ANNUAL REPORT 2022

TANZANIA URBAN RESILIENCE PROGRAM

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Tanzania Urban Resilience Program 2022

ANNUAL REPORT 2022

TANZANIA URBAN RESILIENCE PROGRAM

TANZANIA
URBAN RESILIENCE
PROGRAMME

WORLD BANK GROUP

UKaid
from the British people

Tanzania Urban Resilience Program (TURP) was established in 2016 from a partnership between the Foreign, Commonwealth and Development Office (FCDO) of the UK Government and the World Bank to support the Government of Tanzania in its endeavor to increase resilience to climate and disaster risk.


AZAM SEALINK

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ACRONYMS

ARU	Ardhi University
BIG-Z	Boosting Inclusive Growth for Zanzibar – Integrated Development Project
DarMAERT	Dar es Salaam Multi-Agency Emergency Response Team
DMDP	Dar es Salaam Metropolitan Development Project
EOC	Emergency Operations Center
ERF	Emergency response function
FCDO	Foreign and Commonwealth Development Office of the United Kingdom
FY	Fiscal Year
ICF	Investment Climate Facility
LGA	Local government authority
PO-RALG	President's Office – Regional Administration and Local Government
PMO-DMD	Prime Minister's Office – Disaster Management Department
RGoZ	Revolutionary Government of Zanzibar
SUA	Sokoine University of Agriculture
SUZA	State University of Zanzibar
SWM	Solid waste management
TACTIC	Tanzania Cities Transforming Infrastructure and Competitiveness Project
TDCS	Tanzania Disaster Communication Strategy
TEPRP	Tanzania Emergency Preparedness and Response Plan
TURP	Tanzania Urban Resilience Program
UDSM	University of Dar es Salaam
ZBS	Zanzibar Bureau of Standards

01. EXECUTIVE SUMMARY

The Tanzania Urban Resilience Program (TURP) is a multi-year, strategic technical assistance program funded by the Foreign and Commonwealth Development Office (FCDO) of the United Kingdom. The program's main objective is to support Tanzania's national and local governments in better managing climate risk in cities and enabling climate-resilient urbanization across the country.

TURP has four main pillars: 1) Risk Identification; 2) Risk Reduction; 3) Emergency Preparedness; and 4) the Resilience Academy. These pillars complement each other, providing a comprehensive approach to the climate risk challenges Tanzania cities are facing.

PILLAR 1
Risk Identification

PILLAR 2
Risk Reduction

PILLAR 3
Emergency Preparedness

PILLAR 4
Resilience Academy

Tanzania, like other Sub-Saharan Africa countries, is increasingly experiencing climate change and climate change–induced hazards, such as floods, droughts, and medium to extreme heat.[1] Floods are the most common hazard in the country; during the rainy season, they are prevalent in urban centers, whose vulnerability to flooding is heightened by rapid urbanization, accompanied by unplanned settlements, inadequate infrastructure, and the limited financial and technical capacity of national and local authorities.

Dar es Salaam, Tanzania's largest city, is frequently affected by flooding. Although, the government's continued efforts to minimize the impact of flooding, including by frequently dredging the Msimbazi River, has partially abated the problem of overflowing bridges and the disruption of major transport facilities, a more sustainable and comprehensive solution is needed. To this end, the Government of Tanzania has developed a $260 million integrated flood protection project in the Msimbazi Basin, financed by the World Bank and informed by the analytics and consultations conducted under TURP. Going forward, it will be critical to accelerate similar climate adaptation investments, as the city is growing rapidly, with a population expected to reach 10 million by 2030.[2]

Dar es Salaam is not the only city experiencing rapid growth. Although the growth rate varies widely across

[1] ThinkHazard (https://thinkhazard.org/en/report/257-tanzania/EH).
[2] World Bank, Transforming Tanzania's Cities: Harnessing Urbanization for Competitiveness, Resilience, and Livability (Washington, DC: World Bank, 2021).

Tanzania's cities, five of the country's secondary cities (more than 250,000 people) and thirty tertiary cities (fewer than 250,000 people) are growing at an average rate of 4.1 percent.[3] Zanzibar City is also experiencing rapid urbanization. Urban areas are helping to significantly reduce poverty, exemplifying the strong role of urban development in poverty reduction. However, growing secondary cities are also vulnerable to the effects of climate change, exposed to risks associated with floods, droughts, and sea level rise. TURP has supported various technical assistances to inform a range of investments under World Bank–financed projects in Zanzibar and secondary cities on the mainland. For instance, both the Boosting Inclusive Growth for Zanzibar – Integrated Development Project (BIG-Z) and the Tanzania Cities Transforming Infrastructure and Competitiveness Project (TACTIC) aim to improve resilience and service delivery in fast growing cities..

TURP's main objective has been to reduce climate change impacts and associated urban development challenges in Tanzania. Over the past six years, the program has built up a repository of actionable, community-based climate risk data and information. This data informs risk reduction measures and the planning, design, and implementation of urban infrastructure investments. In the process, the program has been fostering data- and climate resilience–consciousness among a generation of young people, preparing them to take up the resilience agenda across the country. TURP has also significantly strengthened the institutional capacity of national and city governments to respond to emergencies and disasters. As the program approaches closure, the focus has been on sustaining lessons learned since the beginning by informing and upscaling activities in ongoing and pipeline urban investment projects.

The status of implementation progress of TURP activities under each pillar is as follows.

Pillar 1, which focuses on generating actionable climate risk data and information, continued to advance selected data collection and modeling work. TURP is supporting the production of high-resolution cloud and aerial images to inform flood risk analyses and drainage design in fast-growing cities under TACTIC. The work has been completed in Kahama and Kigoma, and is nearing completion in Morogoro, Geita, Tabora, and Sumbawanga. The data will be uploaded to the Climate Risk Database to enable open and free access by government institutions looking to improve basic infrastructure and urban services.

The development of a probabilistic flood model for Dar es Salaam and Zanzibar is nearing completion. The model can quantify flood hazards and risks from pluvial flooding, fluvial flooding, and any tidal influence that may affect flooding, both now and under future climate change and urban development scenarios. The modeling for both Dar es Salaam and Zanzibar is complete, and the scenario dashboard, which enables users to leverage modeling results for decision-making, is also nearing completion and has been made available for user testing.

A risk-informed supervision tool for urban projects has been developed and is undergoing initial user testing in preparation for the application stage, when it will be put to use by the President's Office – Regional Administration and Local Government (PO-RALG) and local government authorities (LGAs). The tool taps into the Climate Risk Database, using existing hazard, risk, and urban management data to inform urban infrastructure planning, design, and implementation monitoring. It allows users to submit georeferenced project updates via Open Data Kit and is integrated with dashboards that aggregate data and streamline conventional reporting and information management tasks.

Pillar 2, which focuses on risk reduction, is dedicated to finding practical solutions to urban challenges, including solid waste management and flooding. TURP is supporting a technical assistance that aims to identify opportunities for greening across Dar es Salaam and to quantify the benefits of urban greening, open space development, erosion control, and sustainable urban drainage systems across various scenarios of current and future city land use, infrastructure development, and climate. The firm has completed the characterization and visualization of trends, current status, and projections scenarios. This assessment has leveraged Resilience Academy partnerships to engage university students in conducting ground surveying and in validating the suitability of nature-based solutions for dominant land uses. In addition, about 119 stakeholders from 29 institutions were engaged in discussions on urban greening through a workshop called "Greening Infrastructure for a Climate Resilient Dar es Salaam," which aimed to validate greening guidelines prepared by PO-RALG.

TURP continues to support solid waste management

[3] Derived from NBS Census, 2012.

(SWM) initiatives across Tanzania Mainland and Zanzibar with the help of innovative geospatial data and tools. In the coastal cities of Mtwara, Tanga, and Bagamoyo, the project is nearing completion on a series of surveys designed to collect data on SWM services to inform litter management strategies. In Zanzibar, TURP has completed and presented to stakeholders a study on identifying the most viable SWM service chains for urban, peri-urban, urban poor, and rural areas across Unguja; the study also identifies cost estimations and financing options to establish optimized SWM value models. The results of this study inform SWM investments under the BIG-Z project. In Dar es Salaam, TURP has completed a baseline community opinion survey on solid waste and cleaning service delivery in the seven wards surrounding the Lower Msimbazi Basin. The information has helped the World Bank and PO-RALG make data-based decisions during the preliminary planning stages of an effective system for waste management in the Lower Msimbazi Basin.

To complement BIG-Z investments and promote climate-resilient buildings in Zanzibar, TURP supported the Revolutionary Government of Zanzibar (RGoZ) to create a comprehensive roadmap for developing building codes. The technical assistance commenced in August and will continue until December 2022. Between June and August 2022, eight staff members from the Zanzibar Bureau of Standards (ZBS) also received training on construction material testing for soil, concrete, reinforcement bar, and bitumen. These trainings are meant to strengthen the capacity of the institution to test and monitor the quality of construction materials used in the islands, and thereby contribute to the overall resilience of the built environment.

Pillar 3, which aims to strengthen emergency management, helped streamline the emergency responses of national and city governments. TURP has concluded projects designed to strengthen the emergency preparedness and response capacity of the Dar es Salaam Multi-Agency Emergency Response Team (DarMAERT) and the national government. At the national level, the Tanzania Emergency Preparedness and Response Plan (TEPRP) and Tanzania Disaster Communication Strategy (TDCS) were reviewed, updated, and validated by the National Platform for Disaster Risk Reduction under the leadership of Prime Minister's Office – Disaster Management Department (PMO-DMD). Four more emergency response documents have been developed to complement the DarMAERT Emergency Response Plan and are currently being translated into Swahili. These are standard operating procedures for 15 emergency response functions stipulated in the 2020 DarMAERT Emergency Response Plan, Flood Contingency Plan, Tsunami Contingency Plan, and Pandemic Continuity of Operations Plan.

A similar engagement in Ilemela Municipality is nearing completion. This technical assistance, which aims to facilitate the development of emergency preparedness and response plans, has led to the establishment of the Municipality Disaster Management Technical Committee. A rapid capacity assessment on emergency response has been completed, and the emergency preparedness and response plan will be completed in November 2022. Under the same engagement, TURP is working with PMO-DMD to compose guidelines for developing emergency preparedness and response plans for LGAs; those guidelines are expected to be completed within the same timeline.

Pillar 4, the Resilience Academy, continued developing youths' digital skills and building the foundations for sustainable knowledge and the ongoing use of climate risk data. In 2022, 150 students from Resilience partner universities – the University of Dar es Salaam (UDSM), Ardhi University (ARU), the Sokoine University of Agriculture (SUA), and the State University of Zanzibar (SUZA) – participated in the industrial training program. They received training and collected various geospatial data, including on drainage, flood exposure, critical facilities, and amenities in Dar es Salaam, Zanzibar, and Morogoro.

To sustain learning beyond TURP's lifecycle, we provided three training-of-trainers through e-learning courses to university teachers, building their capacity to transfer knowledge to students. A total of 198 students, university teachers, and experts have received training on module 4 (flood mapping, modeling, and predictions), module 5 (climate change and resilience impacts), module 6 (community mapping for improved resilience planning), and module 8 (remote sensing and image processing with open-source software).

The Climate Risk Database grew significantly. The number of freely accessible datasets has reached 133, and the database had 408 registered users as of August 2022. To ensure meaningful and sustainable use of the data for urban services and management, the Resilience Academy made a deliberate effort to build partnerships with government institutions through a workshop. The session served as a platform to share what has been accomplished thus far and to demonstrate the use of climate risk data.

02. ABOUT TURP

Activities supported by the World Bank through the TURP Trust Fund are organized into four pillars.

Pillar 1 – Risk Identification

This pillar strengthens the identification and understanding of climate risk and uncertainty in the local context and enhances the linkages and coordination between risk management stakeholders. To make decisions that ultimately strengthen physical, social, and financial resilience, actors need a thorough understanding of disaster and climate risks and their implications in the local context. To this end, Pillar 1 increases access to comprehensive information about physical and societal exposure to climate risks, which inform the implementation of structural and non-structural mitigation measures.

This pillar's key activities are the collection and organization of climate risk data and the development of visualization tools and risk models. TURP gathers crucial socioeconomic data, mapping people, assets such as houses and critical infrastructure, and urban services and livelihoods. Environmental data and models produced under this pillar include historical data on and current monitoring of hydrometeorological phenomena, the geophysical characteristics of the urban environment (soil types, land use, river basin profiles), and application of the best climate models to identify the future impacts of climate change.

Pillar 2 – Risk Reduction

Guided by the data and management tools of Pillar 1, Pillar 2 strengthens cities' capacity to plan for and reduce climate risk through both structural and non-structural measures that address long-term systemic risk. In partnership with government entities, civil society, and the private sector, activities supported by Pillar 2 focus on reducing the vulnerability of people, households, and communities. They analyze non-structural resilience measures, suggesting new or improved policies and legislation, better land use planning, environmental protection and basin plans, hazard zoning and building codes, and the design of risk-reduction works, such as drainage upgrades, ponding schemes, slope stabilization, and retrofitting or reinforcement programs.

