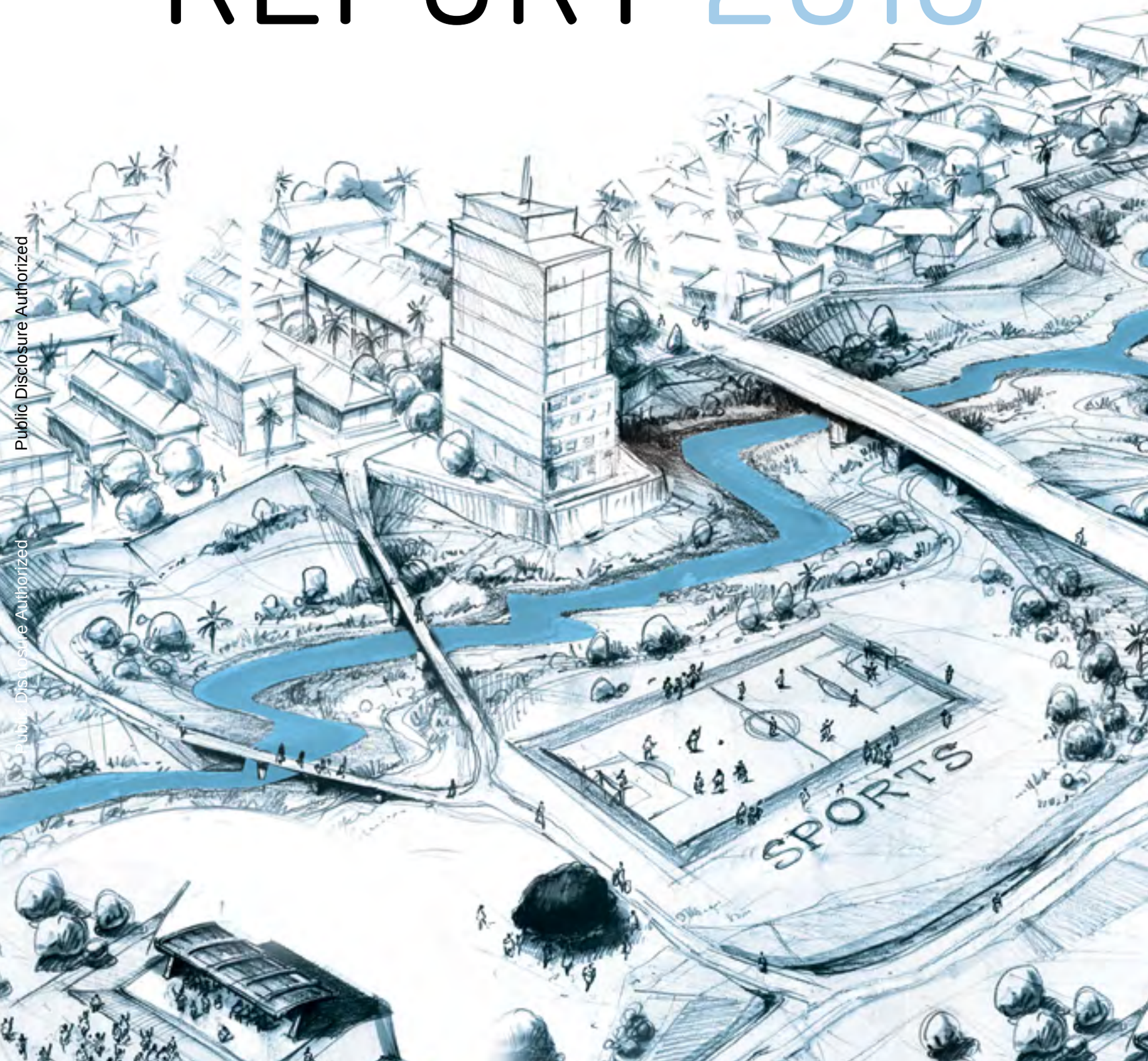
Tanzania
Urban Resilience
Programme

ANNUAL REPORT 2018



Public Disclosure Authorized

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Tanzania Urban Resilience Programme ANNUAL REPORT 2018

Tanzania Urban Resilience Programme (TURP) was established in 2016 from a partnership between the United Kingdom's Department for International Development (DFID) and the World Bank to support the Government of Tanzania in its endeavour to increase resilience to climate and disaster risk.

TANZANIA
URBAN RESILIENCE
PROGRAMME

WORLD BANK GROUP

UKaid
from the British people

"With this program, Dar es Salaam will become a new and better city, the bayou of 'heshima na sifa'. The city will become more liveable and people will visit Dar es Salaam for the sake of visiting Dar es Salaam."

– **Honorable January Makamba,** ***Minister of State in the Vice President's Office***

“It is important that this program receives our government’s support to achieve its goals because this will be our government’s legacy.”

– Honorable Selemani Jafo, *Minister of State in the President’s Office*

This guidance note is intended to be a live document and is subject to change without notice.

TURP REPORT 2018

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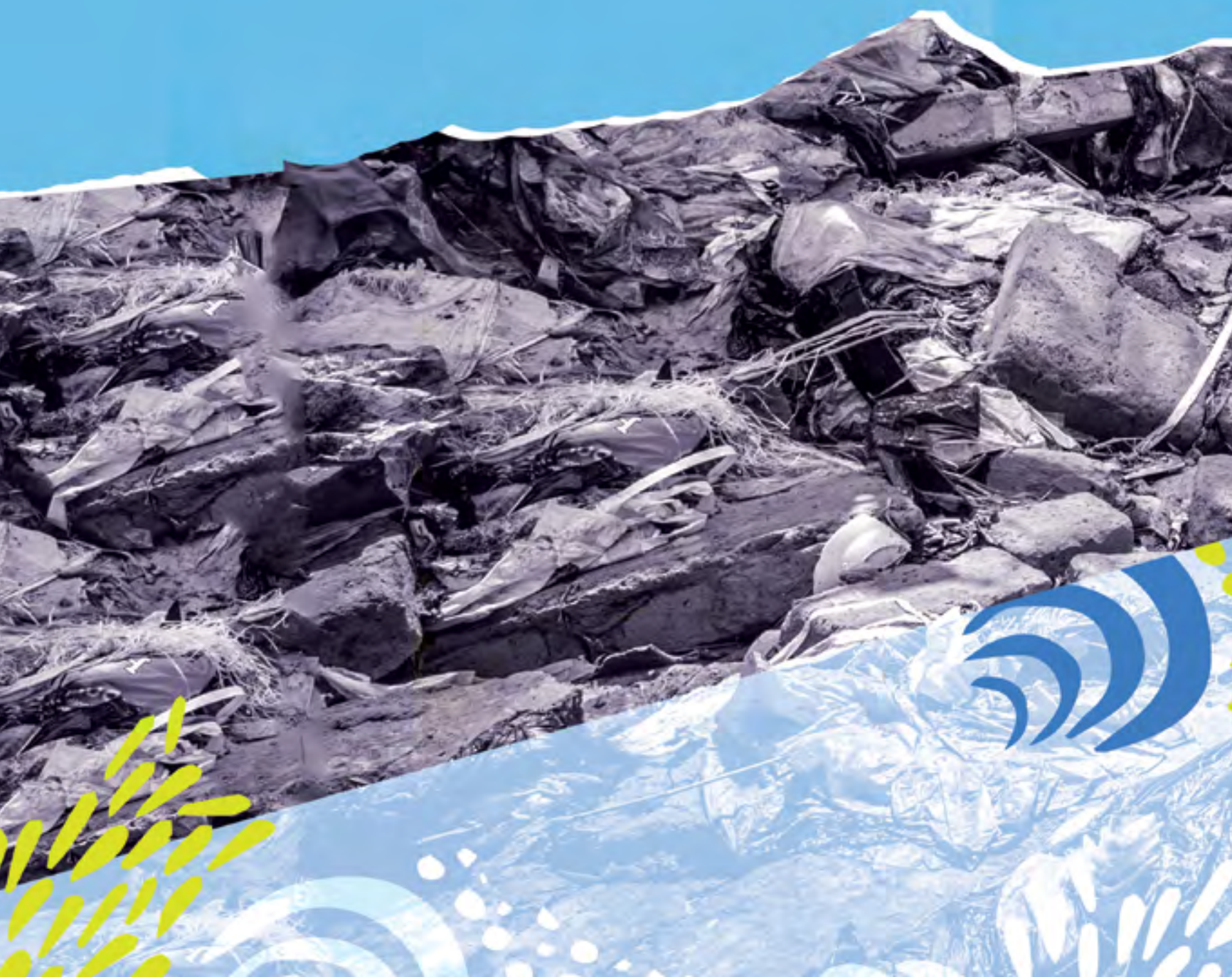
ACRONYMS

AA	Administration Agreement
AAL	Average Annual Loss
ACCA	Awareness, Comprehension, Commitment, Action
ASA	Advisory Services and Analytics
BETF	Bank-Executed Trust Fund
BRT	Bus Rapid Transit
CDPRP	Community Disaster Preparedness and Response Plan
CDRT	Community Disaster Response Teams
CERC	Contingency Emergency Management Component
COP	Community of Practice
COSTECH	Tanzania Commission for Science and Technology
CRRP	Community Risk Reduction Plan
CSO	Civil Society Organization
CTTL	Child Activity Task Team Leader
DarMAERT	Dar es Salaam Multi-Agency Emergency Response Team
DART	Dar es Salaam Rapid Transit Agency
DEMs	Digital Elevation Models
DfID	United Kingdom's Department for International Development
DMD	Disaster Management Department
DRF	Disaster Risk Framework
DRM	Disaster Risk Management
EMI	Earthquake Megacities Initiative
EMIS	Emergency Management Information System
ESA	European Space Agency
EWS	Early Warning System
FY	Fiscal Year
GA	Grant Agreements
GEO-ICT	Geographic Information and Communication Technologies
GFDRR	Global Facility for Disaster Reduction and Recovery
GFR	Grant Financing Request
GIS	Geographic Information System
GoT	The Government of Tanzania
GPSURR	Social, Urban, Rural, and Resilience Global Practice
ICLEI	Local Governments for Sustainability
IGAD	Inter-Governmental Authority on Development
IPF	Investment Project Financing
KPI	Key Performance Indicator
LiDAR	Light Detection and Ranging
M&E	Monitoring and Evaluation
MEO	Mtaa Executive Officer
MKUKUTA-II	National Strategy for Growth and Poverty Reduction
MoU	Memorandum of Understanding
MoWI	Ministry of Water and Irrigation
MSMF	Msimbazi Strategic Management Framework
NEMC	National Environmental Management Council
OPM	Oxford Policy Management
PA	Programmatic Approach
PDNA	Post-Disaster Needs Assessment
PO-RALG	President's Office – Regional Administration and Local Government
RAS	Regional Administrative Secretary
RETF	Recipient-Executed Trust Fund
RMI	Risk Management Index
SC	Steering Committee
SOGDAT	Support to Open Data and Accountability in Tanzania
SUZA	State University of Zanzibar
SWIFT	Survey of Well-being via Instant and Frequent Tracking
TAHMO	Trans-African Hydro-Meteorological Observatory
TANROADS	Tanzania National Roads Agency
TED	Training, Exercises, and Drills Program
TF	Trust Fund
TMA	Tanzanian Meteorological Agency
TOR	Terms of Reference
TRC	Tanzania Red Cross
TTL	Task Team Leader
TURP	Tanzania Urban Resilience Programme
UAV	Unmanned Aerial Vehicle
UDSM	University of Dar es Salaam
ULGA	Urban Local Government Authority
UNA	Urban Natural Assets
USSD	Unstructured Supplementary Service Data
UTEP	Urban Thematic Exploration Platform
VICOBA	Village Community Banks
WBG	Word Bank Group
WRBWB	WamiRuvu River Basin Water Board

01 EXECUTIVE SUMMARY



THE YEAR **FROM JULY 2017 TO JUNE 2018** WAS AN EVENTFUL ONE AND SERVED TO ESTABLISH **URBAN RESILIENCE** AS AN **URGENT PRIORITY** FOR **TANZANIA'S DEVELOPMENT**.

The twin pressures of rapid urbanization and a changing climate are driving an accelerating increase indisaster risk.

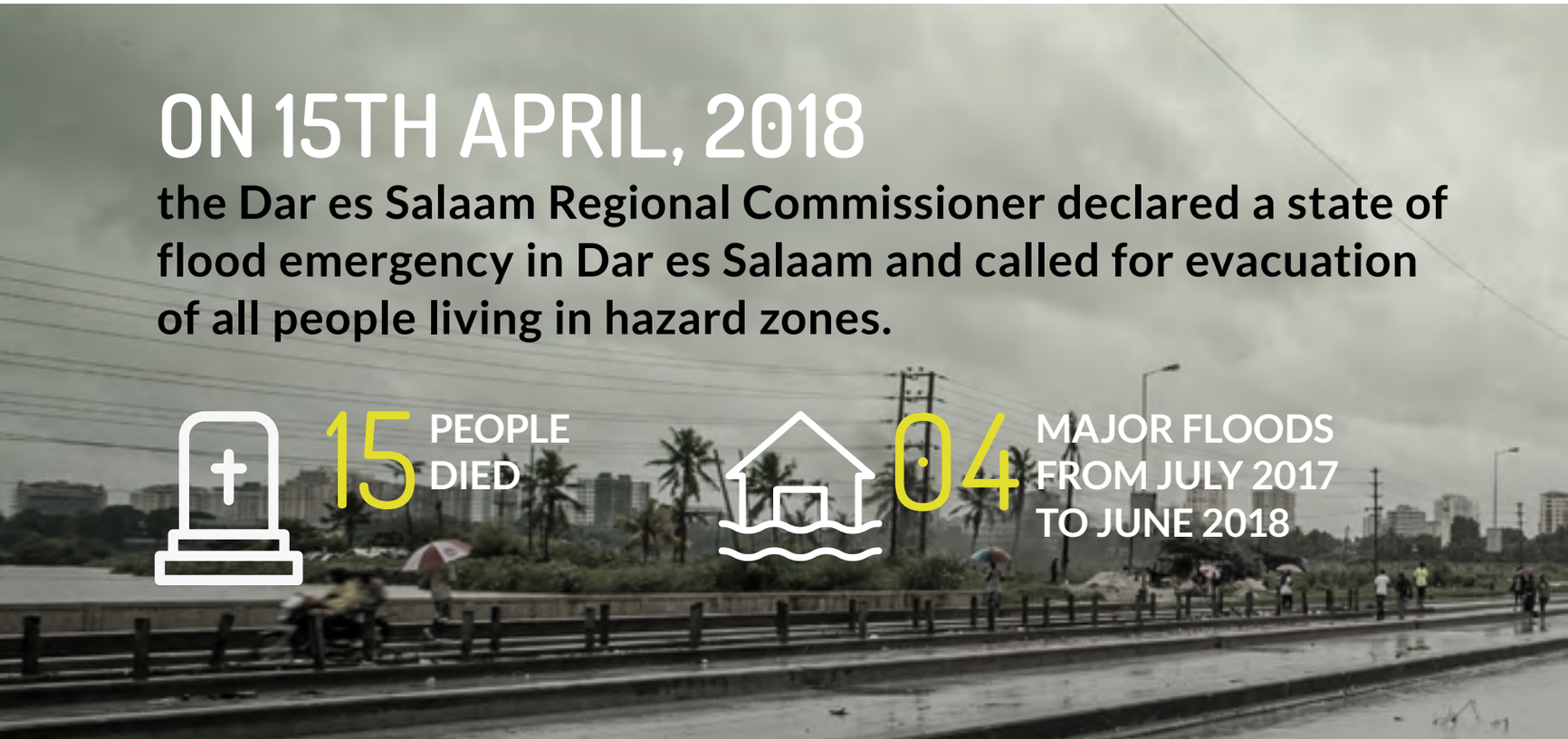
The city of Dar es Salaam experienced four major floods in this period. October 2017 saw unusually intense rainfall, which led to flash floods, loss of life, and housing, destruction, and major disruption to the city's Bus Rapid Transit (BRT) system. Similar scenes were repeated in January, March, and April of 2018.

Following the January 2018 flood event, Her Excellence Samia Suluhu, Vice President of Tanzania, convened a wide range of national agencies and city authorities to review the causes and mitigation options for floods. Key challenges of institutional coordination, integrated planning, and rapid response were identified and resulted in the Vice President establishing the Dar es Salaam City Flood Committee.

On April, 15, 2018, the Dar es Salaam Regional Commissioner declared a state of flood emergency in Dar es Salaam and called for evacuation of all people living in hazard zones. This flood took the lives of 15 persons, and also caused widespread damage to houses, road infrastructure, and bridges.

The Tanzania Urban Resilience Program (TURP) has thus become a critically important initiative at a time of high visibility and government attention. The year has been characterized by a peak in technical assistance activities with over US$5.5 million in UK Department for International Development (DfID) funding having been disbursed or committed across 16 contracts spread through the four program work Pillars.

Pillar 1, which focuses on establishing actionable data and climate science for risk reduction, has already supported risk-reduction planning and response measures. The instrumentation of the Msimbazi Basin with meteorological and hydrological sensors has profiled in detail the flood events of the past year.



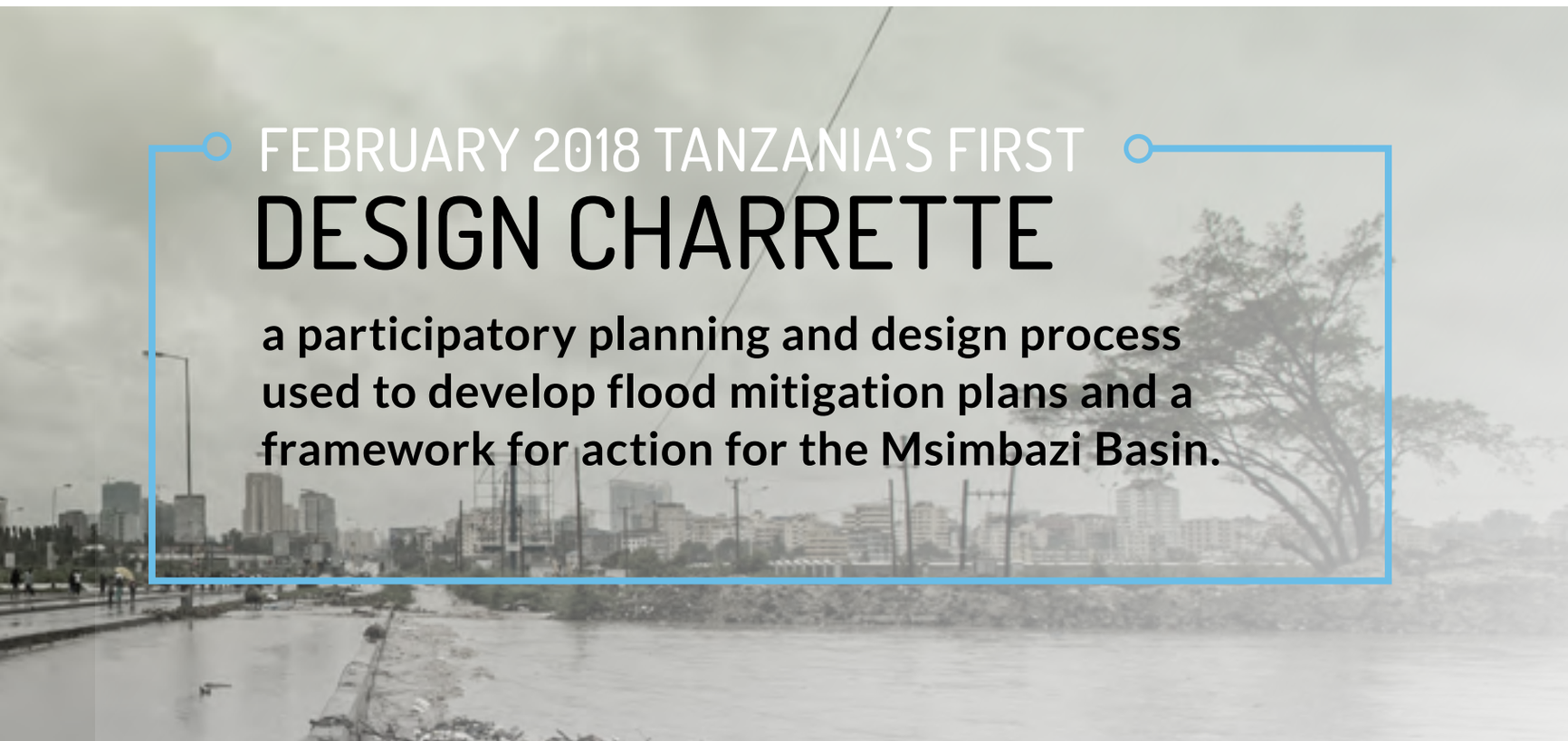
The 24-hour observations of rainfall during the October 2017 flood characterized the event as a one-in-10-year event. These data were essential in developing and calibrating a Msimbazi hydrological flood model used for flood mitigation planning.

