Resilience Academy

PROGRESS REPORT

September 2025

TABLE OF CONTENTS

Executive Summary

The ProWAS SASA project is a collaborative initiative led by the University of Turku and Tanzanian partner universities under the Resilience Academy framework, focused on enhancing climate-resilient urban development and water management in the cities of Tanga and Mwanza, Tanzania. This progress report documents key activities, achievements, challenges, and lessons learned during the reporting period from November 1, 2024, to August 31, 2025.

Project Objectives: The project aims to improve the availability and accessibility of digital geospatial datasets supporting climate risk mapping, strengthen partner capacities to use open-source data tools for climate-resilient water management, and build sustainable awareness around the Resilience Academy's digital services

Methodology and Approach: The project adopts a participatory, hands-on training methodology targeting university students, alumni, government officials, and local communities. Training combines theoretical knowledge with practical application and using real-world datasets. Students and government officials receive specialized training to address challenges related to geospatial data use and decision-making tools such as the Climate Risk Database (CRD) and QGIS software

Key Activities and Outcomes:

- Conducted two focused training sessions for government officials and ProWAS SASA partners in Mwanza and Tanga, addressing gaps in geospatial data access, sharing, and skills for spatial analysis.
- Completed community-driven flood data collection in Tanga, surveying over 7,000 households across two wards, capturing multifaceted data on flood impact, infrastructure, and social vulnerability.
- Established and migrated the Climate Risk Database (CRD) to a robust new server infrastructure to support climate risk management activities and training.
- Developed practical training materials and guides to support dataset management, document handling, and map creation, boosting technical capacities for urban resilience planning.

Lessons Learned and Future Directions: Hands-on and context-relevant training has proven effective in building capacity among stakeholders and enhancing the credibility and usability of collected data. Sustainable impact necessitates ongoing support for government officials and institutional coordination to promote routine data sharing and technical updates. Future plans include expanding training efforts, refining flood risk datasets, enhancing data sharing platforms, and further embedding data-driven decision-making in local urban resilience initiatives. This report emphasizes the value of collaborative, community-engaged approaches and the critical need for sustained capacity building to effectively manage urban climate risks. It provides a strategic foundation for scaling up data-driven, locally owned, and city-level policy-aligned climate risk management interventions.

PROJECT OBJECTIVE

The Resilience Academy for ProWAS SASA contributes to the Green and Smart Cities (EU SASA) project by contributing to relevant SASA outputs and indicators. The main outcome is that partners from Tanga and Mwanza cities including Ilemela municipality, SASA stakeholders including Tanga WSSA, Mwanza WSSA, Lake Victoria Basin Water Board and Pangani Water Basin Boards, and Tanzania Resilience Academy universities have improved capacities to use open data, digital tools and local community-youth driven approaches for climate resilient urban development and water management

To implement a project, the following are the output of the project:

- Improve availability and access to digital geospatial data sets supporting climate risk mapping and management in Tanga and Mwanza
- Improve skills for ProWAS-SASA partners to use open-source data, tools and technologies supporting climate resilient water management in Tanga and Mwanza
- Improve a wider awareness and improve a sustainability of the Tanzania Resilience Academy digital services and their role in urban climate risk management for Urban Resilience

Resilience Academy has been implementing the ProWAS SASA project through a collaborative team composed of experts from the University of Turku and partner universities in Tanzania. Each team member has a defined role in coordinating, managing, and executing project activities, ensuring effective collaboration and delivery across all work packages. The Universities engaged are University of Dar es Salaam (UDSM), Ardhi University (ARU), Sokoine University of Agriculture (SUA) and State University of Zanzibar (SUZA). The following is the list of expert's names and their university as per their participation

Name	University	Project Role
Niina Käyhko	UTU	leader
Msilikale Msilanga	UTU	manager
Khairiya Masoud	UTU	expert
Ernest Mauya	SUA	coordinator
Mercy Mbise	UDSM	coordinator
Marry Khatib	SUZA	coordinator
Zakaria Ngereja	ARU	coordinator
Justo Jonas	SUA	expert
Zahor Zahor	UDSM	expert
Paulo Haule	UDSM	expert
Massoud Hamad	SUZA	expert
Amedeus Kimaro	ARU	expert
Nelly Babere	ARU	expert

Resilience Academy is an institutional cooperation which was built from the existing cooperation since 2003 with the aims of fostering joint efforts in teaching, training of trainers, research, and project implementation. There are currently 5 active university members in Tanzania which operates under the Memorandum of Understanding that includes academic institutions, government organizations, and NGOs as it shows in the Figure 1 below. Over the years, through the cooperation, RA has implemented other projects in Tanzania where the recent one is GeoICT4e[1]. ProWAS SASA project is therefore another project which is ongoing while carried out through this partnership. It is during the implementation of the project under the RA where university experts and young people are engaged in gaining new skills, developing new training materials, providing training, and participating in the actual innovative practical as per the project.

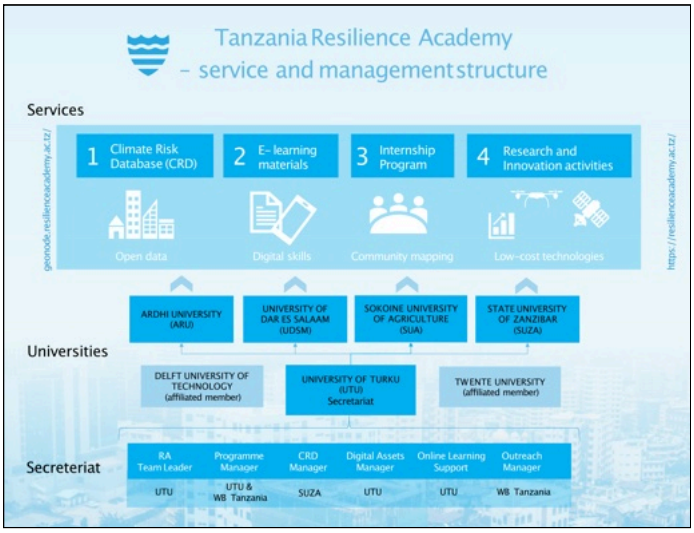


Figure 1: Resilience Academy secretariat.

[1] https://www.geoict.org/

1. INTRODUCTIONS

On Nov 2024, Resilience Academy began operations for ProWAS SASA scheduled to run from 1st Nov 2024 to 31st August 2026. Resilience Academy is working with university partners in Tanzania lead by the University of Turku (UTU) under the MoU to implement its activities including University of Dar es Salaam (UDSM), Ardhi University (ARU), Sokoine University of Agriculture (SUA), and State University of Zanzibar (SUZA).

This report provides a progress of activities under the ProWAS SASA project from **1st November 2024 to 31st August 2025**. It serves as a general summary, consolidating the key activities carried out in the project with our RA experts from both Tanzania and Finland. It also provides Resilience Academy's approach for designing, implementing and monitoring progress on the project activities and overall objectives.

Included in this report are several items as per the contract for the project including but not limited to:

- A summary of discussion and work with key stakeholders including ProWAS SASA partners
- An outline of how the activities are executed, together with work plan
- An outline of content for each of the progress reports we provide through the contract
- A list of outputs
- The data capture strategy

2. METHODOLOGY

Training approach

Resilience Academy has extensive experience in training university students, academic experts, community members, and government partners in data collection for decision-making and research. For the ProWAS SASA project, participating students were recruited from our partner universities, while alumni were engaged through established university communication channels. Additionally, participants in the government official training were invited in collaboration with GIZ, based on their roles in using geospatial data to support decision-making processes.

The training we provide to students and alumni combines both theory and practice, rather than relying solely on theoretical pedagogy. We begin with short introductions to bring participants up to speed, but most of the training is hands-on, where they learn by doing. The goal is to equip university students and alumni with skills that not only cover theoretical concepts but also their practical applications. Real case projects, such as ProWAS SASA, are used to give them experience with real-world challenges and to build relevant workplace skills. For the government officials, the training is tailored to the challenges they face in their daily work. We start with simple, step-by-step practical exercises to build understanding, and then use their own official datasets in the training. This ensures that the skills they develop are directly relevant and applicable to their work environment. However, continuous support to the government officials is needed for sustainability of the skills that are given to the government officials.

Data collection approach

The data collection was conducted by the University alumni from Ardhi University in participating in the Tanga flood mapping activities, by which we followed a series of standardized steps and processes to achieve the project's data collection goals within the set timeline. Alumni were divided into three groups to ensure wider coverage of the areas to be mapped, and each group member was assigned a specific role to make the data collection more efficient.

- **Mappers:** Alumni who were responsible for carrying out the actual household mapping activities.
- **Community Members:** They accompanied the alumni throughout the exercise to guide them around the areas, identify ward boundaries, and introduce alumni to residents, ensuring smooth interaction. They also contributed by learning about the mapping activities, including the tools used and the questions asked, while providing feedback on flood-prone areas from the community's perspective.
- **Supervisors:** They had prior experience with Resilience Academy mapping projects and served as supervisors. Their role was to oversee the alumni groups, ensure that daily mapping targets were met, and resolve any issues that arose with community members during the data collection.
- **Expert:** A university expert working with the Resilience Academy oversaw all mapping activities, ensuring smooth operations both financially and administratively, and addressing any challenges faced in the community.

Before data collection, we conducted an analysis to identify key areas prone to flooding. This analysis helped us determine the relevant sub-wards and buildings for mapping. We evaluated spatial data, reviewed topographical features, and assessed the distribution of buildings within high-risk flood zones. By streamlining the field data collection efforts, we targeted the most critical locations for effective flood risk assessment. As a result, we categorized the two wards into two zones: Zone 1, which is the 100-meter buffer from the river, where we collected data from households covering 80% of the area; and Zone 2, which is the rest of the area away from the river, where we collected data from households covering 20% of all the buildings.