The activities support communities, planning entities, and works authorities, helping develop a pipeline of investments to reduce urban risk. These investments support the resilience of critical infrastructure, and specifically target measures that aim to protect priority river basins and improve flood management infrastructure.

Pillar 3 – Disaster Preparedness and Emergency Management

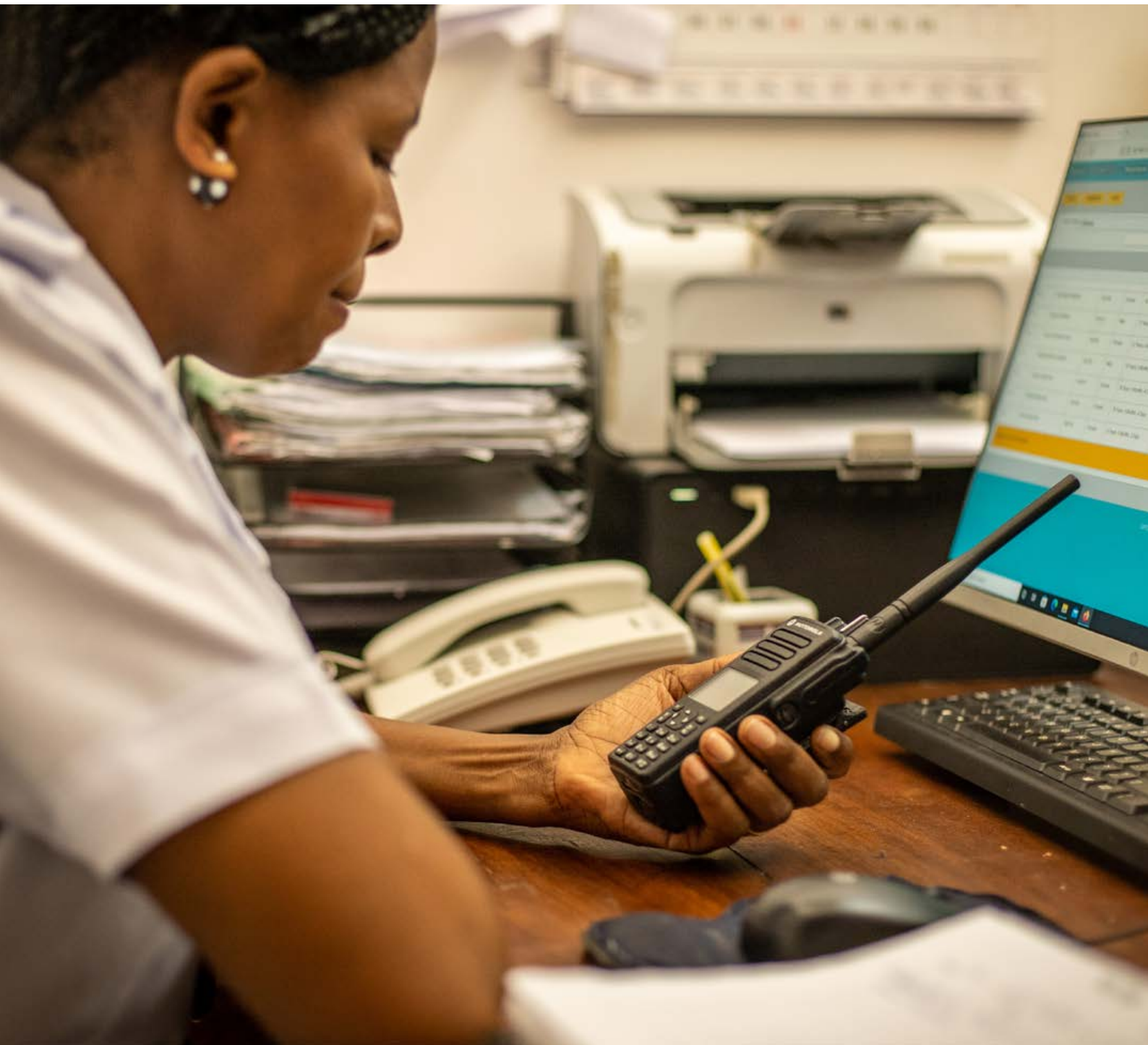
Pillar 3 supports all the stakeholders involved with short-term disaster events, helping improve preparedness for specific emergency scenarios. Also guided by Pillar 1 data, the scenarios of city risk collected under Pillar 3 will

be used to establish best practices around identifying and preparing vulnerable groups, developing emergency response plans, and establishing an operations center. They will provide inputs for the design of early warning systems; clarify requirements for equipment, tools, and infrastructure; and inform simulations, drills, and damage assessment capacities. Stakeholders in this workstream are concerned with civil protection, disaster management, community volunteers, coordination for response, and recovery actions.

Pillar 4 – Resilience Academy

The thematic content of the Resilience Academy is embedded as a knowledge-transfer function within the activities of Pillars 1, 2, and 3. The Resilience Academy is an evolving virtual program anchored in Tanzanian universities and training institutes that delivers digital curricula, practical experience, training placements and courses, and equipment to support survey, maintenance, risk-monitoring, and analysis activities.

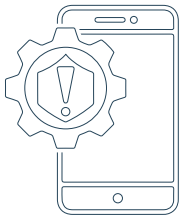
Under Pillar 4, TURP transfers data sets and risk analysis tools to university programs, and leverages yearly placements in industry programs to provide university students with real-world experience in collecting, analyzing, and applying risk data. The Resilience Academy's goals are to foster a legacy for skills and tools developed through TURP and to build partnerships between academia and practitioners that enhance the sustainability of risk-management practices and data sets in Tanzania.



03. BY THE NUMBERS

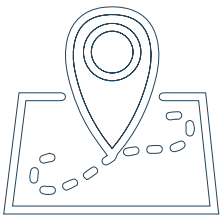
PILLAR 01 – RISK IDENTIFICATION

RISK-INFORMED REMOTE SUPERVISION TOOL



1 **beta version** of the tool deployed

INPUTS TO RISK-INFORMED DRAINAGE STUDIES



6

LGAs provided with **high-resolution cloud and aerial images** to support flood risk analyses and drainage design

DAR ES SALAAM AND ZANZIBAR CITY PROBABILISTIC FLOOD RISK MODELING AND EVALUATION

2 **visualization dashboards** completed

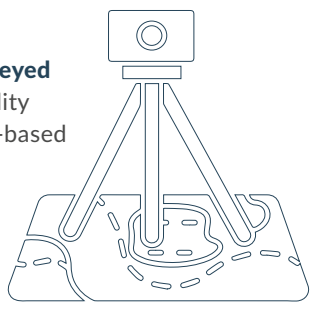
PILLAR 02 – RISK REDUCTION

GREEN DAR OPPORTUNITIES ASSESSMENT

119

representatives from 29 institutions participated in "**Greening Infrastructure for a Climate Resilient Dar es Salaam**" workshop

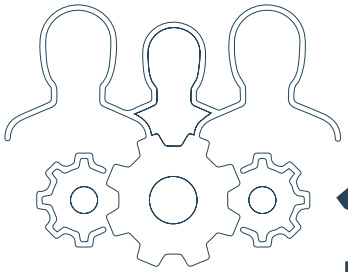
15 **areas surveyed** for suitability for nature-based solutions



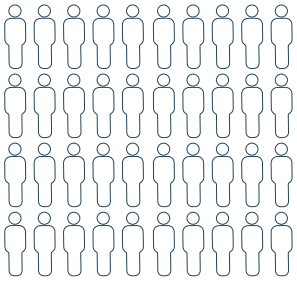
LITTER MANAGEMENT STRATEGIES FOR SECONDARY CITIES

50 **Resilience Academy students** from UDSM and ARU collected, analyzed, and quality-assured geospatial data on litter generation and prevalence in Mtwara, Tanga, and Bagamoyo

IMPROVEMENT OF BUILDING CODES AND STANDARDS IN ZANZIBAR

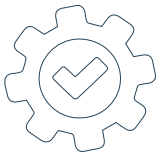


1 technical oversight **committee** formed



40 **representatives from 31 institutions** participated in technical discussions on building codes

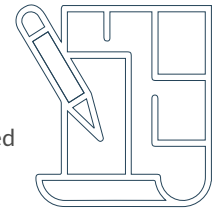
CONSERVATION OF HERITAGE BUILDINGS VULNERABLE TO CLIMATE CHANGE



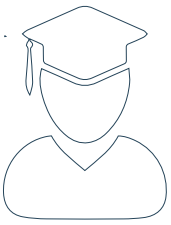
8 **ZBS staff trained** on construction material testing and quality control

SOLID WASTE MANAGEMENT IN ZANZIBAR

17 **youth mappers** (8 females and 9 males) collected geospatial data

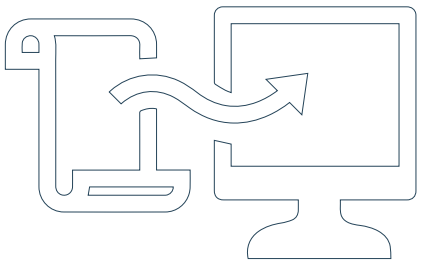


SOLID WASTE MANAGEMENT DATA COLLECTION, LOWER MSIMBAZI VALLEY



50 **students from ARU and UDSM** collected and analyzed geospatial data

Over **60** **community members** trained in data collection



4,260 buildings re-digitized

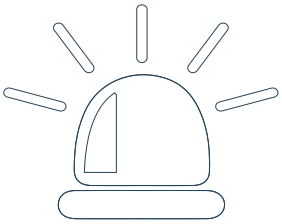
626 road segments re-digitized

SUPPORT TO AREA-BASED URBAN UPGRADING SUB-PROJECTS

3 **terms of reference** benefited from technical inputs provided to support the area-based urban upgrading sub-projects in Unguja and Pemba

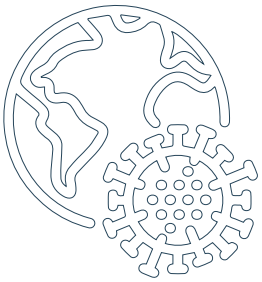
PILLAR 03 – DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT

STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY, ILEMELA MUNICIPALITY

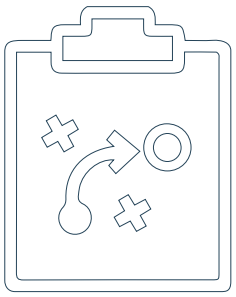


1 **Municipal Council Disaster Management Technical Committee** formed with 35 members

STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY – DARMAERT



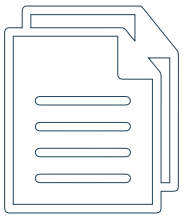
1 **Pandemic** Continuity of Operations Plan developed



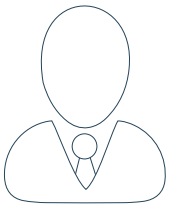
2 **Contingency plans** (Flood Contingency Plan and Tsunami Contingency Plan) developed

15 **standard operating procedures** for each emergency response function developed

STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY – NATIONAL LEVEL



2 **national emergency response guiding documents** reviewed and updated

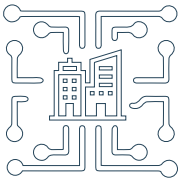


52 **members** of the National Platform for Risk Reduction validated the TEPRP 2021 and TDCS 2021

PILLAR 04 – RESILIENCE ACADEMY

INDUSTRIAL TRAINING

243 **students** mapped over 577 square kilometers in 9 cities. (Dar es Salaam, Tanga, Mtwara, Morogoro, Sumbawanga, Kahama, Kigoma, Bagamoyo and Zanzibar)



39,351 **datapoints collected** in Dar es Salaam

2,705 **tree datapoints** collected in Morogoro

1,644 **datapoints** collected in Zanzibar

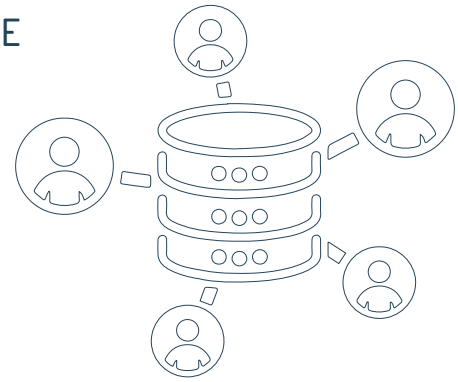
E-LEARNING

5 **trainings** provided to 198 university teachers, students, and other experts

8 **modules** developed

CLIMATE RISK DATABASE

133
data sets/layers



408
registered users

04. ACTIVITY SUMMARY

PILLAR 1: RISK IDENTIFICATION

OBJECTIVE

To strengthen the identification and understanding of climate risk and uncertainty in the local context.

OVERVIEW OF PROGRESS

Efforts to improve the understanding of climate risks were expanded to several secondary cities during FY22, with the goal of strengthening urban management, improving LGAs' infrastructure services, and informing ongoing and pipeline World Bank–financed urban projects.