In addition to hazard data collection, TURP has advanced the state of mapping of the urban environment by surveying on the ground and from the air the buildings, infrastructure, and community assets. This process has leveraged innovations in satellite, drone, and community data collection methods to ensure low costs and address local skills and sustainability. Ramani Huria, the 'Open Map', which engages a consortium of local universities, has continued to grow. The mapping campaigns have trained over 350 Tanzanian students and engaged 35,000 households in the collection of community knowledge in rapidly growing neighborhoods.

In addition to mapping of flood-related infrastructure, such as houses at risk and transport and drainage networks, the initiative also quickly deployed to survey flood perceptions in the Msimbazi Valley, solid waste dumps, and community priorities for protection.

Pillar 2 activities, focused on planning and coordination for risk reduction, began work at both community and metropolitan levels. One highlight has been the execution of Tanzania's first Design Charrette — a participatory planning and design process — used to develop flood mitigation plans and a framework for action for the Msimbazi Basin. The process began in February 2018 with 45 participants representing a range of agencies, communities, and subject matter experts. This stakeholder group worked iteratively over seven months to assess the results of flood model analysis and flood control options, design a detailed plan for the Lower Msimbazi, and establish priorities for an basin-wide Strategic Development and Managementand Management Framework. The participation grew to over 80 persons by the last charrette, demonstrating strong support and engagement.

Pillar 3, which deals with the emergency management and preparedness activities, began the year by launching the first Dar es Salaam Emergency Response Plan. This document supports the expansion of the emergency communications network established in the first year of TURP and guides stakeholder agencies dealing with metropolitan level alerts, coordination, response,



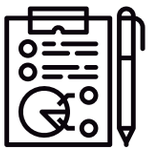
FEBRUARY 2018 TANZANIA'S FIRST

DESIGN CHARRETTE

a participatory planning and design process used to develop flood mitigation plans and a framework for action for the Msimbazi Basin.

PILLARS + RESILIENCE ACADEMY

PILLAR 1
Actionable Data Collection



PILLAR 2
Planning for Risk Reduction

PILLAR 3
Emergency Management and Preparedness

RESILIENCE ACADEMY
Scientific Tools and Models for Risk Management

and recovery actions. The World Bank has worked with the Dar es Salaam Multi-Agency Emergency Response Team to prepare a two-year program of training, exercises, and drills, as well as a review of the Emergency Operations Center and standard operating procedures for which an international firm was engaged to further develop these activities.

THE TANZANIA URBAN RESILIENCE PROGRAM (TURP) HAS THUS BECOME A CRITICALLY IMPORTANT INITIATIVE AT A TIME OF HIGH VISIBILITY AND GOVERNMENT ATTENTION.

In addition to support for the institutional elements of the regional and municipal disaster management system, TURP was able to respond to specific needs of the transport network. Following the multiple disruptions to the road and bridge network, and especially to the BRT service due to recurrent flood events during the year, TURP mobilized international experts to support the Dar es Salaam Rapid Transit Agency (DART) and Tanzania National Roads Agency (Tanroads) in assessing options for a contingency and emergency operations plan and developing a road map for short- and long-term emergency management.

The Resilience Academy has evolved into a stand-alone pillar of TURP following high demand for a skills and sustainability focus to investments in data, scientific tools, and models, as well as risk management practices. A Memorandum of Understanding (MoU) was signed with Ardhi University in September 2017, with collaborations and student participation increasing during the year and a draft curriculum for risk mapping established. In June 2018, the TURP Steering Committee agreed to increase the scope of work in this Pillar and a planning workshop was organized to outline the expansion of work to include three additional Tanzania universities as well as to explore international partnership opportunities for training, research, and collaboration.

The risk register for the program has been updated to reflect the challenges of managing for complexity both in the breadth of institutions as well as in thematic areas. TURP currently has many activities running in parallel, each with inter-related stakeholders and synergies. Coordination and communication are key to ensuring ambitious

timelines and effective stakeholder engagement and results. In addition, expectations are now high that the program will deliver visible impacts in the next year, and it is essential for success to maintain both high-level political ownership as well as stable financial resources.

Looking ahead, the next year of the program anticipates shifting from a peak in design and procurement activities towards a peak for training and implementation. One high-visibility activity is expected to be the World Clean Up day in September 2018, which TURP is supporting to raise awareness and help mobilize residents and local government in the importance of waste management and river clean-ups for flood reduction.

The main focus on implementation in the coming year is expected to be the approval and initiation of an investment project for the Lower Msimbazi based on the science and planning work so far conducted, which intends to deliver flood mitigation works with short- and longer-term benefits for citizens.

Manzese clean up, June 2017
Credit: Chris Morgan – World Bank

02 BY THE NUMBERS

HIGHLIGHTS

Innovation in Risk Identification

26km
OF FLOOD ZONES MAPPED BY UAVS

35,000 HOUSEHOLDS SURVEYED FOR FLOOD INFORMATION

960 COMMUNITY MAPPERS TRAINED

3 FLOOD EVENTS CAPTURED

8 WEATHER STATIONS INSTALLED

77% ACCURACY OF BUILDING DETECTION

Community Engagement for Reduced Risk

04 COMMUNITY WORKSHOPS ON EMERGENCY MANAGEMENT

23 COMMUNITY CLEAN UPS CONDUCTED

The Msimbazi Charette urban design process

9 MONTHS OF COLLABORATION

150 REPRESENTATIVES

35 WORKING SESSIONS

1000 LOCAL CITIZENS

59 ACTORS

01 PLAN AGREED

Strengthening Emergency Response

06 TRAININGS ON EARLY WARNING SYSTEMS

04 RADIO BASE STATIONS

03 FLOOD EVENTS CAPTURED

06 MOBILE STATIONS INSTALLED

50% to **100%** EXPANSION OF EMERGENCY COVERAGE

03 REPEATER STATIONS

03 ABOUT TURP

THE **OVERALL OBJECTIVE** OF THE TURP IS TO **SUPPORT NATIONAL AND LOCAL GOVERNMENTS** IN TANZANIA IN **STRENGTHENING MANAGEMENT OF CLIMATE RISK IN CITIES.**

Tanzania is the most flood-affected country in East Africa and is also home to some of the fastest-growing cities on the continent. The program therefore seeks to enable climate-resilient urbanization through greater risk identification, systems planning for risk reduction, and supporting coordination and emergency management activities. This is especially aligned with the Sustainable Development Goal 11 to "make cities and human settlements inclusive, safe, resilient, and sustainable".[1]

Higher-level objectives to which the program contributes include:

1 https://www.un.org/sustainabledevelopment/cities/

INCREASING RESILIENCE TO CLIMATE AND DISASTER RISK:

TURP supports the Government of Tanzania(GoT) in implementing a program that promotes climate and disaster risk management in the wider context of sustainable development. The proposed engagement is aligned with and directly addresses the government's priorities on growth, the environment, and climate adaptation outlined in the second National Strategy for Growth and Poverty Reduction(known as MKUKUTA-IIMkakatiwa Kukuza Uchumina Kupunguz aUmaskini Tanzania). Similarly, the activities directly support the strategic objectives and interventions in the National Climate Change Strategy, Zanzibar Climate Change Strategy, and Disaster Management Act 2015.

PROMOTING SHARED PROSPERITY AND ENDING EXTREME POVERTY:

Climate change and adverse natural events have the greatest impact on the poorest populations who generally live in higher-risk areas and have a diminished capacity to recover from disaster. In the case of Tanzania, even frequent, low-intensity events such as a heavy rainfall can have crippling and cumulative effects on livelihoods and communities of the bottom 40%. Impediments to development gains as a result of climate hazards that particularly

CHALLENGES OF TURP

Lack of data and information

Inadequacy of Tanzanian urban and land use planing

Significant and growing, infrastructure gap

impact the poorest communities can be minimized by reducing the exposure to hazard events and decreasing the vulnerability of the poor to climate disturbances.

These are the core challenges being addressed by TURP, a partnership between the GoT, World Bank Group (WBG), and UK Department for International Development (DfID) to support national and local governments in strengthening management of urban climate risk. Initiatives being implemented by this program are aimed at establishing a systematic mainstreaming of risk management principles across government and civil society stakeholders operating at community, municipal, and national levels.

Over the past two years, TURP has worked through a structure of four Pillars to effectively foster engagement and dialogue surrounding urban resilience. These Pillars are: (1) risk identification, (2) risk reduction, (3) emergency preparedness, and (4) the Resilience Academy.

A Steering Committee, composed of key stakeholders from the Prime Minister's Office — i.e., Disaster Management Department, the President's Office — regional administration and Local Government,the DfID, and the World Bank have overseen the implementation projects that fall beneath these Pillars, with advice from the Technical Advisory Committee, composed of a broader set of program stakeholders and government agencies.

Credit: Chris Morgan, World Bank

DESCRIPTION OF PROGRAM ACTIVITIES

THE ACTIVITIES FINANCED BY THE TF INCLUDE:

World Bank-executed activities, for which the World Bank has implementation responsibility:

(A) 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, a thorough understanding of disaster and climate risks in the local context and their implications are vital. This informs decision makers about the risks they face and the drivers of those risks. As such, Pillar 1 increases access to comprehensive information about physical and societal exposure to climate risks, which inform implementation of structural and non-structural mitigation measures.

Key activities in this Pillar are the collection and organization or climate risk data as well as the development of visualization tools and risk models. Socio-economic data include the mapping of people, assets such as houses or critical infrastructure, and urban services and livelihoods. Environmental data and models include the historical data and current monitoring of hydro-meteorological phenomena, geophysical characteristics of the urban environment such as soil types, land use, and river basin profiles, as well as applying the best climate models to identify future impacts of climate change.

Flooding victims in Manzese, March 2017
Credit: Chris Morgan – World Bank

Drain mapping in Manzese, June 2017
Credit: Chris Morgan – World Bank

(B) PILLAR 2 – RISK REDUCTION

Guided by the data and management tools of Pillar 1, Pillar 2 functions to strengthen cities' capacity to plan for and reduce climate risk through the use of both structural and non-structural measures addressing long-term systemic risk. In partnership with government entities, civil society, and the private sector, activities supported focus on the reduction of the vulnerability of people, households, and communities. This is accomplished by providing analysis of non-structural measures, such as creating or improving 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 activitiessupport communities, planning, and works authorities with the development of a pipeline of investments reducing urban risk. These investments support the resilience of critical infrastructure, and specifically target measures aimed at protecting priority river basins and improving flood management infrastructure.

(C) PILLAR 3 – DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT

Pillar 3 supports all stakeholders involved with short-term disaster events and preparedness for specific emergency scenarios. Also guided by Pillar 1 data, Pillar 3-collected scenarios of city risk will be used to establish good practices around identifying and preparing vulnerable groups, emergency response plans, and an operations center; design of Early Warning Systems (EWSs); requirements for equipment, tools, and infrastructure; and 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.

Students mapping in Manzese, March 2017
Credit: Chris Morgan – World Bank

THE GOAL IS T**O ENABLE A LEGACY FOR SKILLS AND TOOLS DEVELOPED** THROUGH TURP...THAT **ENHANCE THE SUSTAINABILITY OF RISK MANAGEMENT PRACTICES AND DATASETS IN TANZANIA.**

(D) RESILIENCE ACADEMY

Thematic content of the Resilience Academy is embedded as a knowledge-transfer function within the activities of Pillars 1 through 3.

The concept of the Resilience Academy is as an evolving virtual program anchored in Tanzanianuniversities and training institutes and delivering digital curricula, practical experience, training placements and courses, and equipment to support surveying, maintenance, risk monitoring, and analysis activities.

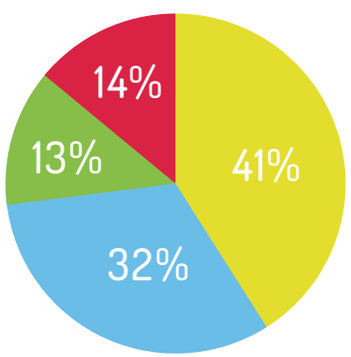
Key activities are the transfer of datasets and risk analysis tools to university programs, as well as leveraging the yearly placement in industry program to provide university students with real-world experience in collecting, analyzing, and applying risk data.

The goals are to enable a legacy for skills and tools developed through TURP and build partnerships between academia and practitioners that enhance the sustainability of risk management practices and datasets in Tanzania.

Government projects for which one or more agencies have implementation responsibility:

TURP will provide financial support for government implementation of activities designed to (i) mainstream and scale up climate risk management practices, including community-driven works, projects, and small grants; and (ii) introduction of green urban investments for flood riskreduction, basin management, drainage enhancements, and EWSs.

A key focus will be to support the government's Flood Management Task Force through a Msimbazi River Flood Risk Reduction project and development of a Msimbazi Basin Flood Management Framework.



DISTRIBUTION OF TURP PROJECT PILLAR FUNDS IN FISCAL YEAR 2018

- PILLAR 1
- PILLAR 2
- PILLAR 3
- RESILIENCE ACADEMY

Credit: Chris Morgan, World Bank

04 ACTIVITY SUMMARY


STAHAMALA
KUTAMBUA HALI HA
KUPUNGUZA HALI Y
KUJIANDAA NA DHA
SHULE YA STAHAMA
STAHAMALA YA MIJ
STAHAMALA
KUTAMBUA H

BANK-EXECUTED GRANTS

PILLAR 1 RISK IDENTIFICATION

Objective

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

Overview of Progress

The first Pillar remained a priority over Fiscal Year (FY) 18 with activities working to collect data and serving as a foundation for other TURP initiatives. Outputs to date have been presented to the Steering and Technical Advisory Committees, and it is expected that new commitments under Pillar 1 will either start to focus on secondary cities in Tanzania or begin to wind down.

Ramani Huria workshop participants

ACTIVITY	STATUS	PROGRESS
Historical Events Inventory	INITIAL STAGES	International consultants have been selected to provide review and design of inventory needs.
Risk Management Index + Updates	INITIAL STAGES	An international team has been selected to develop a framework and recurring assessment of institutional activities for collective risk management. The first set of assessments is expected in late 2018 and will include retroactive scores for 2016 and 2017
Elevation Model and Exposure Mapping	ONGOING	Various digital elevation models have been acquired and used for different flood models. These include a citywide digital terrain model for Dar es Salaam based on 2016 imagery, as well as smaller, very high-resolution drone-based maps along 26km of high-risk rivers. Annual mapping of high-risk rivers Is expected to continue, as is work to complement the 2016 aerial mapping with in-situ surveys, control points, and river profiles. In addition, these datasets shall be made available on government and university map portals under appropriate documentation and licensing.
Socio-economic exposure mapping - Ramani Huria	ONGOING	20 flood-prone wards mapped at high resolution for buildings, drains, businesses, community assets, and concerns.
City Satellite Data Mapping Pilot– Planet Labs	FINALIZED	Cloud-free imagery collected, building detection established, changes in building footprints identified, building height and floor space index calculation demonstrated.
Hydrological Study - TAHMO	ONGOING	8 weather stations installed, 4 trainings on weather stations conducted, and an EWS shell established for model development and testing set-up.
Spatial Data Management & Hosting	ONGOING	Geonode instances have been set up at COSTECH and SUZA as testing sites for use with risk Information and map sharing. A risk data model has been developed to align urban data collection system with international standards for exposure, hazard, vulnerability, and risk data.
Dar es Salaam Probabilistic Flood Risk Evaluation	PENDING	Concept note developed and consulted. This activity awaits the availability of key input datasets as well as user feedback on visualization tools before tendering.
Sediment Erosion Monitoring	ONGOING	Study initiated for Dar es Salaam rivers, observations, and data now being analyzed.

ELEVATION MODEL

The availability of Digital Elevation Models (DEMs) is critical for flood-hazard mapping, providing terrain topology for developing accurate flood models, identifying flood plains, and indicating which infrastructure is at risk. DEMs can be obtained through satellite or aerial imagery as overlapping images from above, allowing for the formation of a 3D model of the Earth's surface, or from radar, LiDAR, or ground-based surveys. Drones can use similar photogrammetry techniques to provide much more detailed DEMs, which also support more accurate flood models at a cheaper acquisition cost than aerial surveys or LiDAR.

In FY 18, approval to use a 4300km2 Digital Elevation Model for all of Dar es Salaam, based on 2016 Ministry of Lands Aerial Surveys, was acquired to support implementation of program-funded projects. In addition, highly dynamic features, such as river courses, river deltas, and rapidly changing urban areas, have been updated with local elevation models using drone imagery. This is the same technique as employed for aerial manned flights; it presents significant advantages, however, in higher resolution, lower cost, lower complexity, and greater timeliness for deployment. It is expected that drone imagery will also support post-disaster damage assessments in the future, and will provide high-cadence baseline information for the benefit of both program and non-program projects.

Collaboration with the Urban Thematic Exploration Platform (UTEP) of the European Space Agency (ESA) supported this initiative and has also opened opportunities for partnerships and research on climate impacts.

COMMUNITY MAPPING

TURP's community engagement and mapping project, known locally as Ramani Huria or 'Open Map', is facilitated by the Humanitarian Open Street Map Team.

Over the course of FY 18, this project equipped

MAP LABELS IN UNPLANNED COMMUNITIES

An important element to emerge from the community groups was the need to update or assign place-names to local features – these is particularly problematic when communicating with external partners, government or in case of a larger emergency.

As such the mapping facilitators worked with residents to label places in high risk areas such as:

960+ Tanzanian citizens with basic mapping skills using locally accessible tools. Historical flood extent mapping undertaken by these citizens resulted in the acquisition of approximately 35,000 individual household responses that have guided the development of community assets, drainage, and flood inundation hazard maps.

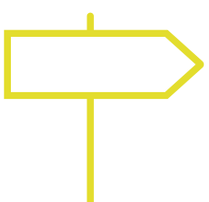
The quality of drainage mapping was improved by the introduction of the Deltares topological quality assurance model that works to reveal missing data and missing connection information, such as identified outlets or open ends in the drainage network. Twenty previously unmapped wards were covered through this process, and an atlas of flood resilience, reaching sub-ward level, was produced from the results.

The Ramani Huria team also conducted a series of community meetings in Kigogo Mbuyuni and Kigogo Kati, sub-wards of Kigogo ward, to engage with different actors[2] in the sub-ward about the assets and possible threats perceived by the community.

These meetings also served to socialize existing Ramani Huria maps and develop basic spatial awareness at local levels with respect to flood hazards and typical community flood response. At the end of the exercise, all participants were able to locate theirhouses andupdate street road names on the map.This was followed by community work conducted in groups to identify important local assets by tracing on transparencies and creating an associated list of issues.

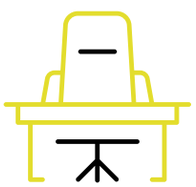
The main features mapped were i) critical facilities or assets such as schools, places of worship, playgrounds, and health centers; ii) known services and places at risk, such as frequently flooded public buildings and areas; and iii) evacuation centers.

