Baseline information and indicators for projects:

"*Implementation of concrete adaptation measures to reduce vulnerability of livelihoods and economy of coastal communities of Tanzania*"
Funded by: Adaptation Fund Board

And

"*Developing core capacity to address adaptation to climate change in productive coastal zones of Tanzania*"
Funded by: Global Environmental Facility

Prepared by: C4 EcoSolutions (Cape Town, South Africa)

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List of Acronyms

AF	Adaptation Fund
AR5	Fifth Assessment Report
C4ES	C4 EcoSolutions
CAN-Tanzania	Climate Action Network Tanzania
CBO	Community-based organisation
CCCS	Centre for Climate Change Studies
CCOT	Climate Change Observatory Tanzania
COSMO	Coastal Zone Simulation
CRiSTAL	Community-based Risk Screening Tool: Adaptation and Livelihood
CVCA	Climate Vulnerability and Capacity Analysis
DAWASA	Dar es Salaam Water and Sewerage Authority
DEICO	Directorate of Environmental Information, Communication and Outreach
DIVA	Dynamic Interactive Vulnerability Assessment
DMDP	Dar es Salaam Metropolitan Development Project
EBICAM	Ecosystem-Based Integrated Coastal Area Management
EBICAM	Ecosystem-based integrated coastal area management
ENSO	El Nino Southern Oscillation
EPMS	Environmental Protection Management Services
FORUM CC	Tanzanian Civil Society Forum on Climate change
GIS	Geographic Information System
GoT	Government of Tanzania
ICAM	Integrated Coastal Area Management
ICLEI	International Council for Local Environmental Initiatives
ICM	Integrated Coastal Management
ICZM	Integrated Coastal Zone Management
IMS	Institute of Marine Sciences
IPCC	Intergovernmental Panel on Climate Change
KILORWEMP	Kilombero and Lower Rufiji Wetlands Ecosystem Management
LDCF	Least Developed Country Fund
LGA	Local Government Authority
M&E	Monitoring and Evaluation
MACEMP	Marine and Coastal Environment Management Project
MoF	Ministry of Finance
NEAP	National Environmental Action Plan
NEMC	National Environment Management Council
NGO	Non-governmental organisation
PIR	Project Implementation Report
PM	Project Manager
PRBMP	Pangani River Basement Management Project
PVA	Participatory Vulnerability Assessments
RF	Results Framework
RUMAKI	Rufiji Delta-Mafia Island-Kilwa District
RWSSP	Rural Water Supply and Sanitation Project
SIDA	Swedish International Development
SLR	Sea-level rise
SMART	Specific, measurable, achievable, relevant and time-bound
STA	Senior Technical Advisor
TaTEDO	Tanzania Traditional Energy Development Organisation
ToR	Terms of Reference
UDSM	University of Dar es Salaam
UNEP	United Nations Environmental Programme
VPO	Vice Presidents Office
ZACCA	Zanzibar Civil Society Alliance on Climate Change

Executive Summary

Local communities living in the coastal zone of Tanzania are vulnerable to the negative effects of climate change. In particular, increasing temperatures, Sea Level Rise (SLR) and more erratic precipitation – which are resulting in increased frequency and severity of floods and droughts – are affecting natural ecosystems, community livelihoods and infrastructure. This vulnerability to climate change is exacerbated by non-climate threats. These threats include *inter alia* poverty, dependence on rain-fed agriculture, unsustainable use of natural resources and limited coordination of coastal development. Moreover, local communities are reliant on structures and measures that are implemented by the central state to adapt to climate change. However, within the central state, there is limited institutional capacity and knowledge to manage climate hazards. Therefore, under climate scenarios that predict more significant impacts from SLR and precipitation variation, local communities in Tanzania will become increasingly vulnerable.

With a view to increasing the resilience of Tanzania to the negative effects of climate change, the Government of the United Republic of Tanzania is executing two projects for climate change adaptation. These projects are: i) the 'Implementation of concrete adaptation measures to reduce vulnerability of livelihoods and economy of coastal communities of Tanzania' supported by the Adaptation Fund (AF) (AF project); and ii) 'Developing Core Capacities to Address Adaptation to Climate Change in Productive Coastal Zones of Tanzania' supported by the Least Developed Country Fund (LDCF) (LDCF project). The implementing entity/agency for both projects is the United Nations Environmental Programme (UNEP). The executing entity/organisation for both projects is the Vice President's Office.

The main objective of both of these projects is to reduce the vulnerability of local communities in Tanzania. For both projects, this objective will be achieved through three main outcomes. The outcomes of the AF project are: i) adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced; ii) coastal ecosystems are rehabilitated and Integrated Coastal Area Management is implemented; and iii) knowledge of climate impacts and adaptation measures is increased. For the LDCF project, the main outcomes are: i) local level capacities and knowledge to effectively analyse the threats and potential impacts of climate change increased; ii) government and public engagement in climate change adaptation activities is enhanced; and iii) vulnerability to climate change is reduced in the coastal zones by means of adaptation interventions and pilot innovations. Through both projects, on-the-ground activities will be implemented in coastal areas, namely: i) three districts in Dar es Salaam (AF project); and ii) Pangani, Bagamoyo, Rufiji and Zanzibar (LDCF project). These activities include: i) rehabilitation of coastal ecosystems; and ii) upgrade and/or construction of infrastructure to protect coastal assets.

C4 EcoSolutions, a climate change adaptation consultancy based in South Africa, was contracted by the VPO to conduct a baseline assessment for both the AF project and LDCF project. The baseline assessment will guide project activities by providing a pragmatic and accurate results framework as well as provide a detailed understanding of current conditions in the project intervention sites. The baseline assessment will also provide a detailed understanding of current conditions at project intervention sites. In adhering to the Terms of Reference (ToRs), the specific tasks of the consultant are to:

i)   assess and briefly describe the status of each of the indicators and where appropriate, validate or further develop the indicators and targets for each outcome and output included in the project documents according to the adaptation results that the projects are aiming to generate;
ii) collect baseline data for the project indicators established;

iii) identify data gaps and agree in consultation with UNEP and the VPO on a methodology to fill in the data gaps; and

iv) develop a sampling design and a data collection and management protocol.

To fulfil the ToRs above, a mission was conducted for the baseline assessment from 15 May to 8 June 2014. During this mission, meetings were conducted with stakeholders from a variety of organisations. In addition, project sites in Dar es Salaam, Pangani, Bagamoyo, Rufiji and Zanzibar (Unguja and Pemba) were visited to collect: i) household survey data; and ii) GPS data that are particular for each project site and intervention. Thereafter, the data that was collected on mission was processed and analysed. These analyses included: i) simple queries in Google Earth and more complex land classification analyses in ArcGIS; and ii) statistical analyses of household survey data. The information that was generated from these analyses was used to: i) define the socio-economic baseline; and ii) update the Results Frameworks (RF) of both projects. Findings from the mission and post-mission data analyses are presented below. These findings are detailed in the body of the report.

- The coastal communities living in Pangani, Bagamoyo, Rufiji and Zanzibar (LDCF project sites) engage in a number of livelihood activities including crop growing, fishing, small businesses and employment. The percentage of household survey respondents that are involved in each of these activities differs from one project site to the next. In contrast, most of the household survey respondents from Dar es Salaam (AF project sites) own small businesses or are employed.

- The RFs of both projects were amended. These amendments were made mostly because: i) the original indicators and targets were not specific, measurable, relevant, achievable and time-bound; and ii) since the project documents were developed, the baseline situation has changed at some sites. In particular, local communities on Pemba Island (Zanzibar) have constructed dykes at Tumbe and Ukele. In addition, local environmental committees have been rehabilitating mangroves. Therefore, local communities and local government authorities have proposed alternative sites. On Unguja Island (Zanzibar), additional sites and activities have been proposed. Baseline data was collected for sites that were listed in the project documents and the additional sites. Therefore, the VPO should consider the information presented in this baseline report and conduct further consultations with technical experts to decide – in conjunction with UNEP – which combination of activities and sites is feasible.

- A number of data gaps need to be filled before targets can be finalised and activities can be implemented. In particular, technical expertise is required to set targets for: i) rehabilitating drainage systems; ii) upgrading and/or constructing seawalls to manage the effects of climate change; and iii) rehabilitating degraded areas of coral reef. In addition, a number of targets and indicators were amended based on the results of extensive desktop analyses. For example, the locations and areas available for mangrove rehabilitation for the LDCF project were determined using a number of desktop sources including project reports, ArcGIS and Google Earth. Therefore, the ToRs for experts for both projects should include activities to: i) fill the data gaps that the baseline assessment has identified; and/or ii) validate the findings of the baseline assessment that require technical input. For example, the coastal zone management specialist should visit sites to validate that identified areas are suitable for restoration. In addition, the specialist that is contracted to conduct the feasibility for the drainage systems and seawalls should: i) identify the locations for rehabilitation of drainage systems; and ii) prioritise lengths of wall to be constructed or upgraded if the budget is not sufficient to implement all recommendations. Therefore, the targets should be validated by these experts and updated if necessary.

- Protocols for monitoring the success of project interventions – including methods to collect and manage data – have been developed. For some of the project activities, technical expertise is required to finalise these protocols.

SECTION 1
1. Introduction

Local communities living in the coastal zone of Tanzania are vulnerable to the negative effects of climate change. In particular, increasing temperatures, Sea Level Rise (SLR) and more erratic precipitation – which are resulting in increased frequency and severity of floods and droughts – are affecting natural ecosystems, community livelihoods and infrastructure. This vulnerability to climate change is exacerbated by non-climate threats. These threats include *inter alia* poverty, dependence on rain-fed agriculture, unsustainable use of natural resources and limited coordination of coastal development. Moreover, local communities are reliant on structures and measures that are implemented by the central state to adapt to climate change. However, within the central state, there is limited institutional capacity and knowledge to manage climate hazards. Therefore, under climate scenarios that predict more significant impacts from SLR and precipitation variation, local communities in Tanzania will become increasingly vulnerable.

With a view to increasing the resilience of Tanzania to the negative effects of climate change, the Government of the United Republic of Tanzania (GoT) is executing two initiatives for climate change adaptation. These projects include: i) the 'Implementation of concrete adaptation measures to reduce vulnerability of livelihoods and economy of coastal communities of Tanzania' supported by the Adaptation Fund (AF) (hereafter called the AF project); and ii) 'Developing Core Capacities to Address Adaptation to Climate Change in Productive Coastal Zones of Tanzania' supported by the Least Developed Countries Fund (LDCF) (hereafter called the LDCF project). The implementing entity/agency for both projects is UNEP. The executing entity/organisation for both projects is the Vice President's Office (VPO) – Division of Environment. The AF project has a budget of US $5,008,564 and the LDCF project a budget of US $3,356,300. Both projects started in 1 November 2012 and will continue for a 60-month period until 30 October 2017.

C4 EcoSolutions (hereafter C4ES), a climate change adaptation consultancy based in South Africa, was contracted by the VPO to conduct a baseline assessment for both the AF project and LDCF project. The baseline assessment will guide project activities by providing a pragmatic and accurate results framework as well as provide a detailed understanding of current conditions in the project intervention sites. The baseline assessment will also provide a detailed understanding of current conditions at project intervention sites. In adhering to the Terms of Reference (ToRs), the specific tasks of the consultant are to:

i)   assess and briefly describe the status of each of the indicators and where appropriate, validate or further develop the indicators and targets for each outcome and output included in the project documents according to the adaptation results that the projects are aiming to generate;
ii) collect baseline data for the project indicators established;
iii) identify data gaps and agree in consultation with UNEP and the VPO on a methodology to fill in the data gaps; and
iv) develop a sampling design and a data collection and management protocol.

Through negotiation on 26 March 2014, it was agreed to remove item (v) of the assignment tasks for the baseline assessment: 'develop bills of quantities of rehabilitation and construction works'. This activity will be undertaken by the feasibility study.

2. Brief description of the AF and LDCF projects

<u>AF Project</u>

The objective of the AF Project is to reduce the vulnerability of ecosystems, infrastructure and the economy in Tanzania. The project sites are in Dar es Salaam, which is the major commercial, administrative and industrial centre of Tanzania. The project is designed to achieve the following three outcomes: i) adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced; ii) coastal ecosystems are rehabilitated and Integrated Coastal Area Management (ICAM) is implemented; and iii) knowledge of climate impacts and adaptation measures is increased. To address the barriers to climate change adaptation, the project proposes an integrated blend of hard and soft coastal protection interventions. In addition, interventions will contribute towards learning and the development of policy linkages to support the upscaling, mainstreaming and replication of lessons learnt into the national development processes. See Table 1 for a summary of outputs and activities.

Table 1. AF project activities and related outputs

Output	Activity
• Seawall raised, rehabilitated, constructed in areas showing particular damage.	Rehabilitate coastal protection facilities to protect settlements economic and cultural infrastructure
• Effective storm and flood drainage systems in urban areas and near coastal communities.	Cleaning up of the drainage channels, rehabilitation of storm drains
• Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones. • Appropriate alternative energy (efficient cook stoves, small solar) technology transferred for avoided deforestation including through training. • Coral reef rehabilitation and protection in coastal sites. • Shoreline stabilisation and rehabilitation using trees and grasses.	Coastal ecosystem rehabilitation for climate resilience through the implementation of a GreenJobs program
• Performance of a baseline study based on coastal vulnerability.	Stocktaking
• Create and operate a Climate change observatory for Tanzania for ongoing monitoring of CZM and Coastal environmental status and scientific research. • Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through undertaking cost-benefit analyses).	Coastal monitoring and assessment
• Lessons learned from the project outputs documented. • District level administration have the capacity to adequately manage rehabilitated infrastructure. • One EBICAM Action Plan for the coastal region is approved.	Policy linkages

The purpose of the LDCF project is to address urgent and immediate adaptation needs in four targeted vulnerable coastal sites. These include Pangani District, Bagamoyo District, Rufiji District and Zanzibar (Unguja and Pemba). The project is designed to achieve the following three outcomes: i) local level capacities and knowledge to effectively analyse the threats and potential impacts of climate change increased; ii) government and public engagement in climate change adaptation activities is enhanced; and iii) vulnerability to climate change is reduced in the coastal zones by means of adaptation interventions and pilot innovations. Interventions will address the systematic barriers to climate change adaptation and strengthen existing soft and hard infrastructure for coastal protection. See Table 2 for a summary of activities and related outputs.

Table 2. LDCF project activities and related outputs

Output	Activity
Climate change impact assessment capacity established for project sites (monitoring climate changes)	• District level training on sectoral, livelihoods and planning, climate and economic vulnerability and Participatory Vulnerability Assessments (PVA) (3 training workshops). • Procure and provide district-level training on coastal vulnerability modeling tools (DIVA, COSMO).
Detailed participatory coastal vulnerability assessment for Rufiji, Bagamoyo and Pangani districts and Zanzibar	• Produce coastal vulnerability models and maps and a costal vulnerability index for Tanzania. • Perform PVA, revise existing land use policies to integrate climate adaptation and prepare policy recommendations including budget allocations.
Public engagement in climate change adaptation activities is enhanced	• Strengthening of non-governmental organisation (NGO) and community-based organisation (CBO) network on climate change. • Implementation of an awareness campaign focused on climate change in Coastal zones.
Student internship program established for interns to project sites	• Creation and administration of a climate change internship program for undergraduate and graduate students.
Knowledge is integrated into university curriculum	• Perform a curriculum assessment for potential integration of climate change (CC) as multidisciplinary course of study within formal curriculum review. • Develop pilot courses and educational materials for streamlining CC into selected courses. • Train academic staff and deliver pilot courses.
Mangroves are restored in pilot sites	• Restore mangroves using locally available resilient tree species (Rufiji, Zanzibar, Pemba). • Creation and local enforcement of no-take zones and buffer areas in rehabilitated mangroves. • Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring.

Water resources are protected from sea level rise and erosion and coastal communities have access to safe water	• Decommission and relocate salinized wells (Bagamoyo). • Water harvesting systems implemented (Bagamoyo). • Train communities on water conservation, management and recycling (Bagamoyo).
Coastal infrastructure and assets are protected	• Rehabilitation and upgrade of Pangani seawall, Kisiwa Panza seawall and Bwawani seawall. • Dyke, groyne and spillway reconstruction at Ukele and Tumbe west (Zanzibar).

3. Link between projects' activities and vulnerability

The objective of the AF project is to "reduce the vulnerability of ecosystems, infrastructure and economy in Tanzania through implementation of concrete and urgent adaptation measures". Similarly, the LDCF's objective is to "develop institutional capacities to manage climate change impacts through improved climate information, technical capacity, through the implementation of concrete adaptation measures and innovative solutions to reduce vulnerability in key vulnerable areas, and learning". To achieve these objectives, on-the-ground activities implemented by both the AF and LDCF projects will reduce the vulnerability of coastal communities living at project sites. The conceptual framework for vulnerability is based on the Intergovernmental Panel on Climate Change's (IPCC's) definition of vulnerability: "[It is] the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity; and its adaptive capacity"[1]. Vulnerability is a complex characteristic that can be measured at a range of spatial scales. Therefore, a standard tool cannot be applied to measure and compare vulnerability across countries[2]. It is best understood as an aggregation of three components: exposure, sensitivity and adaptive capacity. Each of these components is described below.

- Exposure is the nature and degree to which a system is exposed to significant climatic variations.
- Sensitivity is the responsiveness of a system to climatic influences, which are shaped by both socio-economic and environmental conditions.
- Adaptive capacity is the ability of local communities to cope with a hazard, reorganise their resources and minimise loss at different levels. The main determinant of adaptive capacity is access to resources/capital (natural, financial, social, human and physical).

The impacts of the on-the-ground activities of the AF and LDCF project – particularly on the components of vulnerability – are described in Table 3 and 4 below. Project interventions for increased institutional and technical capacity at national level are excluded from the tables below, as these interventions do not have an immediate impact on exposure, sensitivity or adaptive capacity of communities. Although the project activities will contribute to reducing the vulnerability of coastal communities at all sites, the impact of project activities will vary greatly because: i) there are a number of intervention types – and combinations of interventions – at the different sites (e.g. mangrove rehabilitation in Rufiji vs. mangrove and seawall rehabilitation in Zanzibar); and ii) the geographic extent of interventions is variable (e.g. rehabilitating pockets of mangroves in 3,000 ha of Rufiji vs. 10 ha in Pangani). In addition, there are noticeable

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[1] Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E. (eds.) 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC. Cambridge University Press: Cambridge.

[2] PROVIA. 2013. PROVIA Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change. Consultation document, United Nations Environment Programme, Nairobi.

differences in the vulnerability of coastal communities between project sites at project inception. For example, more than 50% of household survey respondents at Pangani are small business owners or employed while only 27% are farmers (Figure 1 in Section 6). In contrast, more than 50% of respondents in Zanzibar are farmers and 31% are small business owners or employed (Figure 4 in Section 6). Therefore, local communities in Zanzibar are more vulnerable to weather extremes – such as droughts – than those living in Pangani. Sensitivity is influenced by socio-economic and environmental conditions. Therefore, external variables could decrease sensitivity of the targeted communities, thereby reducing their overall vulnerability. For example, strengthened trade markets could decrease the sensitivity of small-business owners and employees.

Because of the socio-economic complexities described above, it is difficult to accurately determine the baseline vulnerability of coastal communities to the effects of climate change. In addition, it is impossible – given the time and resource limitations – to track the impact of project interventions exclusively on the vulnerability of these local communities. Therefore, the overall impact of the projects on the vulnerability of local communities at project sites has not been included in the Results Framework (RF) of any of the projects.

Table 3. Link between the activities of AF project and vulnerability

Activity	Vulnerability indicator	Vulnerability component	Expected impact on vulnerability	Site-specific notes
Outcome 1: Adverse impacts of SLR and floods on coastal infrastructure and settlements are reduced				
Rehabilitate coastal protection facilities to protect settlements and economic and cultural infrastructure.	• Beach erosion	Sensitivity	Coastal communities are vulnerable to the negative effects of SLR. A direct effect of this climate-related hazard is erosion of beaches and damage to economic and cultural infrastructure located along these areas. The upgrade of seawalls will protect beaches from erosion thereby protecting the coastal infrastructure and communities living near the beaches.	The economic and cultural infrastructure located near the seawall in Dar es Salaam includes the Ocean Road currently known as Obama road in Ilala and the Mwalimu Nyerere Memorial Academy in Kigamboni. The effects of project activities will only be realised behind the stretch of seawall that will be upgraded.
Clean up the drainage channels and rehabilitate storm drains in Dar es Salaam.	• Health • Urban floods[3]	Sensitivity	The capacity of drainage infrastructure to mitigate the negative effects of climate change – including flooding of drains because of extreme rainfall – has an impact on the vulnerability of urban communities. Improved design and cleaning of drainage channels and stormwater drains will improve the flow and drainage of water from project sites in Dar es Salaam during periods of increased rainfall. This improved drainage system will reduce damage caused by flooding events in Dar es Salaam. Therefore, the health of urban communities living around these areas will be improved.	The effects of upgrading drainage infrastructure will be localised to the project sites. These sites are as follows: **Kinondoni Municipality:** i) Tandale street in Tandale ward; and ii) Kawe street in Kawe ward. **Ilala Municipality:** i) Bungoni Street in Buguruni ward. **Temeke Municipality:**

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[3] "Urban floods" are included in the survey as an indicator of exposure. Generally, projects for adapting to climate change do not impact indicators of exposure. For the purpose of assessing vulnerability for the AF project, "urban floods" will be regarded as an indicator of sensitivity: i.e. the response of the drainage infrastructure in the city to erratic rainfall.

				i) Miburani-Mtoni Bustani streets in Mtoni ward; and
				ii) Butiama Street (Butiama drainage) in Kijichi ward
Outcome 2: Coastal ecosystems are rehabilitated and ICAM is implemented				
Transfer appropriate alternative energy technology (efficient cookstoves).	• Health	Sensitivity	By providing cookstoves to a number of local communities in Ilala, Kinondoni and Temeke Districts, the woodfuel efficiency of households in these areas will increase. However, this increased efficiency will not have a direct effect on deforestation rates in these districts because most charcoal is produced in areas outside of Dar es Salaam and imported into the city. However, efficient cookstoves promote improved health because they produce less smoke.	The effect of using an efficient cookstove instead of an open fire on the health of targeted households can only be truly measured using quantitative data on health over a number of years.
Rehabilitate mangroves through planting resilient seedlings, dredging and creating no-take buffer zones. Rehabilitate and protect degraded coral reefs.	• Beach erosion • Supply of fish • Livelihood sources • Changes in natural environment		Mangroves act as buffers for coastal areas to SLR and storm surges[4]. In addition, they provide habitats for fish and other sea animals on which many coastal communities depend for their livelihoods[5]. By rehabilitating mangroves, beach erosion will be reduced in areas behind these ecosystems. In addition, these rehabilitated ecosystems will provide habitats for sea animals. Most of the expected impacts from rehabilitating mangroves will only accrue once the mangrove ecosystems have established after the AF project has terminated. Coral reefs provide the following ecosystem services and goods: i) buffers for coastal areas to	Mangrove rehabilitation will be at either Selander Bridge, Kunduchi, Mbweni and/or Unumio. Therefore, benefits from this project activity will only be realised in the selected areas.

[4] Mustelin, J., Asseid, B., Haji, T., Khamis, M., Klein, R., Mzee, A. and Sitari, T. 2009. Practical measures to tackle climate change: coastal forest buffer zones and shoreline change in Zanzibar, Tanzania. Department of Geography, University of Turku, Finland.
[5] Semesi, A.K., Myaga, Y., Muruke, M., Francis, J., Julius, A., Lugomela, C., Mtolera, M., Kuguru, B., Kivia, D., Lilungulu, J., Magege, D., Mposo, A., Kaijunga, D., Mwinoki, N., Msumi, G. and Kalangahe, B. Coastal resources of Bagamoyo District, Tanzania. Joint study between Department of Botany, Department of Zoology and Marine Biology and Institute of Marine Sciences, University of Dar es Salaam, Bagamoyo District Natural Resources Office, Bagamoyo, Mafia Island Marine Park, Mafia and Prawtan Ltd., Bagamoyo.

			SLR and storm surges[6]; ii) habitats for food products; and iii) livelihoods from snorkelling, diving and other beach-related tourism. Rehabilitation of degraded coral reefs will enhance these ecosystem goods and services from coral reefs on the shoreline of Dar es Salaam. However, most of the expected benefits from rehabilitating these reefs will only accrue once the ecosystems have established after the AF project has terminated.	==Update with information about location of coral reefs==
Rehabilitate and stabilise shoreline using trees and grasses.	• Beach erosion • Changes in natural environment		More intact and stable shoreline vegetation will reduce coastal erosion thereby protecting infrastructure located behind this vegetation.	The shoreline vegetation will be rehabilitated behind the seawall to be upgraded. The combination of both "soft" and "hard" measures will increase the climate-resilience of the stretch of land in front of economic and cultural infrastructure in Dar es Salaam, including the State House. Because this project activity is localised, effects will only be realised behind the stretch of vegetation to be rehabilitated. However, the public of Dar es Salaam uses this green space as a walkway and recreation area.

Table 4. Link between the activities of LDCF project and vulnerability

Activity	Vulnerability indicator	Vulnerability component	Expected impact on vulnerability	Site-specific notes
Outcome 2: Government and public engagement in climate change adaptation activities is enhanced				

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[6] Santavy, D., Fisher, W., Campbell, J. and Quarles, R. 2012. Field manual for coral reef assessments. U.S. Environmental Protection Agency, Office of Research and Development, Gulf Ecology Division, Gulf Breeze, FL. EPA/600/R-12/029.

Strengthen NGO network on climate change to include CBOs from local project sites.	• Conceptual awareness • Engagement	Adaptive capacity	Enhanced awareness on climate change – and regular engagement through the network – will promote the adaptive capacity of local communities to climate change. Therefore, the vulnerability of these local communities will be reduced.	The effects of the LDCF project should be similar among all sites.
Implement an awareness campaign focused on climate change in vulnerable sites.	• Conceptual awareness • Engagement • Information/training	Adaptive capacity	Enhanced awareness on climate change will promote the adaptive capacity of local communities to climate change. The awareness campaign should include information on techniques for local communities to adapt to climate change thereby increasing their adaptive capacity. Therefore, the vulnerability of these local communities will be reduced.	The effects of the LDCF project should be similar among all sites.
Outcome 3: Vulnerability to climate change is reduced in the coastal zones through adaptation interventions and pilot adaptations				
Restore mangroves using locally available species.	• Beach erosion • Supply of fish • Livelihood sources • Changes in natural environment	Sensitivity	Mangroves act as buffers for coastal areas to SLR and storm surges[7]. In addition, they provide habitats for fish and other sea animals on which many coastal communities depend for their livelihoods[8]. By rehabilitating mangroves, beach erosion will be reduced in areas behind these ecosystems. In addition, these rehabilitated ecosystems will provide habitats for sea animals. Most of the expected effects from rehabilitating mangroves will only accrue once the mangrove ecosystems have established after the LDCF project has terminated.	Mangroves will be rehabilitated in Pangani, Rufiji and Zanzibar. However, the effect of these activities on the sensitivity of local communities will differ between these sites relative to the area of mangroves that are rehabilitated.

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[7] Mustelin, J., Asseid, B., Haji, T., Khamis, M., Klein, R., Mzee, A. and Sitari, T. 2009. Practical measures to tackle climate change: coastal forest buffer zones and shoreline change in Zanzibar, Tanzania. Department of Geography, University of Turku, Finland.

[8] Semesi, A.K., Myaga, Y., Muruke, M., Francis, J., Julius, A., Lugomela, C., Mtolera, M., Kuguru, B., Kivia, D., Lilungulu, J., Magege, D., Mposo, A., Kaijunga, D., Mwinoki, N., Msumi, G. and Kalangahe, B. Coastal resources of Bagamoyo District, Tanzania. Joint study between Department of Botany, Department of Zoology and Marine Biology, and Institute of Marine Sciences, University of Dar es Salaam, Bagamoyo District Natural Resources Office, Bagamoyo, Mafia Island Marine Park, Mafia and Prawtan Ltd., Bagamoyo.

Strengthen local capacity to protect mangroves.	• Changes in natural environment	Sensitivity	By developing and implementing sustainable mangrove protection plans with the local environmental committees, the condition of mangroves at these sites will be improved.	The effects of the LDCF project should be similar among all sites.
Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring.	• Changes in natural environment	Sensitivity	There is a need to increase the awareness on the importance of mangroves among local communities at project sites[9]. By strengthening associations for mangrove management and establishing local community-based nurseries, there will be increased responsibility within the local communities at these sites to conserve the mangrove ecosystems that surround them. This increased responsibility and awareness will result in fewer illegal activities in these ecosystems – such as clearing of land or logging – and the improved condition of mangroves. The plans that are developed for mangrove and nursery management should be integrated into the sustainable mangrove protection plans.	The effects of the LDCF project should be similar among all sites.
Upgrade infrastructure to increase year-round supply of freshwater in Bagamoyo District.	• Fresh water availability • Health	Sensitivity	Decommissioning of salinised wells and constructing new wells and water harvesting systems will provide access to freshwater for local communities for domestic, agricultural and small-scale commercial use. The increased supply of freshwater for domestic use – including cooking and drinking – will promote the improved health of the local community. In addition, access to freshwater will support local farmers during dryer months.	Activities for improved freshwater availability are only being implemented in Bagamoyo. Therefore, the effects will only be realised at these project sites.
Implement water-harvesting systems.	• Fresh water availability • Health	Sensitivity		
Train communities on water conservation, management and recycling.	• Fresh water availability • Health	Sensitivity Adaptive capacity	Strengthened capacity of the local community to conserve, manage and recycle water will result in increased availability of freshwater. This increased supply of freshwater will be used by these local communities for domestic, agricultural and small-scale commercial use.	

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[9] Raphael, S. 2014. Personal communication with District Mangrove Officer, Rufiji.

Upgrade seawalls.	• Beach erosion	Sensitivity	Coastal communities are vulnerable to the negative effects of SLR. Direct effects of this climate-related hazard include erosion of beaches and damage to infrastructure and households located along these areas. The upgrade of seawalls will protect beaches from erosion thereby protecting the coastal communities living near the beaches. Construction of dykes and spillways will provide similar protection. The upgrade of an irrigation drain will also protect livelihood assets – in particular agricultural lands – by decreasing the likelihood of these soils becoming waterlogged with seawater.	Activities to upgrade seawalls are being implemented in Pangani, Kisiwa Panza and Bwawani. The effects are expected to differ between project sites relative to the length of wall to be rehabilitated.
Upgrade dykes, groynes and spillways, irrigation and drainage systems to protect livelihood assets.	• Beach erosion	Sensitivity		Activities to construct dykes and spillways will occur at one or more of the following project sites[10]: Tumbe East, Tumbe West, Tovuni and Ukele (Pemba Island, Zanzibar). The local community has recommended: i) the upgrade of an irrigation drain at Tibirinzi and a drainage system at Mnazi Mmoja (both Pemba Island, Zanzibar); and ii) the construction of groynes at Kilimani (Unguja, Zanzibar). Therefore, effects from these activities will only be realised at these project sites.

[10] Since the project document was developed, the local communities at some of the original proposed sites on Pemba Island have constructed dykes. These constructed dykes should be assessed to determine if they are suitable to manage current and predicted effects of climate change. If these dykes are not suitable, they should be upgraded (i.e. raised and strengthened).

SECTION 2

1. Study Area

Within the LDCF project, on-the-ground activities will be conducted in: i) Pangani Town in Pangani District, Tanga Region; ii) the towns of Dunda, Gongo, Kaole, Kibindu, Kwamduma, Kwamsanja, Magomeni, Makuruge, Milingotini and Saadani in Bagamoyo District[11], Pwani Region; iii) Nyamisati Delta in Rufiji District, Pwani Region; and iv) Bwawani, Kisiwa Panza, Tumbe East and West, and Ukele in Zanzibar[12] (Maps 1 – 12 in Annexure 1). Alternative project sites in Zanzibar include: Kilimani, Mnazi Mmoja, Tibirinzi and Tovuni (Maps 13 – 16 in Annexure 1). The sites in Bagamoyo, Pangani, Rufiji and Zanzibar are located in rural areas. On-the-ground activities to be conducted within the AF project will focus on three districts in Dar es Salaam and surrounds, namely Ilala, Kinondoni and Temeke (Map 18 in Annexure 1). In contrast to the LDCF project, the sites in Dar es Salaam are located in urban areas.

Intervention sites for the LDCF and AF projects are located in the wet sub-zone of the Lowland Coastal Zone of Tanzania. Annually, this sub-zone receives an average precipitation of 1,800 mm. The soils in Pangani, Bagamoyo and Dar es Salaam are infertile and sandy while the Rufiji area has alluvial soils. Generally, eastern Zanzibar islands have shallow, acidic, infertile, rocky coral rags soils while the islands in the west have deep, fertile soils[13]. The land cover at intervention sites located in rural areas comprises coastline, coastal vegetation and agricultural land. Villages and/or towns in which targeted communities live are located near the coastline. In the coastal city of Dar es Salaam, most of the land is covered by urban and suburban buildings and infrastructure.

2. Methodology

This report presents the results of the baseline assessment undertaken during a mission to Tanzania from 15 May 2014 to 8 June 2014. During this mission, meetings were conducted with stakeholders from a variety of organisations (See Annexure 2). In addition, project sites in Dar es Salaam, Pangani, Bagamoyo, Rufiji and Zanzibar (Unguja and Pemba) were visited to collect: i) household survey data; and ii) GPS data that are particular for each project site and intervention. See Annexure 3 for an overview of the mission and detailed workplans for each site.

Surveys were used to collect data at a household level on: i) demographics and socio-economic conditions; ii) awareness on climate change; iii) perceptions on climate-related hazards; iv) effect of the climate-related hazards on livelihoods; v) access to climate information and training; and vi) current adaptation to climate change. Structured questionnaires for both projects were developed prior to the mission (See Annexure 4 and 5). While collecting data, a random gender-

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[11] During the project development phase, the following towns were identified as project sites: Kaole, Kibindu, Kwamduma, Kwamsanja, Makuruge and Saadani. Since project inception, the following additional towns have been identified: Dunda, Gongo, Magomeni and Milingotini. Project activities might not be implemented in all of these areas.

[12] During the project development phase, the following areas were identified as project sites: Bwawani, Kisiwa Panza, Tumbe East and West and Ukele. Since then, local communities have implemented activities in Tumbe East and West and Ukele, Therefore, Tibirinzi and Tovuni areas have been identified as substitute areas for project activities. However, activities that the local communities have conducted should be assessed to determine if they are adequate (i.e. if project activities should be conducted in substitute areas).

[13] Y.H., Kombo, Juma, S., Fakih, S., Abass, T. and Oliver, D. 2004. Vegetation reconnaissance survey of Kiwengwa Forest Reserve of Zanzibar – Tanzania. Department of Commercial crops, fruits and forestry. Available at http://coastalforests.tfcg.org/pubs/Vegetation_Kiwengwa_Znz.pdf . Accessed on 26 June 2014.

sensitive selection of households was adopted[14]. In total, 314 surveys were conducted (See Annexure 6 for a list of respondents from household surveys and Annexure 7 for descriptive results of socio-economic surveys).

Intervention sites for mangrove rehabilitation and coastal infrastructure rehabilitation and/or construction were also visited. Because of limited time, rapid assessments were conducted at proposed mangrove rehabilitation sites. To this end, the following activities were carried out: i) GPS data were collected on land cover classes and vegetation health; and ii) photographs were taken. At sites where upgrade and/or construction of infrastructure will take place, the dimensions of existing infrastructure were measured, and visual observations were recorded with corresponding photographs and GPS points. These GPS points and measurements were used to calculate the total length of infrastructure that should be upgraded and/or constructed for each project site[15]. See Figures 2 and 7-9, 11-17 and 19 in Annexure 1.

The household data were analysed using descriptive statistics to define the socio-economic baseline. In addition, indices for climate change awareness were constructed for each of the project sites (See Annexure 6). The GPS points and photographs were assessed and sorted to describe the condition of areas for: i) mangrove rehabilitation; and ii) infrastructure upgrading/construction.

The condition of degraded mangrove and coastal vegetation areas was also assessed further at a desktop level using a Geographic Information System (GIS). For known, smaller locations, polygons of proposed intervention sites were digitised manually using: i) the GPS points that were collected on mission; ii) Google Earth Imagery; and iii) LANDSAT™ images. For larger project sites in which particular areas for rehabilitation were not identified, GIS analyses were conducted to identify patches of bare saline soil. To conduct these analyses, the GPS points collected in the field were used to perform land classification analyses. Classification was derived from LANDSAT™ satellite imagery using ESRI ArcGIS software. Three LANDSAT™ images, consisting of seven bands, were acquired. All bands were assigned the UTM37S coordinate system. False colour composites of the LANDSAT™ images were created using bands 3, 2 and 1 displayed with their red, green and blue components displayed respectively.

Training sites for each land cover type (healthy mangrove, degraded mangrove, agricultural areas, water bodies etc.) were developed as the first step in supervised classification. Training classes were identified using GPS points collected in the field and digitized on-screen to create a vector file of training site polygons. Several training sites for each training class were digitised to ensure a sufficient number of pixels. Following training site development, statistical characterisations of each informational class – termed signatures – were created and the resulting histograms and scatterplots analysed to evaluate the signatures. The maximum likelihood classifier was used to create the land cover classification for each proposed site for mangrove rehabilitation.

3. Socio-economic findings

For descriptive results of the household surveys, see Annexure 7. The coastal communities living in Pangani, Bagamoyo, Rufiji and Zanzibar engage in a number of livelihood activities.

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[14] At each project site, women-headed households were interviewed whenever possible to capture gender-representative information.

[15] Upgrading existing infrastructure includes i) raising the height of and/or rehabilitating existing infrastructure that is crumbling/cracking/collapsed or ii) replacing existing infrastructure. Construction of additional infrastructure will take where i) there is no existing infrastructure or ii) the length of the existing infrastructure needs to be extended.

Popular livelihood activities include crop growing, fishing, small businesses[16] and employment[17]. Growing crops is a more popular livelihood activity on Zanzibar than any other project site, with 57% of households reportedly engaging in this activity (Figures 1 - 4). In Bagamoyo and Pangani, 14% of surveyed households reported engaging in fishing activities, which is the highest percentage among project sites (Figures 1 - 4). Small business activity is more prominent in Pangani than any other project site, with 36% of households reportedly engaging in this activity (Figures 1 - 4).

Figure 1. Livelihood activities of survey respondents in Pangani.
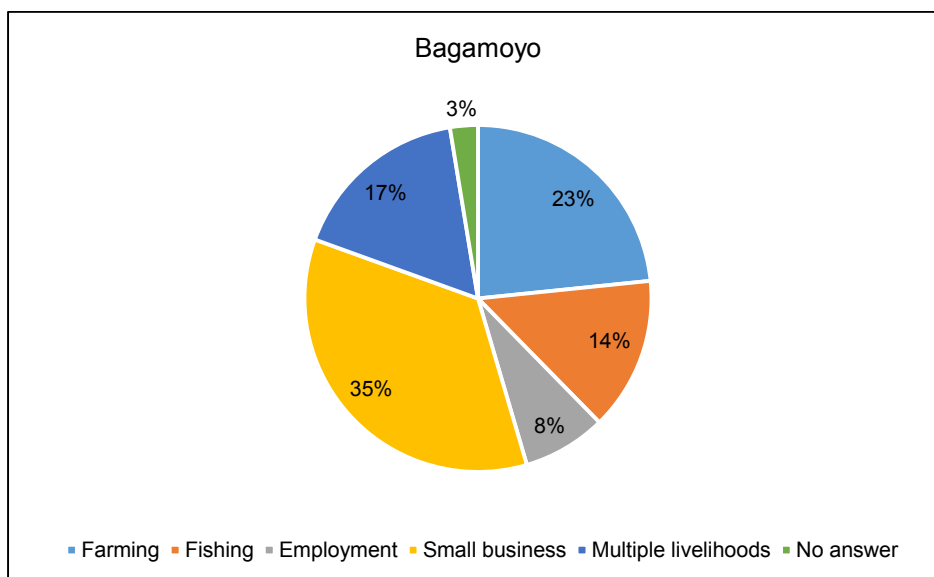
Figure 2. Livelihood activities of survey respondents in Bagamoyo.

