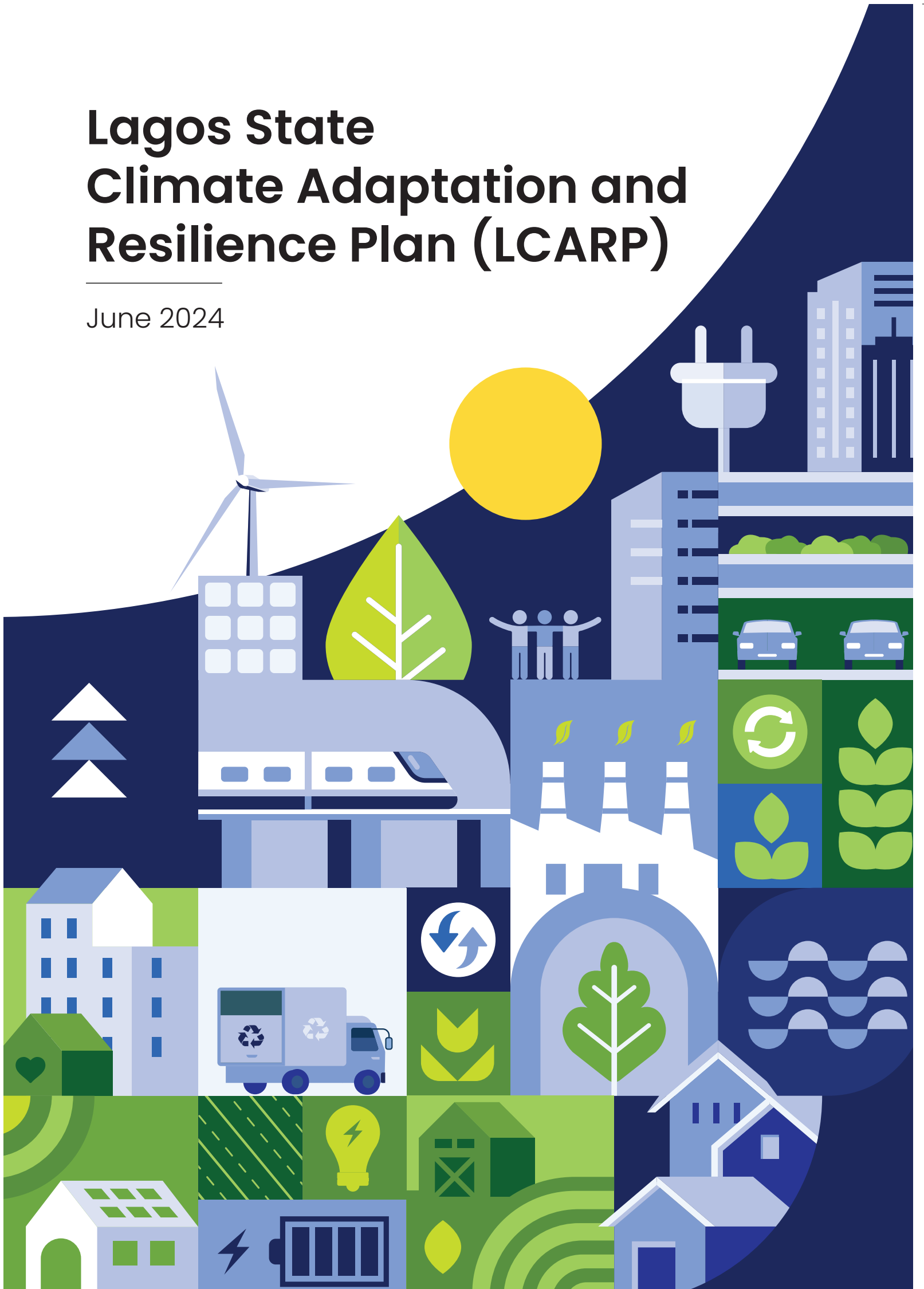


Lagos State Climate Adaptation and Resilience Plan (LCARP)

June 2024



Ministry of Environment and Water Resources

Lagos State Climate Adaptation and Resilience Plan (LCARP)

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Published by: Ministry of Environment and Water Resources