TURP has produced and processed aerial imageries to support the design of flood resilience infrastructure for six LGAs (Kahama, Kigoma, Morogoro, Geita, Tabora, and Sumbawanga) to inform the TACTIC project. The Probabilistic Flood Risk Models for Dar es Salaam and Zanzibar, which will enhance understanding of flood risks, are also near completion. TURP has completed a beta version of the risk-informed remote supervision tool for urban projects, which is expected to be adopted and scaled by PO-RALG leadership.

ACTIVITY	STATUS	PROGRESS
Inputs to Risk-Informed Drainage Studies (Kahama, Kigoma, Morogoro, Geita, Tabora, and Sumbawanga)	**NEARING COMPLETION**	Data collection and processing has been completed for Kahama and Kigoma; work for the remaining LGAs will be completed in November 2022.
Probabilistic Risk Model for Dar es Salaam and Zanzibar	**NEARING COMPLETION**	The modeling for Dar es Salaam and for Zanzibar is complete. The beta version of the data visualization dashboard is complete, with the final version expected to be completed by December 2022.
Risk-informed remote supervision tool	**COMPLETED**	The beta version of the tool has been finalized.

INPUTS TO RISK-INFORMED DRAINAGE STUDIES (KAHAMA, KIGOMA, MOROGORO, GEITA, TABORA, AND SUMBAWANGA)

TURP is supporting the production of high-resolution cloud and aerial images from unmanned aerial vehicles (drones), which will inform flood risk analyses and drainage design in urban areas for fast-growing cities under the World Bank–financed TACTIC project.

Six urban LGAs are involved in this project, and the implementation is at a different stage for each. Data collection and processing are complete for Kahama and Kigoma. The data for Geita and Tabora are now being reviewed, while Sumbawanga is in the processing stage.

The aerial images serve as key inputs in the identification of hot spots that are vulnerable to flooding, and support the municipalities' ability to strengthen urban management and improve basic infrastructure and services. Through the Climate Risk Database, the collected data will be made openly available for further applications, including research and urban planning in Tanzania.

PROBABILISTIC RISK MODEL, DAR ES SALAAM AND ZANZIBAR

The purpose of this project is twofold. The first objective is to carry out a flood risk assessment to quantify flood hazard and risks from all sources of flooding for the cities of Dar es Salaam and Zanzibar. This includes pluvial flooding, fluvial flooding, and any tidal influence that may affect

flooding, both now and under future climate change and urban development scenarios. The assessment includes a full probabilistic analysis and quantification of the exposure and vulnerability of all significant human, social, environmental, and material assets, leading to an overall probabilistic flood loss evaluation for the two cities.

The project's second objective is to design and implement a dashboard on flood hazard and risk scenarios for use by river basin and municipal authorities, as well as by local universities. The dashboard will provide geospatial data, visualization, and analysis that meets the needs of all identified potential users. The scenarios dashboard is intended to be a decision-making and planning tool, allowing users to visualize and query the hazard and risk information and generate selected flood risk scenarios, including reference climate scenarios.

The project is now nearing completion. The flood risk modeling work has been completed for both Dar es Salaam and Zanzibar City. The beta version of the data visualization dashboard is complete and is expected to be finalized by December 2022.

As part of the flood analysis and modeling work, a high-resolution digital terrain model for Zanzibar and the surrounding area was developed using cutting-edge photogrammetric data processing. The model was completed in mid-2021. In addition to its use for flood modeling, it provides a valuable additional data set for planning and development projects. As part of a separate exercise, a flood model was developed for Nungwi and the surrounding area on the northern tip of Zanzibar Island, and a complete set of flood hazard maps have been produced.

The project's full benefits will materialize once the results become available on the dashboard, which will enable users to access visualizations and view the results in a simple, informative way. The data will be invaluable in supporting a range of urban and disaster risk management projects in the future.

RISK-INFORMED REMOTE SUPERVISION TOOL

TURP has supported the development of a beta version of a risk-informed remote supervision tool, which was developed and tested with PO-RALG in May 2022. The tool enables users to map hazard risks and urban management data layers alongside layers relevant to infrastructure project implementation. The tool's risk data is derived from the imagery and information layers available on the TURP-supported Climate Risk Database.

The tool also integrates with dashboards that aggregate data submitted via Open Data Kit/Kobo Toolbox forms, thus streamlining conventional reporting and information management tasks. Additionally, the tool permits users to electronically submit georeferenced project status updates and geography-specific field notes with photo and video attachments. By bringing together critical data in easy-to-use maps and dashboards, the risk-informed remote project supervision tool will make it easier for local and central governments to make disaster risk–informed decisions when planning, designing, and delivering infrastructure investments.

A screenshot of the risk-informed remote supervision tool showing a map of Dar es salaam with different data layers.

PILLAR 2: RISK REDUCTION MEASURES AND PLANNING

OBJECTIVE

To strengthen cities' capacity to plan for and reduce climate risk through both structural and non-structural measures that address long-term systemic risk.

OVERVIEW OF PROGRESS

Pillar 2 activities included litter and solid waste management (SWM) across Tanzania, several greening initiatives, and operational support to World Bank–financed projects.

The SWM optimization study in Zanzibar is completed. Results have been presented to the stakeholders, and the final report has been submitted. TURP has also completed the collection of solid waste geospatial data and citizen opinion data in the lower Msimbazi in Dar es Salaam. The results are expected to guide SWM initiatives and investments in urban pipeline projects. The development of Integrated Litter Management Strategies for three Tanzanian coastal cities (Mtwara, Tanga, and Bagamoyo) is also underway, with the first step being a situation assessment. For this project, TURP collaborated with Resilience Academy participants to collect litter data using a specialized app.

Through Green Dar, TURP conducted an assessment that analyzed mapping opportunities and quantified the benefits of urban greening, open space development, erosion control, and sustainable urban drainage systems in Dar es Salaam. The consultant has characterized and analyzed trends, current status, and projections for Dar es Salaam based on land use, infrastructure, population, hydrology, water resources, soil, environment, climate, and urban characteristics. University students are ground truthing and mapping the suitability of nature-based solutions in dominant land use types across the city.

Three technical assistances are also being implemented to complement investments under the BIG-Z project. The technical discussion for creating a roadmap for developing building codes for Zanzibar is nearing completion. Staff from the Zanzibar Bureau of Standards (ZBS) have completed training on construction material testing in preparation for operating a material testing laboratory. Technical support has also been provided to finalize several terms of reference.

ACTIVITY	STATUS	PROGRESS
Green Dar Opportunities Assessment	**NEARING COMPLETION**	Greening opportunities assessment and ground truthing will be completed in November 2022.
Dar es Salaam Metropolitan Development Project: Msimbazi Basin Development Project	**COMPLETED**	Technical support for the for the Msimbazi Basin Development Project was completed and the project was approved.
Litter Management Strategies for Secondary Cities	**NEARING COMPLETION**	Litter data collection in collaboration with Resilience Academy will be completed in November 2022.
Improvement of building codes and standards in Zanzibar	**NEARING COMPLETION**	The Building Codes Technical Oversight Committee has been established and the first series of deliverables submitted. The technical assistance will be completed in December 2022.
Conservation of heritage buildings vulnerable to climate change	**COMPLETED**	8 ZBS staff have received training on building and construction material testing and laboratory management.
Solid Waste Management Optimization in Zanzibar	**COMPLETED**	The final report is under review and the technical assistance will be completed in November 2022.
Solid Waste Management Data Collection, Lower Msimbazi Valley	**COMPLETED**	Geospatial and citizen opinion data collection has been completed, and the report has been finalized.
Support to area-based urban upgrading sub-projects	**COMPLETED**	Technical support to provide key inputs to several terms of reference has been completed.

GREEN DAR OPPORTUNITIES ASSESSMENT

The assessment aims to identify mapping opportunities, and to analyze and quantify the benefits of urban greening, open space development, erosion control, and sustainable urban drainage systems in the context of Dar es Salaam. This work complements PO-RALG's ongoing efforts to develop urban greening guidelines.

The assessment covers the following objectives: (i) characterization and visualization of trends, current status, and projections in Dar es Salaam, based on land use, infrastructure, population, hydrology, water resources, soil, environment, climate, urban and characteristics; (ii) identification of locations that represent opportunities for urban greening, open space development, erosion control, and sustainable urban drainage systems; (iii) conduction of ground surveys and validation of the locations; (iv) identification of mapping opportunities by type of intervention, sector or ministry, thematic area, geographic area or political jurisdiction, and timing of the intervention; and (v) modeling and quantitative analysis of the potential impact of these opportunities, using hydrologic, hydrodynamic, and climate modeling, previous studies, and other established methods.

So far, a report on objective (i) has been prepared by a consultant and reviewed by the World Bank team. Still ongoing are ground surveys for and validation (ground truthing) of a priority selection of different dominant land use types and an analysis of the suitability of different nature-based solutions in dominant land uses. These activities, which are being undertaken by OpenMap Development Tanzania in collaboration with the Resilience Academy university students, involve collecting a range of attributes at 15 sample area locations, including residential land uses and the majority of river areas (e.g., lower, middle, and upper reaches of the tributary).

The assessment analyzes the potential cumulative benefits of nature-based solutions at the city scale for Dar es Salaam by comparing current and future scenarios of city land use, infrastructure development, and climate change. The results will inform World Bank–financed urban projects and future urban greening efforts by LGAs.

In addition, the World Bank collaborated with PO-RALG to conduct a three-day workshop, "Greening Infrastructure for a Climate Resilient Dar es Salaam." The workshop brought together 119 stakeholders from 29 institutions to discuss and validate five greening guidelines (road infrastructure, public open spaces, drainage infrastructure, construction erosion management, and greening for improved urban land management) and share greening examples from within and outside Tanzania. This workshop was preceded by a workshop for Mtaa leaders, attended by 138 participants from all sub-wards in Dar es Salaam.

MSIMBAZI BASIN DEVELOPMENT PROJECT

A US$260 million, World Bank–financed Msimbazi Basin Development Project, which focuses on implementing integrated flood adaptation measures in the Msimbazi Basin, was approved in September 2022. During FY22, the World Bank team continued providing technical support for project preparations. TURP provided key inputs to project documents that served as the basis for project appraisal.

The project is expected to have positive technical, economic, environmental, and social benefits. An Integrated Spatial Plan has been developed to ensure proper function, desired reduction of flood risk, structural integrity, phasing of implementation, and operations and maintenance.

LITTER MANAGEMENT STRATEGIES FOR SECONDARY CITIES

"Littering is one of the major challenges in Mtwara Mikindani Municipality. It is the cause of drainage blockage which results in floods and also environmental and marine pollution. To address this challenge, Mtwara needs a strategy which will ensure sustainable cleanliness of our Municipality. The project has come at the right time, as it will provide the required data for the strategy and an app which will be a game changer on how we report and deal with litter."

Col. Emmanuel H. Mwaigobeko, Director, Mtwara Mikindani Municipal Council

This project aims to develop an Integrated Litter Management Strategy for three Tanzanian coastal cities (Mtwara, Tanga, and Bagamoyo). The development process includes a situation analysis, which involves identifying actors, assessing the current legal and institutional framework, assessing the performance of existing urban services, and identifying behavior of litter. The next step is developing an action plan, which includes an analysis of litter control options, proposed institutional and legal changes, and consensus-building on a final plan.

The situation analysis is informed by: (i) available secondary data and maps on the city; (ii) data on litter collected by crowd-sourced photos submitted through a designated app that can subsequently map the pieces, type, and volume of litter in the city using artificial intelligence; (iii) drone images that map open dumpsites; and (iv) community surveys to assess service coverage and performance.

This intense data collection effort engages technology and technical support on data collection design, analysis, and visualization. Through the Resilience Academy industrial training program, about 50 university students from UDSM and ARU are working on obtaining, analyzing, and quality-assuring geospatial data on litter generation and prevalence in pre-defined wards of Mtwara, Tanga, and Bagamoyo.

SOLID WASTE MANAGEMENT OPTIMIZATION IN ZANZIBAR

The World Bank engaged a consortium of consulting firms to (i) identify the most viable SWM service chains for urban, peri-urban, urban poor, and rural areas across Unguja using innovative geospatial data and tools, and (ii) identify cost estimations and financing options to establish optimized SWM value models.

