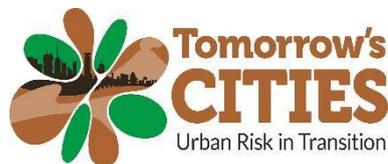


# COP 27 BLOG SERIES

**LAUNCHED BY THE AFRICA RESEARCH AND IMPACT NETWORK (ARIN), IN COLLABORATION WITH UK RESEARCH AND INNOVATION (UKRI) AND OTHER PARTNERS.**



## Introduction

The Africa Research and Impact Network (ARIN), in collaboration with UK Research and Innovation (UKRI) and other partners launched a call for a COP27 Blog series with the goal of profiling best adaptation practices and experiences as well as research and policy gaps that need to be addressed in Africa. The focus of the blogs should be on a number of questions that have been informing the Science-Policy convenings as attached and should ideally have 800-1000 words maximum. The blogs could also be based on ongoing climate adaptation projects or initiatives, highlighting some of the cutting-edge experiences and outcomes of adaptation research and initiatives, and show how such could inform future adaptation action. The blog series will be run during the COP27 adaptation events alongside the highlights from the launch events.

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# 1. Adaptation Research in Africa: Progress and Gaps

## Authors

**Joanes Atela**



**Charles Tonui**



## Introduction

Adaptation to climate change is a fundamental intervention in tackling the unequal impacts of climate change and addressing wider concerns around climate justice. The 2020 adaptation gap report (UNEP, 2020) shows that adaptation actions are growing worldwide but there is still very limited evidence that these actions contribute to climate risk reduction thus tempering any conclusion on adaptation progress as a whole.

In the lead-up to UNFCCC COP 27 this year, there are efforts to upscale climate action, as countries will renew their commitment to the Paris Agreement through enhanced NDCs, building on the first phase and second round of NDCs. The evolving experiences with first phase of NDC implementation has driven new efforts to step-up adaptation ambitions and pay attention to climate justice as a fundamental basis for achieving the Paris targets.

Several global climate action initiatives have been established to redefine and reprofile adaptation. These include multi-national institutions, political initiatives, grassroots level initiatives, and research and academic initiatives and cooperate initiatives. These initiatives have varying mandates including research, advocacy data, technology development and implementation among others. The [State and Trend on Adaptation in Africa \(2020\)](#) analysed several of these research in Africa and among the findings are gaps on incorporation of adaptation into planning. The report also reveals the opportunity for African countries to fully incorporate

climate risks into their planning processes as they close the gap on large infrastructure projects, access to services, and transformative adaptation programs for food security, including irrigation systems, drought-resistant crops, and making crop insurance more widely affordable and available.

The recently released report by the UK Collaboration on Development Research ([UKCDR, 2021](#)), for instance shows that Africa has been home to several impactful UK funded research with specific African countries such as Kenya, Egypt, Ethiopia among the top. However, it is not clear how sustainable or effective these projects are in reduction of climate risks. Part of the challenge is lack of adequate learning and impact platforms to showcase impacts, best practices, sustainable learnings and connections to the broader global picture.

### **The Africa-led Adaptation Event**

There is an opportunity to better profile the impacts of various existing projects and to understand some of emerging lessons, gaps and opportunities even as countries aim to raise adaptation ambitions during COP 27. Therefore, the Africa Research and Impact Network (ARIN) ([www.arin-africa.org](http://www.arin-africa.org)) in collaboration with UK' Research and Innovation (UKRI) and wider partners organized UKRI COP27 Adaptation and Resilience Africa Launch event as part of the preparatory dialogues to mark the 27th United Nations Climate Change Conference of the Parties (COP27). It brought together different stakeholders including UK funded research consortia and projects in Africa, policy makers, Africa Group of Negotiators (AGN), Think Tanks and climate change stakeholders to showcase ongoing adaptation and resilience research projects based in Africa and gain insights on opportunities for upscaling these. The discussions centered on four key questions from where key insights are drawn:

### **Key Insights from the discussions**

*In terms of adaptation research gaps, Africa is experiencing an increasing amount of adaptation research supported by international community. However, a number of strategic research gaps still exist including lack of*

comprehensive dedicated database and platform to provide disaggregated data and information for easy access and sharing. Data driven adaptation initiatives are potentially transformative in the African context. Additionally adaptation impact research is evolving but remains a major gap. There seem to be a lack of clear understanding of impacts of adaptation research currently ongoing in different parts of Africa. Both short-term and long-term impacts of adaptation research are not properly documented or profiled for global upscaling. Most impacts reported in projects are largely aspirations partly because most research projects take short time frame to realise tangible impacts. However, some of the outputs and outcomes from these research projects require new interventions to profile and assess opportunities for tangible impacts. This remains a major research gap. For most participants, there is need to build sustainable adaptation research systems including capacity and can strengthen impact research.

The issue around scale in adaptation research was highlighted as another gap with participants noting that some disintegration in adaptation research is taking place in Africa. Most of the adaptation research activities fail to account for environmental flows across geographical/ecological scales thus sometime resulting in maladaptation, limited impacts and externalities. Additionally, adaptation research in Africa has focussed more on addressing climate hazards such as floods, rising sea levels, and this has often resulted in recommending actions that are more reactive rather than informing proactive adaptation planning. Consequently, much of the adaptation actions in Africa are reactive to climatic events. One option recommend by the delegates is the risk approach to adaptation research that enhances our understanding of the dynamics of adaptation by unpacking holistic components of adaptation including vulnerability, exposure and adaptative capacity. The risk approach to adaptation research potentially enables preparedness to climate risks and various shocks such as natural disasters and pandemics such as COVID19 that

either are exacerbated by climate change or exacerbates climatic impacts.

*In terms of transformative adaptation*, discussions revealed that most stakeholders are not entirely aware of what a transformative adaptation research could look like. While most participants had ideas around various best practices, it was not clear how these best practices constitute transformations. The understanding of best practices in an African context is valuable in replicating these in different contexts. Further, focusing on best practices has only meant replication of ideas rather than pursuing real change that can enhance resilience of vulnerable communities. The limited understanding of how to achieve transformative adaptation is an impediment to the continent's adaptation pursuit as this limits the ability to develop ideas and Africa-led concepts that are transformative. Consequently, most adaptation research activities are either driven by conceptual framings from elsewhere with little African voices around the transformation agenda. In the run to COP-27, there are major global efforts towards enhancing adaptation action and already there are major concerns that these initiatives might fail to bring the required transformation. Already the African research and policy fraternity, through the Africa Research and Impact Network, have raised several issues around financial architecture, weak African voice in the initiatives. The petition raising these issues can be accessed here: <https://www.arin-africa.org/2021/10/15/africa-research-scientists-petition/>. Nonetheless, participants highlighted a number of ideas that they thought could constitute transformative adaptation research. These include co-creation of adaptation knowledge with local communities, adaptation research that explores low carbon development as an opportunity. Additionally research that integrates impact testing and experimentation to enable practical testing and incubation of research findings and outputs was noted to be transformative.

*In terms of partnerships for adaptation*, a key point raised by delegates is the need to enhance Africa's leadership in adaptation research. In this,

there were calls that partnership in adaptation research need to enhance equity, transparent and fair contribution from Africa. There is need for enhanced leadership role for African researchers in international adaptation research while leveraging support from the global North. Strengthening multi-stakeholder partnerships in adaptation research was also highlighted as key to building transformative partnerships. There is need to prioritise long-term partnerships made up of diverse actors that also foster common but differentiated responsibilities in adaptation research. Partnerships that bring together both the researchers as knowledge producers, communities and governments and beneficiaries and overall knowledge users is likely to enhance robust research uptake, learning and complementary knowledge sharing. Concerns were raised that to-date, most research partnerships have consciously or unconsciously left out the private sectors who are key knowledge consumers and thus there is need to close this gap. The role of private sector in adaptation action, funding and knowledge and data generation is appreciable and needs to be harnessed as part of transformative partnership.

*In terms of profiling adaptation actions in Africa to the global scale, several strategic challenges were raised. There are useful adaptation actions and research generated across the continent, some of which are attracting significant international attention. However, these are not effectively communicated or connected to the global decision space due to several challenges. The lack of skills to help translate local adaptation actions into a global language remains a challenge. While most African countries have established agencies and climate change directorates to help with tracking and national reporting of adaptation actions, the reporting process often focused more on outputs. There is therefore need for institutional strengthening to institute skills-sets that can undertake comprehensive inventories and help translate reported outputs into stronger global messaging and interpretation. Additionally, Africa still lack dedicated adaptation platforms to profile best practices and ongoing*

actions. While multiple adaptation actions are ongoing in different parts of the continent, there are no dedicated platforms to showcase ongoing adaptation projects. There is a major concern that various researchers and policy makers are unaware of adaptation research projects, taking place in their contexts. Similarly, there is little awareness about existing adaptation expertise in the continent. The need for a dedicated adaptation platform for Africa is urgent to help profile adaptation research and expertise and create stronger connections with the global platforms.

Overall, the Africa-led adaptation event generated key insights that are useful in informing the discussions and enhancing adaptation progress in Africa post COP 27. Discussions and key insights point to several gaps in adaptation research, partnerships and communication in Africa. These gaps present new opportunities for rethinking adaptation in Africa but also, if not well addressed, could impede progress and ambitions in adaptation action in Africa contrary to the global expectations. The 26<sup>th</sup> COP provides an opportunity for actors to ventilate on these issues, rally knowledge, expertise, funds and people to action and to ensure that emerging programs targeting Africa do not repeat same mistakes but are truly delivering for the vulnerable communities as noted by the IPCC 2021 report.

## 2. Reflections on addressing gaps in knowledge and research processes

**Author: Professor Declan Conway**

Contact: [d.conway@lse.ac.uk](mailto:d.conway@lse.ac.uk)



*Professorial Research Fellow, Grantham Research Institute on Climate Change and the Environment, London School of Economics*

In this blog, I reflect on adaptation research gaps from experience in leading a large consortium (UMFULA), one of the five funded through the Future Climate for Africa research programme. I draw from a recent UMFULA research paper, which I feel, is a good example of work that tries to cross-cut several long-standing research and research process gaps between areas of expertise among adaptation and climate science communities. I then consider the policy implications of this type of work and ways to address gaps between research and impact.

The paper encapsulates the combined efforts of many contributors. Titled [Climate variability impacts water-energy-food infrastructure performance in Eastern Africa](#)<sup>1</sup> it presents results that span the wide-ranging elements required for adaptation research that is practice oriented. In UMFULA, we tried to integrate insights from new climate and social science research with uptake and impact in mind. This included raising awareness, informing the design of policy, modifying decision-making processes, co-producing and disseminating information

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<sup>1</sup> Siderius, C. et al. (2021) [Climate variability impacts water-energy-food infrastructure performance in Eastern Africa](#). *One Earth* 4, 1-13.

about climate risk, developing climate impacts models, guiding different stages in the planning and operation of water resources management and strengthening capacity in partner organisations. A diverse suite of activities, that all fall within the remit of adaptation.

**Decision challenges under climate change** – our overarching aim was to assess what level of risk climate change represents to national-scale development plans across the water, energy, and food sectors in two rapidly developing river basins in south-east Africa: the Lake Malawi-Shire River system and the Rufiji River Basin in Tanzania. For example, the Tanzanian government is currently building what will be one of Africa’s largest hydropower dams – a high stakes investment worth 100s of millions of dollars – but will it work under the weather patterns and management objectives in a much warmer future world? Such a risk assessment necessitates grappling with important knowledge gaps but also procedural gaps in traditional research structures.

**Knowledge gaps** about the climate include understanding of present day regional ocean and climate influences such as the El Niño-Southern Oscillation, how they will evolve under global warming and what this means for future rainfall patterns – will it become wetter, drier, more extreme or some combination of all three....? Both river basins are large and underpin crucial social, economic and environmental functions serving millions of people, however, their hydrology is complex and due to limited measurements, imperfectly understood, particularly in areas such as wetlands. Therefore, in each case we needed to develop climate impact models to examine how water availability might be affected by climate change.

Deciding the level of risk that a threat or hazard represents also requires knowledge about who or what is at risk and why. This involves studying the institutions and decision-making processes that strongly influence the consequences of hazards. Furthermore, there are political questions about these processes, who makes decisions, how and why, and are people or

groups excluded from the process? Our analysis of policy processes highlighted gaps between strongly connected sectors such as water, energy and food with collaboration limited to ad hoc projects, rather than as a process.

**Procedural gaps** – decisions about major infrastructure such as dams and large irrigation schemes are complex, they involve multiple sectors, institutions, different values of outcomes, and high levels of uncertainty about how the climate might change and other critical influences such as urbanisation rates and demand for water. Without careful research design, this can quickly grow into an unmanageable volume of technical information. Therefore, involving stakeholders from the outset in defining their problems and the types of solution spaces that might be amenable to them is a crucial part of the research process. With this in mind, we adopted a basket of interactions with relevant organisations to design an iterative process and diverse outputs to fit the needs of decision-makers and other audiences. Important features of this method were taking time to establish relationships with stakeholders and identifying critical performance objectives of different infrastructures (e.g. reliable electricity production, wildlife protection, etc.). Developing ways of communicating information such as project briefs and interactive visualisations of trade-offs associated with alternative development and climate scenarios were key elements in our strategy.

