



Food and Agriculture  
Organization of the  
United Nations

AgWA

Partnership for agricultural water for Africa



# NATIONAL INVESTMENT PROFILE



**WATER FOR  
AGRICULTURE AND  
ENERGY**

**UGANDA**

## EXECUTIVE SUMMARY

Agriculture remains the mainstay of livelihoods for the majority of Ugandans. Nonetheless, despite the importance of the sector, agriculture has experienced very limited growth in the past 10 years. This contrasts poorly with the level of development experienced in both the services and industrial sectors. The contribution of agriculture to the national GDP decreased from 51 percent to 22 percent between 1992-93 and 2013-14. Agriculture's lackluster performance is partly explained by the largely subsistence and low productive nature of the sector. Most of the agricultural production in Uganda is undertaken by small holder farmers in rural areas. These farmers are characterized by the use of rudimentary tools, limited application of inputs and reliance on rain fed agriculture with minimal irrigation.

According to the national irrigation master plan (Ministry of Water and Environment, 2011), the estimated area equipped for irrigation in 2010 was 14 418 ha (less than one percent of cultivated land). In addition to this, there is an estimated 53 000 ha of rice which is grown informally on managed wetlands. These figures are well below the country's irrigation potential that was estimated at around 567 000 ha in 2010. Public irrigation schemes cover only around 3 000 ha. Most of these schemes were set in up in the 1960s and 1970s and overtime, a number of them have run into a state of disrepair. In the recent past, the government has rehabilitated some of those schemes and has set up new small demonstration schemes or valley tanks — especially in the semi-arid sub region of Karamoja.

The total renewable water resources of the country are estimated at around 66 km<sup>3</sup>/yr, with water withdrawals representing 0.4 percent of total renewable water resources. The greatest water user was the municipal sector with 134 million m<sup>3</sup>, followed by irrigation and livestock with 120 million m<sup>3</sup>, and industry with 46 million m<sup>3</sup> (FAO-Aquastat 2014).

With regard to energy resources, most of the energy used in Uganda is traditional in form of biomass extraction i.e. firewood (93 percent). Hydroelectricity accounts for 14.3 percent of the supply of non-biomass based energy supply (Baanabe, 2012). According to the Ministry of Energy and Mineral Development, the current installed hydro power generation capacity is 683 MW with the hydro power potential estimated at over 2 250 MW (Baanabe, 2012). Nonetheless, access to electricity remains very low, at a rate of 14.6 percent (UBoS, 2014).

Uganda Vision 2040 intends to transform the country's economy "from a peasant to a modern and prosperous economy within 30 years". Agriculture's contribution to the vision is included in the Development Strategy and Investment Plan (DSIP) for agriculture (2010-2015). The Sub-Programme Water for Agriculture production includes several lines of action, for instance, the evaluation of all existing irrigation schemes and sites; the rehabilitation of five large irrigation schemes (about 6 535 ha); the establishment of four new irrigation schemes; the establishment of thirteen irrigation research and development sites; undertaking district-based demonstrations, etc. Regarding energy development, Uganda has the objective of increasing access to modern, affordable and reliable energy sources as a contribution to poverty reduction. With this purpose, the government has actively promoted biofuel production and prioritized the development of large scale hydropower schemes.

To translate objectives in to action, Uganda is currently implementing 23 projects in water for agriculture and energy and will implement another 10 projects from 2015. The expected amount that the country will spend from now to 2020 (so called investment envelope) is US\$3.8 billion, which is mainly attributed to three on-going large scale hydropower projects, namely: the Karuma Hydropower Project, Ayago Hydropower Project and Isimba Power Station which have a total cost of US\$2 200 million, US\$1 900 million and US\$570 million respectively. Irrigation categories account for only 2 percent of the envelope, with a total of US\$126.63 million, of which US\$70 million will be devoted to large scale irrigation development, US\$23 million to rehabilitation/modernization of irrigation schemes and approximately US\$30 million to the development of small-scale irrigation.

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## 1. CONTEXT

### 1.1 AGRICULTURE AND FOOD SECURITY

#### Agriculture

Agriculture remains the mainstay of livelihoods for the majority of Ugandans. Over 72 percent of the population (77 percent for women and 67 percent for men) is employed in the sector (Uganda Bureau of Statistics, 2014).

Despite the importance of the sector, agriculture has experienced very limited development in the past 10 years: during 2004/5-2013/14, the growth rate in agricultural GDP averaged just over 1 percent (Table 1). This contrasts poorly with the growth experienced in both the services and industrial sectors—which averaged 8 percent per annum during the same period. Indeed, the contribution of agriculture to the national GDP decreased from 51 percent to 22 percent between 1992/93 and 2013/14 (Ministry of Finance, Planning and Economic Development, 2014).

**Table 1. Uganda: Growth in GDP (%) by major sectors (2002 constant prices)**

	Financial Year									
	2004/05	2005/06	2006/7	2007/8	2008/9	2009/2010	2010/11	2011/12	2012/13	2013/14
<b>Total GDP</b>	<b>6.3</b>	<b>10.8</b>	<b>7.9</b>	<b>9.8</b>	<b>7.3</b>	<b>5.9</b>	<b>6.6</b>	<b>3.4</b>	<b>6.0</b>	<b>4.7</b>
Major Sectors										
Services	6.2	11.2	8.8	13.0	8.8	8.2	8.2	3.7	6.5	5.6
Industry	11.6	14.7	9.9	6.4	5.8	7.9	7.9	2.5	6.8	5.6
Agriculture	2	0.5	0.1	0.7	2.9	1.2	1.2	0.8	1.3	1.5
Agricultural sub sectors										
Cash crops	-5.5	-10.6	5.4	2.2	9.8	-1.1	-1.5	8.2	3.5	3.3
Food crops	-0.2	-0.1	-0.9	2.4	2.6	2.7	0.7	-1.7	0.2	1.9
Livestock	3	1.6	3.0	3.0	3.0	3.0	3.0	2.8	3.4	3.3
Forestry	6.5	4.1	1.9	2.6	6.3	2.9	2.8	3.3	2.0	2.2
Fishing	13.3	5.6	-3.0	-12.6	-7.0	2.6	1.8	1.9	2.5	-5.1

Source: Ministry of Finance, Planning and Economic Development. Background to the budget reports: 2014/15, 2012/13 and 2008/09

The above trends are partly explained by the largely subsistence and low productive nature of the sector, which is affecting agriculture's contribution to cash incomes of households<sup>1</sup>. The declining agricultural productivity has taken place against a backdrop of sustained population growth—averaging 3.2 percent per annum. If the above trends in agricultural GDP growth are maintained, the most deprived Ugandans, who depend heavily on agriculture, are unlikely to register any changes in welfare status in the medium term.

<sup>1</sup> Another reason put forward to explain the poor agricultural performance is the continued dominance of a few agricultural products as the main income earners (Bahigwa *et al.*, 2005). For example, cash crops are dominated by coffee while Matooke/Bananas account for the bulk of the food crops. Consequently, in cases where these specific products perform poorly, this has adverse effects on the overall production in the sector.

Most of the agricultural production in Uganda is undertaken by small holder farmers in rural areas. These farmers are characterised by the use of rudimentary tools, limited application of inputs and reliance on rain fed agriculture with minimal irrigation.

Table 2 shows the changes in household source of income for the most recent Uganda National Household Survey (UNHS). It is indicated that about one out of two households report subsistence agriculture as the main source of income. However, it has been observed that dependence on subsistence agriculture declined from 57 percent in 2005/6 to 48.9 percent in 2012/13. Overall, the table shows that structure of the sources of household's main incomes has changed in tandem with the growth in household incomes—there has been some diversification away from reliance on agriculture to wage employment and non-agricultural enterprises.

Table 2. Changes in household income sources 2005/06-2012/13 (%)			
	Population Share		
	2005/6	2009/10	2012/13
Agriculture	57.3	51.5	48.9
Wage employment	17.0	21.3	20.7
Non-agricultural enterprises	18.1	20.4	23.0
Remittances	3.4	4.5	4.7
Other	4.2	2.3	2.5
<b>Uganda</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Ssewanyana and Kasirye (2014)

At a spatial level, Central and Western Uganda each account for about 30 percent of the total land under cultivation. They also account for most of the agricultural area devoted to main cash crops such as coffee, maize and beans. Eastern Uganda has the largest area devoted to rice and sugarcane (upcoming cash crops promoted by large scale agricultural estates) and 20 percent of the crop area is devoted to maize. Northern Uganda's cultivation profile differs markedly from the rest of Uganda. This is because the region experiences only one rainy season (uni-modal) while the rest of the country experiences two (bi-modal). In the North, cassava accounts for the largest share of the area under cultivation, a crop that is well adapted to the region due to its minimal rainfall demands.

### Irrigation and Water Control

According to the national irrigation master plan (Ministry of Water and Environment, 2009), the estimated area equipped for irrigation in 2010 was 14 418 ha (less than one percent of

cultivated land) and the area actually irrigated was 12 447 ha. In addition to this, there is an estimated 53 000 ha rice which is grown informally on managed wetlands in Tororo, Buteleja, Pallisa, Budaka and Iganga where swamps around streams flowing into lake Kyoga have been developed for irrigation.