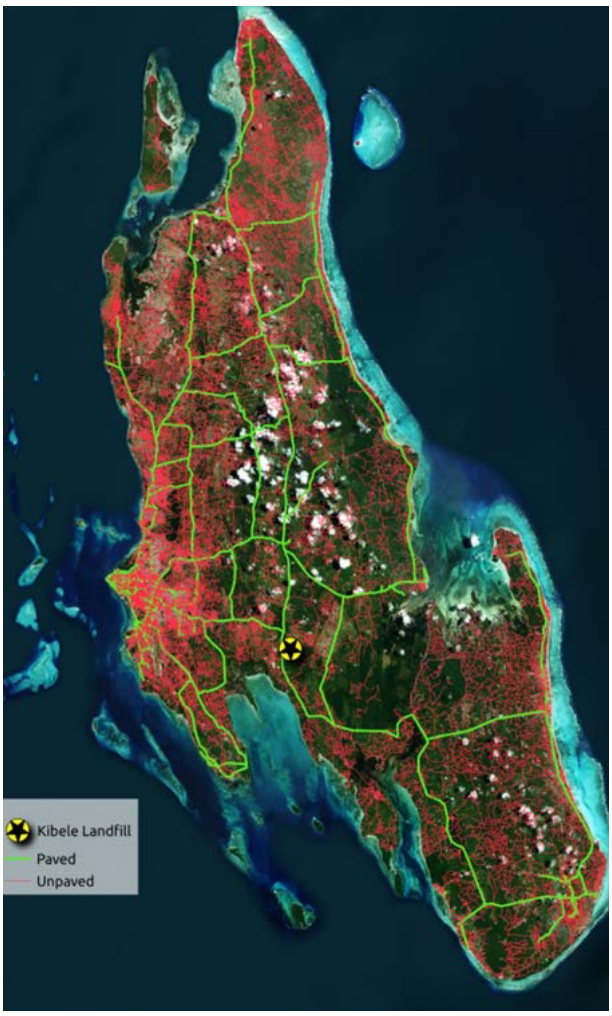
The results from such modeling could dramatically enhance the capacities of LGAs across Unguja to carry out SWM services, and would better inform strategic infrastructure investments under BIG-Z.

The consortium started work in September 2021 and is expected to finish in November 2022. The study has identified a significant opportunity to support the development of a circular economy model of SWM across the archipelago. Food and organic waste makes up the biggest proportion of the waste stream (around 42 percent) and should be a top priority for resource recovery interventions. Further, key interventions in recycling plastic, paper, and glass could also be made by improving transport to markets (in Dar es Salaam or internationally) along with balers, shredders, and improved transport connections.

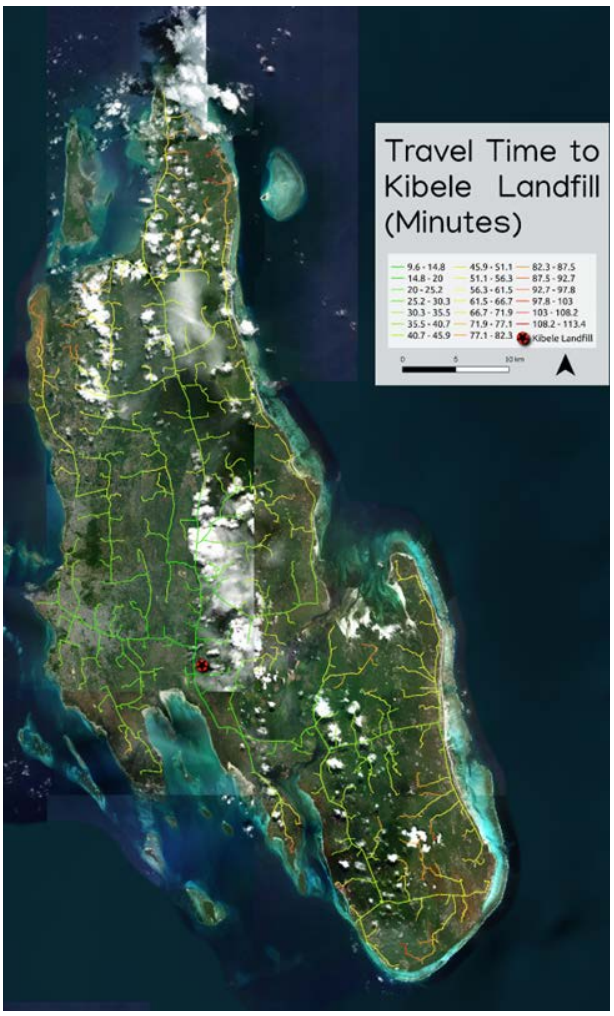
The study also found that around 52 percent of residents report paying for waste collection services; community members who are not paying for waste services identified a number of reasons why. The study provides recommendations on how to significantly enhance revenue collection and increase the share of those paying for SWM services.

The study engaged 17 youth mappers (eight females and nine males) from SUZA and community leaders from specific locations to collect data in areas of interest using mobile applications like Open Data Kit. This process built participant capacity around using open-source digital tools to gather data from communities. All collected data was presented at a stakeholder workshop in Zanzibar on June 9–10, where key stakeholders from LGAs, the private sector, and community-based organizations could see the results and provide valuable input into the optimization modeling scenarios being developed by the consultants.

Road surface types in Zanzibar.

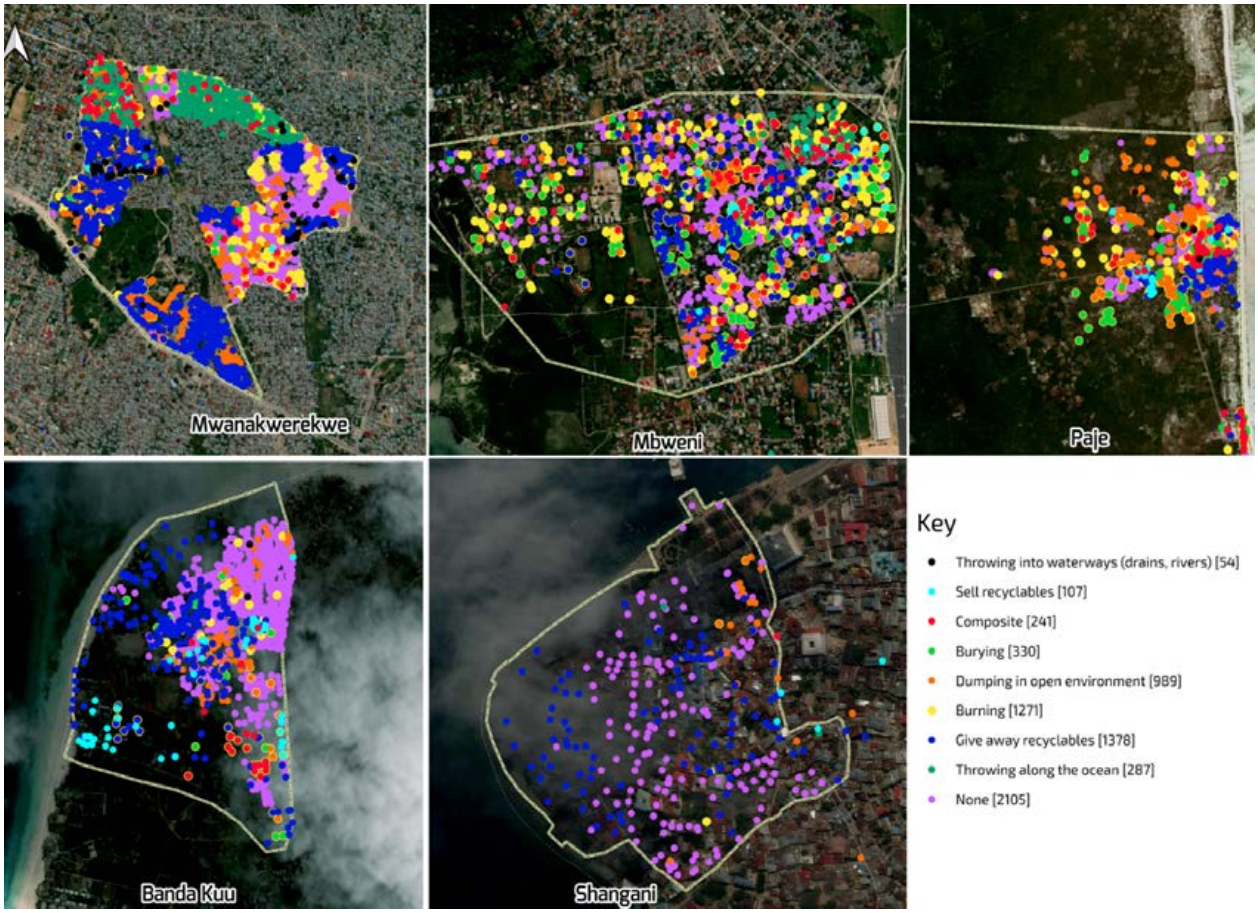


Travel time to Kibele landfill in Zanzibar



The study area covered by the solid waste management optimization in Zanzibar

Other ways of handling waste in Zanzibar.



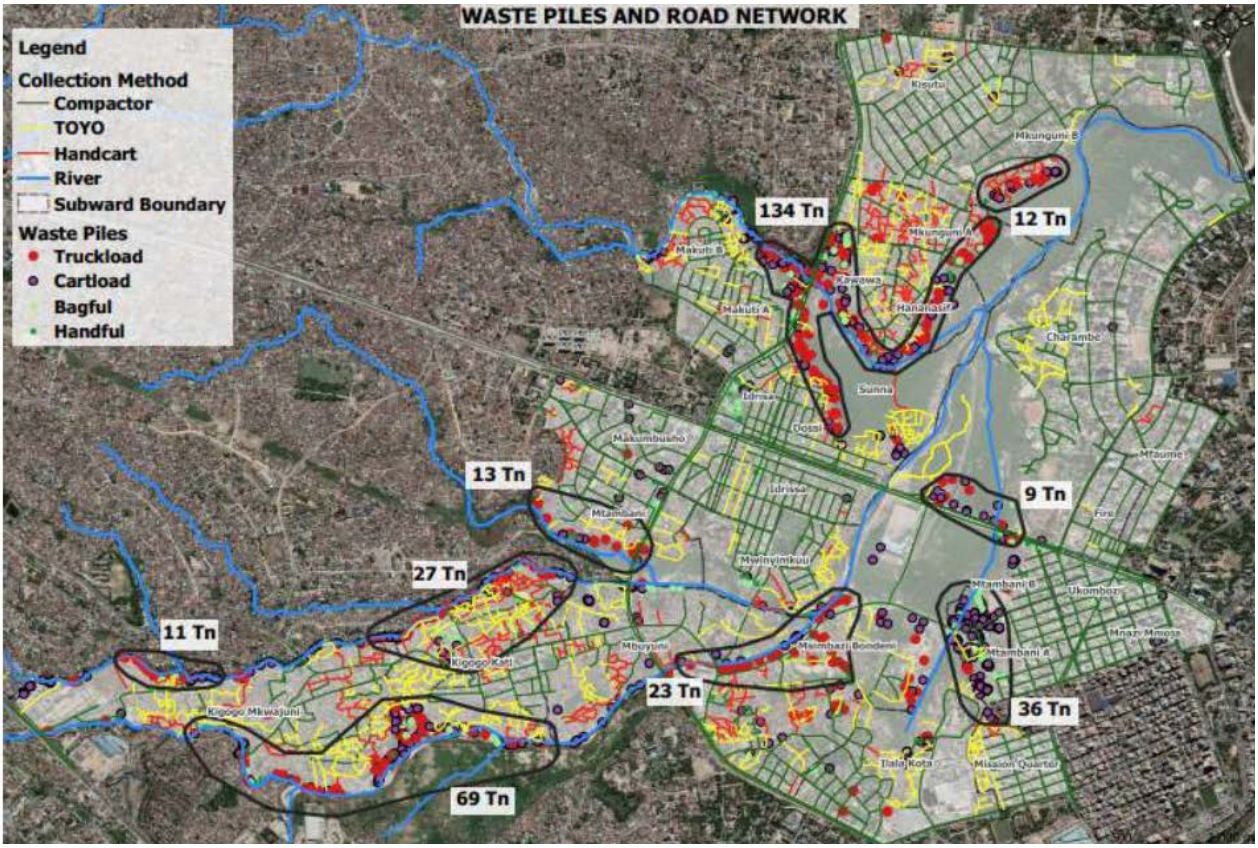
The status and distribution of dumpsites in Zanzibar.