2 Mtaa Executive Officer (MEO), Chairman of sub-ward, all councillors of Wajumbe, 10 cells Shina Wajumbe, non-governmental organizations, and community-based organizations such as Tegemeo



ROAD NAMES

PLACES OF WORSHIP



OFFICES/ PUBLIC OFFICES

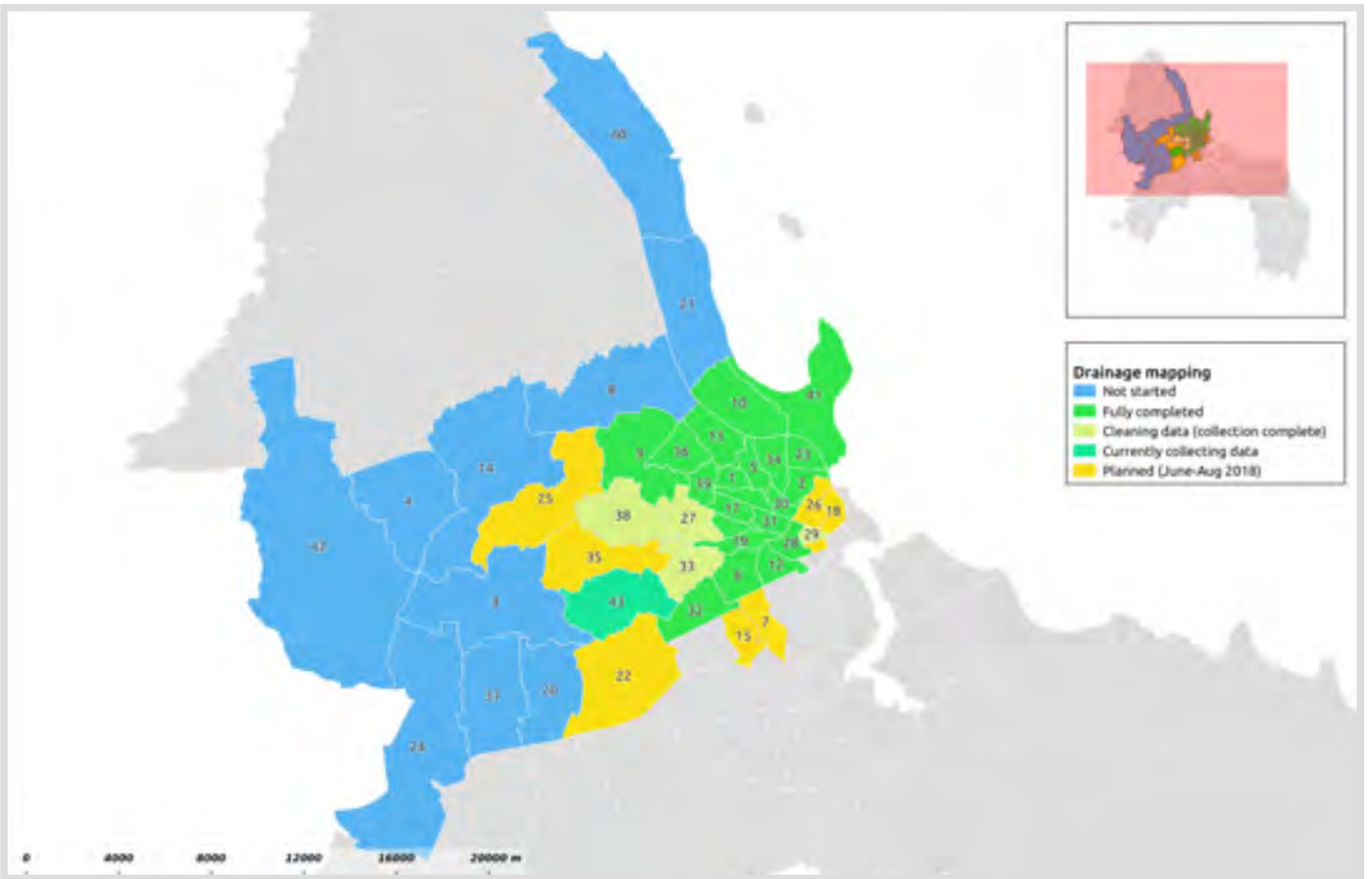
LODGES/ GUESTHOUSES

PLAYGROUNDS

LEISURE CENTERS AND BARS

PETROL STATIONS

DAR ES SALAAM MAPPING PROGRESS



THE **RAMANI HURIA PROJECT** ALSO ENTERED INTO **A PARTNERSHIP WITH NIPE FAGIO THROUGH TURP** FUNDING TO SUPPORT **WORLD CLEANUP DAY.**

A four-day workshop facilitated by the Ramani Huria team further brought together over 40 stakeholders to engage in discussion on the progress and potential of community-mapping methods. Participants were introduced to visualization tools and methods based on open source and free data, anddesigned to assist with collecting spatial data, sharing and visualizing, and analyzing at local scales.

"The workshop made it very tangible that we can now identify which health facilities are under threat of flooding. The Ministry for Health also needs to be able to track where cholera outbreaks originate from. The Shina boundaries mapped by the Ramani Huria team provide an unprecedented detail to determine where a person comes from. As soon as health facilities ask patients for their Shina this will narrow down our search for contamination sources of Cholera and other waterborne diseases."

- Ali Nyanga, *Ministry for Health Representative*

The Ramani Huria project also entered into a partnership with Nipe Fagio through TURP funding to support World Cleanup Day.

Ramani Huria will thus support the mapping of solid waste dump sites and drainage impacts which is expected to assist the Nipe Fagio team in designating trash collection locations across the city of Dar es Salaam to enable analysis for effective waste management.

Ramani Huria workshop participants left the program with knowledge and practical skills

HIGHLIGHTS

625 **COMMUNITY MEMBERS (FEMALE 226, MALE 399)**

313 **SUMMER 2017 STUDENTS (FEMALE 127, MALE 186)**

960
TOTAL TRAINEES

22
INSTITUTIONS

Expected in 2018

ENGAGE

450
STUDENTS DURING THE 2018 SUMMER PLACEMENT IN INDUSTRY PROGRAM

1,000+
COMMUNITY MEMBERS

MAP

44
WARDS

over 380 SQ.KM
AREA COVERED

2.3+ million
PEOPLE AFFECTED

SPOTLIGHT STORY

Next Generation of Youth in Tanzania to Be Equipped With Critical Skills in Urban Resilience

Related Link: http://www.worldbank.org/en/news/feature/2018/02/14/next-generation-of-youth-in-tanzania-to-be-equipped-with-critical-skills-in-urban-resilience

Saada Ally Salum and other students drain mapping in Manzese
Credit: Chris Morgan – World Bank

"OUR HOUSE WAS FLOODED UP TO THE ROOF AND WE DID NOT HAVE SHELTER FOR THREE DAYS."

Saada Ally Salum, of the deadly floodsthat affected the Jangwani area of Dar es Salaam in 2011.

"Over these days, it was difficult for me to go to school and my exercise books were taken by the water."

Saada Ally Salum is one of the nearly 5 million inhabitants of Dar es Salaam, many of whom face the likelihood of flooding during Tanzania's two rainy seasons (in March/April and November/December). As her story shows, the consequences of flooding are disastrous for them, putting their homes, jobs, and lives at risk of loss or destruction.

Situated partially upon a flood plain, and ever-expanding under the combined pressure of climate change and rapid urbanization, the risk of flooding in Dar es Salaam is only increasing.

This is what motivated Salum to participate in the second phase of Dar es Salaam's Ramani Huria (Swahili for "open map") project—a city-wide, community-driven mapping initiative to t survey the existing drainage systems to better advise the city on flood mitigation.

The mapping itself is straightforward.

"We are starting from the starting point and identifying where the water is flowing," Salum explains. "We

identify point features, like a starting point of the drain, or a place where water enters to the ocean or lake. After that, we define whether it is a drain or a ditch or a culvert."

But the students go further than this to collect critical data directly from community members in an effort to precisely identify the extent of flooding within each city ward.

"To collect this information, we use a form found on smartphones (Open Data Kit)," saysArdhi student, Asha Mohammed Mustafa, who displays the form. "This form gives you all the information, all the questions that you need to fill in."

"The main issue is to know how many houses are being affected by flooding and how the depth [of floodwater] has increased overtime," she adds. "The goal is to enable a better understanding of the areas most affected."

While the students surveyed one particularly flood-prone ward of the city, community leader Roya Marian Makolo explains how some members of his community cope.

"During the rainy seasons, it can flood up to the level of your waist," he says. "One family living nearby usually moves to my place during extreme flooding, their beds, kitchen pots all swamped. The children are so vulnerable," he adds. "So we have to take them in for at least three or four hours, and when the water level goes down, they go back to their houses."

Roya Marian Makolo, ***community leader talking to students***
Credit: Chris Morgan – World Bank

Elizabeth Mrema, Assistant Director for Surveys and Mapping at Tanzania's Ministry of Lands, Housing and Human Settlement Development, emphasizes the critical role mapping plays.

"Maps are part of history, maps are planning," she insists. "Without maps, you cannot know where a problem is, how big a problem is, or, when the problem comes, what will be affected."

Leading into the next rainy season, under the guidance of consultants from the Humanitarian OpenStreetMap Team and 10 other Tanzanian students from the project's pilot who have now become trainers, Salum, Mustafa, and their fellow Ardhi students are mapping an area covering a total of 44 wards, home to the majority of Dar es Salaam's population.

Beyond drainage networks, the students are mapping health care services, toilets, water sources, and various other elements of urban infrastructure to provide more information that can guide the Tanzanian government—from the local to national levels—in their efforts to improve flood resilience and service delivery across the city.

Ramani Huria data will further be used to inform other World Bank initiatives relating to urban development and disaster risk management, and the project will not end with this particular level of intervention, but includes plans for a bachelor's degree curriculum on sustainable planning for resilience to be developed jointly between the World Bank and Ardhi University. Bella Bird, Country Director for Tanzania, Burundi, Malawi, and Somalia, notes: "This is a commitment the World Bank is making to improve Tanzania's skill base, as the most critical area of investment for an industrializing economy."

By making this commitment, Ramani Huria will not simply prepare communities for disaster risk, but will transfer skills, knowledge, and tools to more students like Salum and Mustafa, who,as a result, will be better equipped to support sustainable urbanization, moving forward.

As Mrs.Mrema puts it, "This all begins with a good map."

Community members participating in the installation of weather stations
Credit: Chris Morgan — World Bank

HYDRO-METEOROLOGICAL STUDY

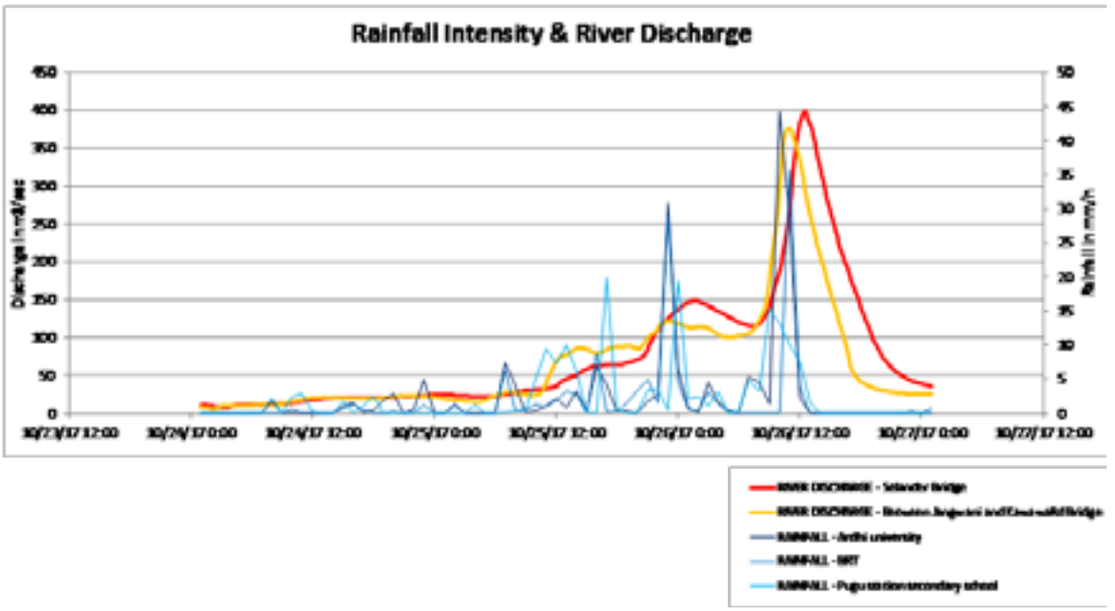
There has been a historical dearth of data on rainfall in Dar es Salaam due to a sparse monitoring network, and this has been detrimental to the ability of the GoT to take action on flooding. To address this, TURP has worked with the Ministry of Water and Basin Authority, Delft University, and the Trans-African Hydro-Meteorological Observatory (TAHMO) to install monitoring instruments with the capability of recording precisely both rainfall and associated weather data across the city, as well as hydrological readings such as stream flow and river depth in the Msimbazi Basin.

Over the course of the year, eight instruments were installed at five stations. These consisted of staff gauges, radar-stage sensors, and ultrasonic sensors for water level and discharge measurements.

With data collected by the TAHMO weather stations surrounding the Msimbazi River Basin, flood modeling was conducted. The figure below shows the rainfall intensity at various TAHMO stations, together with river discharge levels over the course of three days, October 24 to 27, in 2017. During this period, the Msimbazi experienced a significant flood event and it was used as the reference for assessing flood control measures and their impacts.

Results of the hydrological study enabled by these instruments have helped to calibrate a Msimbazi flood model, which identifies current and potential extent of flooding across the river basin — data that has been adopted into recommended interventions for the area.

Two more instruments are to be installed during the next fiscal year, and consultants will create an open access platform for data download and visualization from the hydromet stations. To date, these data have been key to calibrate the Msimbazi flood model. With the introduction of a dashboard, the network becomes useful for live monitoring and situation awareness and is expected to also demonstrate specific flood alerting and early warning within the city.



CITY EROSION AND SEDIMENTATION STUDY

An important part of the flood risk story that has emerged is the critical impact of soil erosion and river sedimentation on flood dynamics. As such, studies were commissioned during FY18 to investigate the role of morphological (sediment deposition and erosion) processes in the rivers and streams of Dar es Salaam. These studies were carried out by Deltares in the Msimbazi River Delta and JBA Consultants at a city-wide scale to scan the main rivers of the city.

The purpose is to better understand the influence that geomorphology has on flooding in the city, and, more specifically, to provide guidance on sustainable flood risk mitigation measures in Msimbazi River Basin and wider areas within the city of Dar es Salaam.

The main objectives were to:

- Carry out site visits across all drainage basins within the city to begin developing an understanding of the morphological processes at work, looking specifically at the dynamics of erosional processes, including causes and sources of material, and locations, formations and impact of sediment deposition.

- Consult with local knowledge holders to obtain first-hand information and insight relating to the ongoing changes and processes relating to the rainfall run-off generation and geomorphology, including urban development, de-forestation and loss of vegetation cover, and the influence of solid waste.

- Source, collect and review available data and information supporting more detailed analysis and quantification of the erosion and sedimentation processes.

- Begin to consider the feasibility and practicality of mitigation strategies, both in terms of erosion control and flood risk reduction.

Work is now underway to review the observations and data collected to understand the factors leading to erosion and sedimentation and identify appropriate mitigation strategies over various timescales.

“The river and its floodplain should be considered as one single unit, rather than in separation. By modifying the floodplain through urban development, rivers will naturally respond.”

- Matthew Hemsworth, ***Geomorphologist JBA Consultants***

***Morphological Experts Inspect Lower Msimbazi River and Sediments*, May 2018**
Credit: Chris Morgan – World Bank

Th flood loss manual in Msimbazi catchment reported an estimate average annual loss of

$47 MILLION

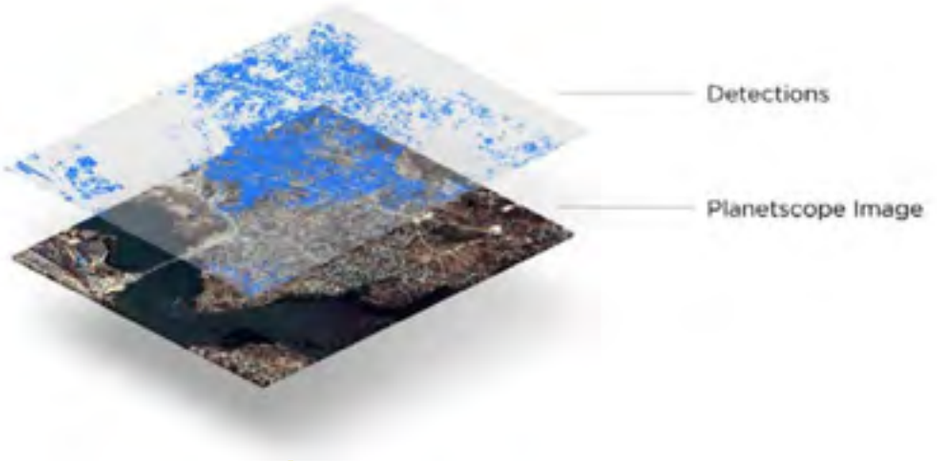
YEAR DUE TO FLOODING

FLOOD RISK EVALUATIONS AND VISUALIZATION TOOLS

In FY 17, TURP presented the work carried out by Anchor Environmental during 2014 – 2016, which included a flood loss model in the Msimbazi catchment. The report estimated average annual losses of US$47 million per year due to flooding.

In 2018, work has focused on consulting and determining the requirements for a fully probabilistic flood risk model that would cover the Dar es Salaam metropolitan area, expanding beyond the Msimbazi. In addition, the model is ambitious in its requirement to use improved datasets that are both affordable and locally acquirable. This will involve re-evaluating the Msimbazi catchment with up-to-date data as well.

Work to issue a competitive tender for this activity has been delayed, as the program uncovered challenges in establishing underlying input data sets. Several investigations and local surveys were carried out to validate the digital elevation model, which is considered a critical input, as well as ongoing work to collect river stream flow data and rainfall histories across eight sites in Dar es Salaam. In addition, the significance of geomorphological process, such as erosion and sedimentation in rivers, in the metropolitan area, has been raised as a priority.



Dar es Salaam is demonstrating current feasibility in the use of satellite imagery for monitoring the Floor Space Index in African cities.

New studies and data collection has also focused on establishing sediment loads of rivers and determining the requirements for a sediment monitoring system.

As a result of increased focus on data collection and user requirements consultation, a tender will be reissued later in 2018. Results from a probabilistic flood model are expected in 2019.

SATELLITE MONITORING

Modern Earth observation and data analytic technologies have shown great advances and have the potential to help address the challenges that accompany rapid urbanization. The satellite monitoring pilot project, a collaboration between the World Bank and Planet Labs, aimed to leverage advanced Earth observation and analytics technologies to automatically detect and measure urban change in Dar es Salaam.

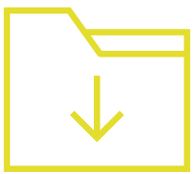
Cloud cover historically has been a challenge when attempting to use satellite imagery for tropical locations and especially in the rainy seasons. Nonetheless, Planet Labs first demonstrated the feasibility of providing cloud-free quarterly image mosaics with a 3.7m resolution over the city.

To pilot the methodology in Tanzania, building outlines from the Ramani Huria project were used to teach a machine learning model to recognize buildings in Dar es Salaam. This model was capable of detecting buildings with 77% accuracy in its first version. Using 0.8m stereoimagery, a 3D model of the downtown area of the city was also demonstrated, although with lower accuracies for identified number of floors.

This project serves to demonstrate the current feasibility in the use of satellite imagery for monitoring the Floor Space Index in African cities. It is expected that within the next two to three years, many more satellite sources will become available and improvement in machine learning will continue; thus, the detection of new buildings and the rates of urbanization will be automatically detected across Tanzanian cities more affordably and with increasing accuracy.

Results will be distributed among key stakeholders to assess viability of a possible follow-up project.

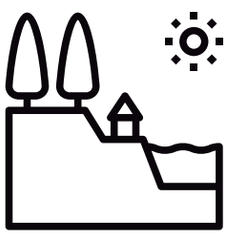
LESSONS + CHALLENGES



EXPOSURE DATA

AERIAL SURVEYS OF RIVERS

SATELLITE IMAGERY



EROSION AND SEDIMENTATION

WEATHER STATIONS

INSTITUTIONAL ASSESSMENTS AND RISK MANAGEMENT INDEX

The objective of this activity is to develop and apply a tool for the comprehensive assessment of institutional capacities and performance to identify, reduce, manage, and finance disaster risk in the Dar es Salaam region. Groundwork was done in FY17/18 with preliminary assessments of capacity of institutions and systems. A methodology is now being developed that leverages a limited number of aggregate disaster risk management indicators that can be easily interpreted by policymakers. This methodology will allow the generation of a performance road mapfollowing accepted principles of disaster risk management, upon which Dar es Salaam Region's stakeholders will be able to understand their status and progress against locally agreed objectives.

A team led by Earthquake Megacities Initiative (EMI) has been selected and is in the process of collecting baseline data to develop both an Urban Resilience Index as well as a Performance Road Map Scorecard. The first set of assessments is expected in late 2018 or early 2019.

CHALLENGES AND LESSONS LEARNED

Risk information initiatives have had a critical role to play in the collection of data for all other activities of the TURP portfolio. The process of determining data collection requirements and reviewing existing datasets is a technical exercise subject to significant uncertainties and reliance on expert judgment. Delays in verifying information, gaps in documentation and metadata, lack of clarity on licensing, and terms of use restrictions all have an impact on costs and timelines.

Deadlines over FY 18 were ambitious, with some activities requiring more field work and additional surveys beyond what was originally expected.
A few notable challenges were:

- ***Exposure data*** — The data model and methodologies for verifying household data surveys have been iterated and tested, leading to improvements in accuracy and replicability of results. This has also increased time and costs involved, however. In addition, community mappers reported high financial expectations of community leaders and stakeholders for their cooperation in the project, and that rapidly changing building structures challengedtheir progress.

- ***Aerial surveys of rivers*** — UAV mappers encountered delays and uncertainty inprocessing flight permits and facilitating communication in sensitive areas, given that the general regulatory regime is nascent and changing quickly.

- ***Satellite imagery*** — The provider struggled to secure the necessary quality of data for the first version of the Floor Space Index for Dar es Salaam.

- ***Erosion and sedimentation*** — Rates were found upon preliminary inspection to be significantly higher than expected and a major contributor to urban flooding, leading to a need to invest in geomorphology experts and studies. This led to new surveys and inspections, and a need for soil maps.

- ***Weather stations*** — Consultants installing weather stations notedobstructive sedimentation in the river and the difficulty in siting stations. In addition, permission has not yet been granted to site a sample station nearby to the existing airport weather station for the purpose of data verification and comparison. This should not affect flood model calibration, but may delay the qualification process for an early warning demonstration.

The majority of Pillar 1 activities have been fast-tracked as far as possible, and, with the exception of the probabilistic flood risk evaluation, most activities are in transition from the initial phase of data collection and model development towards a monitoring, updating, and training phase. It is also an overarching consideration, however, that many of these data collection and surveying techniques are novel and should undergo comprehensive stages of approval, capacity building, and knowledge transfer with various counterpart technical agencies. This is not only critical for ensuring that accurate and actionable datasets are obtained, but also for the long-term sustainability of data updates and analysis.