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[16] Including the harvesting and selling of seaweed.
[17] Based on household surveys that were conducted at each intervention site.
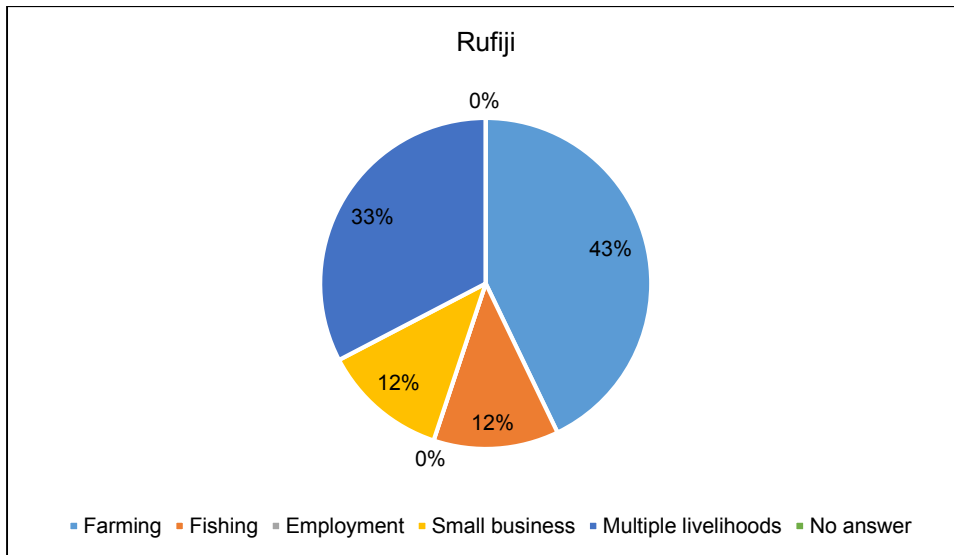
Figure 3. Livelihood activities of survey respondents in Rufiji.
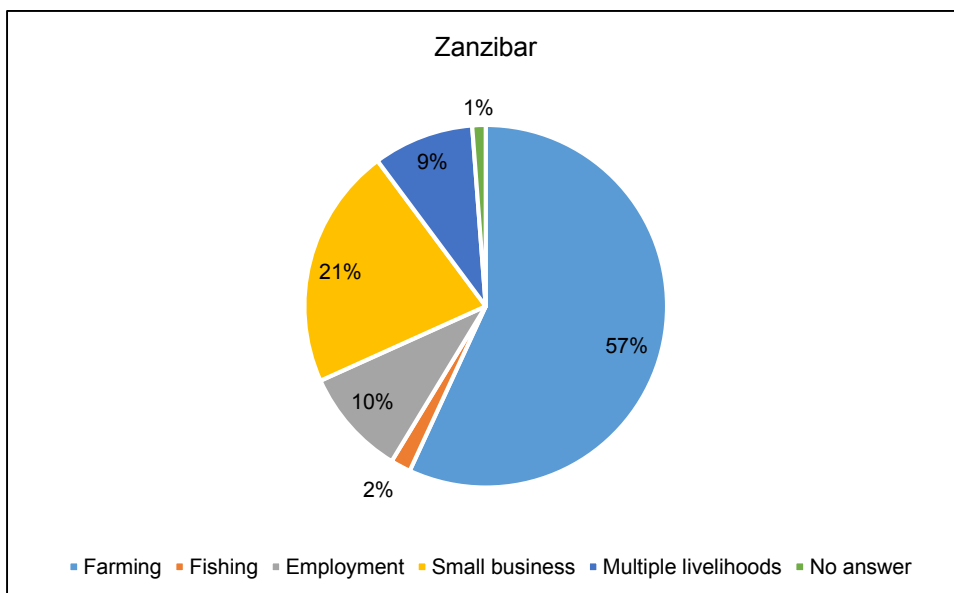
Figure 4. Livelihood activities of survey respondents in Zanzibar.

In LDCF project sites, the primary crops cultivated by survey respondents are rice, cassava and bananas (Figure 5). In Rufiji, rice is grown by most household survey respondents (70%<) that are involved in growing crops. Other crops that are grown include avocado, breadfruit, cashew, clove, coconut, lime, mango, oranges, potato, sweet potato, sorghum, tomato and yam.
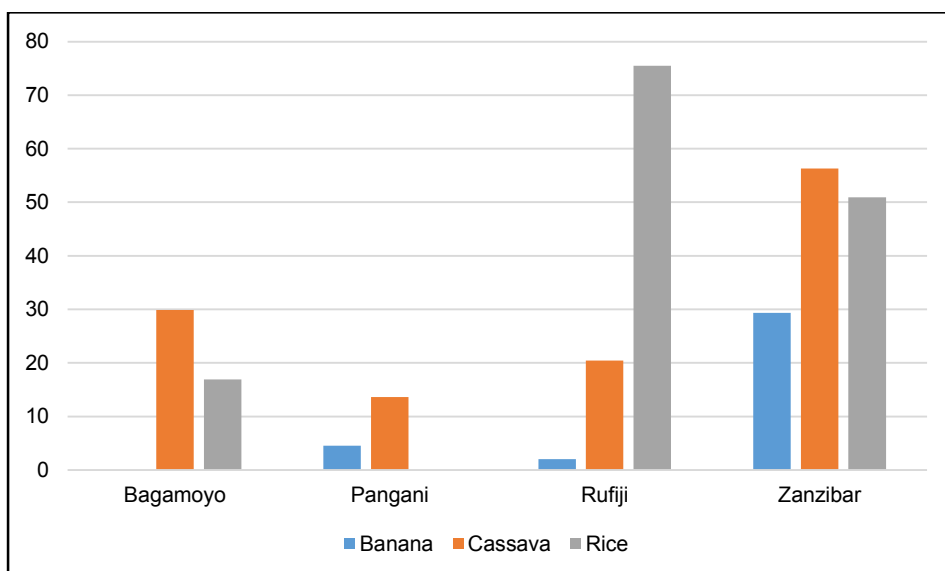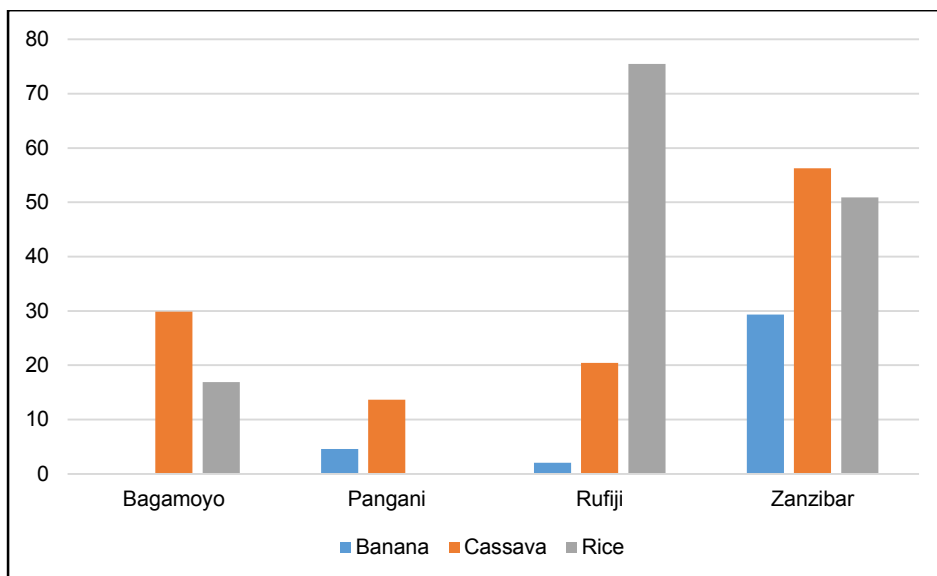
Figure 5. Percentage of different crops cultivated by people in different project sites.

In Dar es Salaam, most of the local community either is involved in small business activities or employed (Figures 6–8). In all the districts, fewer than 15% of households that were interviewed are involved in farming activities. Similarly, fishing was not recorded as a popular livelihood activity, with only 1% of households in Ilala District involved in this activity.
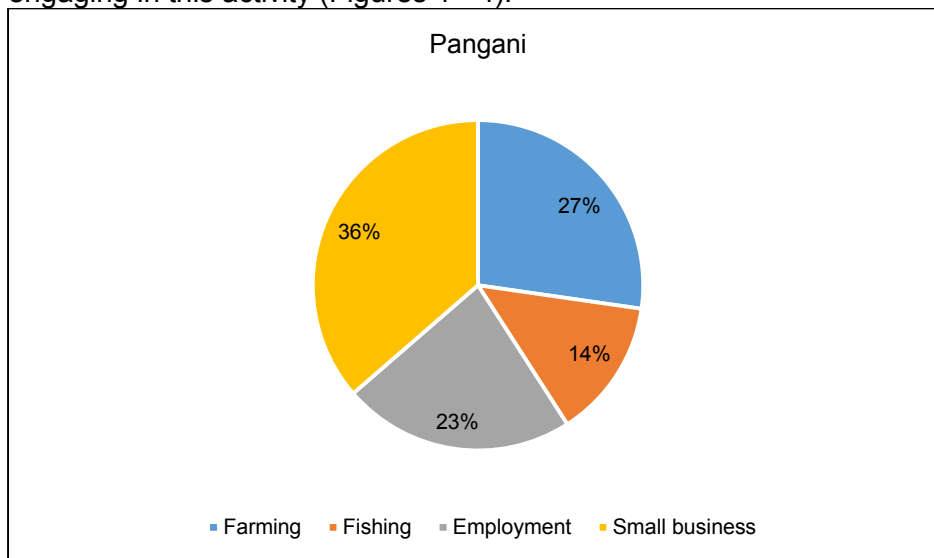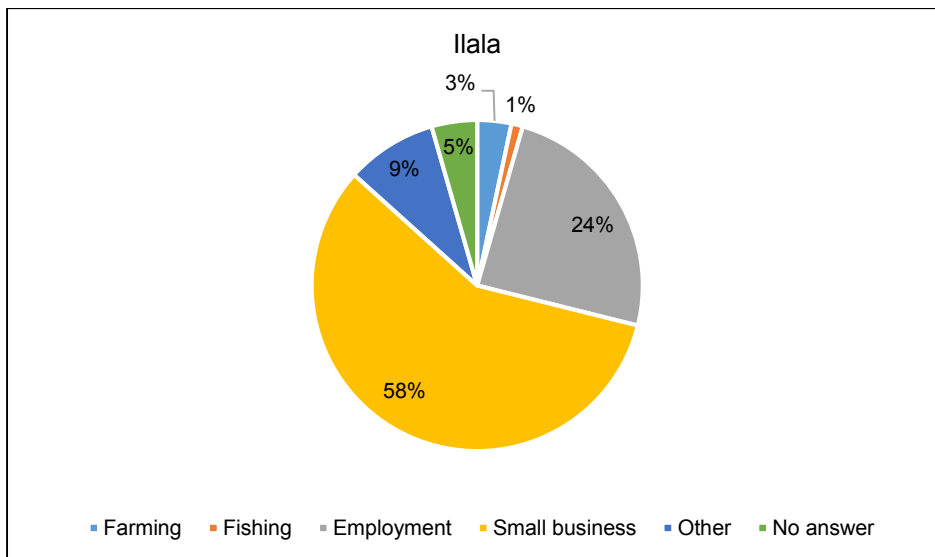
Figure 6. Livelihood activities of survey respondents in Ilala.
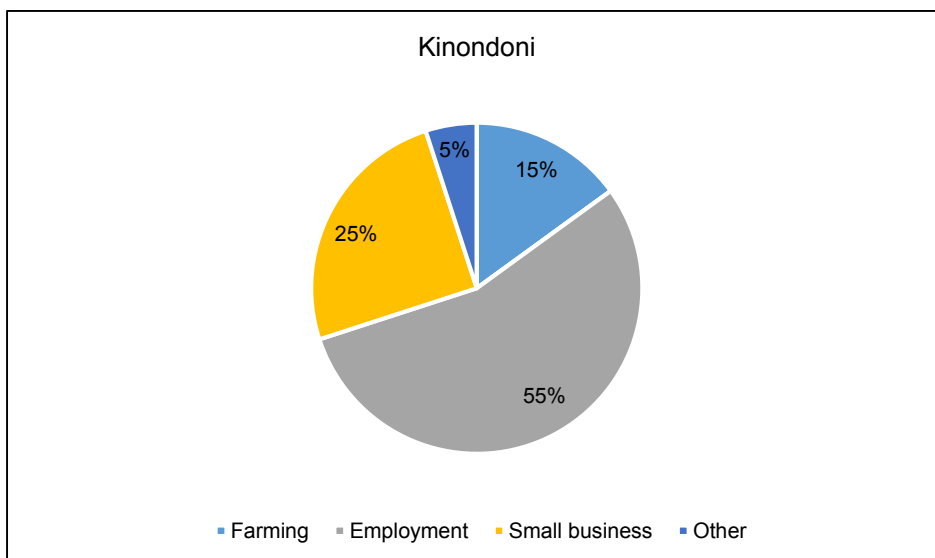
Figure 7. Livelihood activities of survey respondents in Kinondoni.
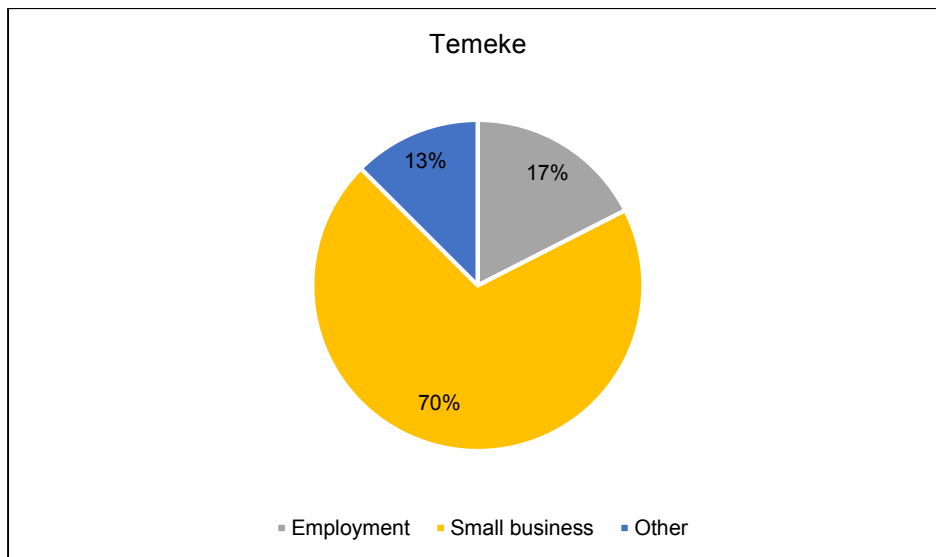
Figure 8. Livelihood activities of survey respondents in Temeke.

4. Assessment of project indicators

During the development of the project documents, indicators and targets were developed to track implementation progress and achievement of results. In the following section, the original indicators contained in the Results Frameworks of the project documents are evaluated against a range of criteria.

<u>Indicator assessment methodology</u>

A valuable indicator is: i) relevant for capturing changes resulting from project implementation; and ii) practical and cost-effective in terms of data collection and management. The suitability of the original project indicators was determined by evaluating them against a set of criteria that were developed using the SMART criteria[18] and AF checklist for selecting indicators[19]. SMART stands for:

1. **S**pecific: the indicator is clear and captures – without ambiguity – the essence of the desired result;
2. **M**easurable: the indicator is reliable and provides a clear measure of results. It describes how the achievement of the result would be measured. Each variable mentioned in the indicator statement should be measurable with reasonable cost and effort; and the indicator should be able to be disaggregated according to gender;
3. **A**ttainable: the indicator provides a clear direction of the anticipated change and a baseline (current) value could be provided for each and every variable in the indicator statement (apart for Yes/No indicators);
4. **R**elevant: the indicator captures the essence of the desired result and is formulated to take into account the target groups' needs and expectations; and
5. **T**ime-bound: a target with a specified timeframe can be set for each variable in the indicator statement (apart for Yes/No indicators).

Furthermore, these criteria were expanded to include additional concepts such as gender and age.

<u>Indicator assessment</u>

During the inception of the baseline study, a preliminary assessment of the original project indicators was conducted. The results of this preliminary assessment – in conjunction with the data and information that was collected during the baseline mission – were used to inform the development of amended indicators in this baseline report. These amended indicators are described for the AF and LDCF projects below. The indicators have been amended to focus only on the activities of the AF and LDCF projects. Thus, many of the baselines were amended to zero values. In this methodology, only the activities of the projects are measured and the targets cannot be met through the interventions of other initiatives. The indicator is therefore specific. However, as the baseline value is zero it does not capture the activities

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[18] Meyer, P.J. 2003. What would you do if you knew you couldn't fail? Creating S.M.A.R.T Goals. Attitude is Everything: If you want to succeed above and beyond. Meyer Resources Group, Inc. ISBN: <u>978-0-89811-304-4.</u>
[19] Adaptation Fund. 2011. Results Framework and Baseline Guidance: Project Level.

of other initiatives. This information is summarised in the text below each amended indicator to prevent a duplication of efforts and provide more information on the current conditions on the ground. Thus, the text below each indicator is important to understand the baseline situation for each indicator.

Adaptation Fund

Component 1: Addressing climate change impacts on key infrastructure and settlements

Activity: Rehabilitate coastal protection facilities to protect settlements economic and cultural infrastructure
Output: Seawall raised, rehabilitated, constructed in areas showing particular damage.

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Length of seawalls raised, rehabilitated, constructed (m).	Dar es Salaam seawall (2.6km) showing signs of severe degradation along Ocean road and Kigamboni.	1335 linear meters of seawall rehabilitated along the Ocean Road (Kivukoni-Upanga East) and Kigamboni.	• The baseline was updated. • The indicator and target were amended to be specific, time-bound and attainable.	• Engineering reports • Physical assessments (including photographs and GPS coordinates).
Amended	Length of seawalls upgraded by the AF project (m) to manage the effects of climate change.	0 0	By project end-point: • 145 meters of seawall upgraded along Kigamboni seawall. • 221 meters of seawall constructed in Kigamboni. • 800 meters of seawall upgraded along Ocean Road. • 500 meters constructed along Ocean Road.		

In Kigamboni, 366 m of coastline was assessed in front of the Mwalimu Nyerere Memorial Academy (see Figure 19 in Annexure 1). The current infrastructure in Kigamboni is an *ad hoc* combination of gabion seawall and concrete seawall that shows signs of severe degradation and in parts complete collapse. Along Ocean Road, 2.36 km of coastline was assessed from the State House to the Aga Khan hospital (see Figure 18 in Annexure 1). The seawall along Ocean Road shows signs of moderate to severe degradation at parts. This is because *ad hoc*

maintenance has been conducted by the government. For full descriptions of the Ocean Road and Kigamboni seawalls – including a visual assessment – see Annexure 8 and 9, respectively.

Currently, the seawalls are not the appropriate height, texture nor shape to manage the effects of climate change. As a result, multiple forms of degradation – including cracking, crumbling and scour – were noticed along the lengths of the seawalls. Scour occurs because waves impact the smooth structure and are displaced upwards. When the water falls back down, its force causes a scour hole to develop in front of the structure[20] (see Figure 9 below). Additionally, the Kigamboni seawall was flanked by coastal erosion as a result of the longshore component of scour (see Figure 10 below). To determine appropriate dimensions for the seawall as well as exact sites along lengths that need to be upgraded and constructed, a seawall engineer should be consulted.
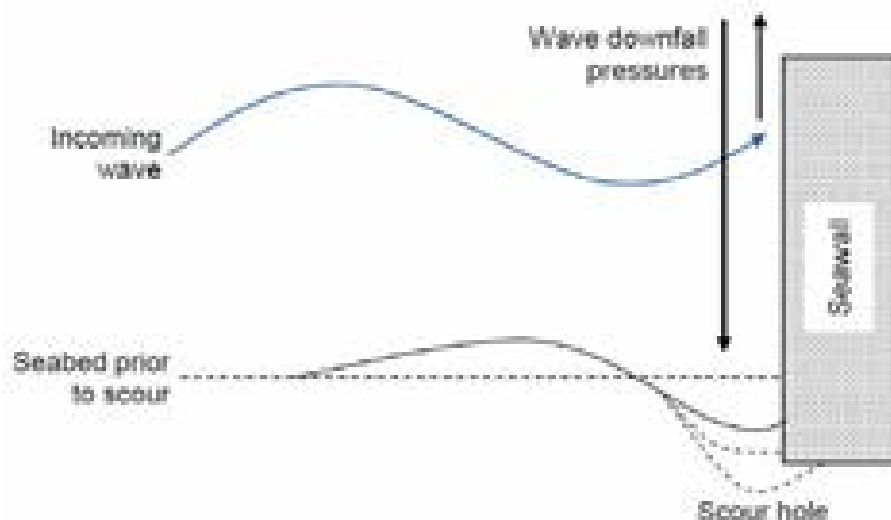
Figure 9. Schematic cross-section illustrating seawall scour[21]

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[20] Linham, M.M. and Nicholls, R.J. 2010. Technologies for climate change adaptation: coastal erosion and flooding. UNEP/Riso TNA guidebook series. Available at: http://tech-action.org/.
[21] Linham, M.M. and Nicholls, R.J. 2010. Technologies for climate change adaptation: coastal erosion and flooding. UNEP/Riso TNA guidebook series. Available at: http://tech-action.org/.
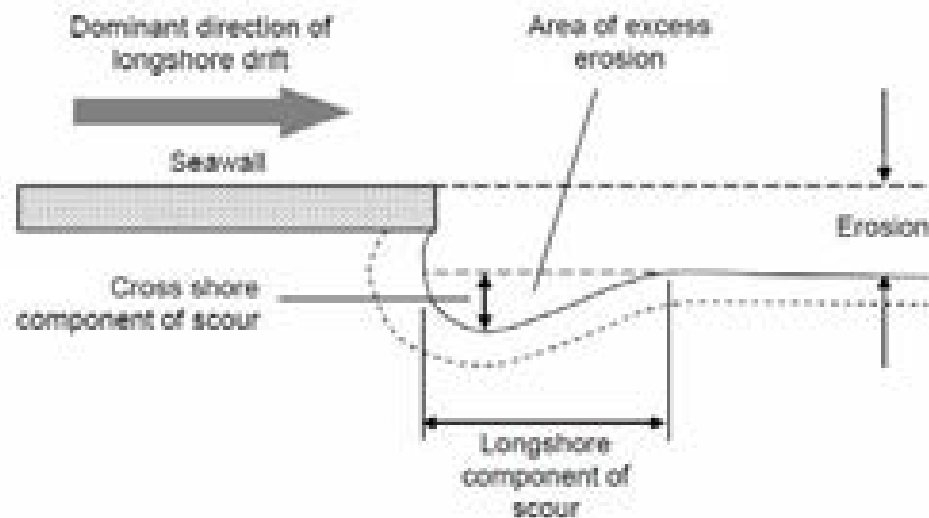
Figure 10. Seawall viewed from above, showing typical effects associated with the structure[22]

Activity: Cleaning up of the drainage channels, rehabilitation of storm drains in Dar es Salaam
Updated activity: Clean drainage channels and rehabilitate storm water drains in Dar es Salaam

Output: Effective storm and flood drainage systems in urban areas and near coastal communities

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Change in number of urban flooding events	According to recent data there have been on	A 50% reduction in the number of flooding events		

[22] (Adapted from McDougal et al. 1987)Linham, M.M. and Nicholls, R.J. 2010. Technologies for climate change adaptation: coastal erosion and flooding. UNEP/Riso TNA guidebook series. Available at: http://tech-action.or

	related to storm and severe rainfall.	average 5 flooding events in Dar es Salaam city center during rainy seasons over the past 5 years	during rainy season in targeted sites	• The indicator was revised to be specific, measurable, relevant and time-bound. • The baseline and targets were updated.	• Engineering assessments following methodology of feasibility assessment.
Amended	% increase in volume along X m of drainage channels and X m of stormwater drains.	X m³	By project end-point, at least X% along drainage channels and X% along stormwater channels.		

In Dar es Salaam, the drainage channels and stormwater drains are not suitable to manage the effects of climate change that result from increased and erratic precipitation. This is because most of the existing drainage infrastructure was built in 1961, with some sections having been built in the 1930s. The original designs and dimensions of these channels and drains are not adequate to carry increased volumes of water that result from an increase in frequency and intensity of flooding. In addition, pollution – in the form of solid waste –blocks drains and watercourses. Currently, the government has limited technical equipment to clean the lengths of the drains. Therefore, only the drain outlets are cleaned and unclogged. There has been no major rehabilitation or replacement of these drains. Although there is limited information on the condition of these drains, it is widely acknowledged that drainage in all districts is under-developed[23]. Moreover, in some areas of the city, there is no drainage infrastructure. Furthermore, unplanned urban development is resulting in settlements and large-scale construction in valleys in Dar es Salaam. Consequently, riparian and/or watershed ecosystems in these areas are being degraded. These degraded ecosystems have reduced ability to control, retain or filter the increased volumes of water passing through them during periods of increased frequency and intensity of floods.

Stakeholders – including district and municipal engineers – have indicated that Ilala and Kinondoni Districts are worst affected by floods. The sites selected in Kinondoni are Tandale Street in Tandale Ward and Kawe Street in Kawe Ward. In Ilala, the priority areas that were identified in this district include: Rinondoni, Msasani, the city centre, Buguruni, Mchikichihi, Msanani and Vingunguti. The site selected for Ilala is Bungoni Street in Buguruni Ward. The topography of Temeke results in a natural drainage of rainwater. However, during periods of heavy rainfall, this natural system is inadequate. As such, the sites selected for Temeke are Miburani-Mtoni Bustani Street in Mtoni Ward and Butiama Street in Kijichi Ward.

Flood events are influenced by a number of factors including *inter alia* rainfall and changes in land use patterns such as construction and human settlements. While inadequate drainage is a considerable factor in flooding events, the causal relationship is not isolated enough to

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[23] Dodi Moss et al. Dar es Salaam Master Plan. Preliminary Draft – Rev.01.

use flooding events as an indicator of successful drainage rehabilitation. Additionally, a 50% reduction in flooding events is not easily measurable as flood data is scattered among various institutions depending on the scale and effect of the flood. Recently, the Dar es Salaam Metropolitan Development Project (DMDP) undertook a drainage assessment of all three districts in Dar es Salaam. Although the assessment focussed on particular areas – and is therefore limited in scope – it will be a useful guiding document for the feasibility assessment for the AF project.

The indicator does not define the type of flooding events to be measured. This definition is important since major flooding events occurred in 2010, 2012 and 2014. Additionally, flash floods occur annually during the rainy season. Moreover, records that are kept by the Disaster Management Department only reflect: i) those events for which a coordinated disaster response was required; and/or ii) floods that have an effect on human life. The records on flood events that the districts respond to without reporting to the Disaster Management Department are kept in relevant district departments.

According to the current baseline, a 50% reduction in flooding events would result in a target of 2.5 flooding events in the five years following the construction of the infrastructure. Based on the gathered information, this target is not measurable nor achievable. In addition, it is not specific nor relevant to the activity. Therefore, an amended indicator and target has been recommended to better track the progress of the activity. The baseline for this indicator will be determined through a feasibility study that will define the specifications, degradation and blockages of current drainage systems. The feasibility assessment should determine: i) the baseline volume of the drainage channels and stormwater drains at identified sites; and ii) the percentage increase in volume of drainage channels and stormwater drains at the identified sites that will be sufficient to manage the effects of climate change.

Component 2 - Ecosystem-Based Integrated Coastal Area Management (EBICAM)

Activity: Coastal ecosystem rehabilitation for climate resilience through the implementation of a GreenJobs program
Updated activity: Rehabilitate coastal ecosystems for climate resilience through the implementation of a GreenJobs program

Output: Appropriate alternative energy (efficient cook stoves, small solar) technology transferred for avoided deforestation including through training.

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	% change in woodfuel use; Number of people in	Average wood fuel consumption per capita in Tanzania is 1 to 1.3 ton m³; fuelwood efficiency is estimated	At least 30% decrease in use of woodfuels among participating communities.	• The baseline was updated. • The indicator and target were amended to be	• Project implementation reports.

				specific, relevant, measurable and time-bound.	• Registers of families that have received cookstoves.
	project sites with access to alternative or efficient energy sources (disaggregated by gender).	at less than 10% on average in all sites; estimated mangrove deforestation rate is 2% per year.	1500 households with access to alternative and or efficient energy sources (disaggregated by gender).		
Amended	Number of households receiving: i) efficient cookstoves; and ii) training on optimal use and maintenance of these stoves (disaggregated by age and gender).	0	By project end-point, at least 1,500 households		

The original indicator measures woodfuel use. However, this is not a relevant indicator to measure the transfer of technologies as the output suggests "*appropriate alternative energy (efficient cook stoves, small solar) technology transferred for avoided deforestation including through training*". Thus, the indicator has been revised to measure the number of households that have access to improved technologies.

In Dar es Salaam, 70% of the population uses woodfuel[24] as a source of energy (see Figure 11 below). The majority of this woodfuel is sourced from rural areas outside of Dar es Salaam, including Rufiji, Bagamoyo and Morogoro. Therefore, this activity might have a greater impact on deforestation rates outside of the project site. In 2012, improved cookstoves had a market penetration rate of up to 68% in some urban areas of Dar es Salaam. Therefore, these stoves are already relatively popular amongst local communities in the city. Households that do not currently have access to this technology should be prioritised as beneficiaries. In addition, existing associations that are involved in coordinating the production of artisan cookstoves in local communities should be consulted[25].

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[24] The most commonly used woodfuel in Dar es Salaam is charcoal.

[25] Currently, the Tanzanian Traditional Energy Development Organisation (TATEDO) is training communities to produce artisan efficient cookstoves. However, there are no associations or user groups for artisan cookstove producers in local communities. Moreover, there are no standards or specifications to guide the design of these cookstoves. Therefore, these stoves are often poorly constructed. Consequently, stakeholders have reported that these stoves have an average lifespan of 3-4 months. In an attempt to resolve this problem, the College of Engineering and Technology at UDSM is researching mechanisms to standardise the production of these cookstoves.

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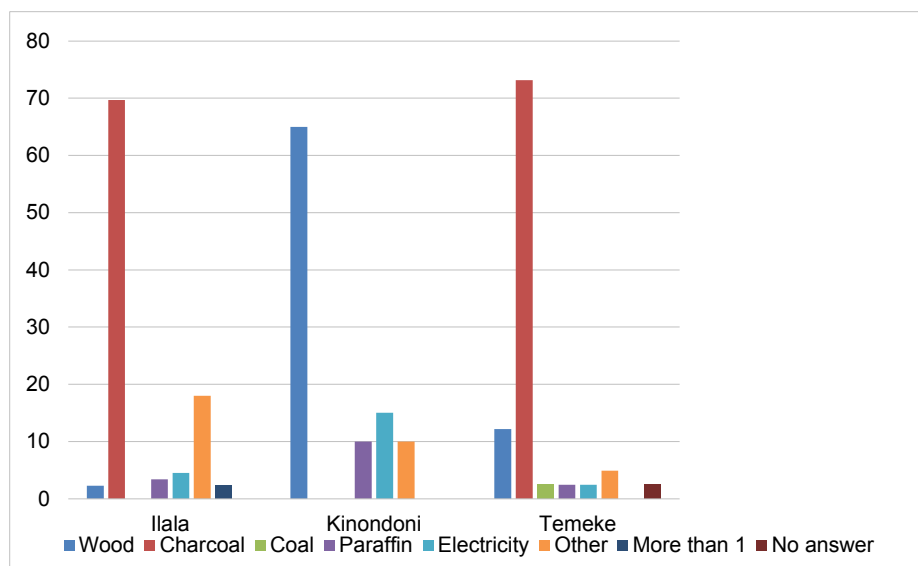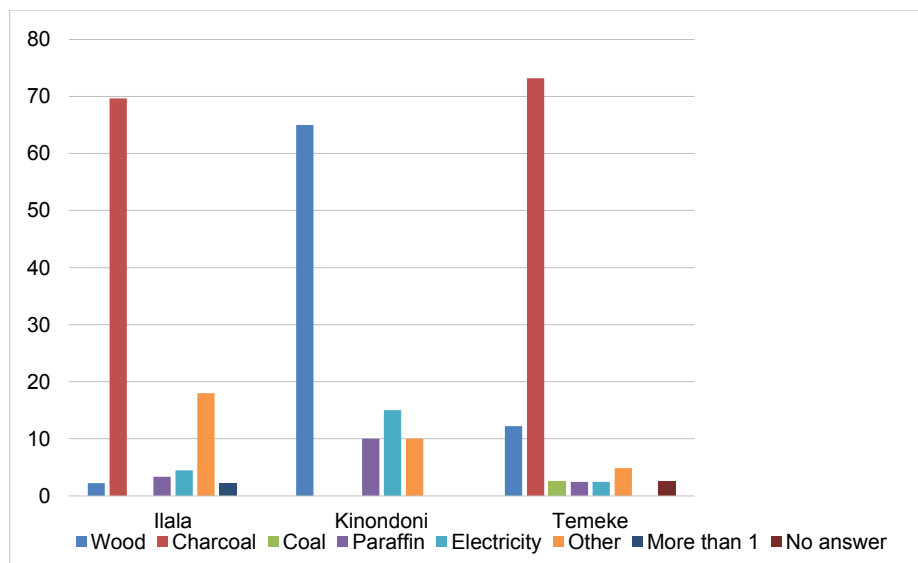
Figure 11. Types of energy sources used by households in the districts of Dar es Salaam.

<u>Output: Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones.</u>

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Area of mangrove under rehabilitation	There are approximately 2,000 ha of mangroves in Dar es Salaam surroundings.	Mangrove rehabilitation underway in a total area of 40 ha	• The baseline was updated. • The indicator and target were amended to be specific, relevant, achievable and time-bound.	• Project implementation reports. • GPS data collection at project sites (See Section 9).
Amended	Area of mangroves rehabilitated by the AF project	0	By project end-point, 40 ha of mangrove rehabilitated in one or more of the following areas: Selander Bridge, Kunduchi, Mbweni and Unumio.		

In Dar es Salaam, the primary threat to mangroves is clearing for construction. A number of government institutions oversee construction in the city and surrounds, including *inter alia*: the Ministry of Lands and Settlements[26], VPO and the National Environmental Management Council (NEMC)[27]. As a consequence of multiple institutions being involved, coordination of activities for construction – including regulation of legislation – can be complex. Therefore, mangrove areas are sometimes cleared illegally without penalisation. Mangroves are also cleared for: i) advertising space along roadsides; ii) salt production areas; and iii) fuelwood.

Originally, it was proposed that 40 ha of mangroves be restored in the riparian area near Selander Bridge[28]. However, stakeholder consultations and GIS analyses have revealed that 40 ha may not be feasible in this site alone[29]. Therefore, additional sites have been proposed. Interventions near Selander Bridge must consider the following: firstly, preliminary plans exist to construct a sewage treatment plant near Selander Bridge[30]. Secondly, some coastal communities living near Selander Bridge have expressed an interest to clear mangroves in the future to prevent this vegetation from trapping solid wastes that flow through Msimbazi Creek towards the sea. The Kinondoni Municipal Council and Tanzania Forest Services should create awareness among these coastal communities on the role of mangroves in protecting the community from floods and sea-level rise. This will improve buy-in from these communities. Currently, there is

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[26] The Ministry of Lands and Settlements grants building permits.
[27] These institutions are responsible for undertaking EIAs for proposed construction.
[28] Selander Bridge is the causeway over the Msimbazi Creek. This infrastructure connects Ilala and Temeke Districts.
[29] According to the Community Development Officer, Engineer and Environmental Officer for Kinondoni.
[30] Pers. Comm with Ilala Municipal Engineer. This needs to be verified with the Dar es Salaam Water and Sewerage Authority (DAWASA).

limited clearing of mangroves near Selander Bridge because the space is very public and the community and passers-by are vigilant in reporting illegal activities. Although it is illegal to cut mangroves in Dar es Salaam, this law is often poorly enforced because of budget constraints. Furthermore, when people are prosecuted the penalty for transgressions is often the minimum sentence.

Stakeholders[31] suggested that additional sites be considered for mangrove rehabilitation through the AF project. Currently, communities in Kunduchi, Mbweni and Unumio are being engaged by the Kinondoni Community Development Officer to facilitate mangrove rehabilitation. The development officer for AF project activities recommended these sites because: i) mechanisms are already in place to engage the community in planting activities[32]; and ii) there is enough land available for mangrove rehabilitation.

Output: Coral reef rehabilitation and protection in coastal sites

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Area of reef under rehabilitation.	Latest data sets show a low rate of biocover in reefs (20-45%). Fringe and tidal reefs line the entire cost of Tanzania, at a short distance from the shore; patch reefs and inlets are also located a few hundred meters off.	2000m^2 (0.2 ha)	• The baseline was updated. • The indicator was amended to be specific. • The target could not be determined without the input of a coral reef expert.	• Project implementation reports. • Data collection at project sites. • (GPS points and polygons digitised in a GIS to determine the areas in which rehabilitation has been conducted).
Amended	Area of reef under rehabilitation by the AF project.	0	By project end-point, X m^2 under rehabilitation.[33]		

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[31] These stakeholders included the Community Development Officer, Engineer and Environmental Officer for Kinondoni.

[32] Community involvement and buy-in is important for successful activities for mangrove rehabilitation. Therefore, it is important that lessons learned through similar initiatives for mangrove rehabilitation and conservation are integrated into the AF project. According to a range of stakeholders, initiatives for mangrove restoration in the Tanga Region have been successful.

[33] Quantitative target to be determined by coral reef expert. See Section 9 for the proposed strategy.

Recent data on the condition of coral reefs in the project area is limited. As such, available research is mostly based on data surveyed in the late 1990's and early 2000's[34]. These reports investigated the recovery rate of reefs following the El Nino Southern Oscillation (ENSO) during 1997-1998, which caused coral bleaching and resulted in a 30% loss of corals[35]. The reported damage included a dead coral cover of 14% and ~15% of reefs near Mbudya and Bongoyo islands respectively[36], and a mortality of 40-60% of hard coral structures near Mbudya Island[37]. Overexploitation and unsustainable fishing practices – including dynamite fishing – have also had a notable effect on reefs within the same period. Fungu Mkadya Reef reportedly had a 60% cover of coral rubble[38] and the southwest reefs near Fungu Yasin were almost entirely covered by rubble[39].

