



Beira, Mozambique //
Sub-Saharan Africa

Cities and Climate Change Project 3CP: Rio Chiveve and Green Urban Infrastructure Project

Country Information

Population

32.9 Million

(World Bank, 2022)

UNFCCC National Adaptation Plan

No

GINI

(Scale of 0-100)



(World Bank, 2019)

Intervention Information

~\$122 Million (USD)

Cost

2012-2020

Timeline

ND-GAIN Vulnerability Score

(Scale of 0-1)



(ND-GAIN, 2023)



Rationale for Selection

Cases were selected for review based on general screening criteria, including timeframe of intervention, location of implementation, and evidence-based outcomes, as available. This effort was highlighted for its integrative approach - implementing nature-based solutions for climate hazards, while taking into consideration the socio-economic context for sustainability.



Outcome Area(s)

Enhanced Flood Resilience and Coastal Protection, Strengthened Municipal Capacity



Funding Partner(s)

World Bank, Pilot Program for Climate Resilience, and KfW Development Bank (Green Urban Infrastructure) German Development Agency/Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)



Implementation Partner(s)

Administration for Water Sanitation and Infrastructure (AIAS), Municipality of Beira, Associação de Desenvolvimento Economico Local (ADEL), CHICO Construction (contractors), TPF Mocambique (construction consultant), CES / Inros Lackner (engineering consultant), Associação de Desenvolvimento Economico Local (ADEL), Associação de Activistas e Animadores (ASSANI), and Association for the Development of the Goto (ADEG)

Context of Intervention

In Africa, the impacts of climate change on coastal cities is often coupled with insufficient resources and capacity for essential services. This can include the lack of proper drainage systems, as well as poor sanitary sewage and trash management in informal settlements. Waste is dumped in open spaces and waterways, which contributes to flooding and public health challenges.¹

Mozambique illustrates the devastating impacts on coastal cities of rising sea levels, more intense and frequent storms, high intensity rainfall and other extreme weather events from climate change. With a coastline of approximately 1700 miles, Mozambique is one of the most exposed to coastal flooding in Africa and has experienced an increase in frequency and severity of flooding with significant damage to infrastructure, homes, and livelihoods. For example, in March 2019, Cyclone Idai struck Mozambique, causing catastrophic flooding and widespread destruction. The storm affected over 1.8 million people, with more than 600 deaths and an estimated \$2 billion USD in damages.² The city of Beira, Mozambique's fourth-largest city and second largest coastal city, was particularly hard hit. Beira, with over half a million inhabitants, is particularly vulnerable due to its low elevation, exposure to frequent extreme weather events, inadequate infrastructure, and high poverty rates. Much of the city was underwater after Cyclone Idai; this was due in part to the degradation of the Chiveve River ecosystem, which included the constriction of the river with waste thereby reducing its ability to mitigate floods. Accordingly, the Beira City Council and the Mayor made climate change adaptation one of the priorities of future urban development.³

Description of Intervention

The Green Urban Infrastructure project in Beira, Mozambique is a significant component of the Cities and Climate Change Project (3CP) convened by the German Development Bank (KfW) and financed by the World Bank. In Mozambique, the 3CP project's aim was originally developed with the primary goal of strengthening municipal capacity for sustainable urban infrastructure provision and environmental management that enhance resilience to climate related risks. This was later revised to include strengthening institutional capacity for local revenue enhancement and land use management in targeted municipalities, and to enhance climate resilience in the coastal cities of Beira and Maputo.⁴ The Chiveve River and Green Urban Infrastructure project in Beira focuses on a sustainable strategy to reduce the coastal city's susceptibility to climate-related flooding. It integrates both green and traditional gray infrastructure measures in a community-engaged approach, addressing key physical climate vulnerabilities.