FINANCIALS

Over FY 18, Pillar 1 projects have disbursed US$1,204,482 with a total of US$1,650,000 since program start.

Financial summaries are detailed in *Section 8*.

Ramani Huria workshop participants

BANK-EXECUTED GRANTS

PILLAR 2 RISK REDUCTION MEASURES AND PLANNING

Objective

To strengthen cities' capacity to plan for and reduce climate risk through the use of both structural and non-structural measures addressing long-term systemic risk.

Overview of Progress

Pillar 2 saw significant progress over FY 18, informed by the foundational work of Pillar 1. The key focus of this work was on the Lower Msimbazi Basin, to integrate the best available risk information together with a participatory approach to risk reduction in targeted communities and infrastructure in the city. This represents a deep dive into tackling a flood risk hotspot of Dar es Salaam, and the planning methods deployed have reflected the multidisciplinary and multidimensional nature of the challenge.

In addition to concentrating on comprehensive risk reduction in the Msimbazi, a number of city-wide decision tools were launched, including plans and engagements to support community-level risk management, as well actionson solid waste management and drain maintenance.

***Morphological Experts Inspect Lower Msimbazi River and Sediments*, May 2018**

ACTIVITY	STATUS	PROGRESS
Socioeconomic Studies	FINALIZED	Study concluded with 3 key recommendations
Msimbazi Flood Infrastructure Diagnostic	FINALIZED	Data collected and flood models created 6 potential mitigation measures recommended
Msimbazi Design Charrette and Special Planning Area	ONGOING	Monthly workshops conducted engaging critical stakeholders, 10 strategies conceptualized, and consensus found for a design vision
Msimbazi River Basin Management Framework	ONGOING	This output builds on the Msimbazi Design Charrette work, and is expected to be delivered in August 2018
Msimbazi Displacement and Resettlement Strategy	COMMENCED	Recommendations prepared based on outcomes from the Msimbazi Charrette
Community Level Risk Reduction	COMMENCED	Formative studies finalized, community risk maps developed, and contract signed.
Drainage and Clean-ups Maintenance Information System	ONGOING	Prototyping and field validation tests conducted, community workshops and local government user testing complete. System requirements generated
Participatory Climate Risk Plans, Training, Behaviour Change	PROCURED	N/A
World CleanUp Day	COMMENCED	Contract signed and initial activities begun

DATA WAS COLLECTED FROM
1058 households

89%
OF HOUSEHOLDS
indicated that the **October 2017** flood was the **most severe** that the household ever had experienced.

88%
OF THE FLOOD EVENTS
that households indicate being the **most severe** happened **after 2014.**

24% **OF HOUSEHOLDS**
affected in **locations** that are **not at risk**

SOCIO-ECONOMIC STUDIES

In 2017, two socio-economic studies were launched with the aim to explore and quantify the relationship between poverty and flood risk in Dar es Salaam, and to understand the village (Mtaa level) community resilience actions and networks.

Poverty and Disasters Research

This focused particularly on the role of poverty in exposure (those affected by floods), vulnerability (what is lost in floods) and socioeconomic resilience (how do the affected cope and recover). The goal is to understand how policy can strengthen resilience and to capture synergies between risk management and poverty reduction actions.

These socio-economic studies have incorporated some of the work conducted for other TURP components. For example, the team used maps based on Ramani Huria community mapping activities to identify areas exposed to floods.

To be able to assess the relationship between poverty and disaster risk, the household surveys measure an accurate statistical estimation of household income. This is achieved through a rapid poverty assessment tool known as the Survey of Well-being via Instant and Frequent Tracking (SWIFT), which makes use of the latest machine learning techniques to produce economic estimates based on official country data. This method is weaved into a Disaster Risk Management (DRM) questionnaire on household income, risk exposure and socio-economic characteristics in one single data collection effort.

In 2017, data was collected from 1058 households in Dar es Salaam – selected based on Ramani Huria and other sources that have defined flood prone areas.

Close to 24% of households reported being

affected by a flood, including in locations that are not considered at risk. Some of this can be explained by the fact that some households do not experience floods, but still must cope with indirect impacts through infrastructure disruption (such as transport disruptions). A high proportion of households - 89% - indicated that the October 2017 flood was the most severe that the household ever had experienced. And 88% of the flood events that households indicate being the most severe happened after 2014.

Affected households are significantly more food insecure that non-affected households, demonstrating a correlation between poverty and exposure to floods. This difference in levels of food insecurity between affected and non-affected households holds in high risk and low risk areas. At this stage, it is difficult to say if exposure led to higher food insecurity or if relatively poorer households tend to settle in areas that frequently flood. There is evidence for both and follow up interviews are in process to shed light on this.
Whilst no important differences between quality of housing and access to services between affected and not affected households were found, affected households do display lower ability to save, making them less able to cope with flood impacts. This could be a result of dealing with recurrent floods – 35% of affected households practice saving compared to 48% of non-affected.

Access to early warning is common and affected households have higher access - 59% of affected households report having been warned of a flood in the past year in comparison to 46% among non-affected households. While receiving weather information from informal sources is common (warnings through neighbors and friends), a significantly larger share of affected households that received a warning obtained the information from the Tanzanian Meteorological Agency (TMA) than among non-affected households.

While a large share of households seems to be able to absorb shocks, some households have a difficult time recovering.

Households experiencing flooding

ABOUT 36% OF AFFECTED HOUSEHOLDS REPORT **NOT** HAVING **RECOVERED** SINCE BEING AFFECTED.

About 36% of affected households report not having recovered since being affected. These households seem to be less prepared than others. For example, they have lower access to bank account, lower saving capacity and lower access to informal lending through social networks or community saving groups.

In comparison to the rest of the households in the sample, these particular households have recently moved to the area, which is another explanation to why they may be less prepared to face shocks than other households.

Community resilience study

This second socio-economic vulnerability study had a goal of undertaking action research in flood-affected communities in order to help inform the subsequent design of community disaster response plans and risk reduction plans for Dar es Salaam.

Specifically, the research aimed to understand:
(i) the landscape of pre-existing decision-making and emergency response as it related to flooding; (ii) the dynamics of community participation; and (iii) the uses and barriers to use of the Ramani Huria maps.

The study involved 25 one-on-one interviews in six different Subwards, five stakeholder meetings, and five community focus groups. Interviews included Subward chairmen; Subward executive officers; Subward mjumbe (representatives); Ward executive officers; Ward health and community development officers; fire

COMMUNITY RESPONSES TO FLOOD

BELOW KNEE

focus on safe guarding possessions and facilitating flow of water

ABOVE KNEE

focus on temporary evacuation

department officers, and members of the Tanzanian Red Cross. Stakeholder meetings involved officials from the Tanzanian government, including the Disaster Management Department and the President's Office – Regional and Local Government, municipal bodies such as the Dar es Salaam Multi-Agency Emergency Response Team (DarMAERT), and the NGOs Twaweza and Humanitarian OpenStreetMap Team. Two focus groups were conducted with community '10-cell leaders' while another three focus groups were conducted with residents of four different flood-affected wards.

The study established a baseline for current community responses to floods, levels of participation, and uses of maps and demonstrated that perceptions of what constitutes flooding varies, as do responses to different types of flooding. When water is below the knee, actions tend to involve safeguarding possessions and facilitating the flow of water. When water is above the knee, temporary evacuation is the preferred response.

Despite flood response being largely uncoordinated, there are dense networks of mutual aid in many communities, which can help households deal with flood-related emergencies. For most community members, the Subward chairman is the key figure for issues relating to safety and security, though these chairmen often felt underequipped to deal with flooding specifically. Community participation in local government initiatives is high.

However, volunteer groups suffer from the continuing pressures of urban life

" The impact of flooding is felt by women especially as we have to look after our families. We are becoming separated because we have to move from our homes to find another place, and we are spoiling our health because the water is polluted. It also affects our children, they miss school, their exercise books are spoiled. But I can see that the government is listening because if they were not listening, we would not have been here."

- Habiba Mondoma, *Community Member*

and widespread expectations of remuneration. Access to and awareness of the Ramani Huria maps is low at the Mtaa level, and the lack of familiarity with complex maps is a barrier. Despite this, local government officials express interest.

Based on these findings, the study made three recommendations.

1. Engagement with the Subward level of government would be the most appropriate for moving forward with the design and dissemination of community disaster response plans and risk reduction plans.

2. The existence of mutual aid networks should be further investigated, as these provide a practical form of 'everyday' resilience for many.

3. The maps used in the planning process should be differentiated to meet the needs of different government levels and to maximize their accessibility.

Further field research will be undertaken, and after the first rainy season. This research will focus on pre-existing networks of mutual aid, including Village Community Banks (VICOBA) , informal rotating credit associations known as upatu, and ujirani mwema (good neighbour) community groups. A key aim will be to better understand how these pre-existing groups may positively impact community resilience to flood risks, combining analysis of SWIFT surveys with nested qualitative research.

MSIMBAZI FLOOD INFRASTRUCTURE DIAGNOSTIC

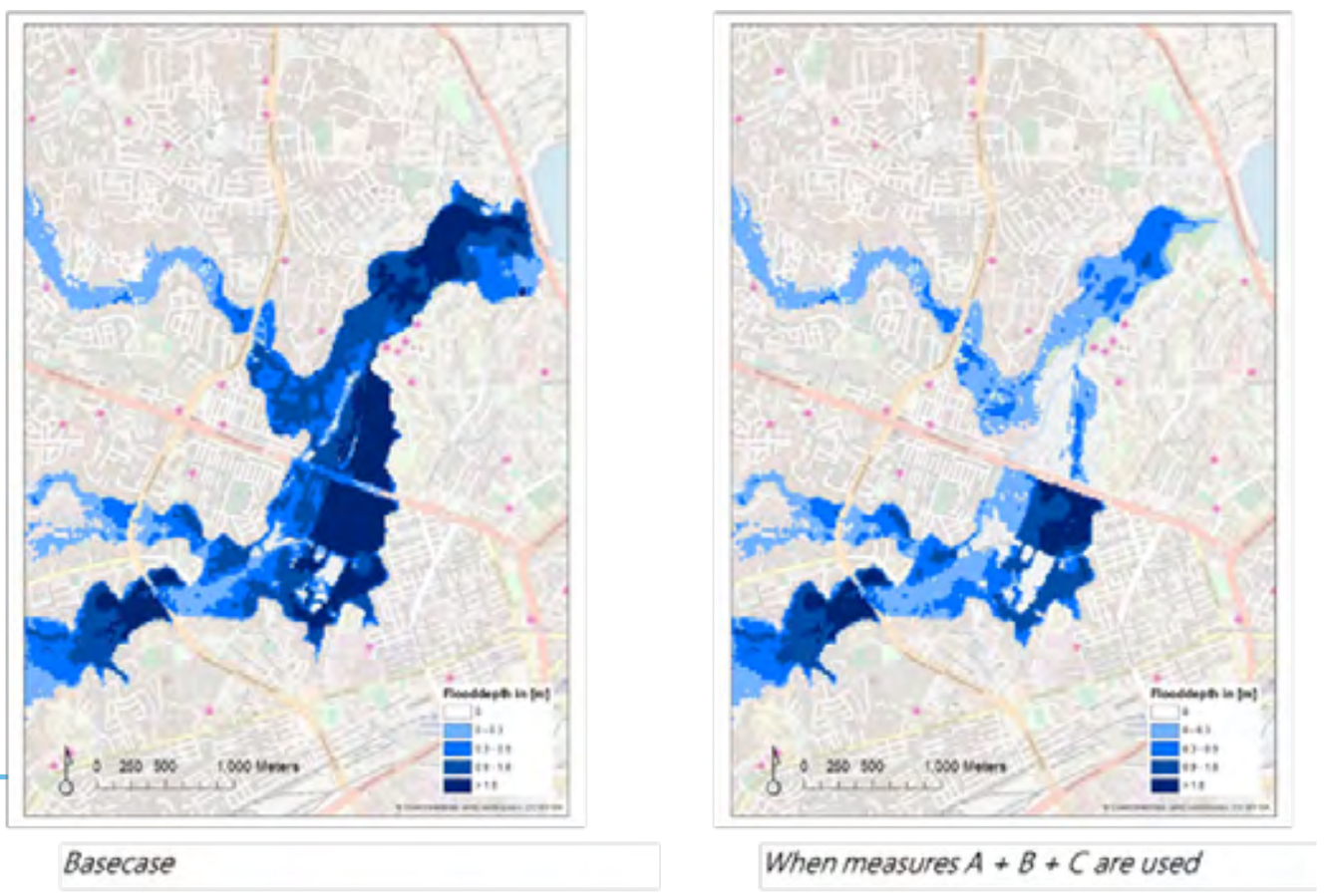


Figure 1 ***Comparison of Differences in Modelled Flood Extent in Lower Msimbazi Basin for a 1 in 10 year Flood event***

Pillar 1 provided for baseline hazard and exposure data used to develop a custom model for lower Msimbazi river. This modelling exercise ran a number of flood scenarios in the Msimbazi against a range of possible flood control measures in order to explore the options for how to mitigate the flooding and identify which areas are most at risk. The key conclusion from the modelling is that it is feasible for flood control interventions to achieve substantial reduction in flood hazards in lower Msimbazi. A combination of river training (deepening and widening) with adjustments to the Jangwani bridge and culverts should be short term priorities. Upstream measures for water retention and erosion management will be necessary also, however these will not provide the same degree of short term flood reduction as the lower basin measures.

Overall, it is possible to ensure that some areas of the lower Msimbazi can remain dry to during flood event, but very impractical to prevent flooding across the entire basin and therefore some degree of accepting the flood waters is necessary. This involves planning for floods and setting land aside for water retention when necessary.

Envisaged flood risk reduction measures provide potential for further spatial development and an opportunity to reimagine the basin as a city park.

Analysis was further used to identify six potential mitigation measures to address the critical state of flooding in this area:

A. River training between Jangwani and Selander Bridge
B. Widening and Heightening Jagwani Bridge
C. River widening from Jangwani Upstream
D. Widening Kawawa Bridge
E. Opening Culverts
F. Upstream Measures

A combination of A, B, C, and E is now being recommended to the Government of Tanzania for consideration.

Contrasting modelled flood extents (Figure 1) shows that adopting interventions A, B, and C alone can significantly reduce the impact of a 1 in 10 year flood by increasing the conveyance capacity of the river and reducing peak water levels and the sedimentation problems. The Morogoro bridge and road (and hence Bus Services) remains dry, as do large area of the basin and local communities. The flood risk to other assets such as Muhumbili Hospital is lowered. The flood depth hydrograph (Figure 2) also illustrates the dramatic reduction in flood duration. The green curve represents the depth and duration of flooding when A, B and C interventions are combined, and flooding is seen to reduce from a peak of approximately 1 meter to scarcely 10 cm.

Further, the duration of flooding is reduced from three days to a few hours. These curves are representative for the flood model results at the Bus Rapid Transit depot location immediate upstream of Janagwani bridge west.

However flooding is not entirely prevented across the valley and therefore medium and longer term measures will also be needed upstream – such as retention basins, reforestation, and other activities to reduce peak water. In addition, the lower Msimbazi will have to accommodate some level of flood waters and water holding – seen in the images, the greatest extent and deepest area of flooding is the dark blue region

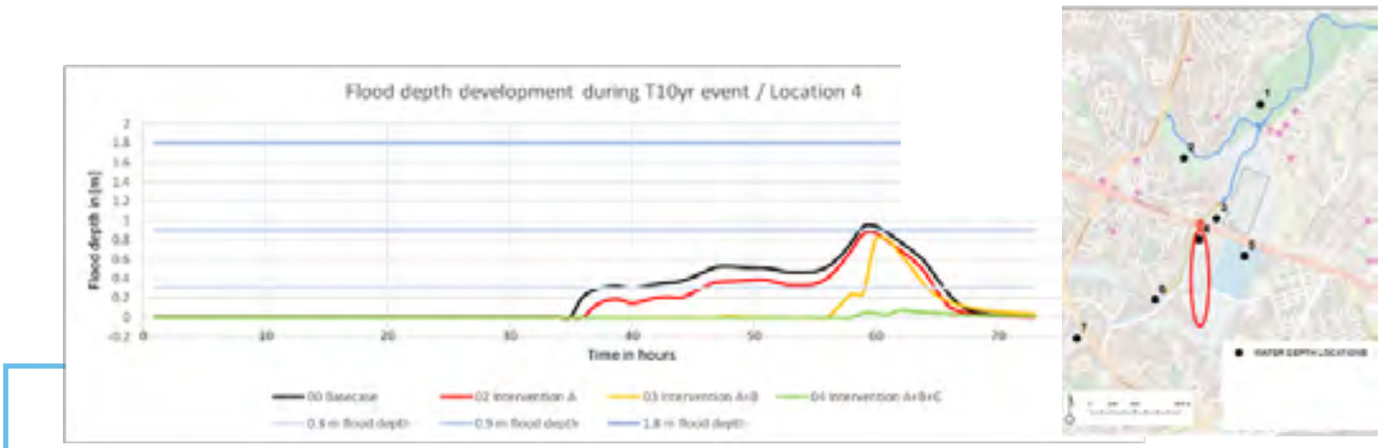


Figure 2 ***Reduction in Modeled Flood Depth and Duration at Jangwani Bridge resulting from top three priority interventions A, B, C***

corresponding to the wetland area immediately upstream of the eastern end of Jangwani bridge.

Further modelling work is underway to analyze the 1 in 100 year flood events as well as impacts of upstream interventions.

MSIMBAZI CHARRETTE AND SPECIAL PLANNING AREA

A process of participatory, rapid, decision-making to solve a complex urban problem using an interactive and visual approach – known as a design charrette – was adopted for the lower Msimbazi basin. Given the long-standing problems of flooding, urbanization, and environmental degradation in the 200km2 Msimbazi catchment, in addition to an institutional inertia to solve the problem in a comprehensive and coordinated way, the use of a charrette process was deemed as an appropriate approach.

This aims to provide the analytical basis for informed decision-making around mitigating floods in this area. Outputs from this process are in the form of: (a) a Strategic Development & Management Framework; (b) a detailed plan for the Lower Msimbazi; (c) a new boundary for Msimbazi Special Planning Area; and (d) a flood model calibrated specifically for assessing the benefit of interventions in their lower basin.

Thus far stakeholders have been engaged through monthly workshops with excellent attendance, upwards of 60-70 participants in each workshop, have managed to develop a set of ten overarching strategies for managing different elements of the basin, and have agreed on a design vision for the lower basin. A final framework and plan are expected by the end of August 2018 – high-level officials have already taken interest, with the Minister of Environment, Minister of PO-RALG, and Mayors from the City Council, Ilala and Kinondoni having been briefed on the process and expecting updates once the design is finalized.

As previously noted, through a hydrodynamic flood model, the charrette consultants have been able to test different types of drainage interventions as well as land use scenarios to determine the impact on flooding and gauge where households and infrastructure are most at risk and benefit most from different scenarios.

This has been instrumental for stakeholders to understand the flood impacts of various basin plans proposed and supports comparisons of results based on a consistent application of the same flood analytics across all scenarios.

Three different philosophies have also been presented through this process for the Special Area Planning of the Lower Msimbazi Basin.

These include:

1. **Asset Islands -** Raising assets and formalizing them into multi-storey buildings and allowing the rest of the area to flood
2. **Wetland Park -** Trying to restore the ecology of the lower Msimbazi and allowing as much flooding a possible to move t hrough – more resettlement, relocating wastewater treatment plant
3. **River Front -** Focus on regeneration along the boundaries – much greater degree of urbanization and densification

Final conclusions from the Msimbazi Charette will be provided at the end of August 2018 and presented to high level politicians prior to their public debut at the Understanding Risk Tanzania conference.

From concepts to three legitimate alternatives

An artistic depiction of what the city could look like with a wetland and city park

HIGHLIGHTS

8 MONTHS TO CREATE & AGREE ON OVERALL VISION

a set of strategies for managing the catchment, and a conceptual plan for flood control, development, environmental improvements and open space for the lower basin.