However, research conducted in 2004/5 on coral reefs in northern Tanzania – including reefs near Mbudya and Bongoyo islands – indicated that the reefs are moderately resilient to climate change[40]. In 2011, a postgraduate study reached a similar conclusion for the coral reefs in the Dar es Salaam Marine Reserve[41]. However, the study did not report on the current condition of the reefs and their spatial patterns of degradation. Research has also been conducted in an attempt to determine the vulnerability of coral reefs along the Tanzanian coast to future bleaching events. Similarly, this research did not include information on current degradation of coral reefs along the coastline of Dar es Salaam[42].

Stakeholders report that the damage of coral reefs in the ocean along Dar es Salaam (mainland) is more extensive than that of reefs surrounding Zanzibar Island. This difference is related to the greater incidences of dynamite fishing off the coast of Dar es Salaam. Currently, these activities occur because coast guards do not patrol outside marine park areas.

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[34] Wagner, G.M. 2004. Coral Reefs and Their Management in Tanzania. *Western Indian Ocean J. Mar. Sci.* 3:2.

[35] IPCC 2007.

[36] Mohammed, M. S., Muhando, C. A. & Machano, H. 2000. *Assessment of coral reef degradation in Tanzania: results of coral reef monitoring – 1999.* Coral Reef Degradation in the Indian Ocean (CORDIO) and Institute of Marine Sciences, Zanzibar, Tanzania.

[37] Wagner, G. M., Mgaya, Y. D., Akwilapo, F. D., Ngowo, R. G., Sekadende, B. C., Allen, A., Price, N., Zollet, E. A. & Mackentley, N. 2001. Restoration of coral reef and mangrove ecosystems at Kunduchi and Mbweni, Dar es Salaam, with community participation. In: Richmond, M. D. & Francis, J. (eds.) Marine science development in Tanzania and eastern Africa. Proceedings of the 20th anniversary conference on advances in marine sciences in Tanzania, 28 June - 1 July 1999, Zanzibar, Tanzania. Institute of Marine Sciences, University of Dar es Salaam and Western Indian Ocean Marine Science Association (WIOMSA), Zanzibar, Tanzania. pp. 467-488.

[38] Bipa, J. D. 2000. *Habitat survey and distribution of coral genera, fish and invertebrates on the fringing reef of Pangavini Island.* A report submitted in partial fulfilment of the Degree of Bachelor of Science at the University of Dar es Salaam. Department of Zoology and Marine Biology, University of Dar es Salaam.

[39] Peter, R. 2002. *Characterization of the landward side of Fungu Yasin patch reef and the survival and growth rates of coral transplants.* A report submitted in partial fulfilment of the Degree of Bachelor of Science at the University of Dar es Salaam. Department of Zoology and Marine Biology, University of Dar es Salaam.

[40] McClanahan, T. R., Muthiga, N. A., Maina, J., Kamukuru, A. T., & Yahya, S. A. (2009). Changes in northern Tanzania coral reefs during a period of increased fisheries management and climatic disturbance. *Aquatic Conservation: Marine and Freshwater Ecosystems* 19: 758-771.

[41] Yahya, S.A.S. 2011. *Habitat structure, degradation and management effects on coral reef fish communities.* Doctoral dissertation for the Department of Zoology, Stockholm University, Sweden.

[42] McClanahan, T. I. M., Maina, J. M., & Muthiga, N. A. 2011. Associations between climate stress and coral reef diversity in the western Indian Ocean. *Global Change Biology* 17: 2023-2032.

Given the lack of recent data on the condition of coral reefs, it is recommended that the contracted reef expert conduct an extensive assessment of the reefs along the coast of Dar es Salaam to validate suitable indicators and targets. See Section 9 for further details.

Output: Shoreline stabilisation and rehabilitation using trees and grasses

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Km of shoreline stabilised using vegetation.	Rate of coastal erosion estimated between 3 and 8 m per year according to recent site specific surveys	30,000 m² in Dar es Salaam broader area.	• The original baseline, indicator and target do not match. Therefore, all of these values were amended. • The indicator and target were amended to be specific and time-bound.	• Project implementation reports. • Data collection at project sites • (GPS points and polygons digitised in a GIS to determine the areas in which rehabilitation has been conducted).
Amended	Area of coastal vegetation rehabilitated by the AF project using species that are good at stabilising sandy soils.	0	By project end-point, at least 56,430 m² of coastal vegetation rehabilitated using three or more fast-growing plant species.		

The original indicator and target for this output were amended to be SMART. See Figure 19 in Annexure 1 for the area of coastal vegetation identified for rehabilitation.

Additional indicator

Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Survivorship of plants and coral in areas that are rehabilitated by the AF project.	N/A	Annually, at least[43]: • 65% survivorship of mangrove species. • 65% survivorship of shoreline vegetation species.	• See data collection protocols. • Monitoring of this indicator should be coordinated by experts but conducted by	• Project implementation reports. • Data collection at project sites.

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[43] All survivorship percentages are based on the assumption that rehabilitation interventions are not undermined by any extreme environmental events or natural disasters

		• X[44]% survivorship of coral reefs.	coastal communities at intervention sites.	

The target for survivorship of vegetation and corals that are rehabilitated by the AF project is based on a literature review of projects conducting similar activities. In addition, local stakeholders who have experience in these projects have validated this target. A number of factors affect survivorship, including: i) species selection; ii) damage from extreme environmental conditions; iii) pests; and v) rehabilitation methodology[45]. In general, the most common cause of limited survivorship in similar projects has been inappropriate species selection. Therefore, experts and stakeholders – including managers and local communities that are involved in similar projects– should be consulted when selecting species. To increase survivorship, strict planting and transplanting protocols should be developed by the relevant experts (Coastal Zone Management Specialist and Reef Expert, respectively) that specify, *inter alia*, i) species selection; ii) the size of seedlings/saplings and coral fragments; iii) the depths for planting seedlings/saplings; iv) nursery management for seedlings/saplings and coral fragments if required; and v) any required maintenance actions, such as watering. The target for survivorship should be checked – and amended if necessary – by the relevant experts (Coastal Zone Management Specialist and Reef Expert).

Component 3 - Knowledge, coastal monitoring and policy linkages

Activity: stocktaking and assessment of physical coastal processes

Output: Performance of a baseline study based on coastal vulnerability

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Availability of a comprehensive baseline study; available knowledge gathered	No such study; there is no recent comprehensive desk review of available knowledge	1 baseline study in year 1		• Project implementation reports.

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[44] The survivorship rate of coral reefs is dependent on, inter alia, the reef and genus that is being transplanted. The coral reef expert consulted should determine this rate.

[45] A mangrove rehabilitation programme in Gazi Bay Kenya found that the survival of transplanted saplings or propagules was better (80–100% of 70 000 after 24 months) than for transplanted small trees (<5% after 12 months). Additionally, planting of nursery saplings gave a higher survival rate (80–100% after 24 months) compared to transplanting of wildings. Kairo JG (1995b) Community participatory forestry for rehabilitation of deforested mangrove areas of Gazi Bay (Kenya). A first approach. Final technical report. University of Nairobi, Department of Botany, Nairobi, Kenya

Amended	Number of comprehensive baseline studies on coastal vulnerability developed through the AF project for Dar es Salaam.	0	By the end of year two, 1 study.		• Baseline assessment report.

There are a limited number of baseline studies on vulnerability to climate change for the Dar es Salaam area. Moreover, none of these baseline studies are geographically comprehensive, nor do they have a focus on coastal vulnerability. Instead, these studies have focussed on isolated areas or districts of Dar es Salaam such as the 'Temeke Municipality, Dar es Salaam Baseline Study' undertaken by the International Council for Local Environmental Initiatives (ICLEI) as part of the project 'Sub-Saharan African Cities: A Five-City Network to Pioneer Climate Adaptation through Participatory Research and Local Action'. Isolated studies such as these result in duplication of research in some areas, and gaps in others. Therefore, the existing assessments cannot be used as decision-making tools in the broader policy and planning context.

Activity: monitoring of the evolution of coastal processes

Output: Create and operate a climate change observatory for Tanzania for ongoing monitoring of CZM and coastal environmental status and scientific research.

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Effective implementation of clearing house function.	There is no climate change clearing house mechanism.	Clearing house function is operational by mid-term.	• The baseline was verified. • The indicator and target were amended to be specific and time-bound.	• Project implementation reports. • Institutional and organisational reports.
Amended	Number of operational clearing house functions implemented by the AF project.	0	By project mid-term, 1 operational clearing house function.		

The baseline was verified; there is no climate change observatory/clearing house function for Tanzania. However, there are organisations – such as the Climate Action Network Tanzania (CAN-Tanzania) – working to collate and disseminate information on climate change adaptation. Following the publication of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) in 2014, CAN-Tanzania hosted a workshop with relevant stakeholders to undertake a gap analysis for addressing the climate change impacts identified in the IPCC. The primary gap identified for Tanzania was the lack of a central database on climate change information. In response, funds were allocated to CAN-Tanzania to begin addressing this identified gap by collecting information on climate change and adaptation in Tanzania to be housed on their website. However, the funds are limited. The majority of this information is housed within academic institutions. Therefore, CAN-Tanzania has spent a great deal of time negotiating agreements on intellectual property with these institutions. In addition, CAN-Tanzania is collating information on all completed and ongoing projects for climate change adaptation in Tanzania. This information will include the best practices that emerge from each project. To date, collating and analysing this information has indicated that limited coordination between projects has resulted in replication of similar interventions in the same areas.

CAN-Tanzania has already started gathering information that is relevant to establish the Climate Change Observatory Tanzania (CCOT). In addition, the organisation has expressed an interest in collaborating with the VPO to improve access to climate change information and awareness. Therefore, CAN-Tanzania should be consulted extensively to deliver this output. The Directorate of Environmental Information, Communication and Outreach (DEICO) – within NEMC – have recently begun disseminating information on climate change to communities and local governments. Therefore, this institution will also be an important stakeholder to consult regarding this output.

Activity: monitoring of the evolution of coastal processes

Output: Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through undertaking cost-benefit analyses).

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Cost-effective measures are identified for upscaling and policy uptake.	*Ad hoc* assessments available but none specific to this project	Measures are identified for upscaling and policy uptake on an ongoing basis.	• The baseline was updated. • The original indicator and target were amended to be specific, relevant, achievable and time-bound.	• Project reports. • Annual cost-benefit assessment reports.
Amended	Number of cost-benefit reports on measures for adapting to climate change implemented by the AF project.	0	Annually, at least 1 report from years 3 and 4. By project end-point, at least 1 report.		

	Number of reports on strategies for upscaling measures with the most favourable cost-benefit ratio.			

A variety of measures for climate change adaptation will be implemented throughout the AF project. Annual assessments should be conducted to identify those measures that have the lowest cost to benefit ratio[46]. Once these assessments have been conducted, strategies should be developed for the most cost-effective measures to be upscaled. The findings of these assessments need to be communicated to policy- and decision-makers through output: "*lessons learned from the project outputs documented*".

Activity: policy linkages

Output: lessons learned from the project outputs documented

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of policy briefs provided to key sectors and regulators; number of workshops.	While there is a good degree of information on climate change, there is no systematic effort to inform policy makers based on project outcomes.	3 briefing notes per year; 2 workshops during the project.	• The baseline was updated. • The indicator and target were amended to be specific, relevant and time-bound.	• Project implementation reports. • Policy briefs. • Workshop reports and registers.
Amended	Number of policy briefs on cost-effective measures and lessons learned through the AF project.	0 policy briefs. 0 workshops.	Annually, 2 policy briefs from years 3 and 4 (1 on measures to adapt to climate change, 1 on general lessons learned). By project end-point,		

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[46] To broaden the scope of these assessments, measures for climate change adaptation that are implemented by other aligned projects can also be included.

			2 workshops (1 on cost-effective measures to adapt to climate change, 1 on general lessons learned).		
Number of workshops on cost-effective measures and lessons learned through the AF project[47] conducted with relevant sectors.					

Since project approval, the policy-context related to climate change adaptation in Tanzania has developed. Since this time, a number of policy documents on – or including sections on – adapting to climate change have been developed including the: i) "*National Climate Change Strategy*" (2012); ii) "*Process and Roadmap for Formulating National Adaptation Plans for Tanzania*" (2013); and iii) "*National Environmental Action Plan (2013-2018)*" (2013). However, lessons learned through the AF project should be collated and disseminated to policy- and decision-makers regularly. Therefore, policy documents should be developed on an annual basis and delivered to relevant sectors. These documents should include strategies to upscale cost-effective measures to adapt to climate change.

<u>Output: district level administration have the capacity to adequately manage rehabilitated infrastructure</u>

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Amount dedicated to infrastructure maintenance from district budgets.	Infrastructure budgets within district administrations are low	Dar es Salaam City Council, Temeke, Ilala and Kinondoni Municipal Council earmark appropriate annual allocations for infrastructure maintenance.	• The baseline was updated. • The indicator and target were amended to be specific, achievable, relevant, measurable and time-bound.	• Project implementation reports. • Report on budget recommendations.
Amended	Number of reports developed through the AF project on required district budget allocations to maintain infrastructure for adaptation to climate change.	0	By the end of the third year, 1 report.		

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[47] Based on policy documents developed by the AF project.

Through the AF project, drainage infrastructure and seawalls will be rehabilitated to manage the effects of climate change. Currently, this infrastructure is degraded. Moreover, the dimensions of the existing infrastructure are not suitable under predicted effects of climate change. To ensure that this type of infrastructure is maintained after the project lifespan, district budgets need to include dedicated amounts for these activities. Currently, most of the district budgets that are dedicated to infrastructure are used to construction new structures that accommodate the spread of urbanisation. Therefore, small portions of the budgets are dedicated to maintaining existing infrastructure. According to stakeholders, these allocations occur because elected politicians approve budgets. These representatives reflect the priorities of the populace who are concerned with development of Dar es Salam City. In particular, large portions of the budgets are allocated to developing road infrastructure. Although the AF project cannot directly revise district budgets, assessments can be conducted on infrastructure that will reduce the vulnerability of communities in Dar es Salaam and the associated budgets to maintain this infrastructure. These assessments will be used to provide recommendations to Ministry of Finance (MoF) and district-level authorities on budget allocations per district.

Output: One Ecosystem-Based Integrated Coastal Area Management (EBICAM) Action Plan for the coastal region is approved

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of plans approved.	No plan exists as yet but ICZM capacity exists.	One plan approved by end of project.	• The baseline was updated. • The indicator and target were updated to specific and measurable.	• Project implementation reports. • Report on EBICAM Action Plan.
Amended	Number of EBICAM Action Plans for Dar es Salaam region developed through the AF project and approved by the Government	0	By project end-point, 1 plan.		

There is no existing EBICAM Action Plan for the Dar es Salaam area. However, through the AF project, an EBICAM task force has been established. This task force includes government representatives from Ilala, Kinondoni and Temeke Districts. Therefore, coordination between these districts will be promoted to develop the EBICAM Action Plan. The inception meeting for this task force took place on May 2014. Once this team develops the plan, it will be approved by the VPO through mandatory procedures to approve policies, which include stakeholder workshops.

Outcome-level indicators

Any project that is funded by the AF must achieve overall outcomes that align with those that are included in the AF Strategic Results Framework. The objective of the fund is to "*Reduce vulnerability and increase adaptive capacity to respond to the impacts of climate change, including variability at local and national levels*". The outcome indicators of the AF project – and the output indicators that each one aligns with in the Strategic Results Framework – are detailed and assessed below.

Outcome 1: Adverse impacts of sea level rise and floods on coastal infrastructures and settlements reduced.

Outcome Indicator[48]		Baseline	Target	Comments	Means of verification and tracking progress
Original	Kms of seawall rehabilitated/ constructed.	-	-	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be specific, time-bound and relevant.	• Engineering reports. • Physical assessments (including photographs and GPS coordinates).
Amended	Meters of seawall rehabilitated/raised by the AF project.	0	By project end-point, 1666 m.		

Outcome 2: Coastal ecosystems are rehabilitated and ICAM is implemented

Outcome Indicator[49]		Baseline	Target	Comments	Means of verification and tracking progress
Original	Area of mangrove under rehabilitation. % change in wood fuel use (disaggregated by gender).	-	-	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be specific.	• Project implementation reports. • Data collection at project sites • (GPS points and polygons digitised in a GIS to determine the areas in which

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[48] The revised indicator is aligned with Adaptation Fund outcome 4: "*Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability*"; and output indicator 4.1.2 '*No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)*'.

[49] The revised indicator is aligned with Adaptation Fund Adaptation Fund outcome 5: "*Increased ecosystem resilience in response to climate change and variability-induced stress and output indicator 5.1.1 'No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)*'.

	Area of coral reefs under rehabilitation. Kms of shoreline revegetated.				rehabilitation has been conducted).
Amended	Area of mangroves rehabilitated by the AF project. Area of coral reef rehabilitation by the AF project. Area of the coastal vegetation rehabilitated by the AF project using species that are good at stabilising sandy soils.	0	By project end-point: 40 ha of mangroves; X m^2 of coral reef[50]; and 56,430 m^2 of coastal vegetation rehabilitated.		

Outcome 3: Knowledge of climate impacts and adaptation measures is increased
Aligned with AF Output 6: "*Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability*"

Outcome Indicator[51]	Baseline	Target	Comments	Means of verification and tracking progress

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[50] Quantitative target to be determined by coral reef expert.

[51] The original indicator was identified as aligning with Adaptation Fund Adaptation Fund outcome 6: "*Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability*"; and output indicator 6.1.1 "No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community-livelihood strategies'. However, the revised indicator is better aligned with the AF outcome 7: "Improved policies and regulations that promote and enforce resilience measures"; and output indicator: "7.1. " "No., type and sector policies introduced or adjusted to address climate change risks.

Original	A solid and validated project baseline study including with targets and indicators.	-	-	• The baseline was updated.
				• The indicator and target were updated and amended to be specific.
					• Project implementation reports.
					• Policy briefs
					• Reports on:
					  o EBICAM Action Plan;
					  o Cost-benefit assessments;
					  o Baseline assessment.

	Number of studies and assessments to support project interventions. Number of cost effective measures assessed. Number of relevant policy briefs. Number of project relevant trainings and workshops. Number of EBICAM Action Plans approved.				
Amended	Number of cost-benefit reports on measures for adapting to climate change implemented by the AF project.	0	Annually, at least 1 report on project interventions from years 3 and 4. By project end-point, at least 1 report. Annually, 2 policy briefs from years 3 and 4 (1 on measures to adapt to		

	Number of policy briefs developed on lessons learned through the AF project – including strategies for upscaling cost-effective measures – and delivered to relevant sectors.

Number of workshops on lessons learned – including strategies for upscaling cost-effective measures – conducted for policy and decision-makers.

Number of EBICAM Action Plans for Dar es Salaam region developed through the AF project and approved by the National Environment Management Council (NEMC). | | climate change, 1 on general lessons learned).

By project end-point, at least 2 workshops.

By project end-point, 1 EBICAM Action plan. | | |

Two indicators were removed from Outcome 3: i) "*Number of project relevant trainings and workshops"*; and ii) "Number of studies and reports to support project interventions". These indicators are not included as output indicators in the RF. Therefore, they would require additional data collection and processing which is not budgeted for. These indicators are not necessary.

LDCF project

Component 1. Scientific and technical knowledge and capacities for climate change adaptation analysis

Output 1.1. Climate change impact assessment capacity established for project sites (monitoring climate changes)

Activity: District level training on sectoral, livelihoods and planning, climate and economic vulnerability and PVA
Updated activity: Train district government on Integrate Coastal Zone Management, Climate Change Vulnerability Analysis and livelihood development

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of people trained in ICZM and vulnerability.	Approximately 20 people trained government wide.	100 people trained.	• The baseline was updated. • The indicator and target were amended to be specific, time-bound and gender-sensitive.	• Project implementation reports. • Attendance registers from training sessions.
Amended	Number of local government representatives trained in ICZM, CCVA and livelihoods development by the LDCF project.	0	Within the first year of the project, at least 110 representatives trained. Trainees – of which 30%[52] must be women[53] – should include representatives from all project sites and relevant sectors such as agriculture, fisheries and natural resource management.		

Training in Integrated Coastal Zone Management (ICZM), vulnerability assessment and livelihoods development has already been conducted by the LDCF project. However, representatives from Pemba Island were not included in this training. Therefore, the target was increased to include local government representatives from Pemba.

Many projects and programmes for coastal management have been completed or are currently being implemented in Tanzania. In particular, through Component 2 of the Marine and Coastal Environment Management Project (MACEMP), strategies for Integrated Coastal

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[52] This target was based on the training session that was conducted in Panagani. This session coincided with the baseline assessment mission and was therefore observed. Of the 21 trainees, seven were women.
[53] The attendance registers from training sessions should be assessed to verify if women were included.

Management (ICM) were built and strengthened. Within this output, implementing agencies and coastal communities were trained in ICM[54]. Other initiatives that have included capacity building for ICM include *inter alia*: government initiatives[55], the Rufiji Delta-Mafia Island-Kilwa District (RUMAKI) Project and the Kilombero and Lower Rufiji Wetlands Ecosystem Management (KILORWEMP) Project. Therefore, prior to project interventions, many government representatives were trained in general ICM.

Activity: Procure and provide district-level training on coastal vulnerability modelling tools

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of people trained in coastal modelling.	2 people trained in coastal vulnerability modelling in University of Dar es Salaam.	100 people trained.	• The baseline was updated. • The indicator and target were amended to be specific, achievable, time-bound and gender-sensitive.	• Project implementation reports. • Attendance registers from training sessions. • Training assignments (i.e. maps and reports).
Amended	Number of government representatives trained in coastal modelling by the LDCF project.	0 (4+ people trained on coastal modelling in Tanzania)	By the end of the first year, at least 8 representatives trained. Trainees – of which at least 2 must be women – should include local government representatives from all project sites.		

According to academics from the Institute of Marine Sciences (IMS), University of Dar es Salaam (UDSM), more than four people have been trained in coastal modelling in Tanzania. Therefore, the baseline has changed since the project was developed. To ensure that the training is beneficial, institutions that have experience on this topic – including the IMS, UDSM – should be consulted when designing the content of this training. In addition, the Center for Climate Change Studies (CCCS) should be consulted. This institution has identified coastal modelling as a priority area for skills development and therefore plans to collaborate with the Department of Mathematics and Department of Physics at UDSM to develop this field of research and expertise. In addit

ion, the CCCS has shown an interest in developing short-courses for policy-makers and practitioners on climate change vulnerability and adaptation. It is therefore recommended that the CCCS also be consulted.

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[54] These included *inter alia*: The Ministry of Natural Resources and Tourism and local Government Authorities. Citation: World Bank. 2013. Implementation completion and results report for a Marine and Coastal Environment Management Project. Document of The World Bank. Report No: ICR2754

[55] For example: i) on Zanzibar, approximately 30 representatives from local government have been trained in ICM; ii) in Pangani, more than 15 representatives from different sectors have been trained in ICM.

There are a number of educational and decision-support tools for modelling coastal vulnerability, including the Coastal Zone Simulation (COSMO)[56] and Dynamic Interactive Vulnerability Assessment (DIVA)[57] models. Therefore, when training on coastal modelling is procured by the appropriate expert, the most suitable tool for modelling coastal vulnerability should be selected based on: i) tool costs; ii) hardware and software requirements; iii) training requirements; iv) applicability of the tool for ICZM.

<u>Output 1.2. Detailed participatory coastal vulnerability assessment for Rufiji, Bagamoyo and Pangani Districts and Zanzibar</u>

<u>Activity: Produce coastal vulnerability models and maps and coastal vulnerability index for Tanzania</u>

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of coastal vulnerability models.	0 models and maps available and no consolidated vulnerability index.	At least 2 models and 4 maps by mid-project.	• The indicator and target were amended to be specific.	• Project implementation reports. • 1 x coastal vulnerability model. • 4 x maps.
Amended	Number of coastal vulnerability models developed by the LDCF project.	0	By project end-point, at least 1 model and 5 maps (1 map per intervention area[58]) developed with local government representatives who are trained in coastal modelling[59].		

If the most suitable tool is selected for modelling coastal vulnerability – through Output 1.1 – it is not necessary to produce more than one model. This model will be used to develop particular maps for each of the project sites. Local government representatives that are trained in coastal modelling in Output 1.1 should be involved in developing these maps. In doing so, these representatives will have the skills to update the models and maps when necessary.

<u>Activity: Perform PVA, revise existing land use policies to integrate climate change adaptation and prepare policy recommendations including budget allocations</u>

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[56] UNFCCC. 2014. Compendium on methods and tools to evaluate impacts of, and vulnerability and adaptation to, climate change. Available at: https://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/5353.php. Accessed on 10 June 2014.
[57] Hinkel, J., Lincke, D., Vafeidis, A.T., Perrette, M., Nicholls, R.J., Tol, R.S.J., Marrzeion, B., Fettweis, X., Lonescu, C. and Levermann, A. 201. Coastal flood damage and adaptation cost under 21st century sea-level rise. Proceedings of the National Academy of Sciences. Doi: 10.1073/pnas.1222469111
[58] 1 map for each of the following areas: Pangani, Bagamoyo, Rufiji and Zanzibar and Pemba.
[59] Those local government representatives trained in Output 1.1.

	Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of participatory vulnerability assessments available at local level. Number of policy documents revised to address vulnerability and adaptation.	No PVA available in selected sites. Local plans do not address adaptation issues.	At least 5 local PVAs.	• The baseline was updated. • The indicator and target were amended to be specific, relevant, time-bound and gender-sensitive.	• Project implementation reports. • Expert reports. • PVA reports and deliverables.
Amended	Number of participatory vulnerability assessments available at local level. Number of briefs on suggested policy revisions developed by the LDCF project to address vulnerability and adaptation at a local level.	1 participatory vulnerability assessment developed for Pangani. 1 participatory vulnerability assessment currently being developed for Rufiji 0 suggested policy revisions.	By project mid-term, at least 1 consolidated and local PVA in existence for each intervention area[60] (5 in total). The PVAs should be gender- and age-sensitive[61]. By project end-point, at least 1 policy brief developed for each project site to address vulnerability and adaptation at a local level. The policy briefs should be gender- and age-sensitive.		

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[60] 1 for each of the following areas: Pangani, Bagamoyo, Rufiji, Unguja and Pemba
[61] The PVAs should include an assessment of gender and age on vulnerability to climate change.

Since the LDCF project document was developed, aligned projects have conducted participatory vulnerability assessments in the Pangani District and Rufiji Delta. Firstly, the Pangani River Basement Management Project (PRBMP) has four components, including climate change and community participation. Through the climate change component, vulnerability assessments were conducted to identify adaptation activities that increase community resilience to climate change[62]. These assessments included two tools, namely: i) the Climate Vulnerability and Capacity Analysis (CVCA); and ii) Community-based Risk Screening Tool: Adaptation and Livelihood (CRiSTAL). The CVCA methodology combines local knowledge and scientific information. Secondly, the Rufiji Delta-Mafia Island-Kilwa District (RUMAKI) project – implemented by WWF – has combined the "flowing forward" approach with CVCA to conduct vulnerability assessments in the project areas, including Rufiji Delta[63]. Currently, the outcomes of the vulnerability assessment for this area are being finalised. The PVAs that are developed for Pangani and Rufiji through Component 1 of the LDCF project should build on the assessments that have been conducted by PRBMP and RUMAKI. Both of these aligned projects have included local communities in the process of assessing vulnerability. If the PVAs that have been conducted in Pangani and Rufiji are not sufficient, they can at least be used as a foundation to develop particular PVAs for the LDCF project

To manage the effects of climate change, a priority action of the National Environmental Action Plan (NEAP) 2013-2018 is to "*Undertake comprehensive vulnerability assessment on climate change impacts*". According to the implementation plan for NEAP, this action will be conducted in the medium term (3-5 years). Therefore, the PVAs that are conducted through the LDCF project will align with the NEAP. Other priority actions in the NEAP include *inter alia*: i) "*Mainstream climate change adaptation into sectoral policies, strategies, programmes, plans and budgets*"; and ii) "*Design and implement programmes and projects at Local Government Authority (LGA) level to address adaptation*". The policy revisions that are developed through the LDCF project to address vulnerability and adaptation at a local level will contribute to implementing these priority actions.

Component 2. Broadening stakeholder engagement for vulnerability reduction

Output 2.1 Public engagement in climate change adaptation activities enhanced

Activity: Strengthening of NGO network on climate change
Updated activity: Strengthen NGO network on climate change

Indicator	Baseline	Target	Comments	Means of verification and tracking progress

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[62] PRBMP. 2014. Pangani River Basin Management Project: Climate Change Adaptation. Available at: http://www.panganibasin.com/index.php/prbmp/activities/category/climate_change/. Accessed on 11 June 2014
[63] Pers. Comm. with Haji Machano from WWF.

Original	Number of participating CBOs from local project sites advocating coastal adaptation issues.	There are a number of existing institutions, such as the Tanzanian Civil Society Forum on Climate Change which was created in 2008 which includes 65 NGO members countrywide. However, none include CBOs yet.	At least 10 new CBOs working on coastal adaptation issues members by end of project.	• The baseline was updated. • The indicator and target were amended to be specific, relevant and time-bound.	• Project implementation reports. • Membership reports from organization for climate change. • Progress reports from District Focal Points. • Progress reports from LGAs. • Progress reports from strengthened CBOs.
Amended	Number of CBOs from project sites strengthened by the LDCF project through a network for climate change organisations.	0	By project mid-point, at least 50 CBOs per intervention area (10 per project site[64]l) registered with – and receiving information and training from – an organisation for climate change.		

The Tanzanian Civil Society Forum on Climate change (Forum CC) network[65] provides a platform for CBOs to engage with and share climate change information amongst themselves. In addition, the Environmental Protection Management Services (EPMS) shares information on climate change with organisations that are registered with Forum CC. Similarly, the Climate Action Network Tanzania (CAN-Tanzania) collates and shares information on climate change with stakeholders from local communities, CBOs and LGAs[66]. The Zanzibar Civil Society Alliance on Climate Change (ZACCA) conducts similar activities in Zanzibar. Currently, a number of CBOs from project sites have engaged these networks and/or other organisations that share information on climate change. However, there are limited records that track the progress these registered groups[67]. Stakeholder consultations revealed that despite a large number of CBOs registered as working with climate change information and adaptation, the effectiveness and coordination of this information-sharing mechanism is limited. Furthermore, not all CBOs that are registered are active. Through the LDCF project, particular CBOs should be identified to be registered – or registered CBOs strengthened – with an appropriate climate change organisation such as Forum CC or CAN-Tanzania. According to household survey data, a small portion of the local communities at project sites are currently part of a CBO (see Figure 12and Annexure 13 for contact details of stakeholders with further information on active CBOs in project sites.). At project sites where are fewer than 10 relevant

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[64] Ten in each of the following areas: Pangani, Bagamoyo, Rufiji, Pemba and Zanzibar
[65] ForumCC. 2014. ForumC. Available at: http://www.forumcc.org/. Accessed on 11 June 2014
[66] Fairclimateafrica. 2011. Climate Action Network Tanzania (CAN-Tanzania). Available at: http://www.fairclimateafrica.com/members/CAN-Tanzania.php. Accessed on 11 June 2014
[67] Such records should include inter alia: i) date of registration; ii) information that has been disseminated to CBOs; and iii) workshops/training sessions that have been attended by CBOs.

CBOs in existence, the LDCF project should facilitate the establishment of new CBOs. Champions from these CBOs should attend civil society forums on climate change, workshops and training sessions. Moreover, these champions should disseminate knowledge gathered through workshops and training with the rest of the CBO and local communities.
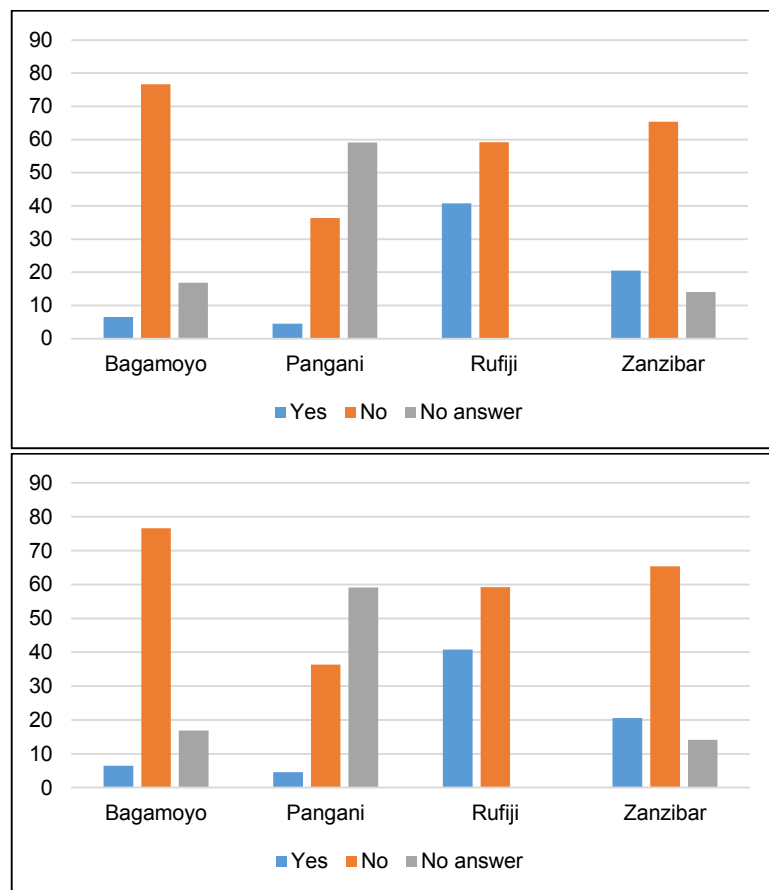
Figure 12. Percentage of household survey respondents at project sites part of a CBO

Activity: Implementation of an awareness campaign focused on climate change in coastal zones
Updated activity: Implement an awareness campaign focused on climate change in coastal zones

	Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Original	Degree of awareness of local populations regarding CC and coastal vulnerability.	General awareness of local populations regarding CC and coastal vulnerability.	Coastal communities demonstrate a sound understanding of coastal vulnerability by the end of the project, all groups.	• The baseline was updated. • The indicator and target were amended to be specific, relevant, achievable and time-bound.	• Surveys conducted at project end-point, including an awareness index. • Project implementation reports.
Amended	Average climate change awareness of coastal communities at project sites (disaggregated by age and gender).	Average for each site[68]: • Bagamoyo: 21% • Pangani: 50% • Rufiji: 63% • Zanzibar: 45%	By project end-point, an average awareness of at least a 70%[69] at all project sites.		

Baseline awareness on climate change differs between project sites (see Annexure 6). This difference is likely to be related to initiatives that are currently being conducted at project sites that have a climate change focus. The average climate change awareness of local communities is highest in Rufiji (63%), while the lowest is in Bagamoyo (21%). Since 2003, the RUMAKI project has been engaging local communities in the Rufiji, Mafia and Kilwa Districts of Tanzania. This project has a climate change focus and participatory vulnerability assessments have been conducted with local communities. Therefore, it is likely that the awareness of these communities has increased substantially over the 10 years that the project has been established.

Vulnerability is a function of a number of variables including adaptive capacity. Adaptive capacity is the ability of a person or community to re-organise and minimise loss to cope with the effects of climate change. For the most part, this capacity depends on whether the community has access to natural, financial, social, human and physical capital. Climate change awareness is the only indicator of adaptive capacity that will be equally impacted between all project sites as a result of the awareness campaigns that will conducted by the LDCF project (see Section 3 on links between project activities and vulnerability). Using baseline adaptive capacity indices for project sites, SMART targets can be set for climate change awareness of local communities.

The awareness campaign should be tailored to present information on the interventions specific to each project site. For example, in Bagamoyo, local communities associate rainwater-harvesting activities with low-income households. This perception might introduce a risk to project activities at this site, which include construction of rainwater harvesting devices. Therefore, the awareness campaign should include information on the economic and environmental benefits of rainwater harvesting.

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[68] Determined using a household survey, including an awareness index.
[69] See Annexure 6.

To increase cost efficiency, – if the timing of the two activities allows –climate change awareness can be measured during PVAs that will be conducted in each project site.

Output 2.2 Student internship program established for interns to project sites

Activity: Creation and administration of a climate change internship program for undergraduate students
Updated activity: create and administer student support programmes which includes an internship programme, summer courses and a research programme focused on climate change for undergraduate students

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of students enrolled annually in a summer course or undertaking climate specific research.	There are on average 12 (TBC) students enrolled in 1 climate-related course within the UDSM Geography Department.	Coastal communities demonstrate a sound understanding of coastal vulnerability by the end of the project, all groups.	• The baseline was updated. • The indicator and target were amended to be specific, relevant, achievable, time-bound and gender-sensitive.	• Project implementation reports. • Reports on findings from research conducted through internship programmes.
Amended	Number of student reports from summer courses funded by the LDCF project. Number of reports from research programme funded by the LDCF project. Number of reports from internships funded by the LDCF project.	0	Annually, at least 5 student reports from summer courses funded by the LDCF project. Annually, at least 5 reports from a research programme funded by the LDCF project. Annually, at least 5 reports from an internship programme funded by the LDCF project. In total, 15 students should be enrolled in student support programmes annually – at least 8 of which must be women.		

In 2013, the CCCS was established at the UDSM, in conjunction with the introduction of a "Masters in climate change and sustainable development". In 2014, the following numbers of student are enrolled per study year: i) 13 in MSc year 1; ii) 32 in MSc year 2; and iii) 2 PhD students. For 2015, the intake of students is expected to be 50 or more. In addition, 10 students are enrolled in an internship programme within the centre. Currently, these students are conducting research through grant funding. The LDCF project should work with the CCCS to align project activities with the programmes and research of the CCCS. Additionally, a number of masters' dissertations and PhD research within the Department of Geography are focused on climate change. However, funding for climate change research is still limited. It is recommended that in addition to funding research on climate change, a combination of an internship programme and summer courses for undergraduate students be implemented. Undergraduates who are currently learning modules on climate change offered by the Department of Geography should be considered when students are selected for the internship programmes. According to stakeholder consultations that were conducted during the baseline mission, a combination of research programmes, internships and summer courses will have the most noticeable benefits

Output 2.3: Knowledge is integrated into university curriculum

Climate change has been integrated into the curriculum of the Department of Geography at UDSM and several modules on climate change are now presented by the Department. These modules are within under- and post-graduate curricula for geography. These modules include *inter alia*: i) defining climate change; ii) identifying the impacts of climate change; and iii) adaptation or mitigation for climate change. All of these courses have a focus on Africa. Furthermore, the curriculum was reviewed and revised in 2014. The revised curriculum will be presented in September 2014. In addition, the CCCS was established in 2013. Therefore, activities under Output 2.3 are no longer relevant.

Component 3: Priority adaptation interventions for resilient Integrated Coastal Zone Management

Output 3.1 Mangroves are restored in pilot sites

Activity: Restore mangroves using locally available resilient tree species (Rufiji, Zanzibar, Pemba)

Updated activity: Restore mangroves using locally available resilient tree species

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Ha of rehabilitated mangrove.	In Rufiji, there are 5,000 ha in need of rehabilitation.	3,000 ha rehabilitated in Rufiji; 10 ha in Pangani; 50 ha in Tumbe;	• The baseline was updated. • The indicator and target were amended to be	• Project implementation reports.