These figures are well below the country's irrigation potential that was estimated at around 567 000 ha in 2010. Of those, 295 000 ha lie close to surface water resources and could be developed without any storage infrastructure and the remaining 272 000 ha could not be developed in the absence of storage facilities and/or feeder systems (Ministry of Water and Environment, 2011). On the other hand, more recent estimates undertaken as part of the Regional Agriculture Trade Productivity (RATP) project indicate that Uganda's irrigation potential was 3.03 million ha in 2012 (Drooger et al, 2012).

Most of area irrigated is under private large scale irrigation with only 2 930 ha under public irrigation schemes. Most of the public schemes were set up in the 1960s and 1970s and overtime, a number of them have run into a state of disrepair. In the recent past, the government has rehabilitated some of those schemes and has set up new small demonstration schemes or valley tanks (with storage capacity of 10 000 m<sup>3</sup>) —especially in the semi-arid sub region of Karamoja. In addition to this, the Ministry of Water and Environment intends to construct bulk water supply schemes to transfer water to areas faced with scarcity.

Public investment in irrigation schemes has traditionally been low, although in the recent past, the Government of Uganda has allocated substantial resources to the rehabilitation of public schemes. Specifically, during 2010-2012, at least UGX 115 billion (US\$ 45 million) were spent on rehabilitating 3 large scale systems: Doho, Mubuku, and Agoro. During 2014-2016, at least UGX 42 billion (approximately US\$ 16.8 million) was earmarked for the rehabilitation of the Olweny Irrigation Scheme.

The most important irrigated crops are rice and sugarcane. Together they account for about 85 percent of the total water managed area (FAO, 2011). Other irrigated crops include maize, flowers, vegetables and sesame.

### Food security

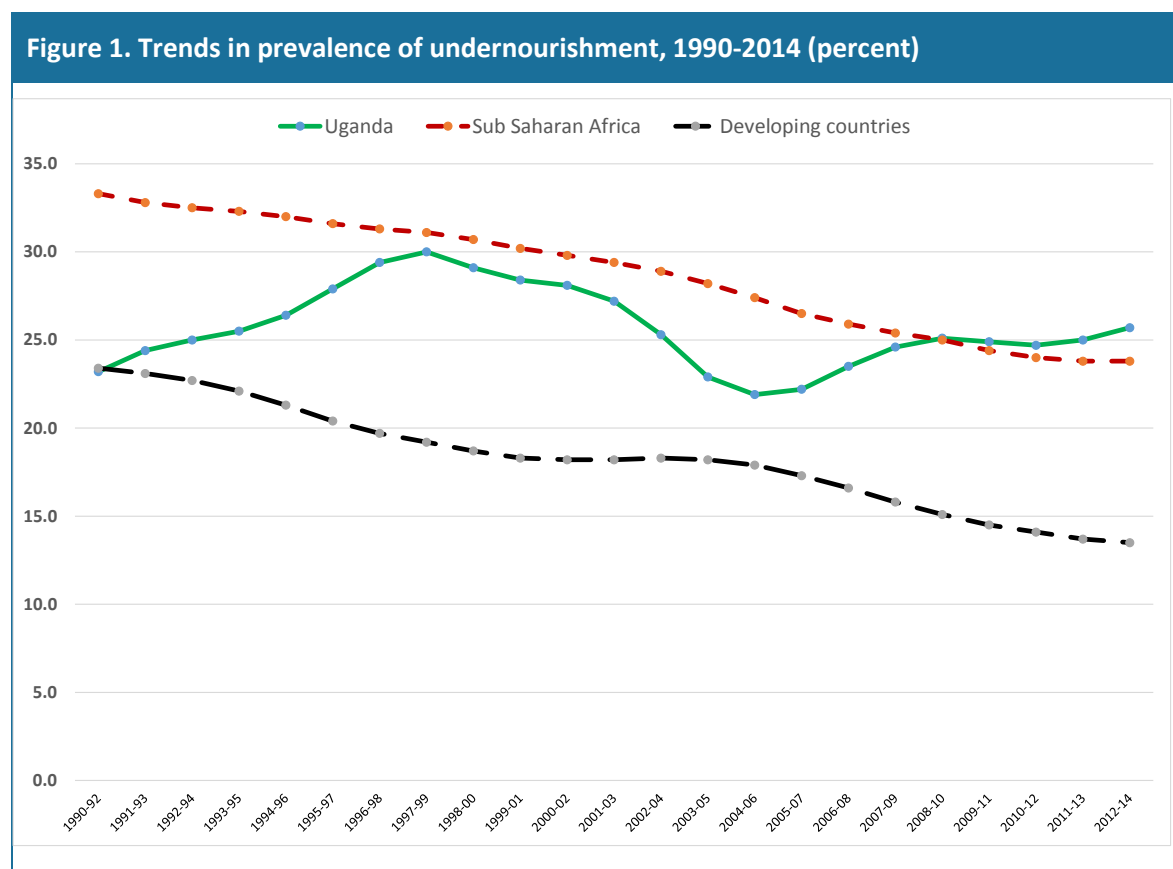
Based on FAO statistics (FAO 2014a), Uganda's average dietary energy supply adequacy —the extent to which a country meets its average dietary energy requirement— has remained above 100 percent meaning that overall food is sufficiently available in relation to total food needs. The challenge remains in transportation of food from food surplus areas to deficit areas. During the 2003-2013, dietary energy supply averaged 110 percent but was still below the average of developing countries (116 percent) and that of the world (119 percent).

Access to food is determined by either the ability to produce sufficient food for own consumption or adequacy of incomes to enable the purchase of food in the market. As such,

domestic prices are an important determinant of access to food. Uganda has witnessed a surge in domestic prices in the recent past. According to FAO statistics, the domestic food price index increased from an average of 1.62 during 2000-2006 to an average of 1.89 during 2007-2013—an increase of about 17 percent (FAO, 2014a). Nonetheless, despite the above changes, Uganda’s domestic prices have remained below the averages of sub-Saharan Africa—whose domestic food price index stood at 2.10 in 2013.

Another important food security indicator affected by domestic food prices is the prevalence of undernourishment. During 1992-2014, the percentage of undernourished people in Uganda experienced ups and downs ranging from 20 to 30 percent (Figure 1). The highest peak was in 1997-99 when it reached 30 percent, while the lowest was in 2004-06 at around 22 percent. In the past years it seems that the percentage of undernourished has remained stable at around 25 percent, still a high rate, above the average for both sub-Saharan countries and developing countries.

In terms of children nutrition the country made better progress. During 2006-2011, the share of infants classified as stunted reduced from 38 to 33 percent (UBoS and IFC International, 2012). Similarly, the proportion of children classified as underweight declined from 16 to 14 percent during 2006-2011. On the other hand, micronutrient deficiency still remains widespread with one out of every three children and women having Vitamin A deficiency.



Source: FAOSTAT, 2014a

Expenditures on food account for a disproportionate share of household budgets in the country. In 2012/13, Ugandans spent around 46 percent of the monthly household expenditures in food and related items (UBoS, 2014). However, the poor spend a higher share on food compared to their non-poor counterparts - 56 percent in 2012/13 (UBoS, 2014). Given such large shares of food expenditures in household budgets of the poor, any changes in the food prices are bound to have immense consequences for overall household welfare. Indeed, any significant price increase not only threatens the short term welfare of these households but may also lead to adverse long term consequence such as an increase in the rates of child stunting.

### Food self sufficiency

There is a heavy reliance on Uganda's own production to acquire food in the country. As such, a large share of the food consumed is locally sourced as opposed to being imported. Estimates by Ssewanyana and Kasirye (2010) show that more than 60 percent of the top three staples consumed (bananas, sweet potatoes and cassava) are consumed from own production. . Among the major staples, it is only maize where the majority of households acquire the food crop through purchases and not own cultivation.