So, what did we find? We focused on the near term future – which is crucial to achieve traction with decision-makers and relevance for operational decisions – and examined how climate change might impact reliability indicators of electricity generation from hydropower, irrigation water supply and river flows for environmental needs. Both basins had high sensitivity to multi-year droughts, which are known to have occurred in the past and would challenge the reliability of proposed infrastructure. While projected risks for the Rufiji River Basin were similar to those of the present day, future risks exceeded those experienced during the 20th century for

the Lake Malawi-Shire River, particularly likelihood of failure to meet irrigation water requirements.

**Impact translation gaps** – moving beyond headline impacts to identifying practical measures to address changing risk profiles requires the kind of detailed understanding and engagement described above. While our results identified some impacts that would be highly problematic; how exactly such information can inform decisions about water-energy-food infrastructure depends upon stakeholder risk appetite toward climate, alongside a host of non-climate considerations. In our case, we recommended development of contingency plans for the worst-case extremes, including increased variability and reoccurrence of a multi-year drought. We also suggested measures to enhance cross-sectoral collaboration and decision-making. However, recommendations such as these should be seen as part of ongoing interactions between ourselves and partners – elements of a long-term process of engagement on adaptation. Achieving long-lasting outcomes relies on the strength of relationship building and our ability to demonstrate the worth of outputs.

### 3. Solar energy and biotechnology for women entrepreneurs in the mangroves of Ramsar site 1017 in Benin (SEWomen)

**Author: Elie Antoine Padonou, National University of Agriculture, Benin**



Contact: [padonouelie@gmail.com](mailto:padonouelie@gmail.com)

SEWomen is part of the support activities of the International Development Research Center for applied development research in West Africa, and in the continuity of the successful initiative on the growth of the economy and economic opportunities of women - CEDEF. The project aims to create sustainable and environmentally friendly businesses for women in mangrove areas of Ramsar site 1017 in Benin (Picture 1) by developing solar cooker technology for salt production and fish smoking (Picture 2) as well as production and use of compost for market gardening. These activities constitute the main income-generating activities carried out by women in this region. These activities mainly use firewood and charcoal as energy source, with negative effects on women's income, their health and the environment. The project has a potential to save 128300m<sup>3</sup> of firewood/year, it can save three working hours used for firewood collection per woman per day, and reduce the negative impact from smoke and heat from the firewood. Furthermore, about 35 tons of household solid waste will be transformed yearly to compost in the study area and contribute to avoid eutrophication of agrochemical runoff into of the mangrove ecosystems and help save significant cash expenses for agrochemicals (savings of 11 Euro/50 kg of compost used).

## Key Question

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? Why these are considered transformative i.e. what is considered transformative in the African context?

## Key highlights

1. SEWomen is a project of 36 months (January 2021 - December 31, 2023) supported by IDRC in Benin (West Africa)
2. SEWomen is promoting the adoption of solar cooking technology for salt production and fish smoking in mangrove areas of Benin as well as the production and use of compost for market gardening production
3. SEWomen will contribute to reduce the workload of women, improve their income and well-being while reducing their carbon footprint.
4. SEWomen will contribute to the development of the scaling-up strategy of the technologies

Picture 1 below: Sites of salt production in mangrove areas of Ramsar site 1017 in Benin



Picture 2 below. Solar cooker (left) and traditional cooker (right)



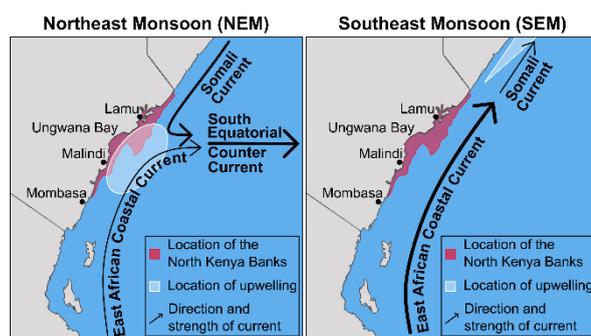
## 4. Climate adaptation strategies: Beyond the comfort zone lays the solution to climate change

**Author: Joseph Kamau – Kenya Marine Fisheries Research Institute**

Contact: josephkamau@yahoo.com

### Climate adaptation strategies

Climate adaptation strategies should ideally be informed by the impacts being felt at the local level. There are however, other impacts that might not be explicitly evident but are of major consequence. For instance, how will climate change affect the Oceanic upwelling systems that depend on wind driven currents?



In addition, how will this affect the fishery and ultimately how will it affect the associate livelihoods? Mitigation of such a scenario requires a multifaceted approach, where adequate data is generated through insitu sampling and models, possible scenarios determined and stakeholders involved to develop mitigation strategies.



*Research cruise along the Kenyan EEZ onboard RV. Mtafiti*

Recent research conducted within the WIO region (Kenya, Tanzania & South Africa) through the SOLSTICE and SAPPHIRE projects and in collaboration with Kenya Marine Fisheries Research Institute (KMFRI), has generated some information on the impact of climate change to the upwelling systems within the participating countries and recommended interventions. There is however need to monitor these systems over extended times to provide insights and early warning.

### **Key question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to these adaptation gaps?

### **Key highlight**

- a. How climate change will affect the oceanic upwelling systems that depend on wind driven currents
- b. There is need to monitor these upwelling systems over extended times to provide insights and early warning.
- c. There is need to enhance research on solid waste management, either through sanitary disposal, recycling, or energy conversion.
- d. Seawater greenhouse is an emerging solution for food security.

## 5. Adaptation and resilience

**Author: Joseph Kamau - Kenya Marine Fisheries Research Institute**

Contact: josephkamau@yahoo.com

Adaptation and resilience is the priority response to climate change in Kenya and indeed the rest of Africa. More than 40 per cent of the world is experiencing water scarcity, and that number continues to rise. In fact, a recent report from the UN warns that water shortages could affect 5 billion people by 2050.



*Semi-arid vegetation*

The government of Kenya being cognizant of the foreseen climate change impacts developed the National Adaptation Plan (NAP): 2015–2030, which is anchored in the Constitution of Kenya and Vision 2030 – Kenya’s blueprint for development.

Additionally, food production in dry coastal areas is severely limited by lack of available or affordable irrigation water (UNSOM, 2018). Desalinization of marine water is therefore increasingly expected to play a key role. With the right environmental parameters, it is possible to farm in a semi-arid area or even at the desert through seawater greenhouse. Where seawater is passed through evaporators, the cooled air cools the greenhouse thus

minimizing evapotranspiration, and the vapor condensed for irrigation and other use.



*Seawater greenhouse*

Another untapped benefit of seawater greenhouses is the ability to “mine” elements like lithium, cobalt and magnesium from the brine. An intervention by the SALT-MINE project is making inroads on piloting research on seawater greenhouse.

### **Key Question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in the African context?

### **Key highlight**

- a. Seawater greenhouse freshwater scarcity

## Reflections on addressing gaps in knowledge and research processes

**Author: Declan Conway**



Contact: [d.conway@lse.ac.uk](mailto:d.conway@lse.ac.uk)

Grantham Research Institute, London School of Economics

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The paper encapsulates the combined efforts of many contributors. Titled *Climate variability affects water-energy-food infrastructure performance in Eastern Africa* (1) it presents results that span the wide-ranging elements required for adaptation research. We tried to integrate insights from new climate and social science research with uptake and impact in mind. This included raising awareness, informing the design of policy, modifying decision-making processes, co-producing and disseminating information about climate risk, developing climate impacts models, guiding different stages in the planning and operation of water resources management and strengthening capacity in partner organisations. A diverse suite of activities, that all fall within the remit of adaptation.

Decision challenges under climate change – our overarching aim was to assess what level of risk climate change represents to national-scale development plans across the water, energy, and food sectors in two rapidly developing river basins in Africa: the Lake Malawi–Shire River system and the Rufiji River Basin in Tanzania. For example, the Tanzanian government is currently building what will be one of Africa’s largest hydropower dams – a high stakes investment worth 100s of millions of dollars – but will it work under the weather patterns and management objectives in a much warmer future world? Such a risk assessment necessitates grappling with important knowledge gaps but also procedural gaps in traditional research structures.

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alongside a host of non-climate considerations. In our case, we recommended development of contingency plans for the worst-case extremes, including increased variability and reoccurrence of a multi-year drought. We also suggested measures to enhance cross-sectoral collaboration and decision-making. However, recommendations such as these should be seen as part of ongoing interactions between ourselves and partners - elements of a long-term process of engagement on adaptation. Achieving long-lasting outcomes relies on the strength of relationship building and our ability to demonstrate the worth of outputs.

### **Key Question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to these adaptation gaps?

### **Key highlight**

- a. Adaptation comprises a diverse suite of activities, particularly when aiming for impact.
- b. Climate risk assessment necessitates grappling with important knowledge gaps but also procedural gaps in traditional research structures.
- c. Deciding the level of risk that a threat or hazard represents also requires knowledge about who or what is at risk and why.
- d. Achieving long-lasting outcomes relies on the strength of relationship building and our ability to demonstrate the worth of outputs.

## 6. Top-down adaptation policies and local mangrove resource conservation strategies across Grand Lahou, in the Southwest of Cote d'Ivoire

**Author:** Sylvestre Tchan Bi<sup>1</sup>, Dieunedort Wandji<sup>2</sup>, Tina Nelis<sup>2</sup>, Jeremy Allouche<sup>2</sup> & Soumahoro Amédée Kando<sup>1</sup>

<sup>1</sup> *Laboratoire de Sociologie Economique et d'Anthropologie des Appartenances Symboliques (LAASSE) at the University Houphouët-Boigny, Abidjan, Côte d'Ivoire.*

<sup>2</sup> *Institute of Development Studies, United Kingdom*

Côte d'Ivoire has long suffered from land deprivation and coastal erosion. Despite acknowledgement of the problem, government-driven climate change adaptation policies and resource conservation strategies have paradoxically failed to win the support of local communities. What then is contributing to this disconnect between government-sponsored activities and local adaptation practices? Fieldwork carried out in Grand Lahou as part of the UK-funded GCRF project "Islands of Innovation in Protracted Crises" sought to address this question. Through semi-structured interviews and ethnographic observation, the project looked at two contentious themes: the protection of mangrove forests and the creation of the Azagany national park.

### **The protection of mangrove forests through awareness raising campaigns in Lahou Pkanda**

In Lahou Pkanda, the government runs daily campaigns on the need to protect the mangrove forests. Although aimed at the entire community, the language and communication channels used suggest that these exercises are particularly directed at the youth. And as with all such activities, the expectation is that with increased awareness, positive behaviour change will occur.

However, despite increased awareness, the youth continue logging mangrove trees, where they are then sold to Ghanaian fishermen and to the local fish market for smoked fish production. On the other hand, older members of the community respond positively, taking on board the advice of the government campaigns.

Herein lies the paradox; in the longer-term, the negative consequences of logging combined with the impact of climate change will affect the youth more than older generations. However, these responses get to the crux of the issue: government driven participatory approaches to adaptation strategies have thus far failed to positively influence those groups with the biggest stake in benefitting from the strategies. It is, therefore, still unclear how to design participatory adaptation in a way that local communities prioritise adaptation demands over their immediate needs. In order to achieve greater participation at the local level, one suggestion might be to better understand the drivers of such behaviour and develop in parallel alternative livelihood programs that would address youth unemployment and entrenched poverty.

### **Community tension around the creation of the Azagany national park**

In Brafedon, local communities have contested the creation of the Azagany national park. Set up to protect natural resources and biodiversity, the park has led to a reconfiguration of the relationship between the state and the local communities.

Amongst the three ethnic groups living in Brafedon (the afè, the brafè, and the sawa), the Sawa feel that their forestlands have been unfairly seized by the state without adequate compensation, and that the protection of biodiversity is being done at their expense. Despite continued arrests, local community members continue to carry out logging and farming activities in areas assigned to the park.

Besides that, government attempts to promote the park as a useful adaptation on the one hand, runs contrary to the local community's determination to have access to and use of their former lands. Such

unresolvable tensions are also witnessed in the actions of the Office ivoirien des parcs et reserves (OPIR), a government-funded conservation community association, which not only petitions for the release of community members imprisoned for trespassing but also runs campaigns to promote the park itself. As a community organisation, OPIR and its actions remain somewhat of a contradiction.

### **Adaptation strategies requires a participatory approach that is people-centred**

What these examples show are the gaps that remain in the interplay between adaptation and structural inequalities, and the failure of government sponsored policies and strategies to address these issues. In Lahou Panka, the role (not) played by the youth exposes a potentially missing intergenerational component in the adaptation design.

As these two examples have shown, a study of local community responses to adaptation strategies reveal that more research needs to be done to ascertain under what conditions local communities can prioritise adaptation over their immediate needs, particularly when adaptation strategies come in conflict with their existing livelihoods arrangements and social expectations. Relatedly, this ultimately begs the wider question as to whether issues of social justice, governance and inequality have been thoroughly examined in adaptation processes.