		In Zanzibar and Tumbe, the mangroves are severely degraded. In Pemba, there are pockets of degradation.	100 ha in Ukele; 50 in Bwawani; and 260 ha in Kisiwa Panza.	specific, relevant, achievable and time-bound.	• GPS data collection at project sites (See data collection protocol – Section 9).
Amended	Hectares of coastal vegetation rehabilitated by the LDCF project[70].	0	By project end-point, the following ha of coastal vegetation rehabilitated: • 1,000 ha mangroves in Rufiji; • 10 ha mangroves in Pangani; • 200 ha mangroves in Kisiwa Panza; and • 7 ha coastal vegetation in Kisiwa Panza; and • 1 ha coastal vegetation enriched to facilitate local apiculture on Kisiwa Panza By project end-point, at least one[71] of the following: • 10 ha mangroves in Tumbe and 0.4 ha of coastal vegetation at Tumbe East port; • 7 ha mangroves in Ukele; or • 1 ha mangroves in Tovuni.		

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[70] See Annexure 1 for proposed areas for mangrove rehabilitation.
[71] One the following will be selected if Tibirinzi is selected as a project site. If Tibirinzi is not selected as a project site, at least two of the targets listed should be achieved.

			By project end-point, either: • 10 ha mangroves in Bwawani; or • 1.4 ha mangroves in Kilimani.		

Since the project document was developed, vegetation cover has changed in areas that were targeted for interventions (see Table 5 below). In addition, LGAs have identified new sites for rehabilitation of coastal vegetation. These areas include: i) mangrove areas in Tovuni (see Output 3.3); ii) mangrove areas in Kilimani; iii) coastal vegetation areas at Tumbe East Port and iv) coastal vegetation areas in Kisiwa Panza. The local environmental committee in Kisiwa Panza has also identified one ha of coastal vegetation to be enriched to facilitate local apiculture initiatives for livelihoods diversification. The location of these proposed sites for rehabilitating and enriching coastal vegetation at Kisiwa Panza should be identified with the local environmental committee.

Table 5. Changes in mangrove cover since the project document was developed

Project site	Change in mangrove/vegetation cover since project document was developed	Driver	Notes
Rufiji	Decrease	Increase in ha of rice paddies.	According to household survey data, most of the local community living in Rufiji Delta are involved in farming rice (See Section 6). In addition, members of local communities travel from surrounding areas – as far away as Dar es Salaam City – to engage in this activity. Recently, mangrove clearing for rice paddies has increased as a result of: i) lowering water levels in the delta which attract rice farmers to areas nearer the water channels; and ii) the relative ease of rice farming in the delta which has a natural irrigation system and is less invaded by weeds. Therefore, since the project document was developed, large areas of mangroves have been cleared. Currently, the government is in discussion with LGAs to try developing a framework whereby landowners are given rights to continue farming on existing paddies but do not clear mangroves to establish new paddies. However, to implement this framework, existing paddies need to be surveyed and mapped. However, the surveying process is an expensive and time-consuming activity. Therefore, opportunities should be explored for the LDCF project to support this framework (see indicator: "*Strengthen local capacity to protect mangroves*").
Pangani	No change	N/A	There is minimal land available for mangrove rehabilitation directly in front of the seawall in Pangani. However – through desktop analyses – an open area was

			identified to the north-east of the seawall. Within this area, 10 hectares should be selected for mangrove rehabilitation.
Tumbe	Increase	Planting of seedlings by local environmental committee.	LGAs have facilitated local environmental committees to plant mangroves in previously degraded areas of Tumbe. This planting has been conducted in conjunction with the construction of dykes to protect rice paddies from saltwater intrusion. The mangroves have been planted in the area between the dykes and seashore. However, the rehabilitation has not been completely successful because most of this area comprises sandy soils, in which the species that were selected do not grow well. Therefore, there is still a large area of land available to rehabilitate (10 ha). Lessons that have been learned through other projects – including suitable species – should be applied to the LDCF project.
Ukele	Increase	Planting of seedlings by local environmental committee.	LGAs have facilitated local environmental committees to plant mangroves in previously degraded areas of Ukele. This planting has been conducted in conjunction with the construction of a dyke to protect rice paddies from saltwater intrusion. The mangroves have been planted in the area between the dyke and seashore. The rehabilitation has been successful. Therefore, there is very little land to rehabilitate in Ukele (7 ha).
Bwawani	Increase	Planting of seedlings by local environmental committee.	LGAs have facilitated local environmental committees to plant mangroves in previously degraded areas of Bwawani. However, there is still a large area of land available to rehabilitate (10 ha).
Kisiwa Panza	Increase	Planting of seedlings by local environmental committee.	LGAs have facilitated local environmental committees to plant mangroves in previously degraded areas of Kisiwa Panza. However, there is still land available to rehabilitate (200 ha).

Added indicator

Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Survivorship of mangroves in areas that are rehabilitated by the LDCF project.	N/A	Annually, at least[72]: • 65% survivorship of mangrove species.	See data collection protocols. This indicator should be coordinated by experts but conducted by coastal communities at intervention sites.	• Project implementation reports. • Data collection at project sites.

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[72] This percentage is based on the assumption that rehabilitation interventions are not undermined by any extreme environmental events or natural disasters.

The target for survivorship of mangroves that are rehabilitated by the LDCF project is based on a literature review of projects conducting similar activities. In addition, this target has been validated by stakeholders who have experience in these projects. A number of factors affect survivorship, including: i) species selection; ii) damage from extreme environmental conditions; iii) pests; and v) rehabilitation methodology[73]. In general, the most common cause of limited survivorship in similar projects has been inappropriate species selection. Therefore, experts and stakeholders – including managers and local communities that are involved in similar projects– should be consulted when selecting species for mangrove rehabilitation. The target for survivorship should be checked – and amended if necessary – by the relevant expert.

Activity: Creation and local enforcement of no-take zones and buffer areas
Updated activity: Strengthen local capacity to protect mangroves

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	% change in mangrove deforestation rates.	In Rufiji, there are 5,000 ha in need of rehabilitation. In Zanzibar and Tumbe, the mangroves are severely degraded. In Pemba, there are pockets of degradation.	Mangrove deforestation is reduced by 40% in restored sites.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were amended to be specific, relevant, achievable and time-bound.	• 1 x mangrove protection plan for each project site. • Project implementation reports.
Amended	Number of sustainable mangrove protection plans developed by the LDCF project.	0	By project mid-point, at least 1 plan developed for each project site in conjunction with the local environmental committee (5 plans in total). Plans should include methods to record and store data on illegal offences.		

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[73] A mangrove rehabilitation programme in Gazi Bay Kenya found that the survival of transplanted saplings or propagules was better (80–100% of 70 000 after 24 months) than for transplanted small trees (<5% after 12 months). Additionally, planting of nursery saplings gave a higher survival rate (80–100% after 24 months) compared to transplanting of wildings. Kairo JG (1995b) Community participatory forestry for rehabilitation of deforested mangrove areas of Gazi Bay (Kenya). A first approach. Final technical report. University of Nairobi, Department of Botany, Nairobi, Kenya.

Currently, mangrove protection at project sites is *ad hoc*. In addition, there are limited records – or access to records – of illegal activities that have occurred in the area. It is not possible to establish the baseline deforestation rate for each project site. It is recommended that the LDCF project strengthen local systems to protect mangroves by developing plans for each project site in conjunction with local environmental committees. Importantly, the context of each project site should be taken into account. For example, in Rufiji, opportunities should be explored for the LDCF project to support the framework that the government is trying to develop to protect mangroves in the delta. This attempt by the government is a reaction to the rapid clearing of these mangroves for rice paddies. If the framework is implemented, landowners will be given the right to farm on existing paddies but clearing of additional land will be illegal and treated as a punishable offence. In addition, landowners will be responsible for protecting the mangroves surrounding their paddies. However, to establish and implement this framework, surveys need to be conducted on all existing rice paddies. Surveying is an expensive and time-consuming process. Therefore, this initiative has not developed. Sustainable mangrove protection plans developed for all project sites will be integrated into mangrove management plans developed in activity "*Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring*".

Activity: Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of operational mangrove management associations.	There is at least 1 mangrove association. It is not operational.	At least 4 mangrove management associations are operational by end of project.	• The baseline was updated. • The indicator and target were amended to be specific, relevant, achievable and time-bound.	• 1 x mangrove management plan for each intervention area. • Progress reports from mangrove association. • Project implementation reports.
Amended	Number of mangrove associations and management plans developed by the LDCF project in conjunction with the local environmental committees.	0	By project mid-point, 1 association and 1 plan developed for each project site (4 associations and plans in total). These plans should include methods to: i) protect mangroves; and ii) record and store data on illegal offences. The		

				association must include as many women as possible.		

Mangrove rehabilitation will likely be conducted in more than one ward per site. Currently, environmental management within each of these wards is governed by local environmental committees. To promote consistent management of mangroves within sites, there should be one association per site area, namely Pangani, Rufiji, Unguja and Pemba. Therefore, the LDCF project should facilitate the members of local environmental committees from a number of wards to form the association for mangrove management for each project site. In project sites where the activities are limited to one ward, the local environmental committee will act as the association for mangrove management. Members of the association, LGAs and a mangrove expert should develop a mangrove management plan for the project site.

The timeline for the target was updated so that the associations are developed by mid-project. In doing so, the association will be involved in activities for mangrove planting and protection during the project (at least two years). Therefore, technical skills and scientific knowledge will be transferred to the association by the LDCF project, including *inter alia*: i) suitable species for rehabilitation; ii) management of the nursery; and iii) monitoring survivorship of seedlings.

Output 3.2 Water resources are protected from sea level rise and erosion and coastal communities have access to safe water

Activity: Decommission and relocate salinized wells (Bagamoyo)
Updated activity: Construct infrastructure to increase year-round supply of freshwater in Bagamoyo District

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of salinized wells relocated.	No saline wells have been decommissioned in project sites.	At least 18 salinised wells in Bagamoyo District are relocated to safe locations.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were amended to be specific and time-bound.	• Engineer reports. • Visual assessment at sites. • Project implementation reports. • District focal point progress report (Bagamoyo).
Amended	Number of infrastructure items constructed by the LDCF project to increase	0 (At least 130 wells and 14 community rain-water harvesting devices in Bagamoyo District).	By project end-point, at least: • 17 wells[74] constructed in locations resilient to SLR; and		

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[74] It is expected that wells will be constructed in the following villages: i) Kaole (four wells); ii) Magomeni (three wells); iii) Saadani (one well); iv) Dunda (one well); Mlingotini (four wells); v) Gongo (one well); and vi) Kitpew (three wells).

			• 6 community rainwater-harvesting devices[75].		
year-round supply of freshwater in Bagamoyo District.					

Currently, there are approximately 130 wells in Bagamoyo District. However, more than half of these wells are not functional because of one or more of the following reasons: i) they have been poorly maintained and are therefore broken; ii) groundwater aquifers have been inundated with seawater and are therefore salinized; and iii) SLR has resulted in wells along the coast being covered by seawater during high tide. In the past, climate change has not been considered when choosing the location and design of these wells.

In Bagamoyo District, there are 14 rainwater-harvesting devices. The majority of these devices – supplied by local government, the World Bank's Rural Water Supply and Sanitation Project (RWSSP) and Swedish International Development (SIDA) – are located on the grounds of institutions such as schools or dispensaries. The surrounding community uses the water that is collected by these devices. These rainwater-harvesting devices are considered as demonstrations for community members.

Activity: Water harvesting systems implemented

Water harvesting systems were included in updated activity: "*Infrastructure is constructed to increase year-round supply of freshwater in Bagamoyo District*". Therefore, the indicator was removed.

Activity: Train communities on water conservation, management and recycling (Bagamoyo)

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of people trained.	0	At least 100 people trained	• The baseline was updated. • The indicator and target were amended to be specific and time-bound.	• Training sessions attendance registers. • Project implementation reports.
Amended	Number of people trained by the LDCF project on: i) water conservation, management and recycling; and ii) maintenance of	0 (Currently, at least 1500 people trained on well maintenance through government initiatives).	By project end-point, at least 100 people trained. Trainees – of which at least 45% must be women – should include local communities from all sites where infrastructure will be constructed to		

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[75] It is expected that rainwater-harvesting devices will be constructed in the following villages: i) Matipwili (at Matpwili Secondary School: four devices); and ii) Makurunge (Razaba Primary School: two devices).

wells and rainwater harvesting devices.		increase year-round supply of freshwater (at least 11 from each site).		

In Bagamoyo District, the government has been constructing wells for more than 20 years. During this time, 25 wells have been constructed. Each of these wells provides water for approximately 60 households. At least one member of each household has received training on water-related topics including *inter alia*: i) maintenance of wells; ii) how to calculate running costs of wells; iii) how to purchase spares; and iv) water conservation. In 2004, the piped water scheme was implemented. Beneficiaries of this scheme are estimated to include approximately 60% of the population of Bagamoyo District. These beneficiaries received similar training when the scheme was implemented. In addition, they receive annual "refresher" courses. Therefore, at least 1,500 people have been trained in Bagamoyo through government initiatives.

<u>Output 3.3 Coastal infrastructure assets are protected</u>

<u>Activity: Rehabilitation and upgrade of Pangani seawall, Kisiwa Panza seawall and Bwawani seawall</u>
<u>Updated activity: Upgrade seawalls</u>

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of meters of seawall upgraded to CC standards.	0	476 metres in Pangani, 119 in Bwawani and 50 m in Kisiwa Panza.	• The indicator and target were updated and amended to be specific and time-bound.	• Engineering reports. • Project implementation reports.
Amended	Length of seawall upgraded by the LDCF project (m) to manage the effects of climate change.	0	By project end-point, the following lengths of seawall (at least) upgraded to manage the effects of climate change[76]: • 476 m of seawall in Pangani raised and reshaped and 200 m constructed; • 119 m in Bwawani raised and reshaped; and		

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[76] To manage the effects of climate change, seawalls at project sites will be rehabilitated to climate change standards. An engineer will be contracted to determine the bill of quantities for the structures.

			• 75 m in Kisiwa Panza constructed.		

To manage the effects of climate change and reduce scour, structures at Pangani and Bwawani should be reshaped to incorporate slopes and/or irregular surfaces. A sloping surface will promote wave breaking which will result in energy dissipation. Alternatively, irregular surfaces will scatter the direction of wave reflection[77]. In addition, these seawalls should be raised to prevent seawater overtopping during spring tides. The seawalls at Pangani should be extended by at least 200 m at the downward drift end of both of these structures. To protect the main village area on Kisiwa Panza, new structures should be constructed. A seawall engineer should be consulted to determine appropriate designs and bills of quantities for these structures. For a detailed description of the condition of seawalls at project sites, see Annexure 10 - 12.

Activity: Dyke, groyne and spillway reconstruction at Ukele and Tumbe West (Zanzibar)
Updated activity: Reconstruct dykes, groynes and spillways and rehabilitate irrigation and drainage systems to protect livelihood assets

Indicator		Baseline	Target	Comments	Means of verification and tracking progress
Original	Number of metres of dykes and spillway constructed.	The existing dykes, groynes and spillways are nearly completely destroyed.	14 structures reconstructed in Tumbe and 16 in Ukele.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be time-bound.	• Engineering reports. • Project implementation reports.
Amended	Length of adaptation technologies (m) upgraded by the LDCF project to protect livelihood assets.	0	By project end-point, at least two of the following: • 387 m of dyke constructed at Tovuni (Pemba); • 485 m of irrigation drain upgraded at Tibirinzi (Pemba); • <mark>XXX</mark> *m of dyke upgraded at Ukele*		

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[77] French, P.W. 2001. Coastal defences: processes, problems and solutions. London: Routledge.

			• *XXX m of dyke upgraded at Tumbe (Pemba)*[78] If selected, by project end-point: • XXX[79] m of groynes constructed along 538 m at Kilimani (Unguja); and • Valve cleaned/rehabilitated at Mnazi Mmoja (Unguja).		

Since the project document was developed, the local communities at some of the original proposed sites on Pemba Island have constructed dykes at Ukele and Tumbe. Therefore, alternative sites and project activities have been identified by local government[80] (Figures 16 and 17 in Annexure 1), namely: i) construction of a dyke at Tovuni; and ii) upgrade of an irrigation drain at Tibirinzi. At Tovuni, rice paddies have been affected when the area becomes waterlogged with seawater at high tides, causing salinization of the soil. Therefore, land that was previously used for rice paddies is no longer productive. At Tibirinzi, the main channel of the irrigation drain is not functioning effectively because it is blocked. As a consequence, the saltwater that flows into the main channel at spring high tides cannot flow freely out when the tide lowers. Therefore, the area becomes waterlogged, resulting in salinization of the soil. As a result, approximately 16 ha of rice paddies are no longer productive in this area. See Annexure 12 for a visual assessment of the project sites and alternative sites.

Project interventions should take place in two of the following four sites: Ukele, Tumbe, Tibirinzi or Tovuni. Before decisions are made regarding target sites for the LDCF project, the dykes that were constructed by the local community (Ukele and Tumbe) should be assessed to determine if they are suitable to manage current and predicted effects of climate change. If these dykes are not suitable, they

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[78] The dykes that were constructed by the local community should be assessed to determine if they are suitable to manage current and predicted effects of climate change. If these dykes are not suitable, they should be upgraded (i.e. raised and strengthened).

[79] This target will depend on the design of the groynes. Therefore, it should be updated by the expert who is responsible for designing these structures.

[80] According to LGAs, SLR negatively affects more than 150 areas on Pemba Island. The proposed sites were chosen because interventions will result in the highest number of beneficiaries.

should be upgraded (i.e. raised and strengthened). Currently, these structures are comprised of stones and mud (see Annexure 12); their dimensions are listed in the table below.

Table 6. Dimensions of dykes constructed by the community in Ukele, Tumbe West and Tumbe East

Site	Length (m)	Breadth (m)	Height (m)
Ukele	850	3	7
Tumbe West	370	3	6
Tumbe East	150	2	5

On Unguja Island, additional sites and project activities have been identified by the LGA – including the local environmental committee – namely: i) construction of groynes along the coastline of Kilimani; and ii) upgrade of a drainage system at Mnazi Mmoja (Figures 14 and 15 in Annexure 1). Currently, coastal erosion in both of these areas is severe (see Annexure 11). In Kilimani, degraded drainage infrastructure exists along approximately 538 m of the coastline. At Mnazi Mmoja, the area inland of the coast – including a communal playing field – becomes waterlogged during rainy seasons. Previously, this area was drained by means of a system of pipes that surround the field and valves that were opened during the rainy season. Currently, this system is inoperative because one of the valves is blocked. As a consequence, during the rainy season the playing field in Mnazi Mmoja becomes waterlogged (Figure 15 in Annexure 1) and cannot be used by local communities. The communities' houses are located directly behind the playing field. The waterlogged playing field results in an increased number of mosquitoes that transmit malaria, and vector-borne diseases. This increase has a negative effect on the health of local communities.

Outcome level indicators

RF should include indicators that can track the progress of achieving outputs and outcomes of a project. Achieving output-level targets contributes to achieving targets at an outcome level. The original RF did not include outcome-level indicators; these indicators are included as Annexure 15 in the LDCF project document (Tracking Tools). They have been amended to reflect the changes made to the output-level indicators and will be included in the revised RF. In addition, the corresponding GEF tracking tools have been identified. Additional information will not need to be collected to track the progress of the outcome-level indicators. Instead, data that will be collected to track the progress of output-level indicators will be used to track the progress of project outcomes.

Outcome-level indicators

Outcome 1: Local level capacities and knowledge to effectively analyse the threats and potential impacts of climate change increased

Outcome Indicator	Baseline	Target	Comments	Means of verification and tracking progress

Original	Availability of climate change related information at a local level. Degree of understanding among local-level stakeholders. Number of people trained.	There is information available but it is scattered and not always relevant to local-level planners. Understanding and capacity at local level is still not at its most efficient level.	Local level planners have the necessary tools and capacity to understand climate vulnerability information. 100 people are trained in local administrations; 100 people trained in local communities.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be specific, time-bound and gender-sensitive.	• Project implementation reports. • Attendance registers for training sessions. • Progress reports from district focal points. • Vulnerability model. • Vulnerability maps • PVA reports.
Amended	Number of people trained in skills for coastal adaptation by the LDCF project[81].	0	Within the first year, at least: • 110 LGA staff trained in ICZM; • 110 LGA staff trained in CVCA; • 110 LGA staff trained in livelihoods development; and • 20 LGA staff trained in coastal vulnerability modelling. At least 30% of all trainees must be women.		

Outcome 2: Government and public engagement in climate change adaptation activities is enhanced

	Outcome Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Original	Existence of a strong network of civil	While there are individual organisations, NGOs and	10 new CSOs working on adaptation by end of project		

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[81] GEF Tracking Tools were not included in the project document. The revised indicator is aligned with Indicator 2.2.1.1 "*No. of staff trained on technical adaptation themes (per theme) – disaggregated by gender)*".

	society on adaptation who functions as an effective partner to government institutions.	CBOs, these are not yet functioning as an effective partner to government in adaptation planning and programming.	and 60 students and researchers engaged in adaptation activities within the universities.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be time-bound.	• Project implementation reports. • Progress reports from district focal points.
Amended	Number of public representatives supported to engage in activities for climate change adaptation by the LDCF project.	0	By project mid-point, at least 50 CBOs registered with – and receiving information and training from – an organisation for climate change. Annually, at least i) 5 student reports; ii) 5 research reports; and iii) 5 internship reports from students enrolled in student support programmes for climate change.		• Progress reports from CBOs. • Annual reports from organisation for climate change. • Enrolment registers of students in pilot projects. • Progress reports from students enrolled in pilot project. • Reports on findings of pilot projects.

Outcome 3: Vulnerability to climate change is reduced through adaptation interventions and pilot innovations

	Outcome Indicator	Baseline	Target	Comments	Means of verification and tracking progress
Original	Physical and ecological vulnerability in project sites is reduced. • (Number of hectares of rehabilitated mangroves); • (number of linear meters of	At present, project sites are experiencing high degrees of physical vulnerability to coastal climate change.	3470 hectares of mangroves rehabilitated. 645 meters of protective infrastructures. 20% increase in year-round water availability.	• The baseline was updated and changed to align with indicator/target. • The indicator and target were updated and amended to be time-bound.	• Project implementation reports. • Progress reports from district focal points. • Surveys conducted at project end-

	rehabilitated protection infrastructure); and • (increase in water availability).			point, including a vulnerability index.
Amended	Physical and ecological infrastructure enhanced by the LDCF project[82] to deal with climate change. Number of: • Water conservation devices installed; • Hectares of mangroves rehabilitated; and • Linear meters of coastal protection infrastructure rehabilitated.	0 ha 0 m	By project end-point, at least: • In Bagamoyo, 23 water conservation devices installed; • In Rufiji, Pangani and Zanzibar, 240 ha mangroves; and • In Pangani and Zanzibar, 872 m of coastal protection infrastructure.		

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[82] GEF Tracking Tools were not included in the project document. The revised indicator is aligned with Indicator 1.2. ''1.2 "*Resilient infrastructure measures introduced to prevent economic losses*".

5. Revised results frameworks

Table 7: Revised results framework for the AF project

	Activities	Output	Indicator	Baseline	Target	Source of verification
Component 1: Addressing climate change impacts on key infrastructure and settlements **Outcome 1: Averse impacts of sea level rise and floods on coastal infrastructure and settlements reduced**	Rehabilitate coastal protection facilities to protect settlements economic and cultural infrastructure	Seawall raised, rehabilitated, constructed in areas showing particular damage.	Length of seawalls upgraded by the AF project (m) to manage the effects of climate change	0 m	By project end-point: 145 meters of seawall upgraded along Kigamboni seawall 221 meters of seawall constructed in Kigamboni 800 meters of seawall upgraded along Ocean Road 500 meters constructed along Ocean Road	• Engineering reports • Physical assessments (including photographs and GPS coordinates)
	Clean drainage channels and rehabilitate storm water drains in Dar es Salaam	Effective storm and flood drainage systems in urban areas and near coastal communities	% increase in volume along X m of drainage channels and X m of stormwater drains.	X m³	By project end-point, at least X% along drainage channels and X% along stormwater channels.	• Engineering assessments following methodology of feasibility assessment

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	Activities	Output	Indicator	Baseline	Target	Source of verification
Component 2: Ecosystem-Based Integrated Coastal Area Management (EBICAM) **Outcome 2: Coastal ecosystems are rehabilitated and ICAM is implemented**	Rehabilitate coastal ecosystems for climate resilience through the implementation of a GreenJobs program	Appropriate alternative energy (efficient cook stoves, small solar) technology transferred for avoided deforestation including through training	Number of households receiving: i) efficient cookstoves; and ii) training on optimal use and maintenance of these stoves (disaggregated by age and gender).	0 households	By project end-point, at least 1,500 households	• Project implementation reports • Registers of families that have received cookstoves
		Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones	Area of mangroves rehabilitated by the AF project	0 ha	By project end-point, 40 ha of mangrove rehabilitated in one or more of the following areas: Selander Bridge, Kunduchi, Mbweni and Unumio.	• Project implementation reports • GPS data collection at project sites (See Section 6).

	Activities	Output	Indicator	Baseline	Target	Source of verification
		Coral reef rehabilitation and protection in coastal sites	Area of reef under rehabilitation by the AF project.	0 m^2	By project end-point, X m^2 under rehabilitation.[83]	• Data collection at project sites • (GPS points and polygons digitised in a GIS to determine the areas in which rehabilitation has been conducted).
		Shoreline stabilisation and rehabilitation using trees and grasses	Area of coastal vegetation rehabilitated by the AF project using species that are good at stabilising sandy soils.	0 ha	By project end-point, at least 56,430 m^2 of coastal vegetation rehabilitated using three or more fast-growing plant species.	• Project implementation reports • Data collection at project sites • (GPS points and polygons digitised in a GIS to determine the areas in which rehabilitation has been conducted). Project implementation reports • Data collection at project sites

[83] Quantitative target to be determined by coral reef expert. Please see Section 9 for the proposed strategy.

	Activities	Output	Indicator	Baseline	Target	Source of verification
		N/A	Survivorship of plants and coral in areas that are rehabilitated by the AF project.	N/A	Annually, at least[84]: • 65% survivorship of mangrove species. • 65% survivorship of shoreline vegetation species. • X[85]% survivorship of coral reefs.	• See data collection protocols • Monitoring of this indicator should be coordinated by experts but conducted by coastal communities at intervention sites.
Component 3: Knowledge, coastal monitoring and policy linkages **Outcome 3: Knowledge of climate impacts and adaptation measures increased**	stocktaking and assessment of physical coastal processes monitoring of the evolution of coastal processes	Performance of a baseline study based on coastal vulnerability	Number of comprehensive baseline studies on coastal vulnerability developed through the AF project for Dar es Salaam.	0 comprehensive baseline studies	At the beginning of year one, 1 study.	• Project implementation reports • Baseline assessment report
		Create and operate a climate change observatory for Tanzania for ongoing monitoring of CZM and coastal environmental status and scientific research	Number of operational clearing house functions implemented by the AF project.	0 operational clearing house functions	By project mid-term, 1 operational clearing house function.	• Project implementation reports • Institutional and organisational reports

[84] All survivorship percentages are based on the assumption that rehabilitation interventions are not undermined by any extreme environmental events or natural disasters

[85] The survivorship rate of coral reefs is dependent on, inter alia, the reef and genus that is being transplanted. The coral reef expert consulted should determine this rate.

	Activities	Output	Indicator	Baseline	Target	Source of verification
		Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through undertaking cost-benefit analyses)	Number of cost-benefit reports on measures for adapting to climate change implemented by the AF project. Number of reports on strategies for upscaling measures with the most favourable cost-benefit ratio.	0 cost-benefit reports 0 reports on strategies	Annually, at least 1 report from years 3 and 4. By project end-point, at least 1 report.	• Project reports. • Annual cost-benefit assessment reports
	Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through undertaking cost-benefit analyses)	lessons learned from the project outputs documented	Number of policy briefs on cost-effective measures and lessons learned through the AF project. Number of workshops on cost-effective measures and lessons learned through the AF project[86] conducted with relevant sectors.	0 policy briefs. 0 workshops.	Annually, 2 policy briefs from years 3 and 4 (1 on measures to adapt to climate change, 1 on general lessons learned). By project end-point, 2 workshops (1 on cost-effective measures to adapt to climate change, 1 on general lessons learned).	• Project implementation reports. • Policy briefs • Workshop reports and registers

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[86] Based on policy documents developed by the AF project.

Table 8. Revised results framework for the LDCF project

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
Component 1: Scientific and technical knowledge and capacities for climate change adaptation analysis **Outcome 1.1: Local level capacities and knowledge to effectively analyse the threats of climate change increased**	1.1. Climate change impact assessment capacity established for project sites (monitoring climate changes)	Train district government on Integrate Coastal Zone Management, Climate Change Vulnerability Analysis and livelihood development	Number of local government representatives trained in ICZM, CCVA and livelihoods development by the LDCF project.	0 local government representatives	Within the first year of the project, at least 110 representatives trained. Trainees – of which 30%[87] must be women[88] – should include representatives from all project sites and relevant sectors such as agriculture, fisheries and natural resource management.	• Project implementation reports • Attendance registers from training sessions
		Procure and provide district-level training on coastal vulnerability modelling tools	Number of local government representatives trained in coastal modelling by the LDCF project.	0 local government representatives	By the end of the first year, at least 8 representatives trained. Trainees – of which at least 2 must be women – should include local government representatives from all project sites.	• Project implementation reports • Attendance registers from training sessions. • Training assignments (i.e. maps and reports)
	1.2. Detailed participatory coastal vulnerability	Produce coastal vulnerability models and maps and coastal	Number of coastal vulnerability models and	0 coastal vulnerability models	By mid-project, at least 1 model and 5 maps (1 map per intervention	• Project implementation reports

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[87] This target was based on the training session that was conducted in Panagani. This session coincided with the baseline assessment mission and was therefore observed. Of the 21 trainees, seven were women.

[88] The attendance registers from training sessions should be assessed to verify if women were included.

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
	assessment for Rufiji, Bagamoyo and Pangani Districts and Zanzibar	vulnerability index for Tanzania	maps developed by the LDCF project.		area[89]) developed with local government representatives who are trained in coastal modelling[90].	• 1 x coastal vulnerability model • 4 x maps
		Perform PVA, revise existing land use policies to integrate climate change adaptation and prepare policy recommendations including budget allocations	Number of participatory vulnerability assessments available at local level. Number of briefs on suggested policy revisions developed by the LDCF project to address vulnerability and adaptation at a local level.	1 participatory vulnerability assessment developed for Pangani. 1 participatory vulnerability assessment currently being developed for Rufiji 0 suggested policy revisions.	By project mid-term, at least 1 consolidated and local PVA in existence for each intervention area[91] (5 in total). The PVAs should be gender- and age-sensitive[92]. By project end-point, at least 1 policy brief developed for each project site to address vulnerability and adaptation at a local level. The policy briefs should be gender- and age-sensitive.	• Project implementation reports • Expert reports. • PVA reports and deliverables

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[89] 1 map for each of the following areas: Pangani, Bagamoyo, Rufiji and Zanzibar and Pemba.
[90] Those local government representatives trained in Output 1.1.
[91] 1 for each of the following areas: Pangani, Bagamoyo, Rufiji, Unguja and Pemba
[92] The PVAs should include an assessment of gender and age on vulnerability to climate change.

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
Component 2: Broadening stakeholder engagement for vulnerability reduction **Outcome 2.1: Government and public engagement in climate change adaptation activities is enhanced**	2.1 Public engagement in climate change adaptation activities enhanced	Strengthen NGO network on climate change	Number of CBOs from project sites strengthened by the LDCF project. through a network for climate change organisations.	0 CBOS	By project mid-point, at least 50 CBOs per intervention area (10 per project site[93]l) registered with – and receiving information and training from – an organisation for climate change.	• Project implementation reports • Membership reports from organization for climate change. • Progress reports from District Focal Points • Progress reports from LGAs • Progress reports from strengthened CBOs
		Implement an awareness campaign focused on climate change in coastal zones	Average climate change awareness of coastal communities at project sites (disaggregated by age and gender).	Average for each site[94]: • Bagamoyo: 21% • Pangani: 50% • Rufiji: 63% • Zanzibar: 45%	By project end-point, an average awareness of at least a 70%[95] at all project sites.	• Surveys conducted at project end-point, including an awareness index • Project implementation reports

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[93] Ten in each of the following areas: Pangani, Bagamoyo, Rufiji, Pemba and Zanzibar
[94] Determined using a household survey, including an awareness index.
[95] See Annexure 6

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
	2.2 Student internship program established for interns to project sites	create and administer student support programmes which includes an internship programme, summer courses and a research programme focused on climate change for undergraduate students	Number of student reports from summer courses funded by the LDCF project. Number of reports from research programme funded by the LDCF project. Number of reports from internships funded by the LDCF project.	0 reports	Annually, at least 5 student reports from summer courses funded by the LDCF project. Annually, at least 5 reports from a research programme funded by the LDCF project. Annually, at least 5 reports from an internship programme funded by the LDCF project. In total, 15 students should be enrolled in student support programmes annually – at least 8 of which must be women.	• Project implementation reports • Reports on findings from research conducted through internship programmes
Component 3: Priority adaptation interventions for resilient Integrated Coastal Zone Management	3.1 Mangroves are restored in pilot sites	Restore mangroves using locally available resilient tree species	Hectares of coastal vegetation rehabilitated by the LDCF project[96]	0 ha	By project end-point, the following ha of coastal vegetation rehabilitated: • 1,000 ha mangroves in Rufiji; • 10 ha mangroves in Pangani;	• Project implementation reports. • GPS data collection at project sites (See data collection protocol – Section 9).

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[96] See Annexure 1 for proposed areas for mangrove rehabilitation

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
Outcome 3.1: Vulnerability to climate change is reduced in the coastal zones through adaptation interventions and pilot innovations					• 200 ha mangroves in Kisiwa Panza; and • 7 ha coastal vegetation in Kisiwa Panza; and • 1 ha coastal vegetation enriched to facilitate local apiculture on Kisiwa Panza By project end-point, at least one[97] of the following: • 10 ha mangroves in Tumbe and 0.4 ha of coastal vegetation at Tumbe East port; • 7 ha mangroves in Ukele; or • 1 ha mangroves in Tovuni. By project end-point, either: • 10 ha mangroves in Bwawani; or • 1.4 ha mangroves in Kilimani.	

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[97] One the following will be selected if Tibirinzi is selected as a project site. If Tibirinzi is not selected as a project site, at least two of the targets listed should be achieved.

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
		Strengthen local capacity to protect mangroves	Number of sustainable mangrove protection plans developed by the LDCF project.	0 sustainable mangrove protection plans	By project mid-point, at least 1 plan developed for each project site in conjunction with the local environmental committee (5 plans in total). Plans should include methods to record and store data on illegal offices.	• 1 x mangrove protection plan for each project site. • Project implementation reports
			Survivorship of mangroves in areas that are rehabilitated by the LDCF project.	N/A	Annually, at least[98]: • 65% survivorship of mangrove species.	• Project implementation reports • Data collection at project sites
		Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring	Number of mangrove associations and management plans developed by the LDCF project in conjunction with the local environmental committees.	0 mangrove associations	By project mid-point, 1 association and 1 plan developed for each project site (4 associations and plans in total). The association must include as many women as possible.	• 1 x mangrove management plan for each intervention area. • Progress reports from mangrove association. • Project implementation reports
	3.2 Water resources are	*Construct infrastructure to*	Number of infrastructure	0 infrastructure items	By project end-point, at least:	• Engineer reports.

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[98] All survivorship percentages are based on the assumption that rehabilitation interventions are not undermined by any extreme environmental events or natural disasters

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
	protected from sea level rise and erosion and coastal communities have access to safe water	*increase year-round supply of freshwater in Bagamoyo District*	items constructed by the LDCF project to increase year-round supply of freshwater in Bagamoyo District.	(At least 130 wells and 14 community rain-water harvesting devices in Bagamoyo District).	• 17 wells[99]; and • 6 community rainwater-harvesting devices[100].	• Visual assessment at sites • Project implementation reports • District focal point progress report (Bagamoyo)
		Train communities on water conservation, management and recycling (Bagamoyo)	Number of people trained by the LDCF project on: i) water conservation, management and recycling; and ii) maintenance of wells and rainwater harvesting devices.	0 people trained (Currently, at least 1500 people trained on well maintenance through government initiatives).	By project end-point, at least 100 people trained. Trainees – of which at least 45% must be women – should include local communities from all sites where infrastructure will be constructed to increase year-round supply of freshwater (at least 11 from each site).	• Training sessions • Attendance registers • Project implementation reports
	3.3 Coastal infrastructure assets are protected	Upgrade seawalls	Length of seawall upgraded by the LDCF project (m) to manage the	0 m	By project end-point, the following lengths of seawall (at least) upgraded to manage the effects of climate change[101]:	• Engineering reports • Project implementation reports

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[99] It is expected that wells will be constructed in the following villages: i) Kaole (four wells); ii) Magomeni (three wells); iii) Saadani (one well); iv) Dunda (one well); Mlingotini (four wells); v) Gongo (one well); and vi) Kitpew (three wells).

[100] It is expected that rainwater-harvesting devices will be constructed in the following villages: i) Matipwili (at Matpwili Secondary School: four devices); and ii) Makurunge (Razaba Primary School: two devices).

[101] To manage the effects of climate change, seawalls at project sites will be rehabilitated to climate change standards. An engineer will be contracted to determine the bill of quantities for the structures.

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
			effects of climate change.		• 476 m of seawall in Pangani raised and reshaped and 200 m constructed; • 119 m in Bwawani raised and reshaped; and • 75 m in Kisiwa Panza constructed.	
		Reconstruct dykes, groynes and spillways and rehabilitate irrigation and drainage systems to protect livelihood assets	Length of adaptation technologies (m) upgraded by the LDCF project to protect livelihood assets.	0 m	By project end-point, at least two of the following: • 387 m of dyke constructed at Tovuni (Pemba); • 485 m of irrigation drain upgraded at Tibirinzi (Pemba); • *XXX m of dyke upgraded at Ukele* • *XXX m of dyke upgraded at Tumbe (Pemba)*[102] If selected, by project end-point: • XXX[103] m of groynes constructed along 538 m at Kilimani (Unguja); and	• Engineering reports. • Project implementation reports

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[102] The dykes that were constructed by the local community should be assessed to determine if they are suitable to manage current and predicted effects of climate change. If these dykes are not suitable, they should be upgraded (i.e. raised and strengthened).
[103] This target will depend on the design of the groynes. Therefore,it should be updated by the expert who is responsible for designing these structures.

	Outputs	Activities	Indicator	Baseline	Target	Source of verification
					• Valve cleaned/rehabilitated at Mnazi Mmoja (Unguja).	

6. Data gaps and recommendations

Data gap analysis

The interventions of the AF and LDCF projects include the implementation of a variety of activities along the coastline of Tanzania. To finalise suitable targets for some of these activities, technical experts need to be consulted. In addition, some of the baseline values that were determined during the baseline assessment need to be verified by these technical experts. The data gaps – and recommendations to fill these gaps – are described below.

Upgrade of seawalls: technical designs
Both the AF project and LDCF project include activities to upgrade seawalls. Currently, the seawalls at the project sites are not suitable to manage the effects of climate change. These project sites include Pangani, Ocean Road (Dar es Salaam), Kigamboni (Dar es Salaam), Bwawani (Unguja) and Kisiwa Panza (Pemba). Severe damage was noticed along the lengths of the existing walls at Pangani, Ocean Road and Bwawani. Along some lengths, these walls have completely collapsed. Moreover, stakeholders at these sites reported overtopping of seawater into areas behind the seawalls at very high tides. Therefore, these walls should be upgraded to protect the infrastructure directly behind them. At Kigamboni and Kisiwa Panza, the seawalls have collapsed along their entire length. Therefore, it is recommended that these walls be completely reconstructed.