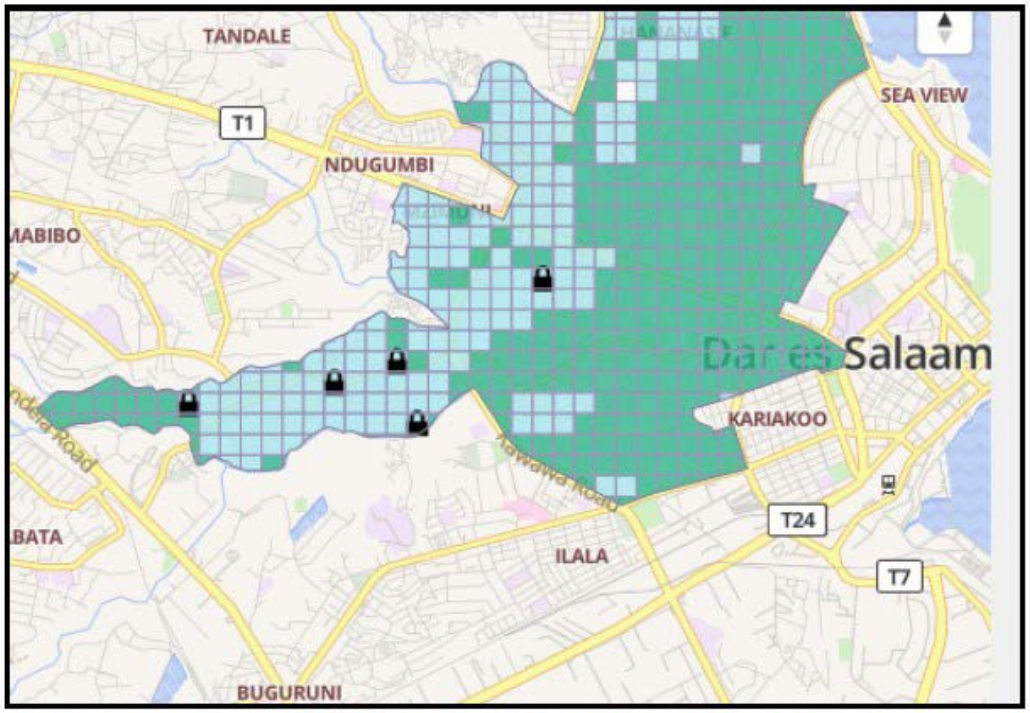
SOLID WASTE MANAGEMENT DATA COLLECTION, LOWER MSIMBAZI VALLEY

When it comes to creating sustainable waste management systems, the lack of baseline data remains a critical challenge in Dar es Salaam and other growing cities in Tanzania. Through TURP and the Dar es Salaam Metropolitan Development Project (DMDP), the World Bank engaged OpenMap Development Tanzania to collect geospatial data and carry out surveys on community opinions relating to solid waste and cleaning service delivery and cleanliness in the seven wards surrounding the Lower Msimbazi River.

The information has helped the World Bank make data-based decisions in the preliminary planning stages of an effective system for waste management in the Lower Msimbazi Basin. It enabled deeper analyses of the current performance of solid waste collection and cleaning services, service requirement projections up to 2035, and proposed service enhancements. The assignment commenced in May 2021 and was completed in February 2022.

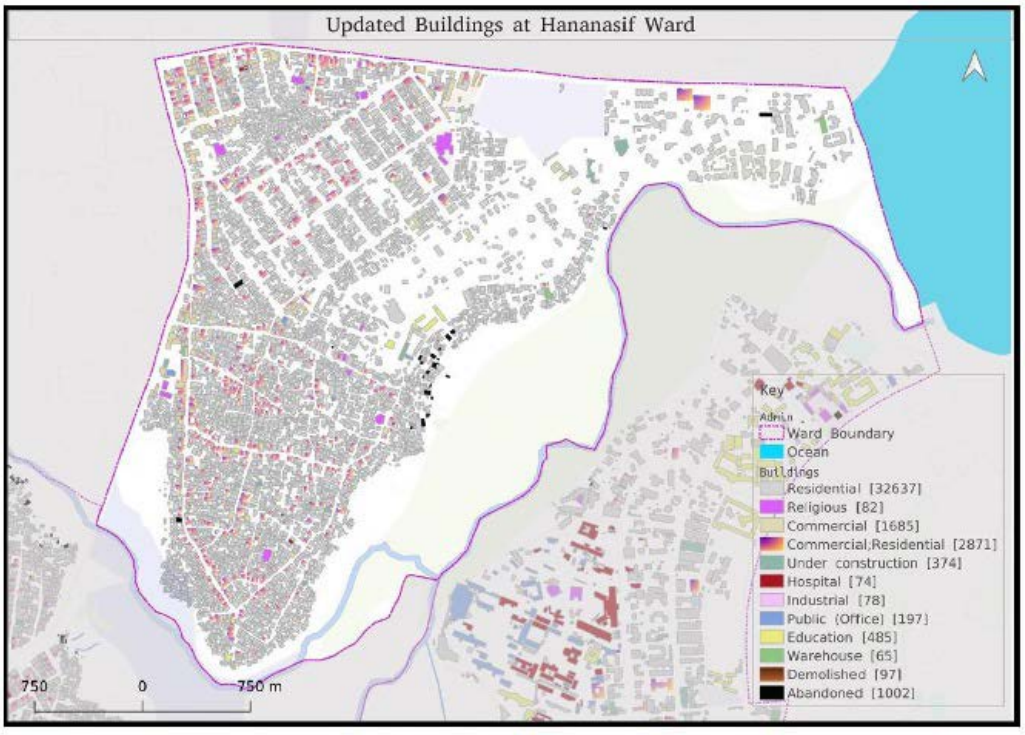
The project engaged Resilience Academy students and community members, and collected some valuable geospatial data and insights on community opinions relating to solid waste and cleaning services in the Lower Msimbazi River Basin. A total of 50 Resilience Academy students from the UDSM and ARU collected and analyzed geospatial data, and over 60 community members were trained in data collection using open-source mobile phone applications. The findings show that, at the time of study, there were 412 tons of waste littered in the environment across the Lower Msimbazi, and that 60 percent of citizens who have no waste collection service provider dispose of their waste by dumping it in the open environment or throwing it into waterways (drains and rivers).





A screenshot of a project in HOT Tasking manager showing the task project that was used during re-digitizing of the buildings, roads and other features at AOI

A screenshot of buildings before and after re-digitization in Mzimuni ward



A map showing updated buildings-Hananasif ward

Intentional dumping of waste by citizens to prevent soil erosion along Msimbazi river- Hananasifu Ward (September, 2021)

IMPROVEMENT OF BUILDING CODES AND STANDARDS IN ZANZIBAR

In 2019, the World Bank supported a Building Regulatory Capacity Assessment that found that there is no legislation or building code with legal effect in Zanzibar. Following that assessment, TURP engaged a consulting firm to facilitate technical discussions within the Revolutionary Government of Zanzibar (RGoZ) to support the development of a new building code. The activity includes identifying responsible parties, building consensus, and supporting the establishment of a committee to oversee the development of the code. The results of the discussion will lay a foundation for BIG-Z support on developing building codes for Zanzibar.

The RGoZ has established a Technical Oversight Committee, led by the Ministry of Lands and Housing Development, which is responsible for determining the best way forward on developing a building code. The committee comprises 17 representatives from 11 government and private institutions. It is expected that the technical assistance will provide a clear road map for developing building codes, one that includes code structures and implementation mechanisms.

The first series of technical discussions were conducted August 2–4, 2022, in a stakeholders' workshop. About 35 representatives of ministries and agencies, the private sector, and community-based organizations participated in the workshop. They discussed building classifications and construction methodologies, challenges and opportunities within building code development, and stakeholder mapping. A follow-up technical discussion was organized in October 2022; the final discussion is scheduled for November 2022.

The new building codes are expected to strengthen institutional capacity for reviewing building plans, carrying out inspections, and developing conservation and restoration plans for selected heritage sites. In addition, appropriate building codes will help boost Zanzibar's resilience to evolving climate change and frequent natural hazards.

CONSERVATION OF HERITAGE BUILDINGS VULNERABLE TO CLIMATE CHANGE

"The laboratory is going to solve challenges we have been facing on construction materials and buildings in general …it will reduce costs for the organization (ZBS), as we previously had to sub-contract tests to provide results to our customers."

Nasra Suleiman Abdallah, Director of Corporate Services, Zanzibar Bureau of Standards

TURP engaged UDSM to provide capacity support and training to the Zanzibar Bureau of Standards (ZBS) on construction material testing and laboratory management. The aim is to ensure that staff can conduct construction material testing to ensure safety and quality for a sustainable built environment. The training focuses on testing protocols and laboratory operations and maintenance. This technical assistance complements BIG-Z's procurement of new equipment for Zanzibar's construction material testing laboratory.

Eight ZBS staff participated in this training at the University of Dar es Salaam, which was provided in two phases:

training for the building material laboratory (July 18–29), and training for the soil and highway laboratories (August 8–25). ZBS also received a copy of test standards, standard operating procedures for testing, a worksheet for recording data from each test, and a report template for issuing results to customers for each test, along with other relevant materials. The training will enable ZBS to control the type of imported and local construction materials used in Zanzibar, and eventually to control the quality of buildings. Through testing, ZBS can also ensure that the materials used in restorations of heritage buildings are of adequate quality.

SUPPORT TO AREA-BASED URBAN UPGRADING SUB-PROJECTS

TURP provided technical support to the BIG-Z project implementation team, stakeholder ministries, and LGAs through technical workshops, meetings, and advice to advance the development of terms of reference for sub-projects in Zanzibar City, Pemba, Chwaka, Makunduchi, and Nungwi. A team of World Bank consultants worked with the respective teams throughout the fiscal year to provide hands-on support.

PILLAR 3: EMERGENCY MANAGEMENT AND RESPONSE

OBJECTIVE

To strengthen the capacity of stakeholders involved in preparedness and short-term disaster events to cope with specific emergency scenarios.

OVERVIEW OF PROGRESS

In FY22, TURP extended Pillar 3 activities – capacity-building support for LGAs on emergency preparedness and response capacity – to secondary cities. In coordination with PMO-DMD, TURP provided technical assistance to Ilemela Municipal Council in Mwanza City to develop its emergency preparedness and response plan. The program completed a rapid emergency preparedness and response capacity assessment for Ilemela Municipality, and the technical assistance is planned to be completed in December 2022.

This year, TURP also completed projects on strengthening the emergency preparedness and response capacity of the Dar es Salaam Multi-Agency Emergency Response Team (DarMAERT) and the national government. In both projects, key emergency response guiding documents were finalized and submitted to the government.

At the national level, an updated Tanzania Emergency Preparedness and Response Plan (TEPRP) and the Tanzania Disaster Communication Strategy (TSCS) were drafted and have been validated by the National Platform for Disaster Risk Reduction. The PMO-DMD is currently incorporating stakeholders' comments and finalizing these documents.

Four more documents have been developed to support DarMAERT and are currently being translated into Swahili. These are standard operating procedures for 15 emergency response functions stipulated in the 2020 DarMAERT Emergency Response Plan, Flood Contingency Plan, Tsunami Contingency Plan, and Pandemic Continuity of Operations Plan.

ACTIVITY	STATUS	PROGRESS
Strengthening Emergency Preparedness and Response Capacity – National level	**COMPLETED**	All project deliverables completed and submitted to PMO-DMD for internal approval procedures.
Strengthening Emergency Preparedness and Response Capacity – DarMAERT	**COMPLETED**	Flood and Tsunami Contingency Plans, a Pandemic Continuity of Operations Plan, and standard operating procedures for emergency response functions have been completed and are being translated into Swahili.
Strengthening Emergency Preparedness and Response Capacity, Ilemela Municipality	**NEARING COMPLETION**	The rapid emergency preparedness and response capacity assessment for Ilemela Municipality has been completed.

STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY – NATIONAL LEVEL

"We can build community resilience to disaster if all institutions and stakeholders play their part by considering disaster risk reduction in plans being implemented in their sectors."

Major General Michael Mumanga, Director, PMO-DMD

In partnership with TURP, the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) supported a project on Strengthening Emergency Preparedness and Response Capacity in Tanzania, which was implemented through PMO-DMD. The project, which focused on updating national emergency response guiding documents, produced the following deliverables:

i. A report on legal and institutional arrangements in the disaster risk management sector, which outlines the laws, regulations, policies, strategies, and guidelines enacted by the government to organize, conduct, manage, supervise, monitor, and evaluate disaster risk management practices and systems in Tanzania

ii. An updated Tanzania Emergency Preparedness and Response Plan (TEPRP-2021), which covers emergency preparedness and response processes around the control and coordination of resources; these processes generally correspond to the activation and deactivation protocols for the National Emergency Operations and Communications Center and its partner agencies and organizations that provide emergency response functions

iii. An updated Tanzania Disaster Communication Strategy (TDCS), which outlines communications procedures by which the emergency missions and functions of the operations plan will be carried out during an emergency or disaster situation

iv. A Capacity Needs Assessment of the National Emergency Operations and Communication Center, which evaluates the center's ability to fully function on a daily basis and during major national emergencies

Thirty-eight representatives (29 male, nine female) of 18 institutions were virtually consulted on these project deliverables. All four documents have been finalized, submitted, and accepted by the World Bank and PMO-DMD. In addition, the two national-level documents, TEPRP 2021 and TDCS 2021, were reviewed and validated by the National Platform for Disaster Risk Reduction (52 member participants) from July 11–13, 2022, in Arusha, with the support of the United National Development Program. PMO-DMD is now revising the documents based on stakeholders' comments. Formal approval of the documents by the national government will follow.

STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY – DARMAERT

Building on previous support to strengthen emergency management in Dar es Salaam, TURP supported a project on Strengthening Emergency Preparedness and Response Capacity of the Dar es Salaam Multi-Agency Emergency Response Team (DarMAERT). By developing key guiding emergency response documents, the project strengthened

the capacity of core DarMAERT member agencies to coordinate during emergencies and to respond to the most common hazards in Dar es Salaam. The following key documents were developed and tested:

i. Standard operating procedures for each of 15 emergency response functions (ERFs) stipulated in the DarMAERT Emergency Response Plan 2020, which describe the basic protocols of interaction between the agencies that comprise the ERFs and the DarMAERT Emergency Operations Center (EOC)

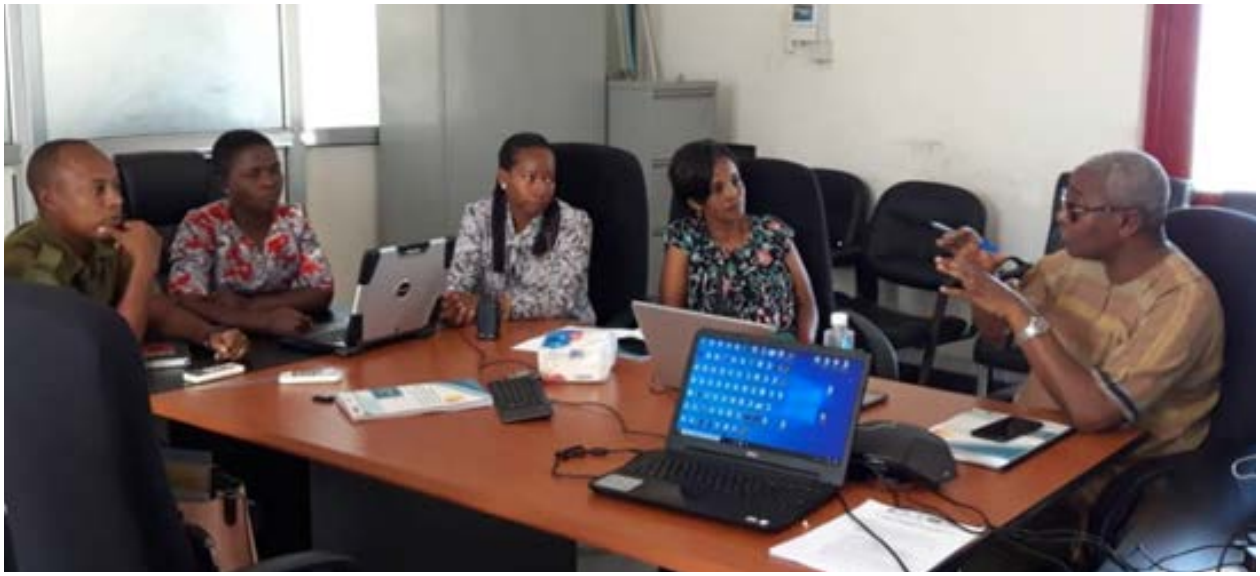
ii. A Flood Contingency Plan that lays out the specific response strategies of the DarMAERT EOC and ERFs in the event of a catastrophic flood

iii. A Tsunami Contingency Plan, which provides additional detail for external-facing response operations, and further refines specific response strategies of the DarMAERT EOC and ERFs in the event of a catastrophic tsunami

iv. The DarMAERT Continuity of Operations Plan, which provided guidance to DarMAERT on maintaining its essential functions and services once a pandemic had been declared by the World Health Organization and the Ministry of Health had confirmed a case of the infectious disease within Tanzania

Through a series of co-design workshops and simulations, 58 representatives (22 female, 36 male) of 17 agencies participated developing these documents. The documents have been finalized and are currently being translated to Kiswahili before being formally adopted by the Dar es Salaam Regional Administrative Secretary Office.

TURP's support since 2016 has enhanced DarMAERT's capacity to prepare and respond to emergencies across Dar es Salaam. Other development partners have shown interest in supporting DArMAERT to complement World Bank efforts – for example, the World Food Program has provided training on the use of drones for emergency response.



STRENGTHENING EMERGENCY PREPAREDNESS AND RESPONSE CAPACITY, ILEMELA MUNICIPALITY

Ilemela Municipality is prone to frequent flooding and rockfall, and its Municipal Council needs deeper capacity to respond to such disasters. This technical assistance aims to strengthen the emergency preparedness and response capacity of the Ilemela Municipal Council, and is a continuation of TURP's efforts to build the resilience of LGAs to climate and disaster risks. The technical assistance, which is being implemented in collaboration with PMO-DMD, focuses on: (i) preparing a national guideline for the development of emergency preparedness and response plans for Tanzanian cities; and (ii) enhancing emergency preparedness and response in Ilemela Municipality by training the Rapid Response Team and preparing and testing the Ilemela Emergency Preparedness and Response Plan.

The implementation of this technical assistance will draw lessons from TURP's capacity-building work with DarMAERT. It is also a pilot of the potential emergency preparedness and response activities to be implemented under TACTIC.

Significant progress has already been made. The Ilemela Municipality has established a Disaster Management Technical Committee comprising 35 members from 15 institutions. Members will receive basic training on emergency preparedness and response and will participate in the development of an emergency preparedness and response plan. Between June and July, TURP conducted a rapid emergency preparedness and response capacity assessment for Ilemela Municipality and other agencies in the Disaster Management Technical Committee; a draft report has been submitted. A follow-up field investigation was conducted in October 2022 in order to: (i) present the main findings of the rapid assessment; (ii) gather additional inputs to the Emergency Preparedness and Response Plan for Ilemela Municipality; and (iii) discuss a proposed draft of the Guidance Note on the preparation of emergency preparedness and response plans in Tanzanian municipalities. The technical assistance is expected to be completed in December 2022.

PILLAR 4: RESILIENCE ACADEMY

OBJECTIVE

To maximize program impact and sustainability by establishing university partnerships that transfer skills and risk management tools to the next generation of urban planners.

OVERVIEW OF PROGRESS

The Resilience Academy has continued to expand its platform for urban resilience data sharing and learning through the Climate Risk Database, e-learning, and an industrial placement program. The latter provided learning opportunities for 150 students to enhance their capacities in data collection, quality control, community mapping, data analysis and overall digital skills. Data collection has expanded beyond Dar es Salaam and Zanzibar to include several secondary cities.

The Climate Risk Database has continued to grow, and now encompasses 133 data layers and 408 registered users. All eight e-learning training modules have been completed and provided to university teachers, students, and experts. Deliberate efforts were also made to build partnerships with government institutions to ensure the sustainability of resilience data and the continued use of information for decision making.

ACTIVITY	STATUS	PROGRESS
Industrial training	**COMPLETED**	243 university students participated in data collection in Dar es Salaam, Morogoro, and Zanzibar.
E-learning	**NEARING COMPLETION**	All eight developed modules have been developed; four were offered to university teachers, students and experts.
Climate Risk Database	**NEARING COMPELTION**	The Climate Risk Database is being continuously enhanced.

INDUSTRIAL TRAINING PROGRAM

"Skills I have acquired throughout these eight weeks are and will be important throughout my professional development and [for] employment opportunities."

Edward Charles Almasi, student, UDSM

In FY22, the industrial training program engaged 243 students from ARU, SUA, SUZA, and UDSM.

The program entailed different activities in Dar es Salaam, Morogoro, Kahama, Kigoma, Geita, Tabora and Sumbawanga, and Zanzibar:

- In Zanzibar, training focused on collecting data on solid waste management across Unguja LGAs and all building attributes and public spaces in Chwaka and Makunduchi. Students collected 1,644 datapoints on businesses, water facilities, schools, toilets, playgrounds, electrical infrastructure, community centers, hotels, and health facilities.
- In Morogoro, students digitized tree canopies and grasslands and conducted ground truth surveys. In total, they collected 2,705 tree datapoints, a process that included examining tree health.
- In Dar es Salaam, training focused on community mapping for solid waste management and post-flood surveys, including mapping drainage and digitizing households affected by previous floods. Students collected 39,351 datapoints, comprising building digitization, health facilities, financial facilities, education facilities, religious facilities, and other business data. Students also mapped open spaces, transport infrastructure, natural drainage channels, and buildings for urban greening opportunity assessment.
- In Morogoro, Sumbawanga, Kahama, and Kigoma, students collected data on drain segments and elevation points.
- In Tanga, Mtwara, and Bagamoyo, students collected data on solid waste services, conducted household surveys, and digitized waste piles.

The industrial placement program exposed student participants to urban challenges and expanded their knowledge and skills to find practical solutions. It fostered a generation of urban planners who have mastered the collection of data using locally and easily available tools.

E-LEARNING

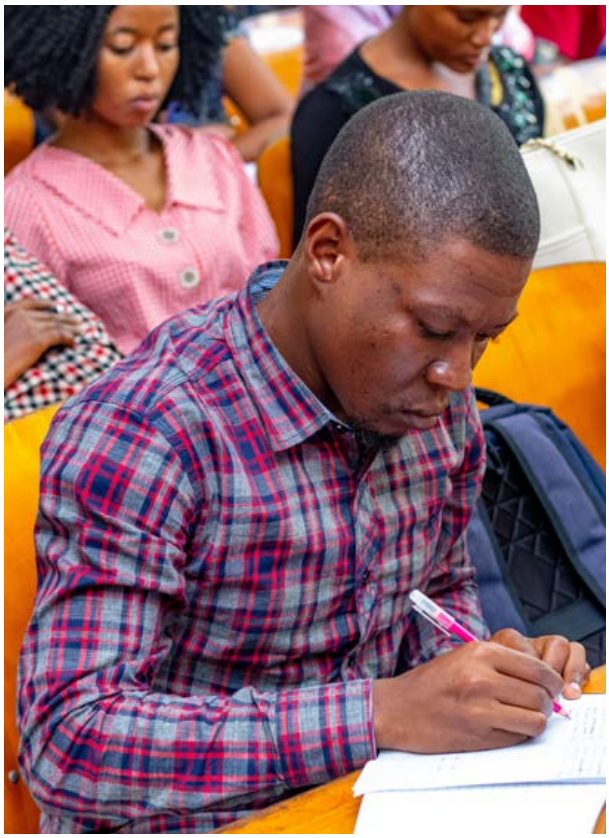
During FY22, the Resilience Academy provided five trainings to 198 students, university professors, and experts from DLab to increase the sustainability of resilience courses developed for universities. The training covered four modules: module 4 (flood mapping, modeling, and predictions), module 5 (climate change and resilience impacts), module 6 (community mapping for improved resilience planning), and module 8 (remote sensing and image processing with open-source software).

Among the five trainings, three were training-of-trainers, designed to help university teachers build their capacity to transfer knowledge to students beyond TURP's lifecycle. In total, 20 university experts were trained in module 4, 11 were trained in module 6, and 17 received Geonode training. As part of the industrial training program, 150 university students were trained on all four modules to enhance their capacity in data collection and analysis. The provision of these trainings completes all the modules planned under the Resilience Academy.

CLIMATE RISK DATABASE

With 408 users as of August 2022, the Climate Risk Database now includes 133 datasets. Eight data managers from the Resilience Academy partner universities curated data from TURP's activities into the database. Two of the e-learning trainings discussed above promoted use of the database among university teachers, students, and DLab experts.

On August 18, 2022, the Resilience Academy conducted a workshop to disseminate and share with government counterparts the work that has been implemented through the industrial training placements, data catalog, and Climate Risk Database. The workshop aimed to foster closer collaboration and technical partnership with government stakeholders and other end-users of the Resilience Academy's urban resilience and disaster risk data mapping and analysis services. This is a critical step towards ensuring the sustainability of these services and the institutionalization and management of climate risk and resilience information in Tanzania. The workshop shared use cases from activities undertaken by the Government of Tanzania and TURP, provided a hands-on demonstration of the Climate Risk Database, presented the e-learning materials, and showcased the industrial training program. Participants comprised 34 representatives from the Dar es Salaam Institute of Technology, the Ministry of Land, PO-RALG, various LGAs, the World Bank, and Resilience Academy partner universities.



PROGRAM MANAGEMENT

OBJECTIVE

The objectives of this component are to support program governance arrangements and Trust Fund–related meetings; to develop and execute work plans and budgets; to manage communication; to disseminate lessons learned; to report on progress; and to conduct monitoring and evaluation of the program.

OVERVIEW OF PROGRESS

TURP's closing date was extended from November 2021 to May 2023, following the cancelation of approximately US$20 million that was earmarked for Recipient-Executed activities under the Msimbazi Basin Development Project. To allow expansion of the program to secondary cities FCDO provided additional funds of approximately US$2 million for Bank-Executed activities.

TURP held steering committee meetings to present a new set of investments that were aligned with World Bank–financed projects in order to expand the program to multiple secondary cities. The main objective of these new investments was to mainstream resilience into the infrastructure and institutional strengthening components of major World Bank–financed investments. This effort included activities such as risk profiling, resilience database expansion, support for urban management, and urban greening studies, among other efforts. Another major focus in FY22 was sustainability, with several indicators that focused on consolidating the knowledge, data sets, and programs developed over the years.

TURP financed several knowledge-sharing events throughout the year, such as an urban greening conference, a Resilience Academy workshop, and workshops on building code development.

ACTIVITY	STATUS	PROGRESS
Steering Committee Meeting	**COMPLETED**	Two Steering Committee meetings were held, covering activities in FY22. During these meetings, the work plans were reviewed and endorsed by the committee.
Annual Review and Report	**COMPLETED**	The annual review and report was completed in November 2022.

