

---

## CHAPTER SEVEN

# WATER FOR FOOD SECURITY

---

### 7.1 Introduction

Despite Uganda's remarkable economic growth registered in the recent years, one key set back remains the persistent food shortages and critical nutritional deficiencies often experienced in many parts of the country. Under-nourishment, especially in childhood years, is unacceptably high and periodic famine has become a common phenomenon in many parts of the country. This situation is partly attributed to occasional poor harvests attributed to erratic rain seasons, which have a very significant impact on the largely rain-fed subsistence farming being practised by over 80% of the population.

An example of the adverse impact of the above situation on the most vulnerable section of the population, children, is given **Box 7.1** below:

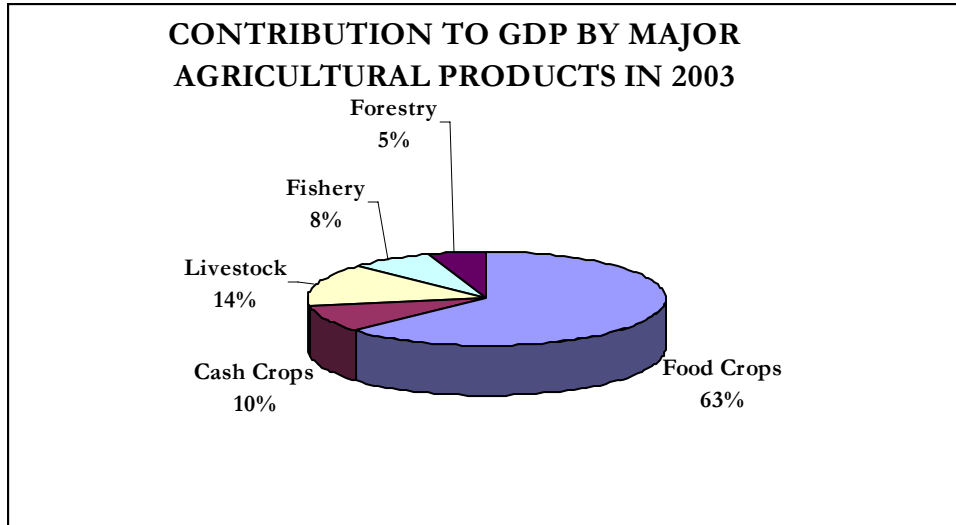
<b>BOX 7.1 – Impact of Malnutrition on Children in Uganda</b>
---

- |   |
|---|
| ✓ 40% of overall death among children in Uganda is due to malnutrition!               |
| ✓ 38% of children below 5 years of age experience stunted growth due to malnutrition! |
| ✓ 23% of all children in Uganda are under weight due to malnutrition!                 |
| ✓ 4% of all children in Uganda are wasted due to malnutrition!                        |

Source: *National Food and Nutrition Policy, 2000, MAAIF and MoH*

In order to address the above challenges, government has initiated several national programmes aimed at addressing, among other issues, constraints to food production, processing, storage and marketing of agricultural products, and improvement of general national food security.

Over the years, agriculture has remained a dominant sector in the Ugandan economy, and contributed 33% to the total GDP in fiscal year 2002/03. The relative contribution of the major agricultural products to the national GDP is highlighted in **Figure 7.1**.



**Figure 7.1 – Relative contribution to GDP by major agricultural products**  
(Source: UBOS, 2003)

The frequent droughts experienced in the recent years have aggravated the food shortages in many parts of the country resulting in increased government spending on food imports in aid of the affected communities. The role of water towards enhanced food security in Uganda cannot be over emphasized. To this effect, Government is promoting the sustainable use of water for enhanced agricultural production through several initiatives including:

- ✓ Promotion of small to large scale irrigation,
- ✓ Water harvesting for supplementary irrigation,
- ✓ Soil and water conservation, and
- ✓ Swamp development and utilisation.

### 7.1.1 National Goal and Targets

Due to its strategic role in the national economy, agriculture represents a key factor in the general improvement of economic performance, increased incomes and rising living standards of rural households as well as in ensuring food security and poverty eradication.