A number of studies should be conducted to determine i) the height to which the seawalls need to be upgraded or constructed; and ii) the exact sites to be upgraded or constructed along the length of the existing seawall and beachfront, respectively. An overview of these phased studies is given below[104].

- A detailed Topography Assessment of the entire damaged area[105] of the seawall including a 10 m buffer zone on either edge of seawall to ensure that the top wall, base and some beach profiles are captured.
- Geographic research on: i) prevalent tides, winds and swell direction; and ii) the wave heights experienced in the bay (i.e. impacting the seawall). This information will allow an engineer to determine the size of the rocks required to build the seawalls to manage the current and predicted waves.
- A trial pit into the stretches of sandy or rocky coastline to check base stratum. These pits need to be dug to ensure chief (stable) ground is reached during the reshaping or construction of the seawalls.
- A robust review of literature published by the United States Marine Corps on Angle of Repose (gentle slopes for wave run-up attenuation) to re-profile the wall[106].

The seawall engineer who was consulted during the baseline assessment made the following statement: "*Please do not fall into the 'cost-effective' trap of simply re-cladding the damaged wall. The core/earth fill behind the wall would also be structurally indeterminate. Instead, consider demolishing the older damaged wall to put in new back fill and geo-textile fabric underneath rocks for a better and more long-term solution.*"

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[104] A seawall engineer was briefly consulted during the development of the baseline assessment report.

[105] Scour was observed along most of the lengths of the seawalls that have not collapsed. Only in isolated areas – in which localised and ad hoc maintenance has taken place – was there no scour.

[106] The seawall engineer that was consulted often designs dual reposed seawalls (2 different angels of repose from top to mid core and from mid core to base of wall).

The ToRs for the seawall engineer should include activities to: i) determine suitable designs for the seawalls based on the data collected through the studies outlined above; ii) identify exact sites for upgrade and construction; iii) compare designs and select the most feasible and beneficial option; and iv) develop a bill of quantities – including dimensions – for the seawalls that will be upgraded and constructed. The dimensions for the seawalls should be used to update the indicators and targets for the activities to upgrade/construct seawalls. These indicators include: i) "*Length of seawalls raised, rehabilitated, constructed (m) to manage the effects of climate change*" (AF project); and ii) "*Length of seawall upgraded by the LDCF project (m) to manage the effects of climate change*" (LDCF project).

Upgrade of stormwater drains and drainage channels: sites, baseline values and technical design

The project sites are as follows: i) Tandale Street in Tandale Ward and Kawe Street in Kawe Ward in Kinondoni; ii) Bungoni Street in Buguruni Ward in Ilala; and iii) Miburani-Mtoni Bustani streets in Mtoni Ward and Butiama street in Kijichi ward in Temeke. The dimensions of the current drainage systems in these sites should be measured to determine the baseline for the indicator in the AF project: "*% increase in volume along X m of drainage channels and X m of stormwater drains*". Therefore, the length of the targeted drainage channels and stormwater drains should be measured. In addition, the average diameter along these lengths should be measured (including lengths that are blocked and need to be cleaned). The engineer that is contracted for the AF project should determine dimensions for these drainage systems to manage the effects of heavier and more frequent rainfall at project sites better. Once these dimensions have been determined by the engineer, the target for this indicator should be updated: "*By project end-point, at least X% along drainage channels and X% along stormwater channels.*" Therefore, the ToRs for this expert should include the activities described above.

Coral reef rehabilitation: sites, methods to rehabilitate coral reefs and to track progress of this activity
Since the development of the AF project document, data on the condition of coral reefs have not been developed or made readily available. Therefore, it was impossible to identify sites for this activity given the period over which the baseline assessment was conducted. The coral reef expert to be contracted should: i) conduct a status monitoring assessment (to determine the condition of reefs and select sites for project activities)[107]; and ii) develop technical protocols – based on the types of targeted coral reefs – for rehabilitation and monitoring of interventions[108]. The findings of the research conducted by this expert will be used to: i) update the baseline and target for this activity: "*By project end-point, X m^2 coral reef rehabilitated*"; and ii) guide implementation and monitoring of the activity. Therefore, the ToRs for this expert should include these activities.

Mangrove rehabilitation: validate areas and methods to track progress of this activity.
It may not be possible to rehabilitate 40 ha of mangroves at Selander Bridge (See Section 7). Therefore, Kunduchi, Mbweni and Unumio have been recommended as additional sites for mangrove rehabilitation within the AF project. For the LDCF project, the areas that are available for mangrove rehabilitation have been calculated using spatial data (including land classification analyses), information collected in the field and gathered reports. Therefore, the areas that are

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[107] Stakeholders that have been working extensively in the area should be consulted to accelerate the process.
[108] For example, the following biophysical attributes are important to determine the condition of coral: i) reef dimensions; ii) topographic complexity; iii) roughness and spatial arrangement; and iv) colony size and height.

available at the recommended alternative sites for AF[109] and LDCF project interventions[110] should to be checked with the mangrove expert to be contracted for the project. Therefore, this expert will need to validate the targets that have been set. In addition, this expert will validate the proposed methodology that has been recommended to track interventions for mangrove rehabilitation.

Upgrading adaptation technologies to protect livelihood assets: sites and interventions
Since the development of the LDCF project document, local communities at some of the original proposed sites on Pemba Island have constructed dykes (see Annexure 12). Consequently, local government has identified alternative sites and project activities for the LDCF project[111]. However, the dykes created by the local community should be assessed by the engineer contracted by the LDCF project to determine if it is suitable to manage current and predicted effects of climate change. If this infrastructure is not suitable, it should be upgraded (i.e. raised and strengthened). In addition, new sites have been identified on Unguja[112]. Therefore, an engineer should visit these sites and the project budget should be checked to determine which activities are feasible on Zanzibar. Once activities have been finalised, the target for the indicator "*Length of adaptation technologies (m) upgraded by the LDCF project to protect livelihood assets*" should be finalised.

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[109] In Dar es Salaam.
[110] In Pangani, Rufiji and Zanzibar.
[111] Namely: i) the construction of a dyke at Tovuni; and ii) the rehabilitation of an irrigation drain at Tibirinzi.
[112] Namely: i) the construction of groynes in Kilimani and Mnazi Mmoja; and ii) the rehabilitation of a drainage system at Mnazi Mmoja.

Strategy for monitoring indicators during implementation

Implementation of project activities should be monitored by: i) field visits to project sites; and ii) the review of all project reports described in the "means of verification" column in the indicator assessment. In addition, stakeholders and local communities should be consulted regularly to track progress. Revised project indicators should be monitored as described in Table 9 below. The data collected to determine the progress of project activities within the RBFs could also be used for tracking tools (AF) and AMAT indicators (UNEP).

Table 9. Strategy for monitoring indicators during project implementation

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
Seawalls upgraded or constructed by the projects (m) (both projects)	• A seawall engineer should determine the suitable designs for seawalls (including dimensions). • Seawall upgrade/construction will be based on the approved seawall design and targets. However, once the upgrade and construction of seawalls begins, dimensions of the walls should frequently (at least quarter-annually) be checked and recorded by the relevant expert. These basic measurements can be conducted using a GPS and tape measure, or tool equivalent. In addition, photographs should be taken at points along the upgraded/constructed seawall. This information should be passed to the Project Managers (PMs) and Senior TeFchnical Advisor (STA) to include in progress reports and Project Implementation Reports (PIRs). • At mid-term and terminal evaluations, the seawalls should be measured by the Monitoring and Evaluation (M&E) expert against the specifications prescribed in the seawall design. In addition, fixed-point photographs should be taken and compared to those in Annexures 8 - 12. These findings should be included in the mid-term and terminal evaluation reports.	• GPS • Camera • Tape measure	• Seawall engineer • M&E expert • Dar es Salaam City Council (DCC) • Contracted civil works or coastal engineering firm • VPO • STA • UNOPS
Drainage channels cleaned and volume of storm water drains upgraded (AF project)	• An engineer should determine suitable dimensions for upgrading the drainage channels and stormwater drains. • Targets should be updated based on these dimensions and baseline data (described in the point below). • Project team – under the supervision of the engineer – to measure dimensions of drainage infrastructure at selected sites (length and average diameter along the degraded/clogged area). These measurements should be conducted using a GPS and tape measure, or tool equivalent. By identifying the length and average	• GPS • Camera • Tape measure	• Engineer • M&E expert • Dar es Salaam City Council • Contracted civil works firm • VPO • STA

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	diameter of targeted drainage systems, their current volume (m^3) can be determined. In addition, photographs should be taken at these sites to record the baseline condition of the drains. This information will be passed to the PM and STA to include in progress reports and PIRs. • Upgrade/cleaning of the drains should be based on the specifications defined by the engineer. However, once activities have begun, the dimensions of the cleaned/upgraded drains should be checked and recorded frequently (at least quarter-annually) by an LGA that is associated with the project. These measurements should be conducted in a similar manner to those described above (i.e. using a GPS and tape measure, or tool equivalent). In addition, photographs should be taken at points along the upgraded drainage systems. This information should be passed to the PMs and STA to be included in progress reports and PIRs. • At mid-term and terminal evaluations, the drainage systems should be measured by the M&E expert against those dimensions prescribed in the upgraded system design. His/her findings should be included in the mid-term and terminal evaluation reports.		
Mangroves rehabilitated by the projects and survivorship of mangroves (both projects)	• At all project sites for mangrove rehabilitation, a detailed vegetation assessment should be coordinated by the coastal zone management expert – in conjunction with the district focal points (or a representative) – and conducted by members of the local community. Within these assessments, the average density of mangroves at intervention sites at project inception will be determined. • Based on the vegetation assessments, the coastal zone management expert should calculate the number of seedpods/seedlings that need to be planted per hectare for project sites[113] • As project activities are implemented, GPS points should be captured by a representative from the environmental committee	• GPS • GIS • Camera	• Coastal zone management expert • M&E expert • Ministry of Natural Resources and Tourism • Sub-contracted NGO/institution • Local communities • VPO • STA

[113] A minimum of 2,500 seedlings per hectare are required to qualify natural regeneration as being sufficient. Srivastava, P.B.L., Bal, H.S., 1984. Composition and distribution pattern of natural regeneration after second thinning in Matang mangrove reserve, Perak Malaysia. In: Soepadimo, E., Rao, A.N., Macintosh, D.J. (Eds.), Proceedings of the Asian Symposium on Mangrove Environment: Research Managements, Kuala Lumpar, Malaysia, pp. 761–784

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties

	along outlines of areas that are rehabilitated. This should take place frequently (at least quarter-annually). These GPS points should be passed on to the STA – or a similar representative from the project team with GIS skills – to digitise and map polygons of rehabilitated areas. Using these GPS points, this digitising should be conducted in a Geographic Information System (GIS).
	• In addition, photographs of project sites should be taken.
	• The GIS data that is developed and the photographs taken should be passed to the PM to include in progress reports and PIRs.
	• Annually, members of the mangrove associations should measure survival rates for seedlings/saplings in rehabilitated areas. To do this, a minimum of three permanent plots (10m X 10m) within targeted areas should be established along transects that are perpendicular to the shoreline with one plot in each of the following tidal elevations: i) high; ii) middle; and iii) low[114]. Although a minimum of three transects is recommended, the number of transects should be determined by the coastal zone management expert, based on the size of the sites for rehabilitation. The following factors should to be taken into account when spacing transects and points:
	  o transects should not be too close together - no seedling/plant/tree should be sampled twice;
	  o the spacing between transects and points along the transect will be determined by the size and shape of the restoration area;
	  o the transects and points should try to cover as much of the area as possible; and
	  o GPS co-ordinates should be taken at the start and end of each transect as well as at each successive point along the transect.
	• A census should be conducted on the seedlings/saplings within these permanently marked plots by counting the number of seedlings that have survived. This information will be passed to the STA and PMs to include in progress reports and PIRs		

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[114] This methodology was selected based upon a literature review of monitoring methodologies. The transect line permanent plot method has previously been used by programmes for mangrove rehabilitation in Tanzania to track survival and measure ecosystem health. These programmes include the IUCN "Assessment of Marine Biodiversity, Ecosystem Health, and Resource Status in Mangrove Forest in Mnazi Bay Ruvuma Estuary Marine Park".

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	• The same methodology to establish plots should be followed for the initial vegetation assessment. • At mid-term and terminal evaluations, this information should be assessed by the M&E expert. In addition, he/she should visit project sites to assess the project sites independently. These findings should be included in the mid-term and terminal evaluation reports.		
Area of reef under rehabilitation and survivorship of coral reefs (AF project).	• Reef expert and/or contracted NGO to conduct a detailed coral reef assessment at project inception to determine the condition of coral reefs and the area to be restored. This may include average biocover, number of fish grazers, fish biomass and biodiversity at the project site[115]. • Reef expert and/or NGO to calculate the amount/area[116] of coral transplants or in situ breeding required per m^2. • Reef expert and/or NGO to record the amount/area of coral transplanted or bred in situ per m^2. • As project activities are implemented, the reef expert and/or NGO should capture GPS points along outlines of rehabilitated areas. This should take place frequently (at least quarter-annually). These GPS points should be passed on to the STA – or a similar representative from the project team with GIS skills – to digitise and map polygons of rehabilitated areas. This digitising should be conducted in a Geographic Information System (GIS). This data will be passed to the PMs to include in progress reports and PIRs. • Annually, local fishermen/dive operators should measure survival rates for transplanted coral fragments in reefs that have been rehabilitated. To do this a minimum of X[117] permanent transects should be established within targeted areas. The following methods are recommended for measuring survivorship of reef fragments: o The line point intercept method should be used for reefs that are at a consistent depth. This method is one of the most cost- and time-effective methods for monitoring survivorship. For this method, the permanent transect must be marked at 10cm intervals and the survivorship of the coral directly below the mark should be recorded. A camera that has an attached	• GPS • GIS • Camera	• Reef expert • M&E expert • NGO sub-contracted for reef restoration • Ministry of Natural Resources and Tourism • VPO • STA

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[115] The coral reef expert will determine the proxies for reef conditions that will be measured.

[116] Depending on the final combination of chosen methodologies, there are multiple measures, for example, mass, the size and number of coral fragments or cm^2.

[117] The number of permanent transects is dependent on the size of the reef. This should be determined by a reef rehabilitation expert. 10m transect are commonly used.

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	quadrat (e.g. 10cm x 10cm) should be used to record the coral below the point on the transect line. This method will result in more accurate measurements of growth and survivorship and reduce the likelihood of human error being introduced. The following should be taken into account when spacing transects and points: ▪ transects should not be too close together; ▪ the spacing between transects and points along the transect will be determined by the size and shape of the reef; and ▪ the transects should try to cover as much of the area as possible. o The circle search method is more appropriate for pinnacle shaped reefs. For a circular search one end of the distance line (defines by the radius of the circle) is carried by the diver and the other is attached to the datum position by any appropriate method[118]. The diver should then measure survival of transplanted fragments that fall within the circle dictated by the search line. After a full circle, the diver should reduce the distance line by 1m and follow the procedure above. Depending on resources, a camera that has an attached quadrat (e.g. 10cm x 10cm) should be used to record the coral at 1m intervals of the circle search. This method will result in more accurate measurements of growth and survivorship and reduce the likelihood of human error being introduced. • Depending on the reef type and depth of restoration areas, a monitoring survey should take 3-4 days using an expert and four volunteers to assist in a range of survey tasks. The use of cameras and quadrats will enhance the quality of data collected and allow relatively untrained individuals to collect data. • At mid-term and terminal evaluations, the M&E expert should assess this information. These findings should be included in the mid-term and terminal evaluation reports.		
Energy efficient sources	• Expert in rural energy to produce reports on training on alternative energy technologies.	• N/A	• Rural energy expert • M&E expert

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[118] For example, clipped to the base of a shot line, pegged into the bottom, tied to a fixed object on the bottom or held by another diver.

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
(disaggregated by gender) disseminated (AF project).	• VPO to develop a list of households that receive efficient cookstoves. • All the information in the above three points should be passed on to the PMs and STA to be included in progress reports and PIRs. • At mid-term and terminal evaluations, the status of this activity should be assessed by the M&E expert. He/she should include findings in the mid-term and terminal evaluation reports.		• Ministry of Energy and Minerals • VPO • STA • Ilala, Temeke and Kinondoni municipalities
Coastal vegetation rehabilitated and survivorship of coastal vegetation (both projects).	• A coastal zone management expert should coordinate a detailed vegetation assessment of the project sites. Using these assessments, the current density of shoreline vegetation at the project site at project inception will be determined. • Based on the vegetation assessments, the coastal zone management expert should calculate the number of seedlings that need to be planted at the project site. • As project activities are implemented, GPS points should be captured by a member of the project team along outlines of rehabilitated areas. This should take place frequently (at least quarter-annually).These GPS points should be passed on to the STA – or a similar representative from the project team with GIS skills – to digitise and map polygons of rehabilitated areas. This digitising should be conducted in a Geographic Information System (GIS). • In addition, photographs of project sites should be taken. • The GIS data that is developed and photographs that are taken should be passed to the PM to include in progress reports and PIRs. • Annually, members of the local community should measure survival rates for seedlings/saplings in the area that has been rehabilitated. All of the project sites are in areas used by the local community. Therefore, it might not be viable to section off permanent plots. Instead, 10% of the seedlings/saplings planted for each selected species should be marked or tagged and the GPS points recorded where planted. A census should be conducted on these seedlings/saplings. To do so, local community members will return to the marked/tagged plants – using GPS points – and assess them. The number of seedlings that have survived should be recorded. This information will be passed to the STA and PMs to include in progress reports and PIRs.	• GPS • GIS • Camera	• Coastal zone management expert • M&E expert • Ministry of Natural Resources and Tourism • Sub-contracted environmental engineering firm • Local communities • VPO • STA

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	• At mid-term and terminal evaluations, the M&E expert should assess this information. In addition, he/she should visit the project site to assess the project intervention independently. These findings should be included in the mid-term and terminal evaluation reports.		
Clearing house functions effectively implemented and operational (AF project).	• The CCOT (within VPO) should develop meeting reports. These reports should be delivered to the PM and STA. This information should be included in progress reports and PPRs. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• Climate Change Knowledge Management Specialist • M&E expert • VPO • STA
Cost-benefit reports on measures for adapting to climate change implemented by the AF project. Reports on strategies for upscaling measures with the most favourable cost-benefit ratio. (AF project).	• The expert should develop cost-benefit analyses and replication strategies. These reports should be delivered to the PM and STA. This information should be included in progress reports and PIRs. In addition, the findings should be shared with the Ministry of Finance. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• Relevant technical expert • M&E expert • Ministry of Finance • VPO • STA
Policy briefs on interventions of AF project provided to key sectors and regulators. Workshops on cost-effective measures and lessons learned through the AF project[119] conducted with relevant sectors (AF project).	• The expert should develop policy briefs. These briefs should be checked by the PM and STA. • PMs – or representatives – should conduct workshops, and develop workshop reports and attendance registers. This information should be included in progress reports and PIRs. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• Relevant expert • M&E expert • VPO • STA

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[119] Based on policy documents developed by the AF project.

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
Reports developed within the AF project on required district budget allocations to maintain infrastructure for adaptation to climate change (AF project).	• The expert should develop report on required district budget allocations. This report should be checked by the PM and STA and relevant information included in progress reports and PIRs • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• Relevant expert • M&E expert • VPO • STA
EBICAM Action Plan for Dar es Salaam region developed within the AF project and approved by the VPO-DoE. (AF project).	• The EBICAM task force should develop meeting notes and progress reports on the Action Plan. These notes and reports will be delivered to the PM and STA, and relevant information included in progress reports and PPRs. • The EBICAM task force should develop the Action Plan. The PM and STA should check this plan and include relevant information in progress reports and PPR • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• EBICAM task force • M&E expert • VPO • STA
Local government representatives trained in ICZM, CCVA and livelihoods development by the LDCF project (LDCF project). Government representatives trained in coastal modelling by the LDCF project (LDCF project).	• Training experts should develop material, attendance registers and workshop reports. These deliverables should be checked the PM and STA and relevant information included in progress reports and PIRs. • At mid-term evaluation, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term evaluation reports.	• N/A	• Training expert • M&E expert • VPO • STA
Coastal vulnerability models developed by the LDCF project (LDCF project).	• The expert should deliver quarter-annual progress reports to the PM and STA. • Complete coastal vulnerabilities should be delivered to the PM and STA and relevant information to be included in progress reports and PIRs.	• N/A	• Persons that are responsible for developing the vulnerability models • M&E expert • VPO • STA

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	• At mid-term evaluation, the M&E expert should check that the vulnerability models have been developed. This expert's findings should be included in the mid-term report.		
Participatory vulnerability assessments available at local level. Briefs on suggested policy revisions developed by the LDCF project to address vulnerability and adaptation at a local level (LDCF project).	• The experts should deliver quarter-annual progress reports to the PM and STA. Relevant information should be included in progress reports and PIRs • Completed PVAs and suggested policy revisions should be delivered to the PM and STA, and relevant information included in progress reports and PIRs. • At mid-term evaluations, the M&E expert should check that PVAs are complete. At terminal evaluation, this expert should check that policy briefs have been developed. The findings of this expert should be included in the mid-term and terminal evaluation reports.	• N/A	• Experts/persons that are responsible for developing the PVAs and policy briefs • M&E expert • VPO • STA
CBOs from LDCF project sites strengthened through an organisation for climate change (LDCF project).	• The chosen climate change organisation (e.g. CAN Tanzania) and the CBOs should deliver quarter-annual progress reports to the PM and STA. In addition, the organisation should deliver workshop reports. • Relevant information from the progress and workshop reports should be included in progress reports and PIRs. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• Organisation for climate change • CBOs • M&E expert • VPO • STA
Climate change awareness of coastal communities at project sites (disaggregated by age and gender) (LDCF project).	• Relevant expert/organisation to develop material for awareness campaigns and progress reports on awareness campaigns. This material and the progress reports should be checked by the PM and STA. Relevant information should be included in project progress reports and PIRs. • At terminal evaluation, the M&E expert should conduct household surveys to assess the change in average awareness scores at the project sites. These surveys will replicate the baseline survey (Annexures 4 and 5). Moreover, they should be conducted in the same villages/wards. If possible, the same respondents should be interviewed[120].	• N/A	• Relevant expert/organisation to conduct awareness campaigns • M&E expert • VPO • STA

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[120] See Annexure 6 for a list of respondents from the baseline survey.

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	• The climate change awareness score should be recalculated using the relevant equation[121]. The M&E expert should include findings in the terminal evaluation report.		
Students enrolled in a student support programme for climate change funded by the LDCF project (LDCF project).	• The University of Dar es Salaam and the PMU should keep lists for all students enrolled. • Enrolled students should deliver: i) progress reports; and ii) reports on findings form research conducted through internship programmes. • These lists and reports should be checked by the PM and STA. Relevant information should be included in project progress reports and PIRs. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term and terminal evaluation reports.	• N/A	• University of Dar es Salaam • Enrolled students • M&E expert • VPO • STA
Sustainable mangrove protection plans developed by the LDCF project (LDCF project).	• Local environmental committees and LGAS to develop meeting notes and reports on the progress of the mangrove protection plans. These notes and reports should be delivered to the PM and STA and relevant information included in progress reports and PIRs. • Relevant experts and local environmental committees should develop the mangrove protection plan. The PM and STA should check these plans and include relevant information in the progress report and PIR. • At mid-term evaluation, the M&E expert should assess the status of this activity. He/she should include the findings in the mid-term and terminal evaluation reports.	• N/A	• Local environmental committees • District focal point and LGAs • M&E expert • VPO • STA
Mangrove associations and management plans developed by the LDCF project in conjunction with the local environmental committees (LDCF project).	• Local environmental committees and LGAs should develop meeting notes and reports on the progress of the mangrove associations. These notes and reports will be delivered to the PM and STA, and relevant information included in progress reports and PIRs. • Mangrove associations and LGAs should develop plans to manage the rehabilitated mangroves and established nurseries. These plans will be integrated into the broader sustainable protection plan	• N/A	• Local environmental committees • Mangrove associations • District focal point and LGAs • M&E expert • VPO • STA

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[121] Climate change awareness = *conceptual awareness* + *experiential awareness* + *engagement.*

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	The PM and STA should check these plans and include relevant information in progress report and PIR. • At mid-term evaluation, the M&E expert should assess the status of this activity. He/she should include the findings in the mid-term and terminal evaluation reports.		
Infrastructure items constructed by the LDCF project to increase year-round supply of freshwater in Bagamoyo District (LDCF project).	• An engineer should capture GPS points at sites and verify suitable structures for wells and water harvesting devices in Bagamoyo. • As the activity is implemented, the STA – or a similar representative from the project team with GIS skills – should develop maps using the GPS points of sites to illustrate the constructed well and water-harvesting devices. In addition, photographs should be taken to record visually the progress of the activity. • These maps and photographs should be delivered to the PM and STA and relevant information included in progress reports and PIRs. • At mid-term and terminal evaluations, the M&E expert should assess the status of this activity. He/she should include the findings in the mid-term and terminal evaluation reports.	• GPS • Camera	• Engineer • District focal point (Bagamoyo) and LGAs • M&E expert • VPO • STA
People trained by the LDCF project in: i) water conservation, management and recycling; and ii) maintenance of wells and rainwater harvesting devices. (LDCF project)	• Training experts should develop material and attendance registers. These deliverables should be checked by the PM and STA and relevant information included in progress reports and PIRs. • At mid-term evaluation, the M&E expert should assess the status of this activity. He/she should include findings in the mid-term evaluation reports.	• N/A	• Training expert • M&E expert • District focal point (Bagamoyo) and LGAs • VPO • STA
Adaptation technologies (m) upgraded by the LDCF project to protect livelihood assets.	• Engineer/s should determine: i) feasible combinations of sites/interventions; and ii) suitable designs for the interventions (including dimensions). • Targets to be updated based on the designs of interventions. • Upgrade/construction of the adaptation technologies should be based on their design and targets. However, once the upgrade and/or construction begin, the dimensions of the adaptation technologies should be checked and recorded frequently (at least quarter-annually) by the relevant expert. These measurements should be conducted using a GPS and tape measure, or tool equivalent. In addition, photographs should be taken at points	• GPS • Camera • Tape measure	• Engineer • M&E expert • District focal point and LGAs • VPO • STA

Activities	Strategies for data collection and monitoring	Equipment	Responsible parties
	along the upgraded/constructed technologies. This information should be passed to the PMs and STA to include in progress reports and PIRs. • At mid-term and terminal evaluations, this information should be passed on to the M&E expert. This expert should check the measurements against the specifications prescribed in the designs of the adaptation technologies. In addition, photographs should be taken to visually assess the progress of project activities. These findings will be included in the mid-term and terminal evaluation reports.		

7. Conclusion

From the 15 May to the 8 June 2014, a mission to Tanzania was conducted for the projects: "Implementation of concrete adaptation measures to reduce vulnerability of livelihoods and economy of coastal communities of Tanzania" supported by the AF; and ii) "Developing Core Capacities to Address Adaptation to Climate Change in Productive Coastal Zones of Tanzania" supported by LDCF. The purpose of the visit was to: i) assess and describe the status of the indicators and further develop the RFs for both projects; ii) collect baseline data for the established project indicators; iii) identify data gaps and propose a methodology to fill these gaps; and iv) develop a sampling design and data collection and management protocol.

Findings from the mission and post-mission data analyses are presented below:

- The coastal communities living in Pangani, Bagamoyo, Rufiji and Zanzibar (LDCF project sites) engage in a number of livelihood activities including crop growing, fishing, small businesses and employment. The percentage of household survey respondents that are involved in each of these activities differs from one project site to the next. In contrast, most of the household survey respondents from Dar es Salaam (AF project sites) own small businesses or are employed.

- The RFs of both projects were amended. These amendments were made mostly because: i) the original indicators and targets were not SMART; and ii) since the project documents were developed, the baseline situation has changed at some sites. In particular, local communities on Pemba Island (Zanzibar) have constructed dykes at Tumbe and Ukele. In addition, local environmental committees have been planting bare areas with mangroves. Therefore, the local communities and LGAs have proposed alternative sites. On Unguja Island (Zanzibar), additional sites and activities have been proposed. Baseline data was collected for sites that were listed in the project documents and the additional sites. Therefore, the VPO should consider the information presented in this baseline report and conduct further consultations with technical experts to decide – in conjunction with UNEP – which combination of activities and sites is feasible.

- A number of data gaps need to be filled before targets can be finalised and activities can be implemented. In particular, technical expertise is required to set targets for: i) rehabilitating drainage systems; ii) upgrading and/or constructing seawalls to manage the effects of climate change; and iii) rehabilitate degraded areas of coral reef. In addition, a number of targets and indicators were amended based on the results of extensive desktop analyses. For example, the locations and areas available for mangrove rehabilitation for the LDCF project were determined using a number of desktop sources including project reports, ArcGIS and Google Earth. Therefore, the ToRs for experts for both projects should include activities to fill the data gaps that the baseline assessment has identified.

- Protocols for monitoring the success of project interventions – including methods to collect and manage data – have been developed. For some of the project activities, technical expertise is required to finalise these protocols.

Annexure 1: Maps

Figure 1. Intervention sites (AF and LDCF project)

Figure 2. Pangani – seawall assessment and proposed area for mangrove rehabilitation: 10 hectares within these 73 hectares should be rehabilitated.

Figure 3. Bagamoyo intervention sites (LDCF project)
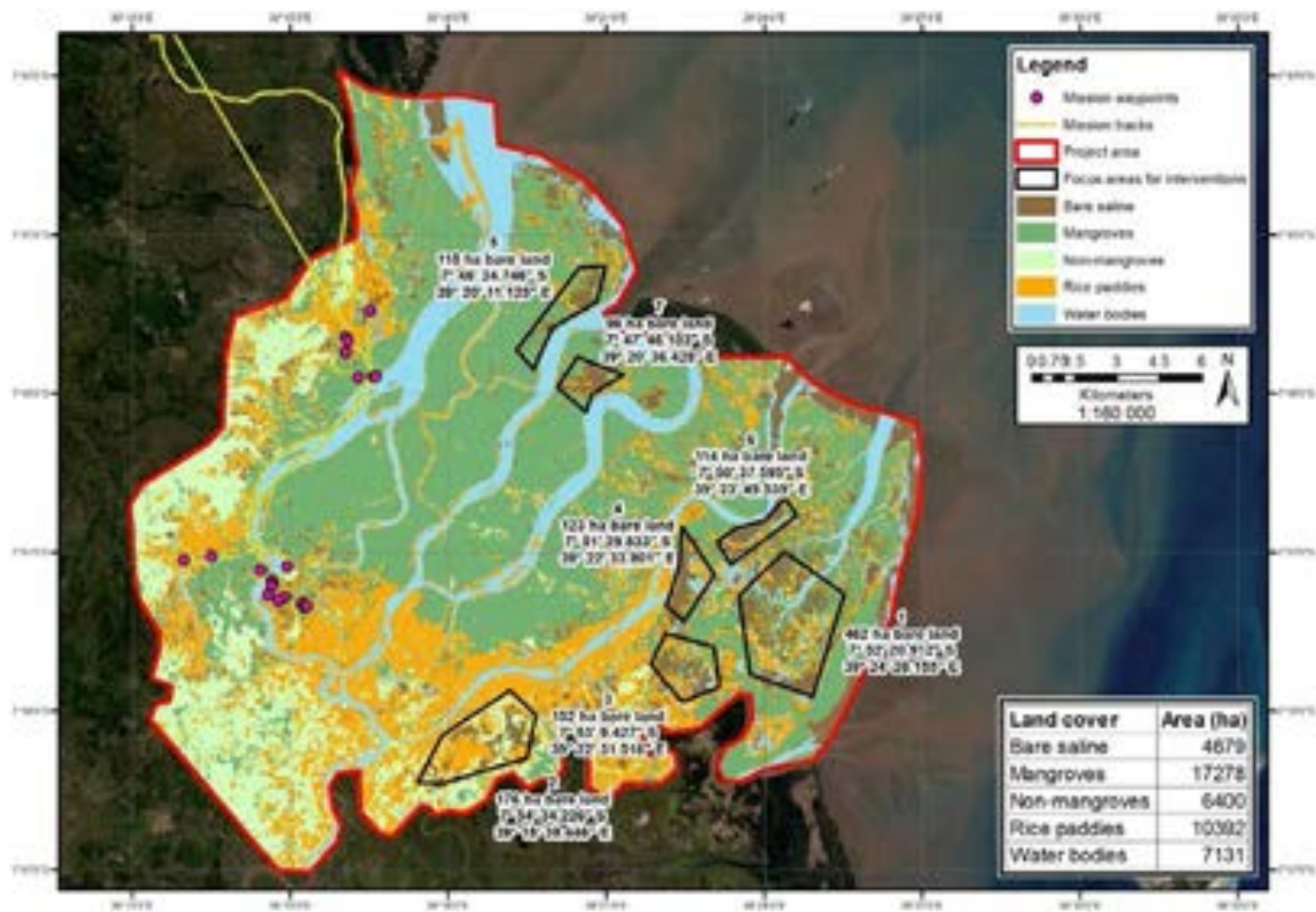
Figure 4. Rufiji – landcover and target areas for mangrove rehabilitation (LDCF project
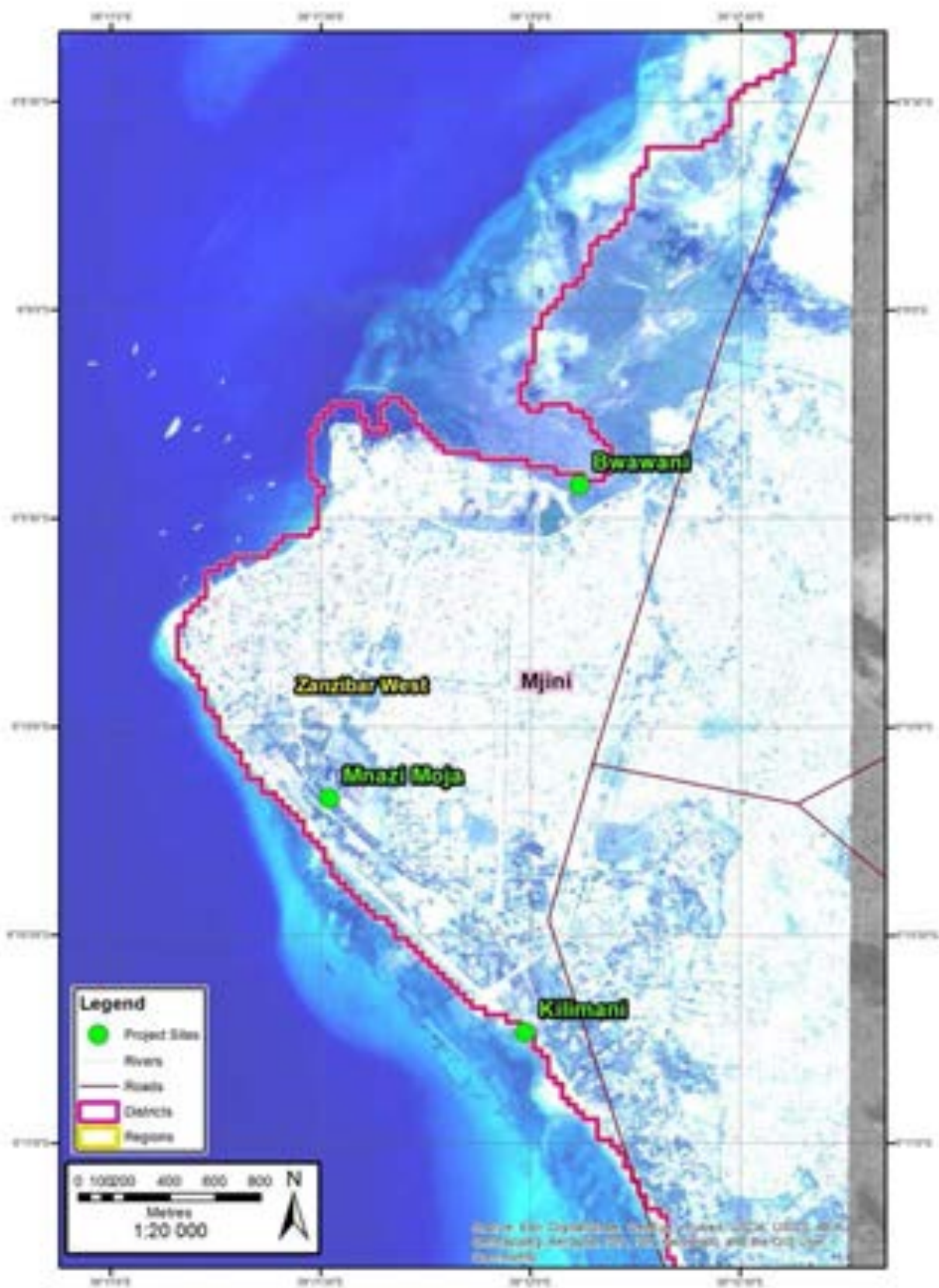
Figure 5. Unguja Island – intervention sites (LDCF project)
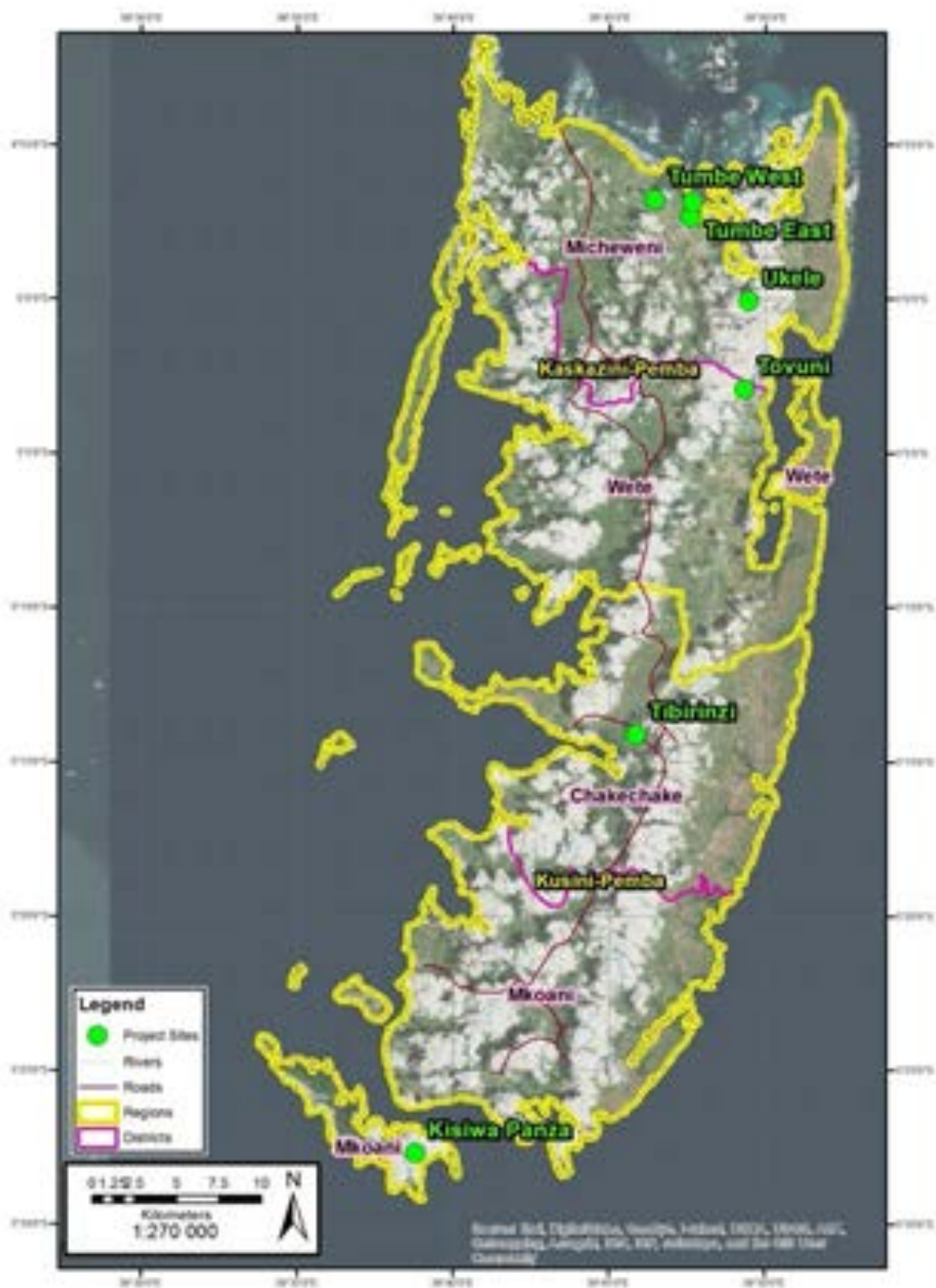
Figure 6. Pemba Island – intervention sites (LDCF project)

