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# MOZAMBIQUE COASTAL CITY ADAPTATION PROJECT

FINAL REPORT

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**Contract No.** AID-656-C-14-00001

**Cover photo:** Flooding in an informal settlement in the Chuiba neighborhood of Pemba after heavy rainfall in 2014, a result of the lack of a drainage channel. (Credit: Danilo Singano/Coastal City Adaptation Project Staff)

## DISCLAIMER

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# ACRONYMS

|         |   |
|---------|---|
| ANAMM   | National Association of Municipalities of Mozambique (Associação Nacional dos Municípios de Moçambique)         |
| CCA     | climate change adaptation   |
| CCAP    | Coastal City Adaptation Project   |
| CECOHAS | Coordination Center for Water, Sanitation, and Hygiene (Centro de Coordenação para Higiene, Agua e Saneamento)  |
| DRR     | disaster-risk reduction   |
| ESOP    | emergency standard operating procedures   |
| GIS     | geographic information system   |
| ICLEI   | International Council for Local Environmental Initiatives   |
| INGC    | National Institute of Disaster Management (Instituto Nacional de Gestão de Calamidades)                         |
| LGSAT   | Local Government Self-Assessment Tool   |
| MIMAIP  | The Ministry of Sea, Inland Waters and Fisheries (Ministério do Mar Aguas Interiores e Pesca)                   |
| NCCAMS  | The National Climate Change Adaptation and Mitigation Strategy  |
| PLA     | Climate Change Local Adaptation Plans (Plano Local de Adaptação)  |
| SIGIC   | Integrated Disaster Information Management System (Sistema Integrado de Gestão de Informação sobre Calamidades) |
| SIGIU   | Integrated Urban Information Management System (Sistema Integrado de Gestão de informação Urbana)               |

# EXECUTIVE SUMMARY

## BACKGROUND

At 2,700 kilometers (1,678 miles), Mozambique has the fourth longest coastline in Africa, and its coastal cities are among the continent’s most vulnerable to sea-level rise. These cities are also particularly vulnerable to environmental changes that contribute to extreme climatic events, such as cyclones and tropical storms, and climate hazards, such as flooding, wind damage, and disease epidemics. Mozambique’s coastal cities are home to about 13 million people — 60 percent of the population. Accounting for a disproportionate share of national economic activity, these economic hubs are the country’s primary drivers of economic development. Consequently, the climate adaptation challenges that Mozambique’s coastal cities face have serious impacts on urban infrastructure, local populations’ health, biodiversity, and socioeconomic development.

In 2000 and 2001, a series of cyclones and floods inundated the southern and central parts of Mozambique, displacing much of the population and contributing to an increase in the prevalence of diseases such as malaria and water-borne illnesses. A comprehensive analysis of the economic costs of climate change in Mozambican cities found that average losses due to climate hazards will increase substantially by 2030.<sup>1</sup> Evidence shows, however, that proactive investments in adapting to climate change can significantly reduce its adverse economic impacts and have substantial benefits. In response to the country’s climate change challenges, the government of Mozambique approved The National Climate Change Adaptation and Mitigation Strategy (NCCAMS) at the end of 2012. The NCCAMS aims to increase resilience and reduce climate risk at the national and community levels. The national strategy document outlines strategic actions grouped under two main pillars as well as cross-sectoral issues, as Exhibit I illustrates.

### EXHIBIT I. STRATEGIC ACTIONS OF THE NATIONAL CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGY

| 1. ADAPTATION AND CLIMATE RISK REDUCTION  | 2. MITIGATION AND LOW-CARBON DEVELOPMENT   |
|---|--|
| <ul style="list-style-type: none"><li>• <b>Strengthen early warning systems</b></li><li>• <b>Increase capacity to prepare responses to climate risks</b></li><li>• Increase capacity to manage water resources</li><li>• Increase access and capacity to capture, store, treat, and distribute water</li><li>• Increase the resilience of agriculture and livestock</li><li>• Increase the resilience of fisheries</li><li>• Guarantee adequate levels of food security and nutrition</li><li>• <b>Increase the adaptive capacity of vulnerable people</b></li><li>• <b>Reduce people’s vulnerability to climate change-related vector-borne diseases</b></li></ul> | <ul style="list-style-type: none"><li>• Improve access to renewable energy</li><li>• Guarantee the development of regulations dealing with emissions from the extractive industries</li><li>• Promote low-carbon urbanization</li><li>• Control emissions from industrial processes, including solid waste and wastewater</li><li>• Develop low-carbon agricultural practices</li><li>• Reduce deforestation and wildfires</li></ul> |

<sup>1</sup> Responding to Climate Change in Mozambique. National Disaster Management Institute (INGC).

| 1. ADAPTATION AND CLIMATE RISK REDUCTION   | 2. MITIGATION AND LOW-CARBON DEVELOPMENT  |
|--|---|
| <ul style="list-style-type: none"> <li>• <b>Promote mechanisms for the planting of trees, and establish forests for local use</b></li> <li>• <b>Develop resilience mechanisms for urban areas and other settlements</b></li> <li>• Suit the development of tourist zones and coastal zones to reduce the impacts of climate change</li> </ul>  | <ul style="list-style-type: none"> <li>• Plan and manage biodiversity and coastal ecosystems</li> <li>• Manage and set a price for waste</li> </ul> |
| CROSS-SECTORAL ISSUES  |   |
| <ul style="list-style-type: none"> <li>• Align the current legal framework with the NCCAMS</li> <li>• Align the current institutional framework with the NCCAMS</li> <li>• Develop research on climate change</li> <li>• Strengthen institutions' systematic data collection for inputs to greenhouse gases inventories and national communications</li> <li>• <b>Develop the level of knowledge about and capacity to act in response to climate change</b></li> <li>• <b>Promote the transfer and adoption of clean and climate change-resilient technologies</b></li> </ul> |   |

*Items in bold represent strategic actions from the NCCAMS that the CCAP scope of work covered.*

## PROJECT OBJECTIVES

To strengthen Mozambique’s ability to build resilience to climate change challenges, especially in vulnerable coastal communities, USAID launched the \$19.9 million Coastal City Adaptation Project (CCAP) in 2013. Over a five-year period, CCAP worked with municipal governments to increase understanding of urban adaptation issues and increase the application of management options for urban adaptation, particularly for the most vulnerable communities. CCAP engaged and partnered with stakeholders at central and local levels, including different ministries, city authorities, academia, civic organizations, community members, and international partners to reduce risk and build resilience of the country’s coastal areas.

Geographically, CCAP’s interventions focused on the most vulnerable coastal cities that, at the time, were not receiving significant support from other donors. During the project’s first phase, the cities of Pemba and Quelimane, which USAID chose during the design stage, served as the project’s initial two sites. Building on lessons learned in Pemba and Quelimane, CCAP started implementing selected interventions in the coastal city of Nacala in Year 3. In Fiscal Year 2017, CCAP scaled up to the municipalities of Mocimboa da Praia (Cabo Delgado province) and Ilha de Moçambique (Nampula province) and to the district of Palma (Cabo Delgado province).

## HIGHLIGHTS OF TECHNICAL ACCOMPLISHMENTS AND RESULTS

Mozambique CCAP supported the country in preparing for the impact of climate change by building the capacity of local governments and communities to undertake integrated, long-term planning and develop the knowledge, skills, and attitudes to make informed decisions on key climate change adaptation (CCA) issues. As the CCAP objectives outlined in the box below suggest, project activities aligned with the adaptation and climate-risk reduction pillar of the NCCAMS while complementing key cross sectoral strategic actions.



To strengthen the capacity of targeted coastal cities in climate planning and service delivery, CCAP invested in a range of CCA and disaster risk reduction (DRR) initiatives by developing climate change local adaptation plans (Plano Local de Adaptação [PLA]) with municipalities, conducting awareness raising and capacity building in vulnerable communities and assessing innovative approaches for risk reduction in the national and regional insurance markets. We highlight key achievements under each objective below.