Data Collection Tools

Figure 2: Alumni using mobile phone during the data collection in Tanga in July 2025

Resilience Academy uses both OpenDataKit (ODK) and the related OpenMapKit (OMK) software for field data collection. For the mapping in Tanga, only ODK was used since it is particularly well-suited for integrating the spatial information with collected information from the households to therefore add extra information to (tagging) flood information while collecting information. It has a simple and intuitive UI which permits fast training of new data collectors, and it uses mobile devices to collect data which is in point-base data.

The ODK collect app is combined with the Kobo Toolbox to aggregate the data which can enable more functionality like live update while collecting data and can produce good results at scale. Many Resilience Academy students and alumni have been trained to set up ODK forms to ensure that the capacity to do this remains within the local team.

The approach of Resilience Academy is rooted in the community-based methodology, working with local stakeholders at various levels of society to enhance the use of open geospatial tools like ODK.

Partners

Resilience Academy works in partnership with a wide range of stakeholders. In the ProWAS SASA project, GIZ supports several actors, including local communities, government departments such as water basin authorities, disaster risk management offices, and urban planning units, as well as other organizations and programs such as CCI, Nipe Fagio, and VEI.

Resilience Academy universities contribute not only by engaging students and communicating with alumni to participate in ProWAS SASA project activities, but also by providing a strong link to communities of practice in participatory methodologies, education, urban planning, and geography. They are also direct beneficiaries of the project outputs, including collected datasets, tools, methods, and training materials, which continue to support their academic and research work. Each university has a Resilience Academy coordinator who is institutionally responsible for integrating experiences from projects like ProWAS SASA. This ensures that university experts benefit from the training and expertise generated and can apply these resources in teaching, aligning them with university curricula to strengthen student learning.

University students and alumni are key stakeholders in Resilience Academy activities, as they are the main beneficiaries. Our goal has been to equip students with practical skills that provide real-life experience, preparing them for future careers and increasing their employability. In the ProWAS SASA project, this approach has also been applied. We engaged university students from Ardhi University and the University of Dar es Salaam, as well as alumni from Ardhi University, in multiple stages of the project. During the flood data collection in Tanga, they were exposed to real work experiences that helped them bridge the gap between academic learning and professional practice.

Open Map Development Tanzania (OMDTZ) collaborated with Resilience Academy to organize training for university students and other partners as part of the ProWAS SASA project. The training included a Mapathon aimed at equipping students and young people from various organizations particularly within the humanitarian community with skills to contribute to the availability of data for Tanga and Mwanza. This data is essential for humanitarian purposes, including flood response and management. OMDTZ has been a Resilience Academy partner for over six years, working with us on different projects. Their role has primarily focused on hosting students, providing training, and engaging them in data collection activities.

CCI also works closely with Resilience Academy to understand methods and promote the use of the Climate Risk Database for accessing geospatial data. This database supports the delivery of their activities under the ProWAS SASA project. In addition, CCI contributes by sharing their long-standing experience in community engagement, as well as providing training materials and geospatial data. These resources are integrated into the Climate Risk Database and made accessible to the wider Resilience Academy community, including university experts and students.

Urban Planning Departments in Tanga and Mwanza provided us with valuable geospatial datasets that were shared through the Climate Risk Database. We also collaborated closely with individual planners from both cities to validate the data provided, ensuring its relevance based on the alignments with urban planning needs. This engagement not only strengthened the quality of the datasets but also built a stronger connection between the project and local planning authorities.

The Local Community plays a crucial role as a partner in Resilience Academy activities. Communities actively participate in data collection processes, sharing their local knowledge, experiences, and perspectives, which are essential for comprehending on-the-ground realities. By involving residents in participatory mapping and flood risk assessments, RA ensures that the collected data accurately reflects lived experiences and local priorities. Beyond participation, communities benefit from the project's outputs, such as collected datasets, maps, and tools, which inform local planning, enhance disaster preparedness, and support decision-making at the neighborhood level. This partnership fosters trust, promotes inclusivity, and empowers local communities to sustain resilience practices even after project activities conclude.

Quality Assurance

Data quality and quality assurance are built into the Resilience Academy mapping procedures. For everyday mapping by Resilience Academy participants, several hours of validating and quality control are implemented. All remote mapping is validated by another, usually more experienced mapper. Field mapping is quality-checked by university experts and GIS teams as well as field supervisors. For example, flood mapping segments are cleaned using QGIS software, run through a topology and quality checker tool and feedback is provided to the field supervisors to complete or correct the data gathered in the field. The following tools and technology are used:

- **Topology correction and digitization rules** from the QGIS (and GRASS) toolkits will be used to validate error-prone layers such as administrative divisions.
- **The Map Campaigner**[2] application serves roles in remote mapping, field mapping and quality assurance.
- **Validation procedures** as defined by the OSM Wiki's guidelines[3] (which have been specifically updated to reflect Ramani Huria procedures)
- **Topology checker**[4] plugin which was used to check connectivity of vector layer's topology in QGIS

[2] https://github.com/hotosm/MapCampaigner
[3] https://wiki.openstreetmap.org/wiki/Tasking_Manager/Validating_data
[4] https://docs.qgis.org/3.40/en/docs/user_manual/plugins/core_plugins/plugins_topology_checker.html

3. STAKEHOLDER MEETINGS AND NEED ASSESSMENT

To implement the project, experts from the University of Turku visited Tanzania to meet with ProWAS SASA partners in Mwanza and Tanga. The aim was to introduce themselves and discuss the specific needs of the partners in relation to their ongoing work. During the visit, meetings were held with key government stakeholders including the Lake Victoria Basin Water Board (LVBWB), Ilemela Municipality, Nyamagana Municipality, and MWAUWASA. In addition, discussions were conducted with project implementation partners such as the Center for Community Initiatives (CCI) and VEI.

The outcomes of these meetings highlighted a need for reliable and up-to-date geospatial data to support water-related initiatives and broader urban resilience efforts under the ProWAS SASA project. There was a vivid need to provision of training related to the use of Open-Source tools like QGIS to work with geospatial data sets for analysis that can be used during decision making. Several key challenges were identified:

- Outdated Systems: Many existing government systems especially those that cary geospatial dataset are not regularly updated, making the available data obsolete and ineffective for decision-making.
- Lack of Data Sharing: There is limited coordination between departments, leading to fragmented data that is not shared across sectors, even when needed for critical planning and decision-making.
- Limited Skills and Culture of Data Use: There is a general lack of awareness and capacity among staff to utilize open-source tools and data effectively. The culture of using data to inform decisions remains underdeveloped.
- Lack of Suitable Data Infrastructure: There is no widely adopted platform that integrates the necessary components for secure data storage, sharing, and internal use among government offices.

These findings have been instrumental in the Resilience Academy's next steps, particularly in identifying the focus for providing training to the ProWAS SASA partners and government officials. The goal is to equip them with knowledge and skills to leverage open-source tools and solutions, such as the Climate Risk Database (CRD), to bridge these gaps.

4. COLLECTING OF EXISTING GEOSPATIAL DATA SETS

Resilience Academy is hosting a CRD environment for sharing of geospatial data sets. It is through sharing of the data that decision makers, researchers, and students can access them for use. In this project, data sets from Mwanza and Tanga cities have been collected and shared in the CRD for access and use. Project experts have been working on the collection of general geospatial datasets from two key project areas: Mwanza and Tanga. A total of 85 geospatial datasets were collected from Mwanza and 65 geospatial datasets from Tanga, covering layers such as roads, buildings, drainage systems, administrative boundaries, and other infrastructure. These datasets have now been curated and uploaded to the Climate Risk Database (CRD) to provide accessible geospatial information for ProWAS SASA project partners, supporting data-driven decision-making in urban resilience and water-related planning efforts.

Region	Individual Datasets	Point Features	Line Features	Polygon Features
Mwanza	85	25	20	40
Tanga	65	15	8	42
Total	**150**	**40**	**28**	**82**

Table 2: Table of Datasets summary:

Establishment of a new CRD Domain

During our meeting and trainings to the ProWAS SASA partners and government officials we received feedback suggesting that the Climate Risk Databse (CRD) platform's name should align with the domain name for better consistency and recognition. In response to this and to enhance the accessibility and visibility of the Climate Risk Database (CRD), a new domain name was successfully registered to reflect the identity of the platform: https://crd.resilienceacademy.ac.tz.

This new domain now hosts the updated version of the CRD, offering improved performance, features and scalability. As a result, the CRD can now be accessed via two domain names:

- https://geonode.resilienceacademy.ac.tz (Old - Original)
- https://crd.resilienceacademy.ac.tz (New - Updated)

Migration of CRD to a new server

As part of the CRD development, the platform was updated to the new version (4.2), which includes additional features and enhanced security. These improvements provide the data users with all the necessary tools for data access and usability for their projects. Additionally, the CRD was successfully migrated from its previous server environment to a new, more secure, and efficient server. This migration improves platform performance, enhances data security, and allows for greater customization and reliability in managing geospatial datasets. With this migration, the server is now capable of storing large datasets at a faster pace compared to before.

Development of CRD training materials

A comprehensive set of 12 training materials was developed by experts from the University of Turku, Ardhi University, and the State University of Zanzibar. These materials cover key topics which is focusing on understanding the use of data from various sources, including CRD, and how to use it for decision-making. The materials begin with installation and use of QGIS, data uploading and curation in CRD, and connecting CRD to open-source tools. They serve as step-by-step guides designed to enable effective training and long-term capacity building for government and academic stakeholders. These materials were used in training conducted in Mwanza from March 10th to 11th, 2025, and in Tanga from July 21st to 22nd, 2025, as explained in the following chapters. The materials developed for this training are available in early access[5], but they will also be shared in an online environment to allow a wider audience to access and gain skills from them.