Figure 7. Seawall at Bwawani intervention site (LDCF project)
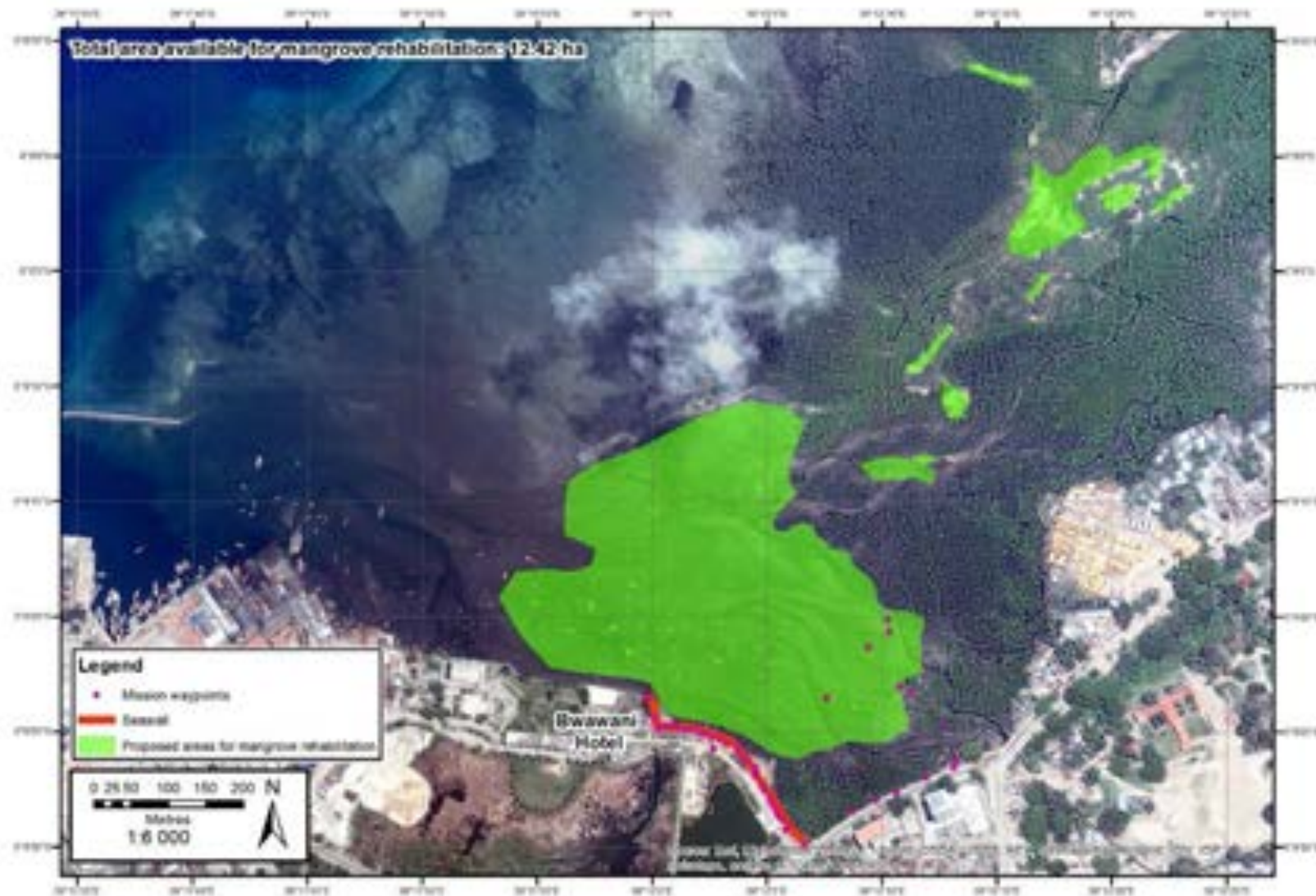
Figure 8. Bwawani – proposed area for mangrove rehabilitation (LDCF project)

Figure 9. Kisiwa Panza – seawalls to be constructed (LDCF project)
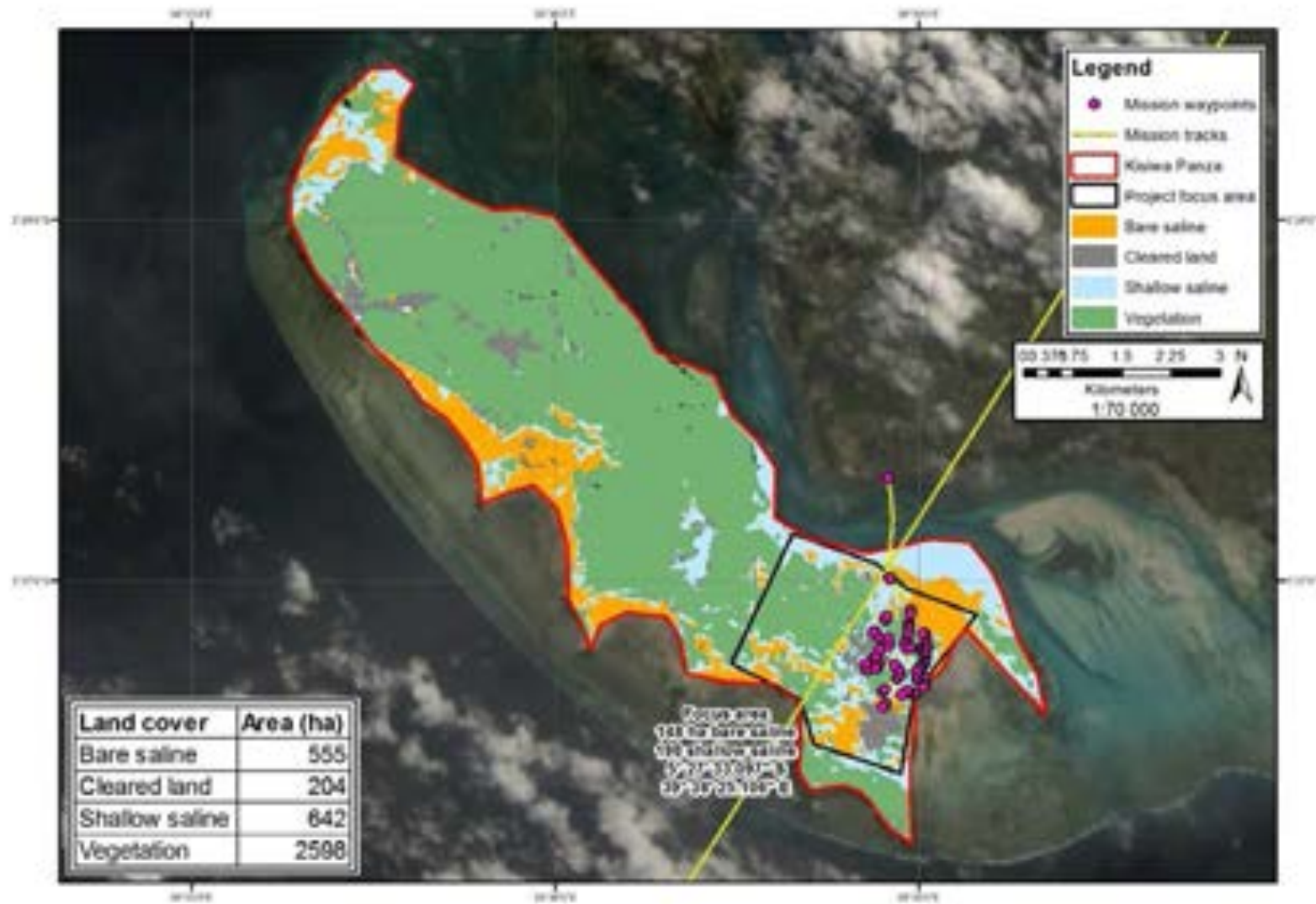
Figure 10. Kisiwa Panza – land cover and focus area for mangrove (LDCF project)
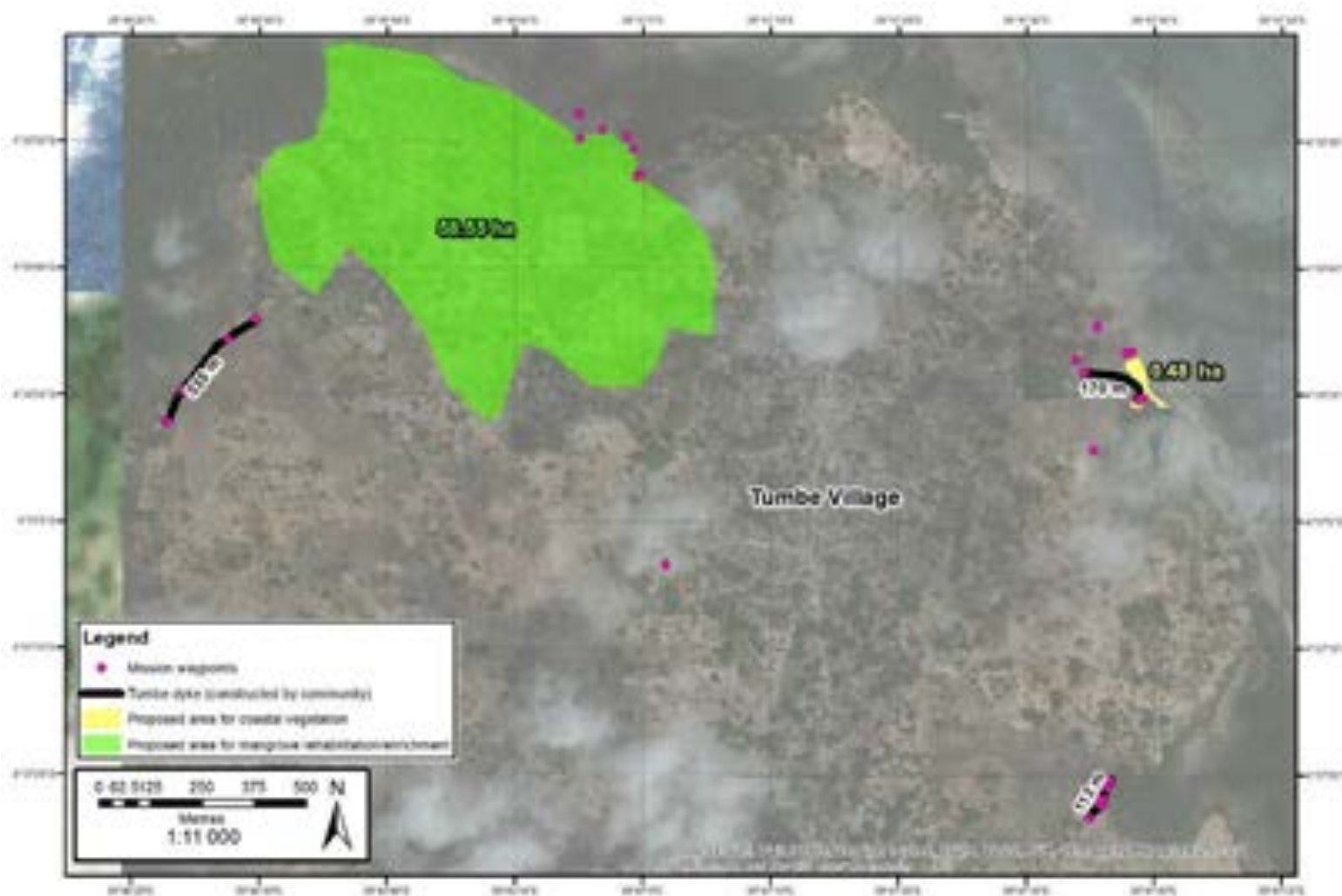
Figure 11. Tumbe overview: proposed area for mangrove rehabilitation in Tumbe West project site and dykes in Tumbe East and West constructed by the community (LDCF project)
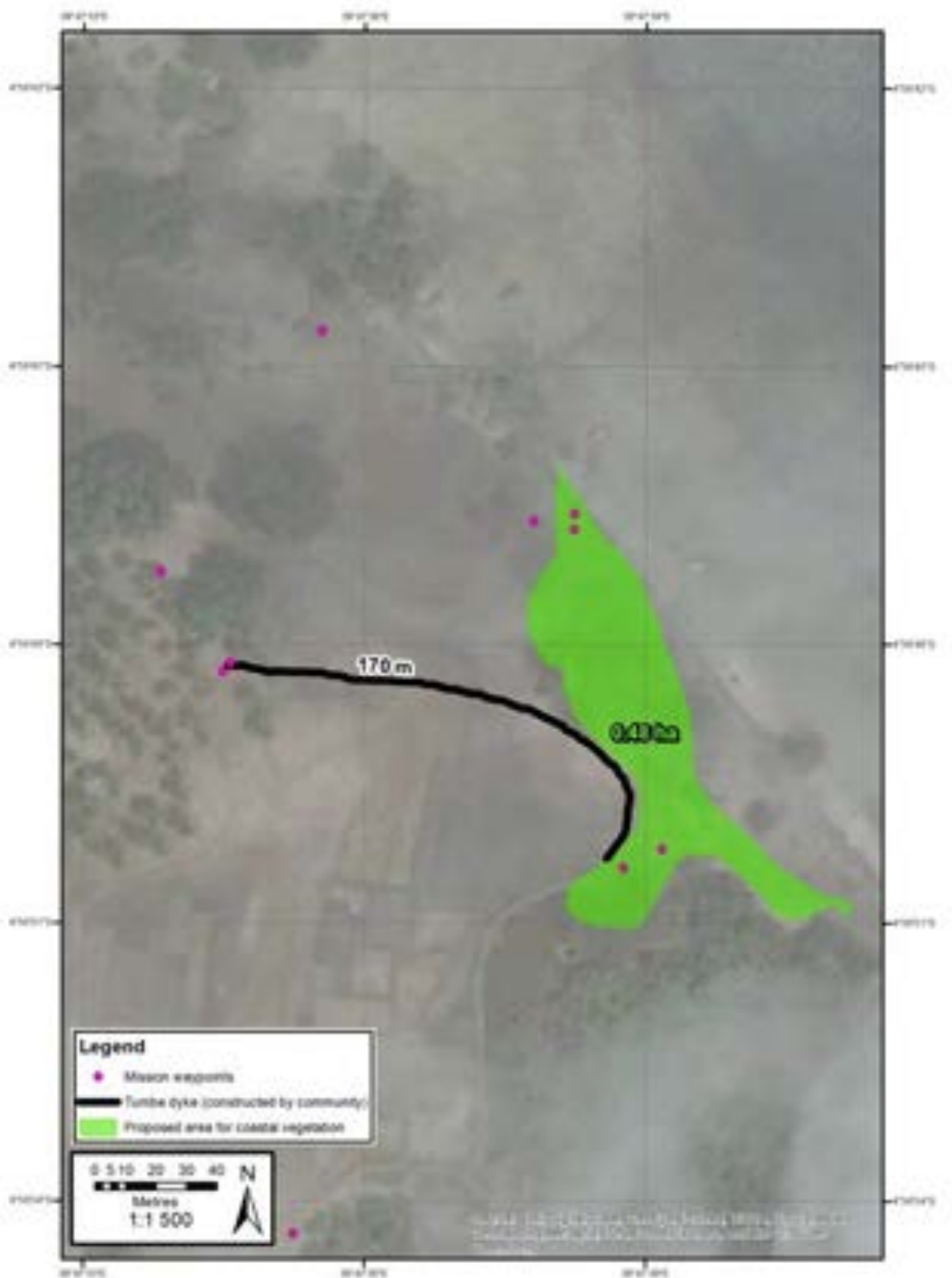
Figure 12. Tumbe East – proposed area for mangrove rehabilitation and dyke constructed by the community (LDCF project)
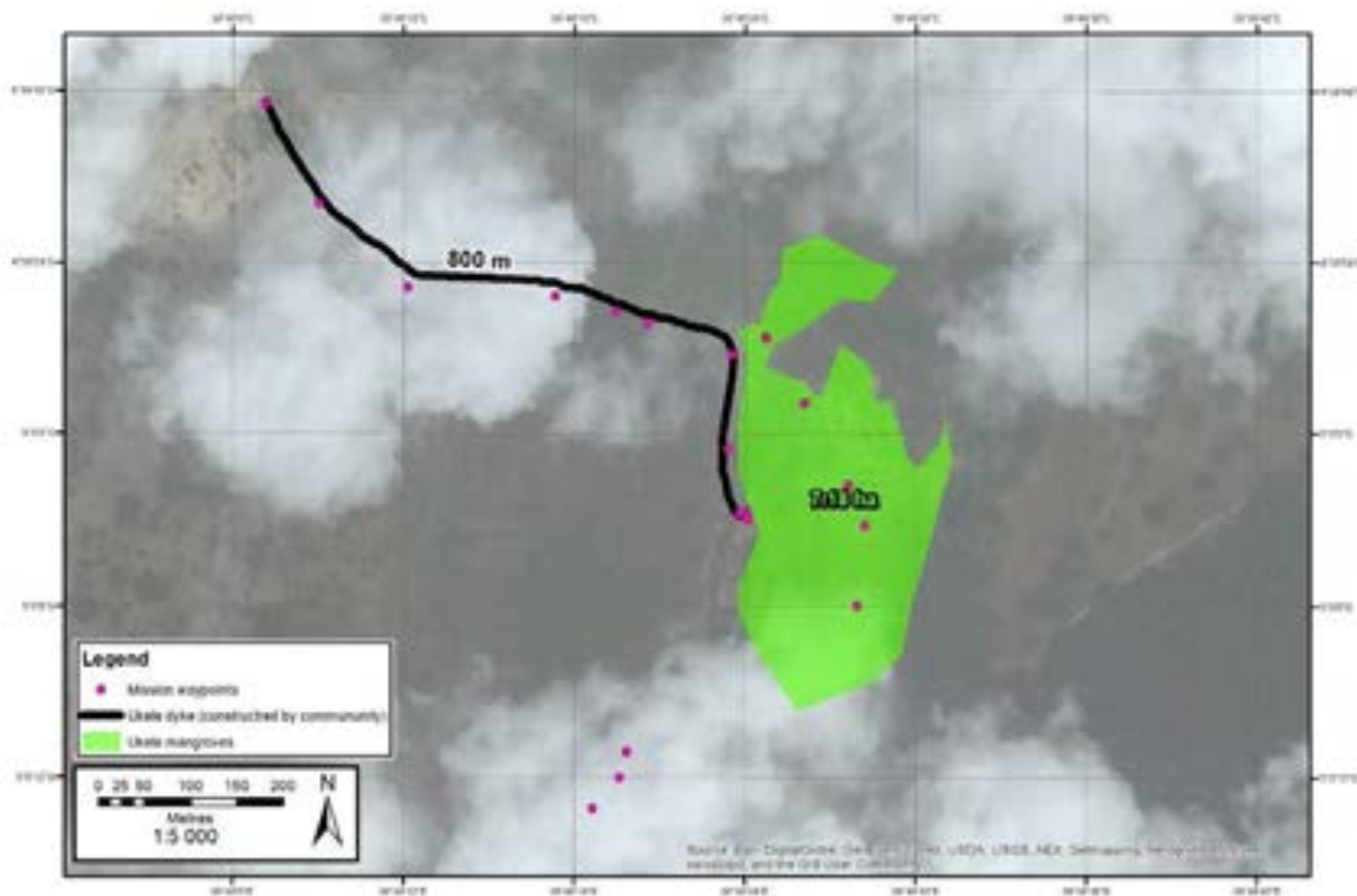
Figure 13. Ukele – proposed area for mangrove rehabilitation and dyke constructed by the community (LDCF project)

Figure 14. Kilimani (additional project site – Unguja): proposed area for mangrove rehabilitation and proposed length of beach for groyne construction (LDCF project)

Figure 15. Mnazi Mmoja (additional project site – Unguja) blocked valve (LDCF project)

Figure 16. Tibirinzi (alternative project site – Pemba) blocked irrigation drain (LDCF project)
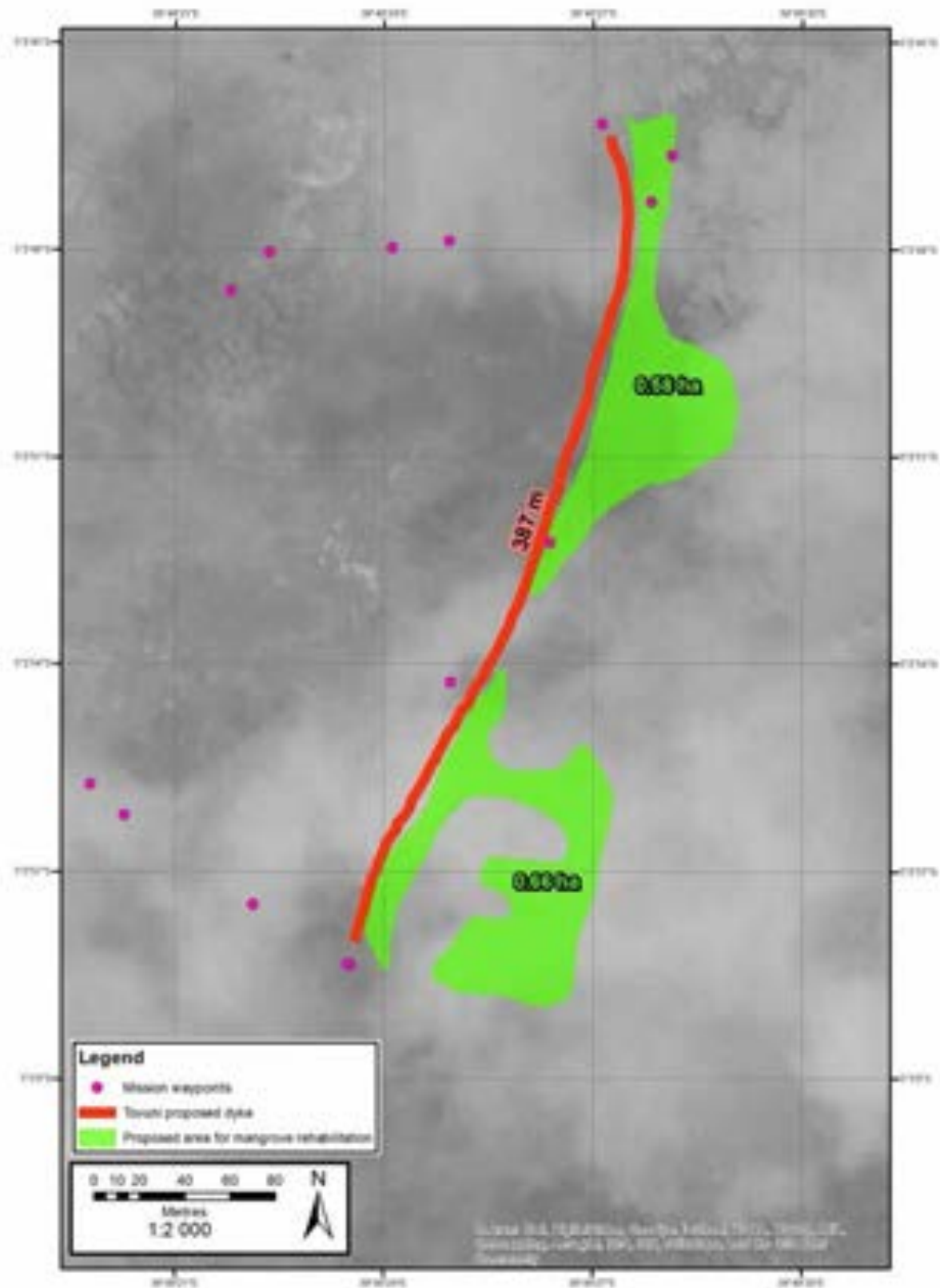
Figure 17. Tovuni (additional project site – Pemba) proposed area for mangrove rehabilitation and length of proposed dyke (LDCF project)

Figure 18. Target districts for AF project (Dar es Salaam)

Figure 19. Seawall along Ocean Road in Dar es Salaam

Figure 20. Seawall at Kigamboni, Dar es Salaam

Annexure 2: Stakeholders consulted during mission

Institution	Contact person	Contact details
Bagamoyo District Council	Engineer	Email: jongehuela@yahoo.com
	Mr. Mposi	Email: abuu1957@yahoo.co.uk Mobile: 075 444 0461
Climate Action Network Tanzania	Sixbert Mwanga	Email: sixbertmwanga@yahoo.com Mobile: 071 731 3660
Dar es Salaam City Council	Engineer Kawawa Chionda	Email: engchionda@yahoo.com Mobile: 065 554 9193
Environmental Protection and Management Services	Euster Kibona	Email: eusterkibona@yahoo.com Mobile:075 457 7475
Forum CC - Tanzanian Civil Society Forum on Climate change	Fazel Issa	Email: f.issa@forumcc.org Mobile: 0713737374
Ilala Municipal Council	Engineer Chacha	Mobile: 078 433 5553
	Churchill Mujuni	Email: mujunichurchill@yahoo.com
Kinondoni Municipal Council	Engineer Mussa Natty	Mobile: 075 427 9627
	Engineer Wamara	Mobile: 071 368 0880
Ministry of Energy and Minerals	Mr. Silinge	Email: tsilinge@yahoo.com Mobile: 075 485 3488
	Mr. Masanyiwa	Email:masanyiwam@gmail.com Mobile: 076 953 5374
National Environmental Management Council	Lewis Nzali Mtemi	lmnzali5@hotmail.com
National Forest Resource Monitoring and Assessment Project	Soren Dalsgaard	Email:soren.Dalsgaard@fao.org
National Gender and Sustainable Energy Network	Everline Frank	Email: everlinefrank@yahoo.com Mobile: 071 790 7199
Pangani District Council	Mkongo Ty	Email: yahayatwahiir@yahoo.com
Prime Minister's Office-Disaster Management Department	Engineer Osbert	Email: fanosbert@gmail.com
Researchers	Ronald (PhD research in Rufiji area)	Mobile: 071 359 7191

	Rebecca Klaus	Email: rebecca.klaus@gmail.com
Rufiji District Council	Mr. Rwegasila	Mobile: 078 750 3738
Tanzania Forestry Services	Mr. Nashanda	Mobile: 078 933 3168
	Ms. Rita Mganga	Email: rithamaganga@yahoo.com rithamaganga@gmail.com Mobile: 075 403 3820
Tanzania Meteorological Agency	Dr. Ladislaus Chang'a	Email: changa60@hotmail.com Mobile: 075 934 9966
Tanzania Port Authority	Mr. Gassaya	Mobile: 078 636 4622
Tanzania Traditional Energy Development and Environmental Organisation (TATEDO)	Shima Sago	Email: shima.sago@tatedo.org Mobile: 0713420382
Temeke Municipal Council	Mr. Meshew	Email: meshew1@yahoo.com Meshew@hotmail.com
UDSM Center for Climate Change Studies	Professor Pius Yanda	Email: pyanda@gmail.com
UDSM Geography of Department	Professor Maro	Email:pmaro@udsm.ac.tz Mobile: 075 446 4852
UDSM Institute for Marine Sciences	Dr. Narriman Jiddawi	Email: n_jiddawi@yahoo.com Mobile: 077 742 3183
	Dr. Saleh	Email: saleh@ims.udsm.ac.tz Mobile: 077 770 7866
Zanzibar Government	Sheha Mjaja	Email: sheha_mjaja@hotmail.com Mobile: 077 742 0801
	Sihaba Vuai	Email: svuai@yahoo.com Mobile: 078 598 9019
	Mwalim	Email: mwlkhamis@yahoo.com
Zanzibar Woody Biomass Survey	Ali Basha	Email: basha_au@hotmail.com Mobile: 077 747

Annexure 3: Workplans for mission to Tanzania

Table 1: Draft of workplan for baseline assessment mission[122]

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
28) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	29) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	30) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	1) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	2) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	3)	4)
5) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	6) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review	7) • Literature review • Questionnaire design • Compile list of stakeholders • Inception report • GIS analyses • Indicator review ***Inception report***	8) • Literature review • Questionnaire design • GIS analyses	9) • Literature review • Questionnaire design • GIS analyses ***Draft 1 questionnaires***	10)	11)
12) • Literature review • Questionnaire design • GIS analyses	13) • Literature review • Questionnaire design • GIS analyses	14) • Literature review • Questionnaire design • GIS analyses	15) • Travel to Dar es Salaam	16) • Inception workshop/meeting to refine baseline mission	17) • Meetings stakeholders in Dar es Salaam	18) • Meetings stakeholders in Dar es Salaam

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[122] This workplan was changed once in Tanzania to accommodate existing travel arrangements of government officials and/or project staff.

19) • Meetings stakeholders in Dar es Salaam	20) • Meetings stakeholders in Dar es Salaam	21) • Meetings stakeholders in Dar es Salaam	22) • Meetings stakeholders in Dar es Salaam	23) • Ground truth (seawall and shoreline vegetation) • Community surveys	24) • Ground truth (drainage system) • Community surveys	25) • Ground truth (mangroves) • Community surveys
26) • Travel to Bagamoyo • Ground truth saline wells • Community surveys	27) • Stakeholder consultation/Community surveys	28) • Travel to Pangani	29) • Ground truth (mangroves) • Community surveys	30) • Travel to Dar es Salaam	31) • Travel to Rufiji • Ground truth (mangroves) • Community surveys	1) • Ground truth (mangroves) • Community surveys
2) • Travel to Dar es Salaam • Travel to Zanzibar	3) • Ground truth (mangroves - Bwawani) • Community surveys	4) • Travel to Pemba • Ground truth (mangroves – Kisiwa Panza) • Community surveys	5) • Ground truth (mangroves and dykes, groynes and spillways – Tumbe) • Community surveys	6) • Ground truth (mangroves and dykes, groynes and spillways – Ukele) • Community surveys	7) • Travel to Dar es Salaam • Wrap-up meeting	8) • Leave Tanzania

Table 2: Pangani workplan for 21 May 2014

Time	Activity	Comments
09:00	Cletus, Margot, Alice and district surveyors to meet at district council office	
09:00 - 09:30	Briefing on the surveys	
09:30	Surveyors to travel to community.	Each surveyor to collect 20 surveys (10 in the morning and 10 in the afternoon)
10:00	Cletus, Margot and Alice to meet with district focal point	
11:30	Cletus, Margot and Alice to meet with training experts	
13: 00 – 16:30	Cletus, Margot and Alice to visit seawall/mangroves	
17:00	Cletus, Margot and Alice to meet with surveyors, collect surveys and debriefing on survey process.	

Table 3: Bagamoyo work plan for 23 May 2014 – 27 May 2014

Time	Activity		Comments
Bagamoyo Friday 23.05.14			
09:00 - 09:30	Margot, Alice, district focal point, Joachim and district field assistant to discuss surveys		
09:30 – 17: 00	Alice, Margot and district focal points to visit as many salinized wells as possible (geography permitting)	Joachim and district field assistant to visit **accessible site 1** to conduct household surveys (20 surveys each = 40 in total)	• Margot, Alice and district focal point to travel together • Joachim and district field assistant to travel together to accessible site 1 BUT to conduct surveys separately in different households
Bagamoyo Saturday 24. 05.14			
09: 00 – 11:00	Alice, Margot and district focal point to meet district focal point to visit remaining wells		• Alice and Margot to travel to Dar es Salaam in the afternoon
Bagamoyo Monday 26.05.14			
08: 00 – 17:00	Joachim and district field assistant to visit **accessible site 2** to conduct household surveys (20 surveys each = 40 in total)		• Joachim and district field assistant to travel together to accessible site 2 BUT to conduct surveys separately in different households
Bagamoyo Tuesday 27.05.14			
08: 00 – 17:00	Joachim and district field assistant to visit **accessible site 3** to conduct household surveys (20 surveys each = 40 in total)		• Joachim and district field assistant to travel together to accessible site 3 BUT to conduct surveys separately in different households • Joachim to collect all surveys and arrange with Alice and Margot to hand over to them
Joachim to bring completed surveys to Dar es Salaam before Saturday morning as Alice and Margot will travel to Zanzibar			

Table 4: Rufiji workplan for 26 May 2014 - 28 May 2014

Time	Activity	Comments
Rufiji Monday 26.05.14		
10:30 – 13:30	• Alice travel to Rufiji	• Mr Shengena/Mr Muyungi to coordinate
13:30 – 14:00	• Lunch	
14:00 – 14:30	• Alice to meet with district focal point to collect information and discuss plans	
14:30 – 15:00	• Alice to meet with interviewers to discuss survey design	

Time	Activity	Comments
15:00 – 17:00	• Alice, district focal point and 2 x interviewers to travel to mangroves	• Overnight at mangrove site
Accommodation near mangrove site (for Alice and 2 x interviewers)		
Rufiji Tuesday 27.05.14		
09: 00 – 17: 00	• Alice to conduct mangrove assessments (guided by district focal point and field assistant). • 2 x interviewers conducting surveys independently (i.e. in separate households) in nearby villages.	• We will need to hire a field assistant to escort Alice around mangroves – can this be arranged? Mr Shengena /Mr Muyungi to coordinate. • At least 40 surveys should be collected by the interviewees on this day (20 each).
Accommodation near Mangroves (for Alice and 2 x interviewers)		
Rufiji Wednesday 28.05.14		
09: 00 – 13:00	• Alice to continue conducting mangrove assessments (guided by district focal point and field assistant). • 2 x interviewers to continue conducting surveys independently (i.e. in separate households) in nearby villages.	• Some pockets of degraded mangroves preliminarily identified (GPS points). • At least 20 surveys should be collected by the interviewees on this day (10 each).
13:00 – 15:00	• Alice, district focal point and 2 x interviewers to travel to district town.	• District focal point and 2 x interviewers to be dropped off in district town.
15:00 – 18:00	• Alice to travel back to Dar es Salaam.	

Table 5: Dare es Salaam workplan for 27 May 2014 - 30 May 2014

Time	Activity		Comments
Dar es Salaam Tuesday 27.05.14			
17:00 – 17:30	• Margot to meet Upendo and local government representative (who will assist to conduct surveys) to discuss survey structure		• Alice will still be in Rufiji. The surveys will begin to be conducted early Wednesday morning. Therefore, the structure needs to be discussed on Tuesday evening.
Dar es Salaam Wednesday 28.05.14			
09:00 – 17:00	• Upendo and local government representative to conduct surveys in communities near mangroves in Kinondoni (Selander bridge)		• Margot will be meeting stakeholders in Dar es Salaam • Alice will be travelling back from Rufiji • Upendo and local government will conduct surveys independently (visiting different households)
Dar es Salaam Thursday 29.05.14			
09:00 – 09:30	• Alice, Margot, Mr Kawawa, Upendo and representative from local government to meet at Dar es saam City Council		
09:30 – 17: 00	• Alice and Margot to meet Mr Kawawa and representatives from Ilala, Temeke and Kinondoni Municipalities in the morning. • Alice, Margot and Mr Kawawa to travel to seawall in the afternoon to assess the seawall and vegetation.	• Upendo and local government representative to conduct surveys with local people behind seawall (20 each = 40 in total).	• Alice, Margot and Kawawa will travel together. • Upendo and local government representative will travel together. However, they will conduct surveys separately (in different households).
Dar es Salaam Friday 30.05.14			
09:00 – 09:30	• Alice, Margot, Mr Kawawa, Upendo and representative from local government to meet at Dar es salaam City Council		

09:00 – 17: 00	• Alice, Margot and Mr Kawawa to travel to mangroves near Selander Bridge in the morning. • Alice, Margot and Mr Kawawa to travel to proposed areas for drainage upgrade in the afternoon.	• Upendo and local government representative to conduct surveys with local people around proposed drainage upgrade area (20 each = 40 in total).	• Alice, Margot and Mr Kawawa will travel together. • Upendo and local government representative will travel together. However, they will conduct surveys separately (in different households). • Alice and Margot will arrange with Upendo to collect all the surveys.

Table 6: Zanzibar workplan for 31 May 2014 – 5 June 2014

Time	Activity	Comments
Zanzibar Saturday 31.05.14		
07:00 – 07:30	Alice and Margot to travel to Zanzibar	• Alice and Margot will coordinate flight. If possible will fly Fri evening. To be picked up at the airport by driver
09:00 – 10:00	Meet Zanzibar District focal point (Mr Vaui & Mr Shear)	
10: 00 – 11: 00	Alice and Margot to meet with interviewers	• Mr Vaui to organise meeting
11: 00 – 17: 00	Interviewers to travel to Bwawani (complete) and Kilimani (half) to conduct surveys	• Mr Vaui to organise transport. Interviewers and consultants will work independently and may need separate transport on some days.
13:00	Lunch	
15: 00	UDSM Marine Institute	• Alice and Margot to organise
Accommodation near district headquarters		
Zanzibar Sunday 1.06.14		
10: 00 – 11: 00	Meet with Zanzibar Woody Biomass Survey	• Alice and Margot to organise
Zanzibar Monday 02.06.14		
08: 00 – 17:00	Interviewers to conduct surveys in Kilimani (cont.), Mnazi Mmoja, Alice, and Margot to visit Bwawani, Kilimani and Mnazi Mmoja sites.	•
Accommodation near Mangroves (for Alice and surveyors)		
Pemba Tuesday 03.06.14		
07: 00 – 08:30	Travel to Pemba	• Alice and Margot to organise ferry once in Zanzibar
09: 00 – 10: 00	Meet with Pemba interviewers	•
10: 00 – 17: 00	Interviewers to conduct surveys in Tumbe, Alice and Margot to visit mangroves and coastal infrastructure in Tumbe	• Mr Vaui to organise transport
Accommodation on Pemba		
Pemba Wednesday 04.05.14		
08: 30	Meet up with interviewers and driver	
09: 00 – 17:00	Interviewers to conduct surveys in Ukele, Alice and Margot to visit mangroves and coastal infrastructure in Ukele	• Mr Vaui to organise transport
Accommodation on Pemba		
Pemba Thursday 05.06.14		
08: 30	Meet up with interviewers and driver	
	Interviewers to conduct surveys in Kisiwa Panza, Alice and Margot to visit mangroves and coastal infrastructure in Kisiwa Panza	• Mr Vaui to organise transport
Accommodation on Pemba		
Friday: travel to Dar es Salaam		

Annexure 4: AF Project household survey questionnaire

Date:…………………Village:…………………………………………………………….

