

LIRA 2030

Africa

ADVANCING THE 2030 AGENDA IN AFRICAN CITIES THROUGH KNOWLEDGE CO-PRODUCTION

Urban experiments led by
early-career African scientists



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SUMMARY

Context

The 2030 Agenda with its Sustainable Development Goals (SDGs), Agenda 2063 of the African Union, the Paris Agreement on Climate Change, the Sendai Framework on Disaster Risk Reduction and the New Urban Agenda (NUA) all recognize the critical role of cities in transformation towards sustainable development. With the fastest urbanization rates in the world, African cities are at the front line of global development. Given that the bulk of urbanization in Africa has not yet taken place, African cities have an unprecedented opportunity to shape their urban futures in an inclusive, sustainable and resilient manner. Decisions being taken now by governments at the national, sub-national and city level will have consequences for the functioning, liveability and environmental sustainability of cities for decades to come. Meaningful contributions to sustainable urban development on the continent will require inclusive and coordinated policies, strategies and actions, which should be based on context-specific evidence and nuanced analysis of urban processes.

The LIRA 2030 Africa Programme

To stimulate the new evidence required for practice and policy-making in sustainable urban development, the International Science Council (ISC) has implemented Leading Integrated Research for Agenda 2030 in Africa (LIRA 2030 Africa), a five-year research programme running from January 2016 to December 2020, in partnership with the Network of African Science Academies (NASAC). Financial support has been provided by the Swedish International Development Cooperation Agency (Sida).

The overall goal of the programme is to build the capacity of the next generation of African scientists to lead the innovative re-thinking of urban futures on the continent, working with local communities, policy and practice.

The programme provides financial support and training to consortia of early-career African scientists to co-produce solutions-oriented, contextualized knowledge on sustainable urban development. The distinctive feature of the LIRA programme is that it promotes transdisciplinary research, a collaborative mode of knowledge production that is oriented towards specific societal challenges and which integrates knowledge and perspectives from different scientific disciplines and from non-academic stakeholders.



Based on initial learnings from the projects supported by LIRA, this report sheds light on what it takes to co-produce transdisciplinary knowledge on sustainable urban development in Africa, through collaboration between scientists, policy actors, urban practitioners, the private sector and communities.

Scientists from CSRS (Centre Suisse de Recherches Scientifiques en Côte d'Ivoire) take water samples to test for cholera and leptospirosis while people wash their clothes, Abidjan, Côte d'Ivoire. Photo: CMAPPING

The report identifies opportunities and challenges for this form of knowledge co-production in the implementation of the SDG framework, and provides options for the creation of enabling environments that enhance the capacity of African scientists to undertake this type of research.

KEY MESSAGES

Recommendations based on the LIRA learnings to date include:



Urban challenges require novel methods of knowledge production. These should cut across sectors, disciplines, and cultures, and acknowledge the complexity, uncertainty and contested nature of urban development. Knowledge co-production is an enriching process.

It provides space for dialogue, learning and collaboration between different stakeholders. Research teams that combine scientists from different academic disciplines with non-academic stakeholders are better equipped to manage the complexity of the real world. This approach also offers new possibilities for engaging within and across institutions, helping to break the silo mentality and stimulating the transformation of existing institutional structures and processes in universities and other partners. Through knowledge co-production, scientists from different disciplines undertake research with practitioners and policy-makers across sectors and geographical scales, and create and test local solutions jointly to bring about transformative change in cities.



Knowledge co-production offers benefits for implementing the SDGs in African cities. Working with different stakeholders helps researchers to have a better understanding of local needs and interests, to gain a holistic understanding of problems, and to co-produce locally grounded knowledge and solutions. By fostering new place-based partnerships across different sectors, knowledge co-production helps anchor SDGs in the local context, and increases the responsiveness of communities to the global agenda. By providing a space for stakeholders to express their constraints and aspirations, it promotes better participation of groups that are usually silenced and formally excluded in the implementation of the SDGs. This makes the knowledge production process more inclusive. By bringing contending actors and sectors together, it helps identify interconnectedness between the SDGs, and ways to achieve them. Finally, knowledge co-production helps to leverage the expertise, skills and resources required to implement the SDGs.



Realizing the full potential of knowledge co-production process requires researchers:

- To be strategic and realistic about the engagement with policy and society, and to think carefully about whom to engage and at what stage of the research process. Based on the LIRA learnings to date, there are three main phases of knowledge production. Each helps to bring together different types of knowledge, foster learning across institutions, and build cross-sectoral partnerships. These phases are the joint framing of research agendas; co-designing methods for knowledge generation and use; and the co-creation of policy options and action for change.
- To spend time early in the project on identifying ways of working together, understanding individual interests in the project, and building trust. Researchers need to accept from the outset that engagement with policy and society will slow down the research process.
- To create space for the project team and partners to reflect about research methods and processes and adapt them, if necessary, to evolving conditions.
- To listen attentively to those who will act upon research findings, in order to understand their concerns and aspirations and create knowledge products that are useful in the real world.
- To manage adequately the expectations of stakeholders, especially those of local communities.
- To critically reflect on existing power dynamics, on each other's positions and experiences, and on ways of interrupting the reproduction of unequal power relations.



The complexity and uniqueness of African cities means that more scholarship on African cities from Africa is needed.

Urban issues in Africa are distinctly different from those of other regions, yet today's urban knowledge is predominantly shaped by research on and from the Global North. Although many frameworks and tools for generating knowledge are relevant to African contexts, more attempts should be made to support the development of African research theories and framing, to grasp the problems and solutions in their specific context.



Academic institutions, and international and national funding agencies, should consider creating enabling environments in Africa for knowledge co-production involving different societal actors.

Global policy processes such as the 2030 Agenda call for stronger contributions from science. But knowledge co-production is still poorly rewarded by funding mechanisms and academic structures. Committing to transdisciplinary research can be risky for early-career scientists. There are very few opportunities for transdisciplinary career development within discipline-centred institutions. To address this issue would require structural changes within the institutions but also within the prevailing system of academic incentives and the 'publish or perish' culture. Acknowledging and rewarding the non-academic outcomes of knowledge co-production work, such as social and institutional learning, capacity development, engagement with policy and the public, and relationship-building, would encourage solutions-oriented research. Creating more peer-reviewed journals that are focused on publishing transdisciplinary research would be also beneficial. Furthermore, administrative barriers that prevent funds transfers between institutions and across borders need to be removed if the benefits of collaboration, knowledge exchange and learning across universities and cities in Africa are to be fully realized.

Funding mechanisms should also include resources for activities that may not be directly linked to research. These might include capacity-building for transdisciplinary research, public and policy engagement, communication, and network- and community-building. Courses on knowledge co-production, on putting research into use, on building communication, as well as on facilitation and negotiation skills, should be considered as part of undergraduate and postgraduate studies. This would prepare the next generation of scientists to act as knowledge brokers and to lead engagement with different stakeholders, bridging the divide between science, policy and society and fostering cross-sectoral collaboration around urban challenges.



Building scientific capacity – especially of next-generation scholars – to co-produce knowledge on sustainable urban development is a sustained long-term process.

However, the current approach to funding research and capacity-building is short-term and project-based. It does not support the accumulation and application of knowledge on sustainability. Nor does it allow the outcomes of co-produced knowledge to be tracked. It also prevents the relationships and partnerships created between science, policy and society from being sustained over time. This diminishes the impact of investments made in building trust and partnership, and leaves participants with the sense of not fully accomplishing what they intended to do. Without longer-term funding for

transdisciplinary research, researchers and other stakeholders may go back to their disciplines and domains once a project ends. This makes an integrated approach to solving challenges in African urban development difficult to achieve.

The projects profiled in this report inspire hope for early-career African scientists to cross the conventional boundaries between science, policy and society, and to do research that is innovative, engaged, relevant, and that ultimately contributes to social change. Investment in transdisciplinary research and training is crucial to equip the next generation of scholars with the mind-sets and tools needed to ensure that urban science is geared towards transformative and systemic change in African cities.

INTRODUCTION

Urbanization has been in the spotlight during the past decade. More than half of the human population now lives in cities (United Nations, 2014). Cities occupy only about 2 per cent of the Earth's land surface, but contribute about 70 per cent of global economic output, over 60 per cent of global energy consumption, 70 per cent of global greenhouse gas emissions and 70 per cent of global waste (UN-Habitat, 2016). Rapid urbanization brings with it many challenges associated with population density and increasing needs for services, coupled with resource and technological constraints. However, there are also opportunities for more inclusive urban development, especially in regions and countries that are not yet locked in to resource-intensive development pathways.

Africa has not yet reached the level of 50 per cent urbanization. Its cities are still growing and new cities are still being developed (Parnell et al., 2014). Seven of the world's ten new megacities anticipated by 2030 are in Africa. They include Cairo (Egypt), Accra (Ghana), Johannesburg-Pretoria (South Africa), Khartoum (Sudan), Kinshasa-Brazzaville (Democratic Republic of the Congo), Lagos (Nigeria) and Nairobi (Kenya) (UN-Habitat, 2016). However, despite their growth, small and medium-sized cities are projected to characterize urbanization processes in Africa.

The speed and scale of urban growth in Africa has enormous social, economic, and environmental implications, making African cities crucial to addressing the global challenges of rapid urbanization and to achieving regional and global policy processes such as Agenda 2063, the 2030 Agenda on Sustainable Development, the New Urban Agenda, the Paris Climate Agreement, and the Sendai Framework on Disaster Risk Reduction.

African cities also have a unique but often overlooked capacity to innovate and experiment with solutions for sustainability. They include complex but agile informal settlements and multiple ecologies with resources that offer alternative pathways to the implementation of the global development agenda (Buyana, 2019; Kovacic et al., 2019). African cities are home to micro-scale innovations and local community action that have demonstrated approaches for leapfrogging to cities which are sustainable, inclusive and resilient (SDG 11) (Patel et al., 2017; Arfvidsson et al., 2017; Valencia et al., 2019). This has, for example, been demonstrated by green roofing and rain water harvesting movements in urban informal settlements, targeted at improved storm-water management, better regulation of building temperatures, and reduced urban heat-island effects (Oberndorfer et al., 2007; Broto et al., 2013). Africa offers enormous opportunities for harnessing knowledge and solutions that can facilitate the implementation of the SDGs, including SDG 11 that targets cities.

African cities have to respond to global policy processes. But their attempts to do so are often impeded by a lack of understanding of the rate, scale and trajectories of African urbanization. Empirical, contextualized knowledge about urban processes in Africa is often limited (Parnell et al., 2014). This is a major impediment to the development of effective urban planning systems. Urban planners and decision-makers in African cities need more evidence and more accurate data

on demographic trends and urban processes to help them to manage cities and risks, and to develop strategies for sustainable urban development.

