



Master Thesis Lab



Leiden-Delft-Erasmus-East Africa Research Network (LEARN)

LEARN is an international multidisciplinary research network focused on collaborative and transformative urban research. The network aims to strengthen science-policy-society interactions through co-creating contextually relevant, evidence-based, and transformative knowledge to address pressing urban development challenges in Africa. LEARN brings together academics, policymakers, and civil society actors from (Eastern) Africa and The Netherlands, with the primary focus of fostering the coproduction of actionable, practical, and impactful urban research in Africa.



Overview of the Program

Rapid urbanization and mounting climate pressures, innovative, interdisciplinary research is crucial to building resilient and equitable cities. Since its launch in December 2024 in Nairobi, the LEARN Master's Thesis Lab has brought together Kenyan and Dutch master's students in a collaborative setting that bridges academic research and practical application.

Rooted in Kenya's dynamic urban and peri-urban contexts, the Lab focuses on pressing issues such as disaster risk management, energy access, and clean cooking technologies. It creates a vibrant space where emerging researchers combine diverse perspectives, methodological innovation, and community engagement to generate actionable insights relevant to sustainable urban development.

The program is embedded in the LEARN Education activity.

Themes

Theme 1: Disaster risk management in cities



Kenyan cities like Nairobi have increasingly become susceptible to disasters such as flooding, fires, epidemics, and droughts, largely due to rapid urbanization and climate change. For example, in 2024, Kenya was ravaged by floods which resulted in the tragic loss of at least 267 lives and the displacement of over 380,000 people. Informal settlements experienced significant impacts due to poor drainage and infrastructure, and these vulnerabilities were compounded by a brutal response from authorities. Potential research ideas involve examining the perceptions and lived experiences of disaster risks among vulnerable populations, analysing the coping mechanisms they employ, and evaluating the inclusivity of existing disaster management policies. The research could develop, test or evaluate technological innovations on disaster preparedness and response e.g. early warning systems, mobile applications but also governance structure and collaboration between diverse involved actors. A study in this area could propose enhancements to disaster risk management strategies to make them more effective and inclusive for vulnerable communities in Nairobi and other African cities.



Informal settlements

experienced significant impacts due to poor drainage and infrastructure, and these vulnerabilities were compounded by a brutal response from authorities.

Theme 2: Climate resilient retrofitting of informal housing



With over 60% of Nairobi's population living in informal settlements, these areas are disproportionately vulnerable to climate-related risks, including extreme temperatures, poor ventilation, and high levels of indoor air pollution. According to UN-Habitat, informal housing in Nairobi often lacks adequate infrastructure, resulting in severe thermal and noise stress, as well as elevated health risks linked to indoor air pollution, particularly from cooking with traditional fuels.

There is a pressing need to explore sustainable and affordable solutions to improve living conditions in these settlements. Projects could explore social, cultural, technical and economic aspects that underpin the current design of informal housing structures and communities, and related barriers and opportunities for sustainable housing improvements. Other ideas could focus on identifying locally available and sustainable materials and technologies for retrofitting informal housing e.g. the use of green roofs, recycled plastics, earth-based construction, etc, and co-designing and co-delivering viable solutions with local stakeholders. A related study could investigate the economic feasibility of different retrofitting solutions, e.g. a cost-benefit analysis to determine which interventions offer the best return on investment in terms of health, energy efficiency, and climate resilience. The research could also develop frameworks for monitoring and evaluating the long-term impact of retrofitting projects on both environmental and social outcomes.

Theme 3: Clean cooking



The clean cooking challenge in Kenya is immense. The latest estimates show that 64.5 per cent of the population continues to depend on 'traditional' biomass fuels such as firewood, charcoal, and kerosene for their primary cooking needs. These cooking solutions are said to significantly contribute to household air pollution, and they account for approximately 40 per cent of Kenya's total greenhouse gas emissions. The Kenyan government has set ambitious targets to transition households to clean cooking technologies in its recently developed national cooking strategies. However, there is need to generate evidence to support a directed clean cooking transition. Research in this theme could explore the complex dynamics surrounding the adoption and sustained use of clean cooking solutions. It could examine the perceptions of clean cooking solutions across different social groups, and how these perceptions impact the success of clean cooking initiatives.

