Royal Academy of Engineering

GCRF Africa Catalyst Case Study:

Climate resilience and sustainable infrastructure

Africa Engineers the Future

The global issue

Global efforts to address climate change are promising, but insufficient. While we can applaud the recent commitments by Parties to the UN Framework Convention on Climate Change (UNFCCC) to reduce greenhouse gas emissions by 45% by 2030 to limit global warming to 1.5°C, we still need to build climate resilience. Climate change is already here – and its impacts are growing more severe by the day. Extreme droughts, floods, storms, and sea level rise all disproportionately affect the world's most vulnerable people. That is why we must invest in climate resilience so people can adapt to the impacts that are already being felt from climate change.

What is climate resilience?

Climate resilience is the degree to which a system can cope with the adverse effects of climate change and bounce back. Being climate resilient means people can anticipate, prepare for and respond to the problems caused by climate change, be they extreme weather events, changing weather patterns or rising sea levels. Part of this means having resilient infrastructure to cope with these events.

National responses

Kenya and Uganda have both committed to reducing their greenhouse gas emissions to limit global warming to 1.5°C. National commitments cover a variety of domains, including one key aspect: strengthening resilience and reducing vulnerability to climate change.

What's happening on the ground?

KENYA

Informal neighbourhoods in African cities bear the brunt of the adverse effects of climate change. In Nairobi, for example, slums are often located beside the river and are extremely vulnerable to floods. Challenges worsen when local community members are left out from participatory decision-making for slum upgrading. A lack of specific policies, guidelines and requirements, limited budgets, poor urban governance, and an increased demand for skilled, engineering professionals all exacerbate the problem.

The Kounkuey Design Initiative (KDI), with University College London (UCL), the Architectural Association of Kenya (AAK), Akiba Mahinani Trust (AMT) and Arup East Africa, are trying to address this issue.

Through the Royal Academy of Engineering Global Challenges Research Fund (GCRF) Africa Catalyst sustainable infrastructure programme aimed at building the capacity of engineering policy and practice for sustainable and resilient infrastructure, they have been developing an Integrated and Inclusive Infrastructure Framework (3IF). This will enable infrastructure planning to support sustainable development, poverty alleviation, equitable societies and better public health.

The framework puts residents of informal settlements at the centre of decision-making. It uses data and knowledge from Kenyan and UK institutions at the forefront of sustainable infrastructure design to ensure that any upgrades to informal settlements are truly inclusive. The plan is that the framework will demonstrate how resilient infrastructure design can help achieve local, national and SDG goals.

On a practical level, the guide for communities in informal settlements will help residents to influence critical decision-making regarding upgrades. The 3IF framework includes a methodology to help policymakers increase consultation and get buy-in from residents when planning infrastructure projects.

The guide will be tested in the Kibera informal settlement in Nairobi, home to about 250,000 residents and characterised by crowded conditions, lack of waste disposal and sanitation services, high unemployment and crime rates, and severe flooding.

UGANDA

In Uganda, as in Kenya, people living in vulnerable areas have direct experience of climate change impacts. Living on the frontline of climate change, they have a detailed knowledge of sustainability issues, but technical inputs from outside teams can also be useful for predicting future climate change impacts and the steps they may need to take for additional resilience.

The College of Engineering, Design, Art and Technology (CEDAT) at Makerere University is assessing resilience and sustainability by undertaking literature reviews and interviews with contractors, local government and national government. It wants to define what sustainability means in Africa – and more specifically in Uganda – and what a resilient transport sector would look like.

Its roadmap is unique in the way it engages in community-based problem solving, building on the knowledge gathered during consultations with underserved communities.

With the support of the GCRF Africa Catalyst sustainable infrastructure programme focused on increasing sustainable economic growth, reducing poverty, and strengthening climate resilience in sub-Saharan Africa, CEDAT is building a roadmap for Ugandan policymakers to incorporate resilience and sustainability requirements into infrastructure planning.

Its roadmap is unique in the way it engages in community-based problem solving, building on the knowledge gathered during consultations with underserved communities. Since day one of the project, the team has involved national and local government in the framework's development to make sure that they have the hearts and minds of communities when designing infrastructure.

Partner organisations involved in the decision-making include the Greater Kampala engineering team through Kampala Capital City Authority, municipal engineers with the Apac Municipality in Northern Uganda, the Ministry of Works and Transports, Uganda National Roads Authority, and the Uganda Institution of Professional Engineers. ResilientAfrica Network has also contributed to the project by facilitating consultative resilience research with communities and translating findings from resilience assessments into innovation challenges.

During interviews with stakeholders regarding the state of the infrastructure in Uganda, technical, environmental, organisational, social, and economic characteristics emerged as crucially important for resilience and sustainability.

CEDAT plans to conduct outreach and knowledge-sharing forums to advocate for the study findings to be integrated into policy. The roadmap will generate clear concepts of resilience and sustainability that are representative of those impacted by climate change-related challenges. It will also provide practical frameworks for assessing resilience and sustainability.

About

Kounkuey Design Initiative

Kounkuey Design Initiative (KDI) is a community development and design non-profit. It partners with under-resourced communities to advance equity and activate unrealised potential in their neighbourhoods and cities.

Makerere University

The College of Engineering, Design, Art and Technology (CEDAT) at Makerere University, Uganda, undertakes high-quality research relevant to the region's and global development needs and consequently produces highly qualified graduates with specialised skills, as well as professional services and innovation for sustainable national and regional development.

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