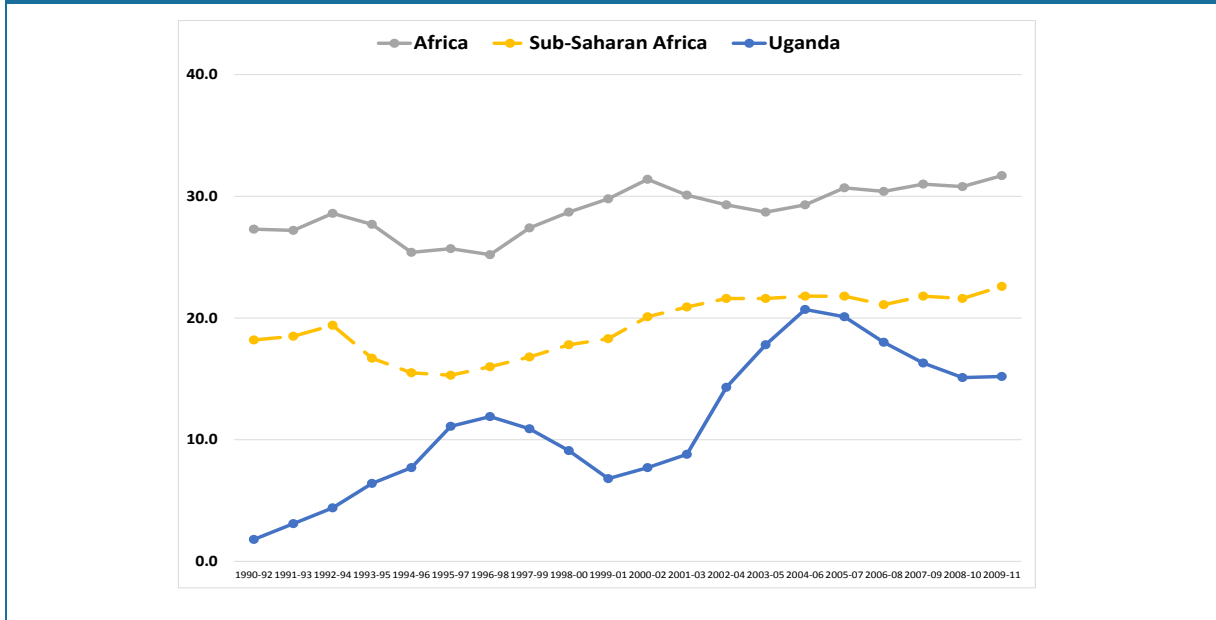
Although the above statistics shows that Ugandan households are relatively self-reliant in terms of food consumption, the situation has changed in the recent past due to changing welfare status and tastes. Figure 2 shows the trends in the cereal import dependency ratio during the past 20 years. It is indicated that Uganda's reliance on imports to acquire cereals dramatically increased—especially after the year 2000. Specifically, the import dependency ratio increased from less than 2 percent in 1992 to 21 percent by 2006 but then decreased to 15 percent by 2011. The peak in cereal dependency is explained by the surge in maize production and subsequent reduction in maize imports. Specifically, between 2006 and 2007, the quantity of maize produced increased from 1.26 to 2.31 million tonnes—a growth of about 83 percent (FAO 2014b). Nonetheless, the overall growth in cereal dependency for Uganda may be partly explained by rising incomes and changing tastes—e.g. consumption of easily processed cereals such as rice by time constrained urban households.

Figure 4 shows overall agricultural trade balance in value (US\$). It can be said that, for the period 1970-2011, Uganda has generally been a net exporter. Only between 2003 and 2005 that trend reversed due to a decrease in agricultural exports and an increase in cereal imports. In particular, cereal imports increased by 45 percent and 26 percent in 2003 and 2004 respectively whereas Uganda's main agricultural exports of coffee and tea only increased by 14 percent and 11 percent during the same period (UBoS, 2007). Main exported products in the period 2009-2011 in terms of value (US\$) were coffee, tea, crude materials, tobacco and raw sugar. As for imports, main products were palm oil, wheat, processed sugar, rice and raw sugar. The decline in export earning is explained by fall in prices of Uganda's leading agricultural



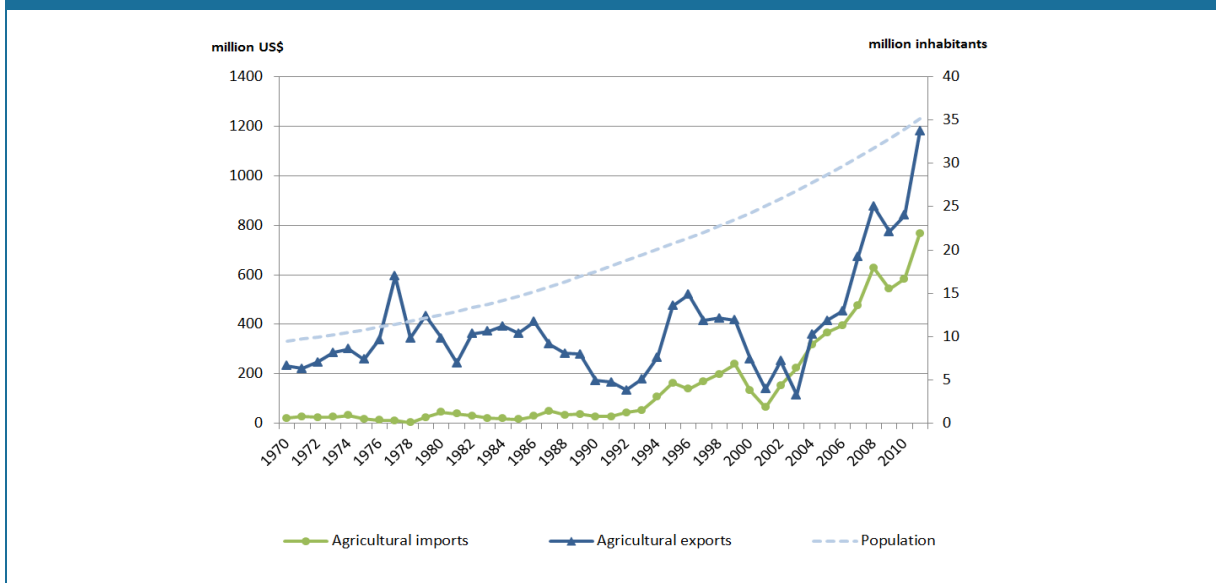
export commodity coffee; specifically, weighted average coffee prices reached US\$ 0.44 per kilogram in 2001/02 before rising to US\$ 1.08 per kilogram in 2004/5 (Uganda Coffee Development Authority, 2011). In 2001/2 Uganda earned US\$ 83 million from the sale of 3.146 million bags of coffee whereas in 2004/5, the country earned US\$ 162 million from the sale of 2.5 million bags of coffee.

Figure 2. Cereal import dependency ratio, 1992-2013 (percent)



Source: FAO 2014b

Figure 3. Trade in agricultural<sup>2</sup> products in value 1970-2011



Source: FAO 2014b

<sup>2</sup> Refers to crop and livestock products

## 1.2 WATER RESOURCES AND HYDROPOWER

Uganda has a surface area of 241 000 square kilometres of which 15.4 percent is occupied by water. The Nile Basin constitutes about 98 percent of the total area of the country, while a fringe of about 4 500 km<sup>2</sup> along the country's border with Kenya belongs to the Rift Valley Basin (FAO-Aquastat 2014). The eight main water catchment areas are the: Albert Nile, Aswa, Victoria Nile, Kidepo and the Lakes of Victoria, Kyoga, Edward and George. Apart from the major lakes, there are over 160 minor water bodies and over 1 000 dams and valley tanks for both aquaculture and livestock watering.

Internal surface water resources are estimated to be 39 km<sup>3</sup>/yr, while groundwater is believed to be around 29 km<sup>3</sup>/yr, but all of this is considered to be overlap between surface water and groundwater, keeping the total IRWR at 39 km<sup>3</sup>/yr. External resources of 27 km<sup>3</sup>/yr comprise inflow from Lake Victoria (25 km<sup>3</sup>/yr) as well as inflow via Lake Edward and Lake Albert from the Democratic Republic of Congo. The total renewable water resources of the country are estimated to be 66 km<sup>3</sup>/yr. Total water withdrawal of the country was 300 million m<sup>3</sup> in 2002, representing 0.4 percent of total renewable water resources. The greatest water user was the municipal sector with 134 million m<sup>3</sup>, followed by irrigation and livestock with 120 million m<sup>3</sup>, and industry with 46 million m<sup>3</sup> (FAO-Aquastat 2014).

Uganda's wetlands are widespread and complex, covering about 10 percent of the country, of which about one-third is permanently flooded. Wetlands may reduce the effects of both floods and droughts, provide fish resources and support cropping and grazing along their margins. They are also centres of high biodiversity and productivity as well as valuable refuges and sources of food for fish. Furthermore, they are active biological filters in the treatment of effluents, but due to this function they are also sensitive to the accumulation of pollution (FAO-Aquastat 2014).

## 1.3 ENERGY RESOURCES

With regard to energy resources, most of the energy used in Uganda is traditional in form of biomass extraction i.e. firewood (93 percent). Hydroelectricity accounts for 14.3 percent of the supply of non-biomass based energy supply (Baanabe, 2012). According to the Ministry of Energy and Mineral Development, the current installed hydro power generation capacity is 683 MW with the hydro power potential estimated at over 2,250 MW (Baanabe, 2012). Nonetheless, even with an installed capacity of 683 MW, access to electricity remains very low—only 14.6 percent of the population had access to electricity in 2013 (UBoS, 2014). As part of the government's long term strategy to increase electricity supply, the government intends to establish 4 large scale dams along the River Nile—construction for two of these dams Isimba (140 MW) and Karuma (600 MW) commenced in 2013.