#### MOZAMBIQUE CCAP OBJECTIVES

- Improve the provision of climate-resilient urban services by municipalities
- Increase adoption of climate-resilience measures by communities and civic and community organizations, including civil society, nongovernmental, and faith-based organizations and universities
- Increase local awareness of economic risk-management tools for at-risk urban infrastructure and livelihoods

#### Objective 1:

- Developed and operationalized emergency standard operating procedures (ESOPs) for the cities of Quelimane, Pemba, and Nacala.
- Developed vulnerability maps and worked with cities to integrate them into their cadaster systems.
- Launched an on-demand public information service to inform users of preparedness and prevention measures for extreme weather events and to disseminate information for disaster- and climate change-related impacts.
- Created the 84-3-2-1 On-demand Information Service, a complementary component of the Integrated Disaster Information Management System (Sistema Integrado de Gestão de Informação sobre Calamidades [SIGIC]) that allows the National Institute of Disaster Management (Instituto Nacional de Gestão de Calamidades [INGC]) and other entities to deliver information about CCA, DRR, and related subjects through voice and SMS data at no cost to the user.
- Repurposed the initial early warning system platform into a mobile-based tool — known as the “Integrated Urban Information Management” or “Sistema Integrado de Gestão de informação Urbana” (SIGIU) — to help municipalities better manage data and information from urban centers and communities.
- Fostered a local, regional, and global community of practice through participation in relevant national and international workshops and conferences, a network that enabled cities to raise \$5.07 million in climate adaptation funding — with \$10 million in submitted proposals that are pending award.

#### Objective 2:

- Designed a peer-reviewed course on CCA and DRR and corresponding manual. The course was delivered via in-person training and adapted as a free online course that is available globally.
- Developed climate-resilient construction techniques and model houses designed to withstand intense storms and provide more reliable household water supplies
- Restored 55.3 hectares of mangrove forests.
- Engaged community-based organizations via a grant mechanism to implement awareness campaigns to increase vulnerable communities’ adaptive capacity.

### Objective 3:

- Conducted a feasibility study to assess the private insurance market in Mozambique and how it can work with the public sector to mitigate climate related risks in the cities of Pemba, Quelimane, and Nacala.
- Increased awareness and built the Mozambican government's capacity to advance options for national-level and sub-national-level actors to access risk-financing instruments.

## SUSTAINABILITY

CCAP focused on a few key factors to enhance project activities' sustainability. Specifically, CCAP focused on incorporating sustainability into the implementation approach from the start, building human capacity to continue the work long after the project's closeout, and developing a set of climate adaptation tools and strategies that would be understood by and useful to the target cities after the project's completion.

## LESSONS LEARNED

CCAP had many key accomplishments during the five-year implementation period, but CCAP's context and operating environment presented certain challenges. We list a few of these challenges below.

- *Addressing the siloed approach to climate adaptation.* Although the impacts of climate change are inextricably linked across sectors, a lot of government institutions have been implementing the NCCAMS in an ad hoc, sometimes incohesive, manner. To better integrate approaches across sectors and develop awareness and buy in for project activities, CCAP convened a broad coalition of participants, including city managers, members of academia, national government officials, and implementing partners to discuss, plan, and prioritize city adaptation, disaster risk reduction, and resilience building initiatives.
- *Building community climate change awareness when basic development needs are unmet.* CCAP's scope of work called for the project to engage very vulnerable coastal communities whose socioeconomic conditions severely limit their ability to address all but the most immediate challenges. To engage communities, CCAP incorporated community members into program activities as agents of change empowered to identify and apply solutions that would work at the local level.
- *Overcoming design flaws in mangrove restoration.* CCAP rolled out a mangrove restoration program in the city of Quelimane in 2014 with an assessment that was meant to inform the program's design, the community's participation, and the establishment of a monitoring system to be overseen by a local university. When early results started to come in, it became clear that the mangroves' growth and survival rates were poor. To address this challenge, CCAP convened a workshop with local stakeholders, including municipal authorities and community members. An international mangrove specialist and a regional community conservation expert led the workshop. Those at the workshop critically contributed to the redesign of the mangrove restoration strategy, including actionable next steps for sustainably rehabilitating the mangrove sites.

## RECOMMENDATIONS

Based on lessons learned from implementing activities over the past five years, we make the following recommendations for future activities:

- *The right champions can make a big difference.* Identifying champions for new initiatives is important for their success and sustainability.
- *Focus on long-term capacity building.* New initiatives in related sectors and geographic areas should expand on the training CCAP provided and continue to develop long-term capacity.
- *Build on increased grantee capacity to allow for longer-term, larger, or more complex grants.* Future programs should consider building on CCAP's efforts to increase the institutional strength of its partners and develop longer-term multi-year grant support agreements.
- *Think ahead to understand the political environment.* Working closely with cities and their mayors, who are by definition politicians, may make it impossible to avoid becoming indirectly involved in politics. Developing a deep understanding of the issues as well as plans to mitigate negative impacts can keep politics from derailing program efforts.
- *School-aged children are an important target group to nurture and revitalize.* Focusing on children can positively affect many more individuals than the children themselves; it can impact children's family units and the people those children influence over the course of their lives.
- *Reinforce and scale up cadaster sector activities.* Future activities should emulate successes from Pemba and Quelimane; help to better integrate systems in Ilha de Moçambique, Nacala, the District of Palma, and Mocimboa da Praia; and eventually scale up to other coastal cities throughout the country.
- *Advance mangrove restoration.* It is recommended that activities in this realm promote awareness-raising for communities involved in mangrove restoration and to consolidate local knowledge through the inclusion of mangroves ecology into the curriculum in of higher education institutions.
- *Continue building capacity to leverage climate funding.* While CCAP was able to help leverage \$5M in climate funding for municipalities, there is still a need for continued municipal capacity building in proposal development and support to strengthen their ability to adequately manage the funds received.
- *Promote stronger linkages between civil society and with municipal representatives.* To increase municipalities' ability to deliver services, it is recommended that future activities provide support to local civic organizations and strengthen the linkages among local entities.
- *Support established organizations with relevant wide-reaching networks.* Continue providing support for organizations like the National Association of Municipalities of Mozambique (ANAMM Portuguese acronym), an organization that works with all 53 municipalities, to provide organizational and technical capacity where needed.
- *Integrate CCA/DRR into national school curriculum.* Support should be given to the education sector to formally mainstream CCA/DRR into the school curriculum at all levels using locally-based experts from institutions such as UEM.

- *Promote use of resilient infrastructures.* The resilient techniques developed with CCAP support was well received by the government of Mozambique. Future activities should maximize on this political goodwill to support municipalities in enhancing promotion of the use resilient construction techniques. Models developed through CCAP can be promoted in agreements with government and institutional partners with the resources and mandates, while capacity development for further adaptation and expansion continues at the community level.

# STRENGTHENING CLIMATE CHANGE PLANNING AND SERVICE DELIVERY

Coastal cities in Mozambique face rapidly growing urban populations; the onslaught of extreme climatic events, such as cyclones, droughts, and inland flooding; and growing threats, like erosion, saltwater intrusion, and vector- and water-borne illnesses. Planning to mitigate adverse impacts of climate change often happens on an ad hoc basis. Cities that created and resourced clear institutional mechanisms for addressing climate change impacts and establishing adaptation strategies, however, have made more progress in advancing a climate adaptation agenda. CCAP invested in strengthening targeted coastal cities’ capacity in climate planning and services delivery by supporting the development and implementation of CCA and DRR knowledge products and tools, such as climate change PLAs, ESOPs, vulnerability maps, and digital cadasters for urban land management.

## INCREASED CAPACITY TO RESPOND TO CLIMATE RISKS

An initial activity CCAP undertook was measuring targeted coastal cities’ level of preparedness and resilience, starting with the cities of Pemba and Quelimane and then including Nacala in Year 3. Using the Local Government Self-Assessment Tool (LGSAT),<sup>2</sup> a tool designed to give city managers and local stakeholders a platform to examine their institutional strengths and weaknesses related to disaster response, CCAP conducted baseline, mid-line, and end-term assessments of the three cities. Over the life of the project, this tool helped CCAP to better assist the target cities with proactively developing responsive mechanisms for becoming more climate resilient by measuring their progress and informing further improvements. The end-term LGSAT assessment revealed that, although the municipalities still experience deficiencies across all 10 dimensions of resiliency that the scorecard measures, the municipalities’ preparedness and resilience increased in the areas in which the municipalities received targeted support from CCAP.

### EXHIBIT 2. MUNICIPALITIES AND THEIR LGSAT SCORES OVER THE LIFE OF CCAP

| MUNICIPALITY | PERCENT CHANGE IN SCORE |
|--------------|-------------------------|
| Pemba        | +22 percent             |
| Quelimane    | +20 percent             |
| Nacala       | +12 percent             |

<sup>2</sup> “Local self-assessment leads to resilience.” <https://www.unisdr.org/archive/36113>. (Accessed October 2015).

