

# Economic Assessment of the Impacts of Climate Change in Uganda

## National-level assessment

## Climate Change and Water

### Introduction

Climate change and variability are already affecting the availability of water in Uganda and this is expected to increase over time. The main economic sectors directly affected by water supply and variability are domestic, agriculture and livestock, fisheries, aquaculture, forestry and tourism. Complementary sectors include lake transport and energy production; social sectors that are impacted are health and nutrition and water and sanitation.

As part of the national-level assessment, an estimate has been made of water demand by sector (agriculture, households and industry) in each of the eight watersheds in the country. This is compared with the supply likely to be available. From the two an estimate is arrived at of the unmet demand, now and in the future under given climate scenarios. This unmet demand (part of which arises from climatic factors and part from socioeconomic changes) is then valued in monetary terms. In addition to looking at 'normal' conditions in the future the report also analyses the situation in the case of a drought and how that would translate into losses in the future.

### Estimated Impacts

#### Water Demand

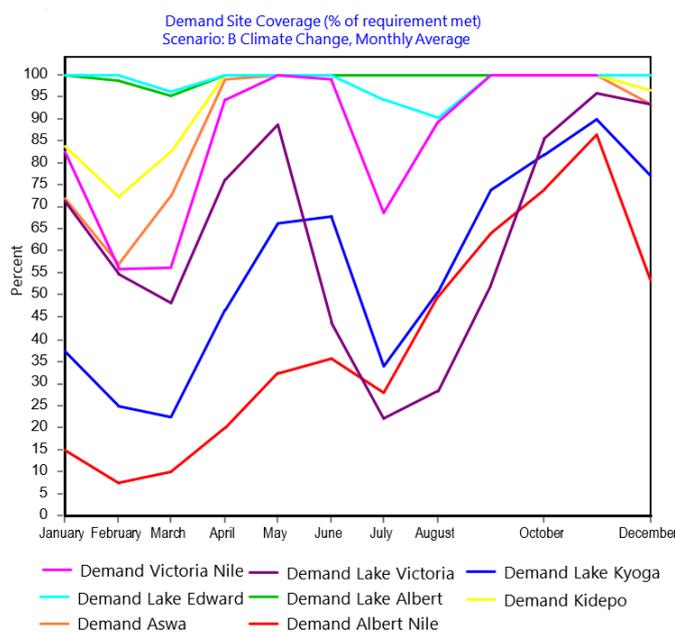
Estimates have been made of water demand by sector (households, industry, livestock and agriculture) for each of the watersheds from 1981-2010. During this period average availability was sufficient in most months to meet supply although there were some periods when unmet demand was as high as 5% of total demand.

In the future, however, projections are for a much greater level of demand and some potential reductions in supply. Total demand is expected to increase from 408 million cubic meters a year (MCM/y) in 2010 to 3,963 MCM/y in 2050. Total unmet demand will then rise from 3.7 MCM/y to 1,651 MCM/y in this period under climate change. In most months water shortages will be enormous.

#### Value of Unmet Demand

The unmet demand has been valued in monetary terms (using willingness to pay surveys). Overall, the expected cost in 2050 is anticipated to be on the order of 14,558 billion shillings (US\$5.5 billion). This is a conservative estimate and the figure could be as much as ten times higher if income effects on willingness to pay are taken into account.

Figure 1. Unmet demand - monthly average coverage for the period around 2050



The largest overall economic losses are anticipated to be in the Lake Victoria, Albert Nile and Lake Kyoga watersheds. These values underline the need for further investment in the water supply infrastructure in Uganda. With or without climate change the economic losses are of a significant magnitude.

In addition to unmet demand under average conditions the report also looked at droughts. Past extreme events of water shortage have had major impacts, with two droughts in the past decade (in 2005-6 and 2010-11) resulting in losses of \$250 million and \$1,174 million respectively. Each drought lasts about 3 years representing an average annual damage per drought event in the last decade of \$237 million.

## Adaptation Priorities

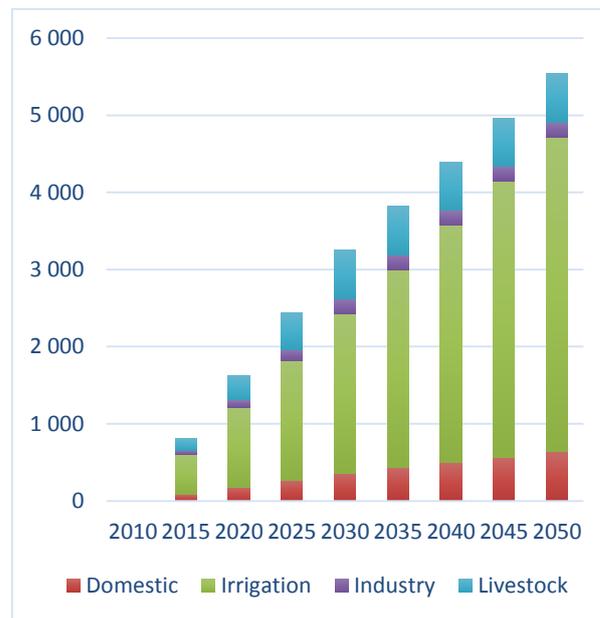
Adaptation measures include those that improve efficiency on the demand side, those that improve water storage and increase availability on the supply side and those that reduce losses from extreme events.

The report has looked at the costs of proposed

actions documented in the the Government of Uganda’s Costed Adaptation Strategy document<sup>i</sup> and compared them to the potential benefits in terms of reducing unmet demand or in reducing losses from droughts. Three programmes, which account for 92% of the Government’s strategy were examined: Programme A focuses on improvements in water use efficiency, Programme B addresses water supply issues for agriculture and industry and Programme C sets up an Integrated Water Resources Management system that would help reduce losses from droughts and floods.

In each case the model calculates the minimum reduction in damages required for the project to generate a 10% rate of return. The results indicate that even with a very small impact on unmet demand, all three programmes would generate this return. **The implications of such a preliminary analysis are that the benefits of action to adapt in the water sector are very high and further investments may well be justified.**

Table 1. Summary of damage and losses by sector 2010:2050 (\$Mn.)



<sup>i</sup> Ministry of Water and Environment, *Uganda National Climate Change Costed Implementation Strategy*, 2012.

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