MINISTRY OF WATER AND ENVIRONMENT
CLIMATE CHANGE DEPARTMENT

Economic Assessment of the Impacts of Climate Change in Uganda

Briefing Note: Infrastructure in the Kampala Urban Area

An Economic Assessment of the Impacts of Climate Change has been completed at the national level in Uganda. As part of this nation-wide study, this case study seeks to assess the impacts of climate change and their costs in the infrastructure sector in Kampala, drawing on national projections of climate change. For further information see www.cdkn.org, or http://ccd.go.ug/index.php/projects/cdkn or contact olivier.beucher@baastel.com

Kampala, the capital of Uganda, concentrates critical economic assets. While there are no robust projections regarding the frequency and intensity of heavy rains, the literature suggests that they have been increasing and will increase with climate change. The costs of inaction are high. Estimates for flooding alone suggest that, if the intensity and frequency of extreme events leading to flooding do not change, current annual damages of between US$1 million and US$7 million in 2013 could rise to between US$33 million and US$102 million by 2050. If the frequency of extreme events doubles by 2050, damages would also double. Adaptation measures can help to mitigate some of this cost; those include (i) revising of policies and plans to account for climate change, (ii) revising building codes to promote bio-climatic designs and avoid building in vulnerable areas, (iii) better use and enforcement of tools such as Environmental Impact Assessment for protection of wetlands, and (iv) strengthening of the evidence base on climate change impacts.

Figure 1: Kampala, Uganda

Introduction

With a little over 1.5 million people in the city itself, and around 3 million people in the Great Kampala Metropolitan Area (GKMA), the capital of Uganda is a crucial demographic and economic pole in East Africa. It is located on the northern shores of Lake Victoria, situated between 1,120 and 1,306 m above sea level, and characterized by flat-topped hills surrounded by wetland valleys. The methodology used in the report combined qualitative and quantitative approaches, and entailed a thorough review of literature and a large number of interviews. The lack of crucial data on the economic costs of the current and likely future impacts of climate change has however reduced the scope of the economic analysis.

Climate Change

Estimates of temperature increase range from 1.5 to 3°C by 2095. Precipitation is expected to decrease slightly. There are no robust projections regarding the frequency and intensity of heavy rains, although recent history and literature suggest that they have been increasing and will increase with climate change.

Extreme events have already caused significant damages in Kampala. The clearing of vegetation in the hills has increased water runoff, and the encroachment of human settlements onto wetlands has increased exposure to flooding and reduced the capacity of these ecosystems to capture, store and dissipate surface water run-off. Insufficient, poorly designed and poorly maintained urban infrastructure contributes to the high vulnerability of the city to heavy rains.

Vulnerability to drought is also significant. The city has not developed alternative water supply sources to Lake Victoria, and a lack of water for hydro-electricity generation could also have significant impacts in the future.

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Economic Impact of Flooding

The study estimates potential damages to humans and physical capital caused by flooding, to 2050, under two scenarios. The estimate of damage does not directly consider either slow onset trends (i.e. changes in temperature and precipitation) or extreme events other than floods, such as droughts and heat wave. It is therefore an underestimate. In addition, it covers only the impacts of floods in terms of loss of life, damage to property and effects on persons due to disturbance of economic activity (costs to businesses from delays and disruption are, for example, not included). The table below provides annual damages figures for the two scenarios:

Intensity and frequency of extreme events leading to flooding:	Annual damages in million US$		
	2013	2025	2050
Same as 2013	1-7	4-18	33-101
Doubles by 2050	1-7	5-26	67-203

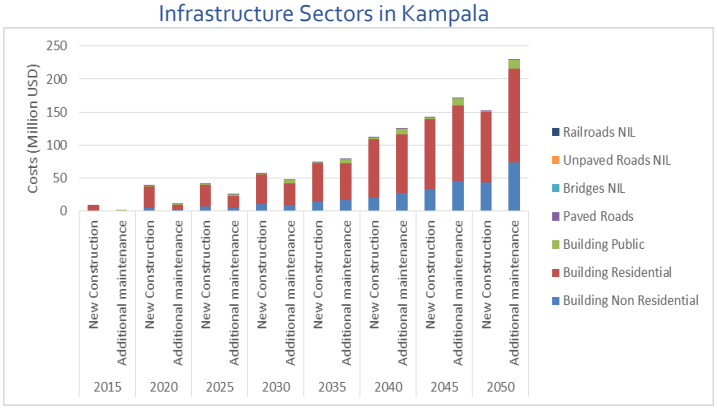
The increase in annual damages is the result of a growing population and assets that are appreciating over time.

Adaptation

The case study estimates the cost of climate proofing new and existing buildings and roads against the projected temperature and precipitation changes to 2050. Given that they consider different climate variables, the estimate of damage cannot be compared to the estimate of adaptation to calculate if adaptation is cost-effective[1]. The estimate of costs of adaptation includes only infrastructure, and excludes other important sectors such as health, water supply or ecosystems degradation. Even with those exclusions, **the estimates of costs are significant, ranging between US$3.3 billion and $3.7 billion between 2015 and 2050:**

- costs are evenly distributed across new construction and maintenance;
- buildings account for 99.8% of the total cost (roads only account for a small fraction);
- private buildings account for 95% of the costs within the building category (the rest are public buildings), residential buildings (as opposed to non-residential) account for 72% of all costs of buildings. The results for the SSP1/RCP4.5 scenario are shown below.

Figure 2: Estimates of Adaptation Costs of Selected Infrastructure Sectors in Kampala



SSP1/RCP4.5 US$2014 Million. Base Case City Growth - NIL indicates no expected cost

The cost of inaction is high and justifies adaptation measures to mitigate some of this cost. Recommended adaptation actions include:

- Plans developed under the Kampala Physical Development Plan (KPDP, 2012) must be revised in light of climate projections. The plans for the degraded and non-degraded wetlands and the lakefront are of particular priority given their relevance in shaping particularly vulnerable areas.
- It is urgent that building codes are revised vis-à-vis climate projections, promoting bio-climatic designs and the use of appropriate materials.
- Mainstream adaptation into Kampala's Low Carbon Development and Climate Resilient (LCDCR) Strategy.
- Strengthen the application and enforcement of tools, such as Environmental Impact Assessments, to ensure the protection of wetlands.
- Ensure that all new construction and the modifications of existing buildings is climate resilient.
- Ensure that the opportunities and challenges that informality represent are taken into account
- Improve evidence and research on climate change impacts.
- Ensure that uncertainty is acknowledged and other tools, such as multi-criteria analysis, are used when assessing adaptation strategies.

[1] The estimate of damage considers extreme events leading to flooding; the estimate of adaptation, slow-on-set trends. The types of impacts also differ: the estimate of damage considers deaths, people affected, buildings destructed and buildings damaged; the estimate of adaptation, buildings and roads. A proper cost-benefit analysis was conducted for the improvement of the physical drainage systems of four of the eight catchment areas of the city.