Science can help shape transformations towards more sustainable urban futures by generating context-specific evidence and nuanced analysis of urban processes, and by identifying potential solutions. It needs to have a stronger role in urban policy and practice. Understanding how to improve the relationships between science, policy and practice has been described as one of the critical challenges for sustainable development in the 21st century (UNEP, 2012; UNDESA, 2015). The 2018 report of the International Expert Panel on Science and the Future of Cities calls for experimental collaboration between science, policy and practice at the local level. It encourages scientists and local government to take tangible steps towards that collaboration, in order to produce relevant and usable knowledge.

In that context, this report describes current examples of collaboration between science, policy and society carried out through transdisciplinary research in a range of African cities. All are being implemented under a research programme known as Leading Integrated Research for Agenda 2030 in Africa (LIRA 2030 Africa). Transdisciplinary research is a collaborative mode of knowledge production oriented towards societal challenges. It integrates knowledge and perspectives from different scientific disciplines and non-academic stakeholders (Schneider et al., 2018).

The report sheds light on what it takes to co-produce knowledge on sustainable urban development in Africa through collaboration among scientists, policy actors, urban practitioners, the private sector and communities, and what opportunities and challenges this engaged process of knowledge production creates. It suggests options for creating enabling environments and for enhancing the capacity of African scientists to undertake this type of research.

A street food vendor in Mathare, Nairobi, Kenya, demonstrates the use of firewood to prepare food for sale in the settlement. Photo: Amollo Ambole



ABOUT THE LIRA 2030 AFRICA PROGRAMME

The LIRA 2030 Africa programme was launched in 2016 to foster scientific contributions from Africa to the implementation of the 2030 Agenda, especially in the urban context. It is managed by the International Science Council, together with its Regional Office for Africa, in partnership with the Network of African Science Academies (NASAC). Financial support is provided by the Swedish International Development Cooperation Agency (Sida). The programme runs until December 2020.

This five-year programme aims to increase the production and use of solutions-oriented, contextualized, and policy-relevant knowledge on sustainable development in African cities. Its distinctive feature is that it promotes transdisciplinary research in a specific urban context in Africa.

In the context of LIRA, transdisciplinary research is understood as a knowledge co-production process with key stakeholders that generates formal knowledge on societal problems as well as actionable knowledge for problem-solving (Hadorn et al., 2006; Lang et al., 2012).

The rationale for promoting this approach is that it seeks to grasp the complexity of the problems involved, and to take into account the diverse scientific and societal views of the issues. A growing body of research shows that the investigation of sustainability challenges, and the identification of solutions, require novel methods of knowledge production which acknowledge the complexity, uncertainty and contested nature of sustainability challenges (Kates et al., 2001; Polk (ed.), 2015; Schneider et al., 2018). As the scientific evidence cannot be separated from the political, cultural and social debate that surrounds societal challenges (Horton et al., 2018), producing this evidence cannot be entirely within the sphere of any single actor.

Furthermore, transdisciplinary research involves social experimentation outside controlled settings. This is important given the uniqueness of African cities, whose development is complex and multidimensional. African cities comprise diverse neighbourhoods and interactions that no single discipline or stakeholder can understand, explain or address adequately.

Through knowledge co-production, the LIRA programme intends to increase the use of scientific evidence as a basis for urban policy development and practice. In the traditional science for policy model, scientists are the producers of knowledge, which is then handed over to policy-makers and practitioners.

This methodology has been critiqued for failing to inform policy and practice in an effective way (Ferguson, 2005). This has led to the emergence of new approaches that connect science with policy and society (Djenontin et al., 2018). Science with policy and society is a process through which scientists, policy-makers, communities and practitioners together engage in problem framing and the production of knowledge on a more equal basis. Rather than the transfer of knowledge from scientists to users, this model focuses on knowledge exchange and co-production. The position of policy-makers, communities and practitioners changes from being end-users to being co-bearers of knowledge with scientists.

To that end, the LIRA programme supports early-career African researchers (with no more than 10 years of work experience following their PhDs) to co-produce knowledge with policy and society. Over two years, all LIRA projects are expected to bring together different scientific disciplines (involving at least one social and one natural scientist) and non-academic stakeholders to co-design normative target questions (what are more desirable urban futures?) and to co-produce actionable knowledge to reach these objectives. The ultimate goal is to test the transdisciplinary approach to overcoming the gap between knowledge and the action needed to address sustainability challenges in African cities.

Since the programme's inception, three open calls have been launched:

- ➔ Understanding the 'energy-health' and 'health-natural disasters' nexuses in African cities (2016).
- ➔ Advancing the implementation of SDG11 in cities in Africa (2017).
- ➔ Pathways towards Sustainable Urban Development in Africa (2018).

As a result of these calls, the programme has supported 28 collaborative research projects to the value of up to €90,000 each over two years. They explore new approaches to rethinking urban futures in Africa in partnership with local authorities, communities, business and government.

Each project brings together cities in at least two countries in Africa. The goal is to foster research collaboration across African research institutions, and learning across cities. A particular emphasis is on ensuring the participation of low-income countries (based on OECD ODA's ranking) in research collaboration. The list of LIRA projects can be found online [here](#). Twenty-two countries in Africa are covered by the projects, including Angola, Benin, Burkina Faso, Cameroon, Democratic Republic of Congo, Ethiopia, Ghana, Ivory Coast, Kenya, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

The LIRA programme provides five-day training workshops for the Principal Investigators of shortlisted projects. This has allowed 99 early-career researchers to build their capacity to undertake transdisciplinary research; to support researchers to build meaningful inter – and trans-disciplinary projects; to support the development of full proposals; and to strengthen their science communication skills. The programme also trains co-investigators of the selected projects, with financial support from the Robert Bosch Stiftung. In total, 47 researchers attended this training activity.

LIRA PROJECTS

Are active in 22 countries
and in 38 cities across Africa





LIRA 2030 Africa provides opportunities for scientific exchange and for South–South and North–South research collaboration through Annual Research Fora. Early-career scientists also have opportunities for career development through participation in international scientific committees and conferences, working groups and inter-governmental policy processes. Between 2016 and 2019, LIRA grantees attended international events including the UN Science, Technology and Innovation (STI) Fora; High-level Political Fora on Sustainable Development; the IPCC Cities and Climate Change Science Conference; the International Transdisciplinarity Conferences; and many others. This gave them the opportunity to present their research, contribute to the dialogue, and to build new networks and collaborations.

While most of the LIRA projects are still ongoing, lessons have already been learnt from their progress so far. They have shown how scientists can work with actors from policy, practice and local communities to confront broad and interlinked urban development challenges. The issues cut across many of the SDGs, including: extreme poverty (SDG 1), health (SDG 3), gender equality (SDG 5), water and sanitation (SDG 6), energy (SDG 7), inequality (SDG 10), cities and settlements (SDG 11), and climate change (SDG 13). The LIRA projects also speak to the New Urban Agenda (NUA), the Sendai Framework on Disaster Risk Reduction and the Paris Climate Agreement.

Members of the LIRA community at the 2019 Annual Research Forum, Université Cheikh Anta Diop de Dakar, Senegal. Photo: Lizzie Sayer for International Science Council

EXPERIMENTING WITH INTERACTIONS BETWEEN SCIENCE, POLICY AND SOCIETY IN AFRICAN CITIES

Key learnings from the LIRA projects

As was mentioned above, all LIRA projects are designed to connect science with policy and society to co-produce knowledge. They are required to bring key non-academic stakeholders into the research process from the outset. But the degree of interaction with stakeholders varies between projects. It ranges from engaging stakeholders and disciplinary expertise at several points in a project timeline to focused engagements with specific stakeholder groups, for example in the form of policy dialogues.

This section provides preliminary findings about key learnings that eight LIRA projects gained by interacting with science, policy and society to produce knowledge for sustainable development in African cities. Three of the projects depicted below started in mid-2017 and finished in late 2019, and five are still ongoing, as they started in mid-2018. Diversity of approaches, themes and regions were considered in the selection of the projects for this publication.

Our preliminary findings confirm the results of published research (Lang et al. 2012, Lawrence, 2015). They show that there are three main phases of knowledge production process that help to bring together different types of knowledge, foster learning across institutions, and build relationships. They are:

- 1. The joint framing of research agendas:** This generally starts with the identification of key issues and challenges by stakeholders from science, policy, communities and practice agencies. The priority challenge(s) is framed cooperatively into research questions that usually include scientific, policy and societal aspects.
- 2. Co-designing methods for knowledge generation and use:** During this stage, scientists, urban practitioners, policy-makers and communities generally exchange their respective knowledge on the best means of executing the research agenda co-framed during stage I. Co-designing methods does not necessarily mean building consensus around the scientific tools for data collection and analysis, although it is useful for

different actors to understand why these tools and methods are chosen. More importantly, participants agree during stage II on the mechanisms that will be implemented throughout the research process to support the generation, integration and sharing of knowledge that is scientifically credible, and which is valuable to policy and society. They might include discussions with a variety of actors on ways of communicating research results to increase their usability in policy or decision-making. During this stage, it is important to agree on the roles and responsibilities of different project stakeholders, taking into account their differing institutional mandates, capacities, skills and networks.

3. **Co-creation of policy options and joint action for change:** This stage generally focuses on understanding what can be tried or scaled up for sustainable urban development to become a reality. During this stage, scientists from different disciplines not only undertake research with practitioners and policy-makers, but also jointly create, test or scale up solutions intended to bring about transformative change in cities. This process is an experimental one. Here interventions that are decided on in stage II are tested, and approaches to sustaining or upscaling them are discussed and prioritized among all actors. The aim is to facilitate societal change. For example, solutions could stem from micro-scale experiments that are situated at the intersection of different urban sectors, and in anticipation of broader systemic change.

Co-creating these options requires a recursive process of social learning to explore alternative, innovative pathways to bringing about policy and social change. An important aspect of these experiments is to understand which interventions work and which do not, and to iterate them where necessary. For instance, such learning can happen in a local community, where policy-makers are invited to witness the evolution or replication of local solutions in the presence of scientists and other intermediaries of knowledge such as NGOs. The participants would share the aim of generating knowledge on the urban policies needed to seize the scale-up potential of local innovation.

The table below provides some examples of the junctures at which engagement with stakeholders and disciplinary experts has occurred to date. The diversity of approaches used in LIRA projects reinforce the point that there are no best practices for knowledge co-production. As it is driven by context and the players involved, knowledge co-production can be practiced in a wide variety of ways.