### **Key Question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to these adaptation gaps?

### **Key highlight**

- a. Climate change adaptation, youth, mangrove

## 7. Insurance as a catalyst for using climate risk information for government planning and decision-making?

**Author: Swenja Surminski - Grantham Research Institute at the London School of Economics**



Contact: [s.surminski@lse.ac.uk](mailto:s.surminski@lse.ac.uk) Climate change is already negatively impacting life on our planet and a wide range of human activities. Nowhere is this more pronounced than in Sub-Saharan Africa, where countries will experience some of the greatest exposure globally while having fewer resources and less adaptive capacity to reduce negative impacts compared with other parts of the world (IPCC, 2014). While global efforts to limit the causes of climate change are essential, there is also an urgent need to enhance the adaptive capacity to respond to current and future climate change risks in these countries (IPCC, 2018). For this, the right enabling factors are needed: a supportive policy environment, adequate funding, political will, the technical capacity of decision-makers, buy-in from key stakeholders and climate awareness (Vincent et al. 2020; Pardoe et al. 2018). All of these are underpinned by appropriate information on current and future climate risk: In an urban context, climate information might influence building and infrastructure, while in a rural context it lends to the choice of crop and timing of planting.

However, data availability remains poor in many parts of Africa, and where data does exist, it often tends to stay siloed within one organization, lacks comparability because of methodological challenges (Dinku, 2018), and is often not used by those who make planning or policy decisions (Wall et al. 2017; Tall et al. 2018). There are various reasons for the lack of uptake of climate information. Some of these are technical and are related to the

appropriateness of information, whilst others are related to the political economy and the structures that shape access and control of information. Risk information may be seen as a hindrance, for example when risk models indicate why certain parts of a city should not be developed due to their risk exposure, or when risk data shows that a newly purchased crop is likely to be unsuitable in future climate conditions.

One potential catalyst for the use of climate risk information for wider decision-making planning and adaptation action is insurance. This financial instrument comes in different forms and shapes such as micro-level insurance products for farmers, property insurance policies for homeowners, business insurance for companies, and sovereign risk insurance as protection of public budgets. Importantly, climate risk information and insurance have a dual relationship: those who provide insurance rely on risk information while they also generate new information as part of the underwriting process, which could be of use to other stakeholders. Indeed, climate risk information generated for or by insurance could be used to encourage risk-based planning and decision-making – either by those insured or by those who make decisions about risk creation and risk management, such as governments, planners, or individuals.

Our research is part of the UK-funded Future Climate for Africa UMFULA programme that has investigated the interplay of climate risk information and insurance processes. It combines insights from a survey of 40 African insurance experts with key informant interviews and document analysis underpinned by evidence emerging from three very different case studies. The studies are, indemnity-based private market products for property insurance (South Africa). In this study, the municipality and the insurer share data and collaborate to address flood risk. The other is the advisory-service focused on infrastructure and property risks but without direct insurance transactions carried in (Tanzania). In this case, the engagement between industry and government started with risk assessment and sharing information, rather than focusing on potential products. Finally, a combination of product and advisory in the context of parametric drought insurance linked to donor-funded data and analytics provision done in (Malawi), where the African Risk Capacity has provided

drought insurance to the Government of Malawi. These three cases illustrate very different contexts but all three need to be seen against the backdrop of very low insurance penetration in Africa: 0.8%, compared to Asia's average of 1.8%, Europe's 2.7% and North America's 4.1% (Deloitte, 2019; see also Swiss Re's Sigma Explorer 2021). Particularly in countries with no existing or nascent insurance markets closing the data and analytics gap can be seen as an important enabling condition for insurance market development while also helping to build risk management and planning capacity prior to any product-focused transactional activities. However, as our analysis shows, that ambition can face many challenges that go beyond availability and suitability of data: limited trust, unclear risk ownership or lack of incentives can provide key barriers, even if there is risk-awareness and overall motivation to manage climate risks. All three cases also show the importance of sustained cross-sectoral collaboration and capacity building to increase awareness and utilization of insurance-related climate risk information. Appropriate incentive structures are essential for the translation process of climate risk information. This applies to both insurers and governments, particularly in the context of climate change and risk information about future risks: The motivation to invest in and consider future information tends to be low on both sides. It is therefore important not to simply assume that insurers themselves use future risk information for strategic planning. Capacity building is essential on all sides to achieve this transformation towards better adaptation. This includes technical areas such as in the operation of GIS technology, but also for decision-makers and planners, who need to see demonstrated benefits of anticipatory planning to justify taking action today.

NB: This is a shorter version of a working paper from Surminsk, S. Barnes, J. and Vincent, K. : <https://www.lse.ac.uk/granthaminstitute/publication/insurance-as-a-catalyst-for-using-climate-risk-information-for-government-planning-and-decision-making>

## **Key question**

What forms of research partnerships are required to achieve these transformations? How best should the UK engage East African researchers and policy makers in pursuing these transformative opportunities? How has COVID-19 and the resultant shifts in UK funding affected adaptation research in East Africa?

## **Key highlights**

- a. The analysis offers a new perspective on the catalyst role of insurance by focusing on underpinning political economy factors, particularly incentives and relationships that influence the catalysing process for three case studies: Malawi, Tanzania and South Africa.
- b. Insurers produce information that can support adaptation to climate change in Africa if accessible and usable.
- c. Perverse incentives and lack of risk ownership can discourage wider use of risk information.
- d. Capacity-building for government stakeholders is needed to increase awareness of the benefits and uses of climate risk information.

## 8. Integrating the Grey, Green, and Blue in Cities: The Missing Puzzle for Climate Change Adaptation in East Africa

**Author: Martial Amou**



Contact: [martial.amou@yahoo.com](mailto:martial.amou@yahoo.com); Institute of Environment and Sustainable Development in Agriculture, CAAS, Beijing, China



This blog is based on a study conducted on climate change adaptation pathways within the development corridors in Kenya, typically across the standard gauge railway (SGR) corridor. It is also part of the Development Corridors Partnership (DCP) project of UNEP-WCMC. It is written with the intention of raising awareness among investors, policymakers and communities on the importance of Nature-based Solutions in climate change adaptation and disaster risk reduction in Kenya.

The most common natural disasters in Kenya are climate related particularly floods and droughts. Floods are generally associated with higher damage to public infrastructure assets, while the burden of drought falls more heavily on rural assets. Moreover, all future projections converge onto worst climate hazards. As the Government of Kenya is moving toward its development vision 2030, ambitious mega-infrastructure projects are

going on all over the country, especially across the SGR and the LAPSSET development corridors. **Are those new infrastructures designed to deliver sustainability?**

Most part of the planned and ongoing development projects in Kenya, including efforts to address climate change in urban areas have focused on gray engineering solutions. However, gray solutions alone have shown limit in the face of extreme climate events in developed countries and are increasingly doomed to fail in addressing 21st century challenges. In fact, old infrastructure principles conceived in the last century, in which biophysical systems are largely ignored or only considered for aesthetics and recreational purposes, are no longer enough to meet the current and future challenges. Therefore, there is need to turn to a new generation of sustainable infrastructure.

Adaptation is not a separate action from development; it must be embedded in all planned activities by taking into account climate risks specific context. Similarly, Nature-based Solutions should be seen as an integral part of adaptation policy as they strengthen resilience in the face of natural disasters such as floods, drought, landslides, heat waves, etc. Blue and Green make Grey works better, and offer the opportunity to address several issues at once, including climate change and biodiversity loss.

In terms of practical actions, a range of activities could be initiated as adaptation to climate change and as counter balance to negative impacts of development projects that remain after all preventive and corrective measures. For example, an eco-corridor using Blue-Green infrastructures (wetlands, forest, greenbelt, bio-swales, river restoration, etc.) can be designed as ecological compensation along or around the SGR corridor to build resilience against flood risk while restoring ecosystems and biodiversity. In this regard, the establishment of ecological compensation both in legislation and in voluntary commitments by companies, central and local authorities is highly recommended.

Development infrastructures should no longer drive away nature but should make the latter an ally. The successful pilot project of "sponge cities" in China, which refers to a package of gray, blue and green technologies systematically connected to each other to deliver a resilient city, could serve as inspiration for decision-making in Kenya.

### **Key Question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to the gaps?

### Key Highlights

- a. Blue
- b. Green
- c. Gray
- d. Adaptation

## 9. Redesigning Prosperity through Transdisciplinary Research

**Author: Henrietta Moore – Institute for Global Prosperity, UCL**



Contact: [igpdirector@ucl.ac.uk](mailto:igpdirector@ucl.ac.uk)

### **Redesigning Prosperity through Transdisciplinary Research**

The [Institute for Global Prosperity](#) (IGP) is redesigning prosperity for the 21st century. Over the past six years, IGP has been conceptualising and operationalising prosperity as a context-specific practice through the creation of localised [Prosperity Indexes](#), paying particular attention to the importance of co-design and deliberative democracy as imperatives for building sustainable prosperity in inclusive ways. IGP is committed to building mechanisms for whole systems change through participatory research and collaboration, working closely with citizen social scientists and building novel collaborations such as the [FastForward 2030](#) network of entrepreneurs and the [African Assembly's](#) network of academics, businesses, policy makers and leadership partners.

This kind of radical form of transdisciplinary research– the involvement of citizens, businesses and communities in research design is paramount for tackling the impending threat of climate and biodiversity emergency. The complexity of socio-ecological systems and adaptation strategies demands dynamic research programmes that are sensitive to the specifics of people and place. An approach of this kind is particularly relevant for research across the African continent. Current imbalances in research structures mean that decision making processes, curation,

analysis and dissemination of results are all too often led by host institutes in the global north that remain disconnected from the lived realities of everyday people that they are trying to assist. Knowledge about the intertwined climate and biodiversity emergencies resides asymmetrically with scientific, government and international organisations, leaving local communities politically disengaged and disempowered. This can lead to a failure for externally crafted research activities exploring systems transformation to have any genuine impact on the ground. Alternative frameworks are thus needed that prioritise innovative whole systems thinking and bold research projects that emerge from criteria set by local communities themselves rather than externally designed.

IGP's [PROCOL Kenya](#) initiative has been involved in a number of projects of this kind that aim to foster dynamic collaborations for building social and ecological prosperity across the African continent by working with trained teams of citizen scientists to help co-design and identify key research questions and undertake primary data collection. [Ongoing work in Elgeyo-Marakwet County](#), north-western Kenya, is an example of this kind of work. Decades of development schemes in the region aiming to improve livelihoods have prioritised economic growth and agricultural output. Whilst these policies may well have increased productivity of the region, they have also given rise to a range of interconnected and unforeseen problems. The surge of potato cash cropping in the highland forests, for example, has led to increased deforestation, reduced water retention of the forest ecosystem and increased soil erosion and landslides. Increased fertiliser run off is contaminating water sources, posing a serious health risk for thousands of people downstream. With these forests acting as one of [Kenya's water towers](#), these issues are of national significance.

In attempting to address issues of food insecurity, expert led development initiatives have not meaningfully engaged with local knowledge, practice, hopes and aspirations. They have failed to understand the deep connection between identity, community practice and place, resulting in

the erosion of indigenous lifeways, agronomic resiliency and ecosystem services. The implications of this are far reaching, disproportionately affecting those who are furthest removed from the decision-making processes.



Agricultural Landscapes in Elgeyo-Marakwet, Kenya  
*Lunn-Rockliffe, S*

*Photo:*

In contrast to these approaches, PROCOL Kenya's work focusses on localised knowledge creation and strategy implementation, beginning with the specifics of location and recognising that the aspirations, values, practices, and systems that shape understandings of social and ecological wellbeing will differ according to context. Our emphasis is therefore on three interlinked concepts: (1) Informed localised agency (working with and through local communities and visionary entrepreneurs to design pathways to future prosperity); (2) Plurality and complexity (progress is not linear, prosperity is not 'one size fits all'; (3) Multiple systems, scales and actors (prosperity results from complex interactions between different actors/systems, including local and national government, business, education systems, health services, social capital, inward investment, individuals, civil society, and community engagements).

Through these processes, we are building citizen led Prosperity Indexes that more readily allow local authorities to monitor progress in their communities towards livelihood prosperity and ecosystem and biodiversity restitution. Effective climate adaptation and transformation strategies will only be successful if we acknowledge that the essential knowledge, skills and abilities needed to transform the present for the future lie within local communities, and that these communities must be re-centred as the primary agents for change.

### **Key Question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And, why are these considered transformative i.e. what is considered transformative in the African context?

### **Key Highlight**

- a. Prosperity
- b. Transdisciplinary
- c. Participation
- d. Community

## 10. KENAFF Climate Change Adaptation Initiatives, Outcomes, and Experiences

**Author: Daniel M'Mailutha - Kenya National Farmers' Federation (KENAFF)**



Contact: [farmers@kenaff.org](mailto:farmers@kenaff.org)

Climate change is intensifying food and nutrition insecurity and threatening the livelihoods of vulnerable farmers in Kenya. Millions of smallholder farm families bear the existential threats posed by climate change owing to their susceptibility to its impacts.