14 NATIONAL AGENCIES

02 MUNICIPALITIES AND THE CITY COUNCIL

17 SUBWARDS

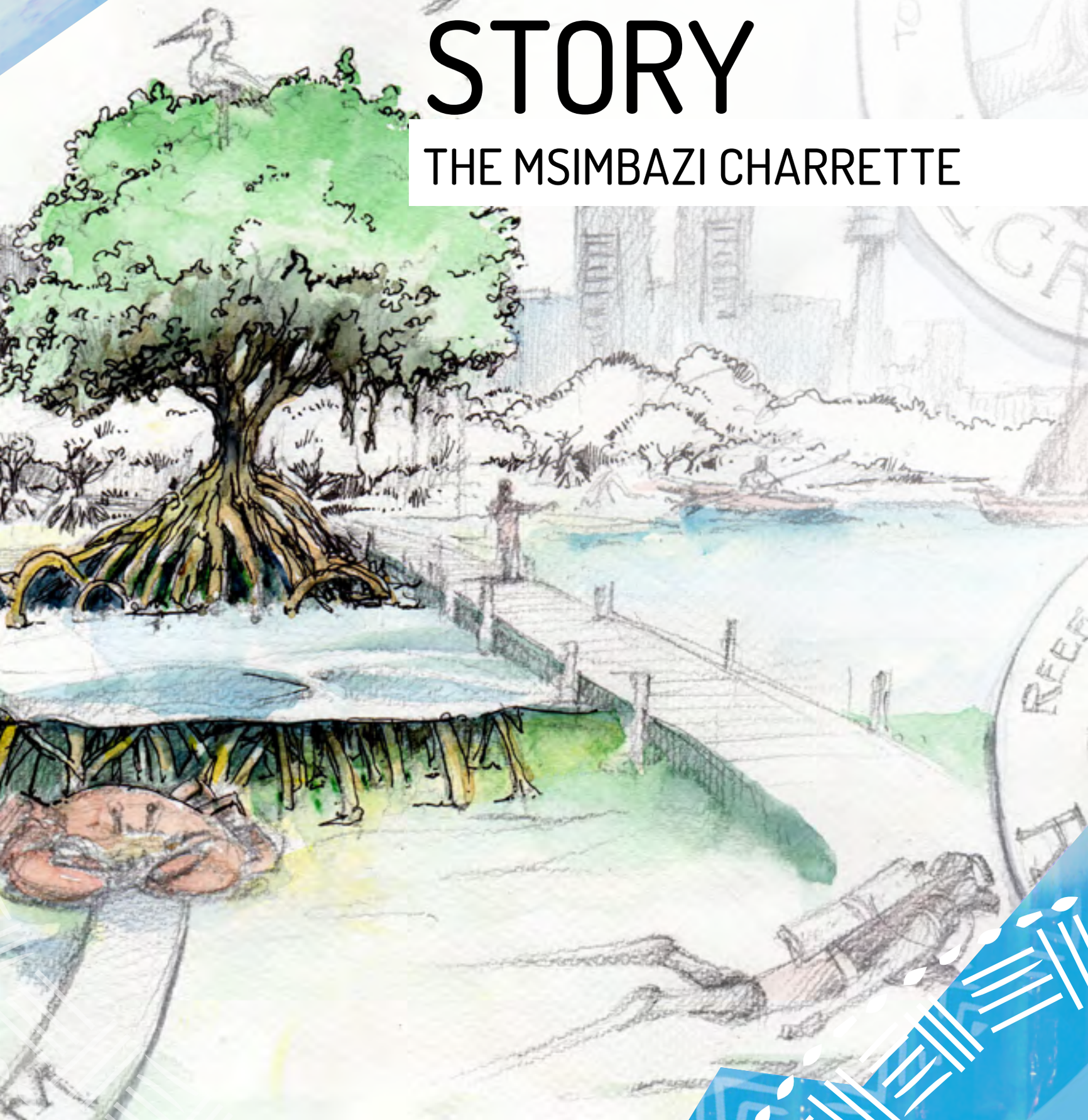
Workshop Results

All 17 subwards in the lower basin have been involved and consulted several times on the plans, with an emphasis on housing and resettlement options for those households in unsafe hazard areas.

As a result of the charrette, the Ministry of Lands, Housing and Human Settlements Development was supported to form a task force and start the process to update the boundary around the Msimbazi and georeference it as a Special Planning Area.

SPOTLIGHT STORY

THE MSIMBAZI CHARRETTE



CHARRETTE
FRENCH/ NOUN

1. An intensive planning session where citizens, designers and others collaborate on a vision for development
2. A period of intense work in order to meet a deadline

"The Msimbazi Charrette has taught us that, together, through dedicated partnerships involving community members, Government and development partners, important steps towards taking action can be achieved, and targeted investments can be effectively defined to build a resilient and more livable city,"

- **Bella Bird,** ***World Bank Country Director for Tanzania, Malawi, Burundi and Somalia.***

Earlier this year, a state of emergency was declared for Tanzania's capital city as heavy rains inundated city roads, destroying critical infrastructure, paralyzing the city and resulting in 15 reported deaths. Many of the deaths occurred in Jangwani, an unplanned neighborhood near the city center that straddles the Msimbazi river.

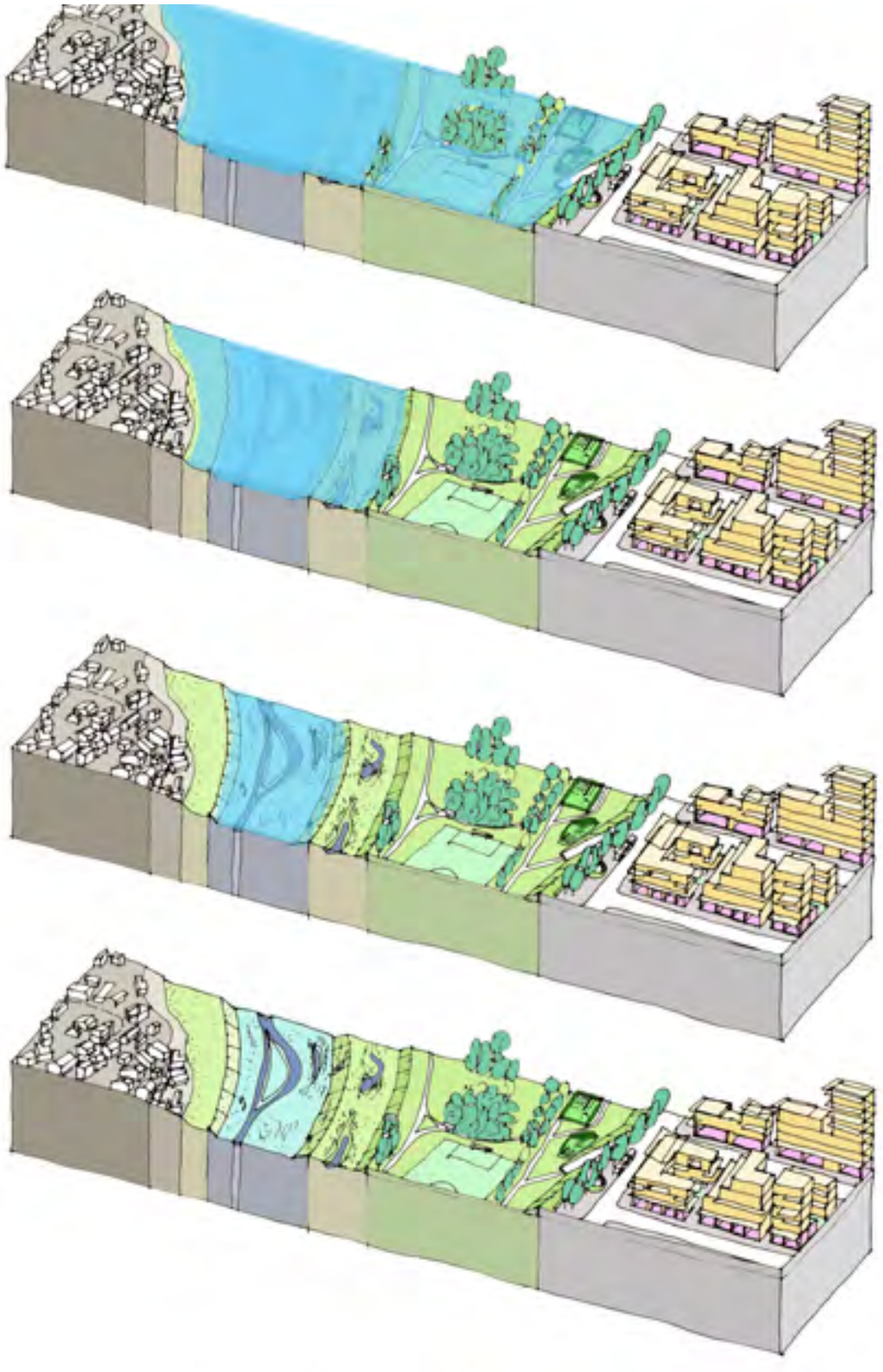
"The water is endangering our lives," said Mama Habiba, who lives in Jangwani. "There's a lot of contamination and many people get sick as result. The flooding also affects our children's studies as their books, clothes, and mattresses get spoiled. It is making it harder, especially for women, to look after their families."

Despite this vulnerable location, Habiba is one of more than three million people living in communities like Jangwani, most of them concentrated along the Msimbazi river basin.

Poverty, rapid population growth and a shortage of affordable housing have led to the development of unplanned communities, and they are predicted to increase. With inadequate services and infrastructure, both the communities and the city are at increased risk for flooding.

"IT IS MAKING IT HARDER, ESPECIALLY FOR WOMEN, TO LOOK AFTER THEIR FAMILIES."

"We have been experiencing increased human activity upstream in the Msimbazi," said Nyariri Nanai, an engineer within the President's Office Regional Administration and Local Government (PO-RALG).



Proposed sect
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"These activities contribute to erosion, causing sedimentation, leading to flooding downstream."

To address this challenge, PO-RALG, in partnership with the World Bank, have been championing the Msimbazi Charrette initiative, an urban design process that draws on the views and experiences of various stakeholders who foresee a more resilient basin.

"The Tanzania Urban Resilience Program has created this platform where all these stakeholders come and design together," said Mussa Natty, and engineer and former Municipal Director and Urban Development Specialist. "This also makes decision-making easier."

The Msimbazi Charrette applied a team of local and international experts, who worked with engineers, planners, community leaders, and high-level government officials in a dedicated workshop.

"We didn't want a top-down solution, so once the solution is there, it means it is agreed by all stakeholders, including the community who has really experienced the problems of flooding," Nanai said. This led to the adoption of an ACCA approach—Awareness, Comprehension, Commitment, and Action—which aims totakethevery complex challenge of flooding and come to mutually agreed, implementable solutions.

Now in its final stages, the initiative is expected to

A LACK OF AFFORDABLE HOUSING WITH ACCESS TO SERVICES AND ECONOMIC OPPORTUNITIES OF THE CITY CENTER.

Landuse Plain

produce a framework to guide a basin investment program, and a detailed plan for the lower basin, including a city park, housing and commercial development. The initiative is also building resilience, by producing a flood model that can be used to design sustainable flood control infrastructure.

With a framework and other elements in place, the initiative aims to help catalyze investment from government, private sector, and development partners to restore the highly-vulnerable flood plain into a city asset.

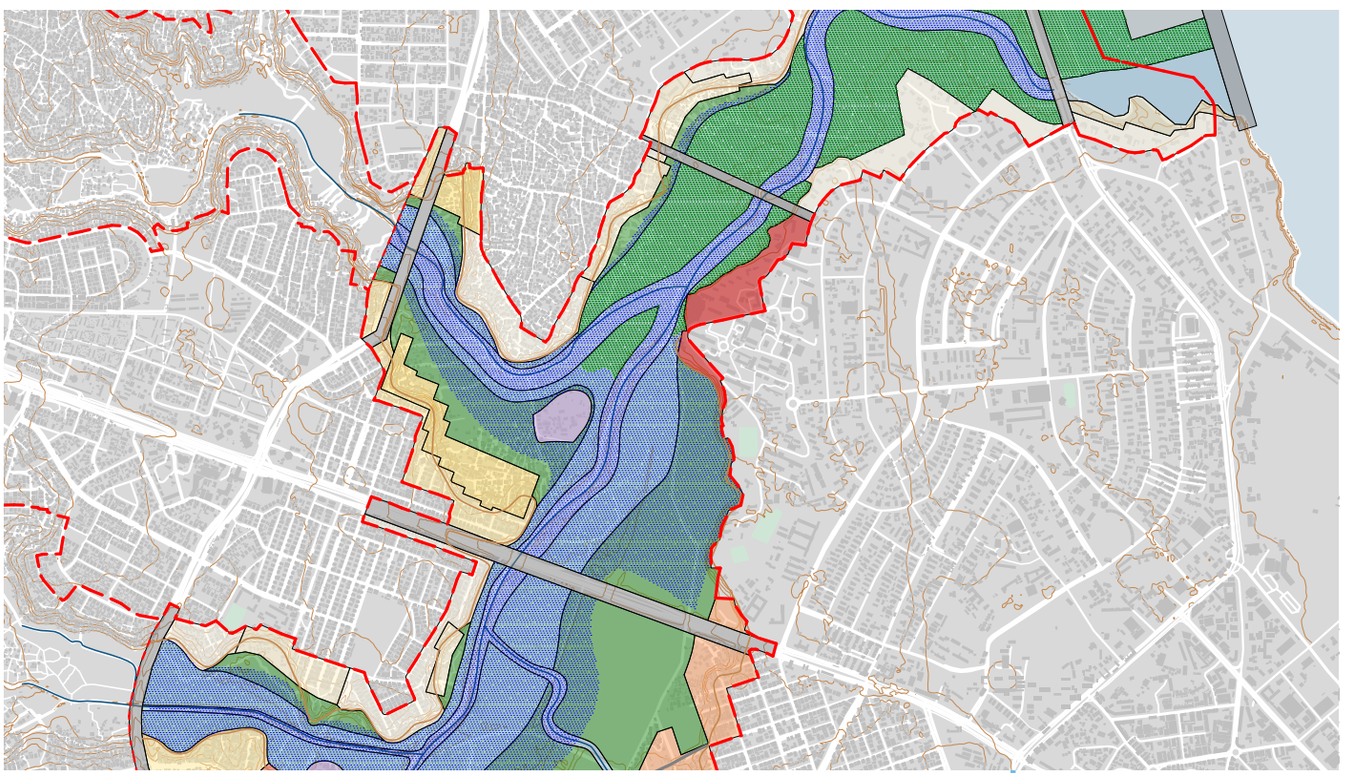
"The Msimbazi Charrette has taught us that, together, through dedicated partnerships involving community members, the government and development partners, important steps towards taking action can be achieved, and targeted investments can be effectively defined to build a resilient and more livable city," said Bella Bird, World Bank Country Director for Tanzania, Malawi, Burundi and Somalia.

Beth Arthy, Head of the UK Department for International Development (DFID) in Tanzania praised the consultative nature of the process.

"We need to continue to build on the momentum of the Charrette and the positive habits of cooperation and collaboration that have been developed so far," she said. "We need to make sure the voices we've heard remain front and center as we move from commitment to action."

Habiba and other citizens who participated in the consultations are just as optimistic.

"I can see the authorities are listening, because if they were not listening, we would not have reached this stage,"she said. "We are proud to be working together with government and stakeholders in this process."



Landuse Plain

IT IS EXPECTED THAT THE **CRRP WILL STRENGTHEN COMMUNITY RESILIENCE** BY HELPING THE COMMUNITY TO **IDENTIFY CRITICAL INFRASTRUCTURE AND ESTABLISH PRIORITIES FOR COMMUNITY INFRASTRUCTURE SPENDING THROUGH** EXISTING GOVERNMENT CHANNELS AND OTHER POTENTIAL SOURCES OF FUNDS.

COMMUNITY LEVEL RISK REDUCTION

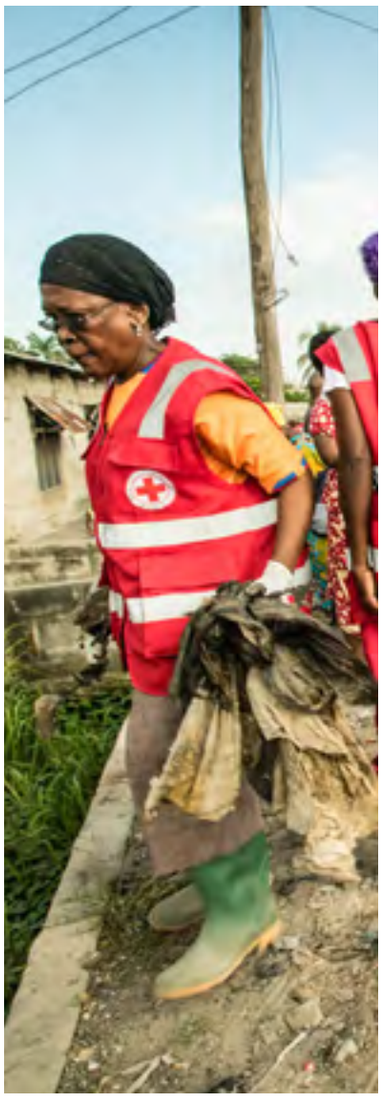
A Community Risk-Reduction project kicked-off in May 2018 that will involve the creation of a toolkit for the development Community Risk-Reduction Plans (CRRP) at the ward and sub-ward levels, as well as support for the development and implementation of these plans by local Disaster Management Committees in the most flood-affected sub-wards of Dar es Salaam. It is expected that the CRRP will strengthen community resilience by helping the community to identify critical infrastructure and establish priorities for community infrastructure spending through existing government channels and other potential sources of funds.

Activities completed to date have focused on project preparation and inception, and these are being led by a consortium consisting of Deltares, Oxford Policy Management (OPM), TRCS, Ardhi University, and FloodTags.

In parallel to this, the Ramani Huria teamh as piloted efforts to develop community risk maps. These community risk maps will serve as inputs to inform Disaster Management Committee discussions in developing the CRRPs.

NIPE FAGIO OUTCOMES

Early in FY19, training of trainer programs for the remaining 5 municipalities will be taking place. An intensive 3-5 day solid waste hotspot and drainage waste hotspot GIS mapping program for Dar es Salaam will also be supported by the World Bank Ramani Huria team, to help identify critical waste accumulation and areas to clean for World Cleanup Day.



Although the project is still in its inception phase, evidence from the socio-economic vulnerability study shows that there is clear need to identify problem infrastructure:

- Residents living in flood-prone areas highlight that though they take part, clean up does not stop flooding. “The problem is upstream,” one person explained. “ All the garbage from the areas upstream of us gets washed down to where we live and causes flooding.”

- Households take precautions ahead of rain to prevent water getting into their houses (see below). Yet, as one local resident explained, the risks from even a small amount of rain remain high: “people have died, children have died, because the water infrastructure has degraded so badly that when it floods, the dirty water gets into the pipes and people get sick”

WORLD CLEANUP DAY

Nipe Fagio, Swahili for ‘give me the broom’, is a Tanzanian civil society organization founded in 2013 that aims to empower communities, the civil society, private sector and government to build lasting change through collaborative education and awareness raising programs across several areas, including solid waste management. This year, *Let’s Do It Global Foundation* appointed Nipe Fagio as the lead Tanzania partner for what has been called ‘the largest positive civic lead movement in the world’ aiming to have 5% of the world population cleaning up on World Cleanup Day, September 15, 2018.

01 **HIGH-LEVEL MULTI-SECTOR PROJECT LAUNCH**

8 **TRAINING OF TRAINER PROGRAMS**

8 **MULTI-SECTOR PROJECT INTRO EVENTS**

AN EXTENSIVE NUMBER OF COMMUNITY CLEAN-UPS AWARENESS RAISING SOCIAL MEDIA CAMPAIGN

Due to the correlation between poor solid waste and increased flooding as well as several other human and environmental risk issues, support is being provided to Nipe Fagio for this initiative with specific emphasis on establishing/conducting:

1. A comprehensive solid waste hotspot map for Dar es Salaam, Tanzania, identifying locations and drainage systems with extensive solid waste accumulation and/or blockages.

2. A nation-wide network of civil society organizations, private sector, and government stakeholders trained on the importance of improved solid waste management and empowered to take action through conducting training, awareness raising, and community cleanup events focused on 11 municipalities.

3. One nation-wide cleanup event on World Cleanup Day (September 15, 2018) directly facilitated in 11 municipalities across the country focused on cleaning up rivers to mitigate floods and about 45 smaller cleanup events prior to World Cleanup Day, in total engaging about 5% of the Tanzanian working population.

It is expected that project outputs will be the catalysts for future flood mitigation projects, inform decision making on required intensive waste cleanup efforts, and provide foundational partnerships and collaboration for improved solid waste management initiatives across the country.

DRAINS AND RIVER MAINTENANCE SYSTEM

During 2017, TwaaMtaro (Adopt a Drain) was developed as an interactive web and mobile tool aiming to provide decision support and local coordination for timely clean-up actions in advance of heavy rain predictions. Prototypes were user tested and some piloting conducted in order to solicit user feedback and iterate design requirements. A key activity was to broaden the scope of users and map out the decision chains. It became evident that the primary need for such a tool was not only as a risk-reduction system, but to provide decision support to both ex-ante preparedness actions at local level (and Early Warning to Early Action system), as well as ex-post assessments and situation awareness once a flood has occurred (a rapid response and situational assessment tool).

As such, system requirements have been significantly redesigned around DarMAERT feedback and this activity has evolved into an emergency response plan support tool. Although preparedness actions and clean-up remain an important action area, the broader effort is now housed as a Pillar 3 activity and detailed further in the next section.

CHALLENGES AND LESSONS LEARNED

During FY 18, many Pillar 2 activities transitioned from concept into action, a critical step that has resulted in substantial program progress. This was, however, a process involving many transactions and workflow complexities. It demanded alignment between the readiness of data inputs with the awareness and engagement of planning stakeholders at central, municipal, and local levels, who were asked to commit significant time to the process.

