

DARAJA: The Inclusive City-Community Forecasting and Early Warning Service, Kenya and Tanzania

DARAJA works with cities and informal settlers to protect themselves and their homes from the impacts of the climate crisis and helps weather forecasters and city planners transform data into informed climate preparedness.



Submitting organisation: Resurgence

Type of organisation: NGO

Key elements of the project:

- **Disaster Risk Preparedness**
This project partners accessible, tailored weather warnings with response action plans to help informal settlers prepare for adverse weather conditions, including through housing improvements. In Nairobi, 98% of residents state they use DARAJA services to prepare for extreme weather.
- **Community Centred**
Weather and forecasting services are tailored to the needs of the community, coordinated through trusted community leaders and financed through pre-existing community revolving funds.
- **Systems-wide Approach**
DARAJA builds 'bridges' and operational partnerships between actors critical to municipal weather services, including government, NGOs, radio channels, media, and health services. In Nairobi alone, these services have reached over 800,000 residents.

What inspires us ...

DARAJA provides a unique service that allows those most vulnerable to climate impacts to protect themselves and their homes. It is a rapidly expanding weather service that made forecasting intelligible to marginalised groups and opened a channel for different stakeholders and community members to improve the overall living situation in informal settlements.





Introduction

DARAJA provides an early warning weather and climate information system for urban areas of the Global South, specifically to those in informal settlements in East Africa. It is operated by Resurgence and project partners in Kenya and Tanzania. It helps weather forecasters and city planners transform data into informed climate preparedness. Informal settlements are among the most vulnerable to adverse weather conditions so this project brings together accessible tailored weather warnings with response action plans that allow communities to prepare. It has effectively mapped out the gaps in the weather forecasting service and engaged a diverse set of relevant actors to deliver a targeted and impactful service. It currently operates in informal settlements in Kenya and Tanzania but is looking to scale.

Organisation Implementing the Project

[Resurgence](#) is a global design, communications and consulting not for-profit social enterprise. It specialises in managing urban climate risk and resilience. It helps cities and communities protect themselves from the impacts of climate change by helping weather forecasters and city planners transform data into climate action.

Resurgence works with clients and partners, including the UK Met Office, the World Bank, the Red Cross, the UN Office for Disaster Risk Reduction, AECOM, and the Climate-KIC, Europe's largest climate innovation partnership. It works to help governments, city authorities, urban planners, responders and communities reduce climate risks including flooding, storms and heatwaves. Its activities include co-designing inclusive forecasting and early warning systems with city and community stakeholders and supporting governments and cities to develop the data infrastructure to manage and reduce climate risk.

Resurgence partners with two local housing organisations in Kenya and Tanzania. In Nairobi (Kenya), it partners with [Kounkuey Design Initiative \(KDI\)](#), a community development and design not for-profit organisation. KDI employs community resilience experts, engineers, architects, local community organisers, community and operations staff. In Dar es Salaam (Tanzania), Resurgence partners with [Centre for Community Initiatives \(CCI\)](#). This is a not-for-profit organisation that builds the capacity of urban poor communities to improve the quality of their housing. In parallel with its work on DARAJA, CCI has been introducing affordable housing schemes in Dar es Salaam. These schemes enable the urban poor to acquire permanent shelter loans through the [Jenga Fund](#). This is a low-cost loan scheme operated by CCI that provides funds for land acquisition and house construction.

Context



Reliable and regular weather and climate information services are particularly important to people who are vulnerable to weather variations, or whose lives and livelihoods can be affected by it specifically, the 1.6 billion people living without adequate shelter worldwide.

As the world is becoming increasingly urbanised (the UN estimates that over 50% of the world's population resides in urban centres and is expected to [rise to 68% by 2050](#)), climate change will have implications for rapidly expanding towns and cities. Worldwide, cities are already experiencing increased flooding, heat waves and extreme weather events. As more people move to cities, they are often forced to settle on increasingly unstable land, in informal settlements which lack the infrastructure to support residents. In many instances, weather and climate information services do not reach the populations of informal settlements or, if they do, residents don't find the information useful or trustworthy, or find it too technical to interpret.

In Nairobi, Kenya, it is estimated that 60-70% of the city's residents live in informal settlements. 44% of those are less than seven kilometres away from the National Forecasting Center and yet still have no access to weather forecasts, let alone early warnings. In Dar es Salaam, figures suggest that over 70% live in informal settlements. Both cities experience regular flooding during periods of heavy rain – as Nairobi and Dar es Salaam continue to expand, this is becoming increasingly a pressing issue.