PHASES OF KNOWLEDGE CO-PRODUCTION	EXAMPLES OF ENGAGEMENT FORMATS
Joint framing of research agendas	<ul style="list-style-type: none"> → Proposal writing → Stakeholder mapping through online meetings → Co-design workshops with national panel of experts and local communities → Participatory mapping → Face-to-face meetings with city government → Learning labs → SDG studios with policy actors and local community groups
Co-designing methods for knowledge generation and use	<ul style="list-style-type: none"> → Workshops with experts and community members → Learning labs → SDG studios with policy actors and local community groups → Site visits to promote experimental learning → City exchange visits to promote cross-city learning → Live online polling for real-time interactive audience participation → Breakout group discussions → Focus group discussions
Co-creation of policy options and joint action for change	<ul style="list-style-type: none"> → Learning labs → Policy seminars with stakeholders to co-create policy recommendations → User journey tool → Validation sessions in each neighbourhood → Final city workshop combined with training

Based on the experience of these engagements, the report provides key learnings that early-career scientists have acquired to date:

Being realistic and strategic about engagement

A key LIRA learning is that it is important to accept from the outset that engagement with policy and society will slow down the research process. It takes time to understand the cultures, priorities and interests of the different actors who may be involved. Furthermore, project progress depends on the contributions of several actors. To establish a long-term commitment from all key partners, it is critical to spend time on identifying appropriate ways of working together, understanding individual interests in the project, and building trust.

Given that engagement requires significant time and resources, researchers need to think carefully about whom to engage with (who are the most relevant and influential stakeholders that should be part of the project?) and at what stages of the research process engagement will be most useful. Depending on the problem to be addressed, stakeholders can be involved at different stages and to different degrees. Projects need to be realistic and strategic about this. The research team in LIRA project 3 (see below) initially aimed to engage all relevant stakeholders throughout the project, but then realized that engagement with community members was most useful when formulating field work in the settlements. On the other hand, engagement with experts and policy actors turned out to be at its most productive when grounded by evidence from the field. This means that initial engagement with community members during field work set the stage for later engagement with experts and policy actors in workshops and seminars.

Another aspect that should be considered is securing institutional rather than individual commitment to the project. This helps avoid inconsistent representation of stakeholders at the meetings, which can be disruptive to knowledge co-production over the project life cycle.

Continuous learning and flexibility

Another learning is that transdisciplinary research is an emergent process. It is important to create space for the project team and partners to reflect about research methods and processes, and adapt them, if necessary, to evolving conditions. For this reason, all LIRA projects hold a half-day self-reflection workshop with their research team at the end of each year.

Learnings from many LIRA projects show that interactions between science, policy and society are not neat, linear processes. Mapping the complexity of policy processes and the diversity of players and agendas in a specific local context is usually one of the first steps that a research project needs to undertake, before it engages with policy.

Active listening

Closing the gap between the worlds of science, policy and practice starts by appreciating what types of information are useful and usable in the real world. Researchers need to listen carefully to those who will act upon their findings to understand their concerns and aspirations.

Furthermore, policy-makers seldom have time to appreciate the details of methodological choices or theoretical debates. They are primarily interested in findings and their implications for policy. Academics are preoccupied with intellectual rigour and may ignore what's politically or socially feasible. While the generation of new knowledge must go through a credible and authoritative process, academics should be prepared to accept that it takes consensus-building amongst a broad number of stakeholders to achieve workable policy change.

Understanding context is critical

Crafting usable knowledge requires a healthy dose of realism. The real world is far too complex to expect interventions to have neat, predictable outcomes. Small actions in one area can have large and unintended outcomes in others. This means that it is critical to understand contexts and interdependences. What might work in one context can fail in another. Some projects faced difficulty developing a common research agenda for more than one city. They had to vary their engagement strategies to allow for the political context and institutional capacity of different settings. Researchers need to appreciate that research can move in different directions and at different speeds. This means that solutions should be flexible and adaptive rather than being the perfect fit.

Process is as important as the final outcome

Instead of looking for technical panaceas, researchers should be encouraged to build stronger partnerships and processes across institutional boundaries. The process of getting stakeholders around the table to work together on a specific challenge can be much more beneficial than any particular knowledge product or innovation if it leads to a stronger longer-term

collaboration between institutions. So the knowledge co-production process can itself be seen as an agent of change. LIRA project 6 (see below) explores policies and governance structures in Cape Town, South Africa, and Douala, Cameroon. It is intended to identify synergies, co-benefits and collaboration opportunities between government sectors and policies for housing and health. Through a knowledge co-production process, it investigates approaches to intersectoral collaboration and data integration across government sectors. These may inform future evaluations of the health impact of housing interventions on the urban poor of both cities.

Managing expectations

Transdisciplinary research focuses on ways to solve real-world problems. It can raise high expectations from stakeholders, especially those in local communities. Managing these expectations and requests can be difficult for researchers. One way of doing this is to be open up front about what the project can realistically contribute.

Power dynamics

Another LIRA learning is that power dynamics should not be overlooked in interactions between science, policy and society. Instead they should be explored as appropriate. LIRA project stakeholders mainly represent three forms of power: expert power held by academics; the statutory and regulatory power of the policy-makers; and the power and knowledge of indigenous and local community actors.

Power is often concentrated in the hands of expert researchers, especially at the beginning of a project. They take the lead in convening different stakeholders to work together on a specific challenge. They introduce unfamiliar concepts and specialized terminology that can make local communities and policy-makers recede into the background.

Policy-makers at the municipal and national level possess statutory power. They ensure that the co-production process speaks to the existing framework of policies, laws and regulations in the city. This power can also be helpful in fostering collaboration between sectors with differing mandates.

Local and indigenous knowledge rests in the hands of local communities. Its power is not based on institutional mandates and formal structures. Rather it stems from the actions and networks of neighbourhood groups, citizen coalitions, associations of informal urban service delivery operators, and federations of city traders. These use micro-scale innovation to address pressing urban challenges, as seen for example in LIRA project 1 with energy briquettes in Kampala.

These three forms of power can work together if there is space to share and critically reflect on each other's positions and experiences, and for thinking about ways to interrupt the reproduction of unequal power relations. Boundary objects¹ can facilitate dialogue across these power groups. For instance, the use of briquettes from organic waste as the boundary object for project 1 helped to establish joint problem ownership, build mutual trust, and shift stakeholder discussions from individual interests and institutional roles to the desired

1 A boundary object is a theoretical tool that can help to understand how the various actors involved can cooperate on a project, despite having different and often conflicting interests.



change in the community. While the knowledge co-production process was steered by academics, the briquettes were the means to engage local knowledge holders, mainly women, in social learning on the local applications of SDG 7 (energy), 11 (cities) and 3 (health). They spoke of the briquette as a means of adjusting energy technology to their experience and their need for sanitation, waste management and employment. This is not possible with other energy sources such as cooking gas and electricity provided by government.

The conclusion was that since the organic briquette can contribute to the implementation of different SDGs including employment (SDG8), energy for all (SDG7), gender equality (SDG5), and healthy cities (SDG3 and 11), it provides the opportunity to redirect the power of knowledge generation into the hands of local communities. So it can be used as an object for circular learning on SDGs amongst scientists, policy actors and local communities. However, explicit effort is needed to interrupt the reproduction of unequal power relations and to enable circular learning and symbiotic relationships amongst knowledge bearers in co-production to come to fruition.

Producing organic briquettes in Kampala, Uganda.
Photo: Kareem Buyana

1

LIRA PROJECT

Making Global SDG Indicators relevant to local communities in Kampala (Uganda) and Nairobi (Kenya)



This project contributes to SDG1, SDG 2, SDG 3, SDG 7, SDG 11, and SDG 13

This LIRA project (2018–2020), led by Kareem Buyana at Makerere University, Uganda, focuses on scaling up the transformation of organic waste into energy briquettes as alternative cooking fuel for households. The project also works with the local briquette-making enterprise, communities and urban policy actors in Kampala and Nairobi to come up with appropriate SDGs indicators that fit into the local context. The project takes place in Bwaise III parish in Kampala, Uganda and Kahawa Soweto Kibera in Nairobi, Kenya. These are two informal urban settlements where low-income groups extract and add value to materials from the waste stream through the use of organic waste for nutrient recovery and production of energy briquettes.

Expertise and partners involved

This project brings together academic and non-academic actors. The academics include experts in urban sociology, geography, fine art, photography, community studies, and spatial planning from Makerere University and the University of Nairobi. The non-academic participants include policy actors from Nairobi and Kampala City Authorities, as well as local community groups: Kasubi Local Community Development Association in Kampala and Kahawa Soweto Youth Club in Nairobi.

Methods

The process of making the SDGs, specifically SDG 11 on cities and SDG 7 on energy, relevant to local communities started by establishing SDG studios in each city. Organized as seminar workshops, these studios brought together local community groups and policy actors to translate SDGs through visuals and storylines depicting local context. The SDG studios enabled the stakeholders to discuss meanings and interpretations of the images and storylines, and to share experiences and ideas in the context of SDG implementation.

This approach helped to mediate discourse on the integrated nature of the SDGs, while highlighting the (dis)connections between local and global measurements of sustainability in cities. This discussion with the communities and policy-makers led to the number of SDGs in consideration growing from

two (SDG 11 and 7) to six, including: SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good health), SDG 7 (clean energy), SDG 11 (sustainable cities), and SDG 13 (climate action). Locally appropriate indicators for these SDGs were jointly selected to align with local sustainability challenges and actions taken so far by the municipal authorities and local community groups (see below).

Results to date

After completing the SDG studios, the academics worked with policy actors from Kampala Capital City Authority (KCCA) and Nairobi City County to develop a five-step process for the local applications of SDGs. The five steps include:

1. Categorize or group applicable and inapplicable indicators.
2. Assess revisions required, based on the original intent of the indicator.
3. Revise, replace or alter the indicator language as locally appropriate.
4. Develop new indicators to align with local context.
5. Validate mapped proposed indicators to existing local and scalable solutions in the community.

These five steps were useful in prioritizing and relating the SDGs to indicators that speak to local contexts and to the experiences of local community groups, as shown below:

SDG	LOCAL-CONTEXT INDICATORS
SDG 1 (No poverty) ***	<ul style="list-style-type: none"> → Number of water service points in the neighbourhood → Level and source of household income → Available range of alternative house rentals → Tenure status
SDG 3 (Ensure healthy lives) **	<ul style="list-style-type: none"> → Proximity to healthcare per household → Type of diet per household → Money spent on medicines per household
SDG 2 (End hunger, achieve food security) **	<ul style="list-style-type: none"> → Number of meals per day → Type of food most consumed by household → Meal preparation time → Price of energy requirements for meal preparation
SDG 13 (Climate Action) **	<ul style="list-style-type: none"> → Changes in rainfall and temperature → Coldness or heat of day or month

SDG	LOCAL-CONTEXT INDICATORS
SDG 11 (Sustainable Cities and Communities) ***	<ul style="list-style-type: none"> → Number of users for each municipal service (water, health, education) → Reduction in health risks → Level of GHG emissions → Number of iron sheets required for roofing a decent home → Land tenure status → Reduced risk of relocation due to floods → Common property services by neighbourhood (quarries, wells, waste dumpsites)
SDG 7 (Sustainable Energy) ***	<ul style="list-style-type: none"> → Quantity and type of energy used → Access to alternative cooking energy → Price for each type of cooking and lighting energy → Energy mix per household → Adjustment practices used to manage energy shocks → Health effects of a given type of energy

Key: *** high priority; ** medium priority; * low priority SDG

Makerere University and the University of Nairobi, together with the local community groups, are planning to use the locally developed SDG indicators to assess the quality of services (e.g. roads, water, electricity, health, housing, security) provided to these communities.