One of the key national development goals is:

***“To ensure food security for all Ugandans and to increase household incomes through increased exports of high value agricultural products.”***

To achieve this goal, government has put in place comprehensive policies and national development programs. These include among others; the Poverty Eradication Action Plan and the Plan for Modernisation of Agriculture.

## 7.2 Water for Irrigation Development

According to the 2002 Uganda Population and Housing Census, the country's annual population growth rate was 3.4% while the annual growth rate of food production was about 1.5%. These statistics clearly indicate that the current food production levels cannot match the population growth and that the country is likely to experience acute food shortage in the near future. The government has, therefore, recognised an urgent need to develop and implement programs aimed at increasing agricultural productivity to ensure food security for the country.

Demonstrations carried out using small-scale irrigation technologies and simple water harvesting techniques have shown very positive results with increases in crop yields of 100-400%. Following these encouraging results, the government strategy, over the next 30 years, is to increase cereal production by 70% through intensified irrigated farming.

### 7.2.1 Irrigation Potential

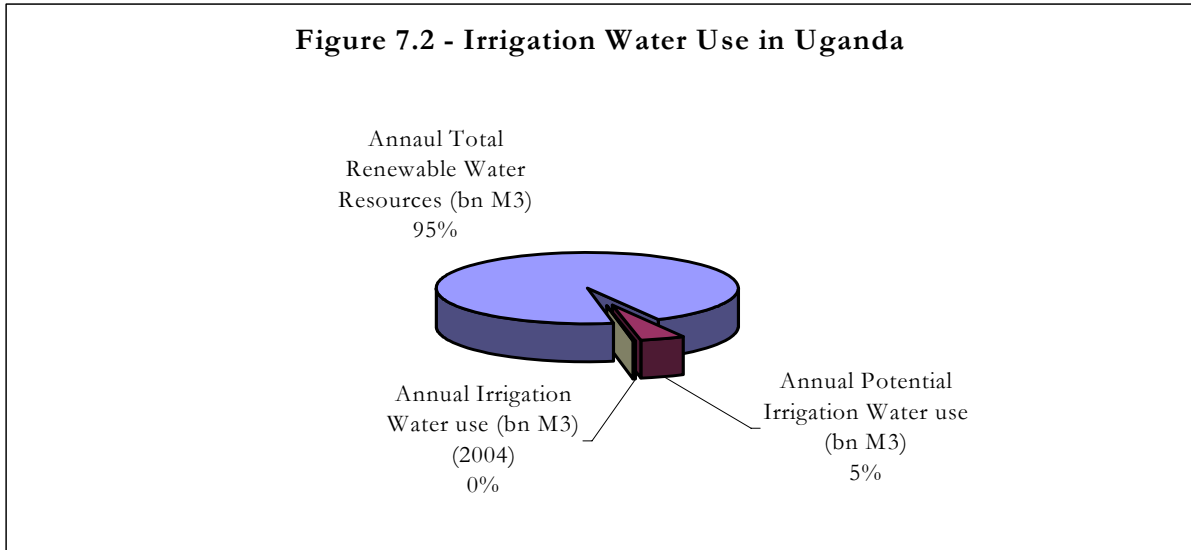
The total potential irrigable area in Uganda is estimated at 202,000 ha (FAO, 1995). A study conducted by JICA in 2004 revealed that less than 14,418ha of the potential irrigable area are under formal irrigation and 67,000ha under informal irrigation, particularly for rice production. Water use for small-scale irrigation schemes is estimated at 10,000m<sup>3</sup>/ha/year while Government large-scale irrigation and commercial irrigation schemes are estimated at 12,000m<sup>3</sup>/ha/year. Details of the current water requirement and irrigated area are indicated in the **Table 7.1** below.

**Table 7.1 – Irrigation Development in Uganda**

<i>Type of Irrigation</i>	<i>Area (ha)</i>	<i>Relative Water Use (M<sup>3</sup>/ha/year)</i>	<i>Total Water Use (10<sup>6</sup> M<sup>3</sup>/year)</i>
<i>Small-scale irrigation technologies</i>	300	10,000	3.00
<i>Government Irrigation Schemes</i>	2,036	12,000	24.43
<i>Commercial</i>	5,282	12,000	63.38
<i>Commercial, supplemental irrigation (Kakira Sugar Plantation)</i>	6,800	5,000	34.00
<b>Total</b>	14,418		124.01

*Source: DWD - Water for Production Study, 2003.*

**Figure 7.2** shows the current and potential irrigation water use as a percentage of the annual total renewable water (ATRW) resources, estimated at 66Km<sup>3</sup>.