[5] https://drive.google.com/drive/folders/1hMcUNRaN6_RdflTLVr_6N22DjnIL3C6G?usp=sharing

1	Guide to Installing QGIS (Windows & MacBook)	Software Installation
3	Guide to CRD Main Interface	Navigation
5	Guide to User and Group Interactions	Collaboration Tools
7	Connecting CRD to QGIS via WFS and WMS	Data Integration
9	Overview of Useful QGIS Plugins	Productivity Enhancement
11	Document Management Guide	Resource Management

5. COMMUNITY-DRIVEN DATA COLLECTION AND QUALITY ASSURANCE

We have organized a mapathon to use participatory approaches in strengthening available open-source geospatial datasets that is available through OpenStreetMap-Mwanza[6] using community-driven data collection and systematic quality assurance. This was organized in Dar es Salaam, where an innovative mapathon methodology was conducted by engaging local students from universities in Dar es Salaam, Ardhi University and technical professionals in a collaborative mapping exercise. Using open-source satellite imagery and local knowledge, participants digitized building footprints for Mwanza city using a combination of JOSM[7] tool and Task tool[8], which are both used when collecting data to the OpenStreetMap. In the mapathon we focused on classified structure types and added relevant attributes essential for water infrastructure planning and flood risk assessment. This approach significantly expanded the coverage and detail of building information, yielding thousands of newly mapped structures and dramatically improving the spatial resolution and currency of built environment data. Beyond accelerating data collection, the mapathon fostered community ownership and raised awareness of the value of geospatial resources.

6 https://www.openstreetmap.org/relation/5712706#map=13/-2.67403/32.98310
7 https://josm.openstreetmap.de/
8 https://tasks.hotosm.org/projects/19971

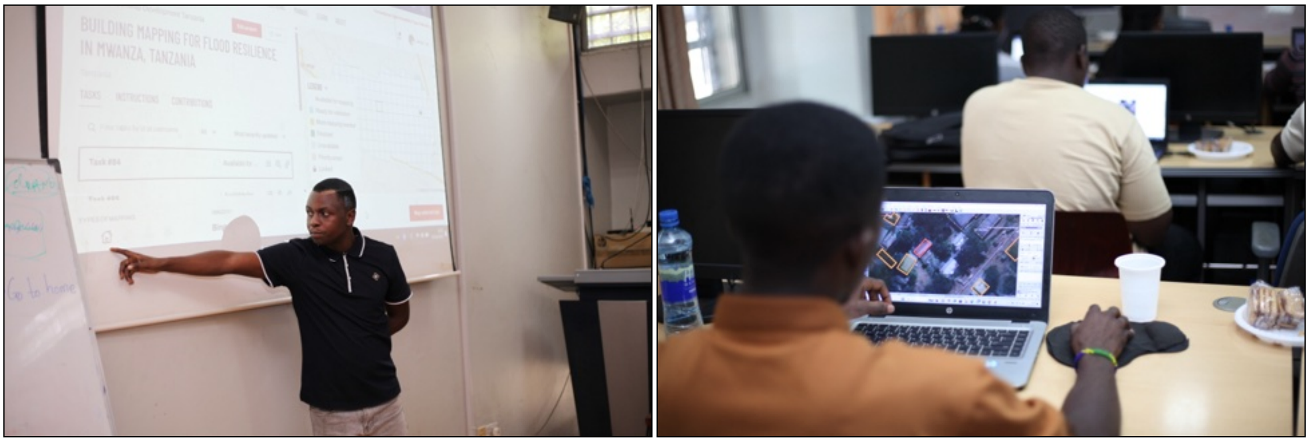


Figure 3: Different photos taken during the mapathon at University of Dar es Salaam

We also organized two data curation events in Zanzibar with students from the State University of Zanzibar and in Dar es Salaam with students from Ardhi University. These events were designed not only to equip students with practical skills in data curation and quality assurance but also to curate geospatial datasets collected from ProWAS SASA partners for adding into the CRD. It is through these two events where the curated datasets went through quality control processes to ensure accuracy, consistency, and usability, including procedures such as coordinate system alignment, attribute verification, and metadata documentation. Total of 87 data was curated from Mwanza and 65 was curated from Tanga then uploaded to the CRD.

Figure 4: Different photos taken during curation event in Zanzibar with students from State University of Zanzibar and students from Ardhi University

6. TRAINING FOR GOVERNMENT OFFICIALS AND PROWAS SASA PARTNERS

As part of the implementation of the ProWAS SASA project, two trainings were conducted in Mwanza from 10th March to 11th March 2025 and in Tanga on 21st July to 22nd July 2025 to respond to the identified challenges around data availability, accessibility, and capacity in urban resilience and water-related decision-making with the title "Climate Risk database (CRD): using geospatial data for management of climate risks in cities". During initial stakeholder meetings in Mwanza and Tanga, key gaps were revealed particularly the lack of up-to-date geospatial data, limited data-sharing mechanisms between departments, and insufficient skills in using open-source tools for spatial analysis and data-driven decision-making.

In response to these needs, the training was designed to strengthen the capacity of government officials and project partners in the use of open-source geospatial tools, promote the use of the Climate Risk Database (CRD), and encourage practical skills for data management and application in planning.

A total of 28 participants attended the training in Mwanza, while 23 participants attended the training in Tanga. The participants in Mwanza were experts from the Mwanza city council, Ilemela city council, Lake Victoria Water Basin, GIZ, and MWAUWASA. On the other hand, the participants in Tanga were attended by experts from the Tanga city council, Tanga UWASA, Pangani Water Basin (PBWB), and GIZ. The sessions in both locations were highly interactive, with participants engaging in group discussions, practical exercises, and case studies to enhance their understanding. Feedback from attendees highlighted the relevance of the training content and the effectiveness of the facilitators. Additionally, participants expressed interest in follow-up training to further consolidate their skills and knowledge.

Figure 5: Photos to show actions during the training in Mwanza.

Figure 6: Photos to show actions during the training in Tanga.

The training was designed to enhance participants' understanding of spatial data and open-source tools by emphasizing their essential role in climate risk assessment and urban resilience planning. Participants explored the benefits of open-source geospatial tools, which lower costs while increasing accessibility and collaboration. The training also introduced the Climate Risk Database (CRD) as a central tool for data sharing, offering participants a comprehensive overview of its functionalities, back-end structure, and customization capabilities. Through this, participants learned how CRD supports efficient data management and informed decision-making for urban resilience.

Practical sessions were a key component of the training, focusing on developing participants' geospatial data handling skills. These sessions enabled participants to create their own CRD accounts, navigate the platform, upload and manage datasets, perform data quality checks, and visualize geospatial data using QGIS.

7. TANGA FLOOD DATA COLLECTION

Flooding poses a significant risk to urban communities, especially coastal cities like Tanga. To address this concern, Tanga City embarked on a comprehensive flood extent mapping initiative. This initiative aimed to assess flood vulnerability, identify impact patterns, and evaluate community resilience.

The extensive data collection effort involved alumni mappers, supervisors, community members, and partners. The focus was on Mnyanjani and Mabawa wards. A total of 7,169 households were surveyed through 108 detailed questions. These questions adopted a multi-dimensional approach to flood risk assessment, covering general spatial analysis, socio-demographic profiling, infrastructure resilience, historical flood experiences, and community responses.

Although the mapping was conducted only in two wards in Tanga, it provides an overview of the entire city's flood risk landscape. The findings highlight key areas for improvement and offer broader implications for disaster risk reduction and urban planning.

Data Model

Flood extent mapping survey was conducted in Tanga City to represent a major data collection initiative designed to understand flood vulnerability, impact patterns, and community resilience in an urban coastal setting. The data to collect flood extent mapping included 108 questions, and we managed to collect 7,169 data in Mnyanjani and Mabawa wards. The actual questions are provided in the Flood Data Model Annex. The data model reflects a multi-dimensional approach to flood risk assessment, combining spatial analysis, socio-demographic profiling, built environment characterization, historical flood experience, and community responses. This holistic framework supports comprehensive flood mapping that goes beyond water depth measurement to include social vulnerability, infrastructure resilience, and adaptive capacity.

Figure 7: Alumni during the action of talking to community during the data collection

The dataset supports a wide range of applications:
- **Spatial analysis** for mapping flood extents, hotspots, infrastructure exposure, and evacuation routes.
- **Temporal analysis** for return periods, seasonal patterns, and long-term trends, including climate change impacts.
- **Social vulnerability analysis** for assessing differential impacts across gender, age, and education levels.
- **Disaster Risk Reduction analysis** to identify, assess, and mitigate potential hazards for enhanced community resilience.