There is also a need to develop frameworks for designing market development activities such as behaviour change communication, subsidies and tax waivers for clean cooking technologies, considering their historical effectiveness in similar contexts. Other studies could explore the extent of cost savings and health impacts for households that transition from 'dirty' fuels to cleaner fuels. New technologies and business models such as smart metering, pay-as-you-cook, carbon financing mechanisms are touted as revolutionary in the clean cooking sector, but their acceptability and effectiveness is not well established in practice. Last but not least, clean cooking in social institutions such as schools, hospitals and prisons is another under researched area that would benefit from empirical evidence.



64.5%

of the population continues to depend on 'traditional' biomass fuels such as firewood, charcoal, and kerosene for their primary cooking needs.

Theme 4: Energy planning for counties and informal settlements



Kenya has made significant progress in expanding access to electricity, with the national electrification rate reaching approximately 76% by 2023, according to Kenya Power and Lighting Company. However, this growth masks substantial disparities across and within counties and informal settlements. Recent local developments, including the government's Integrated National Energy Planning Framework, aim to enhance energy access across the country. However, challenges persist in ensuring that energy planning strategies are sustainable, inclusive, and tailored to the unique needs of marginalized communities.

Research in this area could explore the dynamics of planning for and extending energy access to underserved areas, considering factors such as population density, economic activities, and environmental impact. It will involve analysing existing energy policies, infrastructure, and local energy needs. Projects could identify and explore sustainable energy transition pathways that account for the unique needs of counties, and informal urban and peri-urban areas. Other studies could look into participatory approaches that can be employed in energy planning at the county level. This would involve evaluating existing energy governance structures, identifying gaps in stakeholder engagement, and proposing models that integrate stakeholder inputs into county-level energy strategies. Student projects could also analyse the resilience of energy systems and explore how current energy modelling frameworks and tools could be improved.

76%

of Kenya's population had access to electricity by 2023, reflecting significant national progress in expanding electrification.

Kenya Power and Lighting Company



Program Coordinators



Prof. Dr. Marleen Dekker

Scientific Director/
Professor African
Studies in particular
Inclusive development
in Africa. -Leiden
University



Dr. Musyimi Mbathi

LDE Education
Coordinator- Leiden-
Delft-Erasmus-East
Africa Research
Network (LEARN)



Dr. Elsie Onsongo

Director-Nuvoni
Center for Innovation
Research



Dr. Agnieszka Kazimierczuk

Researcher. -African
Studies Centre- Leiden
University



Bosibori Barake

Urban Program
Coordinator-
Nuvoni Center
for Innovation
Research

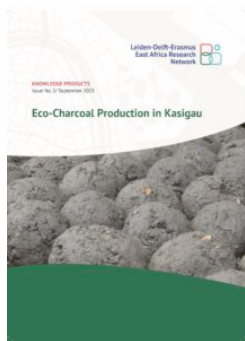
Knowledge Products

1 Ann Njuguna

School: University of Nairobi

Course: Master of Climate Change Adaptation

Thesis Title: Sustainable charcoal production as a nature-based solution for land degradation in African savannas: A case study of eco-charcoal production in Kasigau



Knowledge Product



This newsletter highlights innovative and sustainable approaches to charcoal production in the Kasigau Project Area, Kenya. It documents the eco-charcoal production process, which replaces traditional tree-felling with pruning and carbonizing finger-sized branches, significantly reducing deforestation. The process from harvesting to carbonization and briquette production demonstrates how rural communities can adopt cleaner cooking fuels while regenerating vegetation cover. It also emphasizes the economic, environmental, and social benefits of eco-charcoal, including job creation, cleaner energy adoption, and women's participation in production. Recommendations include scaling awareness programs, integrating eco-charcoal into national policies, and improving market access through modern equipment and supportive regulation.

Link to Product: <https://learnresearch.network/publications/eco-charcoal-production-in-kisigau-project-area/>

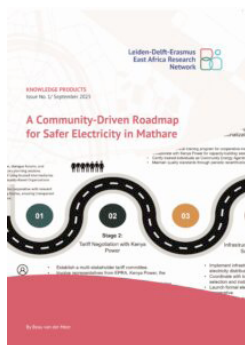


2 Beau van der Meer

School: TU Delft

Course: Master of Science Management of Technology

Thesis Title: How to integrate an informal electricity network into a safer and more reliable system through enhanced stakeholder collaboration and strategic alignment? was that lasting change happens when institutions listen, and communities lead.