## 1.4 CLIMATE CHANGE

The Ugandan crop calendar is characterised by two rainy seasons which affect the pattern of agricultural production. The first rains occur during March-May (also labelled as the lean period). The second rains occur during October-December. Some parts of the country, especially in the North, experience only one rainy season.

There is evidence to suggest that Uganda's climate has been changing and will continue to vary substantially in the coming years. For instance, the incidence, duration and amount of rainfall have been erratic since early 1990s (UNESCO, 2005). A more recent study by the Famine Early Warning Systems Network (FEWSNET) also points to a decrease in the duration of the rainy season and the volume of rain received over the past 25 years (Funk *et al*, 2012).

The impacts of climate change in Uganda are projected not to be uniform across the country: the cattle corridor and highlands are singled out as the ones that will suffer the worst effects of Climate Change. The cattle corridor will see an increase of conflicts as the shortage of grazing land intensifies (Stark, 2011) while the loss of fertile soil in the highlands will affect crop yields (Oxfam, 2007).

Apart from differentiated geographical impacts, climate change is projected to affect specific agricultural products in Uganda—most notably coffee. In Uganda there are officially 500 000 smallholder coffee farmers, 90 percent of whose average farm size ranges from around 0.5 ha to 2.5 ha. In addition to this, the coffee industry employs over 3.5 million families through coffee related activities. In the past 10 years, the export value of coffee in Uganda has risen from over US\$ 125 million in 2004 to an estimated US\$ 425 million in 2013. As coffee is Uganda's largest export product, generating approximately 18 percent of the merchandise export earnings, climate change will negatively impact on coffee exports, which would in turn negatively impact the economy.

## 2 NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

### Overall development strategies

The focus of Uganda's development agenda has changed significantly during the past 15 years. Initially when the country started implementing the Poverty Eradication Action Plan (PEAP)—the equivalent of Poverty Reduction Strategy Papers (PRSPs) in other countries—the focus was in improving education and health in Uganda. As such during 1997-2005, spending on education and health accounted for about 30 percent of the national budget. During this time, the incidence of poverty reduced from 56 percent in 1992/93 to 38 percent by 2002/03 and access to schooling expanded—especially for poor children (Deininger, 2003). In the mid-2000s, the development focus shifted to energy and infrastructure. Starting in 2004/05 financial year, the government allocated increasing amounts of resources to roads and construction of

hydropower dams in order to address the derelict state of infrastructure as well as the persistent power outages experienced. Subsequently, medium term development strategies for Uganda such as the 2010-2015 National Development Plan (NDP) have maintained this infrastructure focus. Indeed, for the 2014/15 financial year, at least 17.5 and 12.7 percent of the national budget was allocated to road construction and energy respectively (MFPED, 2014). Uganda is developing NDP II for the years 2015/16-2019/20 with four major areas of focus: increasing the stock of infrastructure; value addition in agriculture and tourism; human capital development and delivering effective public services (National Planning Authority, 2014).

Apart from the medium term strategies, Uganda also has a long term vision to transform into a middle income country. Specifically, the Uganda Vision2040 intends to transform the Uganda economy “from a peasant to modern and prosperous economy within 30 years”. The vision advocates for harnessing opportunities in oil and gas, tourism, ICT, water resources and agribusiness. Through exploiting such opportunities, It is expected that by 2040, the: incidence of poverty will reduce to 5 percent of the population; the population working in agriculture will decrease from 65 to 31 percent and the agricultural sector contribution to GDP will fall to 10 percent; it is also expected that the population with access to electricity will reach 80 percent. One of the major factors driving the above aspirations is the discovery of commercially viable oil and gas resources in the Albertine region of western Uganda in 2006. By 2014, Uganda’s confirmed oil deposits were estimated at 6.5 million barrels and it is expected that once commercial oil production starts, the country will earn more than US\$2 billion per year from oil revenues.

### Agriculture and irrigation

Uganda has a long history of reforms in the agricultural sector starting in the late 1980s. One of the most important reform programmes entailed the deregulation of producer prices and the liberalisation of the crop market in early 1990s. Prior to this policy change, the totality of the country’s trade in main cash crops was vested in producer marketing boards. Together with the marketing boards, the producer cooperatives also saw their role diminished with the onset of agricultural reforms. Cooperatives were quasi-public institutions that focused on the promotion of cash crop cultivation. The cooperatives not only linked farmers directly to markets but also were key in extending in-kind credit to farmers e.g. tractor hire services and fertilizers. Although the dismantling of marketing boards was accompanied by the creation of product promotion institutions, the disintegration of the cooperative movement was not replaced with a market-oriented infrastructure.

Other reforms in the sector included the enactment of new regulations regarding the ownership and use of land in the country. In 1998, the Land Act was passed, recognising for the first time the land rights of both landowners and the *bona-fide* land occupants, individuals who had continuously occupied land parcels for 12 years or more (Government of Uganda, 1998). Although it was expected that the act, by guaranteeing the rights of tenants, would spur

investment in the occupied land, there is evidence to suggest that this particular regulation led to acrimonious relationships between landowners and tenants. According to Hunt (2004), because of overlapping land rights, squatters still faced the threat of eviction. This meant that squatters did not make long-term investments in the land. Even the absentee landlords did not try to increase investments in the land due to the perception that future legislation would eventually expropriate their land. Research by Deninger & Ali (2008) shows that Uganda's recognition of land interests for both squatters and land owners negatively affects short and long term agricultural investments.

Other major shifts in the country's agricultural policy have included the introduction of the Plan for Modernisation of Agriculture (PMA) in 2000. This plan sought to reduce the level and change the form of government intervention in the sector through selective interventions but at the same time boost rural incomes by increasing the share of marketable surplus in household agricultural products. The PMA is modelled along 7 key pillars: (i) research and technology, (ii) national agricultural advisory services, (iii) agricultural education, (iv) improving access to rural finance, (v) agro-processing and marketing, (vi) sustainable natural resource utilisation and management, and (vii) physical infrastructure. The objectives of this framework for agricultural development include increasing rural incomes and, consequently, reducing poverty through the transformation of agricultural activities from subsistence to commercial agriculture (Government of Uganda, 2000). While the previous interventions were driven by a requirement to re-emphasise public involvement in agricultural production, the interventions implemented from 2001 were driven by the need to balance public and private interventions in the sector. A key anchor of the PMA was the realisation of the limited capacity of government, especially in delivering interventions efficiently. Consequently, the government for the first time adopted the use of private sector actors in the delivery of publicly funded agricultural interventions.

The most notable example of the application of a public-private partnership in delivering agricultural interventions is that of the National Agricultural Advisory Services (NAADS) programme, a publicly financed but privately delivered agricultural advisory information service programme. Despite these and other reforms, the agricultural sector in Uganda has underperformed as shown in Table 1 and 2. Indeed, this suggests a “decoupling of agriculture from the overall economy”—the fact that the sector with the largest employment remains stagnant or registers marginal improvements while the rest of the economy improves.

It is worth noting that after 10 years of implementing the PMA, the Ugandan agricultural sector failed to attain the structural transformation envisaged, i.e. significantly reorienting smallholder farmers from subsistence to commercial agriculture. The key premise of the PMA was that agriculture was a business and as such there was no need to intervene in agricultural enterprises. In addition, the PMA also adopted of the slogan “ensuring food security through the market”. Specifically, if farmers produced sufficient quantities for the markets, they would have sufficient incomes to meet food needs. Over a 10 year period of implementation, only 2 of

the 7 pillars survived—i.e. advisory services and agricultural research. The PMA collapsed in 2010 with the adoption of the Development Strategy and Investment Plan (DSIP) for agriculture for the period 2010-2015 (Ministry of Agriculture Animal Industry and Fisheries, 2010). The DSIP still considers agriculture as business; however, it proposes to institutionalize liberalization within MAAIF rather than operate parallel structures as was the case under PMA. Specifically, the DSIP focus on: enhancing production and productivity; expanding access to agricultural markets and value addition; institutional strengthening of the agricultural sector and providing an enabling environment through requisite laws and regulations to develop the sector. Within the 2010-2015 period, the DSIP provides for development of a comprehensive integrated National Irrigation policy.

In order to operationalize the non-ATAAS component of the DSIP, the 2012 framework implementation plan on Water for Production outlines an ambitious plan to rehabilitate and establish new irrigation schemes across Uganda. Specifically, the plan proposes to rehabilitate 9 irrigation schemes with coverage of 4 583 ha—focusing mainly on citrus fruits (MAAIF, 2012). The same plan sets an ambitious target to establish 10 schemes with an acreage of 9 330 ha to focus on rice and cotton as well as establishing 1 200 farmer site based pilot irrigation schemes.