- Msimbazi flood model calibration and validation was delayed due to uncertainties in digital elevation model verification, expert disagreement on model schematization, and dynamic capabilities. It emerged that in order to develop an actionable flood model result that would improve upon prior efforts and reduce uncertainties, a great deal of expert judgment and data calibration was necessary.

  Eventually a second flood model was developed using alternative modeling concepts as part of the process to establish confidence in model results. This resulted in three months' delay and restructuring to the charrette planning activity.

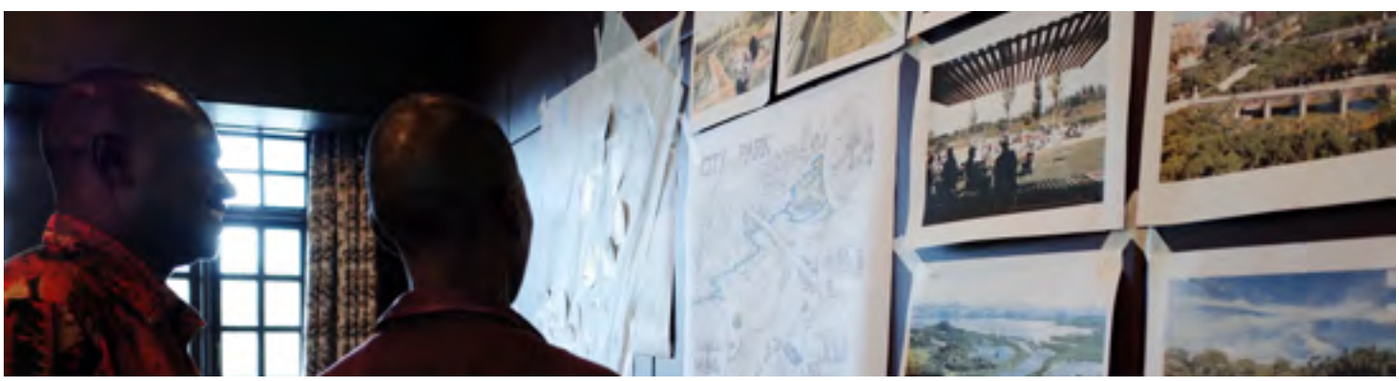
- Fatigue by stakeholders engaged in the Design Charrette resulting from the frequent meetings, perception of slow progress, and challenging endeavor of striking a balance between technical rigor and mobilization. The team realized a need to carefully curate and communicate the preliminary model results — as this at times could confuse participants — as well as develop regular updates and progress notes for stakeholders.

- Consultants working on the Community Risk Plans determined that while the ideal risk management structure — also codified in the 2015 Disaster Management Act — called for the activation of village level (Mtaa) disaster management committees, these did not in fact exist in reality in most sub-wards. The design of the community risk-planning process was therefore confronted with an option to change scope and either focus on the creation and activation of 40 community disaster management committee, or on the ward-level planning processes and existing development committees. A plan for engagement and developing the community risk-management toolkits is expected in August 2018 to review and address this issue.

- The drains maintenance and clean-up decision support tool was determined to have stronger ownership at the municipal level and to be of greater utility at the local level if designed as an emergency management system with both early warning and early action support as well as response and recovery reporting features.

FINANCIALS

Pillar 2 projects were allotted funding from three grants: Risk Mitigation Planning, Msimbazi River Revitalization, and SWIFT Surveys on Poverty and Floods. Funds disbursed by these grants amounted to US$959,434. Financial summaries are detailed in *Section 8*.



BANK-EXECUTED GRANTS

PILLAR 3 EMERGENCY MANAGEMENT AND RESPONSE

Objective

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

Overview of Progress

Activities under Pillar 3 made use of outputs from Pillars 1 and 2, resulting in the implementation and scale-up of many projects. Many of these projects have directly benefitted the DarMAERT in their integrated efforts to coordinate response to potential shock across the hub of Dar es Salaam.

Emergency Response Plan

As of mid-2017 DarMAERT has been supported to procure and train on emergency communications equipment, and to develop an Emergency Response Plan, launched in September 2017.

This plan includes:

- Background information on disaster risk in Dar es Salaam
- Outline of disaster management framework and response structure
- Purpose of the DarMAERT Emergency Response Plan
- Scope of the DarMAERT Emergency Response Plan
- Detailed overview of Emergency Response Operations
- Plan for Emergency Response Activation
- Steps for implementation and review

ACTIVITY	STATUS	PROGRESS
Emergency Response Plan	FINALIZED	DarMAERT Emergency Response Plans translated into Swahili, currently in implementation
Emergency Communications Network	FINALIZED	Equipment distributed and installed, improving emergency communication in Dar es Salaam from 50% to 100%
Training, Exercises, and Drills	COMMENCED	Contract signed and initial plans set for kickoff
Emergency Operations Center Support - Structure	COMMENCED	Contract signed and initial plans set for kickoff
Emergency Management Information System	ONGOING	Piloting and user requirements completed; system design ongoing.
Transport Emergency Preparedness and Response	ONGOING	Support for a situational assessment and contingency plan for Dar es Salaam Rapid Transit bus system.
Damage Assessment Support	FINALIZED	Support to DarMAERT for aerial surveys and mapping post floods in December 2017 and April 2018.
Community Response Plans	COMMENCED	Project preparation and inception initiated, ToR developed, and contract signed
Early Warning System Pilot	ONGOING	8 weather stations have been installed for early warning, and 2 more are to be installed in September 2018. A functional early warning demonstration project expected in late 2018.

HIGHLIGHTS

50% to 100%
EXPANSION OF EMERGENCY COVERAGE

04 **RADIO STATIONS INSTALLED**

03 **REPEATER STATIONS INSTALLED**

06 **MOBILE STATIONS INSTALLED**

SPOTLIGHT STORY

ELEVATING EMERGENCY RESPONSE

Related Link: ***http://www.worldbank.org/en/news/feature/2018/03/09/elevating-emergency-response-in-tanzania***

TURP radio installation, July 2017
Credit: Chris Morgan — World Bank

WITH ITS POPULATION OF APPROXIMATELY 4.5 MILLION EXPECTED TO DOUBLE BY 2030, DAR ES SALAAM IS ON ITS WAY TO BECOMING A MEGA CITY.

The metropolitan area is currently made up of five municipalities and covers 1,350 km2. But with continued population growth, there will be increased demand not only for essential services and better infrastructure, but also for improved capacity to respond to disasters.

In 2011 alone, Dar es Salaam was impacted by two major emergencies. An ammunition depot explosion that occurred in February of that year left 30 dead and scores homeless with the destruction of 1,693 households. Later that year, in December, heavy rains caused widespread flooding, which impacted 50,000 people and claimed about 41 lives. According to official figures, the emergency response and recovery activities cost the GoT TZS5.8 billion, in regard to the explosion, and more than TZS 1.8 billion for the flooding.

If one thing was highlighted by these two events, it was that the emergencies and disaster response could be better coordinated under a city-wide plan of action.

IN 2011 ALONE, DAR ES SALAAM WAS IMPACTED BY TWO MAJOR EMERGENCIES

The DarMAERT, a pilot collaboration, is the first initiative of its kind in Tanzania that brings together emergency response stakeholders in a partnership to serve as the "tactical branch" of the Dar es Salaam Regional Disaster Management Committee.

The partnership is supported under the UKAID and WB partnership, TURP, which recognizes the importance of a strong emergency response network prepared to mobilize in the unfortunate event of disaster.

Clear emergency coordination

On October 20, 2017, Dar es Salaam city authorities launched the DarMAERT Emergency Response Plan after a consultative and collaborative process. The Emergency Response Plan has been designed to ensure that those charged with tackling the emergency (i) know their role; (ii) are competent to carry out the tasks assigned to them; (iii) have access to available resources and facilities; and (iv) work together in a partnership.

The plan provides a strict framework for management, coordination, and control within which a team of responders can go about their work during emergencies.

FROM **50% TO 100%** EMERGENCY COVERAGE

A good system, regardless of its objective, is normally comprised of two important elements: protocols and equipment. Prior to the DarMAERT partnership, only half of the city was covered by an emergency communication network. With an addition of three repeater stations, four radio base stations, six mobile stations, 31 radio handsets, and six table phones procured on behalf of Dar es Salaam, coverage has now reached 100% of the metropolitan area.

As noted by the World Bank's Senior Urban and Disaster Risk Management Specialist, Eric Dickson, however, "For DarMAERT to become an effective response agency, challenges of training, coordination, and equipment must be overcome."

Further collaboration will thus prioritize the complete dissemination of the Emergency Response Plan, as well as the development of emergency response and recovery capacity through targeted exercises, training, and drills.

TURP radio installation, July 2017
Credit: Chris Morgan — World Bank

TRAINING, EXERCISES, AND DRILLS

The Dar es Salaam Emergency Response Plan is an initial version that will require a "test drive" and must be reviewed, updated, and complemented with detailed standard operating procedures and a strengthened Emergency Operations Center. To this end, a consortium led by EMI was selected for the development and implementation of a comprehensive two-year Training, Exercises, and Drills (TED) Program. This activity/project seeks to improve emergency response capabilities of the key agencies that are part of the DarMAERT. The TED Program will be rolling out over the next fiscal year and it is set to include the following activities:

- Design and implement structured training program comprised of a series of skills and training courses to build competency in the field of emergency response and recovery.
- Design and conduct a series of exercises and drills aimed at operationalizing and testing the DarMAERT Emergency Response Plan, providing training andcommunication facilities, and improving coordination and efficiency of operations among key DarMAERT members.
- Prepare Standard Operating Procedures for core DarMAERT members.
- Propose the structure of the Emergency Operations Center and the protocols for its operation and management.
- Provide suggestions for improving emergency preparedness for effective response and recovery.
- Identify strengths and challenges in implementation of DarMAERT Emergency Response Plan and provide suggestion for improvement.

Community members hold knowledge critical to improving risk management

Emergency responder
Credit: Chris Morgan — World Bank

Flooding damages to the buses and Jangwani depot

EMERGENCY MANAGEMENT INFORMATION SYSTEM

The Emergency Management Information System (EMIS) is a collaborative platform to facilitate communication, planning, and actions (to mitigate and be prepared) during (to improve response) and after a disaster (to aid recovery).

EMIS develops upon last year's TwaaMtaro pilot, which laid the foundation for data analysis and community engagement with the goal of tackling flooding in Dar es Salaam. The platform integrates emergency data from different sources, such as stakeholders' contacts, emergency activities and tasks, drainage data, geographical features, weather data, topographical and physical data, as well as records of economic and social damage.

Over FY 18, a series of community and stakeholder hearings and co-creation workshops were convened to co-design the features of EMIS and establish a sustainable institutional arrangement for the platform.

TRANSPORT EMERGENCY PREPAREDNESS AND RESPONSE

In light of Dar es Salaam's multiple flood events that took place over the year, the BRT system was found to be particularly vulnerable with widespread consequences for city authorities and residents. During the 13 months from April 2017 to May 2018, six floods significantly impacted the BRT operations in Dar es Salaam.

The recent floods resulted in significant immediate and short-term impacts to the operations, such as the closure of Morogoro Road, disruptions of bus service availability during the events and their aftermath, and damages to the bus fleet.

Support was therefore provided to the GoT'stransport authorities for emergency preparedness and response for the Dar es Salaam BRT system to identify the BRT operational challenges and provide recommendations and options to manage operations under flooding emergencies and, in particular, for the management of the Jangwani Depot and other critical assets. International experts shared their experience in

emergency preparedness and response practices. In particular, the staff from New York City related experience in managing disasters from response through recovery. The experts also discussed next steps and made recommendations for the management of bus operations in emergency situations. A multi-stakeholder workshop on emergency management for Dar es Salaam BRT system was held on May 24, 2018, with over 40 participants from local agencies.

The workshop identified priorities and concluded that there exists a need to convene all the stakeholders at once using standard procedures. Aroad map of next steps was developed with a view to implementing a coordinated operational emergency preparedness and response plan. This road map covers the short (June to August 2018), medium (before the rainy season in 2019) and long term.

DAMAGE ASSESSMENT SUPPORT

In addition to the thematic focus on the critical transport infrastructure and transport services, DarMAERT was also supported with the acquisition and use of low-cost, high-resolution drone surveys for damage assessment. Initial request from DarMAERT followed the October 27, 2017 flooding events; a lack of familiarity with the permitting procedures, however, led to a two-month delay until flights above the city could be arranged. Tanzania Flying Labs was requested by DarMAERT in 2017 to fly the Mbezi and Msimbazi Lower Basin flood plains, and before and after imagery was hosted online for easy interpretation of impacts. These flights, while not immediately after the floods, did highlight the higher dynamic nature of the river systems and the congested character of the land along the river banks. In the case of the Mbezi River, significant river course changes and housing damage is seen.

Additional drone surveys were conducted in April 2018 by DarMAERT, this time procured from AfricanDrone using TURP support, with similar goals to establish high-resolution baseline data from which river changes, buildings collapse, and broader city impacts can be tracked.

To date, these surveys are limited to supporting decisions on river and basin management and seasonal damage assessments. Near-real-time services, such as situational awareness of ongoing floods and rapid damage assessments just after foods recede, are possible but will require further streamlining of emergency operating procedures with flight permitting processes.

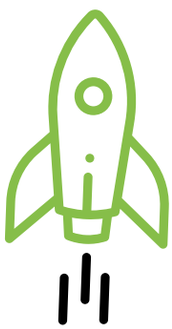
Before and After Floods **- Imagery from Drone and Satellite of Mbezi River December 2017** ***[DarMAERT 2017]***

On October 20, 2017

DarMAERT

EMERGENCY RESPONSE PLAN

was launched by Dar es Salaam city authorities



COMMUNITY DISASTER RESPONSE PLANS

Initial steps were taken to prepare a toolkit for the creation of Community Disaster Preparedness and Response Plans (CDPRP) at the sub-ward level, with plans to further support the development and implementation of these plans by Sub-ward Disaster Management Committees in the most flood-affected sub-wards of Dar es Salaam. The CDPRP will strengthen community resilience with the development and dissemination of clear and effective protocols of how to respond in the event of a flood. The target number of communities is 40 mtaas; this number, however, is subject to revision based on a piloting phase of four community plans.

EARLY WARNING PILOT

Studies have shown that EWSs could contribute up to 36:1 in terms of benefit – costs ratios in developing countries. They are often non-functional, however, due to lack of weather and streamflow data. This challenge is being addressed through a partnership with the Delft University of Technology and TAHMO, through the establishment of a dense network of ground-observing stations. This network will demonstratenear-real-time reliable data to improve numerical weather predictions and flood forecasting in Dar es Salaam.

As noted under Pillar 1, the work done to support EWSs so far has involved the provision of a dense network of ground-observing stations, including eight Automatic Weather Stations installed with two additional stations planned for September 2018, and eight robust hydrological monitoring stations (five staff gauges, one radar-stage sensor, and two ultrasonic sensors).

A dense network of ground-observing stations is being established
Credit: Chris Morgan — World Bank

These stations were set up and data has been made available via an Application Programming Interface for the development and calibration of models for EWSs and river basin management in WamiRuvu. Capacity-building programs for the Ministry of Water and Irrigation (MoWI) and the WamiRuvu River Basin Water Board (WRBWB) were additionally carried out. In total, four face-to-face formal trainings and continuous on-the-job training were conducted. The training covered stationsiting, installation, operation, and data retrieval and processing.

Other training programs are planned for September – December 2018. These will include training for gauge readers, teachers, and hosts of stations in collaboration with the TMA, and product development and operational use of the data collected by the monitoring stations by the MoWI and WRBWB officers.

"With the help of EWS – if intensive rainfall might occur, we would inform communities surrounding that basin or living in Dar es Salaam about the flooding that might occur for them to take precautions. Eventually, we will also look at the purity level of water – how clean or dirty it is - so that people can take precautions on that as well."

- Julietha Alfred Maajaliwa, *Ministry of Water and Irrigation*

CHALLENGES AND LESSONS LEARNED

Preparedness and Emergency Responseactivities have been vital to several government-led responses to emergency events that have taken place over the past year. This has effectively tested their quality, relevance, and value within rather early stages of implementation.

The relatively active and destructive rain events of the past year have also proven to be a significant challenge, with many city stakeholders caught by surprise by the high frequency of flooding. This was especially true in the case of transport operations, with indirect consequences for many residents who rely on network for their livelihoods. Challenges associated with implementation have therefore centered around the tension for resources and time between responding to short-term needs and urgency and maintaining a focus on the overall system strengthening and management functions for long-term outcomes.

Some specific challenges and lessons have been:

- Difficulties arose within the procurement of emergency response equipment for DarMAERT, challenged by conflicting procurement procedures between the Regional Administrative Secretary (RAS) and the World Bank, as well as a lack of storage space within DarMAERT facilities.
- Delays in contracting the consultants for the TED program have slowed progress.
- The executive status of DarMAERT remains uncertain, delaying plans for project implementation.
- A lack of government resources for the creation and activation of village-level Disaster Management Committees mandated in the 2015 Act has led to confusion at ward and sub-ward levels on the guidelines for implementing these groups.

FINANCIALS

Over FY 18, Pillar 3 projects were allotted funding amounting to US$385,212.
Financial summaries are detailed in *Section 8*.

BANK-EXECUTED GRANTS
RESILIENCE ACADEMY

"This is a commitment the World Bank is making to improve Tanzania's skill base, as the most critical area of investment for an industrializing economy."

– Bella Bird, ***World Bank Country Director for Tanzania, Burundi, Somalia, and Malawi***

Objective

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

Overview of Progress

The Resilience Academy has evolved in scope and content over the course of the fiscal year, growing in prominence and becoming its own fourth pillar to the TURP. At the outset, the program was modest and suffered budget cuts in mid-2017, seeking to transfer curriculum, datasets, and provide practical experience for universities students in urban resilience. The goal of the Resilience Academy is to provide long-term impact of methodologies and best practices developed under TURP by embedding them into the university curricula. This will ultimately support the expansion of the program across the country and is intended to improve understanding of the whole extent, exposure, and vulnerability of flooding in communities across Tanzania.

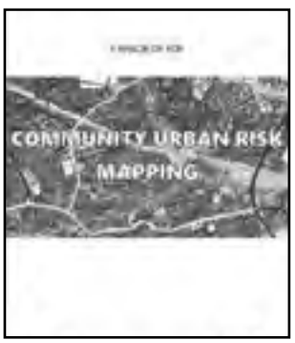
An MoU was signed with Ardhi University in the first year of TURP which was provided a template for cooperation on:

- Ramani Huria – open source tools for exposure mapping and urban data collection
- Trainings in basic risk information analyses, such as InaSafe
- Support for Resilience Labs at the university
- Training of Research staff and students on use of survey drones and other geospatial mapping instruments
- Training and maintenance of hydromet stations;
- Engagement in university conference and events for GIS, computer science, urban planning
- Accreditation of a curriculum for risk mapping

Resilience Academy MoU with Ardhi University signing ceremony

The Steering Committee approved the development of an expanded scope and concept note for extending engagement with three additional universities in Tanzania: University of Dar es Salaam, State University of Zanzibar, and Sokoine University. In addition, partnerships with international universities and researchers to actively utilize and contribute to risk datasets and tools are encouraged and preliminary work with Delft University of Technology (TU Delft) and Turku University has begun.

ACTIVITY	STATUS	PROGRESS
Curriculum for Risk Mapping	ONGOING	A community mapping cookbook was developed to document Ramani Huria methods and outline a university curriculum to teach them
Climate Risk Database for Research	PENDING	An online climate risk data portal Is expected to provide access for researchers In at least four Tanzanian universities working on climate risk. In addition, this portal should facilitate International partnerships for local universities to train, analyse and added to the climate risk knowledge base. So far, discussion have taken place between Ardhi, UDSM, SUZA, and Sokoine, with support form Turku University.
Capacity Building and Training in Risk Data and Systems	ONGOING	Industry placement commenced, equipping over 300 students with community mapping skills and tools



A 'COOKBOOK' WAS CREATED

313
STUDENTS
PLACED IN 2017

450
STUDENTS TARGETED
INTAKE FOR 2018

500
STUDENTS SIGNED UP
FOR 2018

CURRICULUM FOR RISK MAPPING

As a first step, the University of Twente ITC Faculty of Geo-Information Science and Earth Observation was given the assignment to review the approach of Ramani Huria and develop a comprehensive curriculum for universities.

A review of the Ramani Huria approach appears in a "cookbook," providing others with knowledge of how to replicate the approach in their own participatory mapping project. The first draft of this cookbook was provided in June 2018 and is currently being reviewed by local and international experts. Practical master's projects on informal settlement regularization have already been conducted by Ardhi University as a result of high demand from students and university departments.

During FY 18, a number of workshops were additionally held with representatives from local universities to discuss where the various aspects of Ramani Huria can be included in existing courses at the university, such as the Master of Science (MSc) in GIS at Ardhi University, the MSc in GIS, and MSc in Data Science at the University of Dar es Salaam (UDSM).

The Geographic Information and Communication Technologies (GEO-ICT) program of the University of Turku will also be involved to support the integration of the cookbook into Tanzanian university curricula through a "train the trainers" approach. Upcoming activities during FY19 will include the finalization of the curriculum and the integration of some aspects into local university curricula.