## **EMERGENCY STANDARD OPERATING PROCEDURES**

One of the LGSAT assessment's recommendations was for the cities to develop and operationalize an ESOP. The ESOP critically enables the cities to establish a mechanism for understanding the structures and operating procedures for addressing all aspects of disaster management. CCAP assisted Pemba, Quelimane, and Nacala with developing and operationalizing ESOPs for their respective cities. The ESOP will also significantly facilitate each city's operationalization of the NCCAMS.

Local stakeholders, such as community leaders and members; municipal and INGC officials; and critical service providers, such as the Mozambique Red Cross, police and fire brigade, and health authorities were engaged to inform the design of the ESOPs in each of the three cities. Participants discussed critical elements of the ESOP, like the design of an evacuation route, maps of critical infrastructure, information flow from the bottom to the top of the government, and roles and responsibilities of the city's emergency technical group. The three cities also held simulations to test evacuation scenarios from their respective ESOP designs, and in turn, test procedures and refine assumptions.

The ESOP manual underwent an extensive review by both CCAP and the municipalities before each city finalized it. The city of Pemba took the process a step further by revitalizing the city's emergency technical group — the Municipal Council for Disaster Management — to more effectively manage the ESOP.

Now these municipalities have a concrete tool to provide timely, coordinated assistance to those affected by an emergency, reducing the loss of life, property, and health.

## **CLIMATE CHANGE LOCAL ADAPTATION PLANS**

CCAP teamed up with the Africa Climate Change Resilience Alliance to assist the municipalities in developing PLAs. A PLA helps a municipality identify its priorities and actions to address climate change's anticipated impacts. Eduardo Mondlane University (Universidade Eduardo Mondlane), a member organization of Africa Climate Change Resilience Alliance and the oldest and largest university in Mozambique, led this activity with the faculty of the Agriculture and Forestry Department.

The PLA development process involved extensive consultations with municipal authorities, community members, civic organizations, and private sector leaders. The PLAs have effectively engaged local communities in the complex process of adaptation planning. By participating in the PLA process, local stakeholders went from assuming a traditional, more passive role as recipients of emergency response assistance from the government and international community to assuming a more active role as participants in the design and implementation of longer-term solutions. Mayors from the two initial targeted municipalities (Quelimane and Pemba) participated in a study tour to the municipality of eThekweni in Durban, South Africa — a city that has successfully implemented CCA measures and is a leader among African cities in implementing the Durban Adaptation Charter. The tour allowed the mayors to see firsthand the role that

PLAs can play in strengthening local-level adaptation efforts and response mechanisms.

By the end of the project, CCAP had helped develop PLAs for four cities: Quelimane, Ilha de Moçambique, Pemba, and Mocímboa da Praia. Municipal councils ratified the PLAs for incorporation into city plans and budgets. By institutionalizing the PLAs, cities have increased their preparedness for and capacity to deal with adverse impacts of climate change. Institutionalizing the PLAs has also allowed cities to improve governance, because the PLAs offer guidance on how cities can best incorporate measures to deal with city-specific climate challenges into their annual plans. In addition, cities are using the PLAs as resource mobilization tools. Pemba, for example, mobilized approximately \$2 million dollars of climate funds to address priorities identified in its PLA.



Workshop session in Quelimane, where CCAP disseminated results and discussed priorities for implementation of the Local Adaptation Plan to build a smart and resilient city.

## DEVELOPED RESILIENCE MECHANISMS FOR URBAN AREAS AND OTHER SETTLEMENTS

### MAPPING VULNERABILITY

To build capacity to proactively address urban adaptation challenges, CCAP developed city-specific vulnerability maps and worked with cities to integrate them into their cadaster systems. To design these maps, the joint technical team, led by Dr. Elídio A. Massuanganhe of Eduardo Mondlane University, and target municipalities assessed the cities' vulnerability to climate change and other environmental hazards, focusing on natural disasters and extreme weather events. CCAP then conducted training sessions for municipal and other local technical experts on the technical map development process (from community consultation to final product) and on using the maps to inform decision-making.

“The [Pemba] municipality now has a resource to help make more effective decisions on where to build future homes, medical centers, schools, and other buildings and structures.”

— MARQUES NABA,  
INFRASTRUCTURE AND URBAN  
PLANNING COUNCIL MEMBER,  
MUNICIPALITY OF PEMBA

CCAP involved the local communities in the development of the vulnerability maps to ensure that their experiences and priorities were incorporated into the creation of vulnerability concepts. In concert with the municipal representatives, CCAP organized meetings in each municipality, convening local leaders, NGO representatives, religious leaders, local experts, and other influential stakeholders to gather community input.

The vulnerability maps reflect present conditions in a given municipality. Therefore, CCAP trained municipal staff on the entire development process to equip municipal technicians to regularly update the maps and track changes in key variables that may affect a city's vulnerability profile over time. Such variables include population settlements and density as well as social infrastructure (e.g., schools, hospitals, and roads).



CCAP's Casimiro Antonio explains to World Environment Day event participants how the municipality of Quelimane is using vulnerability maps to improve city planning and urban development to adapt to climate change.

The maps constitute a tool that municipalities may use to develop strategies to increase resilience in the current landscape and identify areas that become increasingly prone to natural disasters.

## DIGITAL CADASTERS AND URBAN AND LAND MANAGEMENT

The vulnerability maps have proven useful to municipalities in several respects as they provide data on human population, climate and disaster patterns, and urban infrastructure. With assistance from CCAP, the vulnerability maps have been integrated into digitized municipal cadasters — public registers showing the details of boundaries, value, and ownership of land in a particular area. Cities now take a more effective, modern approach to managing land; whereas city representatives once primarily used pencils and paper to manage land, they now have access to digital cadasters to inform the process of issuing land permits.



Pemba Infrastructure councilman Marques Naba explaining the use of vulnerability map and digital cadaster in Pemba city.

As dynamic tools that may be adjusted to reflect changing realities, the maps also



support municipal land-use planning. Local government officials and planners can integrate this information into their land-use planning to improve their land-use management, considering the vulnerability of locations like coastal zones or areas with a high population density and recommending that land applicants apply adaptation measures tailored to the specific parcel under consideration.

## **STRENGTHENED EARLY WARNING SYSTEMS**

The prevalence of mobile phones and mobile network coverage in Mozambique presented an opportunity to introduce improved forms of early warning and disaster response as well as post-disaster communication systems to complement more traditional forms of communication, such as radio. Mobile technology and infrastructure in Mozambique also allowed for an increase in the effectiveness and efficiency of urban service delivery. CCAP, through a public-private partnership involving mobile network operator Vodacom and INGC, launched an on-demand public information service to inform users of preparedness and prevention measures for extreme weather events and to disseminate information for disaster- and climate change-related impacts.

CCAP scaled its successful startup of a local early warning system to the national level, as it made most sense for a system of this nature to have national coverage and extend beyond the targeted municipalities. This scaled version of the early warning system grew into SIGIC, which provides timely and reliable information for national emergency responses at the national level. The initial platform was repurposed into SIGIU, which facilitates data collection and analysis to improve decision-making at the local level.

## **SIGIC**

Most early warning systems are one-way information delivery platforms. The key feature that distinguishes SIGIC from these systems is its ability to also receive information from the field in real time. Although mobile networks may be temporarily disrupted during extreme weather events, they are often better built than older communications infrastructure. Private mobile companies generally build cell phone towers that can withstand local weather conditions, and these towers are often the first systems to be restored. The two-way, mobile network solution that SIGIC provides performs five critical emergency response and preparedness functions:

1. Alerts citizens to the proximity of imminent extreme events, such as storms or floods
2. Provides instructions to those responsible for providing status information to INGC
3. Collects critical impact information during the extreme event
4. Engages the community in post-disaster response with data collection features
5. Provides free and easy access to information about resilience measures and disaster preparedness.

SIGIC's greatest strength is that it provides the platform for and relies on community engagement. This feature of the system encourages and allows the community leaders driving it to assume, in very tangible ways, responsibility for the people they lead. CCAP

started working within the formal organization of the neighborhoods with neighborhood secretaries and local committees for disaster risk management. The project then engaged religious and local teachers and school principals in this process, providing them with the training needed to support SIGIC. In addition to training community members, CCAP provided extensive training to INGC on managing the system. INGC's diverse leadership structure is an important aspect of the community, and INGC is in the best position to provide an interface between the communities it represents and emergency response teams when natural disasters occur.