The table and figure above reveal that the country's current and potential irrigation water use, estimated at 124 Million m<sup>3</sup>/year and 2,000 Million m<sup>3</sup>/year respectively, is quite small compared to the ATRW.

### 7.2.2 Water Harvesting for Supplementary Irrigation

With annual total renewable water resources of 66 Km<sup>3</sup>/year, Uganda has a very high potential of harnessing its water resources to boost its agricultural production. Though most of Uganda's agriculture is currently rain-fed, the increasing incidences of droughts and the general increase in food demand as a result of the high population growth has prompted farmers to adopt innovative measures of water harvesting to boost their farm production. These measures include among others:

- ✓ Collection of runoff from rooftops into storage structures;
- ✓ Impoundment of surface runoff into reservoirs;
- ✓ Deep tillage to prevent runoff; and
- ✓ Percolation furrows in horticultural crops to enhance in-situ replenishment of soil moisture.

#### *LARGE SCALE WATER HARVESTING*

Large scale water harvesting in Uganda is limited to the few large scale irrigation schemes which divert water from major rivers and lakes for irrigation during the dry season. These include the sugarcane and tea plantations, and commercial rice schemes whose total irrigation requirement is estimated at 120 million m<sup>3</sup> per year.

In addition to these large scale diversions, there are also a number of Valley dams/tanks that have been constructed in several districts in Uganda, mostly the cattle corridor, predominantly for livestock water supply and to a small extent, human consumption. The storage of these valley dams/tanks ranges from 6,000 m<sup>3</sup> to 400,000m<sup>3</sup>.

As part of the irrigation development strategy, Government is promoting the construction of multi-purpose reservoirs (Valley dams and tanks) whose water will be used for both livestock water supply and small scale irrigation purposes. As part of this initiative, Government is promoting the use of the most efficient irrigation systems in order to sustain water abstraction in the reservoirs throughout the dry period. These include among others: localized, sprinkler and drag hose irrigation systems, which have been demonstrated and found viable in drought prone areas.

#### *SMALL SCALE WATER HARVESTING*

Small scale water harvesting (from roof-tops, small springs and diversion of small streams) has been successfully conducted in various parts of the country predominantly for domestic supplementary irrigation for vegetable production, horticulture and small scale irrigation of high value cash crops like clonal coffee and Vanilla.

#### *WETLAND RECLAMATION*

Wetland reclamation for paddy rice production is very popular in many parts of Uganda, especially eastern Uganda. Over 53,000 ha of wetlands have been reclaimed for both small scale and large-scale paddy rice production in Uganda. Given the interest shown by many farmers to take up paddy rice production, the Government, with funding from Japan, has initiated a small-scale irrigation project to support and build capacity of the rice farmers to enhance rice production in the country and also ensure sustainable use of the wetland resources. So far 13 districts from eastern Uganda are already benefiting from the project, namely; Kamuli, Iganga, Mayuge, Bugiri, Busia, Tororo, Mbale, Pallisa, Sironko, Kumi, Soroti, Katakwi and Kaberamaido.

### **7.3 Water for Livestock Production**

The livestock sub-sector contributes 7.5% of the GDP and 17% of the agricultural GDP. In 2000, the livestock population was estimated at 5.8 million cattle, 1 million sheep, 6.2 million goats, 1.5 million pigs and about 24 million units of poultry. Annual production is estimated at 97,000 tonnes of beef, 510,000 tonnes (510 million litres) of cow milk, 41,000 tonnes of chicken meat, 16,000 tonnes of goat meat, 9,700 tonnes of mutton and lamb and limited amounts from various other animals.

Most of the livestock population is concentrated in the 29 Districts in the cattle corridor running southwest to northeast across Uganda. These Districts make up 44% of Uganda's surface area and contain 40% of the population, 55% and 42% of the indigenous and exotic cattle, respectively, 42% of sheep and goats, 36% of the pigs and 38% of the poultry flock.