Data Collection

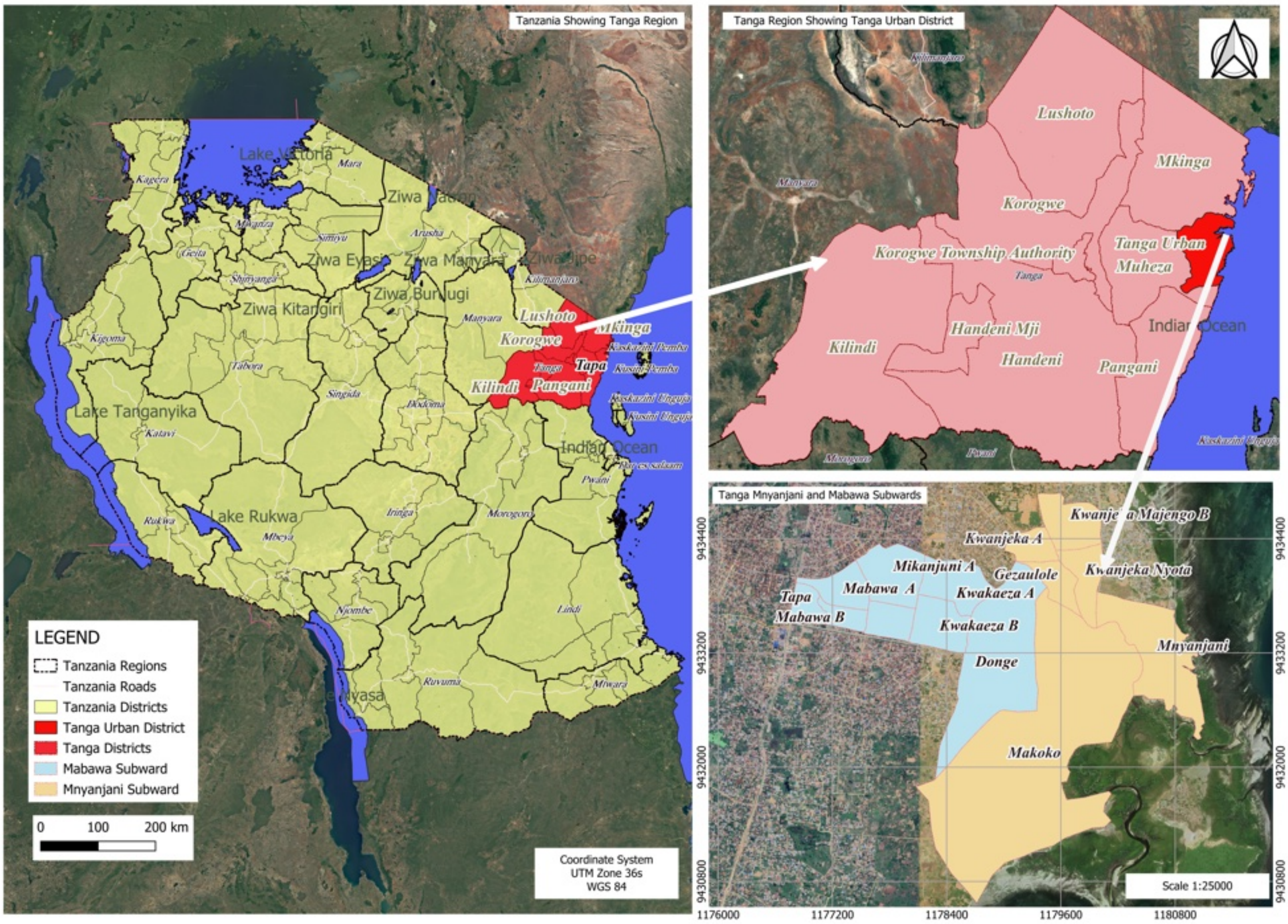
The Tanga flood extent mapping was conducted to represent one of the detailed household-level flood risk assessments. The data collected detailed information from 7,169 households each with 108 questions in the Mnyanjani and Mabawa wards in Tanga. In this chapter, we summarize the key flood-related factors collected and their significance for understanding Tanga urban flood risk, vulnerability, and community resilience.

Selection of data collection Area

Several wards were selected, but only two were finalized as the mapping wards. The selection process was based on the flood history suggested by the Tanga city council experts (Urban Planner) and initial analysis conducted on the DEM data sets for Tanga. This analysis revealed that Mnyanjani and Mabawa were the most flood-prone wards, while others were less prone.

Before data collection, a sampling methodology was designed for the Tanga flood data collection in Mnyanjani and Mabawa wards using QGIS software. This methodology involved creating detailed building layers for both wards, integrating the latest sub-ward delineations. A 100-meter buffer along the main rivers was applied to prioritize buildings at higher risk of flooding. 80% percent of the sampled buildings were allocated within this buffer, while 10% were deliberately selected outside the buffer to capture conditions in less vulnerable areas. This combined approach ensured inclusivity of all building types and locations, overcoming limitations observed in initial spatial random sampling methods that failed to include all structures. Each building was then linked to its corresponding sub-ward using a PostgreSQL database join, ensuring that every sampled unit was correctly referenced for subsequent survey administration.

Finally, the buildings were systematically assigned to mappers to optimize fieldwork efficiency and ensure even coverage across the wards. Using Google Earth Engine (GEE) and QGIS, centroids for each building feature were calculated to determine longitude values, which facilitated sorting buildings from west to east. Buildings were then evenly divided into twelve groups, each assigned a unique group ID, and subsequently allocated to individual mappers for data collection. This structured assignment allowed for efficient distribution of workload, minimized duplication, and ensured that every mapper had a clear and organized set of buildings to survey. The approach effectively combined spatial analysis, administrative validation, and practical field allocation to produce a robust dataset for flood risk assessment in Tanga City.



Map 1: Location map for Mnyanjani and Mabawa.

Findings

- **Widespread Flood Exposure**: 37% of households have experienced flooding, indicating significant community-wide flood risk that extends beyond traditionally recognized high-risk areas.
- **Infrastructure Crisis**: 58% of households report drainage system problems despite 58% living near drainage infrastructure, revealing critical infrastructure functionality failures.
- **Social Resilience**: Strong community networks with 77% of evacuees relying on neighbors, relatives, or friends demonstrate robust social capital that can be leveraged for disaster risk reduction.
- **Vulnerability Concentration**: 30% of households face High or Very High flood risk, requiring immediate intervention and priority resource allocation.
- **Multi-Causal Flooding**: Complex interaction of natural factors (heavy rains) with infrastructure failures (drainage blockage) and planning deficits (unplanned settlement) creates compound flood risks.

Alumni Engagements

The Tanga flood extent mapping initiative adopted a multi-stakeholder, participatory approach to ensure the collection of accurate, comprehensive, and contextually relevant data. Recognizing that flood risk in urban areas is not only a technical challenge but also a social one, the initiative integrated the expertise of alumni mappers, supervisors, community representatives, and RA partners. This collaboration ensured precise identification of sample households, comprehensive coverage of study areas, and high-quality data capture.

A total of 12 alumni mappers actively participated in the field data collection using detailed household-level surveys. The alumni team consisted of 4 male and 8 female alumni, promoting gender balance to enhance community interactions and ensure inclusivity in the data collection process. Each alumnus utilized a mobile device equipped with ODK, a survey mobile application connected to the survey, enabling real-time data collection, automatic tracking of geolocation, and immediate upload to the Kobo toolbox server. This approach minimized errors commonly associated with paper-based surveys, such as transcription inaccuracies and incomplete records.

The alumni were strategically distributed across Mnyanjani and Mabawa wards, following a pre-determined sampling framework to ensure proportional coverage of the target population. The allocation considered population density, spatial distribution, and household typologies within each ward, ensuring that both formal and informal settlements were adequately represented. With their prior training in spatial data collection, mapping, and urban resilience studies, the alumni were able to gather data that was both technically robust and contextually sensitive.

Supervisor Participation

The data collection process was overseen by 4 field supervisors, evenly divided by gender (2 male, 2 female), who provided technical guidance, quality assurance, and logistical support. Supervisors played an important role in ensuring to the survey procedures, verifying the accuracy of household selection, and ensuring that all sampled locations were reached. Their responsibilities included conducting daily briefings with alumni mappers, troubleshooting challenges encountered in the field, and reviewing digital submissions for completeness, consistency, and follow quality standards.

In addition to technical supervision, the supervisors played a crucial role in coordinating with ward leaders, facilitating interactions with households, and addressing concerns related to respondent consent, privacy, and data confidentiality. Their presence was important in ensuring the integrity of the data collection process and building trust among community members regarding the survey's purpose and intended use.

Community engagements

Community participation was the foundation of the flood mapping initiative's success. Ward leaders, local authority representatives, and selected community members actively collaborated with data collection teams (Alumni). They identified sample households, shared historical insights on flooding, and facilitated access to households that might otherwise be challenging to reach. By involving community actors, the initiative ensured that local knowledge informed the technical data collection process, enhancing the dataset's reliability and contextual relevance.

A total of 12 community representatives were formally engaged in the survey activities, comprising 3 male and 9 female participants. Their responsibilities included assisting in household identification, guiding alumni mappers through intricate urban layouts, providing information on previous flood events, and highlighting vulnerable zones and critical infrastructure. This collaboration not only streamlined the data collection process but also fostered community ownership of the flood risk information, which is crucial for subsequent disaster risk reduction and resilience planning.

Data analysis

This comprehensive flood vulnerability assessment examines the multilevel challenges facing Tanga City based on data collected in two wards (Mnyanjani and Mabawa). It analyzes social, structural, and environmental factors contributing to flood risk and community resilience. The data reveals critical gaps in formal flood protection systems while highlighting the vital role of informal community networks in disaster response. This information is essential for developing targeted mitigation strategies and enhancing urban flood resilience in the two wards and Tanga City at large.

Social Dimensions of Flood Vulnerability

The data collected paints a clear picture of how floods affect people and their communities at the neighborhood level. All the households surveyed are in just two areas, making it easier to compare neighborhoods while still keeping a broad view of the city. Looking at the people living there, we see some factors that could make them more vulnerable during floods. Most of the population is female (65%), which might mean they face more challenges getting resources when floods happen. Also, a large number of residents are between 26 and 55 years old (71%), which affects how easily they can move around and respond during emergencies.