To ensure the widespread use of SIGIC, CCAP assisted INGC in training decision-makers and senior technical staff — including national and regional directors, provincial delegates, district managers, and key local technical staff and data collectors at the community level — on how to use the system. The project also granted computers to INGC and included a simple mobile phone as part of 10 emergency kits distributed to the local committees for disaster risk management in selected provincial delegations.



Members of a local committee as data collectors for disaster management at Novo Cabo, Muidumbe district, Cabo Delgado.

With the SIGIC platform in place, disaster managers at the central and local levels have more timely access to disaster-related data, which helps inform decisions and better allocate INGC resources during and after extreme weather events. SIGIC has played a major role in assisting the INGC in its effort to deliver climate-related information to the public at the national level and in encouraging communities to take the necessary precautions to mitigate extreme weather events' impacts.

#### **84-3-2-1 ON-DEMAND INFORMATION SERVICE**

A complementary component of SIGIC is the 84-3-2-1 On-demand Information Service. This platform allows INGC and other entities to deliver information about CCA, DRR, and other related subjects with voice and SMS data at no cost to the mobile subscriber via existing mobile phone networks. CCAP signed an agreement with partner Vodacom to make this service free for all subscribers and to promote its use nationally.

To date, 387,300 people are reported as having accessed the 84-3-2-1 service since its launch in Fiscal Year 2017. When the Inhambane province was hit by Cyclone Dineo, INGC authorities stated that the information service 84-3-2-1 and SIGIC contributed to a lower death toll, explaining that it allowed time for the most affected populations to evacuate areas listed as “high risk” for flooding, high winds, and other adverse effects of the cyclone. Early in 2018, SIGIC was also used to alert at-risk communities and receive situation reports from them when they were hit by strong winds in the coastal districts of Nampula province, in the northern part of the country.

## SIGIU

To address municipal-level gaps in reliable data and information from urban centers and communities, the initial early warning system platform was adapted into another mobile-based tool to help municipalities analyze data and make timely decisions to facilitate the delivery of urban services like trash collection to residents. CCAP worked with municipal technicians to identify priority sectors and urban services and tailored the type of data and information flow to best operate SIGIU in the local

contexts. The process included providing training and technical assistance to local system administrators to create electronic forms (surveys) and collect data. CCAP also trained community data collectors to effectively use the system and respond to the surveys accurately, which was critical to SIGIU's operations.



Right to left: USAID Mission Director Alex Dickie, CCAP Chief of Party Olanda Bata, INGC National Deputy Director Casimiro Abreu, Vodacom public relations officer Paula Zandamela, and Vodacom Mozambique CEO Jerry Mobs during the national public launch of the 3-2-1 Information Service platform for CCA and DRR.

## FOSTERED LOCAL, REGIONAL, AND GLOBAL COMMUNITIES OF PRACTICE

Over five years, CCAP supported the municipalities' participation in relevant national and international workshops and conferences to increase technical exchanges on the most pressing climate change issues facing the targeted cities, including local governance, disaster preparedness and response, ecosystem-based adaptation, use of data for city planning, and use of technology in city management. These exchanges have enabled municipal staff and other personnel to gather information and lessons learned from similar, successful efforts in resilience planning and to develop a national and international network of practitioners, scholars, and donors. This network has been fruitful: Cities have raised \$5.07 million in climate adaptation funding and have a proposal worth up to \$10 million pending with the The Adaptation Fund<sup>3</sup>— an international fund that finances projects and programs aimed at helping developing countries adapt to the harmful effects of climate change. We detail some key engagement opportunities below.

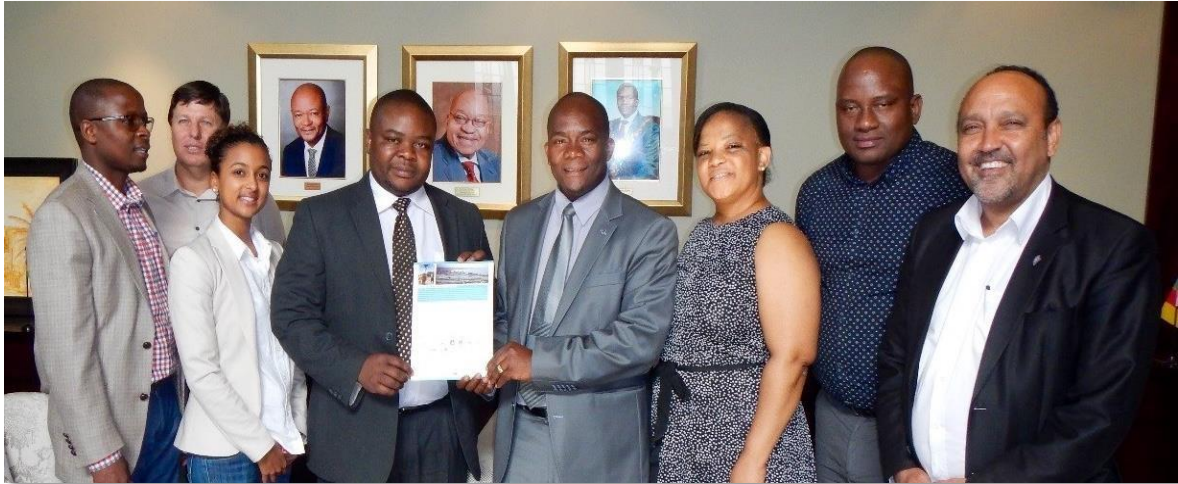
## DURBAN STUDY TOUR

The Durban study tour, which took place in 2015, focused on showing representatives from Pemba and Quelimane how PLAs can play a central role in strengthening local-level

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<sup>3</sup> The fund was set up under the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC)

adaptation efforts and response mechanisms and how to integrate these efforts into broader planning and management processes. Participants observed the way Durban is approaching CCA, from the process of creating a common vision for the city in the context of the changing climate to community-based ecosystem and wetland management, city reforestation with native species, solid waste management, coastline protection, planning and implementing climate resilient infrastructure, and broadly defined public-private-partnerships. Participants saw firsthand how to incorporate considerations of all these elements into the city's strategy and adaptation plan.



Mayors Tagir Carimo of Pemba (center left) and James Nxumalo of Durban (center right) with representatives of the delegation of Mozambique and staff of the municipality of Durban during the study tour.

## **GLOBAL FORUM ON URBAN RESILIENCE AND ADAPTATION**

Through participation in the annual Global Forum on Urban Resilience and Adaptation, in Bonn, Germany, municipal representatives from targeted cities became a part of the International Council for Local Environmental Initiatives (ICLEI), a global network of more than 1,500 cities, towns, and regions committed to building a sustainable future. These representatives not only attended the conference but also presented lessons learned from their climate adaptation efforts and became ranking members of the ICLEI community. In 2017, Manuel de Araújo, Quelimane's mayor, became the vice chair for the 2018-2021 ICLEI Africa Executive Committee.

## **LOCAL CLIMATE SOLUTIONS FOR AFRICA CONFERENCE**

Building on the networks established during ICLEI, efforts continued to cultivate international exchanges between climate vulnerable cities interested in building resilience to improve knowledge sharing and best practices. Mayors of the five targeted municipalities attended ICLEI's Local Climate Solutions for Africa in Boksburg, South Africa. The 2017 edition of the coalition covered solutions to address threats to which African cities are particularly exposed, including lack of sanitation and water resources, dilapidated and inadequate infrastructure, lack of strong urban planning frameworks, and uncertain economic development trajectories. The event's goal was to connect business

and industry, investors, scientists, technical experts, development partners, national governments, and civil society with Africa's cities and urban networks to explore critical links between climate change and urban water and sanitation in Africa's cities.



During the ICLEI Resilient Cities Congress in Germany, the mayor of Quelimane leads a discussion on the different CCA planning tools that Pemba and Quelimane are using to inform municipal decisions.

### **OTHER INTERNATIONAL AND NATIONAL ADAPTATION CONFERENCES**

To ensure that resilience building initiatives and approaches were helping to improve target cities' resilience and resilience beyond the target cities, CCAP worked to disseminate lessons learned and tools at national and international conferences.

CCAP and municipal officials participated in the 10th and 11th International Conference on Community-Based Adaptation to climate change in Dhaka, Bangladesh, where CCAP presented on the PLAs developed with municipalities. In 2018, CCAP was invited to share lessons learned from climate resilience work carried out in Ilha de Moçambique at a conference on Managing Urban Cultural Heritage in Malaysia. The presentation focused on how municipalities in resource-limited cities like Ilha de Moçambique perceive climate change risks, how different approaches and management tools are designed and implemented at the city level, and how those approaches and tools may be used to position vulnerable communities as the drivers to solutions to climate change risks. CCAP also presented at the 2018 Information and Communications Technology for Development Conference, at which CCAP shared its work with SMS-based platforms for disaster preparedness and response — specifically, SIGIC.