#### *LIVESTOCK WATER SUPPLY*

Estimates indicate that about 60% of pastoral households lack water for domestic and livestock use. As a result, livestock have to cover long distances in search of water with all the associated health and productivity risks. Scarcity of water in the cattle corridor reduces

agricultural productivity, promotes nomadism, breeds socio-political conflicts and exacerbates the spread of livestock diseases.

In order to address the plight of pastoralists living in the cattle corridor, Government has for many years implemented livestock water supply programs to try to contain the rampant nomadism. However, these interventions are still inadequate due to the high livestock population and also due to poor maintenance of the facilities. According to an assessment carried out in 1999 (UDC/MFPED, 1999) there are a total of 316 valley dams and 765 valley tanks in the country, out of which only 111 valley dams and 268 valley tanks are operational.

As a long-term strategy, Government has recently prepared a comprehensive Water for Production investment plan which envisions, among other measures, the construction of one valley tank/dam in each sub-county in the cattle corridor districts, with capacities ranging between 6,000 – 10,000 m<sup>3</sup>. This plan, once implemented, will result in the construction of a total of 1,465 valley tanks/dams by 2015. The districts to benefit from the programme include: Luwero, Mbarara, Masindi, Nakasongola, Rakai and Sembabule.

Table 7.2 shows the current (2003) and projected (2015) livestock water requirements.

**Table 7.2 – Current and Projected Livestock Water Requirements**

	2003	2015
<b>Total Tropical Livestock Units, (TLU) (growth rate 3.5%)</b>	6,112,226	9,559,252
<b>Annual Total Water Requirements (in m<sup>3</sup>)<sup>1</sup></b>	111,548,125	174,456,350
<b>Water Requirements, 3 months without Recharge (Storage requirements) (in m<sup>3</sup>)</b>	27,505,017	43,016,600

#### 7.4 Water for Fisheries Production

The overall fisheries sector goal is *“to ensure increased and sustainable fish production and utilisation by properly managing capture fisheries, promoting aquaculture and reducing post harvest losses.”*

The fisheries sector in Uganda provides a vital source of food, employment, recreation, trade and socio-economic well being for the people of this county and for the global community. Per capita fish consumption stands at about 10 Kg per person per annum. Areas of highest rates of fish consumption in the country coincide with areas of highest population densities, which are in the vicinity of the lakes. The liberalised economy has stimulated investment in the capture and aquaculture fisheries resulting in increased foreign exchange remittances as well as household earnings. Therefore, the contribution of fisheries to food security in Uganda cannot be over emphasised. Fisheries are crucial particularly to the populations living along rivers, lakes, islands and the disadvantaged rural poor.

In the past, Uganda's fisheries industry used to boast of over 300 endemic fish species, several of which are targeted for commercial and subsistence exploitation. However, over time, the composition of the fish species in the different lakes has changed due to human exploitation and introduction of exotic species which have led to the extinction of several native species. There are now only 23 commercial species of fish in Uganda's water bodies.

The current fish consumption is estimated to be 240,000 tonnes based on the present per capita fish consumption estimated at 10 kg per year. The projected fish consumption by the year 2015 is 320,000 tonnes. Uganda's current recommended maximum fish export quota is 60,000 tonnes per year.

Besides the traditional fish capture, Government is also promoting aquaculture to boost fisheries production to cope with the increasing fish demand (both domestic consumption and export). This initiative is also coupled with improvements in the conservation and management of capture fisheries through stock rebuilding, targeting of under exploited fish stocks, more rational harvesting practices and wider application of fish food technology to reduce post harvest losses.

The main challenges facing the fisheries sector are:

- ✓ Decline of fish catches due to unsustainable fishing methods such as use of undersized fishing nets and beach seines which crop a lot of immature fish;
- ✓ Decline in species diversity in Lake Victoria and Lake Kyoga following introduction of Nile Perch;
- ✓ Decline in fish size and weight due to increased fishing pressure;
- ✓ Deterioration of water quality due to pollution from industrial wastes, soil erosion due to poor agricultural practices in the catchment areas.