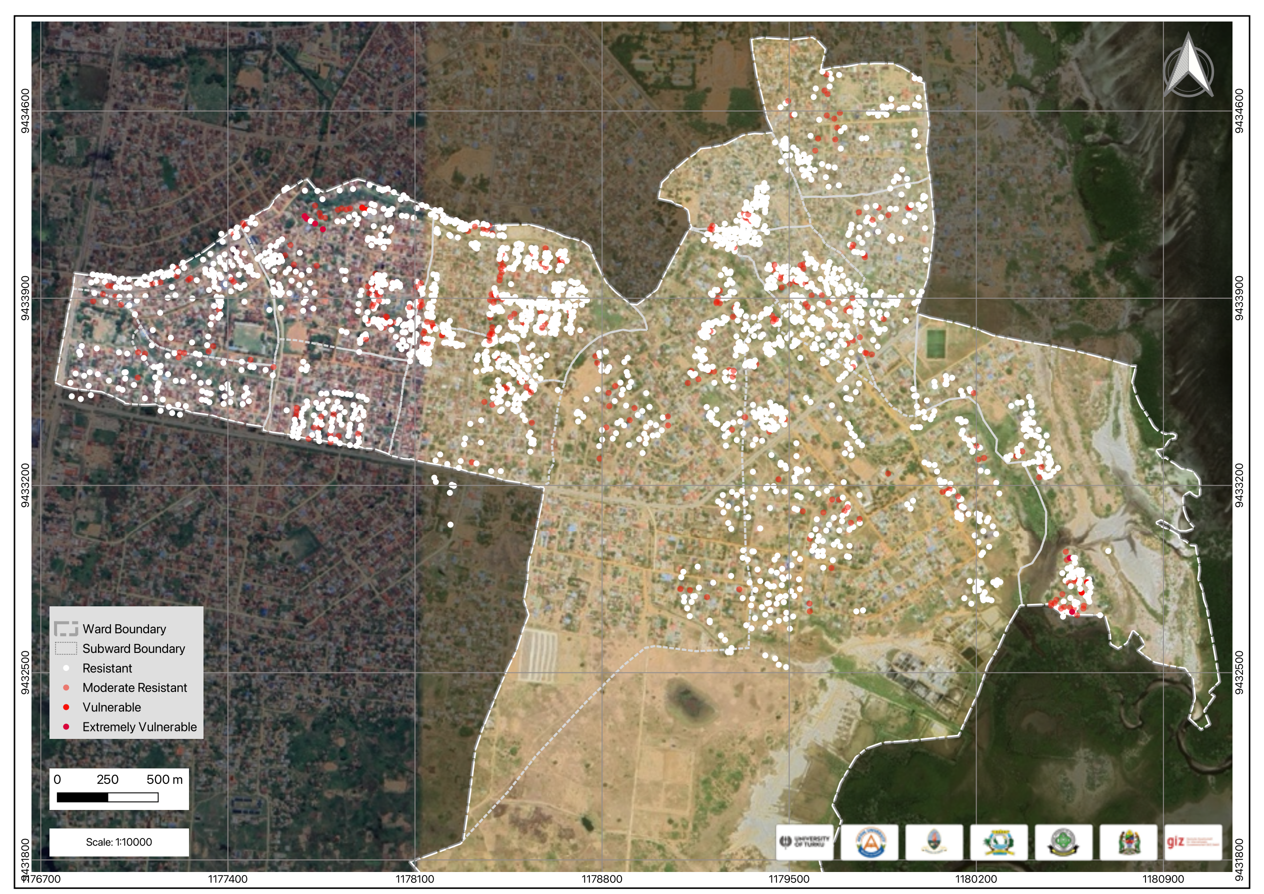
Education levels are average, with about 39% having completed primary or secondary school. This can influence how prepared people are for floods and how quickly they can recover afterward. When it comes to family roles, 45% of people are heads of their households, which plays a big part in making decisions about when to evacuate or how to handle emergencies. Many residents have lived in the same place for a long time 75% have been there for over five years. This shows they are part of an established community, likely having valuable knowledge about local flood risks and strong connections with their neighbors.

Building and infrastructure vulnerability

How buildings are made and where they are located play a big role in how much damage floods can cause and how well people can recover. Most families (72.4%) live in houses that are strong against floods because they're built with better materials. However, about 25.3% of people live in homes that are more likely to be damaged because they don't have many features to protect against floods. A small number (1.7%) live in apartment buildings, and how safe these are depending on how high up they are. The materials used to build homes also matter. Most houses (89.3%) are made of blocks, which offer decent protection. Some (3.5%) are made of bricks, which are strong but not as common. Others (4.0%) are made with mixed materials, which can be risky because the quality isn't consistent. A small number (2.0%) of homes are made from earth or wood, and these are very vulnerable to flood damage.

The condition of the buildings adds to the risk. About 65% of homes are in good shape and less likely to be damaged. Around 30% are in fair condition, meaning they could face some damage, and 5% are in poor condition, making them very weak during floods.

Figure 8: House located in the flood prone area in Tanga



Map 2: Map to show moderate resistance, highly vulnerable, and resistance

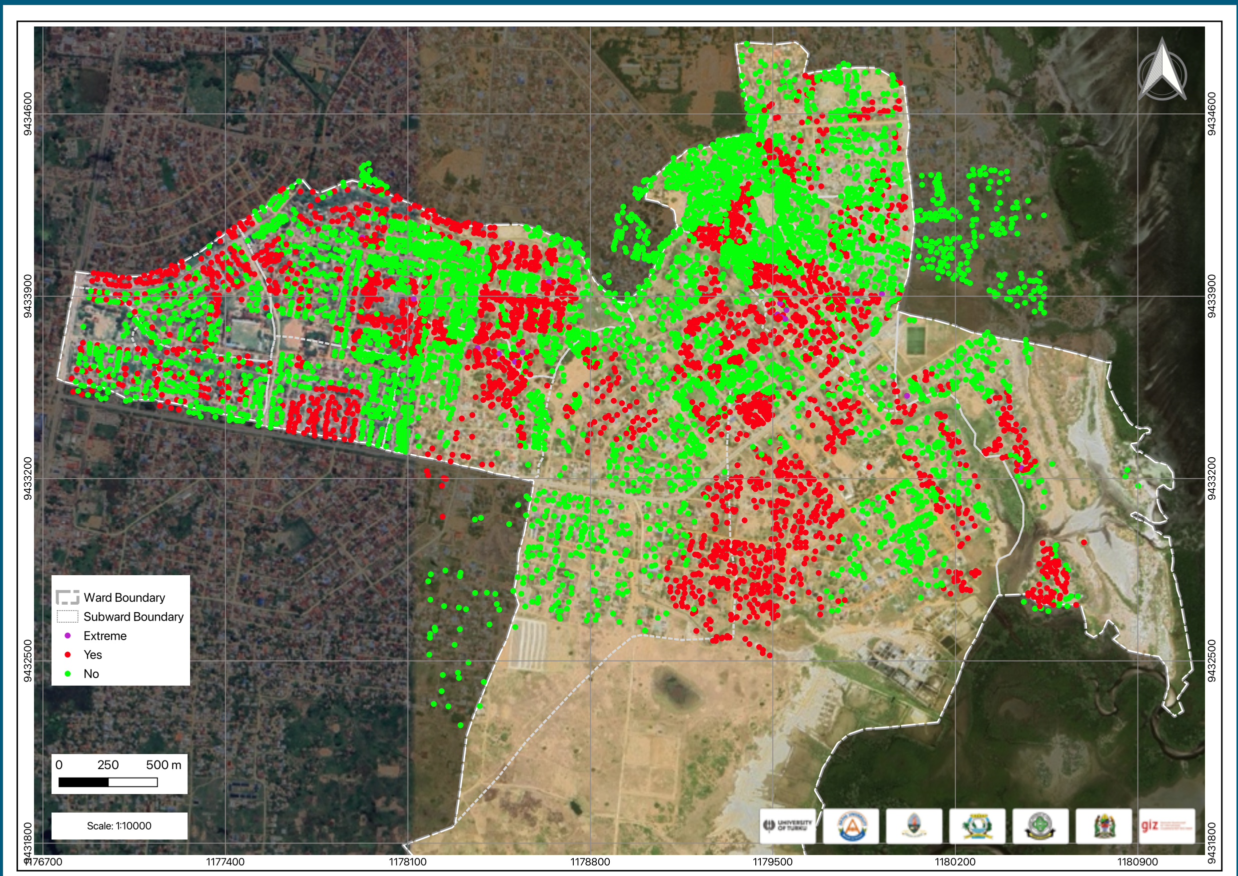
Flood experience and historical patterns

Floods in Tanga City tell an important story about how often they happen, how severe they can be, and which areas get hit the hardest. In neighborhoods like Mnyanjani and Mabawa, about 37% of the families said they've been affected by floods, which shows that many people face this risk. Meanwhile, 63% of families have never experienced flooding, meaning they live in areas that are generally safer. For those who have been affected, 45% dealt with flooding just once, but 55% experienced it more than once. This highlights that flooding remains a problem in some parts of the city.