At the national level, CCAP participated in events such as the annual Mozambique International Trade Fair, International Observatory of Participatory Democracy (Observatório Internacional da Democracia Participativa), and National Association of Mozambique Municipality congress, to name a few. These events convened all 53 municipalities of Mozambique and other interested stakeholders, which presented an opportunity for CCAP to disseminate its work.

### **COMPACT OF MOZAMBICAN COASTAL CITIES**

During Fiscal Year 2017, mayors and municipal representatives from Pemba, Quelimane, Nacala, Ilha de Moçambique, Mocímboa da Praia, and the district administration from Palma signed the Compact of Mozambican Coastal Cities as part of their commitment to carry on with adaptation and resiliency building work after CCAP. With this agreement, the mayors and representatives established their commitment to the following:

1. Coordinating efforts to aid their respective cities in building resilience
2. Promoting actions to reduce climate risks to people and their livelihoods as well as protect the natural ecosystem

3. Making the cities resilient and adapted to climate change impacts
4. Supporting members from the forum to access funds and establish and consolidate partnerships
5. Contributing to the overall sustainable management of their cities, including natural and built environments

The National Association of Municipalities of Mozambique (Associação Nacional dos Municípios de Moçambique) will provide oversight and institutional support to ensure that the Compact of Mozambican Coastal Cities effectively disseminates best practices nationally and internationally.

# BUILDING MORE RESILIENT COMMUNITIES

## INCREASED THE LEVEL OF KNOWLEDGE AND CAPACITY TO ACT ON CLIMATE CHANGE

To help Mozambique and the municipalities better understand and proactively take actions to mitigate the impacts of climate change, CCAP and Eduardo Mondlane University Faculty of Science developed a university course on CCA and DRR and a corresponding manual. Scholars from Brazil and Portugal peer-reviewed the course to ensure that it met international standards.

To further increase the reach of the course, CCAP engaged subcontractor TechChange to convert the course into an online course. The CCA and DRR e-course is now hosted and managed by the Mozambique Climate Change Knowledge Management Center under the Mozambique Academy of Sciences. Mozambique Climate Change Knowledge

Management Center has made the online course globally available so that it can benefit a wide audience of not only students but also of municipal decision-makers and community members. The manual and e-course are available through the following link: <http://www.cgcmc.gov.mz>. Since the e-course's launch in March 2018, more than 368 people have successfully completed it.



PHOTO: Abilio Cossa/CCAP

Municipal officials, members of assembly, directorates, councilmen, and local stakeholders at the CCA and DRR course that CCAP delivered with its partner Eduardo Mondlane University in Pemba and Quelimane.

## DESIGNED RESILIENT HOUSING TECHNIQUES

Across much of Mozambique, constructing a house is a rite of passage to adulthood, and there is an enormous need for more resilient construction techniques as many city residents build houses and other infrastructure wherever they can find land available, including in areas that are prone to flooding, are on steep or unstable slopes, or have contaminated water supplies. Homes are often built with low-quality materials and techniques that make them easily damageable by storms, contributing to a cycle of vulnerability and poverty. CCAP, in partnership with the United Nations Human

Settlements Program, worked to help address these challenges through the development of climate-resilient construction techniques and model houses designed to withstand intense storms and provide more reliable household water supplies.



Mayor Councilman Yassin Calu, right, briefs U.S. Ambassador Dean Pittman, second to right, on the impact the houses will have on the communities.

During the design process, CCAP solicited community participation to ensure construction materials and techniques were appropriate and culturally acceptable. The project gathered prototype design inputs from diverse community members including municipal leaders, women’s groups, local construction firms, master builders, local artisans, and the Provincial Directorate of Public Housing and Water Resources. The construction preparation process included a strong visual and learning-by-doing element, which was intended to ensure community members’ fast absorption of the construction information and skills, including by people with less formal education.

Affordability was another core aspect of the resilient construction activity, which the community also weighed in on. To increase the houses’ affordability, the construction activity designed the models using “modular techniques,” which could be applied as needed given the risks faced in a specific locale and the resources available for construction. For example, where wind damage was a greater threat than flooding, the roofing techniques



Local master builders and community leaders in a training on techniques to build resilient houses in Pemba.



could be applied to constructing houses that did not include the more expensive raised foundations. CCAP also taught residents that, although the resilient building materials and techniques might be more expensive in the short-term, they could yield long-term savings by eliminating the costs of frequent rebuilding and fixing property damage.



Finished houses ready for community outreach on resilient techniques.

Below, we list the key design elements that CCAP and the United Nations Human Settlements Program developed for the model houses and are now promoting to increase the resilience of houses in Mozambique.

### **HOUSING SITE SELECTION**

Proper site selection can reduce the impact of climate-related hazards. For example, planners should avoid building houses in areas with high exposure to flooding and strong winds, and houses should not be located on land with a slope greater than 45 degrees. To avoid creating social conflict between new and existing residents, planners also should be cognizant of existing land claims when selecting construction sites. In each city in which CCAP developed houses, it worked with municipal cadaster teams to use Geographic Information System (GIS) software to identify risks, allocate construction plots that avoided risks, and develop municipal regulations and guidance on selecting future sites.

### **A SECURE ROOF THAT CAPTURES RAINWATER**

CCAP's climate-resilient houses have roofs that are tightly secured to withstand strong winds and protect people and their property. They also collect rainwater for household use, which helps mitigate the effects of drought-related water shortages. The roofs are made of rectangular, waterproof material; installed at angles not less than 12.5 degrees to reduce exposure to the wind; and fastened with nails and galvanized wire.

### **A RAISED FOUNDATION AND REINFORCED WALLS**

The houses' foundations create elevated platforms that are above local flood levels. The foundations are built with materials that can withstand intense rain: cement bricks, reinforced concrete, or even large stones stacked to the appropriate height. The houses' walls are constructed with durable wood or bamboo, and vertical wooden poles are reinforced with diagonal poles and finished with mortar plaster.

CCAP built a total of 22 model homes in three coastal cities. Although the resilient housing techniques indicate that the houses should include the water harvesting system, there was a compromise to forgo the integration of this system in order to focus on completion of model houses. Beyond the human capacity CCAP built through the

development of these model homes, CCAP contributed to the government’s thinking about housing codes. In addition, the International Labor Organization wants to replicate the skills-building aspect of CCAP’s model housing activity with the National Director of Housing and Urbanization as part of their MozTrabalha project. MozTrabalha aims to promote job opportunities in the construction sector for young people.

## PROMOTED MECHANISMS FOR PLANTING TREES, AND ESTABLISHED FORESTS FOR LOCAL USE

### MANGROVE RESTORATION

Mozambique has been losing mangroves at a rate of approximately 5 percent — or 1,821 hectares — a year,<sup>4</sup> and the city of Quelimane is no exception. In Icidua and Mirazane, two coastal communities in Quelimane, Mozambique, the mangrove forest along the Bons Sinais River has been devastated by the growing population’s use of the trees for firewood and construction material. Tree harvesting and expanding settlements threaten the health of local mangroves, which naturally protect low-lying areas from increasingly intense tropical storms, floods, and erosion. Consequently, residents in Icidua and Mirazane can no longer enjoy the natural benefits of the mangrove forest for protection or household use.

A rapid assessment CCAP conducted early in the project found the most cost-effective way to protect these communities was through the restoration of mangrove stands along the Bons Sinais River. CCAP convened relevant



Mangrove seedlings being delivered by a community member of Icidua as the site, which is being reforested, is labeled as a municipal environmental protection area.

community stakeholders and representatives from the Provincial Directorate of the Ministry of Land, Environment, and Rural Development to foster commitment to the restoration project by highlighting the benefits of mangrove restoration, such as protection from soil erosion and potential diversification of income sources through mangrove nurseries.

<sup>4</sup>[“Status and distribution of mangroves in Mozambique.”](https://www.researchgate.net/publication/288790417_Status_and_distribution_of_mangroves_in_Mozambique) [https://www.researchgate.net/publication/288790417\\_Status\\_and\\_distribution\\_of\\_mangroves\\_in\\_Mozambique](https://www.researchgate.net/publication/288790417_Status_and_distribution_of_mangroves_in_Mozambique). (Accessed October 2018).