### Water resources for agriculture

Within enhancing production and productivity programme of the DSIP, there is a significant focus on improving access to water for production. The ministry intends to use a variety of avenues to ensure that farmers have the required water resources to boost productivity. For example, the Sub-Programme Water for Agriculture production proposes the following interventions regarding AWM:

- Evaluation of all existing irrigation schemes and sites and analysing the rehabilitation prospects;
- Rehabilitation of five large irrigation schemes with a total area of some 6535 ha. Government will seek to ensure that management of public irrigation schemes is reorganised and transferred to the lowest appropriate level in order to ensure the sustainability of the schemes can be improved;
- Establishment of four new irrigation schemes;
- Establishment of thirteen irrigation research and development sites;
- Undertake district-based demonstrations on small-scale irrigation technologies and rain water harvesting and management;
- Capacity-building of stakeholders in the irrigation ‘sub-sector’;
- Provision of information to private investors, both large and small scale, on aspects of methodologies, water rights (especially as regards water taken from the Nile), and water access;

- Building of a monitoring framework for the supply, utilization and management of water for crops;
- Provision of backup support including promotional activities, guidelines, regulations, standards designs and manuals, and technical assistance for small scale and commercial private irrigation developers.

Specific to water for livestock, the DSIP intends to establish 25 new valley dams with an equivalent capacity of 2.2 million m<sup>3</sup>. The other area of focus regarding water relates to aquaculture and the plan intends to increase large scale aquaculture from 5 000 ha to 25 000 ha by 2015. Overall, the DSIP earmarked UGX 230 billion (US\$ 110 million) for water for production and out of this 45.5 percent of the budget is for irrigation, 30 percent is for water for livestock, 22.2 percent for aquaculture with the rest of the budget (3 percent) for policy and planning activities.

Within the DSIP and CAADP framework, Uganda has developed a draft National Irrigation Policy by 2014. One of the strategies for irrigation development outlined in the policy relates to the provision of incentives for irrigation infrastructure development. The policy also targets relatively cheaper forms of irrigation such as the development of rainwater harvesting; utilization of gravity flow schemes and bulk water transfer from reservoirs. The policy also intends to involve the private sector in irrigation development through public private partnerships (PPPs).

## Energy and hydropower

Uganda has two major policies guiding the development of energy resources. In 2002, the country launched its Energy policy in 2002 whose major objective was to “increase access to modern affordable and reliable energy sources as a contribution to poverty reduction” (Ministry of Energy and Mineral Development, 2002). The other major objective was to establish the availability and potential of various energy as well as manage energy-related environmental impacts. The other policy guiding the development is the Renewable Energy Policy of 2007. The particular policy set an ambitious target to change the energy mix of Uganda—by increasing the contribution of renewable energy to the energy mix from 4 percent in 2007 to 61 percent by 2017 (Ministry of Energy and Mineral Development, 2007). The focus with the renewable energy policy is on the promotion of solar power, biofuel production, and the development of small dams.

Due to rising energy demands in Uganda—driven partly by a rapidly expanding population, the government has actively promoted biofuel production. Although, the country cultivates a number of crops that could be used for biofuels (e.g. maize, cassava, sweet potatoes, and sorghum), at the moment, biofuel production is only from sugar cane, palm, and sunflower (Hepworth and Goulden, 2008). Furthermore, biofuel production is still on a limited scale—mainly by large commercial estates and associated out-grower farmers. The expansion of biofuel production in Uganda is limited by a number of factors, especially relating to the availability of

cultivable land. This fact was exhibited in 2007 when the government attempted to de-gazette a rainforest—to make way for sugarcane cultivation for biofuels; the initiative was heavily resisted—especially by environmental protection groups (Williams, 2007).

Uganda has prioritized the development of large scale hydropower scheme. Presently, the following large scale dams are under construction: Karuma (600 MW); Isimba (350 MW) and Ayago (600 MW). Due to the country's prioritization of the expansion of hydro power and the associated costs of setting infrastructure, the energy sector now commands a substantial share of the national budget. The sector's share of the budget increased from 5 percent in 2001/2 to 12.8 percent by 2013/14 (MFPED, 2014)

Despite the availability of numerous policies on energy, access to electricity remains low—especially in the rural areas. According to the 2012/2013 UNHS, only 14 percent of Uganda's estimated 7 million households have access to electricity (UBoS, 2014). Most of the electricity is available in urban areas (40 percent) as compared to rural areas (4 percent). Rural residents depend more on renewable energy sources than urban areas. Indeed, out of 150,000 households that use solar for lighting, at least 75 percent are located in rural areas (UBoS, 2014). According to the National Vision 2040, it is estimated that demand for electricity will reach 41,738 MW by 2040 and it expected that at least 80 percent of the population then will be covered by national grid (National Planning Authority, 2013).



### 3 INVESTMENT ENVELOPE

The **investment envelope** is a matrix that presents current and planned investment in the development of water resources for agriculture and hydropower production in a given country.

The investment envelope is produced through the application of a **Financial Diagnostic Tool**. This tool processes project-based information (section 4) to derive the investment estimates at country level. The necessary project information to plug in the tool includes: project description, funding partners, time-scale, total cost, type of project, etc. Project types that are included in the tool are the following:

1. Small scale irrigation development<sup>3</sup>
2. Rehabilitation/modernization of irrigation
3. Large Scale Irrigation development
4. Small/medium scale hydropower development
5. Rehabilitation of hydropower plants
6. Large scale hydropower development
7. Others (drinking water supply, etc)

The Financial Diagnostic Tool incorporates a number of assumptions amongst which are the project cost distribution over time and the relevance of the water component as a percentage of the total cost. A conversion rate (yearly average) to change to US dollars any other base currency has also been applied and projections have been made for the period after 2013 with the use of an exponential regression.

The tool also helps conducting **complementary financial analysis** including: investment by type of project, contribution of different sources of financing, hectares to develop/rehabilitate by crop, etc. This complementary financial analysis is also presented in this section in Figures 4 to 10.

The investment envelope is can be found in Table 4. It present investment estimates according to the project typologies mentioned above and three time scales: short term (less than 4 years), medium term (between 4 and 8 years), and long term (more than 8 years)<sup>4</sup>.

In the case of Uganda, the investment envelope has been calculated based on 23 on-going projects and 13 pipeline projects listed in section 4. The on-going projects range from a cost of about US\$57 000 million to a maximum of US\$2 200 million. The pipeline projects have, on

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<sup>3</sup> Small scale: < 500 ha, large scale: > 500 ha

<sup>4</sup> The baseline year considered for the analysis is 2013. Therefore investment in the short term would be executed from 2014 to the end of 2017, in the medium term, from 2018 to the end of 2021 and in the long term, from 2021 onwards.

average, lower average investment costs and range between a minimum of about US\$2 million and a maximum of US\$105 million (Table 3).

Table 3. Summary statistics of the Projects Portfolio		
	On-going	Pipeline
Number of Projects	23	13
Min (million US\$)	0.057	2
Max (million US\$)	2200	105
Average (million US\$)	107	5

A closer look at the distribution of costs amongst on-going projects (Figure 4) shows that only three projects cost (13 percent of the on-going) costs more than US\$500 million. Four projects (13 percent) cost between US\$100 million and a US\$10 million. The remaining projects cost less than US\$2.5 million (65 percent). As for the 13 projects in the pipeline (Figure 5), only one project costs more than 100 million (eight percent). Six projects (38 percent) cost between US\$30 million and US\$10 million. The remaining six projects (38 percent) have investment costs below US\$6 million.

Figure 4. Project Cost distribution – On-going Projects

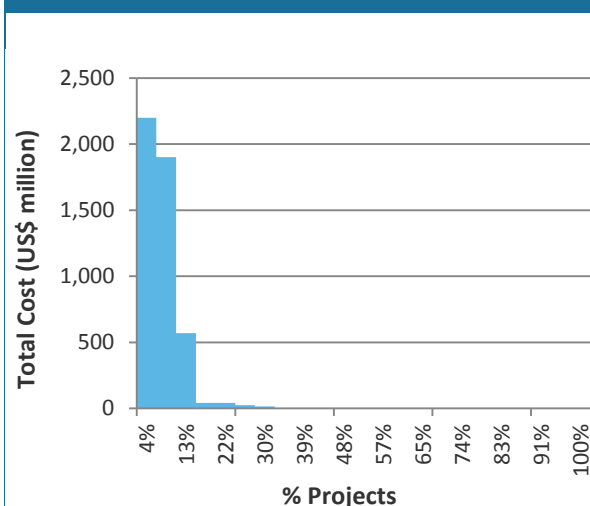
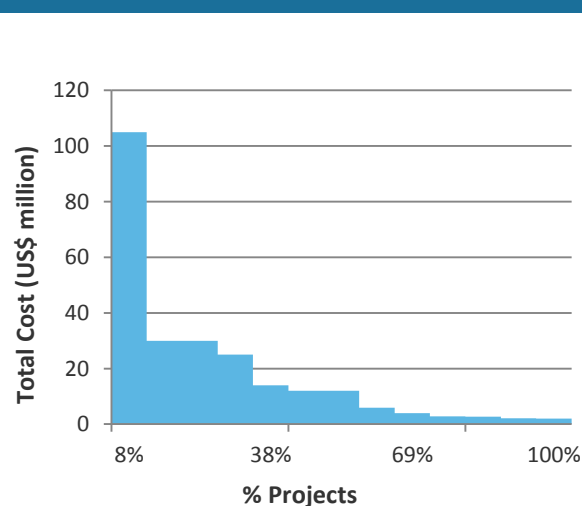


Figure 5. Project Cost distribution – Pipeline Projects



The total investment envelope for Uganda (table 4) is estimated at US\$978 million of which US\$810 million are allocated to the development of large-scale hydropower, US\$ 70 million to the development of large scale irrigation, US\$42 million to the development of small/medium scale hydropower, US\$29 million to the development of small-scale irrigation and US\$27 million

to the development of rehabilitation/modernization of irrigation schemes. No funding is allocated to the rehabilitation of hydropower plants and the *others* category.

