

Economic Assessment of the Impacts of Climate Change in Uganda

National-level assessment

Climate Change and Infrastructure

Introduction

Uganda's infrastructure is currently subject to major impacts from climate variability: this is not a problem only for the future but very much something that urgently needs to be addressed today. In this study an estimate is made of:

- 1) the costs of making the country's infrastructure more resilient in the face of increased climate stress such as increased rainfall and changes in temperature; and
- 2) the cost of damage to infrastructure from extreme events.

Estimated Impacts

Climate Resilient Infrastructure

Infrastructure comprises residential buildings, non-residential private buildings, social infrastructure (including schools, hospitals, ports, airports, government offices) and roads, railways and bridges. The estimates that follow do not include the cost of additional infrastructure to deal with climate events. The key findings for the cost of improving the

resilience of infrastructure to climate change are the following:

1. **Total costs for ensuring climate resilient infrastructure in Uganda are estimated at US\$52-66 million for the period 2015-2020; and US\$638-1,157 million for the period 2045-2050.** New construction accounts for around 37% per cent of total costs; the rest is additional maintenance.
2. With the more climate friendly scenario (RCP4.5), **total costs to 2050 are around US\$2 billion** while with a less friendly scenario (RCP 8.5), costs to 2050 can be as high as **US\$3 billion**.
3. **The most affected sector is residential buildings, which account for around half of all costs.** Public buildings account for approximately 25% of all costs, followed by other private non-residential infrastructure at 16%. In fact it is buildings that account for most of the costs (92%); transport only accounts for 8%. This is mainly the result of projected decline in precipitation: with an increase in precipitation transport costs would play a bigger part as that sector is more affected by an increase in rainfall.

These figures can be compared with those in the Government's Costed Adaptation Strategyⁱ, which estimates a total cost for transport and works of US\$1.05 billion over the next 15 years (i.e. to 2030).

The difference between the two estimates partly lies in the different approaches and partly in the items covered. This report has done a more detailed assessment of climate resilience needs but it has not evaluated the costs of site investigations for future infrastructure development or the costs of water catchment protection. These two items would add US\$394 million to this study's estimates, giving a total figure of US\$694-764 million, which is about 30 per cent less than the Government of Uganda's estimate.

Extreme Events

The report estimates the cost of extreme events on infrastructure based on the frequency of such events in the past and the damages they caused. Damages included in the study are loss of life and injury, damage to property, costs to persons due to dislocation and inconvenience and disaster relief. The key findings are as follows:

- If there is no increase in frequency or intensity of extreme events to 2050 then the damages, which are currently between US\$20-130 million a year (depending on how you value the loss of life), rise to US\$39-234 million by 2025 and to US\$189-838 million by 2050.
- **A doubling of frequency of extreme events every 25 years under climate change would result in damages of around US\$77-467 million by 2025 and US\$738-3,294 million by 2050.** This is equivalent to 0.1-0.3 per cent of GDP in 2050.
- The figures are average of expected damages; an extreme event similar to the El Nino floods in 2007 would represent very significant costs in 2025 and 2050.

Adaptation Priorities

The study concludes that the key adaptation priorities for infrastructure include:

- climate proofing public buildings;
- developing standards for transport and infrastructure planning; and

- integrating climate resilient standards into existing infrastructure risk assessment guidelines.

All of these actions must precede any new investment in infrastructure. Table 1 lists the items in the Government's Costed Strategy with a qualitative assessment of their priority.

As far as extreme events are concerned the Government's Costed Strategy has, in addition to the above, a number of actions under risk management that are relevant to protecting infrastructure from extreme events, with a total cost to 2030 of US\$12 million. If we compare the government's projected adaptation program for disaster risk reduction it is only a fraction of the cost of damages estimated from extreme events. If the government program can reduce damages by even a small amount (i.e. around 7 per cent) they will, under the most conservative assumptions, generate a rate of return of at least 10 per cent.

Table 1. Adaptation Measures for Infrastructure

Item	Amount to 2030	Agency Responsible
Very high priority		
US\$Mn.		
Integrate climate change into the existing infrastructure risk assessment guidelines and methodology	14	Ministry of Water & Envt
Establish and enforce climate change--resilient standards for transport and infrastructure planning and development through monitoring and reporting systems	22	Ministries of Transport, Public Works and Water & Envt
Climate proof public buildings	66-91	Ministry of Public Works*
High priority		
Private non-residential buildings	33-46	Private sector*
Residential buildings	148-203	Private sector*
Paved roads	19-20	Min.of Transport*
Railroads	30-39	Min.of Transport*
Climate-proof existing and future infrastructure by conducting geotechnical site investigations (GSIs) to determine whether areas are appropriate or inappropriate for infrastructural development	204	Ministry of Public Works and Water & Envt
Medium priority		
Promote and encourage water catchment protection in transport infrastructure development and maintenance	192	Ministries of Transport, and Water & Envt

(*) Most of the expenditures will be phased as and when the relevant investments in infrastructure are undertaken.

ⁱ Ministry of Water and Environment, *Uganda National Climate Change costed Implementation Strategy*, 2012.

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