To address protection needs in the short-term, CCAP partnered with a local community-based subcontractor to build dikes and spurs made of environmentally friendly material, including stakes and sand bags, to alleviate the progressing erosion that has destroyed houses, roads, and plantations and required families to relocate. The construction included opening channels to divert waters away from the community. Although some families had already moved out to find safe areas in which to build their homes, the dikes and spurs have reduced the speed of erosion.

With CCAP's support, approximately 55.3 hectares of mangroves were restored and designated municipal conservation areas.

## **UTILIZED THE GRANTS PROGRAM TO INCREASE VULNERABLE COMMUNITIES' ADAPTIVE CAPACITY**

### **MOBILIZING AGENTS OF CHANGE TO BUILD CAPACITY AND REDUCE VULNERABILITY**

In the cities of Pemba and Quelimane, CCAP engaged community-based organizations via a grant mechanism to implement a two-phase door-to-door campaign. In the first phase, the project trained a group of individuals on basic CCA and DRR, identifying common community practices that are harmful to the environment, and how to raise awareness of more climate friendly alternatives. These individuals were dubbed "agents of change."

"We embraced the social behavior change communication initiative because we realized that we needed to help our community; we were all suffering from preventable diseases and other phenomenon"

— FÁTIMA MUSSA VAZ,  
AGENT OF CHANGE, PEMBA

During this phase, CCAP focused on disseminating information to increase understanding of the impact that residents' actions had on the environment and actions to address residents' unfriendly environmental and sanitation practices. One of CCAP's outputs was visiting more than 200 families, about 1200 individuals, in vulnerable neighborhoods. During the visits, the agents of change advocated adopting positive behavior through small adaptation measures to better cope with climate change impacts. The agents of change also advocated adopting resilient construction techniques through the replication of models available in the community of Icídua. In addition, the agents of change discussed the value of continuously cleaning and maintaining city drainage channels; protecting the cities' green infrastructure, such as mangroves; and efficiently managing solid waste to increase city capacity to respond to extreme weather-related events. In this first phase more than 100 of the families that the agents of change visited adapted one or more of the practices the agents of change suggested.

The second phase of the campaign focused on families along the coastline that were more vulnerable to flooding from ocean-level rise and storm surge. The agents of change focused on reinforcing small practices that would reduce diseases commonly caused by flooding in these neighborhoods. One such activity was a beach cleanup;

CCAP provided cleaning tools, and the municipalities provided trucks to remove collected garbage. This cleaning session was integral to CCAP's strategy of bringing about behavior change and sparking communities' interest in building resilience.



A community member in Quelimane adapting measures advocated by CCAP community agents of change to flood proof a house.

## OTHER COMMUNITY CAPACITY BUILDING AND AWARENESS ACTIVITIES

*Radio Mozambique.* During Year 5, CCAP awarded grants to Radio Mozambique provincial stations in Quelimane and Pemba to lead radio shows and debates discussing climate change and disseminating messages about climate resilience and adaptation. Over the course of six months in Quelimane and Pemba, Radio Mozambique hosted live programs, debates, and shows in several neighborhoods around both cities to promote small adaptation measures and disseminate information about environmentally friendly resilience building. The Quelimane station received a second phase grant to conduct campaigns through live and recorded radio shows in additional communities of Quelimane. These campaigns allowed Radio Mozambique to continue promoting behavior change using a communications approach that features local languages and involves community members' participation.

*CECOHAS.* CCAP engaged the Coordination Center for Water, Sanitation, and Hygiene (Centro de Coordenação para Higiene, Agua e Saneamento — CECOHAS) under a grant to help raise awareness and build adaptive capacity of vulnerable communities. CECOHAS produced a video on how community members can protect existing green infrastructure, particularly the mangrove ecosystem, and developed communications materials to mobilize communities in implementing small adaptation measures. Provincial Radio Mozambique aired messages, which CECOHAS also developed into graphics, to provide communities with information on implementing adaptive behaviors to contribute to overall city resilience.

*Christian Council of Mozambique (Conselho Cristão de Moçambique).* To complement CCAP's social and behavior change communication initiatives, CCAP engaged the provincial Christian Council of Mozambique based in the city Pemba, which targeted religious groups through messaging on resilience building and adaptation. To better engage the community and generate more discussion about the campaign, the council organized a competition for the best messages, with prizes for the top three entries.

*Universidade Lúrio.* To raise the awareness of CCA through the practical use of green infrastructure and rainwater conservation systems among school children, CCAP and Universidade Lúrio undertook a three-month project to use rainwater harvesting to feed community gardens located at 16 primary schools throughout Pemba. This innovative approach introduced school children to CCA in a very practical manner. By participating in rainwater capture to water gardens, children acquired firsthand experience with green infrastructure and rainwater capture. The children were able to take these ideas back to their households and neighborhoods, which helped raise awareness of this practical approach to build resiliency and adaptability.

**“We will be able to transform people’s knowledge starting from schools... Students will expand these initiatives to the community.”**

**— SALVADOR  
NANVONAMUQUITXO, FACULTY  
MEMBER, NATURAL SCIENCES  
DEPARTMENT, UNIVERSIDADE  
LÚRIO**

# INCREASING AWARENESS OF ECONOMIC RISK- MANAGEMENT TOOLS

The government of Mozambique has undertaken a widespread and sustained initiative to address the increasing risk its people and economy face as the result of climate change. Although specific initiatives in urban centers have focused on addressing climate change risk, it is necessary to engage the private insurance market and increase access to catastrophe insurance to establish a culture of risk management and, in turn, improve the ability of individuals, businesses, and cities to withstand and recover from climate events.

## **CONDUCTED ASSESSMENT OF FEASIBILITY OF THE PRIVATE INSURANCE MARKET IN MOZAMBIQUE**

In 2017, CCAP engaged subcontractor Guy Carpenter to conduct a feasibility study. The study assessed the private insurance market in Mozambique and how it can work with the public sector to mitigate climate-related risks in the cities of Pemba, Quelimane, and Nacala. In line with identified government priorities, the feasibility study enabled CCAP to identify the obstacles necessary to address to improve targeted coastal cities' resilience. Additionally, CCAP identified needed capacity building activities, assessed the state of insurance markets and barriers to accessing them, and determined ways to improve access to risk-pooling measures, such as insurance plans and contingency funds.

The assessment led to three main recommendations for improving the country's insurance industry: promoting insurance education; standardizing the insurance training professionals receive; and, providing credentials to those who undergo specialized testing through the creation of an accredited insurance institute. This institute should operate independently and be charged with credentialing insurance professionals beyond the licenses awarded by Mozambique Institute for Insurance Supervision.

CCAP disseminated these and other findings at the national and city levels in a comprehensive report available in Portuguese and English.

## **INCREASED AWARENESS ABOUT ADDRESSING BARRIERS TO ACCESSING RISK-FINANCING INSTRUMENTS**

Building on the 2017 feasibility study, CCAP engaged Guy Carpenter again to raise awareness and increase the government of Mozambique's capacity to offer ways for national- and sub-national-level actors to eventually access risk-financing instruments. Guy Carpenter worked with CCAP to design and implement awareness raising and capacity building activities to help the Mozambican government, private sector investors,

and key decision-makers reduce barriers to risk financing. Through the training and dissemination efforts summarized below, CCAP reached approximately 100 key stakeholders at the central and provincial levels.

- The project hosted a workshop for private sector insurance practitioners to strengthen awareness of insurance and other risk-sharing tools for at-risk infrastructure. Participants included key decision makers in the private Mozambican insurance sector (insurance providers, brokers, etc.) based in Maputo. CCAP convened them to discuss the key barriers to further development of the insurance market, focusing on climate-related disaster-risk financing and the realistic options available to address those barriers.
- CCAP also conducted a seminar in Maputo to advance knowledge and awareness of methods for gathering and analyzing exposure and loss data, which are essential skills for advancing the risk financing sector in Mozambique. The seminar covered issues related to exposure, the importance of data, exposure valuation techniques, and loss valuation techniques. The seminar also provided an introduction to modeling. Attendees were a select group of academics, students, and practitioners, which CCAP targeted through the Insurance Supervision Institute of Mozambique and universities in Maputo.
- CCAP worked to increase the financial management capacity of relevant municipal authorities and structures through targeted workshops in Pemba and Nacala. These technical workshops provided municipal authorities and other key stakeholders with a basic overview of relevant insurance issues, including the types, functions, and purposes of deductibles/retentions; key concepts, like “the riskier the exposure the higher the premium paid”; the importance of mitigation measures; the rising importance of good data; underwriting; and the role of supporting service providers (brokers, claims adjusters, etc.). The workshops enhanced the financial acumen of municipal officials by improving their understanding of options available to protect at-risk infrastructure.

