIP)	Coast, Tanga, Kilimanjaro, Arusha, Iringa, Mbeya	7000 - 9000	Pangani & Rufiji	GOT/World Bank (IDA)	To be completed in 2002
2.	Madibira Smallholder Agricultural Development (MSADP)	Mbeya	3,000	Rufiji	GOT/ADB	Completed and operational
3.	Agricultural Sector Support Programme Support (ASPS – Smallholder Irrigation Component)	Mbeya, Iringa, Morogoro	8,000	Rufiji	GOT/DANIDA	To be completed on 2002
4.	Mwega Smallholder Irrigation	Morogoro	580	Rufiji	GOT/Govt. of Japan	To be completed in 2003
5.	Participatory Irrigation Development Programme (PIDP)	Dodoma, Singida, Tabora, Shinyanga, Mwanza, Arusha	7,800	Internal Drainage	GOT/IFAD/IRISH Govt(IRISH AID)/WFP	To be completed in 2006

4.3 Projects/Programmes in Pipeline

S/N	PROJECT NAME	LOCATION (REGION)	AREA (HA)	BASIN	AGENCY/DONOR	COMMENTS
1.	Lower Moshi Integrated Agriculture and Rural Development	Kilimanjaro	4,700	Pangani	GOT/Govt. of Japan	Request for funding submitted
2.	Master Plan Study on Agricultural Multi-Functional (Multipurpose) Small Dams Rehabilitation	Kilimanjaro, Tabora, Iringa, Singida, Dodoma, Mwanza & Shinyanga	-	Pangani, Lake Tanganyika, Internal Drainage, Rufiji	GOT/Govt. of Japan	Request for funding has been submitted
3.	Kitere Irrigation Project	Mtwara	2,000	Lukuledi/Ruvuma	GOT/Govt. of Japan	Request for funding submitted
4.	Lukuledi/Ruvuma River Basin Master Plan	Ruvuma, Lindi, Mtwara	-	Ruvuma & Minor Southern	GOT/Govt. of Japan	Request has been submitted
5.	Pawaga Irrigation Project	Iringa	2,000	Rufiji	GOT/Govt. of Japan	Request for funding submitted
6.	Master Plan Study on Agricultural Development of Kyela Plain	Mbeya	-	Lake Nyasa	GOT/Govt. of Japan	Request for funding has been submitted
7.	Master Plan Study on Irrigation Promotion in Tanzania	All 20 regions	To be determined after the study	All 9 basins	GOT/Govt. of Japan	The Project is in inception stage.

5.0 FURTHER IRRIGATION DEVELOPMENT STRATEGIES

5.1 Rehabilitation of Traditional Smallholder Irrigation Schemes

Rehabilitation and/or upgrading of traditional smallholder schemes in areas with the potential for irrigation will continue to be implemented. The government emphasis will be on the development of small scale irrigation by planning, design and supervision of construction works whereby actual construction is by private contractors through competitive bidding. This approach will bring higher impact with minimum investment.

In line with the above the development of schemes based on water harvesting technology in marginal areas will continue to be implemented. Tanzania has a vast marginal land which is fertile but rainfall is below average. Productive schemes in these areas can be initiated and sustained with a minimum of technical intervention using simple flood management.

Upgrading irrigation schemes will facilitate water use efficiency so that some amount of water will be rendered available to other individuals or sector users downstream of the respective river basin. The traditional irrigation systems are operating at an irrigation efficiency of 15% only. The rehabilitated or upgraded ones improves to over 40% efficiency. Normally for earth canals (unlined canals) irrigation efficiency hardly reaches above 50% depending on the type of soils and other factors. An irrigation efficiency of between 60% - 80% could be realized with lined canals. Conveyance of irrigation water through pipes, sprinkler irrigation and drip irrigation systems can achieve irrigation efficiency above 80% but hardly reaches over 95%. The higher the efficiency one could be looking for, the more costly the capital investment is observed, thus Benefit/Cost analysis is normally done before the decision is made with the consideration of the availability of funds.

5.2 Irrigation Extension Services

For a long time Irrigation and Extension Services have wrongly been perceived as different entities even in the field. In fact after irrigation development the most important task following is extension services to the farmers who were fully involved during the development stage. Having the irrigation infrastructure in place, water for irrigation in place, then farmers are supposed to be correctly guided on proper use of water for the crop in conjunction with other agricultural inputs necessary for the crop. Applying inputs and agro- mechanization to irrigated land is more rewarding than in rainfed land to the investment and the expected crop yield .

Therefore Irrigation extension and application of agro mechanization is to be strongly emphasized to go along with irrigated land as a first priority. The Soil Fertility Recapitalization and Intensification Programme (SOFRAIP) financed by the World Bank, its intervention is closely targeting the irrigated areas.

5.3 Master Plan Study for Irrigation Development in Tanzania

The available data for irrigation sub-sector are not complete to suffice the need. As an example the irrigation potential is reported to be “over one million hectares” which is an indicator that the data precision is quite far from accuracy. The available data were collected, compiled and somehow updated in early 1990s by the UNDP/FAO assisted Institutional Support to Irrigation Development Project (ISID). However it does not cover the whole country.

The government of Japan has accepted to assist the government of Tanzania to undertake a countrywide Master Plan Study for Irrigation Development beginning mid August 2001 for two and a half years.

This will provide us with a more reliable and current database and implement able plan for irrigation development. This will update the existing twenty - year plan of National Irrigation Development Plan (NIDP) which is now seven years old.