However, the current reality is that most international agency funding is still directed towards rural areas, and low-income residents in urban areas remain under-served and often forgotten.

Project Description

The key features of this project are:

- Mapping the information ecosystem: DARAJA scoped the context of the urban informal settlement to see how weather and climate information services were used, and to understand the channels through which residents and city authorities gain information and why these channels are chosen over others.
- Codesign and user-centricity: Brings together existing stakeholders within the weather and climate information services as well as potential new stakeholders to collaborate and design improvements to the services. Provided outreach and awareness building in communities on how to access, interpret and use forecasts.
- Creating local city-wide networks: Formed a new network of forecasters, climate scientists, community leaders, broadcasters, and disaster managers.



- Improved delivery of weather and climate information services: Tailored weather and climate information services are implemented ranging from daily weather broadcasts on local radio and tv, to training students and community leaders to interpret and communicate weather conditions. Forecasts incorporated user-friendly icons, non-technical language and zoning of the city to make them more usable.
- Climate Resilience Housing: Informal settlement residents individually and collectively take preparatory measures to prevent damage to their homes, to secure their belongs, and make their housing structurally safer.

Between September 2018 and May 2023, this project has:

- Provided over 980,000 people with improved access to actionable forecast information.
- Engaged 67 organisations, media partners, community leaders and community channels in the pilot schemes.
- Strengthened and created community-based weather forecasting channels that interpret and communicate forecasting information to informal settlements.
- Helped residents repair and protect their homes and income.
- Led 76% and 81% of respondents in Kenya and Tanzania respectively to feel the actions they took saved their household income.
- Led to a 300% increase and 122% increase in Kenya and Tanzania respectively in household repairs made in response to weather forecasts.
- Enhanced the overall resilience and preparedness of communities by delivering intelligible weather forecasts so they can prepare, whether it be through individual household improvements or collective action.

This project is ongoing.

Aims and Objectives

This project aims to:

- Improve resilience of people living in urban informal settlements through co-creating interfaces and services to address climate-related risks.
- Deliver reliable, co-produced and accessible climate information services to inform new planning decisions at city-level or settlement-level.
- Increase use of reliable, co-produced and accessible climate information services by people living in a low-income/urban informal settlement.

DARAJA is designed to reach the most vulnerable groups in informal settlements exposed to storms, floods, heatwaves and chronic water stress. It does this through existing formal and informal community groups that represent the more marginalised of informal settlements, including women's savings



and loan groups, youth groups, disaster risk communities, disability support groups and faith-based groups. It does this by supporting community structures that already exist rather than creating anew. This in turn strengthens pre-existing community support mechanisms in the informal settlements.

The improved resilience of those living in inadequate shelters benefit city officials especially as conditions are likely to worsen, placing greater demands on municipal services and resources. Rather than creating a new aid-like structure in lieu of adequate state weather services it has worked with the existing services, identified the gaps and pulled in other key informal settlement stakeholders like the Red Cross. Connecting these disparate actors helps them carry out their own responsibilities and missions effectively while delivering a comprehensive and sustainable system.

In five years, the DARAJA service hopes to be available for 250 million residents of informal settlements in 30 cities across the globe.

Key Features

Diverse network facilitation: DARAJA pulls together vulnerable urban residents; national weather agencies providing residents with climate information; civil protection and disaster management agencies working on safety; infrastructure operators working on the built environment; and media houses, telecommunication companies and schools disseminating information, all in one connected information-sharing network.

Community Co-Design: Each weather forecasting service in Kibera and Dar es Salam was designed following workshops with media stakeholders, community members and city authorities. Frequent feedback sessions are also held throughout to continue to refine the service. To ensure inclusive design and implementation, DARAJA works with women and savings groups, faith-based groups and youth groups, among others. Communities take part in the housing and community improvements themselves. KDI and CCI closely supervise these improvements to ensure safety protocols are followed but will also conduct follow up assessments to make sure that the improvements are safe and secure. Trainings are also provided on community health and safety, as well as awareness raising so that community members know when to consult professionally trained experts on housing reconstruction and repairs (electricians, contractors etc.)

Localisation: Weather and climate services are tailored according to community needs. Local leaders, selected by their community, are trained to interpret forecasts. A local communication system was created to trained local leaders share weekly and severe weather forecasts in an easy-to-understand format through messages disseminated by SMS, word of mouth or phone calls. Moreover, the community leaders and local radio stations are instrumental to understanding the actual impacts of adverse weather conditions in the informal settlement and advising residents effectively.