The bulk of funding in Uganda goes to hydropower development mainly at large scale. The total amount of funding allocated to the hydropower categories (excluding rehabilitation of hydropower for which there are no funds) is approximately US\$852 million (87 percent of the envelope). The three irrigation categories total to approximately US\$127 million (13 percent of the envelope).

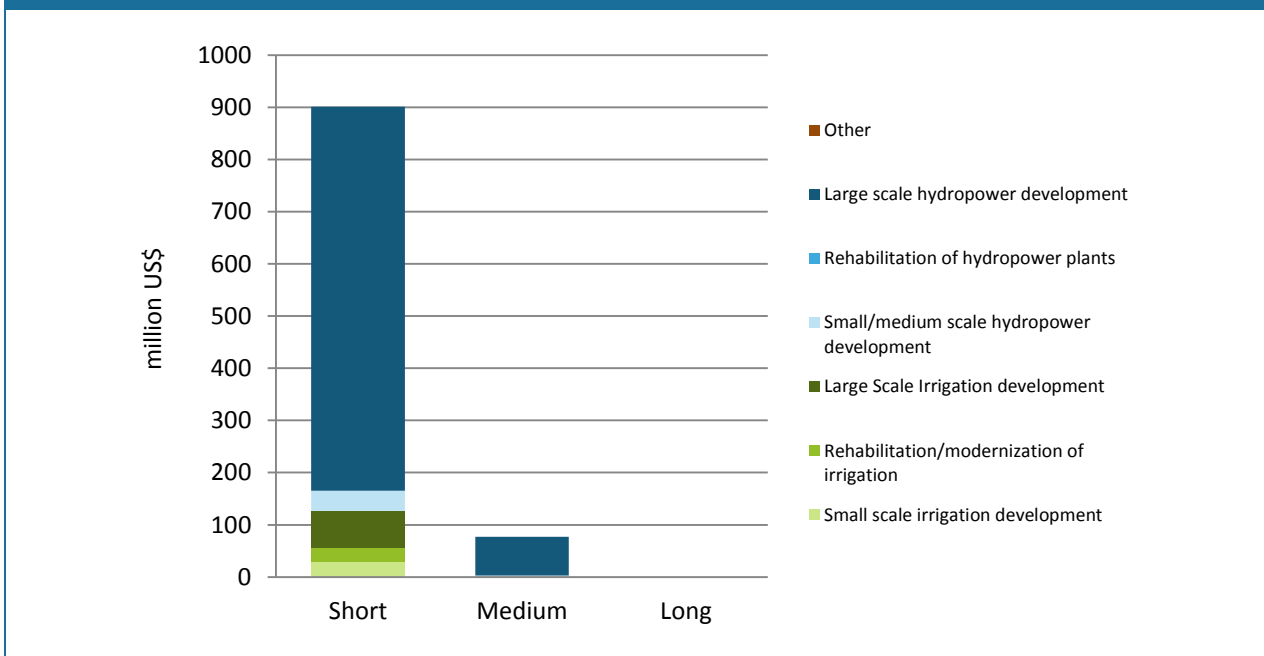
Time Frame	Short-term		Medium-term		Long-term		Total	
	M US\$	%	M US\$	%	M US\$	%	M US\$	%
Size of project								
Small Scale irrigation development	29.20	3%	0.00	0%	0.00	0%	29.20	3%
Rehabilitation/modernization of irrigation schemes	27.43	3%	0.00	0%	0.00	0%	27.43	3%
Large Scale Irrigation development	70.00	7%	0.00	0%	0.00	0%	70.00	7%
Small/medium scale hydropower	39.00	4%	3.00	0%	0.00	0%	42.00	4%
Rehabilitation of hydropower plants	0.00	0%	0.00	0%	0.00	0%	0.00	0%
Large scale hydropower development	735.60	75%	74.17	8%	0.00	0%	809.77	83%
Others	0.00	0%	0.00	0%	0.00	0%	0.00	0%
<b>Total</b>	<b>901.23</b>	<b>92%</b>	<b>77.17</b>	<b>8%</b>	<b>0.00</b>	<b>0%</b>	<b>978.40</b>	<b>100%</b>

More than two of the project investments are expected to take place in the medium term (projects which have more than a four year time duration). All the rest of the project investments are expected to take place in the short term (within the next four years). All on-going projects are scheduled to end by or before 2019. As for pipeline projects, none of them are expected to run beyond 2022.

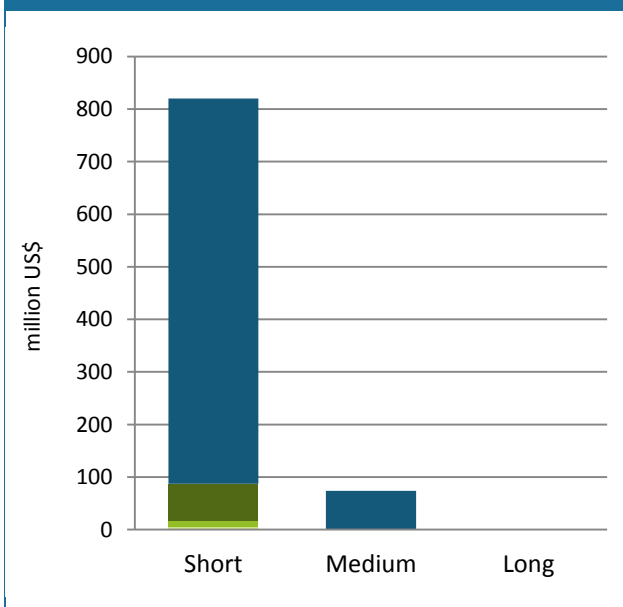
## Cost distribution

Figures 6 to 8 illustrate the distribution in time of project costs by type of project for on-going, pipeline and the total of all projects combined. As aforementioned, it can be seen that the largest bulk of the investments will take place in the short term (next four years) followed by investments that are expected to take place in the medium term (projects which have more than a four year time duration). It can also be seen that on-going projects account for most of the investment envelope (US\$894 million out of a total of US\$978 million).

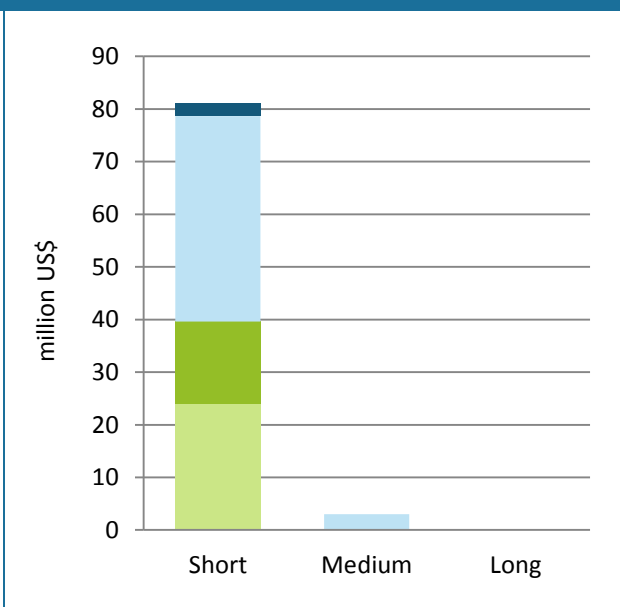
**Figure 6. Cost distribution in time per typology – All Projects (US\$ million)**



**Figure 7. Cost distribution in time per typology – On-going Projects (US\$ million)**



**Figure 8. Cost distribution in time per typology – Pipeline Projects (US\$ million)**



The bulk of the on-going investments are allocated to the development of large-scale hydropower (US\$807 million). These are the *Karuma Hydropower Project*, *Ayago Hydropower*

Project, Isimba Power Station and the Kikagati Mini Hydropower Station which have a cost of US\$2 200 million, US\$1 900 million, US\$570 million and US\$25 million respectively.

Figures 9 to 11 show the percentages of the distribution of costs by type of project. It can be seen that for on-going projects, 90 percent of the envelope is allocated to large-scale hydropower development (Figure 10) whereas for pipeline projects, 50 percent of funding is allocated to small/medium-scale hydropower development (Figure 11).