For the gray infrastructure, the project incorporates a controllable tidal outlet to shield the city from spring tides, storm surges, and heavy rainfall while preserving the river's natural flow. The green infrastructure investments aim at revitalizing the degraded Chiveve River into a vibrant urban park. A significant component of this project is the restoration of the Chiveve River and its native vegetation, a 3.5 km tidal waterway that flows through the heart of Beira, stretching from the fishing port to the southeastern low-income neighborhoods. While a nature-based solution, it has also spurred socio-economic benefits by constructing pedestrian routes, event venues, a local market, and other community areas.⁴

The Green Urban Infrastructure project invested in local partnerships for implementation. This included those for mangrove restoration, river clean-ups, waste-control/sanitation, and public health and environmental education. Through the leadership of the Beira City Council in cooperation with the German development agency (GIZ), the project partnered with local groups such as Associação de Desenvolvimento Economico Local (ADEL), Associação de Activistas e Animadores (ASSANI), and Association for the Development of the Goto (ADEG). ADEL is one of the main local NGOs working with mangrove reforestation in and around Beira; ASSANI is a local organizing NGO and was involved in solid waste collection for the Chiveve's surrounding areas (solid waste collection) and does awareness campaigns for public sanitation. ADEG, is a private sector company involved in river clean-ups and waste-collection for informal settlements. The initiative embedded educational campaigns from the local partners about public health, flood protection, and urban resilience to raise awareness and participate in clean up efforts.⁵ CHICO Construction also facilitated several community dialogues which involved the main project partners including the GIZ, KfW, Administration for Water Sanitation and Infrastructure (AIAS) and the Beira City Council.⁶ This engagement increased the project's relevance and the likelihood of sustainability.

The Green Urban Infrastructure project further expands these investments, creating the multi-functional 17-hectare Rio Chiveve Park along the river. The project design included the creation of a financially autonomous park management entity to generate revenue for reinvestment and maintenance – this included legal set up, staffing, business planning, and administrative structures for operations and management. The park itself is a source of community pride, with the expansion of public spaces, new pedestrian routes, event venues, a local market, kiosks, and other community areas. It received nearly 400,000 visits as of December 2022 since its opening in mid-2021.⁷ As hoped, the over 42 commercial facilities that includes cafes, shops, event spaces, and markets have generated revenue; this is managed by the independent park management entity, the Chiveve River Municipal Company (EMRICH) and reinvested into the park.⁵ The city has committed to ongoing promotion, with an aim to attract further economic development and leverage the new infrastructure to increase revenue generation.

Intervention Funding

The Chiveve Rio and Green Urban Infrastructure project was jointly funded by the World Bank through the Cities and Climate Change Project (3CP) under the Climate Investment Funds' (CIF) Pilot Program for Climate Resilience (PPCR) and the German Federal Ministry for Economic Cooperation and Development (BMZ) through the German Development Bank (KfW) with \$12.3 million USD.⁴ Germany is a major donor to the International Climate Initiative (IKI), which aims to support developing countries in adapting to the impacts of climate change and promoting low-carbon development pathways. The Chiveve Rio/ Green Urban Infrastructure project aligns with Germany's objectives of climate-resilient development and to promote nature-based solutions to climate change adaptation and mitigation, as it incorporates a range of interventions such as mangrove restoration and green urban infrastructure.

Outcomes from the Intervention and Dissemination

As an integrated approach, the Chiveve River Rehabilitation Project is more likely to show sustained outcomes. Critical for such initiatives is the quality of meaningful engagement and support from local residents in affected geographies, as they are more likely to address both ecological and socioeconomic issues associated with climate change.

Enhanced Flood Resilience and Coastal Protection

The project's gray and green infrastructure investments, including upgrading drainage systems, constructing retention basins, and reinforcing coastal areas, have significantly reduced Beira's flood risk, increasing the protection of lives and properties.⁵ The restoration of mangrove forests along Beira's coastline has bolstered the city's defenses against erosion and storm surges, supporting the local coastal ecosystem and biodiversity. Before the project, the river area was used as a dump site for residential and fecal waste, now a 17-hectare urban green park now provides enhanced flood protection in addition to the benefits from the enhanced drainage system. Notably, during Cyclone Freddy in March 2023, Beira experienced considerably lower levels of flooding. Residents of Beira also reported that flooding was less heavy after Cyclone Idai in 2019 which was the biggest cyclone to hit the African continent.⁶ The World Bank also estimates that flood damage in the target area was reduced by \$9 million USD as a result of the investments.⁶

Socio-Economic Benefits and Sustainability

More than half a million people were provided with improved living conditions, about half of which were women.⁶ This includes not only flood protection, but public health improvements impacted by waste management. Furthermore, the infrastructure developments have been linked to a marked decrease in crime, contributing to the overall quality of life for urban residents. Finally, the project design included a model for sustained economic investments in maintenance; this is through the creation of a park management entity (EMRICH), which has financial autonomy to generate revenue from retail rentals that can be reinvested back into the park. The park provides the social benefits of increased access to green spaces and recreational opportunities.