INDUSTRY PLACEMENT

The annual Industrial Placement training program runs from July to September each year. During 2017, 306 students were placed with both classroom training and field-based practical skills on data collections, interviews, surveys, and monitoring.

This particular experience has become popular with both students and professors alike, who in 2018 requested a significant scale-up of university students for placement. TURP has committed to take 400 students in 2018 — bowing to strong demand to increase the scope — from multiples schools of the Universities of Dar es Salaam and Ardhi. At the time of writing this report, 500 students had signed up, far exceeding the available slots and making this program the most sought-after of its kind within this academic field.

The training is expected to last seven weeks and will involve classroom training and community mapping in the field, as well as solid waste mapping in coordination with NipeFagio's World Clean Up activities.

CHALLENGES AND LESSONS LEARNED

The development of the Resilience Academy has been an collaborative process with many stakeholders involved. Challenges have been generally characterized by the sequencing and coordination needed between these parties as the concept is iteratively developed, tested, and revised. Specific challenges are:

- Defining scope – With so many interested parties and resilience encompassing such broad disciplines, it is important to determine a core stakeholder group. Currently, this is focused on the two main universities in Dar es Salaam, as well as Zanzibar State University and Sokoine. In addition, international partners from the universities of Turku, Delft, and Twente are engaged through existing Tanzania resilience programs.
- Oversubscription for the industry placements has been exceeding program capacity. In July through September 2017, the program achieved 306 placements, which was oversubscribed compared to the 250 target. For the planned 2018 placement, the initial response from universities for 250 students has been a request of over 600.
- Formulating a sustainable plan for "training the trainers" and encouragingthe wide adoption of curricular material will be important and requires sufficient time allocation.
- Seeking a balance between a focus on TURP specific skills transfer or a comprehensive school of resilience and risk management theory. So far, the practical activities are TURP specific, whereas the partnership approach enables universities to introduce complementary disaster risk materials and training.
- Managing the international requests from both individuals and institutions for collaboration and research. While this is to be welcomed, the core datasets and mission for the Resilience Academy must be established first.

FINANCIALS

Over FY 18, Resilience Academy projects were allotted funding from one grant: TF0A4238 Resilience Academy. Funds disbursed through this grant amounted to US$400,942.

Financial summaries are detailed in *Section 8*.

The Ramani Huria Industry Training program **has become Ardhi's top choice for students**

Credit: Chris Morgan – World Bank

RECIPIENT-EXECUTED GRANTS

In addition to the wide ranging Technical Assistance provided through the program's Bank executed pillar and Resilience Academy, TURP envisages to provide the bulk of its financial resources for recipient executed grants. The largest grant and primary focus is expected to be a set of Flood Risk Reduction investments in the Msimbazi basin.

The focus on Msimbazi recognizes the importance of the river basin to the city's growth and development, as well as the complexities in addressing the causes and consequences of flooding in the river. The lower Msimbazi Basin transects the city of Dar es Salaam, including its central business district, critical transport infrastructure, and vulnerable low-income communities. This urban river system has experienced increasing severity of flood events

THE FOCUS ON MSIMBAZI RECOGNIZES THE IMPORTANCE OF THE RIVER BASIN TO THE CITY'S GROWTH AND DEVELOPMENT

driven by factors related to rapid and unplanned urbanization, as well as a changing climate.

Deforestation and urbanisation have reduced the rain water retention capacity by infiltration in the natural landscape and have increased surface runoff as well as sediment transport to the lower basin. Moreover, unplanned human settlement in the Msimbazi basin and the associated uncontrolled solid waste disposal, industrial water pollution, and public roads & bridges, have created barriers which have reduced the water conveyance capacity of the river.

The result is that seasonal rains create more frequent and more extensive flooding in the middle and lower basin than in the past. This increased flood risk is linked to a rising number of fatalities, injuries, damaged assets and other livelihood costs, and contributes to uncertainty about the future scope for land use and the value of urban development functions of the Msimbazi basin.

Climate changes also reveal rising sea levels, day and night time temperatures, and variability of rainfall; all of which compound the stresses on the city and it capacity to cope with flood events. In 2016 the Msimbazi basin was estimated to suffer average annual losses of US$47million per year from flood events. This figure is expected to rise rapidly unless new, more resilient, urbanization paths can be adopted.

The work of the Msimbazi Design Charrette in Pillar 2 is expected to produce several key investment plans as well as basin-wide management frameworks, which can be the basis for a Flood Risk Management Project.

TURP recommends the development of a US$20 million to $25million recipient-executed grant to address three main objectives:

1. ***Priority Actions in the Lower Msimbazi for Flood Reduction***
   This component aims for integrated planning actions in order to deliver a comprehensive flood risk program the flooding hotspot of the city. The details of this investment plan are expected by August 2018 and have been collaboratively developed by over 60 local government and community stakeholders through the participatory design charrette from January – June 2018.

The key activities of this plan include:

a. Demarcate boundary of Msimbazi Special Planning Zone and Park
b. Resettle people who are immediately in harms way
c. Train river (widen, deepen, and create terraces to contain water during flood events)
d. Rehabilitate mangrove forest (flush sedimentation to return normal sea water flow)
e. Raise and widen Jangwani Bridge
f. Relocate BRT Depot to safer location
g. Increase water discharge capacity at Kawawa Road
h. Actively manage accumulation of sediment (i.e ongoing extraction)

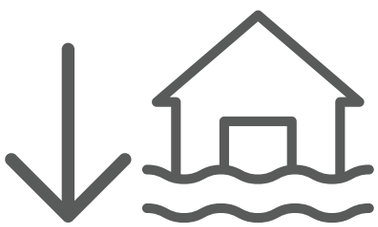
2. ***Institutional Strengthening for Integrated Basin Management***
This supports the training, equipment, operational plans, program coordination and management, and monitoring and evaluation of urban flood risk panning and management. It will be informed by a TURP developed Msimbazi Strategic Management Framework (MSMF) which can serve as a blue print from additional urban river basins.

The MSMF provides guidance for a planned, well-managed and coordinated development in the Msimbazi special planning area in which four main themes are aligned: Flood Protection, Environmental Rehabilitation, and Green city park developments (in the Lower Msimbazi Basin Area).
This framework supports:

a. Design and operationalize flood risk early warning system
b. Establish sand removal points in critical bottlenecks

GRANT OBJECTIVES

TURP recommends the development of a US$20 million to $25 million recipient-executed grant to address three main objectives:



01 PRIORITY ACTION IN THE LOWER MSIMBAZI FOR FLOOD REDUCTION

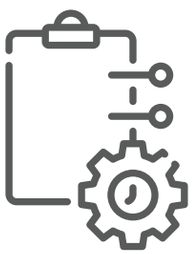
c. Plant vegetation to protect river banks
d. Community sensitization on plan and contributing factors to flooding
e. Solid waste management program
f. Water pollution management program

3. ***Community Engagement***
To develop community awareness and behavior changes to cope with waste management, sediment management, and ensure a strong buy-in from communities. This may involve the creation of a community resilience works fund to support the local investments. Activities may include:

a. Community drainage investments
b. Local waste management solutions
c. Riverbank maintenance
d. Awareness and education campaigns
e. Community greening and reforestation

An extensive and highly participatory process has been used to develop this concept, and final versions of the deliverables are due in late August 2018. Costing and sequencing for an Implementation Plan is underway, so specific activities are tentative. Furthermore, recipient-executed grants will be jointly designed with Tanzanian implementing agencies and subject to Ministry of Finance approvals.

It should also be noted that the available TURP resource envelope and timeline will not match the full needs of the risk-reduction challenge. The goal shall therefore be to leverage as far as possible existing and future investments and provide an exemplary roadmap for risk reduction in Tanzania's commercial hub. This will also involve private sector engagement, as well as coordination with urban, transport, water, and environmental sector projects.



02 INSTITUTIONAL STRENGTHENING FOR INTEGRATED BASIN MANAGEMENT

03 COMMUNITY ENGAGEMENT

PROGRAM MANAGEMENT

Objective

Program management and administrative activities for the TF include, but are not limited to, supporting program governance arrangements and TF-related meetings; planning and executing work plans and budgets; managing communication and conducting outreach; disseminating lessons learned; reporting on progress; and monitoring and evaluating the program.

Overview of Progress

FY 18 has represented peak procurement activity within the TURP program, as all Pillars are now up and running, with few activities fully concluded. At the same time, the programmatic approach to TURP management has required periodic adjustments in scope and work plan in response to government feedback, contractor performances, cost estimate changes, and budget envelope changes resulting from exchange rate fluctuations.

In addition, the Steering Committee agreed that URTZ 2018 — the annual TURP reporting event — will be jointly held with international conference events in Dar es Salaam August 29-31, 2018.

Given the high level of activity and interactions, efforts during FY 18 have focused on improving coordination across the program team and between program partners.

These included:

- Convening of Technical Advisory Committee and expansion of the members invited
- Coordination and delivery of a team retreat for program partners, managers, and consultants held in June 2018
- Development and management of an online collaborative digital repository for program information
- Implementation of a media communication strategy including a mini video series on urban resilience.

MEXICO STUDY TOUR

TURP program provided financial support for three Tanzanian delegates to join an additional three officials from the Government of Tanzania dealing with disaster risk management attended the one-week Understanding Risk Conference in Mexico City. This was a global event that had participation of over 1,050 representatives from 101 countries and 550+ organizations active in the creation, communication, and use of disaster risk information. This was a learning and networking experience for the Tanzanian participants, who learned new approaches and ideas about how DRM is being addressed across the globe. Of particular interest were: (i) the event on the Africa Disaster Risk Financing Initiative, in which over 50 delegates from 13+ African countries attended; and (ii) the visit to the Mexico City's Resilience Agency to meet with the Director General to discuss the city's resilience strategy and related issues.

This international forum gave the Government representatives the opportunity to make new professional contacts in order to continue to exchange DRM approaches and ideas across countries and cities.

TECHNICAL REVIEW SUMMARY

ACTIVITY	PROGRESS
Convening of Technical and Steering Committees	4 meetings convened
Procuring experts and facilitation	13 Consulting firms contracts Issued
	17 Tanzanian consultants hired for a total of 1470 days
	16 International consultants for a total of 969 days
Knowledge capture and sharing	1 external website managed
	1 internal knowledge repository developed and managed
	2 World Bank feature stories
	4 Urban Resilience Video stories produced

SECRETARIAT ACTIVITY SUMMARY

ACTIVITY	PROGRESS
Annual Work Plan Update	COMPLETE
Mexico Study Tour	COMPLETE
Annual reviews	COMPLETE
Communications (detailed narrative below)	ONGOING
International conference	Planning in progress
SC meetings	One in December 2017
	One in July 2018

COMMUNICATIONS

External Communication

Over FY 18, a comprehensive plan was developed with the goal of improving on both internal and external communication. This plan includes a branding guide and a timeline for product dissemination.

Following this timeline, a structure was formulated for videos and stories to be jointly created by the communication team and shared via WBG channels. The outward-facing website was further updated on a bi-monthly basis to reflect program progress and changes, and all related stories published through WBG channels were linked to this digital space.

A mural competition was conceptualized and contracts were signed with a local firm that specializes in community engagement to implement. This project will introduce the local arts community to the topic of urban resilience with the goal of encouraging the production of art that can mobilize community action towards making Dar es Salaam a resilient city. The top 10 designs are to be exhibited at the annual conference and the winning artist will receive a contract to produce his or her work in full on a wall in the Jangwani area.

A community event will serve as the official launch for the mural as part of the Nipe Fagio campaign.

Internal Communication

During this fiscal year, the WBG transitioned all "Collaboration for Development" communities to a new platform. As a result, the TURP Collaboration for Development has now improved in accessibility and TURP team members have been trained on its use.

A template for periodic program updates was also designed, to be implemented over the next fiscal year to help facilitate more consistent communication between all program partners.

OUTPUT	CATEGORY	LINK
Collaboration for Development	Website	*https://collaboration.worldbank.org/groups/tanzania-urban-resilience-online-community*
Program Website	Website	*http://www.worldbank.org/en/programs/tanzania-urban-resilience-program*
Elevating Emergency Response in Tanzania	Feature Story	*http://www.worldbank.org/en/news/feature/2018/03/09/elevating-emergency-response-in-tanzania*
Next Generation of Youth in Tanzania to Be Equipped With Critical Skills in Urban Resilience	Feature Story	*http://www.worldbank.org/en/news/feature/2018/02/14/next-generation-of-youth-in-tanzania-to-be-equipped-with-critical-skills-in-urban-resilience*
Ramani Huria Website	Website	*http://www.ramanihuria.org*

Over the course of the year, several events were organized to engage the community with TURP projects. Most of these were conducted by the Ramani Huria and Emergency Management Information System (EMIS) teams, with the goal of collecting critical community data to inform risk-reduction activities.

The program's annual conference, URTZ 2018, is set to take place from August 29 to 30 at the Julius International Convention Centre. The agenda will bring all stakeholders together for discussion on lessons learned from local initiatives and from similar initiatives in urban resilience abroad. This opportunity will be used to publicly showcase outputs from the Msimbazi Charrette design process.

URTZ 2018 will happen in conjunction with the Free and Open Source Software for Geospatial Conference and support will be provided by the Global Facility for Disaster Reduction and Recovery's Understanding Risk, Increasing Opportunities for Learning Exchange.

05 RESULTS OVERVIEW

IN FY 18, THE **LOG FRAMEWORK WAS UPDATED** UPON REQUEST FROM DFID. THIS FRAMEWORK **ELABORATES ON THE INITIAL RESULTS FRAMEWORK** TO **IMPROVE ON PROGRAM MONITORING AND EVALUATION** AND **TRACK RESILIENCE ACADEMY RESULTS EXPLICITLY.**

Results indicators are segregated into the original three Pillars of priority for program implementation plus the Resilience Academy, as well as specific indicators related to program administration and recipient-executed works. These are detailed in the table below.

Targets described in the indicator column are for the calendar year as a whole, and as of this report, covers the FY up to June 30, 2018. There are a few results that have not fully met the target yet.

Indicator 1.2 has not been measured by the means originally envisaged due to delay in issuing the risk management index evaluation. This delay is due to the need to thoroughly consult and engage government counterparts in the methodology and objectives of such an annual exercise. The assigned value remains “incipient” based on a preliminary capacity assessment conducted in FY 17. A complete assessment is expected later in 2018, which will evaluate that year as well as 2017 retroactively.

Indicator 2.3 was modified to track key government decision points in respect to implementing flood risk-reduction works in the Msimbazi Valley. The expected output indicators were changed to track endorsement of the flood model results and priority interventions, acceptance of a Lower Msimbazi Detailed Area Plan, effectiveness of a Msimbazi Flood Risk Reduction grant, and completion of planned works under the grant.

Indicator 3.1 has been modified from last year to reflect the budget cuts to the program and reduced scope. Rather than track the adoption of emergency plans across cities, this will measure results in operationalizing the Dar es Salaam Emergency Response Plan.

Resilience Academy results indicators are newly introduced and track the results in the Industrial Placement program as well as the use of risk information in research. The industrial placement offers experience and practical skills to Tanzanian students and future town planners, surveyors, and geographers. The use of risk data in research is also a measure of demand for information.

Credit: Andrew Stephen

RESULTS LOG FRAMEWORK

INDICATOR	BASELINE	FY17 / Target	FY18 / Target	DATA COLLECTION AND REPORTING			COMMENT
				FREQUENCY	DATA SOURCE	RESPONSIBILITY	
IMPACT INDICATORS: URBAN AREAS IN TANZANIA ARE MORE RESILIENT TO CLIMATE RISK							
1.1 Number of wards benefiting from or implementing flood risk mitigation measures identified in ward level risk management plans	0	0 / 0	0 / 0	Annually	Regional Administrative Secretary	PO-RALG and ULGAs responding to expert-led survey	This indicator tracks the extent to which structural and non-structural risk reduction measures are identified in local government plans and implemented
1.2 Improved capacity of government agencies to identify, reduce, finance and cope with disaster risks	Low	Incipient / NA	TBD / Incipient	Annually	Disaster risk management index	PO-RALG and ULGAs responding to expert-led survey	Weighted index of advances made in intermediate outcome indicators for Pillars 1, 2 and 3. (Assessment based on Dar es Salaam) and including measures for financial protection. Assessment for 2017 is expected to be conducted in late 2018.
1.3 Modelled Economic losses in the Msimbazi basin reduced as a result of structural risk mitigation mesures designed		AAL US$47million /year	TBD/NA	Model Runs expected in 2019 and 2020. Also contingent on selection of structural measures implemented.	Probabilistic Flood Risk model using TURP exposure and hazard data.	World Bank	Average Annual Loss (AAL) to be determined from flood risk model expected in 2019. 2017 Baseline data is taken from Turpie et al. (2016) model and may be subject to revision once new model is calibrated. No indicator is expected for collection yet.
OUTCOME INDICATORS: URBAN LOCAL GOVERNMENTS IN TANZANIA UTILIZE IMPROVED EVIDENCE BASE AND URBAN PLANNING TO STRENGTHEN RESILIENCE TO CLIMATE-RELATED HAZARDS							
2.1 Number of persons benefiting from improved flood resilience as a result of ICF support	0	0 / 0	350,000* / 250,000	Annually	Flood risk and exposure model	World Bank	Population estimate based on census data, household data, associated with dwellings and businesses exposed to flood hazards and modelled to expect reduced losses as a result of ICF interventions (eg. new/improved drains, early warning systems and/or flood shelters) . (Dar es Salaam only). 350,000 is a population estimate for the lower Msimbazi regions expected to benefit from flood risk reduction support – this figure shall be revised once project design and risk model are deployed.
2.2 Extent to which ICF intervention is likely to have a trans-formational impact	0	1 / 1	TBD / 2	Annually	Annual Review	DfID	Narrative report made during DFID Annual Review process. A score between 1 and 4 will be assigned in November 2018.
	INTERMEDIATE RESULT INDICATORS						
	PILLAR 1 RISK IDENTIFICATION						
1.1 Improved access to climate risk information in Dar es Salaam	Not yet available	Exposure and hazard catalogue / Data Model and Exposure complete, hazard partially complete	2.1 Wards Published: Exposure, Drainage, Inundation hazard / Risk information published for 20 wards of Dar es Salaam with flood inundation scenarios	Annually	Based on indicators 3.1 – 3.4, 4.3, and 4.6		Ageospatial data portal will serve as a repository for information at both national and subnational levels

1.2 Exposure and risk assessments applied in major cities (cumulative number)	0	Pilot satellite-based exposure monitoring service launched / Confirmed Launched with Planet Labs	Pilot service concluded and under evaluation. Monitoring service under discussion with stakeholders / At least 1 monitoring service demonstrated, at least 1 more urban risk service under preparation	Annually	Climate risk geonode repository	PO-RALG	Standardized exposure, hazard and risk monitoring tools will be developed first as pilots and applied across urban centers. These services will serve as a monitoring tool for investment needs (build-up of vulnerable population in hazard areas), baselines for exposure populations, and a support tool for development and improved land use planning
	PILLAR 2 RISK REDUCTION						
2.1 Cumulative number of people directly engaged in climate risk reduction activities - number and percentage of females (WB core indicator)	0	399 (of which 192 are female) / 50 (of which 25 female)	1522 /100	Annually	Participant lists and registrations from trainings and events	World Bank	This indicator is a targeted and high-intensity ICF Indicator that tracks the training of individuals in understanding risk information, analyzing and applying risk data
		Gender disaggregated by program					
		Msimbazi Charrette	32% female 68% male				
		EMIS trainings	38% female 62% male				
		Ramani Huria	37% female 63% male				
		AVERAGE	36% female 64% male				
2.2 Community risk redution plans developed using improved risk information (cumulative number)	0	0 / 0	0/ 10	Annually	Ward Offices and LGAs	World Bank	This indicator directly tracks the progress of risk reduction planning on community level. Toolkit development and engagement process started – 10 plans remain target for end of 2018
2.3 Government risk reduction activities	0	NA	Msimbazi Flood Model Accepted by Stakeholders	Annually	Secretariat	World Bank	This indicator tracks government endorsement of TURP supported risk reduction activities in the Msimbazi basin.
	PILLAR 3 PREPAREDNESS AND EMERGENCY MANAGEMENT						
3.1 Dar es Salaam Emergency Response System	0	Dar es Salaam ERP Prepared	Detailed Trainings, Exercises and Drills program procured	Annually	DarMAERT	Disaster Management Department and World Bank	This indicator tracks: • City Emergency Management authorities adopting and using a City Emergency Response plan; and • Enhancing Emergency response system through Standard Operating Procedures and Emergency Operations Center Enhancing Emergency response system through Standard Operating Procedures and Emergency Operations Center
	RESILIENCE ACADEMY: KNOWLEDGE TRANSFER ESTABLISHED						
4.1 Cumulative Number of staff and students (by gender) placed in Urban Resilience Industry placement	0	306 Total 122 female / 250	829 Total 363 female / 500	Annually	Tanzanian Universities	Disaster Management Department and World Bank	This indicator tracks the number of Tanzanian university students in fields of urban planning, GIS, geography attaining a 10 week immersion in risk data, community engagement and risk analysis techniques required to sustain risk information activities and useful in local governments
4.2 Climate Risk Data and Tools Use in research	0	NA	In progress / Geospatial Data repository established for 4 universities	Annually	Tanzanian Universities	Disaster Management Department and World Bank	This indicator tracks availability, access and use of risk information in research; thus monitoring demand for risk data from academia and research partnerships in Tanzania on resilience.
	PROGRAM ADMINISTRATION						
5.1 Program management, knowledge and communications	0	Launched May 30 2017	Program Committee meetings held; Conference schedule August 2018	Annually	Secretariat	World Bank	This indicator tracks reporting milestones and dissemination

06 RISKS OVERVIEW

The below topics summarize some of the risk profile narrative specific to the last year of TURP.