The project also cultivated ties with the United Nations Economic Commission for Africa (UNECA), the National Planning Authority (NPA), and the Ministry of Lands, Housing and Urban Development in Uganda (MLHUD) to mainstream SDG 11 and the New Urban Agenda into the National Development Plan III (2020–2025) of the Republic of Uganda. The project contributed to the design of the Sustainable Housing and Urban Development Programme as a core component of the National Development Plan (2020–2025).

The project efforts have also resulted into two scientific articles:

- Buyana, K., 2019. Keeping the doors open: experimenting science–policy–practice interfaces in Africa for sustainable urban development. *Journal of Housing and the Built Environment*, pp.1–16. <https://doi.org/10.1007/s10901-019-09699-3>
- Buyana, K., et al., 2019. Experimentation in an African Neighborhood: Reflections for Transitions to Sustainable Energy in Cities. *Urban Forum* (Vol. 30, No. 2, pp.191–204). Springer Netherlands. <https://doi.org/10.1007/s12132-018-9358-z>

In 2019, the PI presented his research at the Shanghai Conference at the College of Architecture and Urban Planning, Tongji University, China; the UN High-level Political Forum on SDGs, New York; and the Annual Science Forum in South Africa.

2

LIRA PROJECT

Transforming Durban (South Africa) and Harare (Zimbabwe) in a changing climate

This project contributes to SDG 11 and SDG 13



Current, conventional adaptation agendas often take a narrow view of tackling climate risks and impacts. They operate within the current state of the socio-ecological system, not questioning the unsustainable or unjust aspects of this system. A transformational approach to adaptation has now emerged which recognizes the need to deal with the synergistic effects of climate change together with other drivers of global change (Colloff et al., 2017). This approach links such issues as justice, equality and inclusivity with the climate change agenda, and tries to address the root causes of societal vulnerabilities (Colloff et al., 2017; Pelling et al., 2015).

Using Durban (South Africa) and Harare (Zimbabwe) as case studies, this LIRA project (2018–2020), led by Alice McClure from the University of Cape Town, South Africa, seeks to better understand the potential of Transformational Adaptation (TA) in managing climate-related water risks through engagement with stakeholders.

The project draws on literature and concepts associated with climate change adaptation, transformation and transdisciplinarity. It aims to make a theoretical contribution to academic work and a practical contribution to decision-making in southern African cities by analysing data collected during transdisciplinary engagements, semi-structured interviews with a range of stakeholders and document analysis.

Expertise and partners involved

The project brings together multiple actors and types of expertise, including participants from water management, urban resilience, development studies, environmental anthropology, collaborative ethnography, urban climate adaptation, human geography, wetlands management and environmental management. eThekweni Environmental Planning and Climate Protection Department, eThekweni Water and Sanitation, GIZ, Zimbabwe National Water Authority and the City of Harare are key project partners.



Methods

Scientists and practitioners meet in carefully facilitated creative workshops called 'learning labs'. These labs provide a space to:

- ➔ co-explore characteristics of TA.
- ➔ select adaptation cases in Durban and Harare that showcase transformative characteristics.
- ➔ collectively assess their appropriateness to each city.
- ➔ investigate how the theoretical ideas of TA can be applied in southern African cities, unpacking the barriers, challenges and opportunities associated with implementing interventions that have transformative characteristics within these local contexts.

Through initial engagements in Durban, the 'Sihlanzimvelo' programme was identified as a case study with transformative characteristics, because it seeks to reduce climate risks through improving the ecological infrastructure of watercourses, while simultaneously supporting the development of small – to medium-sized businesses in the most vulnerable communities. The LIRA project plans to assess the TA potential of the Sihlanzimvelo programme in the context of the socio-economic objectives of Durban. The research team engaged with stakeholders at different levels of this programme (e.g. business co-ops, project implementors, project managers and visionaries) through learning labs, meetings, focus groups and interviews to understand *inter alia*:

Learning lab participants visit the Sihlanzimvelo intervention sites in Durban, South Africa. Photo: Alice McClure

- how the case compares with theoretical concepts of TA.
- pathways towards the transformative approach adopted.
- trade-offs that have been or will be made when working towards transformation.
- ways in which the case could be more transformative.

Results to date

Knowledge that has been generated so far includes *inter alia*: knowledge about the potential effects of climate change on frequency of floods in Durban, as well as responses to these; the benefits of ecosystems for reducing impacts of floods; and ways in which small – to medium – sized businesses can be linked to river ecosystems to promote river health and increase income for local communities.

Similar activities are planned to take place in Harare. However, the implementation process has so far been slower due to the political context. Fewer labs have been organized in Harare to date. Despite this, two case studies have been selected – Harare Wetlands Advocacy Project and the Urban Resilience project. Given the political context in Harare, the project had to shift its focus on stronger cross-city exchanges and learning, leading to participants from Harare taking part in the learning labs in Durban.

The project will also do a regional comparison and collate transferable lessons that will support the scaling up of TA within and between other African cities. Apart from producing context-specific knowledge on TA, the project aims to provide critical feedback to the TA literature based on practical experiences and on evidence that is being generated by interventions that are working towards transformation in these cities.

To date, the project has contributed to the development of the following knowledge products:

- O'Farrell, P., Anderson, P., Culwick, C., Currie, P., Kavonic, J., McClure, A., et al. 2019. Towards resilient African cities: Shared challenges and opportunities towards the retention and maintenance of ecological infrastructure. *Global Sustainability*. DOI: <https://doi.org/10.1017/sus.2019.16>
- Pretorius, L., Taylor, A., Lipinge, K., Mwalukanga, B., Mucavele, H., Mamombe, R., Zenda, S. and McClure, A. Knowledge intermediaries for urban climate adaptation: An embedded researcher approach in southern African cities (submitted) *Environment and Urbanization*.
- McClure, A. & Ziervogel, G. 2018. [How African cities' residents are creating climate change solutions](#). The Conversation Africa.
- [Working Paper: Pathways to transformative climate adaptation in southern African cities](#)
- [Project blog and video](#)

3

LIRA PROJECT

Bringing clean energy to informal settlements: co-designing sustainable energy solutions in Kenya, Uganda and South Africa



This project contributes to SDG 3, SDG 7, and SDG 11

Providing clean energy to urban informal settlements in Africa is a huge challenge. This LIRA project (2017–2019), led by Amollo Ambole from the University of Nairobi in Kenya, sought to provide integrated solutions to the household energy challenge and its related health outcomes in urban informal settlements in Kenya, Uganda and South Africa.

Expertise and partners involved

The research team brought together expertise from design thinking and social innovation; urban metabolism and renewable energy; urban sociology and gender mainstreaming; mechanical engineering; GIS mapping; and urban planning. The project engaged in research activities with various stakeholders in three countries. In Kenya: University of Nairobi; National Ministry of Energy in Kenya; Kenya Power company; Nairobi County Council; and community members from Mathare; in South Africa: Stellenbosch University; Stellenbosch Municipality; and community members from Enkanini; and in Uganda: Makerere University; Kampala National Planning Authority; and community members from Kasubi-Kawaala informal settlements. Development and funding agencies also took part including UNEP-South Africa; IDRC-Kenya, IRD-Kenya, SHOFCO and Slum Dwellers International.

This variety of academic disciplines and expertise required the research team to continuously seek a shared understanding of the complex challenge involved. This shared understanding was shaped by the realities of the informal settlement case studies. For instance, the researchers had to learn how informal energy service provision networks and existing mobilization channels were organized.

Methods

To gain an in-depth understanding of the energy-health nexus challenge in the case studies, the researchers worked with informal settlement dwellers as community co-researchers through:

- ➔ Household surveys of 100 households in Mathare Valley informal settlement (Nairobi, Kenya) and Kasubi-Kawaala informal settlement (Kampala, Uganda),

focusing on household energy access and use and their implications for housing, work and health issues. For comparative purposes, the survey instrument was similar in both cases, and was informed by a previous study in Enkanini informal settlement (Stellenbosch, South Africa). However, the researchers in each case engaged community co-researchers in inception workshops to contextualize the instrument.

- Participatory mapping exercises with Mathare and Kasubi-Kawaala community members focusing on energy access.

Using preliminary results from the field work, the research engaged additional stakeholders, including experts from the private sector and policy. These broader stakeholder interactions took place through co-design workshops and policy seminars in each country. In addition, the researchers from the three countries came together for a regional workshop in Nairobi to carry out a comparative analysis of the three case studies.

The main challenge that the researchers faced during the project was difficulty in securing the participation of stakeholders from the private sector, in particular from the energy sector, since the researchers did not previously have extensive private sector contacts. On the other hand, the researchers were able to engage closely with informal settlement dwellers as co-researchers due to their prior research experience in the informal settlement case studies. The downside of overreliance on existing networks was that it unintentionally led to a situation where the same group of participants attended most of the research activities, preventing a more balanced representation during the research process.

A visit of the field research areas in the Mathare settlement, Nairobi, Kenya. Photo: LIRA research team, University of Nairobi



Engaging stakeholders also required strong attention to ethical considerations. For instance, the community co-researchers had high expectations that the research would deliver immediate benefits. The researchers had to manage these expectations by making it clear that the research aimed at generating knowledge useful for identifying long-term solutions. In some cases, researchers had to use translations where participants did not understand technical terms or academic language. For example, some terms such as transdisciplinarity had to be described at length in Swahili in Nairobi and in Luganda in Kampala.

Results to date

From these multiple engagements, the project has proposed improved design and policy frameworks that would enhance national energy goals in the three countries, as well as contributing to the SDGs on health and wellbeing, gender equality, affordable and clean energy, and sustainable cities and communities. More specifically, the team proposed community driven innovation centres that would showcase suitable alternative technologies and provide a co-design space for stakeholders. In the Kenyan case study, the project proposed a product-service-system (PSS) model for promoting alternative technology adoption in the settlement, through affordable business services such as pay-per-use or shared services. In the Ugandan case study, the team proposed a business model that would enhance the use of community-produced briquettes and articulated a more efficient supply and distribution of briquettes within the community.

Overall, the transdisciplinary approach was useful for integrating methods and tools from different disciplines, as well as integrating academic and non-academic knowledge.