The Kenya National Farmers' Federation (KENAFF), the apex umbrella farmers' organization and "Farmers Voice" in Kenya that represents, articulates, protects and promotes the interests of over 2 million farmers in the country opines, that creating sustainable initiatives and building resilient adaptation actions is vital to sustaining the livelihoods of the millions of small-scale agricultural producers and the billions more, who rely on the food they produce. In fulfilling her core mandate of lobby and advocacy, policy action, farmer empowerment, and targeted capacity building, the federation is working to: promote the integration of local perspectives in research and innovation agendas; catalyze investment in innovative digital technologies that empower and support food producers; and advance transformative approaches to adaptation in the most vulnerable places.

Adaptation to climate change in Kenya and East Africa at large is predominantly perceived as a technical problem that requires majorly engineering and technological solutions. The gap emanating from current adaptation research and policy are embedded in the dearth of a clear understanding of the interaction between the government policies, society, and nature in adaptation decisions and implementation; an apprehension that is important to unpack the invention of transformative adaptation. This is inclusive of local voices, based on learning from experiences, experimentation, and collaboration among actors. Another missing link in the research gap is in the knowledge systems that could facilitate the adaptation of technical innovations into region-specific conditions to build responsive technological innovations that align to diverse and dynamic contexts. Interdisciplinary adaptation research that would combine perspectives of different disciplines to better inform the development of adaptation strategies responsive to variable climatic changes.

KENAFF proposes a comprehensive action package to adaptation that entails the implementation of complementary practices: ecosystem-based adaptations; hybrid options; and building solutions that include measures that target behavior change, institutions and policy frameworks, as well as market-based solutions. As part of her commitment to promoting sector stakeholders' cohesiveness in dispensing progressive uptake of agricultural innovations for enhanced socio-economic status of the farmers, KENAFF targets the realization of climate-resilient agriculture

through advancing transformative adaptation research. The federation is cognizant of the Kenyan farmers' lack of resilience to impacts of climate change anticipated between now and 2050, and that failure to act on these changes could result in catastrophic food and nutrition insecurity for millions of people. In climate change hotspots, for instance, transformative adaptation research is vital, given that incremental adaptation measures are expected to be increasingly insufficient to avert losses and damages within farming communities.

KENAFF endeavors to leverage government, researchers, and funders to begin planning to shift where specific types of crops and livestock are produced; align agricultural production with changing landscapes and ecosystems; introduce innovative production methods and technologies to promote long-term resilience. The federation is determined to continue strengthening a community of adaptation thinkers and actors that recognize the need for radical shifts in agri-food systems. Moreover, the federation is continually devoted to mobilizing innovative finance models that support sustainable, equitable agri-food transitions for climate resilience.

Key amongst the federation's strategies to bolster adaptation to climate change is through the promotion of establishment and sustainable management of farm forestry. KENAFF is implementing a climate change

**OPLE DAILY / Tuesday, April 20, 2021**

### **BRIEFLY**

#### **Initiative to plant 50 billion trees**

The Kenya National Farmers Federation has announced an ambitious 10-year plan for a 'green initiative' to tackle climate change with planting 50 billion trees across the country. Organisation aims at complementing the government's effort to increase forest cover in a bid to reduce the country's atmospheric carbon dioxide, a global warming greenhouse gas by 2030. Chief Executive Daniel Mwendah noted that they intend to work with all farmers throughout the country to begin the planting exercise. Speaking in Rongai in Nakuru at the weekend, Mwendah said involvement of farmers through awareness programmes will be a huge contributor to tree planting and conservation of the environment.

– Roy Lumbe

adaptation and mitigation initiative - the KENAFF Farm Forestry and Afforestation Initiative, which aims to conserve agrobiodiversity and re-forest degraded lands to slow down the impacts of climate change globally over the next 10 years (2021 – 2030) and in perpetuity.

The initiative also intends to preserve soils and water locally; educate smallholder farmers, women, and the youth on the importance of planting trees for improved nutrition thereby reduce food and nutrition insecurity, and poverty in the country.

The KENAFF National Tree Planting Week is twice every year: the first week of April for March, April, and May; and the second week of October for the October, November, and December rainfall seasons.

*KENAFF National Tree Planting Week during the week of March, April, and May rains.*



KENAFF iterates that the only pathway to achieve and exceed this target and indeed, protect natural capital and combat climate change runs through farmers. This helps in maintaining a compulsory farm tree cover of at least 10 percent of any agricultural landholding thus; conserving water, soil and biodiversity; protecting riverbanks, shorelines, riparian and wetland areas; ensuring sustainable production of wood, providing fruits and fodder; and carbon sequestration besides other environmental services.



*KENAFF Farm Forestry and Afforestation Initiative Tree Planting session with farmers; to grow and nurture trees in order to cope with climate change.*

The Initiative is progressively enhancing the resilience of agricultural systems and building the capacity of farmers to adapt to climate change. Through the initiative, local communities are provided with a sustainable supply of wood; the livelihoods of

smallholder farmers, women, and the youth are improved through the sale of tree seedlings and tree products to enable them to cope with the effects of climate change

KENAFF is also implementing a capacity building programme that promotes improved land management using Intensive Silvopastoral System (ISPS) approach that combines fodder shrubs planted at high densities, intercropped with highly productive pastures and timber and or fruit trees planted in East-West lines to minimize shading; to strengthen the capacity and resilience of family farmers; recover degraded pastures;

increase livestock productivity; improve the environment, and build resilience to climate change in the climate hotspots in Kenya.



*KENAFF Programme Officer introductory meeting with farmers on the Silvopastoral system approach in Elgeyo Marakwet County.*

The aforementioned initiatives inform future adaptation actions as part of the efforts to meet the ongoing restoration activities that constitute the efforts to meet Goal 15, “Life on

Land” under the global Sustainable Development Goals (SDGs) aimed at promoting the sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, halting and reversing land degradation and biodiversity loss. The initiatives further feed into Kenya’s aim to restore 5.1 million hectares of land by 2030 under the African Forest Landscape Restoration Initiative (AFRI100), which fuels the Bonn Challenge; an international commitment by countries to restore 350 million hectares of the world’s deforested and degraded land by 2030.

### **Key question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in the African context?

### **Key highlight**

- a. KENAFF climate adaptation initiatives
- b. Outcomes of KENAFF climate adaptation initiatives
- c. Climate adaptation research gaps that need to be addressed
- d. Cutting edge experiences

## 11. Urban water resilience in African cities requires a new approach built on bold leadership and partnerships

**Author: Gina Ziervogel - Associate Professor, Department of Environmental and Geographical Science, University of Cape Town**



Contact: [ginazee@gmail.com](mailto:ginazee@gmail.com)

Cities around the world are experiencing increasing pressure on their water resources. This is driven by many factors; in part by urbanization and growing cities, in part by upward mobility of households using more water, or businesses and agriculture needing it and in part by climate variability and change. Hotter dry seasons, the late arrival of rains and consequent droughts have impacted countries such as Zimbabwe, Ethiopia, Kenya and Somalia in recent years. Increasingly flooding is also impacting cities, driven by high intensity rainfall events along with surface hardening and poor drainage, although momentum on nature-based solutions is growing to address this.

As a citizen of Cape Town, I lived through an extreme climate event where low rainfall for three years in a row [brought the city to its knees](#). Admittedly, as in most cases, this was partly because of a climate shock and partly because of the governance of water and how it was managed. However, climate extremes are putting increased pressure on city water resources, demanding better governance and management of urban water.

Emerging from the Cape Town drought, a new [City water plan](#) was developed and I could see how the understanding of the complexity of the urban water system shifted both for City officials and for citizens. I would say that before the drought, many City officials saw water management as something engineers could manage through dams and pipes. Emerging

from the drought this has shifted to appreciate the importance of understanding the role of the ecosystem and catchment, understanding the extreme economic and social impact a drought can have and better appreciating the importance of governance, finance, communication and partnerships in reducing the impact of an extreme event like this. We do not want it to take a large shock event for other African cities to realize this.

Because water is so directly linked to climate, it is a matter of utmost importance for COP27, as is the urban focus where so many people live and resources are concentrated. Africa is particularly vulnerable to urban water stress because of the high levels of inequality, challenges with governance and infrastructure and growing climate impacts. Significant transformations are needed to view the water system in a more holistic light, to bring in more diverse players to finding innovative solutions and funding and to implement action in a collaborative sustainable way. Cities have not done enough to meet the water needs of poor and marginal groups. This challenge is only going to grow and will need a concerted effort to shift.

The World Resources Institute (WRI) has been engaged in a process to support Urban Water Resilience in African Cities. As part of this, they wrote a comprehensive report, [Water Resilience in a Changing Urban Context: Africa's Challenge and Pathways for Action](#), which highlights the ways in which African cities understand, plan, govern and finance their water systems and how this could change. It is clear that this needs to be a team effort and bring different actors, agendas, coalitions and funders together. In support of this, WRI has been working with [Reos partners](#) to convene stakeholders around this issue, through interviews, stakeholder workshops, developing further supporting documentation and sharing this work at COP27. I have been part of the REOS team.

## **Insights for a regional water resilience agenda**

Through the interviews, a number of interesting points have emerged. First, there is no consensus about resilience and its meaning in the context of urban water. Resilience is a word used to mean so many things these days. Taking time to find out what it might mean to different groups is important. And in fact, this is part of the transformative approach, where voice is given to more groups than before. Some interviewees think that urban water resilience would be strengthened through more robust infrastructure or nature-based solutions whilst others see water resilience as an approach that carefully considers the priorities for different users. Building on these diverse perspectives, new ways of working can emerge that are hopefully better suited to the scale of the problem at hand.

African stakeholders have expressed concern about issues of integrity, corruption and politics that currently undermine progress in this area. One interviewee felt that donor programmes tend to be so focused on specific technical interventions that they do not sufficiently understand the broader context in which the intervention sits which risks undermining the success. For example, a donor might invest heavily in sanitation technology without considering the cultural fit to the local context. This is familiar to those working in climate adaptation, where many of us have been thinking hard about the process of engaging different actors in planning and implementation. Little progress will be made on climate adaptation if technical solutions do not deliberately integrate cultural, political and economic considerations.

Another point that emerged is the importance of working across sectors. Water departments cannot implement urban water resilience alone. Rather, there needs to be an approach that considers how water is intricately linked to planning, energy, agriculture, waste and finance, among others. This requires bold leadership to support a more integrated approach. It requires appealing to actors in different sectors to get involved in planning and implementing a new urban water approach. It requires appealing to citizens, NGOs, and businesses that they need to be

part of an integrated approach. African cities have high levels of informality, often seen as a barrier, but within this context innovation and experimentation is happening. Businesses are emerging around water supply, groups are experimenting with how to treat and clean dirty water in poorly serviced areas. New alliances need to be part of the solution to meet the scale of the challenge.

Change at scale on urban water resilience in Africa is going to take strong leadership, collaboration, funding and time to think creatively. A regional agenda on urban water resilience, that brings together ideas and actors across cities, sectors and regions, could help support this.

### **Key Question**

What forms of research partnerships are required to achieve these transformations? How best should the UK engage East African researchers and policy makers in pursuing these transformative opportunities? How has COVID-19 and the resultant shifts in UK funding affected adaptation research in East Africa?

### **Key Highlight**

- a. African cities are experiencing high levels of water-related stress that will increase with climate change and reduce the wellbeing of citizens and the economy
- b. Achieving urban water resilience in African cities needs a significant shift towards a more integrated approach that works across sectors and scales
- c. Practitioners, officials and funders are not collaborating sufficiently across sectors and themes resulting in a dis-jointed approach to urban water resilience
- d. A regional agenda on urban water resilience in Africa could help to pull together ideas and actors across cities, sectors and regions, to build a stronger integrated response.

## 12. Can you harvest the sun twice? Linking food and energy production to bolster climate change resilience in Kenya

**Author: Christine Lamanna - World Agroforestry (ICRAF)**



Contact: [c.lamanna@cgiar.org](mailto:c.lamanna@cgiar.org)



(Banner/header image): Photo: Chloride Exide Ltd.

In Kajiado County, just south of Kenya's capital Nairobi, [Latia Agribusiness Solutions](#) trains students and small farmers in sustainable, profitable agricultural practices, while producing high quality vegetables for local

markets. But growing vegetables in a semi-arid area is not always easy, and it is getting harder as the impacts of climate change bring increasingly erratic rainfall, frequent dry spells, and drought to the region. Growing crops in these increasingly challenging conditions means ever greater reliance on drip irrigation, run by power-hungry pumps, to keep crops alive.

“Our main challenge is keeping the crops well-watered,” says farm manager Carol Mutindi. “Because we rely on pumps for our irrigation system, electricity is one of our biggest expenses.” In addition to using electricity (and back up diesel generators to weather the frequent blackouts and power cuts) for running their water pumps, Latia also uses electricity for cold storage of dairy and produce, as well as to power their training and educational facilities.

Solar panels offer an attractive, clean and reliable alternative, but there are a few drawbacks. One is the large upfront costs of the panels and infrastructure needed to support and run them. Second, with almost the entire farm’s land devoted to crop production, where were they going to put enough solar panels to power the farm?

But there could be a solution to this challenge: a new approach to solar power is being developed. Instead of mounting solar panels on the ground, as is typically done for mini-grids or solar irrigation systems, in a so-called “agrivoltaics” system, solar panels are raised up above farmland. They are high enough and spaced far enough apart to let sunlight reach the crops below, and can theoretically provide both clean energy *and* food on the same land. The benefits do not stop there. By adding a guttering system to the solar panels that runs into a water storage tank, rainwater run-off can be stored for use during periods of drought. The technology provides a triple benefit: improving food, energy, and water security simultaneously.