Lake Victoria contributes over 50% of the total annual production in Uganda and is therefore of critical importance to manage the lake resources sustainable. Continued yields from the lake will depend on water quality and proper harvesting regimes. Following introduction of Nile Perch and Nile Tilapia into the lake, ecological changes resulted in a fishery dominated by the two introduced species.

The numerous smaller lakes, extensive wetlands and network of rivers and streams are sources of fish for the communities around them. Production from these areas is estimated at up to 2% of the total estimated production from the country's fisheries. However, since most fish from the smaller systems is directly used by the local residents, the current figure may be an under-estimate especially with reference to seasonal riverine- stream-swamp fisheries in the east and the north of the country.

### *AQUACULTURE*

Uganda is well endowed with areas suitable for aquaculture production in addition to suitable tropical climate. Aquaculture was introduced in Uganda in 1953 through a fish-farming project started by the Fisheries Department with a Fisheries Research Station at Kajjansi. The purpose of fish farming introduction was to reduce malnutrition by improving

the supply of animal protein, especially among the rural population. Ugandans from all regions and socio-economic backgrounds have taken up aquaculture. The great majority of fish farmers are ordinarily farmers who manage their fishponds as part of their mixed farming enterprise.

There are currently about 20,000 ponds producing 5,000 tonnes per annum. Average pond size is 250m<sup>2</sup> and number of farmers is estimated at 9,000. However, commercial farmers with average pond sizes of 1000m<sup>2</sup> are coming up.

### ***Water Requirements for Aquaculture***

Water requirements for aquaculture are currently minimal, as water for aquaculture at current production takes place in wetlands and with no significant water consumption compared to the natural status of wetlands. However, with the projected investments in private, large-scale aquaculture water for aquaculture will become largely consumptive due to increased evaporation from reservoirs.

From a water point of view, there is need for clear guidelines and instruments regarding:

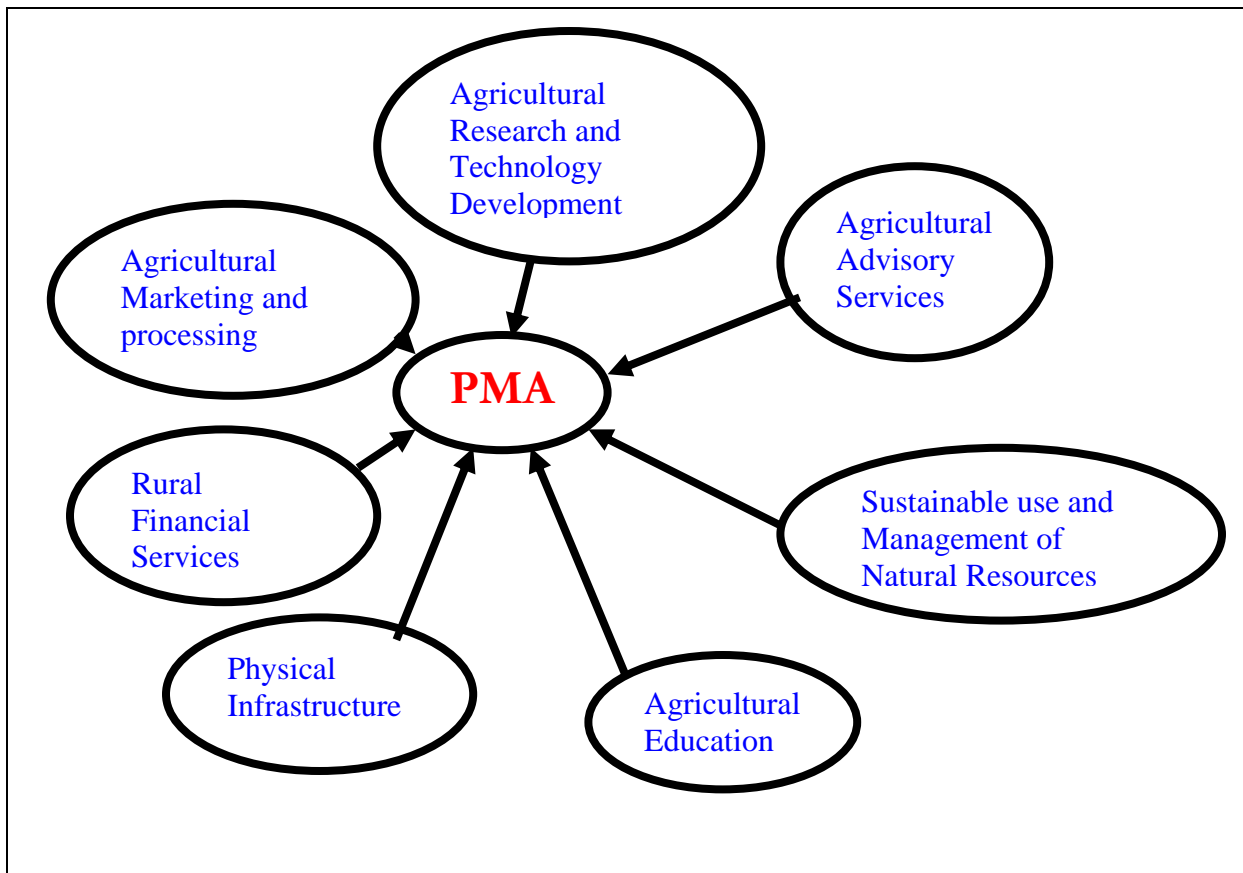
- i) The utilisation of wetlands/swamps for large-scale aquaculture;
- ii) The use of streams (i.e. diversion canals) for aquaculture production;
- iii) Cage culture farming in water bodies (location, size, pollution control, etc.);
- iv) The use of genetically modified fish including the use of chemicals (hormones) by private farmers;