5.4 Development of New Irrigation Schemes

New Smallholder Irrigation Schemes will be developed in those areas where there is no traditional schemes but due to some reasons such as population pressures on land availability creates a demand for irrigation schemes. However this will be coupled with consideration as to whether the intervention will be environmentally friendly sustainable and without adverse negative effects to other users of the respective resources.

The private sector will continue to be encouraged to invest in large new Irrigation on their own cost in line with the appropriate Government guidelines.

5.5 Revival of Abandoned Irrigation Schemes

There are a number of hitherto developed irrigation schemes which have been abandoned for different reasons. Such schemes include Kilangali in Morogoro region, Kalenga in Iringa region to mention a few. Most of these irrigation schemes were abandoned due to poor design approaches which did not considerably involve farmers right from the beginning. So the farmers thought that the projects were set for the government itself and thus did not belong to them.

With our new approach in irrigation schemes development whereby farmers are sensitized with awareness campaigns followed by involvement right from the planning stage to implementation and finally a perpetual full responsibility on the operation and maintenance these farms will be revived. In case no community farmers will happen to be interested then other progressive farmers as individuals or in a legal organization form will be considered through the empowerment approach.

Under the “Empowerment Approach” a framework is being prepared in the Ministry which will be adopted to empower individuals interested in seriously

indulging in irrigated agriculture in terms of necessary capital facilitation and other facilities.

State farms which will not be privatized through the PSRC will enter into this group of Empowerment Consideration. The state farms have everything in respect of the developed irrigation infrastructure however their performance has proved to be below expectation mainly due to mismanagement. If individual farmers will be allocated to these farms they will be serious.

5.6 Appropriate Technology

Large Scale irrigation schemes need more care when planning for them as far as sustainability is concerned. But a variety of Small – Scale affordable techniques can increase food production.

Treadle pumps are simple, inexpensive pedaling pumps which don't need fuel to operate. Human energy is required to operate them. They can lift water to levels higher than eight meters. They can be used to pump water for irrigation purposes and even domestic water use from shallow wells or streams of water. These pumps have enabled poor farmers in many Asian countries to increase their incomes and production by allowing a second crop to be harvested during the dry season. Different varieties of vegetables and other crops can be grown even in marginal areas (Semi arid areas). There are already a number of local manufacturers of these pumps in Arusha and Mwanza. Kenya, Zambia and Malawi are also in a process of introducing this technology. The current prices for these pumps are hardly above Tsh. 100,000.

Low-lift pumps are available in the market. In some parts of our country like along the Lukosi River in Iringa Region there are about eighty pumps in a stretch of about twenty Kilometers. These pumps are suitable for irrigating high value crops like horticulture fruits and flowers which easily pay back the investment and running costs. These pumps are easy to install and simple to operate. In collaboration with the local government authorities such simple technologies will be popularized to the farmers. The Special Programme on Food Security Project financed and executed in collaboration with the FAO have made some demonstrations on these pumps in some parts of Morogoro and Dodoma Regions. The Participatory Irrigation Development Programme (PIDP) funded by a loan from IFAD has a provision to introduce these simple pumps (treadle and Low – lift pumps) where shallow wells are feasible.

Small Scale dams and Chaco-dams are appropriate for irrigation and livestock water storage. Such dams provide an opportunity to extend the availability of water when dry spells are experienced. Again the PIDP has a provision for this intervention. The Master Plan Study for Irrigation Development with the assistance from the Japanese Government will also include the study for potential small, medium to large scale dams for agricultural and multipurpose use.

6.0 FUTURE DEVELOPMENT PLAN

Based on the Agricultural and Livestock Policy (1997), the National Irrigation Development Plan (NIDP) with appropriate modification and the Strategies laid down in chapter 5, the development Plan will base on the following areas:

- Soliciting funds for implementation from Treasury and the donor community
- Existing developed Irrigation Schemes/projects are going to be strongly facilitated with extension services and other technical backstopping so that they perform more efficiently.
- Ongoing and new Rehabilitation/Upgrading Smallholder Irrigation Schemes will continue to be implemented.
- The Master Plan Study for irrigation Promotion is to commence in mid August 2001.
- The abandoned Irrigation Schemes are to be revived. This will start immediately after finalizing the inventory and also after acquiring funds.
- New Irrigation Schemes are to be developed as the demand are observed and financing are acquired..
- Multipurpose Small to medium scale dams will be dealt with. Study on rehabilitation works and eventually actual rehabilitation will be undertaken as soon as funds will be acquired.
- Appropriate Technology particularly for simple pumps, shallow wells and Agro-mechanization will be spread and publicized to the farmers as a matter of priority.

7.0 RECOMMENDATIONS

7.1 Funding

For a long time inadequate allocation of funds for irrigation development has been experienced. It is recommended that actual requirement for irrigation development is disbursed to accomplish the targeted plans.

7.2 The Role of Local Government

The role of local government in sensitizing the targeted beneficiaries, planning, financing the irrigation development and coordination with the Ministry of Agriculture and Food Security and other relevant sectoral institutions be seriously considered by the concerned authorities.

7.3 The Role of Other Sectors

All other sectors which are stakeholders, to irrigation development should provide their appropriate input whenever required for proper coordination and integration in the irrigation development intervention. Otherwise unfavorable experiences like the Water Conflict between the farmers and the hydropower sector on the abstraction of water from Kikuletwa river for irrigation in the Lower Moshi Project can be observed.

When a common understanding and strategy is adopted by the decision makers after proper technical advice such resource use conflicts can hardly occur.

7.4 Institutional Arrangement for Irrigation

In view of the government priority in food security and poverty eradication through various means Irrigated agriculture being one of them, the history and performance of the Irrigation Sub-sector, it is recommended that the irrigation sub-sector be accorded a higher status.