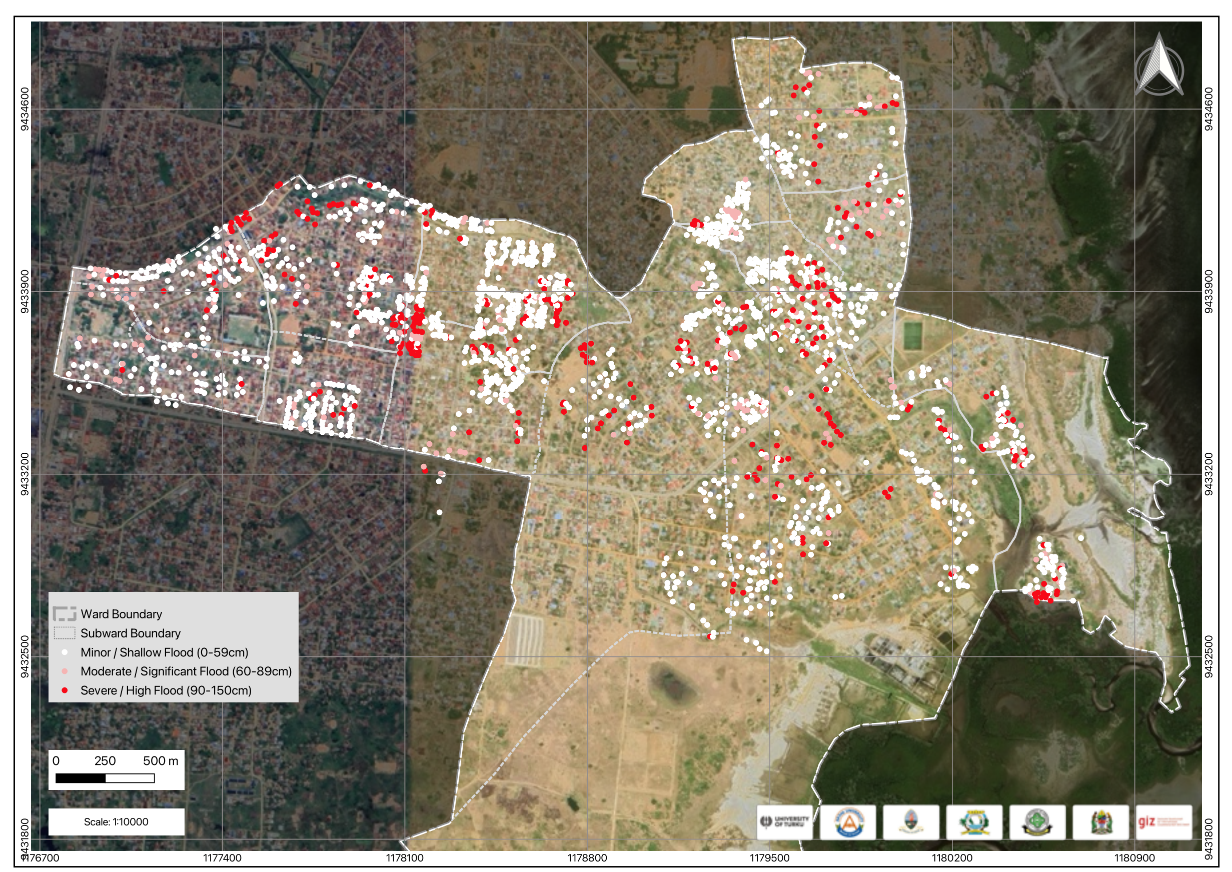
When it comes to how deep the water gets during floods:

20% of the floods had water reaching ankle level (around 5-8 cm),
45% reached mid-leg (18-36 cm),
25% went up to the knees (38-53 cm), and
10% were even deeper, rising past the waist (over 84 cm).

This shows that floods in these two areas can range from minor inconveniences to very serious situations.



Map 3: Map to show flood experiences



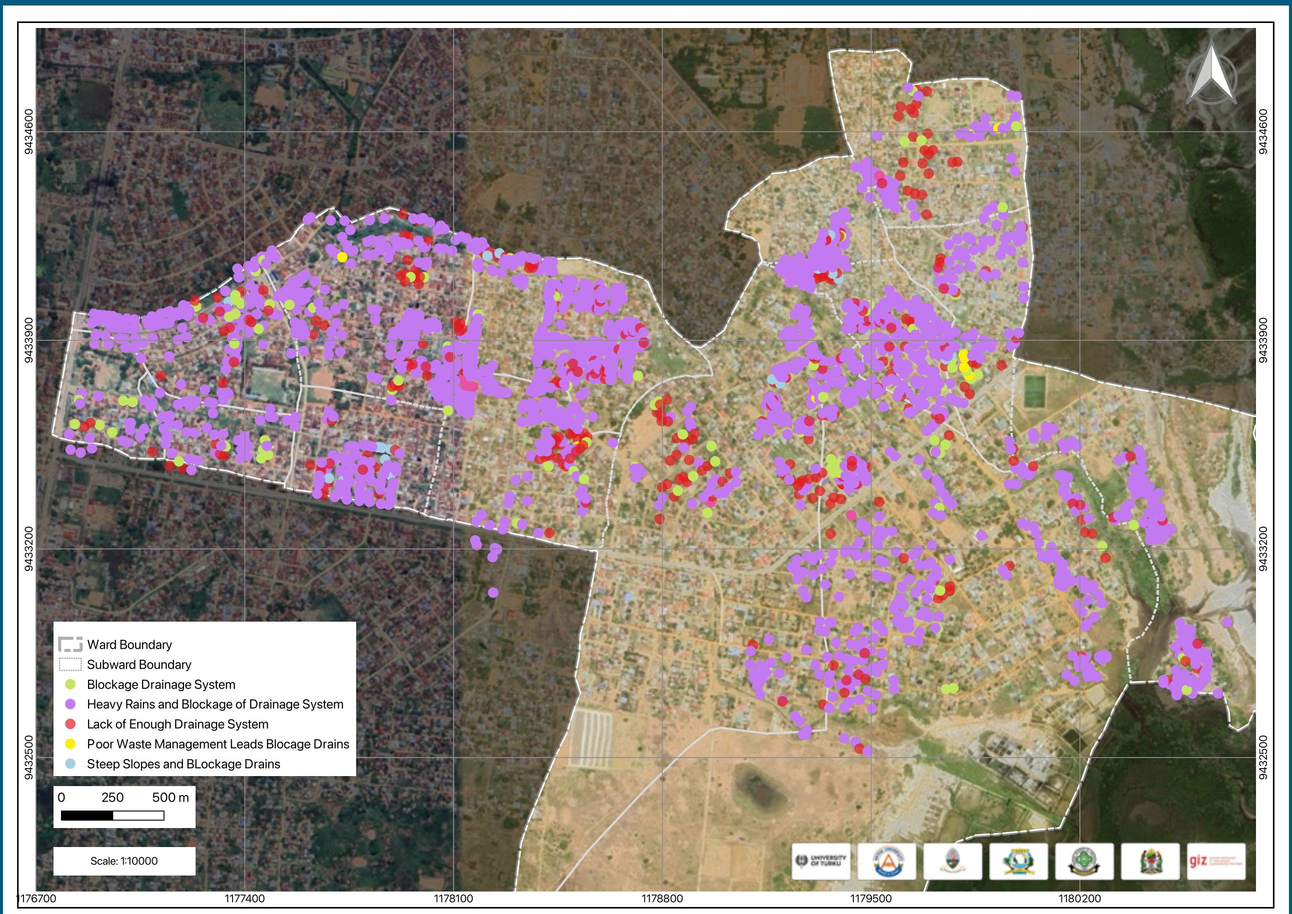
Map 4: Map to show flood Depth

Flood causation and source

Flooding in the two wards is caused by a mix of natural and human-made factors. The biggest natural cause is heavy rainfall, which is responsible for 89% of flood events. Other natural issues include soil erosion (23%) and steep slopes (18%), which make the land more prone to flooding.

Problems with infrastructure also make flooding worse. Blocked drainage systems are to blame for 67% of floods, and drainage systems that can't handle large amounts of water cause 45% of them. This shows a need for better maintenance and upgrades to the current drainage systems.

Urban planning issues add to the problem as well. Floods are linked to unplanned settlements in 34% of cases and poor waste management in 29%. Both of these leads to blocked waterways, which reduce how well water can drain away.



Map 5: Map to show flood causes (Rain, steep slopes, landscape, etc)

Infrastructure and Drainage

The data collected gives us important information about how well flood protection systems are working. Around 58% of homes are close to drainage systems, which could help protect them from floods if they're kept in good shape. However, 42% of homes don't have drainage systems nearby, making them more at risk and showing a clear need to expand the drainage network. A big issue is that many of the existing drainage systems aren't working properly. In fact, 58% are reported as broken or not functioning well, which can give people a false sense of security. On the bright side, 42% of the systems are working and need regular maintenance to keep them effective.