This integration was crucial in tackling the complexity of the energy-health challenge in the informal settlements. Specifically, community members appreciated the opportunity to voice their concerns to the policy actors. The experts and policy actors for their part used the engagements to articulate their positions. The researchers thus acted as mediators by integrating these concerns and positions to arrive at the proposed solutions.

The transdisciplinary approach required significant time and was intellectually challenging for the researchers. The two-year timeline of the LIRA study was insufficient for achieving tangible results such as behavioural change, technological advancement or policy development. The researchers thus sought additional funding to continue with their work, having concluded that the transdisciplinary approach is more appropriate in a long-term research partnership. The project leveraged additional funding for policy work from the International Development Research Centre (IDRC). Stellenbosch University supported the project with a two-year Post-doctoral Fellowship and project team mobility exchange.

To date, the project has produced the following knowledge products:

- ➔ Ambole, A., et al. 2019. Mediating Household Energy Transitions through Co-Design in Urban Kenya, Uganda and South Africa. *Energy Research & Social Science* 55 (May): 208–17. <https://doi.org/10.1016/j.erss.2019.05.009>
- ➔ Kovacic, Z., et al. 2019. Interrogating differences: A comparative analysis of Africa's informal settlements. *World Development* 122 (2019): 614–627. www.sciencedirect.com/science/article/pii/S0305750X19301792
- ➔ Policy brief: Mediating Household Energy-Health-Gender Nexus Transition Through Co-design and Policy Integration in Urban Africa
- ➔ [Project website](#) and [video](#)

In addition, the PI has presented the project results at several international fora, including: the UN Science Technology and Innovation Fora on Sustainable Development in 2018 and 2019 in New York; the Seedbeds of Transformation, 2018 in Port Elizabeth; the first UN-Habitat Assembly, 2019 in Nairobi; the Gates Grand Challenges annual meeting in Addis Ababa, Oct 2019, and the EVERYDAY design residency for energy stakeholders organized by Edinburgh University in Arusha in 2019. Furthermore, as a result of the transdisciplinary nature of the LIRA project, the PI was awarded a Rutherford fellowship by Leicester Institute of Advanced Studies, at the University of Leicester, UK.

Building on the LIRA project, the Kenya and South Africa project partners jointly applied for the Africa-UK trilateral research chair to further study the gendered dimension of energy innovation and explore commercialization opportunities for affordable energy technologies and services. In July 2019, the partners were awarded a five-year grant to collaborate with Brunel University as the UK partner. Going forward, the new collaborative team intends to establish the proposed innovation centres in the form of living labs in Kenya and South Africa to co-design gendered innovations and explore commercialization opportunities in alternative energy technology and services ([see here](#)).

4

LIRA PROJECT

Realizing the potential of urban density to create more prosperous and liveable informal settlements in Durban (South Africa) and Luanda (Angola)



This project contributes to SDG 11

This LIRA project (2018–2020), led by Justin Visage from Human Science Research Council, South Africa, seeks to generate knowledge for improving the quality of life in dense informal settlements in South Africa (Durban) and Angola (Luanda) through a coordinated plan of building housing upwards. A weakness of many existing upgrading programmes is that they focus narrowly on extending basic services and ignore the structural limitations of the current built form, including a lack of living space, inadequate streets for circulation, insufficient shared public spaces and a lack of facilities for micro enterprises or public services. African cities need to find ways to develop upwards rather than outwards, achieving a compact urban form in order to economise on land, improve connectivity, and make room for scale on infrastructure delivery.

Expertise and partners involved

The project has benefited from involvement of a wide range of stakeholders throughout the research life-cycle: from research design through to research co-production, which is currently in progress. The project brings together a transdisciplinary team of academics and practitioners from the Human Science Research Council, Development Workshop Angola, and Project Preparation Trust, eThekweni Municipality, including urban planners, economists, architects, project managers in construction and community-based planners.

Methods

Through a conceptual-framing workshop, the project brought together a diversity of stakeholders from local and national spheres of government, academics, practitioners, and NGOs and community-based organizations to share their insights and experiences of managing rapid informal densification. The workshop made use of online polling (i.e. real-time interactive audience participation) to capture a variety of perspectives and gauge levels of support. Smaller breakaway discussion groups were used to brainstorm core themes.



There were evident tensions in the objectives of different stakeholder groups, for example between accessibility and affordability, building standards and low-cost solutions, formalization and exclusion. Understanding these complexities and trade-offs was a critical component in arriving at a practical research agenda that balances core priorities and concerns. Another benefit of an open co-design process was in better positioning the project in relation to existing programmes of work such as a city-wide incremental upgrading programme in one of the case sites in Durban. Partnerships involving academics and practitioners have also helped to build credibility with local communities, and offered invaluable practical feedback on academic theories.

Parkington Informal Settlement, Durban, South Africa. Photo: Project Preparation Trust

Results to date

The transdisciplinary approach helped to focus the scientific outcomes on producing context-specific socio-technical knowledge. To transform technical know-how into workable solutions, stakeholders need to work together in addressing critical issues such as co-financing in the private and public realms, regulatory flexibility (affordability and safety) and community-based acceptance and coordination according to an agreed master plan. For example, focus group discussions on housing preferences revealed that there were some cultural aversions to apartment-style living, with a preference for rental through kinship. This impacts on the position of the stairway when designing a family unit. Similarly, mitigating against the risk of fire was a critical factor in a person's willingness to invest in their structure.

The project has come up with some innovative designs for low-cost multi-storey housing for reshaping the physical form of these settlements. It involves

timber-frame housing which is lightweight and able to cope with variable geotechnical conditions; is fire retardant; can be raised off the ground to avoid waterlogging; can be built on stilts to avoid slope destabilization; and uses materials and methods that local people can build with. The end goal will be to pilot a community-driven process of 'reblocking' and to deliver the new housing type according to a shared master plan.

By combining ideas and expertise from the fields of architecture, urban planning, and economics, the project offers a more holistic approach to informal settlement upgrading.

In Durban, the outputs of the research process feed into the city's 'iQhazai Lethu' Updating Partnership programme, which seeks to institutionalise an incremental in-situ upgrading policy. Similarly, the project partner in Angola, the Development Workshop, contributes to reviewing the National Housing Policy for the Ministry for Urbanisation and Territorial Planning. Academic outputs so far are still under review and include a journal article on the relationship between density and informal settlement upgrading, and a book chapter on the role of informal settlements in rural-urban migration, to be published in 2020. The research was profiled at different events in 2019, including the UN Habitat National Housing Policy Conference, Luanda and the Public Sector Economic Forum.

5

LIRA PROJECT

Assessment and characterization of volcanic and flood hazards and their health implications in Goma (Democratic Republic of Congo), Buea and Limbe (Cameroon)



This project contributes to SDG 3 and SDG 11

This LIRA project (2017–2019), led by Mabel Nechia Wantim from the University of Buea, Cameroon, seeks to assess the risks of natural disasters such as volcanic earthquakes and floods in Goma (Democratic Republic of Congo), Buea and Limbe (Cameroon), as well as the health implications of these hazards, in an attempt to reduce risks to the cities' vulnerable populations. A project video can be found [here](#).

Goma, Limbe and Buea are all significant urban areas located within active volcanic centres on the African continent. Goma is situated at the flanks of Mount Nyiragongo – the second most active volcano in the East African Rift System. And Limbe and Buea are found at the flanks of Mount Cameroon – the most active volcano along the Cameroon Volcanic Line. Millions of people have been affected by lava flows, toxic gas emissions, landslides, floods, and eruptions due to volcanic activity in these regions in the past, and have faced enforced evacuation, starvation, disease, damage to the local environment, and social and economic disruption.

Expertise and partners involved

The project brings together the University of Buea, Cameroon; the Goma Volcano Observatory (OVG), DR Congo; the Buea Council; Limbe City Council; Goma Municipal Council; traditional rulers in Limbe; media (Cameroon and Goma); religious leaders; the Ministry of Health in Cameroon; and the communities (indigenous and migrant) in Buea and Limbe. During the project proposal development stage, the PI brought together relevant policy-makers and communities to define research questions that reflected community needs. This process also helped to strengthen the project's ownership by communities and policy-makers. For instance, the Universities of Buea and the Goma Volcano Observatory (OVG) decided to provide office and laboratory space and equipment to project members to carry out their research. The City Councils provided human resources to support the implementation of activities aimed at flood management in the cities. They also provided the venues for the project workshops. Health authorities facilitated collection of hospital data needed for the study.

Methods

To evaluate the effects, perceived risk, and coping strategies of people exposed to volcanic activities and floods in the three cities, the LIRA project initiated the development of a database of these hazards. The data was collected through questionnaires, semi-structured interviews, hospital data and focus group discussions in these three cities for selected major past eruptions. The data collected comprised both scientific and indigenous knowledge. The other set of questionnaires focused on the effectiveness of preparedness and response strategies that have been put in place by the City Councils in these cities to mitigate the impacts of natural disasters.

Building on the findings of these surveys, the project organized a series of capacity building workshops with vulnerable populations in the three cities to raise awareness on the health impacts of natural hazards, to learn about existing local coping strategies and to discuss how these strategies can be improved to minimise the health impacts. Local communities, representatives of municipalities, health personnel, academics, local chiefs and media attended these workshops. Following these training workshops, the City Councils and community chiefs agreed to sensitize further populations to the flood and volcano risks and coping strategies.

One of the key project learnings is that people's perception of hazards is strongly tied to indigenous knowledge and that this needs to be taken into account when developing coping strategies. For instance, the indigenous people believe that volcanic eruptions are mystical and are spurred by spirits or 'gods' when they get angry. However, integrating indigenous knowledge is challenging for scientists. In this process, power dynamics need to be dealt with carefully. For instance, the traditional rulers complained that the City of Limbe undermined their authority by instructing the communities in the case of a disaster to follow the recommendations of the government-appointed

Manual mechanical dredging is carried out by the Limbe City Council, Cameroon, as a means of flood prevention and mitigation. Photo: Courtesy of Mabel Nechia Wantim and the LIRA project team in Cameroon



person and not to listen to the rulers. Engaging media should also be done carefully. Following the workshop in Limbe, a newspaper article was published with a title 'Experts warn of possible volcanic eruption in 2020.'

Results to date

Despite the challenges, this project has resulted in increased awareness among the affected communities of natural disasters and their health-related impacts; improved relationships between policy-makers, communities and researchers; and capacity-building of Masters students – three Masters theses have been defended. In 2019 the project, together with engineers, architects, seismologists, mayors and traditional rulers, developed an official building code for the earthquake-prone region of Mount Cameroon, based on analysis of the intensities of historic volcanic earthquakes.