Knowledge Product



Roadmap Infographic

Stage 1: Cooperative Formation and Mobilization



01

- Formally establish the Community-Based Energy Cooperative (CBECE).
- Transform existing informal electricity providers into legally recognized entities.
- Engage stakeholders through community workshops, dialogue forums, and participatory planning sessions.
- Build trust using trusted intermediaries like Community-Based Organizations (CBOs).
- Register the cooperative with relevant regulatory bodies, ensuring transparent governance.



Stage 2: Tariff Negotiation with Kenya Power

- Establish a multi-stakeholder tariff committee.
- Involve representatives from EPRA, Kenya Power, the cooperative, and CBOs.
- Ensure transparent pricing reviews and conflict resolution.
- Conduct negotiations to align tariffs with community affordability.

02

Stage 3: Technical Training and Professionalization



03

- Develop a technical training program for cooperative members.
- Collaborate with Kenya Power for capacity-building sessions.
- Certify trained individuals as Community Energy Agents (CEAs).
- Maintain quality standards through periodic recertification.



Stage 4: Infrastructure Deployment and Service Launch

- Implement infrastructure upgrades for safe electricity distribution.
- Coordinate with local stakeholders for site selection and installation.
- Launch formal electricity services through the cooperative.
- Monitor service quality and resolve technical issues.

04

Link: <https://learnresearch.network/publications/a-community-driven-roadmap-for-safer-electricity-in-mathare/>



3

Charlotte Schenk

School: Leiden University**Course:** African Studies (MA)**Thesis Title:** Implementation policy & Community Resilience: Urban Flooding in the Mathare River Valley in 2024

The Project

The Indispensable Importance of Implementation

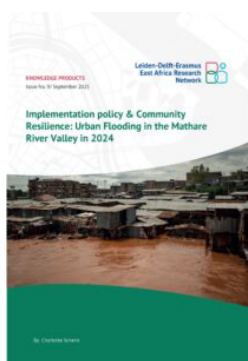
This study investigates the implementation of devolution and disaster risk management (DRM) policies in Kenya, with a particular focus on informal settlements in the Mathare River Valley, Nairobi, during the urban floods of 2024. Through the analysis of existing DRM policy frameworks and fourteen semi-structured interviews with stakeholders from NGOs, community-based organisations (CBOs), and local residents, this research explores perceptions of DRM implementation and the roles of both national and county governments during the flooding event.

Findings indicate that transparency, accountability, and the inclusive engagement of local actors are critical to the effective implementation of both devolution and DRM policies. Despite widespread support for the principle of devolution, poor policy execution has significantly undermined public trust. The study concludes that both levels of government must prioritise improved implementation strategies in order to restore trust and enhance the capacity to prevent and respond to future urban flooding. In light of Kenya's accelerating urbanisation and increasing climate variability, the inclusive and effective implementation of DRM policies is essential to safeguarding vulnerable urban populations. Notably, CBOs demonstrated strong organisational capacity and a sense of responsibility toward their communities, often compensating for institutional shortcomings by translating policy into meaningful local action. Ultimately, this thesis underscores that effective policy implementation is indispensable to building resilience in the face of urban environmental risks.



In light of Kenya's accelerating urbanisation and increasing climate variability, the inclusive and effective implementation of DRM policies is essential to safeguarding vulnerable urban populations

Mathare's flooded shacks. The slum's water supply has been contaminated. Photograph: Edwin Ndeke/The Guardian



Knowledge Product



This policy brief examines how devolution and disaster risk management (DRM) policies are implemented in Kenya, focusing on informal settlements along the Mathare River Valley during the 2024 urban floods. Drawing on 14 stakeholder interviews and an analysis of national and county DRM frameworks, the study highlights critical gaps between policy intent and on-the-ground implementation.

Findings reveal that transparency, accountability, and inclusive participation of community actors are essential for effective DRM. While devolution has created opportunities for localized decision-making, poor coordination and weak execution have eroded public trust. The research emphasizes the vital role of community-based organizations (CBOs), which often bridge institutional gaps by translating policy frameworks into practical local actions that strengthen resilience.

As urbanization and climate variability intensify, Kenya's national and county governments must enhance the implementation of DRM policies by fostering collaboration with local actors. Strengthening community engagement and improving governance structures will be key to preventing and managing future urban floods and safeguarding vulnerable populations.