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First Published: 2024

Version as of June 2024

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106 pages; 28 x 30 cm

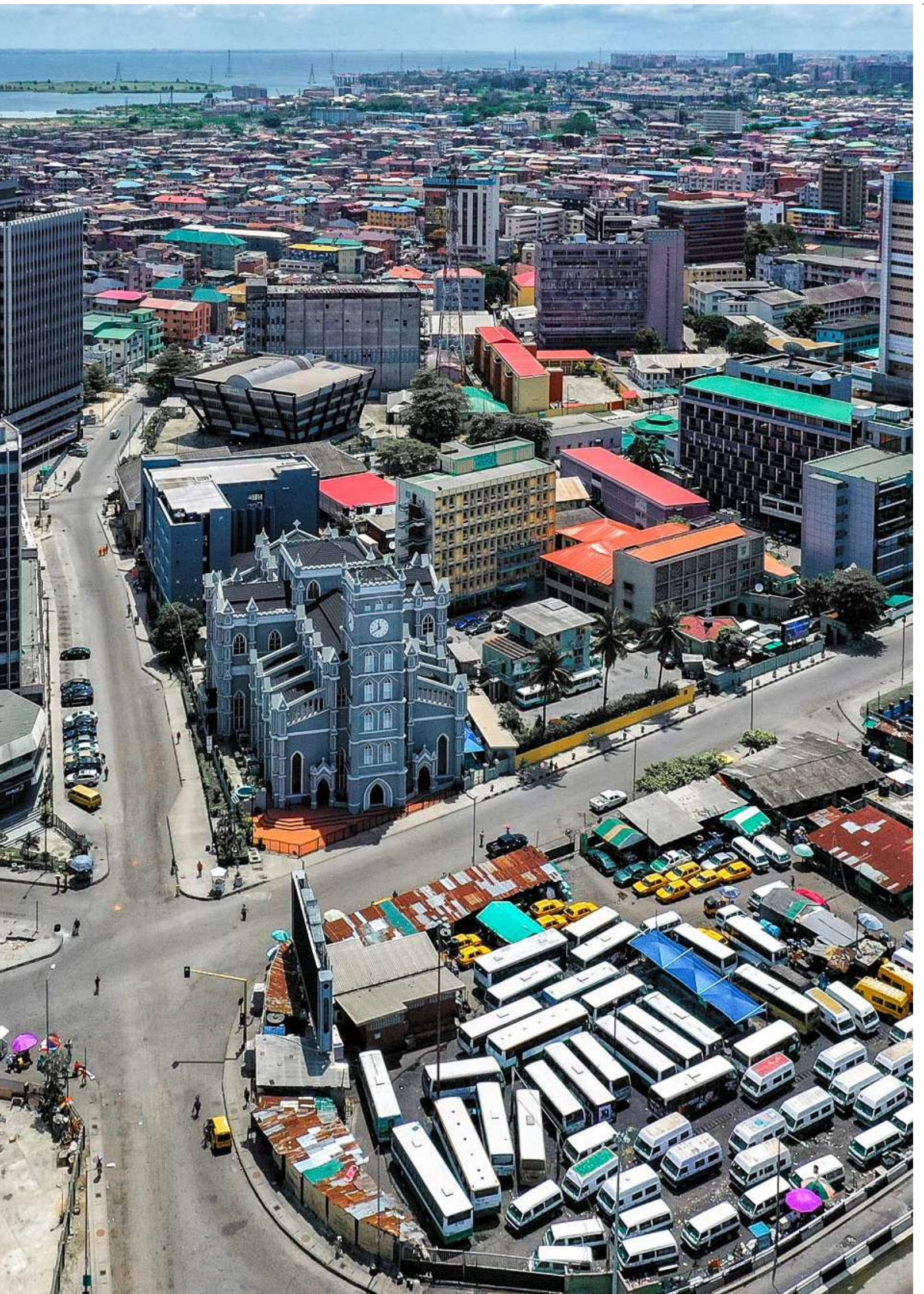


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Preface



GOVERNOR'S STATEMENT

In our rapidly evolving world, cities stand at the forefront of defining the future, not only for their residents but for entire nations. Lagos, the heartbeat of Nigeria, is no exception. As we navigate the global urgency of the climate crisis, it becomes paramount to recognize our city's distinct challenges and opportunities.

Today, Lagos grapples with the tangible realities of climate change. Rising sea levels, extreme rainfall, and unprecedented heatwaves are not mere predictions but daily challenges that threaten our infrastructure, economy, and the very fabric of our society. Yet, it is in these challenges that I see immense potential for Lagos to rise as a beacon of resilience and ingenuity.

I am proud to introduce the Lagos Climate Adaptation and Resilience Plan (LCARP). This initiative is not just a reaction to our current circumstances but a vision for the Lagos we aspire to build - a city that leads Africa's response to climate change and sets an example for urban resilience worldwide.

Through the LCARP, we are embarking on transformative projects that resonate with our global climate commitments. From our transport reforms to our waste management and green initiatives, we are turning words into action.