## **7.5 National Plans and Strategies**

### **7.5.1 Plan for Modernisation of Agriculture**

The Plan for Modernisation of Agriculture (PMA) is a strategic framework for eradicating poverty through multi-sectoral interventions enabling the people to improve their livelihoods in a sustainable manner by raising farm productivity, increasing the share of marketed agricultural production, and creating on-farm and off-farm employment. It is an outcome-focussed set of principles upon which sectoral and inter-sectoral policies and investment plans can be developed at both central and local government levels.

The PMA aims at making adjustments in institutions and policies so as to improve service delivery for purposes of enabling the rural poor to attain a better living. The main focus areas for the PMA are shown in the schematic below.



*PMA OBJECTIVES*

- ❑ Increase incomes and improve the quality of life of poor subsistence farmers.
- ❑ Improve household food security through the market.
- ❑ Provide gainful employment; and
- ❑ Promote proper use and management of natural resources.

*PMA STRATEGIES*

- ❑ Making poverty eradication the over-riding objective of agricultural development,
- ❑ Extending decentralization to lower levels of government for efficient service delivery,
- ❑ Removing direct government involvement in the commercial aspects of agriculture and promoting the role of the private sector,
- ❑ Supporting the dissemination and adoption of productivity enhancing technologies,
- ❑ Guaranteeing food security through the market and improved incomes,
- ❑ Ensuring that all intervention programs are gender focused,
- ❑ Involving and empowering local governments in the planning and budgeting process to enable them influence public policy ; and
- ❑ Ensuring coordination of the multi-sectoral intervention to remove any constraints to agricultural modernisation.

### 7.5.2 Irrigation Sector Development Plan

Though more than 80% of Uganda's population is involved in agriculture, most of it is rain-fed small-scale subsistence farming, which is vulnerable to climatic variability and erratic rain seasons. Other than a few large-scale sugar cane and tea plantations, irrigation is not wide spread in Uganda. In addition, there are a few scattered medium scale rice schemes and horticultural farms, which practice irrigation, though on a small scale.

Reasons for the little developed irrigation farming in Uganda include among others:

- (i) The small-scale nature of our agricultural activities with very small economic returns that cannot pay for the high investment and operational costs of modern irrigation technology.
- (ii) The favourable climatic conditions in the past have sustained rain-fed crop production in many parts of Uganda thus making the need for investment in expensive modern irrigation systems not a priority.
- (iii) The land tenure system in Uganda has not favoured large scale farming in Uganda because of the small fragmented pieces of land belonging to different house holds which are not economically viable for commercial farming.