“In hot, dry climates, growing crops in the shade of solar panels actually retains precious soil moisture and increases the yield of many crops,

including tomatoes, herbs, and others,” says Dr. Greg Barron-Gafford, a Professor in the School of Geography, Development and Environment at the University of Arizona, and lead author of a [recent study on agrivoltaics](#). “What we also found was that the solar panels with crops planted underneath actually produced more energy, more efficiently than panels mounted on the ground, thanks to the evapotranspiration and cooling effect of the plants underneath.”

Could agrivoltaics be the solution that Latia is looking for? To answer that question required a test system to be built at Latia farm and the impacts on water and energy use, and on crop production, to be measured – would this system deliver the “triple win” of improved water, energy and food security, or would there be a “lose-lose” of expensive solar panels and shaded crops growing more slowly? With some funding from the UK Economic and Social Research Council and UK Aid through the Global Challenges Research Fund, an international, interdisciplinary team of researchers, farmers, and energy developers is trying to assess the feasibility of agrivoltaic systems. They are working together to assess the social acceptability, useability and planning of the technology, alongside construction challenges, optimal crop growing strategies, and an analysis of the impact of the technology of agricultural productivity.

Through a co-designed research approach, researchers put local knowledge at the heart of the agrivoltaic system. The farmers at Latia decided which crops to grow, while the agrivoltaics researchers worked with the local solar developer to design and build the structure. On 19 April 2021, ground was broken on the first agrivoltaics system in Africa, and the system has been in full operation since June 2021.



*The Chloride Exide team installs solar panels 3m above the ground on custom-designed scaffolding at Latia Farms, Insinya, Kenya. Photo: C. Lamanna (ICRAF).*

Four crops (cabbage, lettuce, tomato and eggplant) were planted both under the agrivoltaics panels and in a full-sun control plot nearby, to compare the yield, water use, and energy production in agrivoltaics versus conventional farming. Although it is too soon to know what the difference in yield between the two plots will be, some things are already apparent. While the cabbage, lettuce and tomatoes are all growing well in the agrivoltaics plot, the eggplants are struggling to grow in the shadier conditions. Another difference is also apparent: water usage. The AV plot has so far used 40% less water than the full sun plot, meaning a savings of both water and electricity for running the irrigation system.



*Crops growing in the control (full sun) plot will be compared to the crops growing in the agrivoltaics plot for growth, water use, pest damage, yield and quality. Photo: C.Lamanna (ICRAF).*

“In the first two months, we have already seen a reduction in our electricity bills by over 50%,” says Latia Managing Director Charles Macharia. “As we move out of the cold and cloudy season and connect more of our operations to the agrivoltaics system, we expect to see further reductions in our costs.”



*Latia Managing Director Charles Macharia showing the agrivoltaics system. Photo: C.Lamanna (ICRAF)*

Over the coming months, the farmers and researchers will continue taking data on the crop yields, water consumption and energy produced by the agrivoltaics systems to see whether combining agriculture and solar panels can be good for both business and the environment. The “short rains” due to begin in October are predicted to be [warmer and drier than usual](#), exacerbating the already [existing drought conditions](#) in much of Kenya. This season could be a critical test of whether agrivoltaics can increase yields of crops and reduce demand for dwindling water supplies in the face of increasingly frequent dry spells brought about by climate change, all while putting clean solar energy in reach for businesses like Latia.

NB: [Harvesting the Sun Twice](#) is a research project led by the University of Sheffield in collaboration with the University of York, Teesside University, [World Agroforestry \(ICRAF\)](#), [Stockholm Environment Institute](#), the [African Centre for Technology Studies](#), and the [Centre for Research in Energy and Energy Conservation](#). The project is funded by the UKRI's Global Challenges Research Fund and the University of Sheffield.

### **Key Question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to these gaps?

### 13. Mitigating Climate Change in Ghana: The Place of Local Knowledge and Relevant Adaptation Models

**Authors: Georgina Y. Oduro, Emmanuel Acheampong, John W. Ansah and Benjamin K. Nyarko - University of Cape Coast, Cape Coast, Ghana.**

This blog explores how the One Ocean Hub is harnessing international collaborative effort towards (i) strengthening transdisciplinary and interdisciplinary research capacity in West African sub region, and (ii) generating new knowledge to support sustainable management and utilization of natural resources, especially in an era of climate change. Using Ghana as a case study, this blogpost explores how communities and stakeholders in fisheries sector seek to improve climate change resilience, mitigation and adaptation strategies.

The blogpost draws on Emmanuel Acheampong's presentation on the development of relevant adaptation model for sustainable fishing, and Georgina Oduro's joint presentation with John Ansah on the benefits and cautions around adaptation measures employed through the voices of marginalised community members in a village in the Volta Region of Ghana, ([One Ocean Hub, 27 September 2021](#)). The blog highlights the effects of climate change on fishers, women, and children with particular attention to their vulnerabilities, the various levels of destruction they have experienced and the corresponding resilience measures adopted by them at different levels of governance for survival. Continuous sea rise and associated effects on fishers in Ghana and the West African sub-region have led to the adaptation of varying fishing practices and fishing gears and techniques. Our studies show that there has been an increase in fishing effort, migration, modification of fishing gears and techniques and the use of supplementary fishing strategies to reduce difficulties associated with fishing due to climate change. In addition, West African Mangrove Oyster farming can be cited as a sector, which employs many women and children in Ghana and some West African countries.

At community level, climate change has resulted in wiping away villages and communities' infrastructures including schools, homes and kitchens. This has gendered consequence of depriving women and children of their learning, cooking and sleeping places. In addition, community members reported the fear of being washed away into the ocean while they sleep. The destruction further reflected in fishers having their nets tear apart and with others catching debris from damaged buildings rather than fish when they go fishing, thereby depriving them of their livelihoods and spoiling their fishing gears as reflected in these voices of community members below:

- *"Hmmm, now when we cast our net, it catches broken bricks and blocks instead of fish. While we do not get fish, it also spoils our nets" (Fisherman, 47 years).*
- *"You saw the school, sometimes the children will be in school and the waves will enter, wet their books and destroy everything, ... so those who have the means have relocated with their children for a better education and future" (Mother, 50 years, fish processor)*

Community members identified that the deadly effect of climate change was not limited to only physical destruction, but also negatively impacted their heritage, belief systems and religion. From our study within a community from Ghana's Volta Region, one inhabitant expressed how cemeteries had been washed away. A circumstance that forced some community members to exhume the bodies of their relatives for reburial.

*"Have you seen all our cemeteries broken, now when our children grow, how can we show them the tombs of their grandparents? Some of us have exhumed their bones for reburial" (Community leader, Male, 68 years.)*

The picture below illustrates how climate change has destroyed cemeteries:



Figure 1: Destroyed cemetery at the Study Community

In managing the situation, community members had enacted various resilience and adaptation mechanisms at the individual, community, non-governmental organizational (NGO)/CSO and state levels for their



survival. For instance, some members had relocated to higher grounds and other towns/villages. In contrast, others operated a micro-finance system known as 'susu scheme' where they contribute monies to support or cushion themselves in extreme cases of sea rise that make fishing impossible. Community members also reported getting some relief items from the state and bodies such as the National Disaster Management Organization (NADMO), their Member of Parliament (MP) and other support systems. They however called for permanent solution in the form of sea defence along their coast among other adaptation mechanisms. The pictures below show some of the mitigation strategies enacted to control the problem.

Thus, the establishment of Marine Protected Areas (MPAs), the introduction of 'Closed Seasons' – a system where the ocean is closed to fishing for about a month between the months of June and August annually in Ghana to allow the fishes to sponge. Additionally, there is a rise in the introduction of aquaculture and other fish farming practices all aimed at cushioning fishers and marginalised coastal communities against the harsh effect of climate change.

We conclude this blogpost by highlighting that [Ghana's marine fish stocks are currently over-exploited](#) and on the verge of collapse. Global climate change is expected to worsen this dire situation if priority coping strategies are not employed. Projections suggest that the [impact of climate change will reduce Ghana's fish catches by 42 – 55%](#) by the end of the next 3 decades. The country is also expected to experience [as much as one meter of sea-level rise](#), about 10% higher than the global average, by the end of this century. This will exacerbate the [intrusion of seawater into coastal communities](#) and [wetlands](#) (e.g. mangroves, salt marshes) with devastating consequences for the availability of suitable habitats and breeding grounds for [sardine](#), shell fish such as the [West Africa mangrove oyster](#) and other species exploited by Ghana's small-scale, artisanal fishermen and women. In this regard, we join the global community to caution Ghana through the One Ocean Hub research project on the need to give more attention to vulnerable coastal communities and their need for protection in terms of their livelihoods and infrastructure. They need storm shields, relocation to safer sites and the enacting of both pre and post resilience mechanisms whilst disengaging the issue from politics for effective mitigation strategies. This blog has given us insight into the science-policy synergy as well as the transformative power of inter and transdisciplinary research. It also draws attention to the "benefits and cautions" needed from multiple stakeholders in managing the devastating effect of climate change on fishers and local communities since it is a human right issue. As argued by Golo and Eshun, 'People are not to be deprived of their means of subsistence even in the face of weather and

anthropogenic climate effects, thereby ensuring the rights of millions of people to their subsistence and livelihoods' (International human rights law, in Golo & Eshun, 2018:1).

### **Key question**

What forms of research partnerships are required to achieve these transformations? How best should the UK engage West African researchers and policy makers in pursuing these transformative opportunities? How has COVID-19 and the resultant shifts in UK funding affected adaptation research in West Africa?

### **Key four highlights**

1. Lessons on research partnerships as mitigating strategies
2. Place of local knowledge and community voices in resilience and mitigation strategies
3. Synergy between science and policy partnerships
4. Examples from West Africa using Ghana as a case study

## 14. Healthcare systems and flooding: connecting data silos to understand the impacts

### Authors

**Dr. Mawuli Dzodzomenyo<sup>1</sup> -  
Ghana School of Public Health,  
University of Ghana**



**Prof. Jim Wright<sup>2</sup> - University of  
Southampton**



Contact: [j.a.wright@soton.ac.uk](mailto:j.a.wright@soton.ac.uk) <sup>1</sup>Figures from the United Nations Office for Humanitarian Affairs suggest that the number of East Africa inhabitants affected by seasonal flooding has risen from 1.1 million in 2016 to nearly six million in 2020. In part, this reflects sea surface temperature changes in the Indian Ocean. To support regional governments in adapting to this change, there is an urgent need to make creative use of any robust data available that could inform adaptation efforts.

In recent years, there has been a significant scientific effort to develop two major global data systems of relevance to growing flood risk in the region. One data system concerns the spatial extent of flooding, as detected through satellite systems. Since 2011, NASA funding has enabled the fully automated processing of data from the MODIS satellite sensor, enabling the mapping of major flood events in near real-time globally. The resultant data, called the MODIS flood product, is freely available for download (<https://floodmap.modaps.eosdis.nasa.gov/>). Rapid advances in the earth observation sector have enabled further satellite-based systems for flood detection. In particular, the European Space Agency's investment in the Sentinel-1 and Sentinel-2 systems hold considerable promise for flood

mapping. In large part, this is because Sentinel-1 is a radar-based system, unlike the MODIS sensor. Unlike optical systems such as MODIS, since radar can penetrate cloud, Sentinel-1 imagery has potential to advance further, flood mapping from space.

A second data system is known as the District Health Information Software or DHIS2 (<https://dhis2.org/>) for short. This system, developed by University of Oslo, enables the management of health facility records for those attending health facilities around the world. The system is now used not only in Ghana but also to 72 other low and middle-income countries, in total home to 2.4 billion people. Growing use of DHIS2 means that digital data on attendance at health facilities and diseases managed at these facilities is becoming much more widespread.

Led by Dr. Mawuli Dzodzomenyo via the UKRI-funded [Breccia project](#), colleagues at [Ghana School of Public Health](#) (University of Ghana), Ghana Health Services, and [University of Southampton](#) have been working on connecting together these two data systems – the picture of outpatient attendance and water-borne diarrhoeal disease at clinics from DHIS2 and the picture of flooding from the satellite imagery. In doing so, they have focused on two case study districts in the White Volta catchment in Northern Ghana. On a near-annual basis between August and October, many communities along the White Volta are subject to flooding. With changing rainfall patterns along the southern edge of the Sahel, flooding here is often exacerbated by overspill from the Bagre Dam in upstream Burkina Faso. In many years, the impact of this inundation results in damage to housing, livelihoods losses and crops, and human fatalities from the flooding.

The work on integrating the outpatient and satellite-based data streams is ongoing, but early results suggest that flood mapping from the Sentinel-1 system better predicts flood-related drop-off in outpatient attendance than the older but more established Modis-based system. Given that there is an active and thriving DHIS2 research community in East Africa, there would be scope to share the approach taken in Ghana with colleagues in

East Africa, to rapidly connect together these two data systems and share experience between West and East Africa.