But our journey is not solitary. As we progress with the LCARP, international collaboration and partnerships will be instrumental in amplifying our efforts. With clearly defined projects on the horizon, the time for collective action and support is now.

I am not just optimistic, but confident in our path ahead. I believe that together, with unwavering commitment, innovative strategies, and strategic partnerships, we can shape a future for Lagos that is not only resilient but also thriving and sustainable. Let us embrace this moment and propel Lagos to its rightful position as Africa's Model Mega City through climate action.

Babajide Sanwo-Olu
Executive Governor
Lagos State, Nigeria



COMMISSIONER'S STATEMENT

Lagos, a city renowned for its vitality and dynamism, stands at a crossroads. Our unique location as a coastal city combined with the low-lying geography means that the challenges of climate change are not distant speculations, but immediate and pressing realities that affect our very way of life.

It gives me immense pride to introduce the Lagos Climate Adaptation and Resilience Plan (LCARP). This document encapsulates our strategic response to the global climate crisis. Having successfully

developed this plan, we are on track to drive implementation and ensure the long-term resilience of Lagos.

This plan is not a solitary effort of the government; it is a collective call to action. The LCARP serves as our blueprint, outlining significant interventions around building resilient infrastructure; ensuring resilient communities, and protecting vulnerable groups; anticipating risk, and building crisis response.

LCARP has laid the groundwork for over 30 pivotal projects, spanning essential sectors from waste & water management, health, to transportation. We recognize the potential for collaboration, with 14 of these projects being strong candidates for private sector engagement, reinforcing our commitment to incorporate all stakeholders and establish Lagos as the reference of urban sustainability in Africa.

Our aspirations are vast, and we aim to secure investments of around ~\$9 billion by 2035. This is not merely a financial target but a testament to our unwavering commitment to the well-being of millions and our ambition to position Lagos as a torchbearer of progress and resilience.

I invite you, our partners, stakeholders, and the global community, to engage with this plan and join us in our mission. Together, we can craft a future for Lagos and Nigeria that is not only resilient but also prosperous and sustainable for generations to come.

Tokunbo Wahab

Honourable Commissioner

Ministry of Environment and Water Resources

Lagos State, Nigeria



FSD AFRICA CEO'S STATEMENT

In an era where climate change presents unparalleled challenges to our global community, the role of visionary leadership and collaborative action has never been more critical. FSD Africa, at its core, is committed to fostering sustainable development and resilience on the African continent in the face of these challenges. We are thus proud to join the Lagos State Government in launching the next stage of the Lagos Climate Adaptation and Resilience Plan (LCARP) and to be a key partner of this transformative initiative, as it represents a significant milestone in our journey towards a sustainable future.

Lagos, Africa's most populous city, confronts formidable climate-related risks that threaten its infrastructure, economy, and the well-being of its residents. Yet, it is within this context that Lagos

emerges as a symbol of hope and a testbed for innovative solutions. The LCARP is not merely a plan, but a bold declaration of intent to pave the way for a resilient and sustainable urban future.

FSD Africa's involvement in the LCARP reflects our belief that effective climate adaptation and resilience strategies require robust partnerships and investment. In particular, public-private partnerships play a pivotal role in creating the right risk-sharing in adaptation so that the financial and technical capacity of the private sector is leveraged. Our support for this plan underscores our confidence in Lagos's potential to lead by example in this regard, showcasing how urban centres can attract the necessary investment to adapt and thrive amidst the complexities of climate change.

As we look towards the implementation phase, FSD Africa is dedicated to fostering partnerships that will bring the LCARP's vision to life. With an investment target of around \$9 billion by 2035, our ambition transcends financial contributions; it is about building a legacy of resilience, innovation, and sustainable development.

To our partners, stakeholders, and the global community, we warmly encourage you to join us in this critical mission. The LCARP is more than a plan for Lagos; it is a blueprint for the future of urban resilience in Africa and beyond. Together, we can transform challenges into opportunities, ensuring a prosperous, sustainable, and resilient future for Lagos, Nigeria, and the African continent at large.