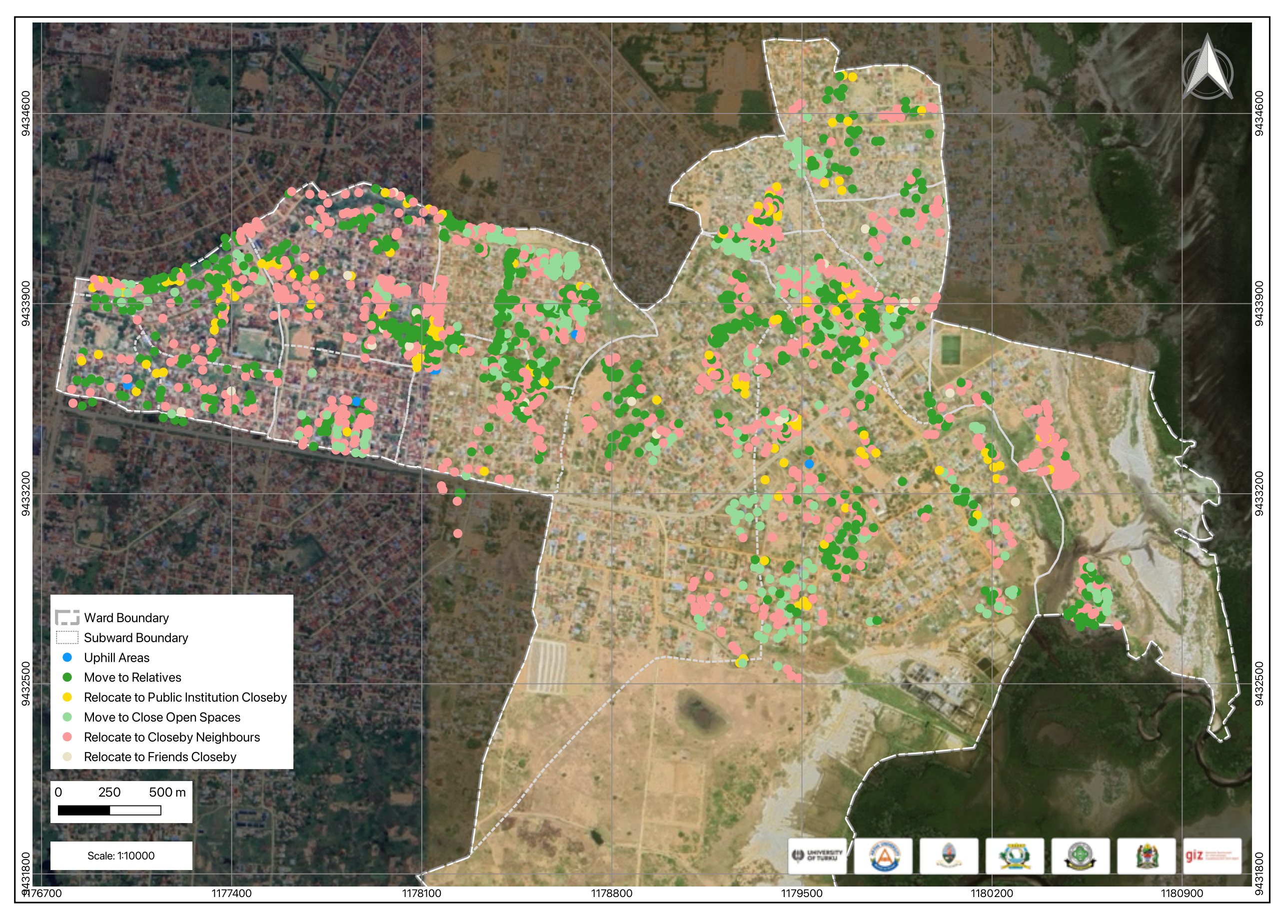
When it comes to being near important places, 25% of homes are close to schools that could be used as evacuation centers during floods. About 35% are near health facilities that can provide emergency care, and 78% are near main roads, which are crucial for getting people to safety quickly.

Map 6: Supervisors in Mnyanjani are looking at the drainage conditions in different locations.

Community Response and Evacuation Patterns

In Tanga City, people rely heavily on their social connections and flexible coping methods when dealing with floods. Based on data from two wards, 45% of evacuees stay with neighbors, 32% go to relatives, and 15% turn to friends. This shows how much people depend on each other and their families, while only 8% use public shelters, highlighting limited available spaces. When floods happen, 34% of families temporarily move to safer places, showing their ability to adapt even though it's disruptive. However, 5% end up moving away for good after facing repeated floods, pointing to the system's weaknesses.

As for drainage, 25% of flooded areas clear up within a day, 50% take between one to three days, and 25% stay flooded for more than three days. This shows serious drainage issues in some parts of the city.



Map 7: Map to show responses related to evacuation patterns, movements, evacuations, etc

There are numerous factors related to the data that can be explored depending on specific needs and objectives. The flexibility of the data allows it to be utilized across various domains to support informed decision-making processes. For example, in Disaster Risk Reduction, the data can help identify vulnerable areas, predict potential hazards, and formulate effective emergency response strategies. This includes flood risk mapping, earthquake impact assessments, and early warning systems for natural disasters.

In the sector of urban planning, the data can contribute to designing sustainable cities, optimizing land use, and improving infrastructure development. Urban planners can analyze population density trends, transportation networks, environmental impact, and resource distribution to create more livable urban environments.

Furthermore, the data can be instrumental in conducting environmental analysis to monitor climate change indicators, assess ecosystem health, and manage natural resources efficiently.

Risk Assessment and Prioritization	Out of all the households surveyed, 2,126 (30%) are at high or very high risk. This helps disaster risk reduction (DRR) teams focus on the areas that need the most help. By seeing where the risks are spread out, teams can plan better for emergencies and create programs that help communities become stronger and more prepared.
Early Warning System Development	Floods usually happen during the rainy seasons (March-May and October-December). Most floods are caused by heavy rain (89%) and blocked drains (67%). Knowing this helps set up early warning systems and community-based flood monitoring networks that can alert people before floods happen.
Infrastructure Investment Planning	More than half (58%) of drainage systems aren't working properly, even though many people live nearby. Fixing these drains is the most cost-effective solution, protecting households. This information helps decide where to spend money to improve flood defenses.
Community-Based Disaster Risk Reduction	During floods, most people (77%) evacuate to stay with neighbors, relatives, or friends. This shows that strong community ties are already in place. Programs can build on these connections to spread information, support each other, and plan together to reduce risks.
Emergency Response Optimization	There aren't enough shelter spaces during floods: 630 spaces short for moderate floods and 3,120 spaces short for major ones. This information helps emergency managers create realistic plans, work with other groups for support, and make sure resources are used where they're needed most.
Policy and Regulatory Framework Development	Newer buildings (built after 2010) handle floods better. This suggests building codes and rules should be updated to make sure new construction is safer. Also, many floods (34%) happen in unplanned areas, showing the need for better land use planning and development control to reduce future risks.
Climate Adaptation Planning	Floods are happening more often, 10% more in the past decade. Some areas, like Mnyanjani, have seen a 12% increase, and Mabawa has seen an 8% rise. This information helps plan for climate change by updating infrastructure designs, emergency plans, and city development strategies to manage increasing flood risks.

Table 4: A table to show areas of topics where flood data can be analyzed for

8. KEY OBSERVATION AND LESSONS LEARNED

The first ten months of ProWAS SASA implementation have generated valuable insights about community-driven approaches to urban flood risk management, capacity building strategies, and the practical challenges of implementing geospatial data initiatives in resource-constrained urban environments.

Community Involvement and Participation: The flood mapping efforts in Tanga provided lessons on how essential it is to actively involve community members in data collection. Instead of treating them as mere subjects, engaging them as partners improved both the quality of the data and the community's sense of ownership. This can be seen on the data collected where 77% of people depend on neighbors, family, and friends during flood evacuations, showing strong local networks that can be useful for disaster preparedness. Maintaining this level of community involvement after the project ends is challenging. It requires ongoing support from institutions and clear ways for community members to keep using and updating the information. The project showed that while single training events are helpful, they work best when combined with continuous guidance and technical support to ensure lasting knowledge.

Building Government Skills and Addressing Challenges: Training sessions for government officials revealed gaps in their ability to use geospatial data effectively. However, there was a strong interest in learning. Issues like outdated systems, limited data sharing habits, and poor data infrastructure pose long-term challenges that can't be fixed with short-term projects. Training that uses real data from participants' daily work proved more effective than generic examples. Ongoing support and mentorship were and can continue to be the key in helping participants apply new skills in their jobs.

Technology and Data Management: Developing the CRD platform taught us that tech systems need to strike a balance between advanced features and ease of use. While high-tech tools can be powerful, simple and reliable platforms are more likely to be adopted by people without technical backgrounds. Ensuring the quality of data takes time and requires skilled people. It's just as important to train locals to maintain data quality as it is to collect the data itself. Involving the community in checking data adds valuable insights alongside technical reviews.

University Partnerships and Student Engagement: Working with multiple universities helped expand the project's reach and brought in a variety of technical skills. Involving students and alumni in real-world projects gave them hands-on experience while contributing to meaningful outcomes. However, coordinating across different universities was challenging. As more partners joined, it became clear that effective communication and dedicated project management are essential to keep things running smoothly.

Flood Risk Insights and Urban Planning: A detailed household flood risk assessment in Tanga showed how social vulnerabilities, poor infrastructure, and environmental issues combine to increase flood risks. Surprisingly, 58% of drainage systems don't work properly, even though they're in place. This highlights that having infrastructure isn't enough, it needs to be functional. Combining spatial data with information on social vulnerabilities provided useful insights for urban planning and reducing disaster risks. However, turning this detailed data into actionable policies requires ongoing collaboration between technical experts and city planners.

Ensuring Long-term Impact: Focusing on building local skills instead of just delivering technical results laid the groundwork for lasting impact. Training materials, partnerships with institutions, and tech infrastructure are valuable resources that can support future activities. To keep these benefits going, continuous institutional support is necessary, especially for maintaining technical systems and delivering ongoing training. We've learned that planning for sustainability should start early in the project, not just at the end.

Innovative Methods and Scaling Up: Combining local knowledge with technical mapping led to new methods that could be used in other cities. Activities like community mapathons, household surveys, and technical data reviews created a framework that others can follow for community-led flood risk assessments. However, scaling these methods requires local technical skills, strong institutional support, and engaged communities. While the tools and processes can be shared, each location will need to adapt them to its specific context, along with ongoing support to build local capacity.