STAKEHOLDER ENGAGEMENT AND PRIORITIES

It was recognized last year, and continues to be the case, that TURP faces a challenge to maintain clear coordination and consultation with stakeholders of divergent priorities or whose goals may change over time. It is crucial that the Secretariat works across different levels of government to ensure clarity on roles. This risk has been intensified by two major activities during the year.

The launch of the Msimbazi Design Charrette includes over 80 stakeholders from a wide spectrum of government and society and dealing with a broad range of urbanization issues from pollution, to compensation, to transport and livelihoods. Inevitably there are competing demands for scarce land and resources and the task has been to guide a process that is constructive, adopts 'deep democracy' principles to listen to voices that are both central and marginal in the debate. A strong emphasis was placed on building buy-in and legitimacy with local communities in the Msimbazi, as well as facilitating translation and Swahili language content. Similarly, the team needed to manage political and institutional coordination challenges to mitigate the risk of a lack of political ownership or institutional barriers from a planning and permitting point of view. To this end, additional resources were invested in working along-side Ministry of Lands and ensuring that the Msimbazi detailed area plan development aligned with the same process for designating and demarcating the special planning zone for Msimabzi. Additional presentation and engagement was also incorporated to consult the city mayors, councilors, and local representatives.

A second major challenge has been the significant flood impacts experience in the past year, beginning with a serious flood in October 2017 and recurring events in January, April and May. In February 2018 the Vice President of Tanzania convened a Flood Management Task force within government. These intense flood events and the high-level spotlight placed by the Vice President presented a potential risk that government priorities may shift towards the short term, response oriented measures. However, the high-level ownership and a clear understanding for the need to drive inter-institutional solutions, also facilitated TURP awareness and mitigated the risk of poor engagement and ownership. To the contrary, TURP has worked to align the Msimbazi actions to the Vice President's tasks force priorities and considers the that high-level ownership within the Government of Tanzania has increased significantly.

FINANCIAL MANAGEMENT AND PROCUREMENT

Exchange rate risks identified last year remain, as the Pound Sterling has fallen against the US Dollar, and further activities will need to be scaled back, increasing risk to development objectives.

An increasing portfolio of components and sub-components also runs the risk of added complexity to the management of firms and consultants as the program has achieved a peak in procurement of consultancies. The TURP program has sought to consolidate where possible into few larger consultancies to mitigate this risk. This is partly a response to the reduce budget last year and as a result of greater confidence gains in which program activities are working well and should scale up.

It remains a challenge to sequence expenditures in the first three months of the calendar year owning to added restrictions on commitment and limited options for program changes. This time period represents the pre-flood season, during which unforeseen needs relating to preparedness may arise. Overall the reduced budget, complex interplay of local and international firms and consultants, and restrictions on January to March contracting, reduce the flexibility of the program to respond to shocks.

ENVIRONMENTAL, SOCIAL, AND SECURITY

A wide range of social and environmental issues have been raised through the TURP program, and particularly in the Design Charrette for the Msimbazi Valley relating to flood risk and risk management. The TURP team has worked with government of Tanzania and key implementing agencies to highlight relevant environmental and social concerns and to ensure that where applicable World Bank safeguard policies are adhered to.

The environmental concerns center on the river basin and activities linked to dredging of the rivers and disposal of waste materials. Erosion and environmental specialists may be needed to review mangrove and other habitat concerns, and if needed an environmental impact assessment will be required from the government before proceeding with any work.

A reputational risk could further arise from any potential or actual environmental damage or improperly managed demolitions and relocations, making it critical that all necessary precautionary measures are considered in the program communication.

07 LOOKING AHEAD


RIKKI

WORKPLAN OVERVIEW

THE COMING YEAR OF TURP WILL INVOLVE A SHIFT AWAY **FROM RISK IDENTIFICATION ACTIVITIES TOWARDS MORE TANGIBLE INVESTMENT OPERATIONS**

TThe coming year of TURP will involve a shift away from risk identification activities and towards more tangible investment operations. These activities have been and will continue to be informed by the results of the multi-stakeholder Msimbazi Charrette process as well as the socio-economic studies and community-level engagements.

FY 19 will further extend engagement of civil society through a major campaign being organized for World Cleanup Day. This campaign, led by Tanzanian civil society organization (CSO) NipeFagio, will include (a) development of a comprehensive solid waste hotspot map for Dar es Salaam, identifying locations and drainage systems with extensive solid waste accumulation and/or blockages; (b) training of a nationwide network of civil society organizations, private sector, and government stakeholders on the importance of improved solid waste management; and (c) one nationwide cleanup event on World Cleanup Day (September 15, 2018) directly facilitated in 11 municipalities across the country focused on cleaning up rivers to mitigate floods and about 45 smaller cleanup events prior to World Clean Up Day, in total engaging tens of thousands in Dar es Salaam.

It has additionally been suggested by the Steering Committee that TURP management endeavors in FY 19 to secure more funding and/or support for urban resilience activities. In this way, the TURP outputs can present a roadmap for risk management and flood reduction investments and the team should seek to leverage additional resources from Bank, additional Development Partners, and the private sector.

The main activities presented to the donor and TURP steering committee for FY 19 are detailed in the following table, in U.S. dollars. These remain projections and subject to change. In addition, closed activities and previously planned but now cancelled activities are not shown. A major difference from the FY18 disbursement projections and the actual figures has been the deferment in determining and disbursing on a government-executed grant (under recipient executed works) and the postponement of probabilistic risk model (under Risk Identification).

THE COMING YEAR OF TURP WILL INVOLVE A SHIFT AWAY **FROM RISK IDENTIFICATION ACTIVITIES TOWARDS MORE TANGIBLE INVESTMENT OPERATIONS**

Credit: Andrew Stephen

WORKPLAN

TOTAL	$3,278,862	$13,362,245
	FY18 Disbursement	**FY19 Disbursement**
PA PROGRAM MANAGEMENT	$328,792	$65,500
TA Program Coordination & Quality Assurance	$124,158	$32,750
Knowledge Sharing	$204,634	$32,750
PILLAR 1 RISK IDENTIFICATION	$1,204,000	$1,565,000
Risk Evaluation	**$1,204,000**	**$1,565,000**
Historical Events Inventory	$12,000	$130,000
Disaster Risk Management Index & Updates	$45,000	$25,000
Elevation Model and Exposure Mapping	$85,000	$33,000
Ramani Huria (Community Mapping) additional cities	$415,000	$163,000
Satellite Data Mapping additional Cities	$165,000	$325,000
Erosion and Sedimentation Study	$86,000	$50,000
Hydrological Study & Monitoring	$256,000	$170,000
Spatial Data Management & Hosting	$105,000	$14,000
Dar es Salaam Probabilistic Flood Risk Evaluation	$35,000	$655,000
PILLAR 2 RISK REDUCTION	$772,630	$676,000
Risk Mitigation Planning	**$354,500**	**$170,000**
Msimbazi Flood Model & Infrastructure Diagnostic	$262,000	$0
Just In Time Technical Assistance	$50,000	$75,000
Land Use Planning and Resettlement Framework	$7,500	$20,000
Drains Maintenance & Management dashboard	$35,000	$75,000
Msimbazi Design Charrette and Special Planning Area	**$221,000**	**$131,000**
Msimbazi charrette and area plan	$200,000	$65,000
Msimbazi River Basin management Plan	$21,000	$65,000
Community Level Risk Reduction	**$0**	**$375,000**
Participatory climate risk plans, training, behavior change	$0	$275,000
World Clean Up Day	$0	$100,000

PILLAR 3 DISASTER PREPAREDNESS & EMERGENCY MANAGEMENT	$385,000	$943,200
Emergency Planning and Response	$385,000	$943,200
DARMAERT Emergency Response Plan	$120,000	$0
Equipment	$0	$0
Municipal Contigency Plans	$50,000	$268,550
Community Response Plans	$45,000	$39,300
Training, Exercises and Drills	$15,000	$78,600
Damage Assessment Capacity building	$15,000	$32,750
Local Early Warning and Early Action Tool	$75,000	$262,000
Forecast and Flood Advisories	$65,000	$262,000

RESILIENCE ACADEMY	$400,000	$635,350
Curricula & Courses for Risk Information	$140,000	$222,700
Support to Placement in Industry Program	$125,000	$137,550
Support to Master's Students & Exchanges	$50,000	$58,950
University Resilience Labs & Equipment	$0	$124,450
Short Courses and Capacity Building	$75,000	$91,700

RECIPIENT-EXECUTED WORKS	$0	$9,170,000
Dar es Salaam Flood Risk Management Project	$0	$7,860,000
Equipment	$0	$393,000
Feasibility studies, designs & Safeguards	$0	$786,000
Msimbazi Works	$0	$6,550,000
Capacity Building	$0	$131,000
Community Resilience Investments	$0	$1,310,000
Community Works	$0	$655,000
Community clean ups	$0	$655,000

SECRETARIAT	$205,000	$307,195
International conference series	$38,000	$98,250
Steering committee meetings	$5,000	$1,310
Communications, Websites and Media	$25,000	$43,885
M&E baseline data collection	$5,000	$6,550

08 FINANCIALS

FINANCIAL OVERVIEW

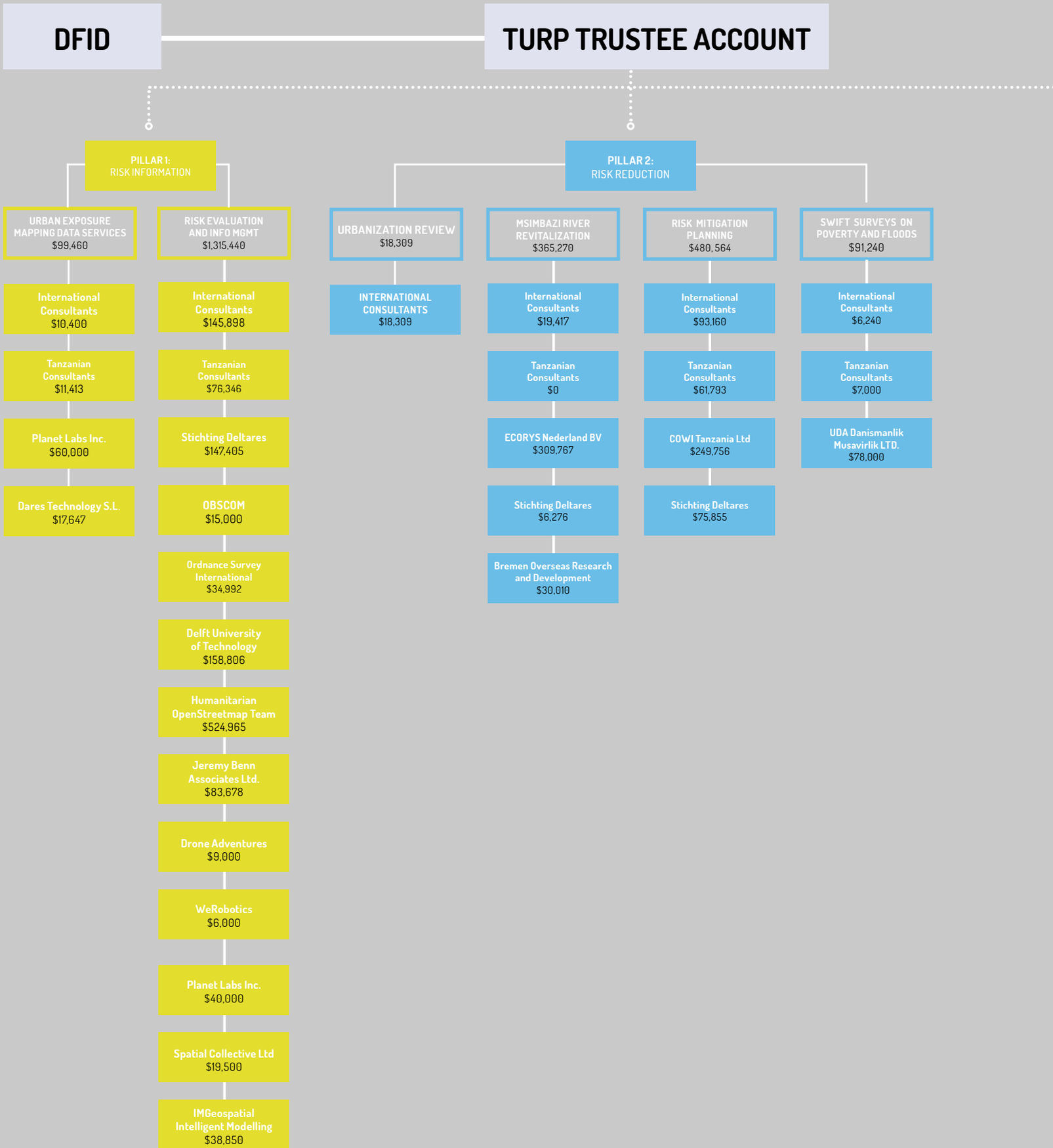
Total disbursements from the TF to date amount to US$4,579,710. In FY 18, a total of US$3,278,862 was disbursed, with $365,380 remaining available. Outstanding commitments of US$2,292,759 will be carried over into the next fiscal year.

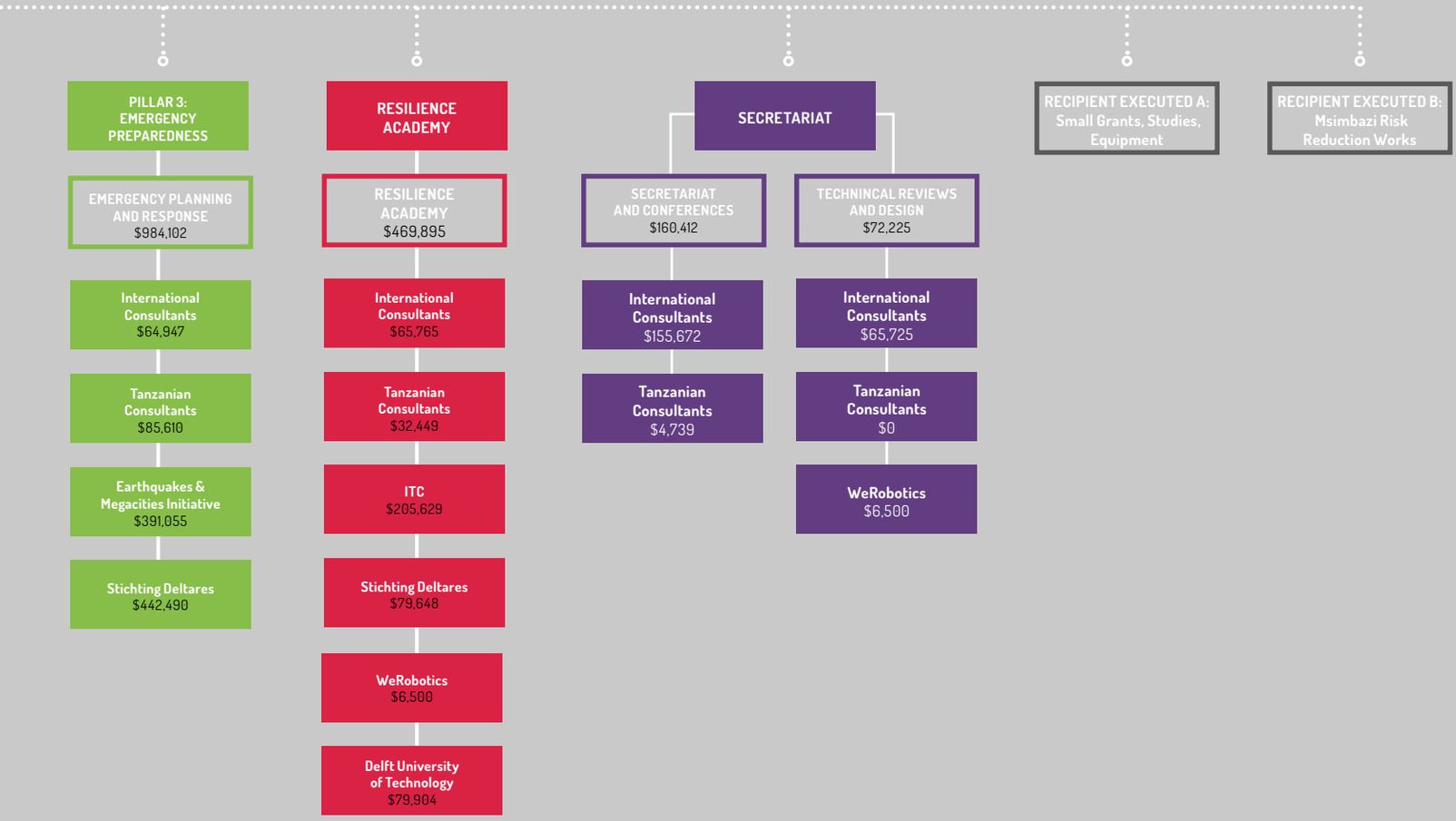
	REPORTING PERIOD ENDED JUNE 30, 2018 (USD)
Total Funds Received from DfID as of June 30 2018	$7,237,440
Disbursements Fiscal Year 2018	$3,278,862
Total TF Disbursements	$4,579,710
Outstanding Contract Commitments	$2,292,759
Cash Balance at the End of Fiscal Year 2018	$365,380
Next Scheduled Transfer from DfID - June 30 2018	$3,280,000

DISBURSEMENTS

BETF ACTIVITY		TOTAL BUDGET ALLOCATED (USD)	FY 18 DISBURSED	COMMITTED	AVAILABLE	% DISBURSED + COMMITTED
PILLAR 1 RISK IDENTIFICATION						
TF0A3559	Risk Evaluation and Information Management	$2,180,000	$1,204,482	$594,966	$80,552	96%
TF0A4139	Urban Exposure Mapping Data Services	$150,000	$0	$0	$0	100%
TOTAL PILLAR 1		$2,330,000	$1,204,482	$594,966	$80,552	
PILLAR 2 RISK REDUCTION						
TF0A4691	Risk Mitigation Planning	$860,000	$354,602	$217,979	$197,419	77%
TF0A3571	Msimbazi River Revitalization	$510,000	$418,028	$72,946	$26	100%
TF0A4575	Urbanization Review - Resilience Planning	$57,848	$0	$0	$0	100%
TOTAL PILLAR 2		$1,427,848	$772,630	$290,925	$197,445	
PILLAR 3 EMERGENCY PREPAREDNESS						
TF0A3828	Emergency Planning and Response	$1,440,000	$385,212	$752,943	$1,845	100%
TOTAL PILLAR 3		$1.440,000	$385,212	$752,943	$1,845	
RESILIENCE ACADEMY						
TF0A4238	Urban Resilience Academy	$920,000	$400,942	$435,428	$78,630	91%
TOTAL RESILIENCE ACADEMY		$920,000	$400,942	$435,428	$78,630	
PROGRAM ADMINISTRATION						
TF0A3742	Technical Review and Design	$280,000	$124,158	$1,200	$642	100%
TF0A2973	Secretariat and Conferences	$650,000	$204,634	$217,296	$3,070	100%
TOTAL ADMINISTRATION		$930,000	$328,792	$218,496	$3,712	
OVERALL TOTAL ACTIVITIES		$7,237,848	$3,278,862	$2,292759	$365,380	95%

DELIVERY CHAIN




PILLAR 3: EMERGENCY PREPAREDNESS
EMERGENCY PLANNING AND RESPONSE $984,102
International Consultants $64,947
Tanzanian Consultants $85,610
Earthquakes & Megacities Initiative $391,055
Stichting Deltares $442,490
RESILIENCE ACADEMY
RESILIENCE ACADEMY $469,895
International Consultants $65,765
Tanzanian Consultants $32,449
ITC $205,629
Stichting Deltares $79,648
WeRobotics $6,500
Delft University of Technology $79,904
SECRETARIAT
SECRETARIAT AND CONFERENCES $160,412
International Consultants $155,672
Tanzanian Consultants $4,739
TECHNINCAL REVIEWS AND DESIGN $72,225
International Consultants $65,725
Tanzanian Consultants $0
WeRobotics $6,500
RECIPIENT EXECUTED A: Small Grants, Studies, Equipment
RECIPIENT EXECUTED B: Msimbazi Risk Reduction Works

TANZANIA
URBAN RESILIENCE
PROGRAMME

WORLD BANK GROUP

UKaid