Mark Napier

Chief Executive Officer

FSD Africa

The Approach to Developing the Lagos Climate Adaptation and Resilience Plan (LCARP)

The LCARP was developed as part of an ongoing five step journey to resilience, as illustrated in the figure below. Lagos state has successfully conducted the first three steps and is now seeking to raise funds for our high-priority initiatives. See details on first three steps below:

Baseline and Risk Assessment: The journey began with baselining the state’s effort towards climate change and assessing climate risks in the state. In this phase, a data-driven climate analytics model was utilized to evaluate the impact of various climate risks faced by the state. Analyzing the impact of these risks across social, economic, and natural factors, the model estimated the cost at stake if the problem of climate change is left unaddressed. The model relies on several data sources, including various open source and proprietary data, satellite records, climate projections, regional climate change studies, historical climate change records, and Climate risk data repository from NASA, IPCC, Open Street Maps, and standard data science algorithms etc.

Adaptation Projects Portfolio: This phase involved identifying a portfolio of localized projects designed to mitigate the effects of climate change and safeguard vulnerable populations. Projects were identified from a list of existing initiatives identified by ministries departments and agencies of the state and from proven climate solutions in other countries and cities. To advance key projects towards implementation, concept notes and appraisal studies were conducted. Additionally

detailed pre-feasibility studies were developed for the top two projects that were considered attractive to potential investors.

Financing Strategy and Enabling factors: The next step of the journey developed a financing play book to support the state’s ability to fund the implementation of projects identified. The play book featured a series of benchmarking and comparison globally and in Africa to identify the ideal mix of financing mechanism and potential funders or funding sources that the state should leverage. It subsequently links projects across various stages of a project lifecycle to different financing mechanism. Additionally, policy and governance structures were identified as two key enablers supporting the financing strategy and implementation of the projects. To identify recommended initiatives, the state’s adaptation policies and governance structure were benchmarked with best in class cities and cities with similar contexts. The recommended policy and governance initiatives were then localized to suit the context of Lagos state. Altogether, LCARP identified several initiatives for the state to implement across projects, financing, policy, and governance structure.

The overall approach to developing LCARP has been innovative, comprehensive, and inclusive, ensuring consultations and discussions with topic experts and relevant stakeholders including, Lagos state Ministries, Departments and Agencies (MDAs) e.g., the office of the Governor of Lagos State, Ministry of Environment and Water Resources, Ministry

Figure 1: LCARP five (5) step journey towards resilience



Lagos State Climate Adaptation and Resilience Plan (LCARP)

of Economic Planning and Budget, Lagos State Resilience Office, Ministry of Health, Lagos Waste Management Authority, Lagos Water Corporation, Lagos Wastewater Management Office. Other stakeholders consulted including over 30 potential investors and experts including technical firms, private funding partners, and development organizations. LCARP also captures and builds on insights and perspectives from diverse database including Lagos state propriety database and plans (Lagos Climate Action Plan, Lagos State Climate Risk Assessment, Lagos Resilience Strategy, and National

Adaptation Framework) and External database and analyst reports (CPI – Global Landscape of Climate Finance reports (2021); IMF – Closing the Gap: Concessional Climate Finance and Sub-Saharan Africa (2023); OECD DAC External Development Finance Statistics (2022); C40 cities Climate Action Plan; Climate Funds Update (2022); UNFCCC Mapping Climate Finance Flows ECOWAS (2020); AFDB Analysis of adaptation components of Africa’s NDCs, 2019; ND-GAIN index (2023); Safeguarding Coastal Cities from Climate Change, BCG (2023), etc.)

Executive Summary

Lagos State¹ is a pivotal economic hub in Nigeria, contributing a remarkable ~30% to Nigeria's GDP. It is also one of the most densely populated cities on the African continent, occupying just 0.4% of Nigeria's landmass while being home to over 27 million people². Moreover, like most of Africa, Lagos is highly susceptible to climate change impacts but is not equipped to handle its repercussions. Lagos is vulnerable to three Climate Impact Drivers (CIDs): sea level rise, extreme rainfall, and extreme heat, the effects of these are heightened by its dense population and urbanization. These hazards pose substantial threats to the livelihoods, assets, and infrastructure of its urban populace, particularly affecting the less affluent and most vulnerable segments of the population.

Leveraging advanced climate analytics, it was identified that Lagos faces a projected increase in sea levels of up to 3 meters by 2050, temperature rises of +1°C, and up to 4 meters of flooding due to extreme rainfall. Combined, the cost of inaction for these three climate risks is approximately just under \$40 billion by 2050, impacting physical, social, and economic systems.³ Specifically, over 1.4 million people in the city face direct risk from flooding. These floods also threaten critical social infrastructures like transportation, healthcare, and education, with over 500 educational centers and potential disruptions impacting 42,000 patients. Economically, the city could suffer significant infrastructure damage estimated at \$5 billion, with an additional \$6 billion to relocate vulnerable population and a projected GDP loss of \$17 billion annually due to disruptions from inundation. The natural environment is also at risk, with projections indicating that 165 km² across 14 Local Government Areas could be inundated, threatening 82% of wetlands and leading to significant biodiversity losses. Given these findings, there is an urgent environmental, social, and economic need to act against the impact of climate change.