Although the project did not have a formal MOU with the National Institute for Insurance Supervision—the government entity responsible for regulating the insurance market—they were receptive to the ideas presented in the feasibility study and committed themselves to use the study to guide future insurance policies and regulations. These instruments can be useful as a baseline for implementing the approved the NCCAMS, which advocates the existence of insurance for national disasters.

## SECTION II: SUSTAINABILITY, LESSONS LEARNED, AND RECOMMENDATIONS FOR FUTURE ACTIVITIES

# SUSTAINABILITY

Below, we detail CCAP's efforts to enhance project activities' sustainability.

### IMPLEMENTATION APPROACH

CCAP's approach relied heavily on the stepwise concept of introducing small and incremental innovations that would eventually lead to a sustainable impact. Complementing this approach, CCAP worked on adapting and maximizing strategies and practices that already existed in the government or communities. This latter approach helped create buy-in and increased the likelihood that Mozambican government agencies and communities would continue to use tools or strategies from CCAP after it ended. CCAP ensured that innovative approaches and techniques were viable and sustainable in the context of Mozambique.



Carnival celebrations in Quelimane (left) and Pemba (right). CCAP and the municipalities used the opportunity to promote CCA and highlight the work being done to increase their communities' resiliency.

### BUILDING HUMAN CAPACITY AND NETWORKS

CCAP promoted programmatic continuity by building the expertise of government partners and civil society, including higher education institutions. The project's capacity building efforts aimed at helping partners develop technical and management skills to prepare for and mitigate climate risks. To this end, CCAP delivered a series of on-the-job CCA and DRR training and learning-by-doing initiatives. In addition to CCA and DRR training, partners received training on managing digital cadasters and vulnerability mapping using GIS or global positioning systems to improve city land-use planning in context of changing climate. Partners also received training on mangrove ecosystem protection and restoration techniques, among other techniques.

CCAP facilitated the development of networks of practitioners to increase technical exchanges and collaboration on the most pressing climate change issues facing the



targeted cities. For example, mayors and municipal representatives from Pemba, Quelimane, Nacala, Ilha de Moçambique, Mocimboa da Praia, and the district administration from Palma signed the Compact of Mozambican Coastal Cities. In this agreement, mayors and municipal officials committed to coordinating efforts to aid their respective cities in building their resilience. The National Association of Municipalities of Mozambique (Associação Nacional dos Municípios de Moçambique) will provide oversight and institutional support to ensure that this is a critical network is an effective channel for disseminating best practices nationally and internationally. Targeted cities not only joined networks of practitioners but also became ranking members of these institutions. In 2017, Manuel de Araújo, Mayor of Quelimane, became vice chair of the 2018-2021 ICLEI Africa Executive Committee.

“CCAP may be ending, but we are here. The human capacity built by the project is here to stay and we have a responsibility to continue the work.”

— ABDULREMANE CALIFA  
CHACA, DIRECTOR, CITY  
COUNCIL ON CLIMATIC  
CHANGE, SANITATION AND  
WATER, PEMBA

## CLIMATE ADAPTION TOOLS

In addition to having increased human capacity, CCAP has left Mozambican government partners and communities with an array of climate adaptation management tools. These tools include the following:

- PLAs
- ESOPs
- CCA/DDR e-course and manual
- Vulnerability maps and GIS software for updates
- SIGIC
- 84-3-2-1 On-demand Information Service
- SIGIU
- 22 resilient model homes

## LEVERAGING CLIMATE FUNDING

In addition to ensuring that the activities it implemented were sustainable, CCAP sought to leverage climate adaptation contributions to ensure that partners developed diverse funding sources to support and continue their resilience building efforts. The target for the life of the five-year program was \$4,800,000 in climate adaptation contributions; the project achieved 106 percent of that target, \$5,069,045. Targeted municipalities also submitted a proposal, worth up to \$10 million and pending award, to the Adaptation Fund.

# CHALLENGES AND LESSONS LEARNED

CCAP implementation was inherently complex given its geographic scale and broad-reaching, innovative scope of work as well as the diversity of its project activities. Although CCAP's context and operating environment presented numerous challenges, the team was able to adapt, and — as demonstrated throughout this report — the project delivered significant results. We summarize a few of these challenges below.

## **ADDRESSING THE SILOED APPROACH TO CLIMATE ADAPTATION**

Given that climate adaptation and resilience building as concepts are relatively new, government institutions have been implementing the NCCAMS in an ad hoc, sometimes incohesive, manner. Furthermore, although the impacts of climate change are inextricably linked to greater socioeconomic development challenges across a number of sectors, institutions tend to work in isolation on these issues, sharing little to no information and resources. This lack of coordination makes resilience building measures at best less efficient and more expensive and at worst impossible to fully execute.

To meet this challenge and develop awareness and buy in for project activities, CCAP convened a broad coalition of participants, including city managers, members of academia, national government officials, and partners, to discuss, plan, and prioritize city adaptation, disaster reduction, and resilience building initiatives. CCAP finalized annual work plans based on these meetings and circulated the plans to cross-sectoral city management boards. The project progress reports were also discussed in an annual multi-sector coordination meeting that allowed CCAP to take corrective measures as necessary while building coordination between departments and sectors by emphasizing their common challenges and objectives related to climate change and resilience building.

## **IMPLEMENTING COMMUNITY ADAPTATION ACTIVITIES WHEN BASIC DEVELOPMENT NEEDS ARE UNMET**

CCAP's scope of work called for the project to engage very vulnerable coastal communities with a low level of knowledge and awareness about environmental issues, climate change impacts, and practical adaptation solutions. These communities are disproportionately vulnerable to the impacts of climate change, and their socioeconomic conditions severely limit their ability to address all but the most immediate challenges. The communities, therefore, prioritize their basic need to have food over climate adaptation and resilience, which made it more difficult for CCAP to promote these communities' participation in activities to increase resilience and adaptation to climate change.

To engage these communities, CCAP incorporated community members into program activities as agents of change empowered to identify and apply solutions that would work at the local level. With a greater sense of involvement and empowerment, the community members showed enthusiasm for and interest in learning about environmental issues and ways they could contribute to environmental management at the household level. The program also promoted solutions to immediate and recurring issues the communities faced, building resilience in them. For example, while developing climate resilient housing models, the program trained local master builders in low-cost techniques that enable communities to construct more resilient homes and avoid the costs of repeated rebuilding.

### **IMPROVING THE DESIGN OF THE MANGROVE RESTORATION ACTIVITY**

With the northern city of Quelimane in 2014, CCAP launched a mangrove restoration program as a green infrastructure initiative to stabilize eroding banks, protect nearby communities from winds and storm surges, and improve economic benefits from fisheries (mangroves are important breeding grounds for fish) and corollary activities, such as apiculture. CCAP rolled out the restoration program with an assessment to inform the program's design, community participation in it, and a monitoring system overseen by a local university. When early results started to come in, it became clear that the mangroves' growth and survival rates were poor.

CCAP, therefore, commissioned a study of the mangrove activity and delayed the award of a follow-on grant for the work until the program was confident it had the information necessary to develop an approach that would yield the best results for community partners. Simultaneously, CCAP underwent its mid-term evaluation, which included recommendations for improving the program. Armed with the results of the study and recommendations from the mid-term evaluation, CCAP convened a workshop with the local actors, which two consultants (an international mangrove specialist and a regional community conservation expert) led. With the university and the communities, CCAP redesigned the approach to the mangrove activity. This approach, launched in 2016, focused on restoring hydrological flows and enhancing natural regeneration. It represented a significant departure from the initial community nursery approach. By the end of the program, results had significantly improved since redesigning the approach.

# RECOMMENDATIONS FOR FUTURE ACTIVITIES

CCAP enabled Mozambique’s government and communities to better prepare for the impacts of climate change, but more remains to be done. We base our recommendations for future activities on lessons learned while implementing activities over the past five years.

## THE RIGHT CHAMPIONS CAN MAKE A BIG DIFFERENCE

Identifying champions for new initiatives is important for success and sustainability. We recommend identifying champions early, investing in them to support their success, reviewing and validating their effectiveness, and supporting them in making changes to meet evolving needs.