COMMUNICATION

A short video documentary capturing the support provided to DarMAERT and the resulting operational improvement of the organization was produced in FY22. The film covers communication and coordination procedures at the DarMAERT EOC and includes interviews with key officials. The videos, which are at the editing stage, will be finalized and published in November to share knowledge and best practices with stakeholders and the public at large.

As the program comes to an end, TURP is also creating an online magazine to showcase program activities implemented since 2016. The magazine will be completed by December 2022 and will complement the program's annual reports.

05. RESULTS OVERVIEW

The following log frame was agreed upon by the World Bank and FCDO to track TURP's progress. This chapter documents the program's achievements in FY22.

IMPACT LEVEL

The program aims to contribute to the following long-term impact statement: Urban areas in Tanzania are more resilient to current climate variability and future climate change, and capable of more sustained patterns of economic growth and poverty reduction.

Impact Indicator 1: Extent to which Investment Climate Facility (ICF) intervention is likely to have a transformational impact

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Achievement of level 4: "Clear evidence of change - transformation judged very likely"**	Despite the significant funding cut to the Recipient-Executed part of the program, the Msimbazi Valley Basin project – a US$260 million project that has been informed by extensive analytical work, studies, and consultations under TURP – was approved by the World Bank board in September 2022. This project will transform the lower Msimbazi River, providing a comprehensive solution to the problem of climate-induced flooding in the valley. In addition, TURP has supported various components of two additional World Bank–financed projects, including the US$150 million Boosting Inclusive Growth for Zanzibar– Integrated Development Project (BIG-Z) and the US$278 million Tanzanian Cities Transforming Infrastructure and Competitiveness Project (TACTIC). TURP has also made a remarkable contribution to strengthening emergency preparedness and response. There is evidence of improved performance and coordination of emergency response during rainy seasons in Dar es Salaam. The expansion of this work to secondary cities and TURP's engagement in improving guidelines and policies has also brought these efforts to the national stage. TURP's data collection, mapping, and risk analytics work has significantly improved the understanding of climate change–included flooding in Tanzania, and at the same time has trained thousands of students in low-cost data collection and data manipulation. The university partnerships that were built through this engagement have brought forth the Resilience Academy, which continues to train hundreds of students every year.

Impact indicator 2: Modeled economic losses in the Msimbazi Basin reduced as a result of planned risk mitigation measures

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Modeled average annual loss demonstrated for Dar es Salaam and Zanzibar**	The probabilistic risk model has been completed. providing important information such as expected average annual loss for Dar es Salaam and Zanzibar under current and future climate change scenarios.

OUTCOME LEVEL

Outcome Indicator 1: Number of persons benefiting from improved flood resilience as a result of ICF support

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Cumulatively, 1.7 million indirect beneficiaries of digital elevation mapping, drainage mapping, or other relevant data gathering and mapping**	The expansion of flood risk mapping to the secondary cities of Kahama, Kigoma, Morogoro, Geita, Tabora, and Sumbawanga has increased the number of indirect beneficiaries to 1.99 million. The population will benefit from resilient infrastructure to be designed based on hazard, risk, and urban management data.

Outcome Indicator 2: Number of wards planning or implementing flood risk reduction and response measures

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**GREEN DAR maps and report used to complement DMDP2 project investments**	The Green Dar studies, including the large workshop attended by more than 100 participants in the summer of 2022, will complement the urban greening guidelines developed by PO-RALG, and will directly contribute to integrating greening initiatives under DMDP2.

Outcome Indicator 3: Climate risk data in sustainable use

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Probabilistic flood risk analysis results and the Climate Risk Database used by at least 5 agencies** **Resilience Academy curriculum integrated into tertiary education program**	PO-RALG and six fast-growing LGAs now use hazard and risk data from the Climate Risk Database to inform infrastructure investments and urban services. Similarly, the BIG-Z project management team uses the results in Zanzibar to inform tourism development planning in three villages and as an input for major urban upgrading investments in Zanzibar City. The four Resilience Academy partner universities also have access to the data for research purposes. The Resilience Academy curriculum has been completed and all eight modules are accessible online. Training of trainers for all modules has also been completed to ensure sustainable transfer of knowledge from the university to the students.

OUTPUTS

OUTPUT 1: INFORMATION AND DATA MANAGEMENT FOR CLIMATE RISK IDENTIFICATION

Output Indicator 1.1: Improved access to climate risk information in Dar es Salaam

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Probabilistic flood model is fully complete and PMO-DMD, DarMAERT, and PO-RALG staff are trained to use it**	The probabilistic flood risk model for Dar es Salaam and Zanzibar is complete and already provides unique insight into flooding and its impact on these cities. The in-person training program is scheduled to take place December 2–6, 2022, as the data visualization tool is currently being finalized. In addition, short training videos are being created to ensure that the training is not just one-off and that future users can easily use the tool.

Output Indicator 1.2: Exposure or risk assessments applied in major cities

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Pilot risk informed-remote supervision tool developed**	The tool has been developed and tested with PO-RALG. The next step is for PO-RALG to customize, adopt, and use it as needed.

Output Indicator 1.3: Number of cities with risk-informed drainage studies

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Inception report delivered for risk-informed drainage studies in at least two cities**	Six cities have completed or nearly completed the production of aerial images and the collection of various datasets for risk-informed drainage studies. The technical assistances for Kahama and Kigoma are complete; those for Morogoro, Geita, Tabora, and Sumbawanga are nearing completion.

OUTPUT 2: DISASTER RISK REDUCTION PLANS DELIVERED

Output Indicator 2.1: Solid Waste Management Plans, GREEN Dar, and Area-Based Studies for Zanzibar delivered

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Zanzibar Area-Based Development Plans and Green Dar maps and report completed**	The mapping effort on integrated local area development in Zanzibar was successfully completed. This study informs immediate urban development investments. The Zanzibar solid waste management study was completed. This study complements significant capital investments currently underway through the BIG-Z project. The Green Dar study is nearing completion. Initial findings were presented during the large workshop organized in summer 2022.

Output Indicator 2.2: Community risk reduction plans developed using improved risk information (cumulative number of wards and municipalities endorsing plans)

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Technical support for the realization of investments under Msimbazi Opportunity Planand BIG-Z delivered**	TURP supported various technical elements of the US$260 million Msimbazi Basin Development Project (approved in September 2022) during the preparation phase. TURP also supported various activities under BIG-Z, including mapping for area-based development, solid waste management optimization, and the development of building codes.

Output Indicator 2.3: Climate-resilient building and sustainable tourism supported in Zanzibar

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Building regulation and conservation training needs assessments completed**	The needs assessment for the development of building codes is completed. The first-phase reports have been delivered and a technical oversight committee has been established. Key stakeholders, building classification and construction methodologies, and challenges and opportunities for developing building codes have been identified. The technical assistance will be completed in December 2022. Trainings on construction material testing were completed for the Zanzibar Bureau of Standards. Eight staff received training on material testing and on building material laboratory management.

OUTPUT 3: EMERGENCY PREPAREDNESS AND RESPONSE MANAGEMENT

Output Indicator 3.1: Cities with emergency contingency plan (regional level)

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**A general guideline for developing emergency response plans, as well as an emergency response plan for one city, are under development**	The emergency preparedness and response plan for Ilemela Municipality is nearing completion. A technical team was formed and a rapid capacity assessment of responding agencies was conducted over the summer of 2022. Consultative and plan validation workshop were conducted in October 2022. The consultative and validation workshops for developing a guideline were also conducted in October 2022. Both reports are expected to be finalized in December 2022.

OUTPUT 4: RESILIENCE ACADEMY ESTABLISHED AND OPERATIONALIZED

Output Indicator 4.1: Cumulative number of students completing industry placement or similar skills-building practicals (gender segregated)

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**1,200**	Over 1,300 university students have cumulatively benefitted from the industrial placement program since 2016. During FY22, 150 students participated in the industrial training.

Output Indicator 4.2: Climate Risk Data and tools use in approved curriculums

ASSESSMENT MONTH/YEAR	MILESTONE	FY2022 ACHIEVEMENTS
Nov. 2022	**Deliver a training-of-trainers for all eight open online Resilience Academy courses for the four Tanzanian universities and run a full set of courses in 2022 (4 universities offer all 8 modules). Deliver the new executive Risk Mapping course.**	Training-of-trainers for all eight open online Resilience Academy courses have been successfully delivered to 48 university teachers. During this year, three trainings were delivered on the remaining four modules.

06. FINANCIALS

FINANCIAL OVERVIEW

To date, total disbursements from the trust fund amount to US$17,155,336. In FY22, US$1,930,034 was disbursed, with US$151,693 remaining available as of June 30, 2021. Outstanding commitments of US$1,425,868 were carried over into the next fiscal year.

REPORTING PERIOD ENDING JUNE 30, 2022 (US$)	
Total Funds Received from FCDO as of June 30, 2022	$18,732,897
Disbursements FY22	$1,930,034
Total TF Disbursements	$17,155,336
Outstanding Contract Commitments	$1,425,868
Cash Balance at the End of FY22	$151,693

DISBURSEMENTS

Reporting period ending June 30, 2021 (US$)

BETF ACTIVITY		TOTAL BUDGET ALLOCATED	TOTAL DISBURSED	FY22 BUDGET ALLOCATION	FY22 DISBURSED	COMMITTED	AVAILABLE	% TOTAL DISBURSED + COMMITTED
PILLAR 1: Risk Identification								
TF0A4139	Risk Evaluation and Information Management	$6,284,002	$5,736,979	$435,000	$620,461	$535,069	$11,954	100%
TF0A3559	Urban Exposure Mapping Data Services	$150,000	$149,333	$0	$0	$0	$667	100%
Total Pillar 1		**$6,434,002**	**$5,886,312**	**$435,000**	**$620,461**	**$535,069**	**$12,621**	
PILLAR 2: Risk Reduction								
TF0A4691	Risk Mitigation Planning	$3,265,000	$2,748,026	$735,000	$642,955	$515,246	$1,729	100%
TF0A3571	Msimbazi River Revitalization	$660,000	$659,753	$0	$0	$0	$247	100%
TF0A4575	Urbanization Review - Resilience Planning	$57,848	$57,848	$0	$0	$0	$0	100%
TF0A5676	SWIFT Surveys on Poverty and Floods	$190,000	$189,995	$0	$0	$0	$5	100%
Total Pillar 2		**$4,172,848**	**$3,655,622**	**$735,000**	**$642,955**	**$515,246**	**$1,981**	
PILLAR 3: Emergency Preparedness								
TF0A3828	Emergency Planning and Response	$3,275,000	$3,221,284	$150,000	$260,748	$37,859	$15,857	100%
Total Pillar 3		**$3,275,000**	**$3,221,284**	**$150,000**	**$260,748**	**$37,859**	**$15,857**	
PILLAR 4: Resilience Academy								
TF0A4238	Resilience Academy	$2,865,000	$2,514,621	$400,000	$354,616	$318,400	$31,980	99%
Total Resilience Academy		**$2,865,000**	**$2,514,621**	**$400,000**	**$354,616**	**$318,400**	**$31,980**	
Program Administration								
TF0A3742	Technical Review and Design	$340,000	$340,000	$0	$0	$0	$0	100%
TF0A2973	Secretariat and Conferences	$1,646,047	$1,537,498	$148,047	$51,254	$19,295	$89,254	95%
Total Administration		**$1,986,047**	**$1,877,498**	**$148,047**	**$51,254**	**$19,295**	**$89,254**	
OVERALL Total Activities		**$18,732,897**	**$17,155,336**	**$1,868,047**	**$1,930,034**	**$1,425,868**	**$151,693**	**99%**

DELIVERY CHAIN

PILLAR 1: Risk Evaluation and Information Management (TF0A4139)	FY22 disbursements (US$)
Tanzanian consultants	$77,381
International consultants	$48,456
Tanzania Flying Labs	$4,572
OpenMap Development Tanzania	$13,660
Cleveland Metropolitan Park Distric	$42,960