Figure 9. Cost share per typology –All Projects (%)

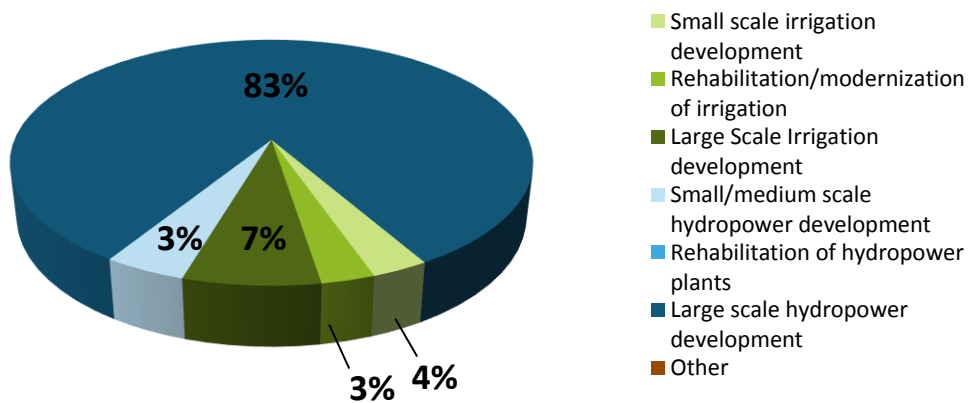


Figure 10. Cost share per typology – On-going Projects (%)

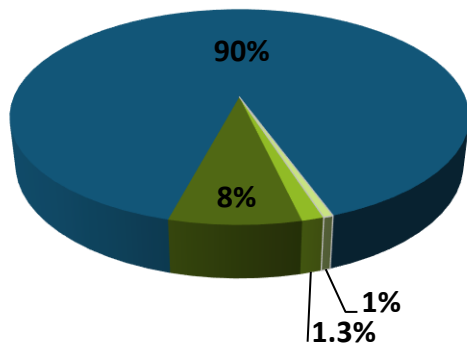
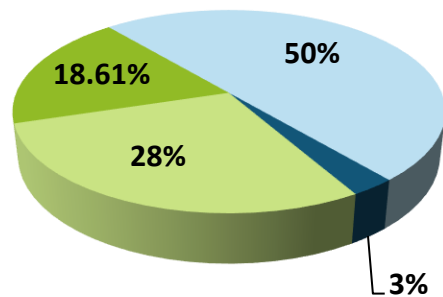
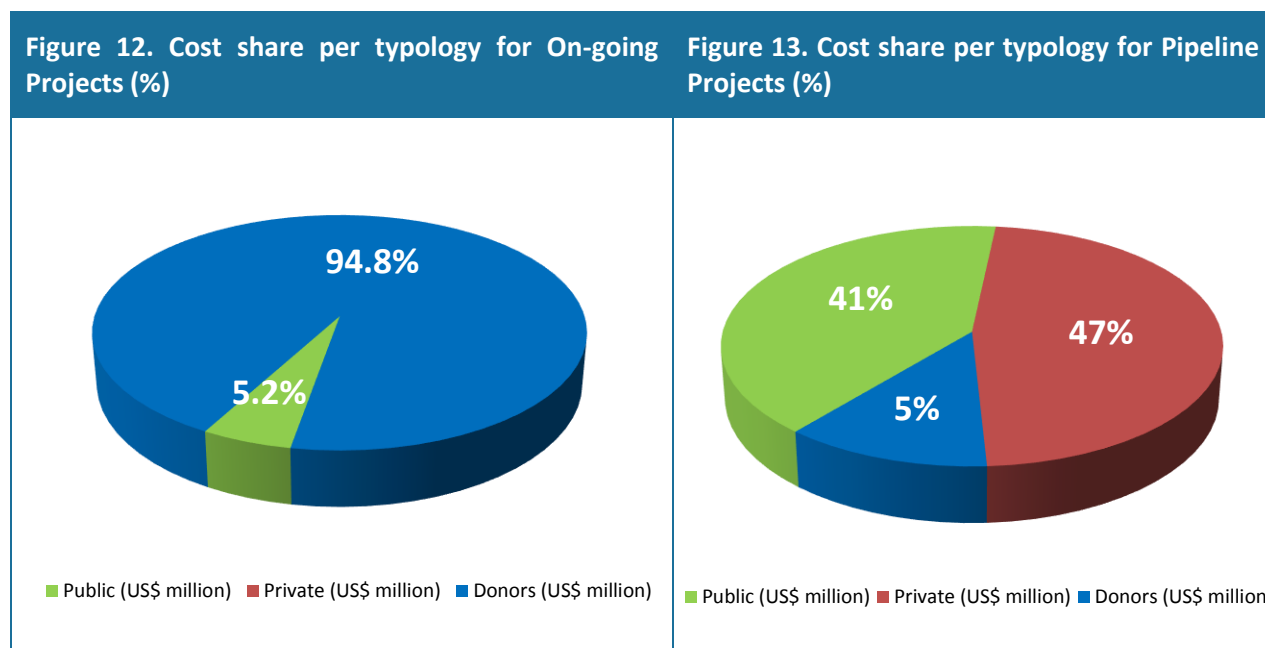


Figure 11. Cost share per typology –Pipeline Projects (%)



Source of funding

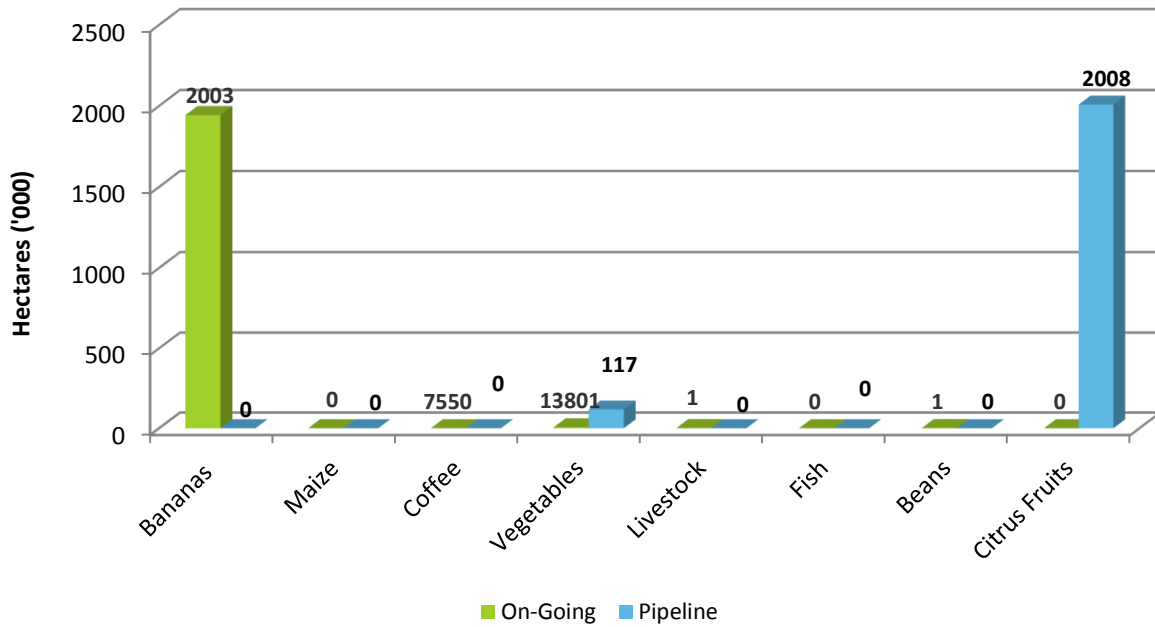
Figure 12 shows that most of the amount of funding of on-going projects is contributed by donors (almost 95 percent of project costs). The main donor funding sources are the African Development Bank (AfDB), followed by the Islamic Development Bank (IDB) and the China Exim Bank (CEB). The donor funding category percentage is largely increased by the donor financing of the *Rehabilitation of the Olweny Scheme* (the Government of Uganda obtained the funds from the AfDB) for a total amount of approximately US\$16 million which accounts for most of the funding for this category (only six out of the 23 projects are donor funded). The second largest source of financing for on-going projects are public funds financed by the Government of Uganda. Regarding pipeline projects (Figure 13), approximately 47 percent of the costs are private funding sources. The private funding category percentage is largely increased by the private financing of the *Nshugyezi Hydropower Station* for a total amount of US\$105 million (the largest funding amount for the projects listed in the pipeline envelope) by Tronder Energy Limited. The second sources of funding in the pipeline envelope are public funds (41 percent) followed by donor funding (five percent). The main sources of donor financing is the French Development Agency (AFD).



### Hectares to develop/rehabilitate

The project portfolio will bring changes to about 15 076 ha of land in the country by 2022 of which 12 951 ha will be developed through on-going projects and 2 125 ha from pipeline projects. Of those, approximately 11 000 ha will go towards the development of large-scale irrigation, 2 125 ha for rehabilitation of irrigation schemes and 1 951 ha for small-scale irrigation development. It is important to consider that the current calculation of hectares is based on the available data which is not available for all projects. Therefore the total number of hectares is likely to increase as more information is available.