“It’s is difficult to change people’s minds. The time given by the project was short, but we had our successes during this period. If it was designed for a longer period we are convinced that further results would have been achieved”

— FÁTIMA MUSSA VAZ,  
AGENT OF CHANGE, PEMBA

## FOCUS ON LONG-TERM CAPACITY BUILDING

New initiatives in related sectors and geographic areas should build on the training CCAP provided and continue to develop long-term capacity. Sustained support to capacity building efforts can help further institutionalize the approaches and training CCAP promoted and provide longer, more meaningful impact.

## BUILD ON INCREASED GRANTEE CAPACITY TO ALLOW FOR LONGER-TERM, LARGER, OR MORE COMPLEX GRANTS

Grants under CCAP were mostly limited to small grants that lasted less than one year. In thinking about long-term adoption and supporting a culture of change, future programs should consider building on CCAP’s work to increase the institutional strength of its partners and develop longer-term multiyear grant support agreements.

## THINK AHEAD TO UNDERSTAND THE POLITICAL ENVIRONMENT

Project activities can sometimes become collateral damage or experience delays due to political parties’ disagreements. Working closely with cities and their mayors, who are by definition politicians, may make avoiding politics impossible, but a deep understanding of issues and plans to mitigate negative impacts can prevent politics from derailing program efforts.

## SCHOOL-AGED CHILDREN ARE AN IMPORTANT TARGET GROUP TO STIMULATE AND REVITALIZE

School-aged children act as “agents of change” by taking the knowledge and skills they

gain in school to their homes. They influence their siblings and parents in practicing what they learn and stimulate replication of positive behaviors. A focus on children may, therefore, have a multiplier effect given the influence children often have on their family units and the influence they can have on others over the course of their lives.

### **REINFORCE AND SCALE UP CADASTER SECTOR ACTIVITIES**

The integration of vulnerability maps into municipal digital cadaster is helping to inform the process of land allocation as well as preventing people from occupying areas deemed unsafe. Future activities should maximize on existing local capacity to reinforce and scale-up activities completed under CCAP. Emulate successes from Pemba and Quelimane; help to better integrate systems in Ilha de Moçambique, Nacala, the District of Palma, and Mocimboa da Praia; and eventually scale up to other coastal cities throughout the country.

### **ADVANCE MANGROVE RESTORATION**

CCAP implemented two methods of mangrove restoration—seedling planting, using plants from the community nursery, and hydrological restoration, to prompt natural regeneration. As the latter method began during the final year of the project there was not sufficient time to carry out an in-depth assessment of the method, however, direct observation in the field demonstrated positive signs of seedling recruitment and establishment. Consequently, CCAP recommends hydrological restoration for prompt natural regeneration as the preferred method moving forward.

Future activities should partner with the Fishery Research Institute of the Ministry of Sea, Interior Waters, and Fisheries (MIMAIP Portuguese acronym)—the governmental body mandated to protect and manage coastal ecosystems and the implementation of the national mangrove strategy—to promote awareness-raising activities for communities involved in mangrove restoration, employing the mangrove hydrologic restoration approach. Programs should also work with MIMAIP to consolidate local knowledge through the inclusion of mangroves ecology into the curriculum in of higher education institutions.

### **CONTINUE BUILDING CAPACITY TO LEVERAGE CLIMATE FUNDING**

CCAP worked to build municipal capacity to develop compelling proposals for climate funding opportunities. While the project was able to help leverage \$5M in climate funding, there is still a need for continued capacity building in proposal development and support to strengthen their ability to adequately manage the funds received. This is critical to the sustainability and expansion of CCAP initiatives, especially considering reduced government spending on municipal budgets in the short to medium term.

### **PROMOTE STRONGER LINKAGES BETWEEN CIVIL SOCIETY AND WITH MUNICIPAL REPRESENTATIVES**

To increase municipalities' ability to deliver services, it is recommended that future activities provide support to local civic organizations and strengthen the linkages among local entities. This can be in form of grants, studies, and internships.

## **SUPPORT ESTABLISHED ORGANIZATIONS WITH RELEVANT WIDE-REACHING NETWORKS**

A key partner of CCAP was ANAMM due to their work with all 53 municipalities in Mozambique on the promotion of good governance, inclusion of gender and equity, and other relevant cross cutting sectors like environment, budgeting etc. Organizations like ANAMM would greatly benefit from organizational capacity building support as well as technical support in implementing activities in municipalities throughout the country.

## **INTEGRATE CCA/DRR INTO NATIONAL SCHOOL CURRICULUM**

Support should be given to the education sector to formally mainstream CCA/DRR into the school curriculum at all levels using local based experts from institutions such as UEM. The digital learning CCA/DRR platform/course can then add to these efforts to train those higher-grade students interested in pursuing careers in CCA/DDR related fields.

## **PROMOTE USE OF RESILIENT INFRASTRUCTURES**

The resilient techniques developed with CCAP support was well received by the government of Mozambique. Future activities should maximize on this political goodwill to support municipalities in enhancing promotion of the use resilient construction techniques. This should be in conjunction with support from national institutions and policies. Models developed through CCAP can be promoted in agreements with government and institutional partners with the resources and mandates, while capacity development for further adaptation and expansion continues at the community level.

# ANNEX A. MEASURING PERFORMANCE RESULTS

| Indicators   | LOP Total   | LOP Target  | % LOP                       | LOP Analyses   |
|--|-------------|-------------|-----------------------------|--|
| 1. Numerical score on UNISDR's Local Government Self-Assessment Tool (LGSAT) (Impact)  |             |             |                             | LOP target achieved.   |
| Pemba  |             | 2.2         |                             |  |
| Quelimane  |             | 2.3         |                             |  |
| Nacala   |             | 2.2         |                             |  |
| 2a. Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance (Outcome) [GCC EG 11-6]            | 1305        | 1100        | 119%                        | LOP target achieved.   |
| 3a. Number of laws, policies, regulations, or standards addressing climate change adaptation formally proposed, adopted, or implemented as supported by USG assistance (Output)* [GCC EG 11-3] | 19          | 20          | 95%                         |  |
| 4. Number of institutions with improved capacity to assess or address climate change risks supported by USG assistance (Outcome) [GCC EG 11-2]   | 30          | 35          | 86%                         |  |
| 5. Number of CCA or DRR tools, technologies and methodologies developed, tested and/or adopted (Outcome)   | 35          | 35          | 100%                        | LOP target achieved.   |
| 6. Amount of investment mobilized (in USD) for climate change adaptation as supported by USG assistance (Outcome) [GCC EG 11-4]  | \$5 069 045 | \$4 800 000 | 106%                        | LOP target achieved.   |
| 7a. Number of people trained in climate change adaptation supported by USG assistance (Output) [GCC EG 11.1]   | 2224        | 1800        | 124%                        | LOP target achieved.   |
| 8. Number of proposals submitted for CCA or DRR projects (Output)  | 9           | 10          | 90%                         |  |
| 9. Area (hectares) impacted by at least one CCA or DRR intervention implemented with citizen input per year (Outcome)  | 3569        | 3000        | 119%                        | LOP target achieved.   |
| 10a. Number of people supported by the USG to adapt to the effects of climate change (Output) [GCC EG 11-5]  | 3821        | 2500        | 153%                        | LOP target achieved.   |
| 11. Number of person-contact hours of information disseminated about climate change vulnerabilities and adaptive options (Output)  | 4 546 029   | 4 000 000   | 114%                        | LOP target achieved.   |
| 11a. Number of households reached by social and behaviour change communication (SBCC) activities that have adopted climate-smart best practices and adaptation strategies. (Output)            | 372         | 500         | 74%                         |  |
| 12. Proportion of CCA or DRR interventions implemented with community contributions (Outcome)  | 88%         | 50%         | Performance is 38% over LOP | Most activities implemented by CCAP during the reporting period involved local communities |
| 13. Proportion of individuals engaged in CCAP activities who are youth (Output)  | 29.2%       | 30%         | 97%                         | Approximately half of activities implemented by CCAP during the reporting period           |

| Indicators   | LOP Total | LOP Target | % LOP | LOP Analyses                       |
|--|-----------|------------|-------|------------------------------------|
|  |           |            |       | engaged youth (19 to 29 years old) |
| 14. Number of people with increased understanding of how to develop economic risk-management tools (Outcome) | 33        | 8          | 413%  | LOP target achieved.               |
| 15. Number of people who receive information about economic risk-management tools (Output)                   | 100       | 100        | 100%  | LOP target achieved.               |
| 16. Number of people who demonstrate increased capacity in financial management (Outcome)                    | 45        | 8          | 563%  | LOP target achieved.               |





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