### **Key Question**

What are the major adaptation research gaps in East Africa and what research is needed to respond to the adaptation these gaps?

### **Key highlights**

- Flooding is a growing threat to public health in East Africa. There has been rapid growth in satellite data systems that detect flooding worldwide and in systems for managing data at health facilities, particularly in East Africa. Connecting together these two data systems could inform adaptation strategy within the region.

## 15. Development Corridors

**Author: Robert Marchant - University of York**



Contact: [robert.marchant@york.ac.uk](mailto:robert.marchant@york.ac.uk)

There is an incredibly rapid building program of infrastructure across the Global South, from ports to roads, from railways to agricultural schemes. These so-called Development Corridors have the potential to boost economic growth, however they need also to protect the integrity of ecosystems, biodiversity, and respect the rights and livelihoods of communities: from the planning in the earliest stages, then throughout the implementation of the development activities. Negative impacts of poorly planned and implemented corridors include the loss of biodiversity, ecosystem integrity, livelihoods and less social cohesion. Poor design or implementation may also leave communities with greater vulnerability such as, the impacts of climate change. Such challenges can threaten the attainment of the broader social and economic goals of development corridors and result in missed opportunities.

### **What we do: Development Corridor Partnerships**

Development corridors have the potential to diversify and improve livelihood capitals by making trade, communications and services more efficient. They can also spread development opportunities to remote, poor and marginalised communities and regions, thus enabling countries to achieve better their priority Sustainable Development Goals by 2030. Partners from Tanzania, Kenya, China and the UK are coming together to build capacity, so that development corridor decision-making can be based on sound scientific evidence and effective use of planning tools and procedures.

To guarantee that development is sustainable in the long-term, we must anticipate changes in land use, ecosystem service provisioning, and livelihoods. This is a daunting task, particularly as we live in an uncertain world where social and environmental changes are unpredictable. In addition, stakeholders priorities are often conflicting, which means trade-offs need to be made in land management decisions (e.g. food vs. energy needs). One way to approach these challenges is to use participatory scenario planning to model different socio-economic, climatic and environmental futures, and changes in land use, at local, regional and national scales.

The partnership will undertake research on how development corridors and associated infrastructure developments are experienced by communities living near to them. We aim to identify what benefits and costs these processes bring at a local level, enabling us to provide research-based policy recommendations for decision makers in planning and delivering socially sustainable corridors.

### **Who is involved**

Partners from Tanzania, Kenya, China and the UK are coming together to improve the rigour, relevance and quality of interdisciplinary development corridor research and build capacity to plan and implement development corridors that maximise potential and minimise impact.

The Development Corridors Partnership project will run until March 2022 and the UK Research and Innovations Global Challenges Research Fund support it.

### **The Partnership is working together to build capacity to do the following-**

- Analyse the social and political dimensions of development corridors to understand the effectiveness of policies and practices, including decision making processes
- Identify positive and negative impacts of existing development corridors in Kenya and Tanzania and key issues in need of change

- Integrate climate change mitigation and adaptation strategies in development corridor processes to build resilience to the risks associated with climate change
- Ensure better use of tools within development corridor design and implementation – such as Strategic Environmental Assessments (SEAs), Environmental and Social Impact Assessments (ESIAs), and Environmental and Social Performance standards generally
- Improve development corridor land-use planning through natural capital and ecosystem services assessment and evaluation, and scenario analysis.

### **Key Questions**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in the African context?

### **Key Highlights**

- The Development Corridors Partnership assesses the streams of Chinese development in Africa and their role in supporting sustainable, inclusive and equitable development.
- The Development Corridors Partnership provides a more effective guidance on Environmental Impact Assessment and Strategic Environmental Assessments.
- The Development Corridors Partnership has given the community a voice in development procedures and hence greater empowerment
- The Development Corridors Partnership provides potential for further projects that are more climate resilient and sustainable.



The standard gauge railway (SGR) has now dissected Nairobi National Park (above) and resulted in greatly enhanced connectivity to Mombasa (below). The construction has not been without controversy both in terms of the route planned and in terms of the impacts on livelihood, biodiversity and natural resources.

## 16. Climate change adaptation requires urgent effective capacity building in Tanzania

**Author: Yinlong Xu**



Contact: [molly.brown@unep-wcmc.org](mailto:molly.brown@unep-wcmc.org)

<sup>1</sup>Chinese Academy of Agricultural Sciences, Development Corridors Partnership

<sup>2</sup>UN Environment Programme World Conservation Monitoring Centre

Climate change poses significant threats globally by creating new risks and amplifying existing vulnerability for society and the natural environment. The Chinese Academy of Agricultural Sciences (CAAS) as part of the Development Corridors Partnership (DCP), a research and capacity building project funded by the UKRI Global Challenges Research Fund, investigated how such risks can be effectively ameliorated through developing climate change adaptation strategies in an agricultural development corridor, the Southern Agricultural Growth Corridor of Tanzania (SAGCOT).



Figure 1 | Prof Yinlong Xu presenting an introduction to climate change adaptation research progress around the world with specific insights from China, US in Morogoro, Tanzania in 2019.

Attention has been paid specifically to better understand how to form a systematic adaptation action plan to promote adaptation actions in Tanzania with help of the adaptation methodology developed from Chinese agricultural adaptation practices (Xu *et al.*, 2014. *Studies on Critical Issues of Agricultural Adaptation to Climate Change in China*. 2014, Beijing, China Meteorological Press; Xu *et al.*, 2020. *Constructing Adaptation Technology System to Climate Change for Crop Production in China*. Beijing, China Agriculture Press). In SAGCOT, catastrophic extreme climatic events including severe floods and drought are more frequent, causing destruction of infrastructure, including widespread devastating impacts on agriculture, water, energy and livestock sectors, paralyzing socio-economic activities and development, which is recognized in Tanzania's Agriculture Climate Resilience Plan (2014-2019).

Tanzania has made progress in addressing adaptation priorities in various sectors by developing a series of adaptation strategies and plans such as the National Adaptation Programme of Action (NAPA) (2007), National Climate Change Strategy (NCCS 2012), and Tanzania's Agriculture Climate Resilience Plan (2014-2019). Moreover, research reports like the World Bank Group's Tanzania-(Intended) Nationally Determined Contribution (2016) have also contributed to Intended Nationally Determined Contributions (INDCs) submitted to the Secretariat of United Nations Framework Convention on Climate Change (UNFCCC) and current adaptation policy-making and actions. However, there is still a gap in scientific knowledge in these documents relative to the advances from international scientific communities. This limits these policies from developing coherent climate change adaptation strategies for effective implementation.

Tanzania now requires urgent support from the international arena of climate change adaptation expertise for effective climate change adaptation capacity building. The CAAS team propose the following recommendations based on ongoing climate change adaptation case study research in SAGCOT.

**First, a rigorous scientific understanding on climate change adaptation is needed in Tanzania, and more broadly in East Africa.**

The Intergovernmental Panel on Climate Change (IPCC), maintains the global standard for scientific knowledge on climate change adaptation, providing scientific understanding on climate change from impacts assessment to identification of key vulnerabilities and urgent risks, and then towards solutions of enhancing climate resilience with effective adaptation (IPCC, 2014). The IPCC's Fifth Assessment Report (AR5 WGII) provides 'Criteria for Identifying Key Vulnerabilities and Key Risks' for urgent and immediate adaptation needs in the face of climate change impacts. However, this was not sufficiently reflected at the country-level for adaptation actions in Tanzania. Whereas, it can be found more adequately applied in Kenya, for instance in the Ministry of Environment and Natural Resources' Determined Contribution Sector Analysis Report (2017). Adaptation has been mentioned in strategy and planning documents in Tanzania, such as the National Adaptation Plan of Action on Climate Change (NAPA, 2007), the National Climate Change Strategy (NCCS, 2012) and INDCs (2016). However, the descriptions of vulnerability and risk in the face of extreme climate events are still too general, and the concrete context for vulnerability and risk is lacking due to limited approaches that use inadequate and non-comprehensive datasets. We recommend that more robust, evidenced based scientific analysis that considers diverse future climate risks need to be sufficiently conducted in Tanzania's climate policy-making process to form the basis for better understanding climate change adaptation issues and the design of effective adaptation actions.

**Second, clearer pathways should be developed to realize climate change adaptation goals.**

Tanzania's pathways to effectively deliver adaptation goals require far more details to achieve the climate resilience levels required to reduce climate risks, which is highlighted in the IPCC AR5 WGII report. However, it is hard to clarify the clear linkage in Tanzania's climate change adaption policies between such climate risks and the identified

climate adaptation goals. For example, in NAPA (2007) and NCCS (2012), adaptation actions were frequently referenced in terms of reducing vulnerability without clarification about the linkages between current vulnerabilities and future risks. Therefore, it is not clear how to evaluate the effectiveness of the adopted adaptation measures to address the current climate vulnerabilities and future climate risks. Therefore, climate change adaptation pathways need to be clarified using robust scientific understanding of the congruent adaptation practices required to reduce the appropriate contextual climate vulnerabilities under multiple climate futures.



Figure 2 | Dr Kuo Li (CAAS) presenting insights on how to construct climate change adaptation technology systems for adaptation planning in SAGCOT held in Morogoro, Tanzania in 2019.

**Third, climate change adaptation measures should be tailored according to specific context.** In the IPCC AR5 WGII report, the adaptation actions were categorized as follows: reduction of exposure and vulnerability, incremental adaptation, transformational adaptation, and transformation. However, in the aforementioned policy documents, the majority of adaptation measures were concentrated only on the reduction of exposure and vulnerability, whilst incremental and transformational adaptation were seldom mentioned. Therefore, a significant need for

improving climate change adaptation in Tanzania relates specifically to strengthening the implementation of adaptation actions via more concrete contextual data to support transformative change for adaptation.

In summary, a feasible guideline based on a systematic adaptation methodology in the context of internationally advanced scientific understandings and Chinese working experience should be developed to help bridge the scientific gaps in Tanzania for effective climate change adaptation.



Figure 3 | In September 2019, members of the Development Corridors Partnership conducted a field visit to Harbin, Heilongjiang Province, northeast China to learn about approaches to climate change adaptation and capacity building.

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## Key Question

Evidence shows that East Africa is registering relatively low presence at the global UNFCCC climate action platforms such as the Global Climate Action Portal (see here: <https://climateaction.unfccc.int/>).

How can we best profile adaptation research and actions taking place in various African countries to the global scale? And what support is required to achieve this?

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**Four highlights** (*submission requirement*)

1. Tanzania's climate change adaptation policy requires rigorous improvement based on the current lack of robust scientific understanding grounding climate change adaptation policies.
2. Clearer pathways should be developed to realize climate change adaptation goals based on feasible guidelines grounded in systematic adaptation methodologies utilising internationally recognised best practice and scientific expertise.
3. Climate change adaptation measures should be tailored according to specific contexts and should have adequate capacity for effective implementation.
4. Improved capacity building approaches for climate change adaptation are required for effective adaptation actions.

## 17. Feature: Ecosystem-based flood risk management – A lasting solution to perennial flooding

**Authors: Priyanka Ukabhai<sup>1</sup>, Emma Baker<sup>1</sup>, Yoliswa Molefe<sup>1</sup>, Charlotte Scott<sup>1</sup>, Lisa McNamara<sup>1</sup>, Chris Gordon<sup>1,2</sup>, Sumetee Pahwa Gajjar<sup>3</sup>, Ana Polgar<sup>3</sup>, Alannah Hofemeier<sup>3</sup>, Hausner Wendo<sup>3</sup>**

1. *Climate Development Knowledge Network (CDKN), SouthSouthNorth (SSN)*
2. *Institute for Environment and Sanitation Studies (IESS), University of Ghana*
3. *PlanAdapt*

Urban floods are becoming more common due to increasing urbanisation, climate change, and poor urban planning. Supported by CDKN, five municipalities in Accra, Ghana, are working together with the University of Ghana to address flood risk, with a special focus on the use of Ecosystem-based Adaptation (EbA) approaches. A new report by PlanAdapt explores the findings from this work and lessons from four African cities.

### **Understanding flood management**

Flooding poses a significant threat to cities in the global South, due to a combination of factors including unplanned city extensions, prevalent poverty and low adaptive capacity. Depending on location, physical characteristics, and climate change risk, a number of flooding typologies can affect urban areas. Rapid urbanisation means cities have a reduced ability to learn from mistakes and build adaptive capacity. Nevertheless, there is a broad range of interventions and measures to reduce flood risk at different scales.

The capital city of Ghana, Accra, and its peri-urban areas, have always suffered from annual floods during the rainy seasons. Supported by CDKN,

five Accra municipalities are working together with the University of Ghana to address flood risk, with a special focus on the use of nature-based approaches. Over the last two years, local officials have met in two events and have had on-going engagements to learn from each other and coordinate their flood-management approaches. As part of this initiative to support Accra-based officials, CDKN supported a new report by PlanAdapt, who undertook a comparative study looking at four African cities and their approaches to flood risk, their use of Ecosystem-based Adaptation (EbA) and what lessons they hold for Accra and other cities.