Questionnaire number:…………..………………………

1. Area: (1) Ilala / (2) Temeke / (3) Kinondoni

2. Village:……………………………………………………………………………………

3. Interviewee name (household head):…………………………………………………

4. Is this area your place of: (1) living (2) working (3) both

5. Gender: (1) M (2) F

6. Age: (1) 1 – 16 (2) 17 – 35 (3) 36 – 65 (4) 65<

7. Marital status: (1) married (2) single (3) widow

8. Number of dependants: (1) less than 3 (2) 3 – 7 (3) more than 7

9. Main livelihood (*please circle all livelihood sources*): (1) Farming (2) Fishing
(3) Employment (4) Small business (5) Forest products (5) Other

10. In terms of livelihood production, which of the following group would you place yourself in?: (1) subsistence (*eat almost everything that is produced*) (2) semi-subsistence (*sell surplus products regularly*) (3) small-scale commercial (*sell most of what is produced*) (4) fully commercial (*sell almost everything produced*)

11. Livelihood sources: *Please write down (in the first column) all products that the interviewee receives livelihoods from. Mark with an "x" if they sell and/or consume. If they sell the product, please write the revenue received per month*

Livelihood product	Consume (X)	Sell (X)	Revenue/month
Example: maize	*X*	*X*	*50,000*

12. What % of your total products do you sell?...

13. How do you water your crops/vegetables? (0) irrigation only (1) irrigation for dryer months of the year (2) rain only

14. What is your main source of energy for cooking?
    (1) wood (2) charcoal (3) coal (4) paraffin (5) electricity (6) Other

15. What type of cookstove do you use?
    (1) open fire (2) metal charcoal stove (3) mud stove (ukombozi) (4) kuni moja or kuni mbili stove (5) kerosene stove (6) electric stove (7) other

16. How much do you spend on cooking fuel per week? (*if wood is collected, please indicate a cost associated with the time spent collecting wood*) …………………………....................................

17. How much wood/charcoal/coal do you use in one week? (*please show them the tin and ask them to estimate how many tins full are used in one week*)…………………………...............................

18. How many floods have you observed over the past 5 years? (2010 – 2014)?
(1) 0 (2) 1 – 5 (3) more than 5

19. What is climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
   0) Not sure
   1) A variation in weather over time
   2) A variation in weather over time caused by changes in land use around the world

20. What is causing climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
   0) Not sure
   1) Natural causes
   2) Humans
   3) Humans and natural causes

21. Have you felt the effects of climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
   0) No/not sure
   1) Yes, I have noticed climate change (e.g. increased temperatures, more floods)
   2) Yes, I have noticed climate change and it is affecting my livelihoods (e.g. reduced productivity of crops, increased frequency of water-borne diseases)
   3) Yes, I have noticed climate change and it is affecting many sectors

22. Please give an example of how you have been affected by climate change:
……
……

23. Has climate change affected your livelihoods? (*including employment/small business*) No / yes

24. If so, have you changed your livelihood practices to cope with climate change? No / yes (*please describe how*):
……
……

25. How often do you talk about climate change?
   0) never
   1) sometimes (once a week)
   2) Often (more than once a week)

26. With whom do you talk about climate change with?
   0) family and friends
   1) co-workers
   2) user groups and community leaders

27. How often do you receive information and/or training on adapting to climate change?
   0) Never
   1) Once/less than once a year
   2) Every year/more than once year

Please look at the table on the next page and ask the interviewee if he/she has noticed changes associated with the weather/natural resources over the past 5 years. Mark the associated box with an "X." If he/she has noticed a change, please also ask how this has affected his/her family. Mark this associated box with an "X" also.

Indicator		Change			Impact on family		
Exposure							
		0	1				2
Temperature		No change/ not sure	Increased	Decreased	No impact	Positive	Negative
Rainy season		No change/ not sure	Comes later in the year	Comes earlier in the year	No impact	Positive	Negative
Rainfall impact		No change/ not sure	Rainfall is heavier	Rainfall is lighter	No impact	Positive	Negative
Droughts		No change/ not sure	Fewer droughts	More droughts	No impact	Positive	Negative
Floods		No change/ not sure	Fewer floods	More floods	No impact	Positive	Negative
Storms/hurricanes		No change/ not sure	Fewer storms/ hurricanes	More storms/ hurricanes	No impact	Positive	Negative
Level of the sea		No change/ not sure	Sea level has dropped	Sea level has risen	No impact	Positive	Negative
Sensitivity							
Beach erosion		No change/ not sure	Less beach erosion	More beach erosion	No impact	Positive	Negative
Soil fertility		No change/ not sure	Soil is more fertile	Soil is less fertile	No impact	Positive	Negative
Fresh water availability		No change/ not sure	More freshwater available	Less freshwater available	No impact	Positive	Negative
Health		No change/ not sure	People in my family are healthier	People in my family are getting sick more often	No impact	Positive	Negative
Crop/livelihood pests		No change/ not sure	Fewer pests	More pests	No impact	Positive	Negative
Supply of fish from the sea		No change/ not sure	More fish	Fewer fish	No impact	Positive	Negative
Changes in the natural environment	Mangroves/coastal vegetation	No change/ not sure	Healthier/more vegetation	Damaged/Less vegetation	No impact	Positive	Negative
	Coral reefs	No change/ not sure	Healthier/more coral	Damaged/Less coral	No impact	Positive	Negative
	Colour of rivers after it rains	No change/ not sure	Cleaner	Dirtier	No impact	Positive	Negative

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Annexure 5: LDCF Project household survey questionnaire

Date:…………………Village:…………………………………………………………….

Questionnaire number:……………………………………

28. Area: (1) Bagamoyo / (2) Rufiji / (3) Pangani / (4) Tumbe East / (5) Tumbe West / (6) Ukele / (7) Kisiwe Panza / (8) Bwawani

29. Village:……………………………………………………………………………………

30. Interviewee name (household head):……………………………………………………

31. Is this area your place of: (1) living (2) working (3) both

32. Gender: (1) M (2) F

33. Age: (1) 1 – 16 (2) 17 – 35 (3) 36 – 65 (4) 65<

34. Marital status: (1) married (2) single (3) widow

35. Number of dependants: (1) less than 3 (2) 3 – 7 (3) more than 7

36. Main livelihood (*please circle all livelihood sources*): (1) Farming (2) Fishing (3) Employment (4) NTFPs (5) Other

37. In terms of livelihood production, which of the following groups would you place yourself in?: (1) subsistence (*eat almost everything that is produced*) (2) semi-subsistence (*sell surplus products regularly*) (3) small-scale commercial (*sell most of what is produced*) (4) fully commercial (*sell almost everything produced*)

38. Livelihood sources: *Please write down (in the first column) all products that the interviewee receive livelihoods from. Mark with an "x" if they sell and/or consume. If they sell the product, please write the revenue received per month*

Livelihood product	Consume (X)	Sell (X)	Revenue/month
Example: maize	*X*	*X*	*50,000*

39. What % of your total products do you sell?..

40. How do you water your crops/vegetables? (0) irrigation only (1) irrigation for dryer months of the year (2) rain only

41. Are you part of a CSO or CBO? No / yes

42. If so, does the CSO / CBO receive information on adaptation to climate change in coastal areas? No / yes

43. Are you aware of a CSO or CBO in this area that receives information on adaptation to climate change in coastal areas? No / yes

44. Are you aware of a local association for mangrove protection or conservation?
yes / no

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45. If so, what is the name of the association? ………………………………………………………….

46. What is climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
    3) Not sure
    4) A variation in weather over time
    5) A variation in weather over time caused by changes in land use around the world

47. What is causing climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
    4) Not sure
    5) Natural causes
    6) Humans
    7) Humans and natural causes

48. Have you felt the effects of climate change? (*ask question and listen to answer – circle one of the following using your discretion*)
    4) No/not sure
    5) Yes, I have noticed climate change (e.g. increased temperatures, more floods)
    6) Yes, I have noticed climate change and it is affecting my livelihoods (e.g. reduced productivity of crops, increased frequency of water-borne diseases)
    7) Yes, I have noticed climate change and it is affecting many sectors

49. Has climate change affected your livelihoods? (*including employment/small business*)
    No / yes

50. Please give an example of how you have been affected by climate change:
    ……
    ……

51. If so, have you changed your livelihood practices to cope with climate change? No / yes (*please describe how*):
    ……
    ……

52. How often do you talk about climate change? (*circle*)
    3) never
    4) sometimes (once a week)
    5) Often (more than once a week)

53. With whom do you talk about climate change with? (*circle*)
    3) family and friends
    4) co-workers
    5) user groups and community leaders

54. How often do you receive information and/or training on adapting to climate change?
    3) Never
    4) Once/less than once a year
    5) Every year/more than once year

Please look at the table on the next page and ask the interviewee if he/she has noticed changes associated with the weather/natural resources over the past 5 years. Mark the associated box with an "X." If he/she has noticed a change, please also ask how this has affected his/her family. Mark this associated box with an "X" also.

Indicator		Change			Impact on family		
Exposure							
		0	1				2
Temperature		No change/ not sure	Increased	Decreased	No impact	Positive	Negative
Rainy season		No change/ not sure	Comes later in the year	Comes earlier in the year	No impact	Positive	Negative
Rainfall impact		No change/ not sure	Rainfall is heavier	Rainfall is lighter	No impact	Positive	Negative
Droughts		No change/ not sure	Fewer droughts	More droughts	No impact	Positive	Negative
Floods		No change/ not sure	Fewer floods	More floods	No impact	Positive	Negative
Storms/hurricanes		No change/ not sure	Fewer storms/ hurricanes	More storms/ hurricanes	No impact	Positive	Negative
Level of the sea		No change/ not sure	Sea level has dropped	Sea level has risen	No impact	Positive	Negative
Sensitivity							
Beach erosion		No change/ not sure	Less beach erosion	More beach erosion	No impact	Positive	Negative
Soil fertility		No change/ not sure	Soil is more fertile	Soil is less fertile	No impact	Positive	Negative
Fresh water availability		No change/ not sure	More freshwater available	Less freshwater available	No impact	Positive	Negative
Health		No change/ not sure	People in my family are healthier	People in my family are getting sick more often	No impact	Positive	Negative
Crop/livelihood pests		No change/ not sure	Fewer pests	More pests	No impact	Positive	Negative
Supply of fish from the sea		No change/ not sure	More fish	Fewer fish	No impact	Positive	Negative
Changes in the natural environment	Mangroves/coastal vegetation	No change/ not sure	Healthier/more vegetation	Damaged/Less vegetation	No impact	Positive	Negative
	Coral reefs	No change/ not sure	Healthier/more coral	Damaged/Less coral	No impact	Positive	Negative
	Colour of rivers after it rains	No change/ not sure	Cleaner	Dirtier	No impact	Positive	Negative

Annexure 6: Equation to determine climate change awareness and climate change awareness scores (also showing list of household survey respondents)

Climate change awareness is a function of conceptual awareness, experiential awareness and engagement. In the structured household survey, questions were included on each of these factors of climate change awareness (see below). Thereafter, equations were applied to determine the baseline climate change awareness scores. These equations are displayed below:

Climate change awareness = (Conceptual awareness + Experiential awareness + Engagement)/3

Conceptual awareness =   (Q19 + Q20)/5*100
Experiential awareness =   (Q21+Q22+Q23)/5*100
Engagement =   (Q25 + Q26)/4*100

Through the awareness campaign, it is expected that the conceptual awareness of local communities will be enhanced and their engagement will increase. This expectation was used to set the target for the indicator on climate change awareness. As such, scenarios were developed whereby the scores for these indicators (conceptual awareness and engagement) were increased substantially.

The summary scores and individual scores for each project site are displayed below. The scores that are achieved by these communities – determined during the terminal evaluation – should be compared to these baseline scores. Therefore, during assessments that are conducted for this evaluation, surveys that include these questions should be conducted.

AF project
Baseline

Site	Average (%)	Min (%)	Max (%)
Ilala	29	0	80
Kinondoni	38	0	68
Temeke	29	0	65

Target

Site	Average (%)	Min (%)	Max (%)
Ilala	29	81	51
Kinondoni	38	86	48
Temeke	29	79	50

Ilala

#	Q1	Q2	Q3	Gender	Conceptual awareness	Experiential awareness	Engagement	FINAL
	District	Village	Name	Gender	SCORE (%)	SCORE (%)	SCORE (%)	SCORE (%)
FB1	Ilala	Mtambani	Zainabu Kibwana	F	20	100	25	48
FB2	Ilala	Mtambani	Mwanjaa Saidi	F	0	40	25	22
FB3	Ilala	Mtambani	Mariamu Omari	F	0	0	0	0
FB4	Ilala	Mtambani	Sada Salumu	F	0	40	0	13
FB5	Ilala	Mtambani	Musa Fedric	M	80	100	50	77
FB6	Ilala	Mtambani	Sakina Issa	F	0	60	25	28
FB7	Ilala	Mtambani	Fatuma Simba Mrisho	F	0	0	25	8
FB8	Ilala	Mtambani	Abilah Iddi	M	0	0	0	0
FB9	Ilala	Mtambani	Hawa M. Hasani	F	0	0	25	8
FB10	Ilala	Mtambani	Tausi Ally	F	40	0	0	13
FB11	Ilala	Mtambani	Nasra Jumaa	F	20	0	0	7
FB12	Ilala	Mtambani	Hamisi Bakiri	M	80	0	75	52
FB13	Ilala	Mtambani	Hamisi Mohamed	M	40	0	75	38
FB14	Ilala	Mtambani	Bakari Bilali	M	0	0	0	0
FB15	Ilala	Mtambani	Mwajabu M. Forogo	F	40	60	25	42
FB16	Ilala	Mtambani	Mfaume Alawi Suleimawi	M	0	0	0	0
FB17	Ilala	Mtambani	Mariamu Hashimu	F	0	40	0	13
FB18	Ilala	Mtambani	Bisuni Juma	F	0	40	0	13
FB19	Ilala	Mtambani	Mahamuda da Kitabu	F	80	40	0	40
FB20	Ilala	Mtambani	Imamu Issa	M	0	0	0	0
FB21	Ilala	Kimara	Hussan Juma	M	0	40	0	13
FB22	Ilala	Kimara	Sophia Majaliwa	F	60	40	25	42
FB23	Ilala	Kimara	Winfred Mshindo	M	0	20	0	7
FB24	Ilala	Kimara	Hemed Juma	M	0	20	0	7
FB25	Ilala	Kimara	Asha Ishumi	F	20	40	0	20
FB26	Ilala	Kimara	Rehema Ally Makamba	F	0	0	0	0

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FB27	Ilala	Kimara	Rajab Juma	M	20	60	25	35
FB28	Ilala	Kimara	Janeth Mathias	F	20	40	0	20
FB29	Ilala	Upanga Kimara	Christina Maseke	F	0	60	25	28
FB30	Ilala	Upanga Kimara	Fransisca Damian	F	60	60	0	40
FB31	Ilala	Upanga Kimara	Hadija Shaibu	F	40	60	25	42
FB32	Ilala	Seaview	Peter Kabelwa	M	20	60	50	43
FB33	Ilala	Upanga	Amina Rashidi	F	20	60	0	27
FB34	Ilala	Seaview	Salum Abdallah	M	0	20	50	23
FB35	Ilala	Seaview	Michael Petro	M	20	60	0	27
FB36	Ilala	Luhinda	Tata Yahaya	M	40	40	50	43
FB37	Ilala	Seaview	Madalena Frednano	F	60	40	0	33
FB38	Ilala	Kimara	Rehema Mdachi	F	40	80	0	40
FB39	Ilala	Upanga Kimara	Mussa Mzava	M	60	40	0	33
FB40	Ilala	Kimara	Yusuph Kamba	M	0	40	0	13
FB41	Ilala	Kisiwani-Tafa	Mwanaisha Sephy	F	0	60	0	20
FB42	Ilala	Kisiwani-Tafa	Nuraji Ally	F	0	60	0	20
FB43	Ilala	Kisiwani-Tafa	Hamisi Mikidali	M	0	40	0	13
FB44	Ilala	Kisiwani-Tafa	Jobet Mishel	F	0	0	0	0
FB45	Ilala	Kisiwani-Tafa	Fidelis Choka	M	60	60	75	65
FB46	Ilala	Kisiwani-Tafa	Mariam Juma	F	0	40	50	30
FB47	Ilala	Kisiwani	Lucia Francis	F	0	40	0	13
FB48	Ilala	Kisiwani	Joseph Michael Maona	M	40	60	75	58
FB49	Ilala	Kisiwani	Fatuma Omari	F	0	60	0	20
FB50	Ilala	Kisiwani	Rahel Omari	F	0	60	25	28
FB51	Ilala	Kisiwani	Amri Ally Sinde	M	40	60	75	58
FB52	Ilala		Ally Rashidi Gasi	M	40	60	0	33
FB53	Ilala	Kisiwani	Asha Nasoro	F	0	60	0	20
FB54	Ilala	Kisiwani	Jane Lucas	F	0	60	25	28
FB55	Ilala	Kisiwani	Raimond Irenus	M	80	60	100	80
FB56	Ilala	Kisiwani	Monica Nestori	F	0	0	0	0

FB57	Ilala	Kisiwani-Tafa	Esta Paulo	F	60	60	25	48
FB58	Ilala	Kisiwani-Tafa	Saide Kidatu	F	60	60	25	48
FB59	Ilala	Kisiwani-Tafa	Furaha Mapunda	F	0	60	0	20
FB60	Ilala	Kivukoni	Andrew Steven	M	80	0	25	35
FB61	Ilala	Kivukoni	Juma Alhaji	M	100	20	0	40
FB62	Ilala	Kivukoni	Frank Esmaco	M	100	60	50	70
FB63	Ilala	Kivukoni	Jackson D. Thawe	M	60	60	50	57
FB64	Ilala	Kivukoni	Rahma Yusufu	F	60	20	0	27
FB65	Ilala	Kivukoni	Salome Salote	F	0	0	0	0
FB66	Ilala	Kivukoni	Kheri Issa	M	80	60	25	55
FB67	Ilala	Kivukoni	Lusajo Mwasieba	M	40	60	25	42
FB68	Ilala	Kivukoni	Teddy Mambo	F	40	0	25	22
FB69	Ilala	Kivukoni	Debora Mwenda	F	0	40	0	13
FB70	Ilala	Kivukoni	Mary Agnes Muzo	F	80	0	25	35
FB71	Ilala	Kivukoni	Prosper Lyakurwa	M	80	60	25	55
FB72	Ilala	Kivukoni	Pancras Masawe	M	100	60	25	62
FB73	Ilala	Kivukoni	Erico Mtavanwa	M	40	40	0	27
FB74	Ilala	Kivukoni	William Kafundi	M	80	40	50	57
FB78	Ilala	Kisiwani	Euarist Kiduko	M	40	60	50	50
CG38	Ilala	Chimara	Mwajuma Saidi	F	0	60	0	20
CG39	Ilala	Chimara	Edna Msaki	F	60	60	25	48
CG40	Ilala	Chimara	Yahaya Mwiri	M	0	60	0	20
CG41	Ilala	Chimara	Flavian Fredrick	F	40	60	0	33
CG42	Ilala	Chimara		F	0	60	0	20
CG43	Ilala	Chimara	Mariam Mapango	F	0	60	0	20
CG44	Ilala	Chimala	Hamla John	M	0	40	0	13
CG45	Ilala	Chimara	Shadya Omy	F	80	60	25	55
CG46	Ilala	Chimara	Jeremia Ikusya	M	60	80	50	63
CG47	Ilala	Chimara	Josephine Lukas	F	60	60	25	48
CG48	Ilala	Chimara	Latifa Iddi	F	0	40	0	13

CG49	Ilala	Chimara	Elizabeth Magamba	F	60	60	0	40
CG50	Ilala	Chimara	Adelina John	F	0	20	0	7
CG51	Ilala	Chimara	Namia Mohamed	F	0	40	0	13
CG52	Ilala	Chimara	Rukia Juma	F	0	40	0	13

Kinondoni

	Q1	Q2	Q3	Q5	Conceptual awareness	Experiential awareness	Engagement	FINAL
#	District	Village	Name	Gender	SCORE (%)	SCORE (%)	SCORE (%)	SCORE (%)
CG18	Kinondoni	Sea view - Upanga	Paulina Togoran	F	0	20	0	7
CG19	Kinondoni	Kimara Street - Upanga	J. Ponela	F	20	60	0	27
CG20	Kinondoni	Luhinda - Upanga	Kelvin Jackson	M	80	100	0	60
CG21	Kinondoni	Sea view - Upanga	Jamik Rajab	F	40	80	0	40
CG22	Kinondoni	Luhinga Seaview	Rehema	F	60	60	0	40
CG23	Kinondoni	Luhinga Seaview	Scolastika	F	60	100	0	53
CG24	Kinondoni	Sea view - Upanga	Henry	M	80	60	50	63
CG25	Kinondoni	Sea view - Upanga	Lilian K.	F	0	0	0	0
CG26	Kinondoni	Sea view - Upanga	Khamis Suliman	M	60	60	25	48
CG27	Kinondoni	Sea view - Upanga	Ibrahim Haji	M	60	60	25	48
CG28	Kinondoni	Sea view - Upanga	Julieth Jackson	F	0	40	0	13
CG29	Kinondoni	Sea view - Upanga	Mina Mello	F	0	40	0	13
CG30	Kinondoni	Sea view - Upanga	Nazra Nasoro	F	60	60	0	40
CG31	Kinondoni	Sea view - Upanga	Nuru Said	F	0	60	25	28
CG32	Kinondoni	Sea view - Upanga	Iddy Said	M	80	60	25	55
CG33	Kinondoni	Sea view - Upanga	Robert Bahati	M	60	60	50	57
CG34	Kinondoni	Sea view - Upanga	Husna Rashid	F	0	0	0	0
CG35	Kinondoni	Sea view - Upanga	Jane Kavishe	F	60	60	0	40
CG36	Kinondoni	Sea view - Upanga	George Martin	M	80	80	25	62
CG37	Kinondoni	Sea view - Upanga	Jimmy Halue	M	100	80	25	68

Temeke

#	District	Village	Name	Gender	Conceptual awareness SCORE (%)	Experiential awareness SCORE (%)	Engagement SCORE (%)	FINAL SCORE (%)
	Q1	Q2	Q3	Q5				
FB75	Temeke	Magurumbasi	Kevin Jimmy	M	60	60	75	65
FB76	Temeke	Magurumbasi	Dietricek C. Ndunguru	M	40	0	25	22
FB77	Temeke	Magurumbasi	Huseni Athumani Rashidi	M	0	40	0	13
CG1	Temeke	Magurumbasi	Joseph Nikandri	M	20	0	0	7
CG2	Temeke	Magurumbasi	Hadija Salehe	F	40	60	75	58
CG3	Temeke	Magurumbasi	Mariamu Salumu	F	40	20	25	28
CG4	Temeke	Magurumbasi	Coroline Sabu	F	80	60	25	55
CG5	Temeke	Magurumbasi	Levina Ismaili	F	0	60	25	28
CG6	Temeke	Magurumbasi	Rosemary Thobias	F	20	0	0	7
CG7	Temeke	Magurumbasi	Flora Stephano	F	0	0	0	0
CG8	Temeke	Magurumbasi	Selina Kikoti	F	80	0	75	52
CG9	Temeke	Magurumbasi	Zuhura Abdala	F	0	0	25	8
CG10	Temeke	Magurumbasi	Debdra Kisesia	F	40	60	25	42
CG11	Temeke	Magurumbasi	Sada Abdala	F	0	0	25	8
CG12	Temeke	Magurumbasi	Kijakazi Zuberi	F	40	0	25	22
CG13	Temeke	Magurumbasi	Aisha Juma	F	40	0	25	22
CG14	Temeke	Magurumbasi	Rukia Nuksini	F	0	0	25	8
CG15	Temeke	Magurumbasi	Fatuma Abdala Mfaume	F	40	0	25	22
CG16	Temeke	Magurumbasi	Msimuni Ally	F	40	40	25	35
CG17	Temeke	Magurumbasi	Asma Abdala	F	0	60	25	28
CG53	Temeke	Keko Magurumbasi	Asha Juma	F	40	40	25	35
CG54	Temeke	Magurumbasi	Mwantum Hamed	F	40	60	0	33
CG55	Temeke	Magurumbasi	Victoria Dasian	F	40	60	25	42
CG56	Temeke	Magurumbasi	Fatuma Kalamayasi	F	40	60	0	33
CG57	Temeke	Magurumbasi	Ngani Kamsale	F	40	60	25	42
CG58	Temeke	Magurumbasi	Isabela Peter	F	0	20	0	7

CG59	Temeke	Magurumbasi	Prisca Isack	F	40	60	25	42
CG60	Temeke	Magurumbasi	Angela Ekingo	F	0	60	25	28
CG61	Temeke	Temeke-Keko	Adelina Gervas	F	20	20	25	22
CG62	Temeke	Magurumbasi	Cecilia Massoi	F	0	60	50	37
CG63	Temeke	Magurumbasi	Peter Paulo	M	40	60	50	50
CG64	Temeke	Magurumbasi	Albetina Gervas	F	0	40	0	13
CG65	Temeke	Magurumbasi	Lazia Shabani	F	0	60	0	20
CG66	Temeke	Magurumbasi	Stella Kimbe	F	0	60	25	28
CG67	Temeke	Magurumbasi	Ziada Mbegu	F	0	60	0	20
CG68	Temeke	Magurumbasi	Sabina John	F	60	60	25	48
CG69	Temeke	Magurumbasi	George Mwamloe	M	0	40	0	13
CG70	Temeke	Magurumbasi	Abiba Salum	F	0	40	25	22
CG71	Temeke	Magurumbasi	Fatuma Hemedi	F	60	60	0	40
CG72	Temeke	Magurumbasi	Hamim Seikombo	M	40	60	50	50

LDCF
Baseline

Site	Average (%)	Min (%)	Max (%)
Bagamoyo	21	0	93
Pangani	50	0	85
Rufiji	63	7	100
Zanzibar	45	0	93

Target

Site	Average (%)	Target (%)
Bagamoyo	21	76
Pangani	50	85
Rufiji	63	86
Zanzibar	45	86

Pangani

#	Site	Village	Name	M or F	Conceptual awareness SCORE (%)	Experiential awareness SCORE (%)	Engagement SCORE (%)	FINAL SCORE (%)
	Q1	Q2	Q3	Q5				
CG72	Pangani	Pangani West	Fatuma Ussi	F	100	80	50	77
CG73	Pangani	Pangani West	Mathias Ungad	M	100	60	25	62
CG74	Pangani	Pangani West	Laki Hamisi	F	100	80	50	77
CG75	Pangani	Bweni	Fatuma Ally	F	40	80	50	57
CG76	Pangani	Bweni	Mohamed	M	100	80	0	60
CG77	Pangani	Bweni	Mohamed Gogo	M	0	0	0	0
CG78	Pangani	Bweni	Saumu Mbaraka	F	40	60	25	42
CG79	Pangani	Bweni	Fatime Abdy	F	40	60	25	42
CG80	Pangani	Bweni	Mariamu Omari	F	40	60	0	33
CG81	Pangani	Bweni	Mwantumu Uwunduwa	F	0	0	0	0
CG82	Pangani	Pangani East	Muhsini Hassan	M	100	80	25	68
CG83	Pangani	Pangani West	Haroub Singano	M	0	0	0	0
CG84	Pangani	Pangani West	Seleman Juma	M	60	20	0	27
CG85	Pangani	Pangani East	Raymond Chihotigaki	M	100	80	25	68
CG86	Pangani	Pangani West	Bihatibu A. Masanga	F	80	60	50	63
CG87	Pangani	Bweni	Mwanahamis Yusuph	F	80	60	0	47
CG88	Pangani	Bweni	Matari Mridu	M	80	100	75	85
CG89	Pangani	Bweni	Mahdaly Said Ally	M	100	40	75	72
CG90	Pangani	Bweni	Amina Mashaka	F	60	80	75	72
CG91	Pangani	Bweni	Asha Hamid	F	0	20	0	7
CG92	Pangani	Pangani West	Salim Juma Kula	M	100	40	50	63
CG93	Pangani	Pangani West	Pih Mwakaruza	F	100	80	75	85

Bagamoyo

	Q1	Q2	Q3	Q5	Conceptual awareness	Experiential awareness	Engagement	FINAL

#	Site	Village	Name	M or F	SCORE (%)	SCORE (%)	SCORE (%)	SCORE (%)
FB155	Bagamoyo	Bondeni Hamlet	Abdulrahwami Mohamed	M	0	0	0	0
FB156	Bagamoyo	Bondeni Hamlet	Husein Ohori	M	0	0	0	0
FB157	Bagamoyo	Bondeni Hamlet	Chuki Kupa	F	0	0	0	0
FB158	Bagamoyo	Mayomeni	Hassan Mwagilo	M	80	60	50	63
FB159	Bagamoyo	Mayomeni	Mwanakombo	F	40	60	25	42
FB160	Bagamoyo	Mayomeni	Hachija Bakari	F	40	20	50	37
CG1	Bagamoyo	Magomeni (Maji Coast)	Sagawa Bashir	M	0	40	0	13
CG2	Bagamoyo	Mlingotini-Faki (Shuli)	Renatus Komata	M	20	60	0	27
CG3	Bagamoyo	Mlingotini-Faki (Shuli)	Sina Romdahani Mlisho	M	80	80	0	53
CG4	Bagamoyo	Mlingotini-Faki (Shuli)	Kienel Emmanuel Besha	F	80	60	0	47
CG5	Bagamoyo	Bondini Hamlet	Mbara Ally Nzagu	M	0	0	0	0
CG6	Bagamoyo	Bondini Hamlet	Sharifa Athumani	F	0	0	0	0
CG7	Bagamoyo	Bondini Hamlet	Mkejina Bashiru	F	0	40	0	13
CG8	Bagamoyo	Bondini Hamlet	Thabit Odnar	M	0	0	0	0
CG9	Bagamoyo	Bondini Hamlet	Asha Abdallah	F	0	40	0	13
CG10	Bagamoyo	Bondini Hamlet	Knmbonji Hija	M	0	40	0	13
CG11	Bagamoyo	Bondini Hamlet	Selemani Vumilia	M	0	40	0	13
CG12	Bagamoyo	Magomeni (Maji Coast)	Pearson Charles	M	60	80	0	47
CG13	Bagamoyo	Magomeni (Maji Coast)	Mwinjuma Salum	M	80	60	50	63
CG14	Bagamoyo	Mlingotini-Faki (Shuli)	Jitihada Bint-Dadi	F	0	0	0	0
CG15	Bagamoyo	Mlingotini-Faki (Shuli)	Ddija Shabani	F	0	0	0	0
CG16	Bagamoyo	Mlingotini-Faki (Shuli)	Hassani Omary	M	0	0	0	0

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CG17	Bagamoyo	Mlingotini-Faki (Shuli)	Mwinyi Kambi Sarehe	M	0	0	0	0
CG18	Bagamoyo	Mlingotini-Faki (Shuli)	Idd Shehd	M	0	0	0	0
CG19	Bagamoyo	Mlingotini-Faki (Shuli)	Mwatabu Mhaji	F	0	0	0	0
CG20	Bagamoyo	Mlingotini-Faki (Shuli)	Mjaka-N Chamuramba	M	80	60	25	55
CG21	Bagamoyo	Bondini Hamlet	Mayasa Mohamed	F	40	60	50	50
CG22	Bagamoyo	Magomeni (Maji Coast)	Mwatumn Ibrahim Mvkiura	F	40	40	50	43
CG23	Bagamoyo	Magomeni (Maji Coast)	Hashim Taibu	M	40	80	0	40
CG24	Bagamoyo	Magomeni (Maji Coast)	Fatima Hamisi	F	0	0	0	0
CG25	Bagamoyo	Magomeni (Maji Coast)	Mwanahamisi Saidi	F	20	60	50	43
CG26	Bagamoyo	Mlingotini-Faki (Shuli)	Lukia Abdala	F	0	0	0	0
CG27	Bagamoyo	Mlingotini-Faki (Shuli)	Hadija Shabani	F	0	0	0	0
CG28	Bagamoyo	Mlingotini-Faki (Shuli)	Tukainao Salum	F	0	0	0	0
CG29	Bagamoyo	Mlingotini-Faki (Shuli)	Tatu Mussa	F	0	0	0	0
CG30	Bagamoyo	Mlingotini-Faki (Shuli)	Shabani Monsuri	M	0	0	0	0
CG31	Bagamoyo	Mlingotini-Faki (Shuli)	Debura Haji	M	0	0	0	0
CG32	Bagamoyo	Mlingotini-Faki (Shuli)	Kombo Ramadhani Ally	M	0	0	0	0
CG33	Bagamoyo	Mlingotini-Faki (Shuli)	Mwaunita Mkame	F	0	0	0	0
CG34	Bagamoyo	Mlingotini-Faki (Shuli)	Nasra Ally	F	0	0	0	0
CG35	Bagamoyo	Mlingotini-Faki (Shuli)	Salama Shabani	F	0	0	0	0

CG36	Bagamoyo	Nianjema 'A' Magomeni	Hassani Ramadhani Shabani	M		80	60	0	47
CG37	Bagamoyo	Nianjema 'A' Magomeni	Haji-Mtumura Ramadhani	M		0	0	0	0
CG38	Bagamoyo	Nianjema 'A' Magomeni	Atihumani Shomari Nkwama	M		80	60	0	47
CG39	Bagamoyo	Nianjema 'A' Magomeni	Mwajabu-Sharifu	F		0	0	0	0
CG40	Bagamoyo	Nianjema 'A' Magomeni	Rashid Yusuph Sekamba	M		80	60	75	72
CG41	Bagamoyo	Nianjema 'A' Magomeni	Mariam Abrahamani	F		0	0	0	0
CG42	Bagamoyo	Nianjema 'A' Magomeni	Mariam Hassani	F		0	0	0	0
CG43	Bagamoyo	Nianjema 'A' Magomeni	Jamila Rajabu	F		80	80	0	53
CG44	Bagamoyo	Nianjema 'A' Magomeni	Farida Maulidi	F		0	0	0	0
CG45	Bagamoyo	Nianjema 'A' Magomeni	Sauda Hassani	F		0	20	0	7
CG46	Bagamoyo	Nianjema 'A' Magomeni	Mwajuma Ramadhani	F		0	0	0	0
CG47	Bagamoyo	Nianjema 'A' Magomeni	Barike Bakari	F		0	0	0	0
CG48	Bagamoyo	Nianjema 'A' Magomeni	Abdalah Ally	M		0	0	0	0
CG49	Bagamoyo	Nianjema 'A' Magomeni	Alima Saidi	F		0	0	0	0
CG50	Bagamoyo	Nianjema 'A' Magomeni	Asha Athumani	F		0	0	0	0
CG51	Bagamoyo	Nianjema 'A' Magomeni	Rajabu A. Rajabu	M		0	0	0	0
CG52	Bagamoyo	Kadle	Malingumu-Mtoro	M		60	100	0	53
CG53	Bagamoyo	Kadle	Rashid Mohamed	M		100	80	0	60
CG54	Bagamoyo	Kadle-Madukani	Mohamed Mwinyhuvua	M		0	40	0	13
CG55	Bagamoyo	Kadle-Madukani	Jestina Benson Lema	F		0	0	0	0

CG56	Bagamoyo	Kadle-Madukani	Tusuph Issa	M	80	100	0	60
CG57	Bagamoyo	Kadle	Bashok Omary Bashok	M	20	60	0	27
CG58	Bagamoyo	Kadle-Madukani	Mwanahwa Mwinyimvua	F	0	0	0	0
CG59	Bagamoyo	Kadle-Madukani	Raya Abdala	F	0	0	0	0
CG60	Bagamoyo	Kadle-Madukani	Mohamed Shek	M	80	80	0	53
CG61	Bagamoyo	Kadle-Madukani	Dillip Kasu Gamust	M	80	60	0	47
CG62	Bagamoyo	Kadle	Mwajuma Hamis	F	0	40	0	13
CG63	Bagamoyo	Kadle	Awa Hassan	F	0	40	0	13
CG64	Bagamoyo	Kadle-Madukani	Ramadhani Habibu	M	0	0	0	0
CG65	Bagamoyo	Kadle (Magombau Hamlet)	John Katanga	M	100	40	0	47
CG66	Bagamoyo	Kadle (Magombau Hamlet)	Ahmad Urari	M	60	100	25	62
CG67	Bagamoyo	Kaole (Magambani Hamlet)	salma Mohamed	F	0	0	0	0
CG68	Bagamoyo	Kaole (Magambani Hamlet)	Westone Baraza	M	100	80	100	93
CG69	Bagamoyo	Kaole (Magambani Hamlet)	Zamba Nasir	F	80	60	0	47
CG70	Bagamoyo	Kaole (Magambani Hamlet)	Ashura Abdallah Saidi	F	80	60	50	63
CG71	Bagamoyo	Kaole (Magambani Hamlet)	Hamza Peter Ruhuza	M	40	60	0	33

Rufiji

	Q1	Q2	Q3	Q5	Conceptual awareness	Experiential awareness	Engagement	FINAL
#	Site	Village	Name	M or F	SCORE (%)	SCORE (%)	SCORE (%)	SCORE (%)
FB106	Rufiji	Mchungu	Bakari Salumu Fakhi	M	40	80	75	65
FB107	Rufiji	Mchungu	Juma Kigomba Omary	M	80	80	75	78
FB108	Rufiji	Mchungu	Bakari Hassani Kihara	M	0	40	75	38
FB109	Rufiji	Mchungu	Sophia Juma Kisenga	F	0	20	0	7

FB110	Rufiji	Mchungu	Mohamed Yusuph Mgaga	M	80	60	75	72
FB111	Rufiji	Mchungu	Mohamedi Abasi Mkesaki	M	100	40	75	72
FB112	Rufiji	Mchungu	Rajabu Juma Urongo	M	60	40	75	58
FB113	Rufiji		Chuki Abdul Nombo	F	60	60	100	73
FB114	Rufiji	Nyamisati	Hamisi Hassani Monero	M	100	80	75	85
FB115	Rufiji	Nyamisati	Salima Iddi Pazi	F	0	0	50	17
FB116	Rufiji	Nyamisati	Omary Hamisi Kilagai	M	20	40	75	45
FB117	Rufiji	Nyamisati	Moshi Omary Mbulute	M	100	60	100	87
FB118	Rufiji	Mchungu	Asia Rashidi Magombeka	F	0	0	50	17
FB119	Rufiji	Nyamisati	Asha Hamisi Mlawa	F	20	0	50	23
FB120	Rufiji	Nyamisati	Nasoro Jumanne Bongo	M	0	80	0	27
FB121	Rufiji	Nyamisati	Mustapha Yusuph Kikumbi	M	60	80	100	80
FB122	Rufiji	Nyamisati	Shakila Mapande	F	80	40	75	65
FB123	Rufiji	Nyamisati	Salima Hassani Muhani	F	0	40	100	47
FB124	Rufiji	Nyamisati	Aziza Juma	F	100	20	100	73
FB125	Rufiji	Nyamisati	Omari Mwichande	M	40	60	0	33
FB126	Rufiji	Nyamisati	Asia Shabani Msese	F	100	80	75	85
FB127	Rufiji	Nyamisati	Hamisi Khatibu Cheha	M	100	80	75	85
FB128	Rufiji	Nyamisati	Rashidi Bakari	M	80	80	50	70
FB129	Rufiji	Nyamisati	Abuuhilary Mnyasi	M	100	80	100	93
FB130	Rufiji	Nyamisati	Mwajuma Hamza	F	80	80	25	62
FB131	Rufiji	Nyamisati	Zawadi Yusufu	F	100	80	75	85
FB132	Rufiji	Nyamisati	Tiba Bakari	F	100	60	75	78
FB133	Rufiji	Nyamisati	Mukhusini Mohamedi Kuchdmbeko	M	0	60	75	45
FB134	Rufiji	Nyamisati	Juma Naimu	M	40	60	75	58