Strengthened Local Capacity and Collaboration

The 3CP project strengthened the Beira City Council's ability to plan and execute climate change adaptation strategies; this may seed further efforts and policies supporting climate risk reduction. The project also cultivated collaboration across a wide range of stakeholders, building capacity for and integration of climate change adaptation across local and international actors. This has involved cooperative agreements with the municipality, GIZ, ADEL, and ADEG.

Scaling and Replicability

The World Bank, encouraged by the project's success, has supported research on lessons learned. This documentation is guiding preliminary studies for further investments under the Cyclone Idai and Kenneth Emergency Recovery and Resilience Project (CERRP)⁵, influencing the execution of similar initiatives in other cities. The rehabilitation of the Chiveve River represents a crucial aspect of the 3CP project, offering a practical model for mitigating the flooding impacts of climate change. The project highlights the viability of an integrated approach to climate resilience and a replicable model for other cities.



Considerations

Social Equity and Sustainability

The sustainability of Green Urban Infrastructure initiatives is greatly increased if accepted and respected by the public. They need strong, locally-led community engagement and knowledge, particularly within the populations that might be displaced by the project. Comprehensive strategies and social infrastructure to work with these communities during the feasibility phase and throughout the project are more likely to result in sustainable, equitable solutions. This allows for details of impacts to their livelihoods to be thought through and addressed.⁹ In cases of resettlement, this approach would also allow for proactive measures regarding the local distribution of benefits of international investment, including long-term economic income generation. Project visibility campaigns have also proven useful to ensure large public support. Such an inclusive approach ensures that development initiatives remain sensitive to the needs of all stakeholders and contribute to overall social equity.

Government and Partner Capacity

A common challenge in data scarce regions is the availability of data – this was true during all planning stages of this project. Nonetheless, even for areas where there was data collected for a previous project, the data can be processed, stored, or managed in a way that make it unavailable for future projects.⁵ For example, the reference elevation datum for the different datasets was initially unclear and differed from project to project; this showed the importance of building capacity for documentation and data compatibility. Relatedly, increasing local capacity for environmental monitoring and analysis (precipitation, water levels, intensity) is important for understanding project outcomes and future initiatives. Especially in an urban context, post-intervention management (access, maintenance, security) often requires funding and expertise; this should be integrated into the early planning.

Financial Investment and Sustainability

Early coordination of different investors and their interests is important to developing integrated and impactful projects. Operation and maintenance (O&M) is the key to the lasting success of green infrastructure projects. A plan for funding to cover O&M costs in the short to long term is critical.

Nature Based Solutions

Unlike conventional engineering projects, nature based solutions (NbS) have more unpredictability in practices and outcomes. Engagement and clear communication regarding the NbS objectives in early planning stages will help to reduce conflict along decision-points and subjective preferences. Teams that reflect the engineering, environmental, and social expertise of the context should guide the planning phase.

Citations

- ¹ Dickenson, E. (2020). Strengthening Resilience in Tanzania through Creative Public Engagement.
- ² ReliefWeb. Mozambique: Tropical Cyclones Idai and Kenneth - Emergency Appeal n° MDRMZ014, Final Report - Mozambique
- ³ World Bank (2020). "Upscaling Nature-Based Flood Protection in Mozambique's Cities: Lessons Learnt from Beira."
- ⁴ M. Shkaratan (2020). "Implementation Completion Report (ICR) Review: Mz Cities and Climate Change PPCR AF (P146059)." World Bank.
- ⁵ World Bank (2020). "Upscaling Nature-Based Flood Protection in Mozambique's Cities: Lessons Learnt from Beira."
- ⁶ World Bank News. "Building Resilience Through Green-Gray Infrastructure: Lessons from Beira."
- ⁷ Club of Mozambique. "Two years after its inauguration, Rio Chiveve Park remains Beira's shield against climate change"
- ⁸ Implementation Completion and Results Report, Cities and Climate Change Project for the Republic of Mozambique (2021).
- ⁹ Möhl, S. A (2021). Vulnerable Mozambican City Builds Green after Disaster. In. Germany: Die Welt.