Flooding is often considered the most devastating natural hazard to manage through disaster risk reduction (DRR) strategies. Integrated Flood Risk Management (IFRM) describes a broader approach, entailing a combination of structural as well as non-structural elements, which improves resilience to flood disasters. The report, *Ecosystem-based Flood Management: A comparative study report of Cape Town and Durban (South Africa), Nairobi and Mombasa (Kenya)*, compiled by PlanAdapt, highlights the use of IFRM approaches such as Ecosystem-based Adaptation (EbA) and Nature-based Solutions (NbS).

Ecosystem-based approaches aim to restore and enhance the natural dynamics of ecosystems to buffer the adverse impacts of climate change. Additionally, these approaches can provide many environmental, socioeconomic, and biodiversity benefits for flood risk management solutions. Ecosystem-based approaches such as restoration of rivers, mangroves and sand dunes, and protection of kelp beds and wetlands, have demonstrated wider benefits for communities through improvements to public health, the protection of livelihoods and creation of new income-generating opportunities.

### **Learning from South African and Kenyan cities**

The PlanAdapt report showcases good practices in flood management approaches by the cities of Cape Town, Durban, Nairobi and Mombasa. Overall, the report is an initial output aimed at fostering valuable exchange

and peer learning between Accra-based District and Municipal officials and cities in South Africa and Kenya. The report provides recommendations from lessons learned from the other countries and lays the groundwork for further peer learning in the future as part of potential CDKN activities.

While each city in South Africa and Kenya has its own political, social and cultural context, they find themselves facing similar challenges when it comes to flooding. In both cases, rapid urbanisation leads to an increase in impervious surfaces and areas with a lack of solid waste management or insufficient drainage systems. Informal settlements located in flood-prone areas are particularly affected. These challenges are exacerbated further by climate change impacts such as heavy rainfall and droughts.

Bearing these similarities in mind, it is useful to understand how each of the selected cities responds to its particular circumstances with a combination of structural (EbA and grey) and non-structural solutions. Collaborative modes of governance that embrace a whole-of-society perspective appear to be most effective.

### **An integrated approach**

Flood and water governance require the involvement of a wide range of stakeholders and institutions as well as intra- and cross-organisational collaboration, sometimes over a long period. For this reason, it is vital that practitioners and officials become informants to the process of knowledge production. The role of civil society organisations and NGOs in affected communities is also imperative, to understand flood management from a local perspective.

The report found that while South African cities have demonstrated maturity in their response to climate change across policy, planning and action frameworks, it is clear that the cities of Mombasa and Nairobi in Kenya are still in the process of climate proofing their urban planning, particularly for flood management.

The reason for Kenya's more nascent response to climate change impacts at the city level was expanded upon in interviews with Kenyan city officials. PlanAdapt found that strong traditional thinking and urban planning practices were prevalent, with a bias towards grey approaches to flood management. This traditional, grey infrastructure response to climate adaptation has tended to underestimate the value of learning and collaborations between city authorities and non-state actors – a key enabling aspect of mainstreaming NbS approaches in urban planning for both cities.

As seen in the case of South Africa, a strong guiding role of the national government may help local governments take ownership of translating national policies for EbA into local mandates on EbA, including DRR and climate protection. This being said, challenges remain for the local government to fully respond to flooding due to land ownership issues as some areas are beyond their mandate. This matter is complicated further since urban flooding is a localised event, but is experienced unequally by residents of cities, based on their location in a city. In most cases, research indicates that more exposed and vulnerable poor neighbourhoods, particularly in informal settlements, face greater impacts.

## **Conclusions**

Overall, this study found that cities in South Africa and Kenya face similar drivers that increase flood risk, especially for vulnerable communities. These drivers include urbanisation patterns, building on unsuitable land and greater climate variability. It also highlighted how local contexts and social network configurations play an important role in translating national policies to the local level.

Finally, it is clear that ecosystem- and community-based approaches offer a vehicle to address multiple challenges faced within informal settlements. Getting stakeholders on board, by identifying champions and communicating the co-benefits of EbA, through, for example, improved health has proved beneficial. Furthermore, incorporation of social

principles in the design and implementation of EbA for flood management is highly recommended, given the vulnerability of particular social groups to the impacts of climate-exacerbated urban floods.

## 18. Solar energy and biotechnology for women entrepreneurs in the mangroves areas of Ramsar site 1017 in Benin (SEWomen)

**Author: Elie Padonou - Laboratory of Applied Ecology, University of Abomey-Calavi**



Contact [padonouelie@gmail.com](mailto:padonouelie@gmail.com)

SEWomen is part of the support activities of the International Development Research Center for applied development research in West Africa. The project aims to create sustainable and environmentally friendly businesses for women by developing solar cooker technology for salt production and fish smoking as well as production and use of compost for market gardening. These activities constitute the main income-generating activities carried out by women in this region. These activities mainly use firewood and charcoal as energy source, with negative effects on women's income, their health and the environment. The project has a potential to save 128300m<sup>3</sup> of firewood/year, it can save three working hours used for firewood collection per woman per day, and reduce the negative impact from smoke and heat from the firewood. Furthermore, about 35 tons of household solid waste will be transformed yearly to compost in the study area and contribute to avoid eutrophication of agrochemical runoff into of the mangrove ecosystems, and help save significant cash expenses for agrochemicals (savings of 11 Euro/50 kg of compost used).

### **Key Question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in the African context?

## Key Highlights

1. EWomen is a project of 36 months (January 2021 - December 31, 2023) supported by IDRC in Benin (West Africa)
2. SEWomen is promoting the adoption of solar cooking technology for salt production and fish smoking in mangrove areas of Benin as well as the production and use of compost for market gardening production
3. SEWomen will contribute to reduce the workload of women, improve their income and well-being while reducing their carbon footprint.
4. SEWomen will contribute to the development of the scaling-up strategy of the technologies

## 19. Mainstreaming Socio-economic factor in Climate Change Adaptation

**Author: James McClain - University of Liberia**



**Contact** [mcclainja@ul.edu.lr](mailto:mcclainja@ul.edu.lr)

Gender has to be mainstreamed into climate change. Population globally continues to increase. Our climate continue to change with global Population increasingly facing greater challenges of the extreme events associated with climate change. Change in the climate significantly impact health, food security, livelihood, water quality amongst others. Socio-economic and Climate systems have considerable interaction. Climate change significantly impact Socio-economic. Therefore, mainstreaming Socio-economic factor in Climate Change Adaptation will help to improve climate action at the subnational or vertical integration in Africa.

### **Key Question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in an East African context?

### **Four (4) Key highlights**

1. Climate Adaptation for Africa
2. Adaptation capacity building
3. Sustainability
4. Climate Adaptation research. Empower African universities

## 20. How to survive when forests and rain are dwindling? Story from Zambia

**Author: Ingrid Griet Dierckxsens – UN**



Contact: [ingrid.dierckxsens@un.org](mailto:ingrid.dierckxsens@un.org)

### **Alternative Livelihoods**

“This year, we’ve seen the worst drought ever,” says Julliette Machona. “Usually the rivers run dry here in this southern part of Zambia by July, but this year, they were empty already in May. The little water we have left is just enough for the people, the cattle and us. We have no water left to raise any crops.”



*Photo by UN-REDD Programme*

Machona is 35 years old, with four kids. When she finished secondary school in Zambia, her parents could not afford to send her to university at a cost of about US\$2,000 per year, particularly given minimum wage is about a US\$100 a month. Noticing the growing difficulties of making a living by growing tomatoes and maize in a region already receiving less than average rainfall, she got a group of women together called Tubeleke, which means “let’s work together”, and they started weaving baskets and brooms. The business was not doing very well until 2015 when the Food and Agriculture Organization (FAO) of the United Nations stepped in to support the Forestry Department of Zambia through the [Forest and Farm Facility](#), a partnership between the Food and Agriculture Organization, the International Institute for Environment and Development, the International Union for Conservation of Nature and AgriCord. The Forest and Farm Facility is an initiative for climate-resilient landscapes and improved livelihoods with a primary focus on strengthening forest and farm producer organizations.



*Photo by UN-REDD Programme*

“We assisted the group with various trainings to build their capacity in areas such as business development, good governance, resource management and improved skills in basket making,” says Vincent Ziba, Forest and Farm Facility national facilitator. The partnership’s support is complementary to the REDD+ implementation. In the case of the basket-weaving group, the link with REDD+ is the landscape management approach through sustainable harvesting of basket materials and involving the producers in resource management. This has led to improved sustainable and diversified income.

“Look at my brick house,” says Machona. “That’s how things have changed for me. Also, our association now has 27 households benefitting from the basket making, and as a group, we have diversified our incomes through other activities as well.” Machona and her group started rearing rabbits, pigs and sheep, an idea that came from the Forest and Farm Facility and the Food and Agriculture Organization, who supported exposure trips to Tanzania and Benin where Juliette learned about raising animals. She is now making pig feed by growing sunflowers and soybeans, especially the sunflowers that do not need a lot of water.

A basket takes two days to be created: one day to collect the bamboo and one day to make it. They can then sell it on the local market for US\$3. They are now also trying to plant bamboo themselves in order to harvest the basket materials in a sustainable way.



*Photo by UN-REDD Programme*

“To fight climate change, we need to get into activities that don’t depend too much on forests or rain, so that’s what we’re working on every day,” says Machona.

### **Key Question**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e., what is considered transformative in the African context?

### **Key highlights**

The Forest and Farm Facility is an initiative for climate-resilient landscapes and improved livelihoods with a primary focus on strengthening forest and farm producer organizations.

## 21. Kenya: How communities get involved via the FPIC system to manage their forests

**Author: Ingrid Griet Dierckxsens - UN-REDD/UNEP**



Contact: [ingrid.dierckxsens@un.org](mailto:ingrid.dierckxsens@un.org))

“It’s always better to involve us,” says Kibarisho Leintoi, a 36-year-old Masai mother of eight children. “Even though I cannot read or write, I know what I need for my family to live: we need healthcare and water.” Water for the irrigation of her tomato farm and for her five goats and five cows. Without water, her income shrinks. She used to have the means to send two of her children to school while the others helped with chores and guarding the cattle. However, after a crop failed due to drought, one of those two children had to drop out when she could not afford the fees.



*Kibarisho in maize field. Photo by UN-REDD Programme*

In the past, a little spring of water would have sufficed for the community, but due to the increasing population and livestock pressure, that is no longer sufficient. The people of the Maji Moto community, near Narok County in Kenya, understood that a dam would help them collect the water so they could use it for irrigation and livestock.

The community selected a committee of seven people, among them Kibarisho Leintoi. The committee met with Indigenous Livelihood Enhancement Partners, an indigenous people's organization that has been working to help establish communities identify and prioritize their needs. When the Maji Moto community told Indigenous Livelihood Enhancement Partners that they needed a dam, they trained the community in proposal writing and helped them find a sponsor. The community then oversaw the funds after receiving training from Indigenous Livelihood Enhancement Partners on how to monitor and handle funds.



*Kibarisho and Noormejooli at the dam. Photo by UN-REDD Programme*

Indigenous Livelihood Enhancement Partners highlighted that indigenous peoples have the capacity to implement projects and take ownership, with just the right training. After working with communities for many years, Indigenous Livelihood Enhancement Partners won the United Nations Development Programme's tender to develop stakeholder engagement and free prior and informed consent guidelines and toolkits. These will help donors and government to involve communities when setting up projects that affect their livelihoods.

"It is important to know who to talk to in the community because in the Masai community, for example, you have a cultural leadership as well as an administrative leadership," says James Twala, programme officer on climate change for Indigenous Livelihood Enhancement Partners. "The constitution spells out that in projects affecting their livelihoods, citizens should be involved."

Indeed, in 2010 Kenya adopted a constitution, which has had profound consequences on how natural resources, including forests, are managed. Governance over natural resources is shared between the national and county level governments. The constitution requires public participation in the management, protection and conservation of forests. Consequently, various legislations such as the Forest Management and Conservation Act 2016 and the Climate Change Act 2016 target the process and engagement of local communities and minorities in environmental protection and monitoring, as well as benefit sharing. “We are not making new laws but making sure that free prior informed consent is respected,” continues Twala. “Because when projects are community-driven, they feel ownership and the project has a better chance for longevity since the community feels personally and collectively responsible for taking good care of it and maintaining it long after the donor has gone.”



The guidelines developed by Indigenous Livelihood Enhancement Partners include consultative meetings where people express their needs and the

community is informed of the details of the project, including costs. Then the community decides if they give their consent or not, and if they do, community leaders have the option of giving consent verbally or signing the agreement. This consent articulates what exactly will happen, the timeline and the outcome. Lastly, the community and the implementing entity is responsible for monitoring the implementation of the project.

The UN-REDD Programme has been a pioneer of innovative policies that value and protect forests and their social and ecosystem services. Commitments to human rights-based approaches, social inclusion and stakeholder engagement are vital to its mandate and work.

Since 2017, the United Nations Development Programme is the delivery partner for the Forest Carbon Partnership Facility, together with the Ministry of Environment and Forestry applied these guidelines in the development of the project document. During this process, stakeholders recommended a review of forest policy and legislation in Kenya to include the application of these guidelines as part of the REDD+ readiness process. This forest policy review has been initiated and is still ongoing to ensure that free prior informed consent is part of Kenya's forest policies. "It gives the opportunity for communities to participate in the decision-making process on projects regarding the forests their livelihoods depend on," says Judy Ndichu, Technical Coordinator for the Forest Carbon Partnership Facility in Kenya.