Link to Product: <https://learnresearch.network/publications/implementation-policy-community-resilience-urban-flooding-in-the-mathare-river-valley-in-2024/>



4

Irine Chesang Toroina

School: Dedan Kimathi University of Technology

Course: Master of Science student in Geospatial Information Systems and Remote Sensing

Thesis Title: Assessing the Effects of Land Use Land Cover Change on Biomass and Carbon Sequestration Using Earth Observation and Machine Learning Techniques: A Case Study of Kamatira Forest, West Pokot County

The Project

The Shrinking Forest: A 34-Year Story of Kamatira

This project delved into the changing landscape of Kamatira Forest in West Pokot County, Kenya. Leveraging Earth observation data and machine learning, Irene set out to understand how and why this vital ecosystem has changed between 1990 and 2024. My research, GIS and Remote Sensing (IGGRS), provides a detailed look at the forces driving these shifts.

Tools like Google Earth Engine and ArcGIS Pro were used to analyse satellite imagery, classifying land use and land cover with high accuracy. This process involved not only a technical analysis of the data but also incorporating field-based ground truths and questionnaire surveys to provide a holistic view. The key insight is that Kamatira's dense forest is giving way to open forest, cropland, and settlements, a clear sign of human pressure.

Insight? Kamatira's dense forest is giving way to open forest, cropland, and settlements, a clear sign of human pressure.





The findings underscore a crucial message: forests are not just trees; they are a reflection of human-environment interactions. The decline in forest cover is directly tied to population growth and the heavy reliance on firewood and charcoal. This highlights the urgent need for a shift towards sustainable practices and alternative livelihoods.

The findings underscore a crucial message: **forests are not just trees; they are a reflection of human-environment interactions.**



This work provides the data and insights needed to create evidence-based conservation strategies. It's a call to action for local communities and policymakers to work together to protect this essential resource, contributing to global goals for climate action and life on land (SDGs 13 and 15).

This project showed the importance of bridging the gap between advanced technology and on-the-ground reality. It was a powerful reminder that behind every data point is a real community and a living ecosystem at risk.

Link to Product: https://link.springer.com/epdf/10.1007/s10661-026-15211-6?sharing_token=JvlBWRoaRMNX6o85tR5_eve4RwlQNchNByi7wbcMAY7HYGpJXQ_RjzB3l-7jMpFJD2SQ6axOVaP-g85KT5MDG19pvff-n5PtF7fx1CUdd_Tym22QrujR-E2gpsD2bfDqlk1yNy_mIztecSMGFpNK5nkiZFXwTEG0XjgtYK9hw9Ho%3D



5 Ojoo Lena Ngesa

School: University of Nairobi

Course: Master's degree in Urban and Regional Planning

Thesis Title: Enhancing Disaster Preparedness in Informal Urban Settlements: Planning Insights from Lucky Summer Ward, Nairobi

The Project

Equipping Lucky Summer Ward for Disasters: A Practical Guide for Disaster Preparedness in Lucky Summer

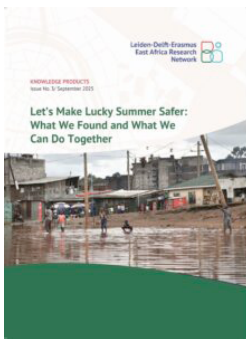
When disasters strike, preparedness can mean the difference between safety and loss. In Nairobi's Lucky Summer Ward, disasters such as floods, fires, and sanitation crises are not distant threats, they are recurring realities. Communities often face these risks with little preparation, not because they lack willpower, but because practical, accessible guidance is scarce.

To address this, a disaster Preparedness Training Guide, a step-by-step resource for community leaders, youth groups, and local schools to build resilience from the ground up. Drawing on household surveys, focus group discussions, and urban risk analysis, the guide translates research findings into simple, actionable training modules. It covers risk awareness, emergency planning, safe infrastructure practices, and community response coordination.

The key insight? Resilience begins where people stand together prepared, informed, and ready. Effective disaster response doesn't start when an alarm sounds; it begins with daily habits, shared knowledge, and local leadership.

Insight: Resilience begins where people stand together prepared, informed, and ready.





This work matters because preparedness saves lives. By equipping residents and local leaders with tools they can use right now, we turn awareness into action and vulnerability into strength. This report blends academic research with professional practice, offering tools that can be applied not only in Lucky Summer but in any Nairobi neighbourhood at risk.