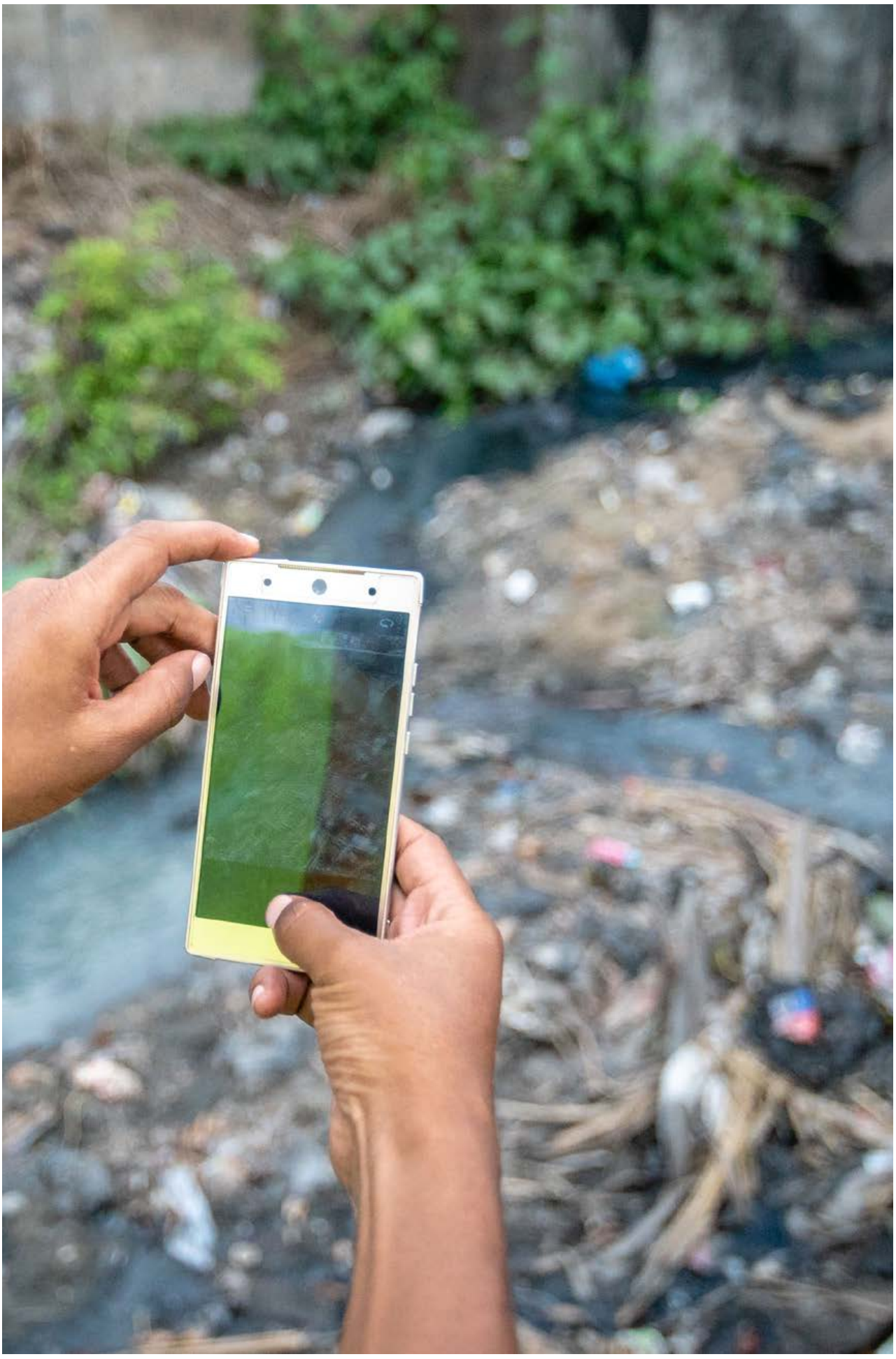
Uhurulabs	$42,600
NTT DATA Corporation	$3,750
Earthquakes & Megacities Initiative	$47,546
Humanitarian OpenStreetMap Team	$33,329
Deutsches Zentrum für	$14,575
Delft University of Technology	$28,800
Stichting Deltares	$127,472
Litterati INC	$47,100
Spatial Collective Ltd	$55,122
Total	**$587,324**

PILLAR 2: Risk Mitigation Planning (TF0A4691)	FY22 disbursements (US$)
Tanzanian consultants	$109,511
International consultants	$101,837
OpenMap Development Tanzania	$49,802
iDev Tanzania Limited	$7,400
Limno-Tech, Inc.	$3,402
Dalberg Research Limited	$2,600
Cardno Emerging Markets (UK) Ltd	$64,773
Arup International Projects Limited	$35,138
Stichting Deltares	$68,385
SERVULO & ASSOCIADOS - SOC. DE	$25,000
Total	**$467,848**

PILLAR 3: Emergency Prepardness (TF0A3828)	FY22 disbursements (US$)
Tanzanian consultants	$81,516
International consultants	$27,735
DeskTop Productions Limited	$1,035
Stichting Deltares	$95,605
Total	**$205,890**

PILLAR 4: Resilience Academy (TF0A4238)	FY22 disbursements (US$)
Tanzanian consultants	$3,668
International consultants	$5,639
OpenMap Development Tanzania	33810
Spatial Collective Ltd	49075
Tanzania Data Lab	5000
University of Turku	$150,000
Total	**$247,192**

Secretariat (TF0A2973)	FY22 disbursements (US$)
Tanzanian Consultants	$5,298
International Consultants	$20,254
Total	**$25,552**



07. RISK

STAKEHOLDER ENGAGEMENT AND PRIORITIES

Stakeholder engagement and consultations were conducted to inform the implementation of project sub-activities. Given the gradual easing of restrictions on in-person meetings, international and local consultants were able to travel and participate in workshops, albeit under strict COVID-19 protocols.

Since the program is in the final stages of implementation, the workshops and activities that took place during this fiscal year were primarily focused on strengthening the alignment of TURP activities with other World Bank–financed urban development and disaster risk management projects. This will contribute to a smooth transition at the completion of the program and ensure the sustainability of the results achieved through the technical assistance.

FINANCIAL MANAGEMENT AND PROCUREMENT

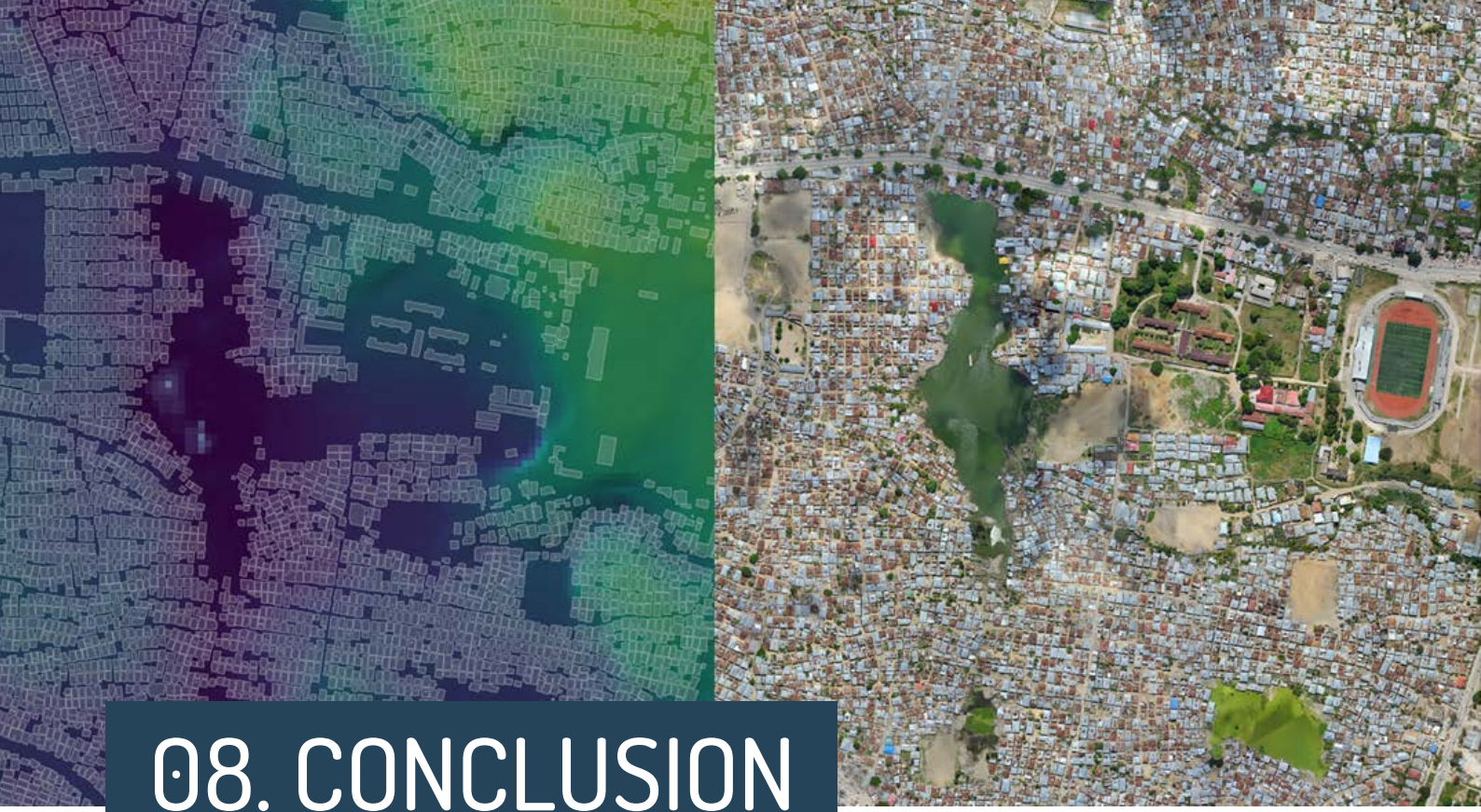
As of November 2022, approximately US$55,000 in funds are available, which TURP plans to use by January 2023. In FY22, the program's focus was on finalizing all committed projects. As part of fiduciary risk management, the World Bank has provided all counterparts with information on how complaints about fraud or any other issue can be lodged anonymously with the either the World Bank or FCDO.

ENVIRONMENTAL, SOCIAL, AND SECURITY

TURP's environmental and social risks are minimal given that all program activities are technical assistances. TURP has conducted several studies that contribute to a better understanding of environmental issues and risks, including risk mapping exercises in several Tanzanian cities. The completion of these mapping exercises will help other World Bank–financed projects and the Tanzanian government to develop effective actions for risk reduction and environmental adaptation.

TURP has supported extensive emergency response programs that have had a significant and direct social benefit, especially to the segment of society vulnerable to natural hazards.

In FY22, some of the Resilience Academy data collection campaigns took place outside the home cities and communities of participating students. The main objective of this work was to bring the lessons learned through the program to multiple secondary and tertiary cities. To ensure the safety of students, a guide was prepared, and proper orientation was provided to universities, consultants, and students so that all parties operated under a clear code of conduct.



08. CONCLUSION

TURP has been instrumental in advancing disaster risk management and providing resilience-related technical assistances to various cities in Tanzania, including Dar es Salaam, Mwanza, Tanga, Zanzibar, Kahama, Kigoma, Morogoro, Geita, Tabora, and Sumbawanga. TURP has demonstrated marked success in all four of its key pillars: Risk Identification, Risk Reduction, Emergency Management and Response, and the Resilience Academy.

For the last two years, TURP's priority has been to align all its technical assistances with new World Bank–financed urban and disaster risk management projects to promote the immediate uptake and use of all deliverables, and to ensure the sustainability of its activities by creating synergies with government-led sub-projects that can help maximize impact. By better linking its activities with the four active and pipeline World Bank–financed urban development and disaster risk management projects – BIG-Z, TACTIC, the Msimbazi Development Project, and DMDP – TURP has significantly contributed to mainstreaming resilience into infrastructure development and planning, and has helped strengthen the institutions that are responsible for designing and implementing these projects.

The activities that TURP has financed include innovative and low-cost data collection projects; technical assistance for development of new building codes; training government staff on construction material testing; promoting green investment and nature-based solutions;; and developing various risk databases, analytical tools, and models.

A number of activities that were initiated or piloted under the program are also expected to be adopted and scaled up by the government. For example, the risk-informed remote supervision tool is expected to be emulated and adopted for project supervision of World Bank–financed projects. Similarly, the greening initiatives, climate change projections, development of building codes, and other similar activities will serve as key inputs to the four World Bank–financed urban development and disaster risk management projects.

The national emergency management guidelines currently being developed, along with the revision of national strategies, will ensure that some of the lessons learned under the intensive engagement with cities such as Dar es Salaam and Mwanza will be replicated. The guideline document will help to consolidate the

experience and knowledge gained thus far and serve as the basis for a broad framework that can be used by other cities in Tanzania.

Engagements that were supported by the Resilience Academy will continue through a similar partnership, GeoICTe, which will involve all of the partner universities, whether local or overseas. A roadmap document is also being developed to outline how the local universities would be able to increasingly take leadership on managing finances and tasks.

Given the large amount of data and the considerable number of analytical tools and reports generated under TURP, the program has created a database to ensure that the information developed over the years is consolidated and documented in systematic way. To help end users locate datasets easily, a catalog of all data generated has been developed.

This data, along with the analyses produced and the knowledge created under TURP, will help Tanzania's local and national authorities better understand and address climate risk, and the program's capacity-building components will help them act on it effectively. Over the past six years, TURP activities have helped key actors in Tanzania identify and reduce risk, prepare for emergencies, and plan for the future. As the program winds to a close, it will continue to focus on cementing and passing on lessons learned. In its final months, TURP's goal, as ever, is to ensure that the government is better prepared to manage climate risk and build a more resilient Tanzania, now and in the years to come

TANZANIA
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PROGRAMME

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