### **Key Questions**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in an East African context?

### **Four (4) Key highlights**

- FPIC is all about social justice,
- Capacity building and governance.
- The community has to feel ownership in order for a project to flourish.

## 22. NDC Financing strategies in Africa and implications for adaptation action

**Author: König Michael**

Contact: [m.koenig@fs.de](mailto:m.koenig@fs.de)

### **NDC Finance Survey across 51 African Countries**

The Paris Agreement in its Article 2.1(c) gives the financial system a central role for the transition required to achieve the climate goals. However, the financial support from developed countries to developing countries is key for the latter to mitigate climate change and to adapt to it. In this regard, 400+ Individuals from Civil Society Organizations (CSOs), Public Agencies and Private Entities across 51 African Countries were asked about the role of finance in implementing their countries' National Determined Contribution (NDC). The outcomes shed light on both, common views across regions and differences due to a diversified sectorial expertise and linked appraisal. The insights from this bottom-up research can be supportive for domestic decision makers on the role and mechanisms of climate finance in the NDC implementation. This blog post describes key characteristics on the unique research set up and discovers a first and unpublished insight only.

### **Sample Characteristic and Research Process**

Through an iterative research process, 50 Fellows<sup>2</sup> of the NDC finance fellowship program from 20 African Countries developed a generic catalogue of key financial questions around the topics of transparency, strategy, and governance for NDC implementation. The sampling procedure was conducted through a snowballing approach in Summer 2021. The primary data collection started with the 50 NDC Fellows, and in a subsequent step, the fellows nominated further key experts within their network and field of expertise for participating in the survey. Additional

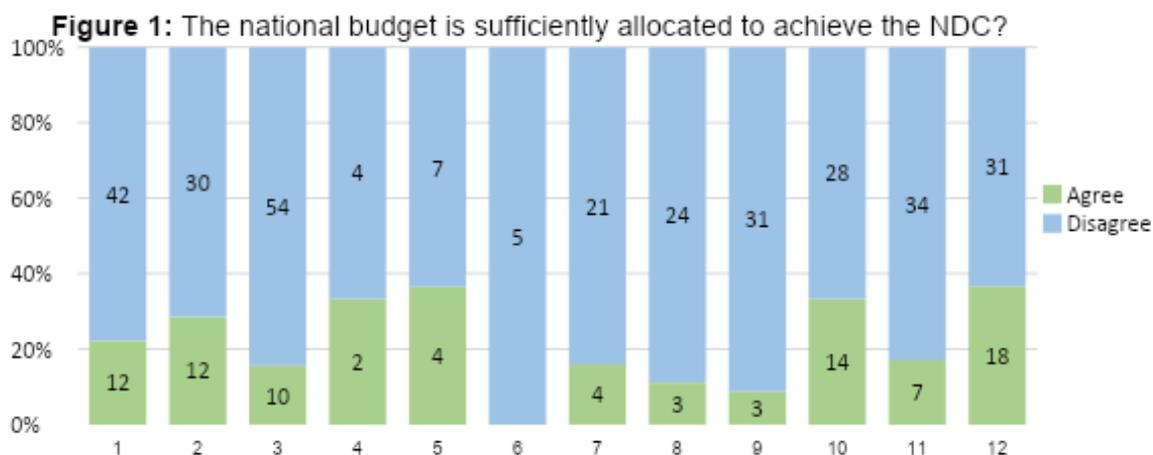
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<sup>2</sup> The bi-lingual NDC (Nationally Determined Contributions) Finance Fellowship assesses the dynamics of climate financing of NDC across African countries. It aims to improve understanding of the role and mechanisms of climate finance in the implementation of NDC. Project oversight: Frankfurt School of Finance and Management and African Research Impact Network. Funded by the International Development Research Centre.

means were used to select participants. Therefore, targeted individuals were directly approached (i.e., focal point at MDBs) to ensure a balanced sample. In total 419 respondents across Africa completed the survey, with a regional high of 166 respondents from Eastern Africa, and a regional low of 23 respondents from Northern Africa. The survey was developed and available in both English and French to increase level of inclusiveness. One third of the respondents conducted the survey in French. For each woman in the sample, three males participated. Overall, respondents were recruited across all sectors, and clustered in three groups, each with a similar sample size: One third of actors came from CSOs, including almost 100 respondents from (domestic and international) non-governmental organisations and more than 30 academic professionals. Public sector actors, including 100 employees from Ministries of Finance and Ministry of Environment, represented another third. The last third of responders were private actors, including more than 80 from the financial sector. On average, every respondent replied to 22 of the 23 questions, which represents a decent completion rate. However, reflecting the non-response bias in the further evaluation is a matter of course.

### **Example of Survey Question on National Budget Allocation**

While international support (finance, capacity building, and technology transfer) is important for many conditional NDCs in low-income countries, public domestic finance plays a critical role as well. Public budget, including national and sectoral structures, financial intermediaries, and so-called green investments banks are pivotal towards low-carbon and climate-resilient development. Therefore, one question the survey asked were if the respondents agree or disagree with the statement, that the national budget is sufficiently allocated to achieve the NDC? As illustrated in Figure 2, the line of sight is similar across regions and sectors in this regard.



Note: Stacked bar chart in relative shares based on Likert scale (1 strongly agree to 6 strongly disagree) and sharply clustered to Agree (1-3) and Disagree (4-6). In total 311 disagree, 89 agree. The number of respondents, incl. the non-probabilistic sampling technique cannot be considered as a representative sample and only serves as indication and description (i.e. consider low number of respondents in North Africa).

Going deeper into national budget allocation, subsequent questions in this survey section referred to domestic financial instruments, such as development grants, debt, equity, guarantees, and insurances or assessing a general understanding to attract international finance and technological support. This trickle-down approach to a more granular level reflects the broad heterogenous perspective of NDC finance implementation in the African continent. For example: Three quarter (n=226) out of the 311 respondents who disagree with the above question in Figure 1 (sum of regions and sectors), disagrees as well with the question, that Available options to attract intl. finance and technological support is well understood. This means, that more than half of the overall respondents stating both, the a.) Domestic budget is insufficiently allocated, and b.) The way to attract international support is not well understood.

### **Outcome, Outlook and Next Steps: Database and Country Case Studies**

In addition to the ongoing quantitative evaluation (in progress), the gathered primary data layer-in country case studies within the NDC

fellowship program, which will be used to develop further findings and specific country insights. These studies cover i.e. financial strategies, knowledge supply, institutional arrangements, and capacity building gaps, which may later help to inform the climate community on national opportunities for low carbon solutions and climate resilient development.

The broad insights from this NDC finance survey flag blind spots and perpetuate knowledge, such as the urgent need to align finance flows with the Paris Agreement. After the full evaluation and publishing of the findings, interested parties can request the raw database, i.e. to support decision-making and research initiatives.

**Acknowledgements:** Thanks to all participants of the NDC finance fellowship for their active engagement in the development of the survey and all snowballed and conducted participants for their active participation in this research. In addition, thanks to Christine Grüning and Pieter W. Pauw for helpful comments.

## **23. Community-Responsive Adaptation to flooding: new learning from Nairobi on pathways to climate justice in the built environment.**

**Author: Joe Mulligan**

**Allan Ouko, Joe Mulligan, Vera Bukachi, Kezia Ojal**

Contact: [joe@kounkuey.org](mailto:joe@kounkuey.org),

*“One key challenge in our community is flooding, when it rains heavily especially near the river causing displacement.” - resident of St John’s, Silanga village, Kibera.*

In 2017, a group of researchers and practitioners from Kenya and Sweden set out to study the outcomes of an innovative and highly participatory approach to flood adaptation. The idea was to conduct an empirical study of an existing approach, co-design, physically build, and then rigorously evaluate real-world resilience interventions with residents and local government in low-income and flood-prone neighbourhoods of Nairobi.

Urban flooding is a critical issue in Nairobi and many other cities where informal settlements are often located in flood-prone areas. The need for spatial and participatory tools to aid in planning and negotiation within the many informal areas adjacent to Nairobi’s major river systems has long been highlighted by urban thinkers (Karisa 2010), though practical examples are elusive (Munene 2018). Top-down approaches to these problems have not historically been successful, primarily because government actors have limited ability to act effectively in these areas. While bottom-up solutions are often ingenious, individual actors alone cannot solve these watershed-scale problems. Many have called for grassroots approaches that complement community-level innovations with connections to technical expertise and wider governance systems. In our research, we call this approach “community responsive adaptation” (CRA).

Between 2017 and 2021, we implemented a “real-world” CRA process at three sites in Kibera (in the Makina, Lindi, and Silanga villages). The local administration (the Kibera “chieftaincy”) was engaged in and approved the local CRA projects and governmental actors, including local Members of Parliament, have visited the projects. We also built a panel dataset for close to 1500 households (at the three sites, and in three equivalent “control” sites), to track flood impacts over time and space, as well as resident and other stakeholder experiences of the CRA process.

Nearly five years later we are coming to the end of the implementation and evaluation phases and are starting to work with the qualitative and quantitative data. The quantitative data emphasises just how nefarious the effects of localised and riverine flooding are on residents of informal neighbourhoods: residents in Kibera across the panel were reporting rates of diarrhoea in under five (in the 2 weeks prior to survey) at more than twice the national urban average in Kenya. The panel survey also overlapped with the COVID19 pandemic, allowing us to track some of the impacts. As a headline figure, reported household income fell by 59% relative to the pre-coronavirus baseline following lockdown measures in 2020. Households attributed declines in income primarily to fewer labour market opportunities or lower demand for services (43% of respondents) rather than the direct health impacts of the pandemic (1%).

Qualitative data collection comprised workshops with residents post intervention, Key Informant Interviews with local authorities and civil society actors, as well as comprehensive documentation of the design process. Some of the social aspects of resilience were highlighted alongside the physical, especially to do with activities that were often taking place in these hazardous sites, as well as new activities that popped up:

*“The site has provided a safe space for kids to play – they play there without risk of drowning” – Andolo resident.*

*“Community welfare is working well and we are supporting each other – meetings are held at the site (public space).” – Andolo resident.*

In addition, local authorities within Kibera saw value in the co0design process, even if it took a long time:

*“As a chief, I learnt a lot from being part of the project. I have learnt many ideas that I can share with other organizations coming to work in the community. When such participatory approaches are adopted and the community is involved, then they (the community) own the project even after the donors have gone away.” - Area Chief, Silanga Village*

The flood modelling produced by the Technical University of Kenya for Kibera to both inform the project and allow for an evaluation of flood risk reduction is significant, as historically flood modelling in Kenya has focused on rural areas (Douglas, et al. 2008; Olang, et al. 2012). When the practice partners (KDI) used the flood maps in the CRA design process to transform a flood-prone site in Kibera’s Andolo neighborhood, residents who had worked with the modeling process were able to fully participate in decisions about placement of structures, finished floor levels, and limitations on what type of building and activity could go where. The situated knowledge of local stakeholders in the co-design process helped to identify public space components, programs and amenities, as well as social and maintenance activities. At a small scale, this demonstrated how modelling could work alongside other participatory methods to build consensus and resilience in a space fraught with conflicting agendas, socioeconomic vulnerability, and climate-related risks. KDI was pleased to host COP 26 president Alok Sharma at the finished site in Andolo in March 2021.

More is to come from this very deep and broad data set and learning. In particular, we look forward to sharing more quantitative analysis on the impact of these interventions from a physical risk reduction and socio-economic development perspective. From a planning perspective, we hope to provide new evidence to ask the all-important question: ‘What do these small-scale examples show us about participation and a risk perspective that can be incorporated in larger scale planning efforts?’ We expect that the ongoing success of the built projects and the analysis we

will carry out will support the case - from both cost and impact perspectives - for a community-informed approach. The renewed focus on using the Special Planning Area policy vehicle for “slum upgrading” in Nairobi could be an immediate area of application. Stay tuned for more!

*This research was delivered by partners from Stockholm University (P.I. Tompsett), KTH Royal Institute of Technology, Technical University of Kenya, Lund University and New York University in partnership with Kounkuey Design Initiative, Nairobi, Kenya. The research is funded under the “Sustainability and Resilience – Tackling Climate and Environmental Changes” call from the Swedish Research Council, Sida and Formas.*

Four highlights:

1. Innovative research design to co-design, physically build, and then rigorously evaluate real-world resilience interventions with residents and local government in low-income and flood-prone neighbourhoods of Nairobi.
2. Focus on physical flood resilience but with co-design process allowed social aspects of resilience to flourish alongside the physical, including public assembly, play, and economic activity.
3. Demonstration of how flood modeling can work alongside other participatory methods to build consensus and resilience in a space fraught with conflicting agendas, socioeconomic vulnerability, and climate-related risks.
4. COP26 President Alok Sharma visited the project site in Kibera in March 2021 as an example of community-based adaptation and risk awareness.

### **Key Questions**

What examples are there of transformative adaptation research enabling action through addressing social justice, capacity building and governance? And why are these considered transformative i.e. what is considered transformative in an East African context?