Resilience Response: The project alone does not focus on just delivering information, but also seeks to encourage behavioural change so that communities can empower themselves to prepare. Following forecasts, residents take actions as cleaning drains, making repairs to their homes, and moving valuable possessions out of harm's way to protect their living environment and homes. These actions are closely supervised and tracked through



local partners, KDI and CCI. Moreover, CCI has improved sanitation infrastructure by installing concrete walls to reduce risk of collapse during heavy rains and high wind, as well as introducing different sanitation options that if unaddressed would accumulate waste and risk flooding during heavy rains.

Innovation

In weather and climate services, DARAJA is certainly innovative as it is one of the first projects that focused explicitly on urban populations when usually these services tend to focus in rural areas. Moreover, it adopted a system-wide approach to all activities that has brought together a number of national, regional and city-level settlement actors. The connection and integration of different services means that informal settlements can be safer in several ways: housing, health, sanitation, and so on.

The extent of the multi-stakeholder co-design process has produced an innovative product with localised languages and icons that is delivered through trusted channels to informal settlers, rather than 'official' channels used by government officials. DARAJA challenges outmoded approaches to early warning information dissemination which tends to be top-down and instead creates a more cohesive dissemination and feedback network across a dense urban network.

Finally, the co-creation aspect has led to the development of new local sub-brands, visual identity (the [DARAJA logo](#)), a [public awareness video campaign](#) with DARAJA recruited community group, [Weather Mtanni](#) and filming by [local artists](#), which has helped galvanise local communities and the media.

Funding

Resurgence's operating costs are covered by a combination of foundation grants and non-profit consulting income. DARAJA has received \$2,000,000,000 USD in total from:

- the UK Foreign, Commonwealth & Development Office (FCDO), Weather and Climate Information Services for Africa (WISER)
- [Climate KIC](#) for the Nairobi and Dar es Salaam projects
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for the Dar es Salaam project
- United Nations Development Programme (UNDP) Africa for the Dar es Salaam project
- UNDP Tadamon Accelerator by the InterAmerican Development Bank (IDB) for scaling to Khartoum, Sudan
- UK FCDO East Africa programme to scale DARAJA regionally by converting it to a phone application.

It has an annual budget of \$300,000 USD which covers six major cities in six countries (Kenya, Tanzania, Rwanda, Sudan, Uganda, Ethiopia). Kenya and Tanzania were the pilot projects and are currently the most developed.



Resurgence has [recently](#) secured a \$250,000 grant from the Lloyd's Register Foundation for additional support for DARAJA in three cities in East Africa: Kenya, Tanzania and Uganda.

Residents spend about 50,000-100,000 TZS (\$21 USD - \$40 USD) in Tanzania for housing improvements. KDI funding is not focused on housing improvements (these are led by residents themselves) but rather secures financing for improvement of public spaces and community spaces in informal settlements. Residents will contribute 5% of the funding to these projects either through loans or paying in-kind by providing on-site labour.

Funding is secured for this project until its scheduled completion in 2025. However, Resurgence and local partners are thinking about the long-term sustainability of the DARAJA and how to transfer funding and investment sources to local government. Indeed, there is a stated government interest in DARAJA and potential scaling up in Kenya. Resurgence is interested in exploring different community approaches to securing funding in the urban resilience space and are hoping the World Habitat Awards Network could provide learnings from other initiatives.

Impact

The figures listed below for each informal settlement were collected from a select group; any other figures are more general. In Kibera, 398 households were interviewed over four areas. There were also 10 focus group discussions and 12 key informant interviews. In Dar es Salaam, feedback was collected from 106 household respondents as well as from five focus group discussions and six key informant issues. However, number of respondents vary according to criteria.

Financial

The improved weather and climate information services from this project allow communities to protect their homes and belongings which in turn helps them save on potential financial loss.

- Nairobi:
 - o 76% felt the actions they took save their household income and that they were able to protect their assets and valuables [**210 respondents**].
- Dar es Salaam:
 - o 81% felt the actions they took saved their household income and that they were able to protect their assets and valuables [**79 respondents**].