However, due to the high population growth, the traditional subsistence farming methods cannot produce sufficient food to meet the current and projected food requirements. This, coupled with the erratic rain seasons being experienced in many parts of the country, has prompted government to seriously consider irrigated agriculture as a viable option for ensuring food security and for raising household incomes through farming in high value crops for export. This new thinking is reflected in the Irrigation Sector Development Plan (ISDP) developed as part of the Plan for Modernisation of Agriculture (PMA).

#### *IRRIGATION STRATEGY*

As part of the ISDP, an Irrigation Strategy has been prepared as a blue print for the transformation of the average Ugandan farmer from a purely small-scale subsistence farmer to a more commercial oriented farmer.

The strategy addresses the following key issues, which are important for improved agricultural productivity:

- ❑ Sustainable use of water resources for enhanced crop production through irrigation;
- ❑ Small scale water harvesting for supplementary irrigation;
- ❑ Irrigation economics; including the identification of suitable and high value crops;
- ❑ Land ownership and accessibility to water resources,
- ❑ Rural financing systems and financial services and agricultural marketing systems for small farmers and small industries;
- ❑ Management of government schemes, including farmers participation, contributions/payment for infrastructure/input services and operation and maintenance arrangements;
- ❑ Access to quality seeds, fertilizer and other inputs;
- ❑ Technical and managerial capacity in water supply development and water use management at national, district, extension and farmer level;

- ❑ Promotion and regulation of private sector participation;
- ❑ Post-harvest management and marketing;
- ❑ Promotion of household small-scale appropriate technologies, irrigation expertise, efficient soil water management practices, livestock water supply management; and
- ❑ Research and demonstration, extension services and farmer education.

### 7.5.3 Water for Production Strategy

In order to address the water for production challenges, government undertook a Water for Production (WfP) sub-sector reform study, as part of the overall reforms taking place in the water sector. The study, which was completed in November 2003, was aimed at developing a comprehensive Strategy for the WfP sub-sector focusing mainly on improving rural household incomes through use of water for increased agricultural productivity and food security.

The strategic interventions proposed by the WfP sub-sector reform study are given in the **Box 7.2** below:

<i><b>BOX 7.2: Key Strategic Interventions proposed under the WFP Reform Study</b></i>	
1	Improved access to water for livestock, especially in the cattle corridor.
2	Promotion of water harvesting for small-scale supplementary irrigation.
3	Promotion of small-scale aquaculture and culture-based fisheries in existing reservoirs.
4	Creation of an enabling environment for private sector investment in the sub-sector.

The study also highlighted the following facts regarding the WfP sub-sector:

- ✓ The country has adequate water resources which could be harnessed to increase agricultural production;
- ✓ The existing policy and legal frameworks are conducive for promotion of Water for Production; in particular through appropriate policies described in the National Water Policy (1999) and the Plan for Modernisation of Agriculture (2000);
- ✓ There is inadequate technical capacity at national, district and local levels to effectively undertake the water for production intervention measures and activities. This lack of capacity, especially at local level, is reflected in the poor management of existing water supply facilities and poor exploitation of existing potential;
- ✓ There is lack of effective coordination mechanisms regarding water for production activities due to institutional fragmentation at national and district levels;
- ✓ The absence of viable financing systems and financial services for small farmers and small industries is a major constraint for development of WfP;
- ✓ Agriculture marketing infrastructure is key to realisation of the WfP potentials. At the moment, agricultural marketing is not effectively addressed.
- ✓ Poor management of Government irrigation schemes has portrayed a negative image of the irrigation sector and served as a disincentive for the would-be actors in the sector.
- ✓ There is a general lack of appropriate mechanisms for assisting farmers/farmer's groups in irrigation system development.

- ✓ There is insufficient coverage of livestock watering facilities in the country resulting in unhealthy competition for the few existing facilities.
- ✓ Poor planning, design, construction and management of livestock watering facilities has greatly contributed to the poor state of many of the existing facilities.
- ✓ There are increasing cases of encroachment on wildlife protected areas by livestock keepers in search of water and pasture, especially during the dry season.

## 7.6 Future Outlook

Water plays a vital role in agricultural production and food security in Uganda. It is clear that with the high population growth and increased occurrence of droughts, irrigated agriculture is going to play a central role in ensuring food security in Uganda.