FB135	Rufiji	Nyamisati	Amiri Omari Kilolo	M	100	60	75	78
FB136	Rufiji	Nyamisati	Swalehe Ali Mkwera Jongo	M	80	60	75	72
FB137	Rufiji	Nyamisati	Mauridi Kassimo Mkima	M	40	60	25	42
FB138	Rufiji	Nyamisati	Yahaya Juma Mlawa	M	40	40	75	52
FB139	Rufiji	Nyamisati	Zaimbu Ali Mkwera (Jongo)	F	60	80	75	72
FB140	Rufiji	Nyamisati	Jumanne Bakari Nditi	M	100	60	75	78
FB141	Rufiji	Nyamisati	Khassimu Mauridi	M	40	80	100	73
FB142	Rufiji	Nyamisati	Abrahmani Ayubu	M	60	0	75	45
FB143	Rufiji	Nyamisati	Jaffari Amini Bongo	M	80	60	75	72
FB144	Rufiji	Nyamisati	Mariamu Ali Mtambo	F	80	60	75	72
FB145	Rufiji	Nyamisati	Haji Omari Kigombo	M	80	60	100	80
FB146	Rufiji	Mchungu	Fatuma Yusufu Magimba	F	40	80	100	73
FB147	Rufiji	Mchungu	Abdurrahim Abdallah Mbembeni	M	100	100	100	100
FB148	Rufiji	Mchungu	Omari Nassoro Kipango	M	60	60	100	73
FB149	Rufiji	Mchungu	Mauridi Ali Msati	M	80	60	100	80
FB150	Rufiji	Mchungu	Saidi Omari Makwiga	M	80	60	75	72
FB151	Rufiji	Mchungu	Salma Amiri	F	20	80	0	33
FB152	Rufiji	Mchungu	Juma Salumu Mgisaki	M	40	80	50	57
FB153	Rufiji	Mchungu	Shabani Hamusi	M	60	80	100	80
FB154	Rufiji	Mchungu	Jongo Abda Jongo	M	100	20	75	65

Zanzibar

	Q1	Q2	Q3	Q5	Conceptual awareness	Experiential awareness	Engagement	FINAL
#	Site	Village	Name	M or F	SCORE	SCORE	SCORE	SCORE

CG127	Bwawani	Gulioni	Fatma Ali Nassor	F	0	20	0	7
CG128	Bwawani	Gulioni	Saada Ali	F	0	20	0	7
CG129	Bwawani	Gulioni	Abeid Moh'd Haji	M	0	20	25	15
CG130	Bwawani	Gulioni	Davd Amani Bakari	M	80	60	0	47
CG131	Bwawani	Gulioni	Riziki Bakari	F	0	80	0	27
CG132	Bwawani	Gulioni	Khamis Abdalla Khamis	M	20	20	25	22
CG133	Bwawani	Gulioni	Ramadhan Haji Simai	M	0	0	0	0
CG134	Bwawani	Gulioni	Maulin Makame Sheha	M	80	20	0	33
CG135	Bwawani	Gulioni	Sumoye Jaffar Bakar	F	0	0	0	0
CG136	Bwawani	Gulioni	Said Nassor Said	M	40	60	0	33
CG137	Bwawani	Gulioni	Amour Ramadhn Juma	M	60	80	50	63
CG138	Bwawani	Gulioni	Kassim Abdalla Said	M	40	60	0	33
CG139	Bwawani	Gulioni	Ali Ussi Pili	M	80	60	0	47
CG140	Bwawani	Gulioni	Abdullah Moh'd Haidar	M	60	80	25	55
CG141	Bwawani	Gulioni	Hemed Ameir Khamis	M	40	20	0	20
CG142	Bwawani	Gulioni	Tufa Sleiman Vuai	F	0	40	0	13
CG143	Bwawani	Gulioni	Haji Khamis Khamis	M	20	40	50	37
CG144	Bwawani	Gulioni	Ali Ame Ali	M	0	20	0	7
CG145	Bwawani	Bwawani	Hassan Khamis	M	0	40	25	22
CG146	Bwawani	Gulioni	Sleiman Nyasa Juma	M	80	60	0	47
CG147	Bwawani	Gulioni	Khalid Hashim Junu	M	40	20	0	20
CG94	Kilimani	Kilimani	Salum Juma Sleiman	M	40	60	25	42
CG95	Kilimani	Kilimani	Kombo Juma Maalim	M	80	100	100	93

CG117	Kilimani	Kilimani	Seif Ali Abdul Rahman	M	80	100	75	85
CG118	Kilimani	Kilimani	Thabit Ali Thabit	M	0	0	0	0
CG119	Kilimani	Kilimani	Tumu Sharifu Yahya	F	40	60	0	33
CG120	Kilimani	Kilimani	Ilham Makame Bakari	F	0	20	0	7
CG121	Kilimani	Kilimani	Zainab Juma Abdullah	F	100	60	0	53
CG122	Kilimani	Kilimani	Masoud Ali Ali	M	80	100	50	77
CG123	Kilimani	Kilimani	Khamis Mabonde Juma	M	40	80	0	40
CG124	Kilimani	Kilimani	Habi Mussa Kombo	M	80	20	0	33
CG125	Kilimani	Kilimani	Asha Simba Makwega	F	60	80	100	80
CG126	Kilimani	Kilimani	Masoud Mussa Ali	M	40	60	0	33
CG148	Kilimani	Kilimani	Othman Salum Mbarak	M	80	60	25	55
CG149	Kilimani	Kilimani	Omar Shomar Omar	M	0	80	0	27
CG150	Kilimani	Kilimani	Maulid Mgeni Khamis	M	80	60	50	63
CG151	Kilimani	Kilimani	Khalid Ali Kombo	M	80	80	100	87
CG152	Kilimani	Kilimani	Saleh Abdulrahman Khatib	M	100	80	25	68
CG153	Kilimani	Kilimani	Khadija Omar Moh'd	F	0	20	0	7
CG154	Kilimani	Kilimani	Ramadhan Songoro Sleiman	M	80	60	0	47
FB1	Kisiwa Panza	Kisiwe Panza	Ali Vuai Ame	M	0	80	25	35
FB2	Kisiwa Panza	Kisiwe Panza	Hamael Haji Mati	M	0	0	0	0
FB3	Kisiwa Panza	Kisiwe Panza	Mussa Said Shoka	M	0	60	75	45
FB4	Kisiwa Panza	Kisiwe Panza	Mwadiui Said Shoka	M	40	40	75	52

FB5	Kisiwa Panza	Kisiwe Panza	Batuliu Mselem Juma	F	0	40	0	13
FB6	Kisiwa Panza	Kisiwe Panza	Zawadi Kali Khamis	F	0	40	0	13
FB7	Kisiwa Panza	Mtondooni Kisiwe Panza	Shami Ame Mkui	M	0	0	0	0
FB8	Kisiwa Panza	Mtondooni Kisiwe Panza	Makame Sharif Othmai	M	60	100	25	62
FB9	Kisiwa Panza	Kisiwe Panza	Mkasi Shaib Omar	F	60	40	25	42
FB10	Kisiwa Panza	Kisiwe Panza	Musajum Ngusali Makane	F	0	80	0	27
FB11	Kisiwa Panza	Mtondooni Kisiwe Panza	Faki Haji Shaali	M	60	40	50	50
FB12	Kisiwa Panza	Mtemani Kisiwe Panza	Suleiman Manoeur Mkui	M	60	80	25	55
FB13	Kisiwa Panza	Mtemani Kisiwe Panza	Mina Ridh-usan Othwari	F	0	60	75	45
FB14	Kisiwa Panza	Pungua K/Panza	Makame Sharif Makame	M	60	60	25	48
FB15	Kisiwa Panza	Pungua K/Panza	Omar Kombo Hassan	M	60	20	25	35
FB16	Kisiwa Panza	Panza	Sheha Faki Makame	M	60	60	50	57
FB17	Kisiwa Panza	Mtemani Kisiwe Panza	Hassan Hamad Oihman	M	60	20	25	35
FB18	Kisiwa Panza	Mtemani Kisiwe Panza	Semeni Khamis Alawi	F	60	20	50	43
FB19	Kisiwa Panza	Maungani K/Panza	Tatu Khamis Khaifan	F	60	60	50	57
FB20	Kisiwa Panza	Kitope K/Panza	Shaibu Omar Khamis	M	60	20	25	35
FB21	Kisiwa Panza	Mtondooni	Ache Abdalla Fumu	F	60	20	25	35
FB22	Kisiwa Panza	Mji Mpya K/Panza	Kazija Omar Khamis	F	0	0	0	0
FB23	Kisiwa Panza	Mtondooni Kisiwe Panza	Kombo Makame Ali	M	80	60	100	80

FB24	Kisiwa Panza	Mtondooni Kisiwe Panza	Haji Makame Yussuf	M		60	60	50	57
CG97	Mnazi Mmoja	Mkwajuni Bondeni	Makame Makame	M		20	60	0	27
CG98	Mnazi Mmoja	Kikwajuni Bondeni	Saleh Issa Fadhili	M		60	60	0	40
CG99	Mnazi Mmoja	Kikwajuni Bondeni	Lucas Milanzi Frani	M		0	0	0	0
CG100	Mnazi Mmoja	Kikwajuni Bondeni	Ali Maganga Kasase	M		60	60	50	57
CG101	Mnazi Mmoja	Kikwajuni Bondeni	Mahboub Juma Issa (Mayor)	M		60	80	100	80
CG102	Mnazi Mmoja	Kikwajuni Bondeni	Parmukhsingh Hoogian	M		80	100	100	93
CG103	Mnazi Mmoja	Kikwajuni Bondeni	Abeid Khamis Moh'd	M		80	80	0	53
CG104	Mnazi Mmoja	Kikwajuni Bondeni	Rajab amour Sleiman	M		100	40	50	63
CG105	Mnazi Mmoja	Kikwajuni Bondeni	Farid Fazach	M		60	60	75	65
CG106	Mnazi Mmoja	Kikwajuni Bondeni	Ibrahim Ali Ibrahim	M		60	80	100	80
CG107	Mnazi Mmoja	Kikwajuni Bondeni	Siwa Mohd Rashid	F		60	80	50	63
CG108	Mnazi Mmoja	Kikwajuni Bondeni	Maninyi Abdul-Rahman Dedesi	M		80	80	0	53
CG109	Mnazi Mmoja	Kikwajuni Bondeni	Abdul Bakar Jaffar	M		20	60	0	27
CG110	Mnazi Mmoja	Kikwajuni Bondeni	Said Mnkame Said	M		0	80	0	27
CG111	Mnazi Mmoja	Kikwajuni Bondeni	Asha Moh'd Issa	F		80	20	0	33
CG112	Mnazi Mmoja	Kikwajuni Bondeni	Masoud Ali Ame	M		0	20	0	7
CG113	Mnazi Mmoja	Kikwajuni Bondeni	Aziza Abdullah Ahmed	F		40	80	50	57
CG114	Mnazi Mmoja	Kikwajuni Bondeni	Said Masoud Habib	M		40	60	100	67

CG115	Mnazi Mmoja	Kikwajuni Bondeni	Saleh Juma Ali	M	80	60	0	47
CG116	Mnazi Mmoja	Kikwajuni Bondeni	Zainab Juma	F	0	20	0	7
FB25	Tibirinzi	Tibirinzi	Matunda Khanis Joma	F	40	80	25	48
FB26	Tibirinzi	Tibirinzi	Amina Uassim Ali	F	20	80	50	50
FB27	Tibirinzi	Minazini	Alphonce Elias Kaula	M	60	60	50	57
FB28	Tibirinzi	Tibirinzi	Fatma Mohd Haji	F	40	80	25	48
FB29	Tibirinzi	Tibirinzi	Mtumwa Salum Dadi		60	80	0	47
FB30	Tibirinzi	Tibirinzi	Rukia Moh'd Salum	F	40	80	0	40
FB31	Tibirinzi	Msingini	Ali Yussuf Mgosi	M	100	80	0	60
FB32	Tibirinzi	Msingini	Salma Juma Ali	F	0	0	0	0
FB33	Tibirinzi	Muharitani	Fatuma Matar Moh'd	F	40	80	0	40
FB34	Tibirinzi	Tibirinzi	Mize Said Salum	F	0	40	0	13
FB35	Tibirinzi	Pondeani	Fatuma Abrahman Saleh	F	20	80	25	42
FB36	Tibirinzi	Msingini	Soud Ibrahim Mauud	M	40	60	25	42
FB37	Tibirinzi	Chanchani	Tatu Salim Suleiman	F	40	80	50	57
FB38	Tibirinzi	Tibirinzi	Hadia Hamadi Faki	F	40	80	25	48
FB39	Tibirinzi	Tibirinzi	Amina Hashim Ali	F	80	80	100	87
FB40	Tibirinzi	Tibirinzi	Mafunda Khamis Hamad	F	80	80	25	62
FB41	Tibirinzi	Tibirinzi	Fatma Salim Khatib	F	20	80	50	50
FB42	Tibirinzi	Tibirinzi	Serevania Yust Makusi	F	80	80	100	87
FB43	Tibirinzi	Tibirinzi	Asha Moh'd Juma	F	100	80	100	93
FB44	Tibirinzi	Tibirinzi	Salma Juma Haji	F	100	80	0	60
FB45	Tovuni	Mjananza	Hadia Ali Omar	F	60	80	25	55
FB46	Tovuni	Mjananza	Ali Kombo Othman	M	40	80	25	48

FB47	Tovuni	Mjananza	Mshamata Omar Issa	M	40	80	25	48
FB48	Tovuni	Kiungoni	Said Hamad Ali	M	60	80	25	55
FB49	Tovuni	Winswi Mjananza	Ali Said Ali	M	40	80	25	48
FB50	Tovuni	Mjananza	Said Omar Issa		40	80	25	48
FB51	Tovuni	Mjananza	Mtama Kombo Shema	F	80	80	50	70
FB52	Tovuni	Mjananza	Sin Omar Issa	F	80	80	50	70
FB53	Tovuni	Mjananza	Hidaya Khamis Hamadi	F	80	80	25	62
FB54	Tovuni	Pwana - Mjcheweni	Saidi Bakari	M	80	80	25	62
FB55	Tovuni	Mjananza	Bizume Suleman Bakari	F	40	80	50	57
FB56	Tovuni	Mjananza	Khadija Kombo Juma	F	40	40	0	27
FB57	Tovuni	Mjananza	Kombo Fakih Ali	M	60	80	0	47
FB58	Tovuni	Mjananza	Saida Ali Faili	F	100	80	0	60
FB59	Tovuni	Mjananza	Hadia Suleiman Hassan	F	0	0	0	0
FB60	Tovuni	Mjananza	Asha Ali Omar	F	100	80	0	60
FB61	Tovuni	Mjananza	Maryam Kombo Bailari	F	80	80	0	53
FB62	Tovuni	Mjananza	Rashid Sanan Massoud	M	100	80	0	60
FB63	Tovuni	Mjananza	Omar Juma Rashid	M	80	80	0	53
FB64	Tovuni	Mjananza	Bizume Omar Said	F	0	0	0	0
FB65	Tumbe East	Tumbe East	Moza Hamza Kassim	F	80	80	25	62
FB66	Tumbe East	Tumbe East	Fatma Said Hamad	F	80	80	50	70
FB67	Tumbe East	Tumbe	Mgeni Shehe Kombo	F	0	0	0	0
FB70	Tumbe East	Tumbe	Faki Ali Hassan	M	100	80	100	93

FB71	Tumbe East	Tumbe East	Hamad Rashid Omar	M	100	80	75	85
FB72	Tumbe East	Tumbe East	Salim Hamad Jabu	M	80	80	100	87
FB73	Tumbe East	Tumbe	Fatma Juma Faki	F	80	80	25	62
FB74	Tumbe East	Tumbe	Juma Hamad Mgambo	M	100	80	25	68
FB75	Tumbe East	Tumbe	Haji Khamis Makame	M	60	80	25	55
FB80	Tumbe East	Tumbe East	Asaa Kassim Shebwana	M	100	80	75	85
FB81	Tumbe East	Tumbe East	Thania Juma Said	F	100	60	100	87
FB82	Tumbe East	Tumbe Mashaiziili	Bizume Hamad Shaame	F	0	0	0	0
FB83	Tumbe East	Kikunguni	Mkitu Haji Abeid	F	20	80	50	50
FB84	Tumbe East	Pita na Zairo	Khatib Bakar Salim	M	60	80	50	63
FB86	Tumbe East	Kaliwa	Faki Khamis Juma	M	100	80	0	60
FB105	Tumbe East	Tumbe East	Time Hamad Juma	F	80	40	25	48
CG96	Tumbe East	Pita na Zailo - Tumbe	Khamis Abdalla Ali	M	0	80	0	27
FB76	Tumbe West	Tumbe West	Salim Juma Mgambo	M	0	0	0	0
FB77	Tumbe West	Mdooni	Halima Hamad Bakari	F	80	60	25	55
FB78	Tumbe West	Ndoani	Ali Hamadi Ali	M	40	40	25	35
FB79	Tumbe West		Time Hamad Suleiman	F	0	80	25	35
FB85	Tumbe West	Tumbe-Kikunguni	Zainab Juma Khatib	F	0	0	0	0
FB68	Ukele	Micheweni Mjini	Ali Ayoub Mshindo	M	100	60	25	62

FB69	Ukele	Micheweni-Majenzi	Mbwana Faki Shaame	M	80	60	25	55
FB87	Ukele	Micheweni Chamboni	Fatuma Amir Faki	F	60	80	100	80
FB88	Ukele	Chamboni	Hahma Dawa Hamad	F	0	40	0	13
FB89	Ukele	Micheweni Mjini	Biache Ali Ayoub	F	100	80	100	93
FB90	Ukele	Chamboni	Biache Kombo Sawa	F	0	0	0	0
FB91	Ukele	Micheweni Mjini	Chumu Mwalim Hamad		100	80	100	93
FB92	Ukele	Micheweni Mjini	Biache Kombo Mshindo		40	80	0	40
FB93	Ukele	Micheweni Mjini	Mchanga Omar Faki	F	0	0	0	0
FB94	Ukele	Micheweni Mjini	Biasha Zubeir Mailami	F	100	80	50	77
FB95	Ukele	Chamboni	Nuru Mbwana Vae		20	60	50	43
FB96	Ukele	Micheweni	Maryam Hamad Mbaroule	F	60	80	50	63
FB97	Ukele	Chamboni	Time Hamad Mbwana	F	20	80	25	42
FB98	Ukele	Micheweni	Naima Khamis Said	F	20	80	50	50
FB99	Ukele	Chamboni	Saada Kombo Dawa	F	20	80	25	42
FB100	Ukele	Micheweni Chamboni	Atendae Ali Khatib	F	0	0	0	0
FB101	Ukele	Kwale	Mziu Abdulla Kai	F	60	80	25	55
FB102	Ukele	Micheweni	Time Ali Ayoub	F	60	80	25	55
FB103	Ukele	Chamboni Micheweni	Biate Ali Khamis	F	60	80	25	55
FB104	Ukele	Majenzi	Sada Othman Faki	F	0	0	0	0

Annexure 7: Descriptive results of socio-economics from household surveys

Table 1. Results of socio-economic surveys conducted at AF project sites

	Total		Sites					
			Ilala		Temeke		Kinondoni	
Demographics	150		90		40		20	
Sex								
Female	98	65%	53	59%	33	83%	12	60%
Male	52	35%	37	41%	7	18%	8	40%
Dependents								
< 3	49	33%	27	33%	12	30%	10	50%
3-7	72	48%	42	52%	23	58%	7	35%
7<	20	13%	12	15%	5	13%	3	15%
Age								
1 -16	1	1%	0	0%	0	0%	1	5%
17 - 35	78	52%	45	50%	23	59%	10	50%
36 - 65	62	41%	40	44%	14	36%	8	40%
65<	8	5%	5	6%	2	5%	1	5%

Table 2. Results of socio-economic surveys conducted at LDCF project sites

Demographics	Total		Pangani		Bagamoyo		Rufiji		Bwawani		Kilimani		Mnazi Mmoja		Ukele		Tumbe		Tibirinzi		Tovuni		Kisiwa Panza	
Households surveyed	314		22		77		49		21		19		20		20		22		20		20		24	
Sex																								
Female	143	46%	12	55%	39	51%	16	33%	5	24%	5	26%	4	20%	15	88%	11	50%	16	84%	11	58%	9	38%
Male	166	53%	10	45%	38	49%	33	67%	16	76%	14	74%	16	80%	2	12%	11	50%	3	16%	8	42%	15	63%
Dependents																								
< 3	52	17%	2	9%	23	30%	6	12%	5	24%	4	21%	2	10%	1	5%	2	9%	2	10%	2	10%	3	13%
3-7	174	55%	17	77%	49	64%	26	53%	11	52%	11	58%	9	45%	9	45%	12	55%	9	45%	12	60%	9	38%
7<	87	28%	3	14%	4	5%	17	35%	5	24%	4	21%	9	45%	10	50%	8	36%	9	45%	6	30%	12	50%
Age																								
1 -16	1	0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%	1	4%
17 - 35	83	26%	9	41%	31	41%	13	27%	3	14%	6	32%	4	20%	2	10%	5	23%	4	20%	5	25%	1	4%
36 - 65	182	58%	11	50%	39	51%	29	59%	14	67%	8	42%	14	70%	12	60%	13	59%	12	60%	14	70%	16	67%
65<	46	15%	2	9%	6	8%	7	14%	4	19%	5	26%	2	10%	6	30%	4	18%	3	15%	1	5%	6	25%

Annexure 8: Assessment of Ocean Road seawall, Dar es Salaam

Description

The seawall is located along of Ocean Road. The existing wall begins beyond the State House on Ocean Road and continues until Aga Khan Hospital (Figure 19 in Annexure 1). In the area in front of the State House, there is no seawall. The length of the seawall includes multiple designs. Portions of the seawall i) are vertical with irregular surfaces; ii) are slightly curved with irregular surfaces; iii) include concrete steps; and iv) include concrete revetments. The condition of the seawall is also varied areas including areas that are: i) completely collapsed; ii) cracked; iii) showing severe scour; iv) reinforced with concrete; or v) recently rehabilitated.

Currently, the length of seawall along Ocean Road is not sloped (Figure 5 in Table 2) and is therefore not very effective at dissipating wave energy[123]. As a result, scour was noticed at the some points along the foot of the wall (Figure 11 in Table 2).There is also notable erosion on the landward side of the seawall that is threatening the stability of the road and seawall itself (Figure 8 in Table 2). For most of its length, the height of seawall is not sufficient. In particular, the average height of the seawall from GPS point 495 (6° 48' 23.699" S; 39° 17' 36.467" E) until the Aga Khan hospital is 0.59m (Figure 22 -27 in Table 2).

Most of the existing seawall in Dar es Salaam is ~50 years old and there are no available engineering reports for the seawall. The seawall has not been raised since the development of the project document. According to the project document and stakeholder engagement during the baseline mission, overtopping of seawater onto Ocean Road has occurred in the past. Therefore, to manage the effects of climate change, it is recommended that the seawall along Ocean Road be reshaped and raised along 800m of a total 915m length. In addition, new seawall will need to be constructed along lengths that have collapsed and where there is currently no seawall (to the north and south of the existing seawall) (500m of a total of 1445m with no seawall). The feasibility study will determine i) the appropriate sites along the length of Ocean Road seawall and beach front for the upgrading and construction, respectively; and ii) an appropriate bill of quantities for the structures along Ocean Road and Kigamboni.

Table 1. Characteristics

Materials	Cement and rock
Average height (m)	1.78
Average width (m)	0.73m

Observations/notes

- Landward erosion
- There are portions of the coast with no seawall
- There are portions of the seawall where the wall is level with the road/beach or only slightly raised.
- There are portions were the coastal erosion is severe and is affecting the condition of Ocean Road.

Recommended upgrade

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[123] Linham, M.M. and Nicholls, R.J. 2010. Technologies for climate change adaptation: coastal erosion and flooding. UNEP/Riso TNA guidebook series. Available at: http://tech-action.org/

- Lengthening the existing seawall
- Reshaping and raising the existing seawall

Table 2. Visual assessment of seawall along Ocean Road on 7 June 2014.

GPS: 443 6° 49' 3.022" S; 39° 18' 2.074" E Figure 1: No wall State House	GPS 450 6° 48' 44.939" S; 39° 17' 56.926" E No wall Figure 2: End of State House	GPS 451 6° 48' 41.796" S; 39° 17' 55.270" E No wall Figure 3: Drainage infrastructure
GPS 452 6° 48' 39.258" S; 39° 17' 52.440" E Figure 4: Beginning of seawall	GPS 455 6° 48' 37.886" S; 39° 17' 52.429" E (3.39h X 0.46w) Figure 5: Moderate erosion	GPS 458 6° 48' 37.001" S; 39° 17' 51.677" E Figure 6: Coastal erosion

GPS 459 6° 48' 36.788" S; 39° 17' 51.547" E
Figure 7: Area of severe erosion

GPS 459 6° 48' 36.788" S; 39° 17' 51.547" E
Figure 8: Circled in Figure 7: tarmac of Ocean Road and erosion

GPS 460 6° 48' 36.126" S; 39° 17' 50.723" E (0.68h X 0.89w)
Figure 9

Figure 10

GPS 461 6° 48' 35.932" S; 39° 17' 50.816" E (2.97h X 0.57w)
Figure 11

GPS 465 6° 48' 35.395" S; 39° 17' 50.413" E (3.4h X 0.62w)
Figure 12

GPS 467 6° 48' 35.280" S; 39° 17' 50.262" E (2.4h X 1.2w)
Figure 13
Erosion above concrete step 0.9m in.

GPS 470 6° 48' 34.369" S; 39° 17' 49.218" E
No wall, erosion to this point
Figure 14

GPS 469
6° 48' 34.225" S; 39° 17' 49.463" E
Facing landward, left cross-section.

GPS 471
6° 48' 34.067" S; 39° 17' 49.391" E
Facing landward, right cross-section.
Figure 15

GPS 472 6° 48' 33.534" S; 39° 17' 48.908" E (2.9h X 0.68w)
Figure 16

GPS 473 6° 48' 33.102" S; 39° 17' 48.610" E
Old and newer wall
Figure 17

GPS 481 6° 48' 30.686" S; 39° 17' 45.902" E
Landward erosion
Figure 18

GPS 483 – 484
6° 48' 29.974" S; 39° 17' 45.305" E – 6° 48' 29.380" S; 39° 17' 44.722" E
Moderate erosion
Figure 19

GPS 484 6° 48' 29.380" S; 39° 17' 44.722" E
Cracking in background
Figure 20

GPS 494 6° 48' 24.239" S; 39° 17' 37.388" E (1.77h X 0.95)
Figure 21

GPS 495 6° 48' 23.699" S; 39° 17' 36.467" E (0.73h X 0.75w)
Figure 22

GPS 496 6° 48' 23.699" S; 39° 17' 36.467" E (0.84h X 0.72w) Crumbling
Figure 23

GPS 497 6° 48' 22.205" S; 39° 17' 34.026" E (0.45h X 0.75w) Crumbling and portion collapsed
Figure 24

GPS 498 6° 48' 21.643" S; 39° 17' 33.079" E (0.34h X 0.63w)
Figure 25

GPS 499 6° 48' 21.085" S; 39° 17' 32.251" E Seawall level with beach
Figure 27

GPS 500 6° 48' 20.671" S; 39° 17' 31.524" E Cross- section of end of seawall
Figure 28

Annexure 9: Assessment of the Kigamboni seawall, Dar es Salaam

Description
The seawall is located in front of the Mwalimu Nyerere Memorial Academy in Temeke District. The seawall includes an older concrete seawall and gabion structures. The concrete seawall is crumbling and in sections completely collapsed (Figure 5-7 in Table 2). The expansion of the Dar es Salaam port increased the rate of erosion to the Kigamboni seawall because of increased wave action from the passing of larger ships. Erosion on the landward side of the seawall also indicates regular overtopping along the length of the infrastructure. This type of erosion further weakens the coastal infrastructure, as weakened soil is more likely to cause structural collapse. The area adjacent to the end of the wall has suffered severe erosion from the longshore component of scour (Figure 1 –3 in Table 2). The infrastructure located behind or near the seawall is vulnerable to coastal erosion include the staff housing of the MNMA, a restaurant/cafeteria of the MNMA and FICO headquarters.

Table 1. Characteristics

Materials	Cement, rock and pieces of ceramic
Average height (m)	1.3m
Average width (m)	1.2m

Observations/notes
- Landward erosion
- There are portions of the coast with no seawall
- There are portions of the seawall that completely collapsed
- Severe coastal erosion on either side of the seawall

Recommended upgrade
- Construction a new seawall to climate change standards

Table 2. Visual assessment of seawall in Kigamboni on 30 May 2014.

Kigamboni		
GPS 188 6° 49' 30.763" S; 39° 17' 45.535" E Figure 1: Longshore scour 94	GPS 188 6° 49' 30.763" S; 39° 17' 45.535" E Figure 2: Longshore scour 96	GPS 188 6° 49' 30.763" S; 39° 17' 45.535" E Figure 3: Longshore scour 102

GPS 190 6° 49' 30.554" S; 39° 17' 49.326" E
Figure 4: Landward erosion 108

Figure 5: Cracking of coastal infrastructure 114

GPS 193 6° 49' 30.929" S; 39° 17' 50.302" E
Figure 6: Collapse of seawall 116

GPS 198 6° 49' 31.757" S; 39° 17' 53.369" E
Figure 7: Coastal erosion where seawall has
collapsed 132

Annexure 10: Assessment of Pangani seawall

Description

The two vertical seawalls seawall (Figure 1 and 2 in Table 2) are located on opposite sides of the Pangani River (Figure 2 Annexure 1). The northern wall protects Pangani West and East towns; the southern wall is located in front of Bweni Town. A ferry transports local people between the two riverbanks. The dock for this ferry is located along the length of the seawall. Currently, the Pangani seawalls are not sloped and are therefore not very effective at dissipating wave energy. Scour was noticed at the foot of the seawalls (Figure 5 and 6 in Table 2). A flanking effect of the coast alongside the downdrift end of the seawall was noticed. This has occurred because the coast has been subject to erosion where the seawall ends (Figure 11 and 12 in Table 2). In addition, landward erosion was noticed in alongside the Pangani seawall. Local communities reported that twice a year overtopping of seawater into the roads directly behind the seawall occurs. Local communities live directly behind the whole length of the northern seawall (in front of Bweni Village). Therefore, this erosion and overtopping is threatening the livelihoods and damaging the assets of these local communities. There has been a request to extend the wall in front of Pangani East and West to the west. Currently, the area behind this proposed length is used for coconut processing seawall (Figure 10 in Table 2).

Table 1. Characteristics

Materials	Cement and rock
Average height (m)	1.5
Average width (m)	0.6

Observations/notes
- Landward erosion.
- As a result of the relatively flat wall surface, scour was noticed at the base.
- A flanking effect of the coast alongside the downdrift end of the seawall was noticed. Local communities live directly behind downdrift end of the seawall.

Recommended upgrade
- Reshaping and raising of the entire length of both walls.
- Constructing 200 m new wall at the downward drift end of both walls.

Table 2. Visual assessment of Pangani seawall on 21 May 2014

Figure 1: Southern seawall overview

Figure 2: Northern seawall overview

GPS 15 5° 25' 42.035" S; 38° 58' 8.357" E
Figure 3: Collapsed seawall

GPS 22 5° 25' 43.079" S; 38° 58' 11.402" E
Figure 4: Scour on southern seawall

GPS 80 5° 25' 56.071" S; 38° 58' 27.944" E
Figure 5: Scour on northern seawall

GPS 87 5° 25' 54.430" S; 38° 58' 22.307" E
Figure 6: Scour northern seawall

GPS 20 5° 25' 42.643" S; 38° 58' 9.995" E
Beginning of gap, GPS 21 end of gap
Figure 7: Collapse along southern seawall

GPS 30 5° 25' 43.550" S; 38° 58' 16.630" E
Figure 8: Cracking and landward erosion along sourthern seawall

GPS 79 5° 25' 56.280" S; 38° 58' 28.286" E
Figure 9: Collapse along northern seawall

GPS 11 5° 25' 39.486" S; 38° 58' 3.698" E
Figure 10: Flanking effect alongside southern Pangani seawall

GPS 102 5° 25' 55.222" S; 38° 58' 16.288" E
Figure 11: Flanking effect alongside northern Pangani seawall increasing the vulnerability of households Bweni village

GPS 102 5° 25' 55.222" S; 38° 58' 16.288" E
Figure 12: Flanking effect alongside northern Pangani seawall in Bweni village 160

GPS 94 5° 25' 55.157" S; 38° 58' 19.369" E
Figure 13: Proximity of community to northern Pangani seawall

GPS 95 5° 25' 55.139" S; 38° 58' 19.056" E
Figure 14: Proximity of community to northern Pangani seawall

GPS 97 5° 25' 54.944" S; 38° 58' 17.411" E
Figure 15: Proximity of community to northern Pangani seawall

Annexure 11: Assessment of coastal infrastructure on Unguja Island.

Description of Bwawani seawall
The seawall is located in front of the Bwawani Hotel and a road that leads to the entrance of the hotel on the western side of Unguja Island, Zanzibar. Since the project document was developed, a temporary seawall has been constructed (Figure 7 in Annexure 1) (Figure 1 in Table 2). The new section of the seawall is a vertical seawall while the older section has a revetment seawall (Figure 5 in Table 2). Before this temporary wall was constructed, seawater used to flow onto the road running parallel to the wall. As a consequence, the road was eroded and not usable. House and hotel walls are located directly above the seawall.

Table 1: Characteristics of Bwawani seawall

Materials	Cement and rock
Average height (m)	1.0
Average width (m)	0.4

Observations/notes
- Landward erosion.
- As a result of the relatively flat wall surface, scour was noticed at the base.
- A flanking effect of the coast alongside the downdrift end of the seawall was noticed. Local communities live directly behind downdrift end of the seawall.

Recommended upgrade
- Reshaping and raising of the entire length of both walls.

Table 2: Visual assessment of Bwawani seawall and Unguja coastal infrastructure, including alternative sites on 2 June 2014.

GPS 217 6° 9' 25.826" S; 39° 12' 3.704" E
Figure 1: Bwawani seawall

GPS 221 6° 9' 25.232" S; 39° 12' 2.592" E
Figure 2: Scour along Bwawani seawall

GPS 221 6° 9' 25.232" S; 39° 12' 2.592" E
Figure 3: Scour along Bwawani seawall

GPS 212 6° 9' 27.403" S; 39° 12' 4.759" E
Figure 4: Collapse of Bwawani seawall

GPS 215 6° 9' 26.255" S; 39° 12' 4.097" E
Figure 5: Crumbling and collapse of Bwawani seawall

GPS 216 6° 9' 26.118" S; 39° 12' 3.946" E
Figure 6: Crumbling and collapse of Bwawani seawall

Figure 7: Erosion along Kilimani coastal area

Figure 8: Erosion along Kilimani coastal area

Figure 9: Erosion along Kilimani coastal area

Figure 10: Erosion along Kilimani coastal area

GPS 268 6° 10' 38.366" S; 39° 11' 53.387" E
Figure 11: Degraded drainage infrastructure in Kilimani

GPS 279 6° 10' 10.247" S; 39° 11' 31.258" E
Figure 12: Affected area in Mnazi Mmoja

Annexure 12: Assessment of coastal infrastructure on Pemba Island

Table 1: Visual assessment of coastal infrastructure on Pemba Island including alternative sites on 3-4 June 2014.

GPS 290 5° 0' 2.635" S; 39° 49' 23.927" E
Figue 1: Dyke constructed by community in Ukele

GPS 309 4° 56' 49.697" S; 39° 46' 23.833" E
Figure 2: Dyke constructed by community in Tumbe west

GPS 322 4° 57' 20.984" S; 39° 47' 36.272" E
Figure 3: Dyke constructed by community in Tumbe east port

GPS 368 5° 2' 54.251" S; 39° 49' 24.852" E
Figure 4: Rice paddies affected by saline soils in Tovuni

GPS 367 5° 2' 52.242" S; 39° 49' 26.278" E
Figure 5: Proposed area for construction of a dyke in Tovuni

GPS 399 5° 27' 35.323" S; 39° 39' 3.629" E
Figure 6: Area waterlogged with seawater at hightide in Tibirinzi

GPS 341 5° 14' 21.757" S; 39° 45' 46.696" E
Figure 7: Proposed irrigation drain for rehabilitation at Tibirinzi

GPS 341 5° 14' 21.757" S; 39° 45' 46.696" E
Figure 8: Proposed irrigation drain for rehabilitation at Tibirinzi

GPS 342 5° 14' 21.880" S; 39° 45' 48.175" E
Figure 9: Proposed irrigation drain for rehabilitation at Tibirinzi

Description of Kisiwa Panza seawall

Two structures were constructed to protect the main residential area on Kisiwa Panza Island from water that flowed towards the main village along two inlets (Figure 9 in Annexure 1). These structures were constructed approximately 50 years ago by the local community. Since then, they have been completely degraded to rubble seawall (Figure 1-4 in Table 3).

Table 2. Characteristics of Kisiwa Panza seawall

Materials	Cement and rock
Average height (m)	N/A
Average width (m)	N/A

Observations/notes

- Currently, the structures are non-existent.

Recommended upgrade

- Constructing new walls/structures

Table 3. Visual assessment of Kiswa Panza seawall on 5 June 2014.

GPS 431 5° 27' 41.152" S; 39° 38' 33.842" E
Figure 1

GPS 431 5° 27' 41.152" S; 39° 38' 33.842" E
Figure 2

GPS 438 5° 27' 24.944" S; 39° 38' 38.087" E
Figure 3

GPS 438 5° 27' 24.944" S; 39° 38' 38.087" E
Figure 4

Annexure 13: Contact details for further details on CSOs/CBOs at project sites[124]

PEMBA
Community Forest Pemba - Mbarouk Mussa
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Bagamoyo CSOs Network - Mr. Swala
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RUFIJI:
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Mobile: 0712 264 397
Email: amikulu@yahoo.com

Pakaya Culture & Environmental Group- Jamal Sagara
Mobile: 0715 773 397
Email: jamal.sagara@yahoo.com

PANGANI
No ForumCC member.

Forest Manager at Pangani
Mobile: 0784 32 63 50

Preliminary CBOs and NGOs identified in Zanzibar[125]
- Jozani Environmental Conservation Association (JECA) based central and southern Unguja;
- South Environmental and Development Conservation Association (SEDCA) based in southern Unguja
- Ngezi-Vumawimbi Natural Resources Conservation Organization (NGENARECO) based in Pemba
- Zanzibar Community Forest Association (JUMIJAZA) based in Zanzibar, both Unguja and Pemba
- Mkokotoni Environment Conservation Association, based in Northern Unguja

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[124] Pers. Comm. with Fazal Issa of ForumCC
[125] Pers. Comm. with Soud Jumah of ZACCA.

- Labayka Organisation based northern, Unguja