Knowledge Product



Let's Make Lucky Summer Safer: What We Found and What We Can Do Together

Lucky Summer Ward is home to thousands of hardworking people families, students, traders, and workers trying to build a better life. But many parts of the ward face dangers that can destroy lives and property in a matter of minutes. During heavy rains, homes flood. Fires start from unsafe electricity connections. Diseases spread when sewage overflows or when garbage blocks drainage. This is not because people do not care but because planning, service delivery, and support are not reaching the grassroots. This brief shares the findings of a detailed study done with residents in all five zones of Lucky Summer. It explains the dangers we face, why they happen, and what we can do, together, to make our neighbourhood safer and better prepared.

Link to Product: <https://learnresearch.network/publications/lets-make-lucky-summer-safer-what-we-found-and-what-we-can-do-together/>



6

Merlijn Eversdijk

School: Leiden University

Course: African Studies (MA)

Thesis Title: we just scream and hope for help”: the role of the community in fire disaster management: a case study of Kiandutu, Kiambu county, Kenya

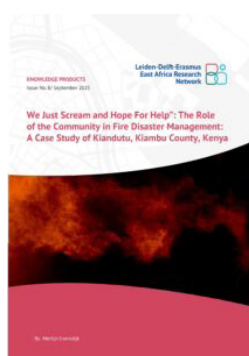
The Project

“We just scream and hope for help”: Community Resilience in Kiandutu

Informal settlements make up a huge part of Kenya’s urban landscape, yet they are often left out of official plans and services. In Kiandutu, one of the largest settlements outside of Nairobi, fire outbreaks are a regular threat to safety and livelihoods. This project set out to understand how residents cope with these risks and what role community resilience plays when formal systems fall short. To explore this, I combined interviews, focus group discussions, and direct observations on the ground. These conversations revealed not only the daily struggles of living with limited infrastructure, but also the creative ways in which people organise and support each other during crises.

Insight: This project set out to understand how residents cope with these risks and what role community resilience plays when formal systems fall short.





What stood out most was that strong social bonds exist, but organised disaster responses such as training, early warning systems, or dedicated community groups are scarce. Poverty and the hope that government-led upgrading will eventually arrive often prevent residents from taking collective action themselves. This matters because informal settlements are not temporary spaces. They are spaces where millions of Kenyans live and build their futures. Recognising and supporting these communities is key to reducing disaster risks. Personally, the research taught me that resilience is more than a policy concept as it is something people practise daily, often under the most difficult conditions. On the website more of these issues are discussed and we would encourage you to explore this further!

Knowledge Product

This policy brief is based on research that examined how the community in Kiandutu, an informal settlement on the outskirts of Thika, Kenya, responds to and prepares for the recurring threat of fire disasters. These fires often caused by faulty electrical wiring, highly flammable housing materials, and limited access to emergency services, have led to loss of life and destruction of homes. Despite the severity of the issue, there has been limited academic engagement on how fire risks are managed at the community level in such contexts. The aim of this policy brief is to provide recommendations to the government on placing the community at the centre of fire disaster management.

Link to Product: <https://learnresearch.network/publications/we-just-scream-and-hope-for-help-the-role-of-the-community-in-fire-disaster-management-a-case-study-of-kiandutu-kiambu-county-kenya/>

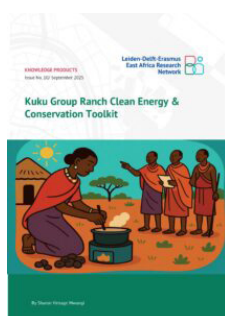


7 S. Vintage W. Mwangi

School: University of Nairobi

Course: Master's degree in Urban and Regional Planning

Thesis Title: Sustainable rural energy use in promoting biodiversity conservation and Community development in kajiado south subcounty.



Knowledge Product

Across the sweeping plains of Kuku Group Ranch, from the shade of acacia trees to the heart of our homesteads, change is taking root. This toolkit is the product of shared dreams and grounded knowledge crafted by researchers, community members, and partners working hand in hand to explore how clean energy, forest conservation, and local leadership can shape a healthier, more hopeful tomorrow. Through dialogue in village barazas, household visits, and school engagements, this work reflects not only data but the lived experiences of women, youth, elders, and leaders. It is a tool made by the community, for the community.

Link to Product: <https://learnresearch.network/publications/kuku-group-ranch-clean-energy-conservation-toolkit/>





Info@learnresearch.network
www.learnresearch.network
(+254) 20 8009928
@LDE_Research
https://x.com/LDE_Research

No. MK088, Ushindi West Avenue,
Mukuyu Rd (Mukuyu West Wing), Thome 1
Nairobi, Kenya