Social



Central to this project is the facilitation of community cooperation with a diverse set of stakeholders working in weather and climate information services. It identified those who could be involved and integrated them into this collaborative network that streamlined target information in a complex urban fabric. For example, before the project, the main mechanisms in-place for weather forecasting and severe weather warnings were all top-down. Once DARAJA was introduced, community leaders, community response groups, and other forms of communication – SMS, Facebook, WhatsApp and face-to-face meetings – cultivated a culture of mutual dialogue and feedback, together with science and local knowledge. DARAJA primarily refers to local knowledge for understanding impacts of adverse weather conditions on certain areas within the informal settlements (depending on topography) and suitable responses but relies solely on the meteorological agencies for weather forecasting information. DARAJA also worked with existing weather and climate information service stakeholders on this, including city media, community media, urban intermediaries (NGOs), city councils and the Red Cross.

This project strengthened and created local early warning weather and climate community groups – such as community volunteer group [Weather Mtaani](#) – which worked with the national meteorological agency in Kenya to codesign new weather information in an accessible language and communication channels (local radio stations, local TV, Facebook, SMS, WhatsApp, face-to-face). Weather Mtaani created [public awareness short videos](#) for the community to take action ahead of any extreme weather to avoid damage and loss to themselves, their livelihoods and their homes.

Community leaders interpreted and delivered early-warning services with tailored advice.

- Community leaders, selected by informal settlements, participate in DARAJA co-design workshops with government representatives from Kenyan and Tanzanian City Authorities.
- Community leaders are also invited to seasonal outlook for consultations about potential weather impacts by the city authorities and the government and are members of an ongoing WhatsApp group that connects them to city and national government officials, including weather forecasters.

As indicated by the data below, individuals and communities have felt more empowered to pro-actively prepare for adverse weather conditions:

- Nairobi (Kenya):
 - 93% access or receive weather and climate information compared to 56% before **[370 respondents]**.
 - 93% of respondents understood information shared through DARAJA pilots very well. The most popular features that made understanding easier are a) language used (80%) b) advice provided (56%) and c) relevance to their needs (44%) **[199 respondents]**.
 - 76% of respondents said they found the information through the DARAJA services to be accurate, and an additional 19% found it to be very accurate **[215 respondents]**.
 - 85% share the information with their household, friends and family **[215 respondents]**.



- The following % increase in actions taken **[210 respondents]**:
 - +110% clean household drains
 - +300% made repairs to house
 - +68% clean community drains
 - +166% moved belongs to a safe place
- Dar es Salaam (Tanzania):
 - 93% access or receive weather and climate information compared to 74% before **[105 respondents]**.
 - 91% of respondents understood information shared very well. The most popular features that made understanding easier are a) advice provided (80%) b) technical terms of forecast explained (80%) and c) probability of weather forecast provided and clear (78%) **[77 respondents]**.
 - 67% of respondents stated they found the information through the DARAJA services to be very accurate, and an additional 31% found it to be accurate **[85 respondents]**.
 - 93% use the information through the DARAJA pilot services to take preparatory action and 80% of those share that information at work, with their household, other family and friends **[85 respondents]**.
 - The following % increase in actions taken **[85 respondents]**:
 - +221% moved belongs to safe space
 - +122% Made repairs to the house

Environmental

DARAJA enhances the overall resilience and preparedness to communities by delivering intelligible weather forecasts so that they can prepare, whether it be through housing improvements or drain cleaning, which in turn reduces the risk of flooding and other disasters,

In Dar es Salaam, specific community actions taken in response to weather forecasting and community guidance include laying sandbags (16% of communities); raising building foundations (5%); waterproofing walls (8%); raising doorsteps (13%); and clearing drains (13%). This is similar Nairobi, although the figures likely differ and are unavailable. CCI has further worked to improve the resilience of community infrastructure – including schools – which has encouraged school administrators to improve buildings, including broken rooves.

In Kenya, KDI uses mostly locally sourced materials, including cement, stones, bamboo and wood. They use permeable block paving so the water can drain through and won't settle in puddles atop of the floor. They also use semi-permeable bricks in outdoor spaces and interlock bricks, the latter of



which are a mixture of cement and local red soil. In Tanzania, CCI use bricks and cement for supporting and lifting stairs, as well as waterproofing but little further information is provided. All materials for both projects are locally sourced to enable communities to maintain, repair and replace any materials easily.

Organisationally, Resurgence explicitly aligns its climate crisis work with its organisational practice. It works to minimise unnecessary travel both national and internationally by conducting meetings remotely when possible and optimising any travel that does take place. It also focuses on building strong partnerships, enabling in-country partners to take the lead as much as possible, which is both environmentally and socially sustainable.