Researchers' skills in monitoring precursory volcanic activity were strengthened through participation in international training courses. The PI was also invited to attend several UN conferences on Disaster Risk Reduction.

6

LIRA PROJECT

Integration of housing and health policies for inclusive, sustainable African cities

This project contributes to SDG 3 and SDG 11



Using Cape Town, South Africa, and Douala, Cameroon, as case studies, this LIRA project (2018–2020), led by Tolu Oni from University of Cambridge School of Clinical Medicine, UK, and the University of Cape Town, South Africa, seeks to develop a practical health and housing-integrated collaboration model that will improve urban policymaking and governance for the planning of African cities. The project brings together academic and non-academic stakeholders representing a range of expertise: public health, health geography, urban planning, and demography.

Methods

The research is conducted in two phases. Phase one explores existing policies and governance structures in Cape Town and Douala through desktop research and in-depth interviews with government officials. The aim is to identify synergies, shared benefits and collaboration opportunities between government bodies and policies in housing and health. Using stakeholder engagement, phase two works with policy partners to investigate approaches to integrating quantitative data across government sectors to inform future evaluation of the health impact of housing interventions for the urban poor in Cape Town and Douala. The engagement process is documented in an article which is currently under review.

The emerging results so far point to an overall willingness for and interest in collaboration between these sectors. However, collaboration is hampered by narrow perceptions of the definition of health and housing and by the roles and responsibilities of the relevant sectors; and by siloed mandates that do not align performance indicators with aspirations of intersectoral collaboration for health and wellbeing.

The concept for this LIRA project was developed through consultative workshops. The first workshop, in Cape Town, brought together researchers across different disciplines whose work was related to health directly or indirectly. Prior to the workshop, attendees completed a survey to detail key aspects of their research and their perspective on how this related to urban health. During the workshop, the existing evidence and knowledge gaps were iteratively discussed, culminating in the identification of key research gaps for urban health in Africa (Oni et al., 2016).



This was followed by a second workshop in Cape Town, to which senior policy representatives from a wide range of government departments (including health, education, environmental affairs, human settlements and public works) were invited. The purpose of this workshop was to hear from a range of policy sectors on their current and upcoming priorities, ongoing work addressing these priorities, and potential areas of overlap with the research gap identified by the researchers. This iterative process resulted in identifying a research agenda on integrating health and housing policies, and raised awareness of existing activities across different departments.

Similar activities took place in Douala. A workshop brought together local academics and representatives from national and local government, the private sector, and civil society. They explored experiences of intersectoral action between the health and planning sectors, understandings of key urban challenges, and implications for health. The process of engaging these actors has been documented in an article, which is currently under review.

The LIRA project team at the stakeholder engagement workshop in Douala, Cameroon. Photo: Tolu Oni

Results to date

Following these workshops, a [policy position paper](#) calling for bolder action on health in Africa was developed and presented at the Second WHO Africa Health Forum to influence policy discussion. Furthermore, the project developed recommendations for action to break down non-communicable disease silos in Africa. The project is also partnering with the World Health Organization Regional Office for Africa to develop training tools for intersectoral action for health that will be used by the WHO Healthy Cities Initiative.

To date, the following knowledge products have been developed by the project:

- ➔ Oni T, Mogo E, Ahmed A, et al., (2019). Breaking down the silos of Universal Health Coverage: towards systems for the primary prevention of non-communicable diseases in Africa. *BMJ Global Health* 2019;4:e001717. <http://dx.doi.org/10.1136/bmjgh-2019-001717>
- ➔ Oni T, Kockat J, et al., (2019). The healthcare community needs to champion healthy and sustainable urban living spaces. *BMJ* June 2019. <https://bit.ly/340kfmz>
- ➔ Weimann A and Oni T, (2019). A Systematised Review of the Health Impact of Urban Informal Settlements and Implications for Upgrading Interventions in South Africa, a Rapidly Urbanising Middle-Income Country. *Int. J. Environ. Res. Public Health* 2019, 16(19), 3608. <https://doi.org/10.3390/ijerph16193608>
- ➔ J Vearey, I Luginaah, NF Magitta, DJ Shilla, T Oni. Urban Health in Africa: a critical global health priority. *BMC Public Health*. 2019 Mar 25;19(1): 340. <https://doi.org/10.1186/s12889-019-6674-8>
- ➔ Ebikeme C, Gatzweiler F, Oni T, Liu J, Oyuela A, Siri J. Xiamen Call for Action: Building the Brain of the City-Universal Principles of Urban Health. *Journal of Urban Health*. 2019;96(4): 507–50. <https://doi.org/10.1007/s11524-018-00342-0>
- ➔ [Project blog](#)

The PI was invited to give a public lecture at the conference Hacking the Future; new ideas for an urban era, Cape Town, June 2019 and to present her research at the Gates Grand Challenges annual meeting in Addis Ababa, October 2019. The engagement with different partners also helped to leverage additional funding that enabled the expansion of the Cape Town workshop to a pan-African focus.

7

LIRA PROJECT

Co-producing urban knowledge in Angola and Mozambique through community-led data collection



This project contributes to SDG 11

This LIRA project (2018–2020), led by Sylvia Croese from the African Centre for Cities at the University of Cape Town, South Africa in collaboration with the NGO Development Workshop (DW) Angola and the Centre for Policy Analysis at Eduardo Mondlane University, Mozambique, seeks to establish more inclusive and innovative approaches to data collection for the monitoring and implementation of the Sustainable Development Goals in Luanda (Angola) and Maputo (Mozambique).

The project focuses on generating data on the indicators of SDG 11 ‘to make cities and communities more inclusive, safe, resilient and sustainable,’ in three selected peri-urban settlements in each city. The aim is to use this data to inform more sustainable and participatory urban planning and policymaking. The project is designed to address the shortage of city-level data and the lack of platforms and mechanisms through which this data can be shared and used in context-specific ways. It is intended to create and strengthen local knowledge (co-) production and experience sharing amongst different stakeholders, within as well as between the cities of Luanda and Maputo.

Expertise and partners involved

In order to raise awareness of the SDGs and the project, and to discuss the research design and questionnaires, a range of different stakeholders was engaged in the inception phase of the research. In Luanda, these included local UN office representatives and government officials, representing the National Office of Statistics, the Urban Upgrading Office for Luanda (GTRUCS) and the Ministry of Planning and Housing, as well as local municipal administrations, NGO representatives and academia. In Maputo, stakeholders included local UNDP and UN Habitat office representatives and government officials, specifically the SDG focal persons appointed within the Ministry of Economy and Finances, the National Office of Statistics, as well as the National Association of Mozambican Municipalities (ANAMM). At the neighbourhood level, the research teams worked with university students, community members and local resident committee representatives.

Methods

The research methods employed included participatory mapping exercises, focus groups, one on one meetings and interviews with key informants, and survey work using GIS-enabled tablets, resulting in a total of 1,285 surveys. Community and stakeholder workshops were used to present, discuss and validate the research questions and findings.

In both cities, the project attracted both interest at national government level and active participation by the community. However, a challenge was to bring in the municipal government as a partner in the research. In Luanda, this was because the ability of municipal governments in Angola to plan and implement urban interventions remains limited (although recent decentralization reforms have given them more responsibilities). In Mozambique, decentralization of power to the local level is more advanced, but the local elections that took place during the research resulted in changes in local leadership, making it difficult for the research team to engage the right people.



Overall, the research findings pointed to the need to adapt and localize SDG targets with indicators that are appropriate at the local level, and to the need to support and learn from community solutions to local challenges. The final phase of the project therefore focuses on the ways in which the project data and findings can contribute to policy-making and implementation for the SDGs at the city level. A knowledge exchange event with the National Association of Municipalities in Mozambique (ANAMM) was organised in Luanda.

Focus group discussion
in Maputo, Mozambique.
Photo: Sylvia Croese

Results to date

In both cities, the project contributed to increased knowledge and understanding between research actors and stakeholders. These relate both to the SDGs and to the need for more inclusive and bottom-up ways of generating, monitoring and evaluating knowledge and interventions. The project activities also led to productive relationships with the National Association of Mozambican Municipalities, the United Cities and Local Governments Association (UCLG) and the UN agencies in both countries. The project also contributed to training on SDG localization for local governments in Maputo. This training was held to inform the preparation of Mozambique's first Voluntary National Review on the SDGs, which will be presented to the United Nations in 2020.

To date, the project has developed the following outreach products: project [presentations](#) (in Portuguese) delivered at Development Workshop Angola; [blog](#); and [video](#). The project presented its work at the International Conference for Sustainable Development at Columbia University in September 2019. The PI was a lead author of the fifth UCLG [report](#) with a focus on the localization of global agendas in Africa.

Using a transdisciplinary approach helped the research team to have a better understanding of local needs and realities, and of the ways in which the SDGs are interlinked in practice. However, co-producing locally grounded knowledge requires time, effort and an ability to engage with different actors, who all have different interests and expectations. It was crucial to be open to incorporating change and new learning into the research process on a continuous basis. Further funding opportunities are being sought to extend the work to other cities in the same countries, and for supporting the monitoring and implementation of specific policy interventions.

8

LIRA PROJECT

Citizen science for improved air quality in Nairobi and Addis Ababa

This project contributes to SDG 3, SDG 7 and SDG 11



This LIRA project (2017–2019), led by Philip Osano from Stockholm Environment Institute in Kenya, seeks to identify and increase awareness of air pollution hotspots in Nairobi, Kenya, and Addis Ababa, Ethiopia, through citizen science. The project contributes to national air quality, health and energy development priorities in Kenya and Ethiopia, as well as to the SDGs 3 on health, 7 on clean energy and 11 on cities and human settlements.

A team of early-career researchers from Nairobi, Kenya, and Addis Ababa, Ethiopia, are investigating whether citizen science – in which non-scientists and amateurs participate in research – can help to identify solutions for improved air quality in Mukuru, the third largest informal settlement in Nairobi. With a population of more than 100,000 squeezed into just 260ha of land, Mukuru’s community faces challenges similar to those faced in many informal settlements: extreme overcrowding, and poor sanitation and water services. The air quality has worsened over the years, but there is little or no information on the scale of the problem and its impact on the inhabitants of the area.

Expertise and partners involved

In order to get a deeper understanding of this complex problem, a team of researchers and practitioners from the Stockholm Environment Institute Africa (SEI), APHRC (African Population and Health Research Center), the University of Nairobi, Slum Dwellers International Kenyan Chapter, and the Horn of Africa Regional Centre and Network (HOAREC) in Ethiopia work with the communities to co-produce knowledge that will respond to the communities’ and policy-makers’ needs to address air pollution in Nairobi and Addis Ababa. These researchers have trained some residents and given them portable Particulate Matter (PM) sensors to assess their exposure to both indoor and outdoor air pollution.