Figure 11 shows the crop pattern (percentage of area to be developed/rehabilitated per crop) for those projects for which information was available<sup>5</sup>. Citrus fruits and bananas are predominant in the project portfolio. Bananas are predominant in the on-going projects whilst citrus fruits are predominant in the pipeline projects. The rest of the projects are expected to develop mainly vegetables and coffee.



<sup>5</sup> Less than half of the total hectares were reported and disaggregated by crop.

## 4 CONCLUSIONS

Based on the information and analysis presented in this report the following can be concluded:

- a) Most of the investment envelope in Uganda is dominated by large scale hydropower development. The country is currently implementing three large scale hydropower projects, namely: the Karuma Hydropower Project, Ayago Hydropower Project and Isimba Power Station which have a total cost of US\$2 200 million, US\$1 900 million and US\$570 million respectively.
- b) The total amount allocated for irrigation development and rehabilitation is US\$126.63 million, of which US\$70 million will be devoted to large scale irrigation development and approximately US\$30 million to small scale irrigation.

The main scope of this profile was to conduct a financial analysis of on-going and planned projects to develop/rehabilitate irrigation and hydropower infrastructure in Uganda. Although the supporting policy and institutional environment is very much necessary to make sure these types of investments are successful, the available time and financial resources did not allow for such an analysis. The authors also wish to acknowledge the importance of undertaking additional investments in research and capacity building in order to promote innovation and optimize returns.



## ANNEX 1. PROJECT PORTFOLIO

Table 1.1. ON-GOING PROJECTS

#	Project title	Funding Partners	Time Scale	Total Budget (million US\$)	Description
1	Bigasha Dam	Government of Uganda	2014 - 2015	0.74	Construction of Bigasha Dam in Isingiro district, with a storage capacity of 19 million cubic meters
2	Ongole Valley Dam	Government of Uganda	2014 - 2014	0.06	Construction of valley dam in Usuk/Amuria District
3	Katatok Dam	Government of Uganda	2014 - 2016	1.78	Construction of Katabok Dam in Abim district
4	Andibo Dam	Government of Uganda	2013 - 2015	1.35	Construction of Andibo Dam in Nebbi district
5	Namatata Dam	Government of Uganda	2013 - 2016	1.08	Rehabilitation of Namatata Dam in Namalu sub Country
6	Rwengaaaju Irrigation Scheme	Government of Uganda	2014 - 2015	2.23	Construction of model village irrigation scheme at Rwengaaaju, Kabarole District
7	Mabira Dam	Government of Uganda	2014 -2015	0.74	Rehabilitation of Mabira Dam in Kashari Mbarara District
8	Bulk Water Scheme Rakai	Government of Uganda	2014 -2014	1.12	Bulk water supply scheme
9	Drip Irrigation at Arechek Dam	Government of Uganda	2012 -- 2014	0.06	Construction of pilot demonstration plots at Arecheck Dam, Napak district
10	Pilot plots at Longoromit Dam	Government of Uganda	2012 --2014	0.06	Construction of pilot demonstration plots at Longorimit Dam, Kaabong district
11	Pilot plots at Kakinga Dam	Government of Uganda	2012 - 2014	0.08	Construction of pilot demonstration plots at Kakinga Dam, Ssembabule district
12	Pilot plots at Kagango Dam	Government of Uganda	2012 - 2014	0.08	Construction of pilot demonstration plots at Kagango Dam, Isingiro district
13	Pilot plots at Leye	Government of Uganda	2013 - 2014	0.06	Construction of pilot demonstration plots at Yele Dam, Kole district

	Dam				
14	Pilot plots at Akwera Dam	Government of Uganda	2013 - 2014	0.06	Construction of pilot demonstration plots at Akwera Dam, Otuke district
15	Pilot plots at Acanpi Dam	Government of Uganda	2014 - 2016	0.56	Construction of an irrigation scheme at Acanpii, Loro Sub county
16	Construction of new schemes	Government of Uganda	2014 - 2015	0.30	Construction of 30 new small scale irrigation and water harvesting demonstration sites
17	Naigombwa Irrigation Scheme	Islamic Development Bank	2014 - 2018	40.00	Construction of a large size irrigation scheme at Naigomba-Iganga district
18	Igongero Irrigation Scheme	Islamic Development Bank	2014 - 2018	40.00	Construction of a large size irrigation scheme at Igongero-Bugiri district
19	Rehabilitation of Olweny Irrigation Scheme	Government of Uganda	2013 - 2016	16.17	Rehabilitation of Olweny Irrigation Scheme, Lira District. It involves the construction of protective buffer zones for rivers and canals at Olweny. It also includes the rehabilitation of heavily degraded watershed points. Finally, the project will train farmers on infrastructure maintenance
20	Ayago Hydropower Project	Government of Uganda	2014 - 2018	1900.00	The Power Station will be located at Ayago on the Victoria Nile in Nwoya district. It is located within Murchison Falls National Park
21	Karuma Hydropower project	China Exim Bank	2014 - 2019	2200.00	Construction of a hydro power project at Karuma Falls. The proposed dam is being constructed at Karuma on the Victoria Nile at the present Karuma Falls. When completed, it will be the largest power-generating installation in the country
22	Isimba Power Station	China Exim Bank	2013 - 2014	570.00	The dam is to be located at Kamuli on the Victoria Nile River downstream of the Bujagali power station. The project is a run of the river and includes the construction of power transmission lines connecting Isimba Power Station to the national power grid at Bujagali power station
23	Kikagati Mini Hydro power station	Tronder Energy Limited	2014 - 2019	25.00	The power station is located on Kagera River along the Uganda-Tanzania. The project will involve the construction of a dam, creating a 4000 m <sup>2</sup> (0.99 acre) reservoir lake. The new power station will be built at the location of another smaller power station that was destroyed in 1979 during the war

**Table 1.2. PIPELINE PROJECTS**

#	Project title	Funding Partners	Time Scale	Total Budget (million US\$)	Description
	Kikasi-Sanga Bulk Water scheme	<b>French Agency for Development</b> - AFD	2015-2019	30	Construction of a multi-purpose bulk water scheme in the sub counties of Kikasi-Sanga-Kanyabyeru in Kirihura district.
1	Kiige Irrigation Scheme	Government of Uganda	2015 - 2017	2.77	Rehabilitation of Kiige Irrigation scheme in Kamuli district in Bugabula sub county. The scheme was established in 1967 but has been non-functional
2	Odina Irrigation Scheme	Government of Uganda	2015 - 2017	2.75	Rehabilitation of Odina Irrigation Scheme in Soroti District. This scheme located in Kamuda sub county was established in 1967 and has been non-functional for some time. Apart from citrus fruits, the other crops targeted include mangoes and cashewnuts
3	Rehabilitation of Atera Irrigation scheme	Government of Uganda	2015 - 2018	5.96	Rehabilitation of Atera scheme in Apac district (Ibuje and Akokoro sub counties). The scheme targets citrus fruits and mangoes
4	Rehabilitation of Labori Irrigation Scheme	Government of Uganda	2016 - 2018	2.00	The scheme established in the 1962 and it used to abstract water from Lake Kyoga before it became dysfunctional. The scheme is located in Serere district (formerly Soroti) in Kasilo sub county
5	Rehabilitation of Ongom Irrigation Scheme	Government of Uganda	2016 - 2018	2.16	Rehabilitation of a scheme established in 1967 supporting citrus fruits and vegetable cultivation in Abebtong districts (formerly Lira)
6	Muzizi Power Station	Government of Uganda	2015 - 2018	30.00	Construction of a mini-hydro power dam on River Muzizi in Hoima district. Muzizi Hydro Power project is located along Muzizi River in the District of Kibaale. The project will be developed under a Public Private Partnership (PPP)
7	Nyagak II power project	Government of Uganda	2016 - 2019	25.00	Construction of a mini-hydro power station in Zombo district

8	Nyagak III power project	Government of Uganda	2015 - 2019	14.00	The proposed Hydro power mini dam will be on Nyagak River, in Okoro County, Zombo district. The project will be developed under PPP arrangement with financing expected from International Finance Corporation
9	Nyamwamba Hydroelectric Power Station	Netherlands Development Finance Co; Emerging Africa Infrastructure Fund; German Investment Cooperation and Finnfund	2017 - 2020	24.00	The dam will be located in Kilembe, across River Nyamwamba, in Kasese district. Development rights are owned by South Asia Energy Management Systems LLC (SAEMS). The dam will be a run of the river mini-hydropower installation
10	Maziba Hydroelectric Power Station	Sri Lanka Developers and Government of Uganda	2015 - 2017	12.00	The Power Station is located across River Kiruruma, a tributary of River Kagera in Maziba sub-county, Kabale district. The proposed dam lies at the site of a smaller (1.6MW), hydroelectric power plant, that was constructed in 1966 but went out of commission in 2002, due to disrepair and silting

## ANNEX 2. MAP OF UGANDA



FAO - AQUASTAT, 2005

**UGANDA**

**Disclaimer**

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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