Learning, evaluation, and recognition

Learning

The barriers and challenges varied according to location. In Nairobi (Kibera), there were strikes from city government officials due to a political crisis in the city and slow response times. This created delays in the issuing of weather and climate information that community leaders depend on to then advise and report to informal settlers. This challenge subsided when the strike ended.

In Dar es Salaam, the main challenge was by the community and the government leaders agreeing on using the Community SMS communication system as the primary channel for early weather warning updates towards the community.

Evaluation

DARAJA's outcome indicators are as follows:

- 1.1 Actors are identified and partnerships established to co-create and co-deliver enhanced weather and climate information services and resources at city and national level.
- 1.2 Partners from target countries and the Eastern Africa region exchange practical learning and knowledge on co-production weather and climate information services approaches in vulnerable urban communities.
- 2.1 Inclusive weather and climate information services are co-created and enhanced to respond to user risks, needs and preferences.
- 2.2 New or enhanced weather and climate information services are sustainable.
- 3.1 All actors have increased awareness, and access to resources on adaptive or risk reduction actions to take at individual, household, community administrative levels.
- 3.2 Response Action Plans are co-developed/ agreed at community and administrative level in target communities.



Several case studies and evaluations have been undertaken by the [World Bank](#), [Adaptation Research Alliance](#), [WMO](#), [British Expertise International](#), [UNDRR](#) (UNDRR [2nd](#) and [3rd](#) report) and [Met Office](#). The findings from these reports (many of which have been listed in impact) may be found [here](#).

Recognition

DARAJA has won two significant independently judged awards: from the [Global Resilience Partnership](#) (Innovation in Resilience) and from [British Expertise](#) (International Climate Cooperation).

The project has been described in the following media outlets:

- [Bridge the Gap - page 10](#)
- [We need cash to adapt, Kenyan slum dwellers tell COP26 president](#)
- [Weather warning and forecast service brings benefits to East African nations](#)
- [Kenya: Slum Weather Data Project Wins Praises](#)
- [Meet Kenya's new 'weather forecasters' in Nairobi slums](#)
- [Weather mtaani and climate action in slums](#)

Transfer and future plans

Resurgence is interested in scaling DARAJA and to some degree already has. It is planning to reach 25% of the one billion residents of informal settlements by 2027.

The DARAJA Service is currently being adapted for deployment into small island states via an urban demonstrator for the Caribbean. This is based in Kingston, Jamaica and financed by the World Meteorological Organisation CREWS Initiative and the InterAmerican Development Bank.

DARAJA has recently been awarded to start a two-and-a-half-year grant by FCDO to scale the service up in East Africa. The objective of the DARAJA regional East Africa Scale Up Programme is to support ICPAC (a Climate Center accredited by the World Meteorological Organization that provides Climate Services to 11 East African Countries) and its NMHS partners in the Greater Horn of Africa to improve, through co-production, the uptake and impact of urban weather, climate and early warning information with specific regard to Informal settlements, city services, including the utilities and infrastructure that serves them. They will have a special focus on extreme heat and drought forecasting and reduction, and support to local and



innovative climate financing underpinned by robust impact evidence. The target countries and cities include Sudan (Khartoum), Uganda (Kampala), Tanzania (Dar es Salaam), Kenya (Nairobi), Rwanda (Kigali) and Ethiopia (Addis Ababa). DARAJA also currently works with Slum Dwellers International (SDI) in a number of these locations to implement its services.

In terms of transfer work, Resurgence believes that the World Habitat Awards could expose them to wider networks that are urban-based which could serve as a platform for their operation with housing-based organisations in an urban context. The second aspect is how to make it workable and appealing to finance locally, rather than dependent through international funding. Resurgence would like to learn from other urban financing initiatives to apply to the weather and information service space.

World Habitat Reflections

This project improves climate resilience in informal settlements through a specific and tailored objective: improving accessibility to weather and climate information services. However, despite its seeming simplicity, this project has managed to engage a vast network of different stakeholders involved in informal settlements and pull them into a far more collaborative and communicative system of early warnings and forecasting. It prioritises community needs, involving residents in the design and implementation process, and seeks to improve an existing structure rather than create everything anew. Its ability to facilitate information-sharing between a complex network of urban stakeholders aligns well with the knowledge sharing and learning objectives of World Habitat and its past awardees.