Efforts made by government in addressing food security issues are commendable, so far. The Plan for Modernization of Agriculture (PMA) offers an excellent opportunity for revamping Uganda's agriculture sector towards sustainable food security. Although the PMA has put in place the enabling environment in terms of appropriate policies, strategies and institutional framework, the government is still faced with the challenge of fully operationalizing the PMA principles to have these translated into tangible benefits to the millions of poor farmers in the country.

Government will continue to promote both large-scale and small-scale irrigation for increased food production. A lot of emphasis is also to be put on improved delivery of livestock water supply as a strategy to achieve increased livestock production. In addition, Government will also continue with its campaign for wide spread aquaculture as a strategy for increased fish production to meet both the domestic and export markets.

## References

---

**Ashley, S., P. Bazeley and S. Holden, 1999:** Livestock in Poverty Focused Development. Livestock in Development.

**Badiane, O. and C.L. Delgado, 1995:** A 2020 Vision for Food, Agriculture, and the Environment in Sub-Sahara Africa. Food, Agriculture, and the Environment Discussion paper 4. IFPR, Washington, D.C.

**Bahiigwa, G. and Bongor T., 1998:** Poverty Eradication Implications of Agricultural Policy in Uganda.

**Balarin, J.D., 1985:** National reviews for aquaculture development in Africa, 10: Uganda. FAO Fish. Circ. (770.10): 109p.

**Banks, R., 2003:** The Uganda Fisheries Authority: Draft Business Plan. MAAIF.

**Beverton, R.J.H., 1959:** Report on the state of the Lake Victoria fisheries. Lowestoft, England: Fisheries Laboratory. (unpubl.rep.)

**Bonzon, A., and B. Horemans, 1988:** Socio-economic data base on African Fisheries. FAO Fish. Circ., (810):109p. Rome:FAO.

**FAO., 1998:** The state of Food and Agriculture, FAO, Rome.

**FAO, 1999.** "Irrigation Sub-sector Review – A Study on the Intensification of Water Utilization for Increasing Agricultural Production in Uganda – Mission Report".

**Government of Uganda, 1999:** Incorporating Environment Issues in the Plan for Modernization of Agriculture. Consultant's Report.

**Government of Uganda, 1999:** Integration of Forestry into the Plan for Modernization of Agriculture, Task Group Report.

**Government of Uganda, 1999:** Integrating Gender in the Framework for Modernization of Agriculture: Issues, prospects and challenges. Consultant's Report.

**Government of Uganda, 1999:** Private Sector Involvement in the Modernization of Agriculture. Task Group Report for Plan for Modernization of Agriculture.

**Government of Uganda, 1999:** Research and Development for the Plan for Modernization of Agriculture. Task Group Report for Plan for Modernization of Agriculture.

**Government of Uganda, 1999:** Strategic Framework for agricultural and rural finance, Task Group Report for Plan for Modernisation of Agriculture.

**Government of Uganda, 2001:** Plan for modernisation of agriculture. Eradicating poverty in Uganda. Strategy and operational framework (August 2001).

**Ministry of Water, Lands and Environment, 2003.** “Water Sector Reform: Water for Production Component – Water for Production Strategy 2003 – 2015”.

**Ministry of Finance, Planning and Economic Development (2001):** *Poverty Eradication Action Plan (2001-2003)*. Volume 1, February. MoFPED, Government of Uganda.

**Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2001:** Fisheries Department Annual Report.

**Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2003:** The Fish (Beach Management) Rules, 2003. Statutory Instrument Supplement No. 35 of 2003.

**Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2002:** National Fisheries Policy for Uganda.

**Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2000:** National agricultural advisory services programme. Master document for the NAADS task force and joint donor group.

**World Bank, 1993:** Uganda Agriculture. A World Bank Country Study. The World Bank, Washington, D.C.

**Zake, J. S., Nkwine, C & Magunda, M. K., 1999:** Integrated Soil Management for Sustainable Agriculture and Food Security in Southern and Eastern Africa. Proceedings of the expert consultation, edited by Nabhan, A. M. Mashali and A. R. Mermut. Harare, Zimbabwe.