Timeline

10. APPENDICES

Training Program - Mwanza

Resilience Academy

Climate Risk database (CRD): using geospatial data for management of climate risks in cities

Dates: 10th and 11th March 2025

DAY 1		
Time	**Training Title**	**Responsible**
9.00am - 9.20am	Registration and introductions	All
9.20am - 9.40am	Welcome remarks	GIZ
9.40am - 10.00am	Introduction to the training: learning objectives, key topic, timetable, teachers, participants	Msilikale Msilanga
10.00am - 10.30am	Tanzania Resilience Academy	Msilikale Msilanga
10.30am - 10.00am	Digital geospatial data for urban development and improved climate resilience	Prof. Niina Käyhko
10.00am - 11.00am	**BREAK**	
11.00am - 12.30pm	Spatial Data Infrastructures (SDIs) - introduction	Zakaria Ngereja
12.00pm - 12.30pm	Climate Risk Database (CRD) as open-access data service for Tanzanian cities and Demo	Massoud Mmanga
12.30am - 1.00pm	Practical 1 - working with geospatial data sets in CRD and QGIS (Incl. Exploring CRD functionalities, metadata, data downloading, data management in QGIS, using layers in QGIS, visualization, thematic maps, basic data management)	Msilikale Msilanga
1.00pm - 2.00pm	**LUNCH BREAK**	
2.00pm - 3.00pm	**Cont.** Practical 1 - working with geospatial data sets in CRD and QGIS (Incl. Exploring CRD functionalities, metadata, data downloading, data management in QGIS, using layers in QGIS, visualisation, thematic maps, basic data management)	Msilikale Msilanga

DAY 2		
Time	**Training Title**	**Responsible**
9.00am - 9.30am	Introduction to geospatial data quality assessment	Prof. Niina Käyhko
9.30am - 10.00am	Demo - data creation processes in the Tanzania Resilience Academy	Msilikale Msilanga
10.00am - 11.00am	**BREAK**	
11.00am - 12.00pm	Demo - CRD data uploading and sharing	Msilikale Msilanga
12.00pm - 1.00pm	Practical 2 - Assessing the quality of geospatial data sets (QGIS tools)	Msilikale Msilanga
1.00pm - 2.00pm	**LUNCH BREAK**	
2.00pm - 3.00pm	Practical 3 - Building metadata for the geospatial sets (excel)	Msilikale Msilanga
3.00pm - 4.00pm	Practical 4 - Data sharing in QGIS	Msilikale Msilanga

Training Program - Mwanza

Training on Enhancing Spatial Data Management for Urban Resilience: Practical Training on QGIS and Climate Risk Database (CRD) in Tanga

Date: 21st – 22nd July 2025 **Venue: Regal Naivera**

Workshop objectives:

- Introduction to the Climate Risk Database (CRD): Accessing, visualizing, and sharing geospatial data for climate resilience and disaster risk management.
- Understanding open-source data and tools for analysis, enhancing data accessibility, processing, and decision-making in urban planning and online available open sources data
- Introduction to QGIS: Understanding how to access data from CRD to view, analyze, and create maps for spatial data management, quality improvement, and decision-making in urban planning, health, environmental management, and resilience.
- Enhancing data quality standards, quality control, metadata creation, and the curation process for accurate and reliable spatial data management.

Workshop programme

	When	What	Moderator
Day 1	8.00 am - 8.30 am	Participants Arrival and Registration	All
	8.30 am - 8.45 am	Welcome word from GIZ	GIZ Team (Queen)
	8.45 am - 9.00 am	Introductions of all participants and trainers.	All
	9.00am - 9.30 am	Overview of training objectives and expected outcome. Provide explanation of program structure and daily schedules.	Massoud
	9.30 am - 10.00 am	Introduction to Resilience Academy	Massoud
	10.00 am - 11.00 pm	**Coffee Break**	**All**
	11:30 - 12:30 pm	Geospatial Data in Urban Resilience	Dr. Ngereja
	12:30 am - 1:00 pm	Introduction to Spatial Data Infrastructure (SDI)	Dr. Ngereja
	1:00 pm - 2:00 pm	**Lunch Break**	**All**
	2:00 pm - 2:30 pm	Climate Risk Database Overview	Massoud
	2:30 pm - 3:30 pm	CRD Main Interface & Navigation	Massoud
	3:30 pm - 3:45 pm	**Coffee Break**	**All**
	3:45 pm - 4:00 pm	Account Management & User Activities	Massoud
	4:00	*Day 1 Wrap-up & Preview*	*All Moderators*

Day 2	8:00 am - 8:15 am	Participants Arrival and Registration	All
	8:15 am - 9:30 am	QGIS Installation & Setup - Hands-on Activity	Amedeus
	9:30 am - 9:45 am	Introduction to QGIS - Hands-on Activity	Amedeus
	9:45 am - 10:45 am	User Management & Collaboration	Massoud
	10:45 am - 11:00 am	**Coffee Break**	**All**
	11:00 am - 12:30 pm	Connecting CRD to QGIS - Hands-on Activity	Massoud
	12:30 pm - 1:30 pm	QGIS Plugin Management - Hands-on Activity	Massoud
	1:30 pm - 2:30 pm	**Lunch Break**	All
	2:30 pm - 2:50 pm	Geonode Plugin Integration - Hands-on Activity	Massoud
	2:50 pm - 3:00 pm	Additional Useful QGIS Plugins - Hands-on Activity	Amedeus
	3:00 pm - 3:30 pm	**Coffee Break**	**All**
	3:30 pm - 4:00 pm	Other tips and tricks	All Moderators
	4.00 pm	*Program Wrap-up & Next Steps*	*All Moderators*

Flood Data Model (Questions used)

Final_Tanga_Flood_Extent_Mapping_July_2025_V03.xlsx - Excel (Product Activation Failed)

I36

	type	name	hint	required	choice_filter	calculation	relevant	appearance	repe
11	select_one gender	gender	What is the gender of the interviewee?						
12	select_one age_group	respondent_age	How old are you?	1			${consent} = 'yes'		
13	select_one education	respondent_education	Respondent education level	1			${consent} = 'yes'		
14	select_multiple role or_other	role_in_household	What is your role in this household?	1			${consent} = 'yes'		
15	integer	years_in_house	How many years has this family lived in this home?	1			${consent} = 'yes'		
16									
17	**note**	**address**	**Section B: Address**				${consent} = 'yes'		
18	geopoint	location	Please and take a GPS point outside the front door of the hor	1				placement-map	
19	select_one dwelling_type	dwelling_type	Choose dwelling type	1			${consent} = 'yes'		
20	select_one building_use	building_use	what are the uses of this building?	1			${consent} = 'yes'		
21	select_one building_material	building_material	What building material used in this building? (exclude roofing	1			${consent} = 'yes'		
22	integer	building_height	How many storeys does this building have?	1			${consent} = 'yes'		
23	select_one building_condition	building_condition	What is the condition of the building?	1			${consent} = 'yes'		
24	select_one occupancy_status	occupancy_status	What is the building occupancy status?	1			${consent} = 'yes'		
25	integer	building_year_built	What year was the building constructed? (to provide an estim	1			${consent} = 'yes'		
26	select_one yes_no	near_drainage	Is there a natural or artificial drainage nearby?	1			${consent} = 'yes'		
27	select_one yes_no	drainage_issue	Are there drainage bottlenecks near here?	1			${consent} = 'yes'		
28	select_multiple critical_risk	critical_risk	What nearby critical facilities are at risk during flooding?	1			${consent} = 'yes'		
29	text	critical_risk_other	Specify				${critical_risk} = 'other'		
30	select_one district	district	What is the name of the district	1			${consent} = 'yes'		
31	select_one ward	ward	What ward does this family live in?	1			${consent} = 'yes'		
32	select_one subward	subward	What sub-ward does this family live in?	1			${consent} = 'yes'		
33	text	subward_other	Specify	1			${subward} = 'other'		
34	text	landmark	What is the nearest well-known landmark?	0			${consent} = 'yes'		
35							${consent} = 'yes'		
36	**note**		**Section C: Flood event**				${consent} = 'yes'		
37	begin_group	flood_general_info	Flood general info				${consent} = 'yes'		
38	select_one yes_no	flood_count	Has floods happen more than ones to this house?				${consent} = 'yes'		
39	integer	number_flood_event	How many times?				${flood_count} = 'yes'		
40	end_group						${consent} = 'yes'		
41							${consent} = 'yes'		
42							${consent} = 'yes'		
43	**begin_repeat**	**flood_history_event**	**historian na matukio ya mafuriko**				${flood_count} = 'yes'		${nu
44	calculate	position_index				position(..)	${consent} = 'yes'		
45	**note**	**flood_event_title**	**Tukio la mafuriko No. ${position_index}**				${consent} = 'yes'		
46	select_one yes_no	experienced_flood	Have you ever had a flood where you are living now?	1			${consent} = 'yes'		
47	date	flood_month	What month and year was this flooding event	1			${experienced_flood} = 'y	month-year	
48	select_one gender	gender	What is the gender of the interviewee?						
49	select_one person_height	person_height	Person's height in cm	1	gender=${gender}		${experienced_flood} = 'yes'		
50	select_one flood_depth	flood_depth	How deep was the flood water?	1	person_height=${person_height}		${experienced_flood} = 'yes'		
51	select_one yes_no	flood_source	Do you know what caused the flood?	1			${experienced_flood} = 'yes'		
52	select_multiple flood_source_list or_other	flood_source_list	What do you think caused the flooding?	1			${flood_source} = 'yes'		
53	text	water_drain	Time water took to drain after rainfall (be specific in time/dura	1			${experienced_flood} = 'yes'		
54	select_one yes_no	moved_house	Have you moved settlement because of flooding?	1			${experienced_flood} = 'yes'		
55	integer	moved_house_frequency	how often did you move because of the flooding? (refer to the	1			${moved_house} = 'yes'		
56	select_multiple evacuation_centre or_othe	evacuation_centre	Please mention the evacuation centres if any?	0			${consent} = 'yes'		
57	image	image	Take a picture or upload						
58	text	description	Please write descriptions (if any)	0					
59	**end_repeat**								

survey | choices | settings

Ready | Accessibility: Good to go

Resilience Academy

https://resilienceacademy.ac.tz/
resilienceacademy@utu.fi
resilienceacademytz@gmail.com

UNIVERSITY OF TURKU