Besides moving around with the portable sensors, the trained community members participated in focus group discussions and qualitative interviews through household surveys, in order to better understand indoor and outdoor air pollution and their health impacts. In the process, these community members are also sharing information with fellow residents, and with policy-makers in Nairobi and Addis Ababa. They are also raising awareness of the potential health impacts of air

pollution. Some of the citizen scientists are community health workers (CHWs) – people from the community, mostly women, who have been trained as paramedics by the Ministry of Health to assist with health outreach services among local residents. These CHWs are now helping to educate others on how to avoid being exposed to air pollution. This forms part of their routine health education visits to families, through a programme funded by the Health Departments.

The involvement of community members, policy-makers, industry groups (such as the Kenya Association of Manufacturers), and civic associations (such as the Kenya Alliance of Residents Association and the 100 Resilient Cities Network in Addis Ababa) facilitates the framing of relevant solutions. Alongside practical actions to reduce exposure, knowing more about the sources and risks of pollution has enabled the community to speak up about air pollution. Denis Waweru, one of the research community members involved in project implementation in Mukuru, won the national photography competition organized by the National Environment Management Authority to mark the 2019 World Environment Day celebration.

However, engagement with different stakeholders can be a challenging process, especially when managing stakeholders' expectations. The key lesson the team has learnt is that it is important to understand the incentives for communities, industry and regulatory authorities to be part of the research process, and to be honest with them about the project boundaries. It is also important to be prepared to manage conflicts at different levels (e.g. between community and industry, between institutions with overlapping mandates, between sub-national and national agencies). Another challenge is to coordinate with other ongoing projects and programmes for increased impact. It is important to take advantage of windows of opportunity, especially in policy, and this requires flexibility and skills to build new alliances.

Citizen scientists in Mukuru, Kenya, monitor particulate matter. Photo: William Apondo/SEI



Results to date

For the research team the involvement of different interest groups, while challenging, has already helped to generate interest in their findings. The results of the PM measurements have been included in the status report for the Nairobi City County's Mukuru Special Planning Area project. The research and practitioner teams are also involved in the preparation of the Air Quality Policy and Air Quality Action Plan for Nairobi City, which is being developed by the Nairobi City County Government, besides contributing to national air quality management plans and to the air quality assessment for health and environment policies in Ethiopia coordinated by UNEP. Building on the project outcomes, the team intends to establish an East African Air Quality Management platform.

Jointly with the Ministry of Environment and Forestry and the Kenya Medical Research Institute, the project co-hosted the Health, Environment and Climate Change Conference in December 2019, raising awareness of integrated planning for air pollution and climate change. The project also organised a Nairobi air pollution roundtable in 2019, focused on sharing existing science and policy and exploring future collaboration to combat air pollution in the region. In 2019, the project team organized capacity-building training on air quality management for 30 environment and health technical officers from the Nairobi City County Government.

The project was represented at the United Nations Environment Assembly in 2017 and 2019 and at Sida Science Day in 2019. The project has also developed a [blog](#) and videos to raise awareness on the pollution challenges (see '[Unchecked Injustice](#)' and '[Nyongwa: Smoke chokes](#)'). Two newspaper articles about research were published in the Daily Nation. Several academic articles are currently under development.

WHAT CAN KNOWLEDGE CO-PRODUCTION OFFER TO THE IMPLEMENTATION OF THE SDGS?

The 2030 Agenda calls for all stakeholders – government, academia, civil society, the private sector and others – to contribute to its implementation. The 17 SDGs further emphasize the critical role of global partnerships and cross-sector collaboration in project implementation. Despite this, global challenges are still managed through traditional organizational structures in government, planning and academia. Each of these often acts in a siloed manner. The preliminary findings of the LIRA projects demonstrate that knowledge co-production, if managed carefully, can contribute to breaking down this silo mentality at the city level by providing space for dialogue, learning and collaboration across different project partners. For instance, one of the LIRA projects in South Africa developed [recommendations](#) for action to break down silos when dealing with non-communicable disease in Africa (see project 6, Oni et al., 2019). In this project, knowledge co-production enabled researchers to have the convening power needed to bring multiple actors together around a common agenda, and to nurture cross-sectoral relationships.

Knowledge co-production also makes research on the SDGs issue-oriented rather than sector-focused. For example, researching energy solutions for better health and housing in Kampala and Nairobi yielded results and policy messages that catalysed collaboration across health, energy, housing and engineering design sectors (see projects 1 and 3).

Other benefits that knowledge co-production offers for the implementation of the SDGs include:

- ➔ **Testing new partnerships' relevance to the local context:** The LIRA projects explore new possibilities for engaging within and across different institutions. They test the ability of new partnership configurations to create place-based responses to urban challenges. For instance, one of the LIRA projects uses learning labs as a creative space for bringing together scientists and practitioners in Durban and Harare to co-explore and assess characteristics of transformative adaptations to climate change, and to select adaptation practices that are appropriate to these cities (see project 2). This project has observed that transdisciplinary research is a *'warm rather than cold extractive'* process because it requires empathy

and humility from everyone involved, thereby truly valuing different knowledge. If managed properly, this type of research could lead to trust-building between different actors. It can also foster social and institutional learning, capacity development and cross-sector relationship-building. Ultimately, this may stimulate the transformation of existing institutional structures and processes within universities and among partners from government and local communities.



- **Localizing the SDGs, and increasing the responsiveness of communities to the global agenda:** Knowledge co-production also helps localize global ambitions. The LIRA project in Kampala harnessed knowledge from community-based organizations to devise a methodology for localizing the SDG indicators (see project 1). Together with policy actors from Kampala Capital City Authority (KCCA), this project co-created a five-step process to mediate social learning on the application of SDG indicators, thus increasing the responsiveness of communities to the global agenda. Furthermore, involving communities in the research process increases the influence of research and the likelihood of it being applied.
- **Making interconnectedness between the SDGs more visible:** These projects refocus urban development thinking onto the broader challenges at stake rather than on individual actors or sectors. As the LIRA projects show, knowledge co-production helps to identify linkages and synergies across different SDGs and to assess potential co-benefits and trade-offs. These can lead to coherent and mutually reinforcing policies on urban development (see projects 1, 3 and 8).

Localizing the SDGs in Kampala, Uganda. Photo: Kareem Buyana

- **Generating knowledge more relevant to the context:** By working with different stakeholders, knowledge co-production leads researchers to a better understanding of local needs and interests. Gaining a holistic understanding of local problems in turn helps them to co-produce relevant and locally grounded knowledge and solutions. The project in Mukuru demonstrates that involving the people affected by air pollution promises a deeper understanding of the problem, but also enables the co-creation of solutions that are relevant to the affected communities, and policy actions that are owned and driven by government institutions (see project 8). The transdisciplinary approach reinforces the collective agency of stakeholders to co-produce change and to build stakeholder commitment. More generally, through knowledge co-production, society plays a more active role in shaping the direction of research and innovation, thus making it more relevant.
- **Making the knowledge production process more inclusive:** Knowledge co-production tries to promote participation of groups that are often silenced and formally excluded in the articulation of how the SDGs can be implemented at neighbourhood and city level. Most of the LIRA projects work with informal settlements. Several engage women-led and youth-led local community organizations, to seize their learning and scale up the potential of small-scale innovation in local communities. Through LIRA projects, community values, constraints, realities and aspirations are integrated in the knowledge production process. This is resonant with the principle of Leaving No One Behind in the implementation of SDGs.
- **Leveraging expertise, skills and resources:** Working with different disciplines and stakeholders within and between cities is enriching. Research teams that combine scientists from different academic disciplines are better equipped to manage the complexity of the real world. By listening to others, scientists and non-academic stakeholders can broaden their perspectives, align visions and build relationships across sectors for more effective responses. Research partnerships between academics, policy experts and practitioners can enhance the ability to integrate different forms of applied and theoretical knowledge. It also gives researchers new expertise and skills. The long-standing experience of Development Workshop, an NGO based in Angola, in urban development was one of the key enabling factors that helped to generate trust amongst key stakeholders and communities in Luanda in project 7.

Furthermore, involving policy-makers and communities in the research design phase can help position the research project in relation to existing initiatives. For instance, the LIRA project in Durban got involved with the Durban's incremental upgrading policy, with a potential to pilot its proposed housing design (see project 4). LIRA projects in Kenya, Congo and Cameroon show that collaborative research processes have a better chance of leveraging resources, know-how, access to data, and co-operation amongst stakeholders in moving to actual implementation (see projects 3 and 5).

CONCLUSION

Strengthening science capacity to lead sustainable development in African cities

On the basis of our learnings across the LIRA projects, a number of fundamental shifts have been identified that should take place in academic and funding institutions to enable scientists in Africa to respond to the challenges and opportunities of sustainable urban development.

- The challenges and opportunities that arise from urban development are emergent and dynamic. To support relevant and responsive research, **universities and research institutions need to become more reflexive and more able to shift research agendas in the light of societal and policy needs.** Novel, collaborative efforts between researchers, decision-makers and communities should be framed by a new research agenda. This agenda should respond to the challenges and opportunities of urban African contexts, oriented towards solutions that support policies in line with the implementation of the SDGs.
- **Academic institutions must interface with cities and city actors to create more learning spaces.** This is a difficult task, considering the traditional, hierarchical structures of most of these bodies. But it is necessary in a rapidly changing world. LIRA projects provide space for cross-sector dialogue and reflection, knowledge exchange, learning and action for realizing the SDGs in African cities. However, these efforts need to be scaled up.
- **Research questions on urbanization in Africa should be strongly rooted in a specific place, and framed by the local context.** Although many transferable frameworks and tools for generating knowledge are relevant in African contexts, new African framings and theories for research inquiry are needed to grasp the problems and solutions at hand. This approach should co-exist alongside research concerns that stem from international perspectives.
- To inform sustainable urban transformation, **science needs to draw from different disciplines and link directly with practice and policy-making.** This requires proactive engagement by scientists. To work effectively together, scientists as well as other actors will have to step out of their comfort zones and to take time to learn the language and professional culture of different stakeholders, and to align terminologies, timeframes and agendas. This requires time, skills and resources (Schneider et al., 2018). Current institutional frameworks are not designed to support the knowledge co-production process. Training courses on knowledge co-production, facilitation, negotiation and communication skills are often not part of a teaching curriculum. Opportunities for transdisciplinary career development are still rare. Universities and funding agencies need to create enabling conditions to support those who want to

create social change, or who wish to work at the interface between knowledge production and its application in real-world situations.

- **New metrics for research evaluation that formally recognize this type of work** should be introduced by academic and funding institutions. Research evaluation procedures are currently dominated by a few quantitative indicators such as number of papers published, citations, and the h-index. These metrics often leave out the societal relevance of research and omit diverse approaches to creating knowledge about social problems (Durose et al., 2018). They fail to reflect transdisciplinary achievements. Publishing transdisciplinary research also takes more time. In addition, transdisciplinary engagement may not always lead to academic papers. As a result, scientists may be disincentivized from undertaking transdisciplinary research if it may harm their career development in the current 'publish or perish' culture.

Academic institutions and funders should formally recognize transdisciplinary research, ensure that it leads to academic career development, and create an enabling environment for it. Acknowledging and rewarding the non-academic outcomes of transdisciplinary work, such as social and institutional learning, capacity development, public engagement, and relationship building, would encourage more solutions-oriented research. Furthermore, **more journals focused on transdisciplinary research should be created**, as the number of journals that currently publish this type of work is still limited.

- **Funding mechanisms should be flexible enough** to accommodate changes that occur during the transdisciplinary research process, which is emergent in nature. There should be resources for activities that may not directly be linked to research, such as communications, network – and community-building and public engagement. To fully realize the benefits of collaboration, knowledge exchange and learning across universities and cities in Africa, existing administrative barriers preventing funds transfers across borders and universities need to be overcome.
- Given the complex and evolving nature of urban challenges, **the way that research is funded needs to change**. The LIRA projects are funded over two years. This is not long enough to put the knowledge generated into use. To witness long-term transformative change in cities, research projects and their funding would need to be sustained over longer periods of time. Having invested resources in building networks, capacities, partnerships and communities of practice, it is important to consider what happens when projects end. With no sustained funding for transdisciplinary research, there is a risk that once projects end, researchers and stakeholders go back to their disciplines and domains, perhaps with a detrimental effect on transdisciplinary urban scholarship. This would also diminish the impact of investments made in building trust and partnerships, and more importantly, leave participants with the sense of not fully accomplishing what they intended to do. **Funding urban research must therefore be a long-term process**. This is why we call for creation of a long-term research programme on sustainable urban development, to be led by an Africa-based institution or institutions.

→ **Courses on transdisciplinary research, applied research and applied scholarship should become part of undergraduate and postgraduate education, to prepare scientists and practitioners to work across sectors and disciplines.** Mobilizing varied stakeholders who are used to operating in a siloed mode, building trust between them, and creating new forms of collaboration, require strong interpersonal skills. Scientists running transdisciplinary projects often have to manage power dynamics, tensions, and varying agendas and expectations. They must take decisions about how and when to include and exclude the voices of different stakeholders. Furthermore, these projects are more complex than conventional ones. Scientists who run them need solid management skills and at least a basic understanding of finance. Therefore, courses should be introduced which prepare scientists to effectively lead engagement with a range of stakeholders, equipping them with tools and skills in areas such as facilitation, mediation, negotiation, communication, and project management.

In conclusion: **the building of scientific capacity, especially of the next generation of scholars, to co-produce knowledge on sustainable urban development needs to be an ongoing, long-term process.** This will ensure that urban science is geared towards transformative change, and is accountable to its role in shaping cities. In the 21st century, knowledge co-production is an inevitable feature of modern society that cannot *not* happen (Miller et al., 2018). The next generation of African scholars needs to be prepared to lead it.

LIRA transdisciplinary research training in Abidjan, Côte d'Ivoire. Photo: CMAPPING



REFERENCES

- Arfvidsson, H., Simon, D., Oloko, M., & Moodley, N. (2017). Engaging with and measuring informality in the proposed Urban Sustainable Development Goal, *African Geographical Review*, 36:1, 100–114. DOI: [10.1080/19376812.2015.1130636](https://doi.org/10.1080/19376812.2015.1130636)
- Broto, V. C., & Bulkeley, H. (2013). A survey of urban climate change experiments in 100 cities. *Global environmental change*, 23(1), 92–102. DOI: <https://doi.org/10.1016/j.gloenvcha.2012.07.005>
- Buyana, K. 2019. Keeping the doors open: experimenting science–policy–practice interfaces in Africa for sustainable urban development. *Journal of Housing and the Built Environment*, 1–16. DOI: <https://doi.org/10.1007/s10901-019-09699-3>
- Colloff, M.J. et al., (2017). An integrative research framework for enabling transformative adaptation. *Environmental Science & Policy*, Volume 68, February 2017, 87–96. DOI: <https://doi.org/10.1016/j.envsci.2016.11.007>
- Djenontin, I.N.S. & Meadow, A.M. (2018). The art of co-production of knowledge in environmental sciences and management: lessons from international practice. *Environmental Management* (2018) 61: 885. DOI: <https://doi.org/10.1007/s00267-018-1028-3>
- Durose, C., Richardson, L. & Perry, B. (2018) Craft metrics to value co-production, *Nature Comment*, DOI: [10.1038/d41586-018-06860-w](https://doi.org/10.1038/d41586-018-06860-w)
- Ferguson, J. (2005). Bridging the gap between research and practice. *Knowledge Management for Development (KM4D) Journal* 1 (3): 46–54.
- Hadorn, G. H., Bradley, D. et al. (2006). Implications of transdisciplinarity for sustainability research. *Ecological Economics*, 60 (2006), 119–128. DOI: [10.1016/j.ecolecon.2005.12.002](https://doi.org/10.1016/j.ecolecon.2005.12.002)
- Horton, P. & Garrett W. Brown, G.W. (2018). Integrating evidence, politics and society: a methodology for the science-policy interface. *Nature*, Palgrave Communications volume 4, Article number: 42 (2018). DOI: [10.1057/s41599-018-0099-3](https://doi.org/10.1057/s41599-018-0099-3)
- Kates, R.W., Clark, W.C. et al. (2001). Sustainability Science, *Science*, 292 (2001), 641–642. DOI: [10.1126/science.1059386](https://doi.org/10.1126/science.1059386)
- Kovacac, Z., Musango, J.K., Ambole, L.A., Buyana, K. et al. (2019). Interrogating differences: A comparative analysis of Africa’s informal settlements. *World Development*, 122, 614–627. DOI: <https://doi.org/10.1016/j.worlddev.2019.06.026>
- Lang, D., Wiek, A., Bergmann, M., et al. (2012). Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science*, 21 (2012). DOI: <https://doi.org/10.1007/s11625-011-0149-x>
- Lawrence, R. (2015). Advances in transdisciplinarity: epistemologies, methodologies and processes. *Futures* 65 (1): 1–9. DOI: <https://doi.org/10.1016/j.futures.2014.11.007>
- Lwasa, S. (2014). Managing African urbanization in the context of environmental change. *INTERdisciplina*, 2(2). DOI: <http://dx.doi.org/10.22201/ceiich.24485705e.2014.2.46528>

- Miller, C.A. & Wyborn, C. (2018). Co-production in global sustainability: Histories and theories. *Environmental Science & Policy*. DOI: <https://doi.org/10.1016/j.envsci.2018.01.016>
- Nagendra, H., Bai, X., Brondizio, E. S., & Lwasa, S. (2018). The urban south and the predicament of global sustainability. *Nature Sustainability*, 1(7), 341. DOI: <https://doi.org/10.1038/s41893-018-0101-5>
- Oberndorfer, E., Lundholm, J., Bass, B. et al. (2007). Green roofs as urban ecosystems: ecological structures, functions, and services. *BioScience*, 57(10), 823–833. DOI: <https://doi.org/10.1641/B571005>
- Oni, T. et al., (2016). Urban Health Research in Africa: Themes and Priority Research Questions. *J Urban Health*. 2016 Aug; 93(4): 722–730. DOI: www.ncbi.nlm.nih.gov/pmc/articles/PMC4987583/
- Oni, T., Mogo E, Ahmed A, et al. 2019 Breaking down the silos of Universal Health Coverage: towards systems for the primary prevention of non-communicable diseases in Africa. *BMJ Global Health Journal*, August 2019. *BMJ Global Health* 2019;4:e001717. DOI: <https://gh.bmj.com/content/4/4/e001717.full#F1>
- Parnell and Pieterse, 2014. Africa's Urban Revolution. Zed Books Ltd.
- Patel, Z., Greyling, S., Simon, D. et al. (2017). Local responses to global sustainability agendas: learning from experimenting with the urban sustainable development goal in Cape Town *Sustainability Science*, Volume 12, Issue 5, 785–797. DOI: <https://doi.org/10.1007/s11625-017-0500-y>
- Pelling, M., O'Brien, K. & Matyas, D. *Climatic Change* (2015) 133: 113. DOI: <https://doi.org/10.1007/s10584-014-1303-0>
- Polk, M. (ed.). (2015). *Co-producing Knowledge for Sustainable Cities: Joining forces for change*. London and New York: Routledge.
- Schneider, F. & Buser, T. (2018). Promising degrees of stakeholder interaction in research for sustainable development. *Sustain Sci* (2018) 13: 129. DOI: <https://doi.org/10.1007/s11625-017-0507-4>
- The World's Cities in 2016 – Data Booklet ST/ESA/SER.A/392 (United Nations, Department of Economic and Social Affairs, Population Division, 2016).
- UNDESA 2015. *Global Sustainable Development Report*. DOI: <https://sustainabledevelopment.un.org/globalsdreport/2015>
- UNEP 2012. *Foresight report*. DOI: <https://wedocs.unep.org/handle/20.500.11822/8056>
- UN-HABITAT. (2016). *World Cities Report 2016: Urbanization and development. Emerging futures*. Nairobi: UN HABITAT. DOI: <https://unhabitat.org/sites/default/files/download-manager-files/WCR-2016-WEB.pdf>
- United Nations 2014. *World Urbanization Prospects: The 2014 Revision* (United Nations Department of Economic and Social Affairs, 2014). DOI: <https://population.un.org/wup/Publications/Files/WUP2014-Report.pdf>
- Valencia, S., Simon, D., Croese, S. et al. (2019). Adapting the Sustainable Development Goals and the New Urban Agenda to the city level: Initial reflections from a comparative research project, *International Journal of Urban Sustainable Development*, 11:1, 4–23. DOI: [10.1080/19463138.2019.1573172](https://doi.org/10.1080/19463138.2019.1573172)

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Africa) programme seeks to build the capacity of the next generation of African scientists to lead innovative re-thinking of urban futures on the continent together with local communities, policy and practice. The programme is run by the International Science Council (ISC) together with its Regional Office for Africa and in partnership with the Network of African Science Academies (NASAC). The programme is supported by the Swedish International Development Cooperation Agency (Sida).

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The Network of African Science Academies (NASAC) was established on 13 December 2001 in Nairobi, Kenya, and is currently the African affiliate network for the InterAcademy Partnership (IAP). NASAC is a consortium of merit-based science academies and aspires to make the 'voice of science' heard by policy and decision-makers within Africa and worldwide. Its membership comprises of 28 science academies on the continent. NASAC is dedicated to enhancing the capacity of existing national science academies and encouraging African scientists to establish new academies in countries where none exist.

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LIRA 2030

Africa

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