To address the effects of these Climate Impact Drivers, a ~\$9 billion project portfolio was developed. The portfolio includes 33 adaptation projects aimed at building resilient infrastructure and public spaces;

ensuring resilient communities and protecting vulnerable groups; and improving response to crisis. One notable project identified for the state is to build a waste-to-energy plant due to the state's escalating waste management issues which exacerbates flooding during extreme weather events. In Lagos today, there are two major landfill handling 79% of collected waste, however, these landfills are approaching end of life. Additionally, the state also faces low waste collection, uncontrolled dumping, and improper disposal of waste. These issues results in blocked drainages, which overflow during flooding or heavy rainfall hence worsening the effects on the city. Building waste to energy plants facilitates improved waste collection, reduce required land for landfills and enable generation of electricity to offset the current inadequate electricity supply in the city. Other examples of projects include building sewage treatment plants, rehabilitating old and constructing new critical transport links (highway and waterways), and reinforcement of coastal embankments. Moreover, two key projects (Building a waste to Energy plant and Wastewater treatment plant) have been advanced to a detailed prefeasibility stage.

In a bid to drive these projects to execution, LCARP is set to mobilize funding through a dynamic blend of financing mechanisms. These mechanism include debt and equity (like green bonds), blended finance in Public-Private Partnerships, grants, and innovative nature-based and disaster risk financing. Potential funders span multilateral and bilateral organizations, specialized climate funds, impact investors, commercial investors, and reflect a comprehensive approach to attract a diverse pool of investment. This mix of financing mechanism and funders aims to optimize funding for a variety of projects within LCARP, from bankable, high-return initiatives to essential grant-funded climate adaptation efforts. LCARP aims to mobilize \$700 million – \$1.3 billion annually to fund the projects across project lifecycle from pre-implementation planning to implementation. This sums up to a financing ambition of \$9 – \$16 billion in adaptation and resilience financing for the city of Lagos by 2035.

1. Also referred to as 'Lagos,' 'the State,' or 'the city' in this report

2. Lagos state macroeconomic indicators 2021

3. Estimated from the climate analytics model, accounting for damaged assets, GDP losses as well as relocation costs for permanently displaced Lagosians.

To create an enabling environment for financing and project implementation, the state will establish appropriate policies and governance structure. The LCARP outlines initiatives aimed at bolstering the policy framework, focusing on specific sectors. For instance, to successfully implement the waste-to-energy project, relevant waste management policies will be implemented. This includes adopting a central waste collection system, employing digital tracking and reporting of Private Sector Participants (PSP) coverage areas and daily tonnage, mandating the reduction of waste going to landfills, and implementing the separation of recyclables and organic waste (compostables) at the source. Other sector specific policies are water quality management, post-disaster emergency response, and early-stage project preparation. Furthermore, LCARP identifies opportunities to strengthen climate governance, including enhanced accountability

across ministries, departments, and agencies (MDAs), clear definition of roles and responsibilities, and improved collaboration.

LCARP not only addresses the long-term needs of Lagos in the face of climate change but also sets forth actionable next steps. It encompasses a wide range of initiatives, all aimed at transforming Lagos into a resilient, sustainable, and economically vibrant city. LCARP has defined 17 tactical initiatives, each crafted to address the pressing challenges of building resilience. As a part of this, the state will embark on an investment acceleration effort that seeks to actively pursue and secure the necessary financing to fund the implementation and construction of these projects, thus driving the city closer towards its goal of being a Climate forward city.



Chapter 1



Lagos Context

Global Climate Change Context for Lagos

Efforts towards mitigation are increasingly proving to be inadequate – Lagos finds itself at a critical juncture. Despite Nigeria’s and, by extension, Lagos’s minor role in contributing to global greenhouse gas emissions, the city faces a disproportionate share of climate-related risks and challenges.

The global climate scenario is rapidly evolving, with surface temperatures soaring beyond historical records. This trend, coupled with the dimming prospect of limiting global warming to 1.5°C above pre-industrial levels⁴, places coastal cities like Lagos in a precarious position.

For Lagos, the reality of climate change manifests in three primary threats⁵: the rise in sea levels, extreme heat, and extreme rainfall. These challenges are not just environmental but also social and economic, impacting everything from public health to local industries. The city’s dense population and high urbanization rate exacerbate the strain on infrastructure and resources,

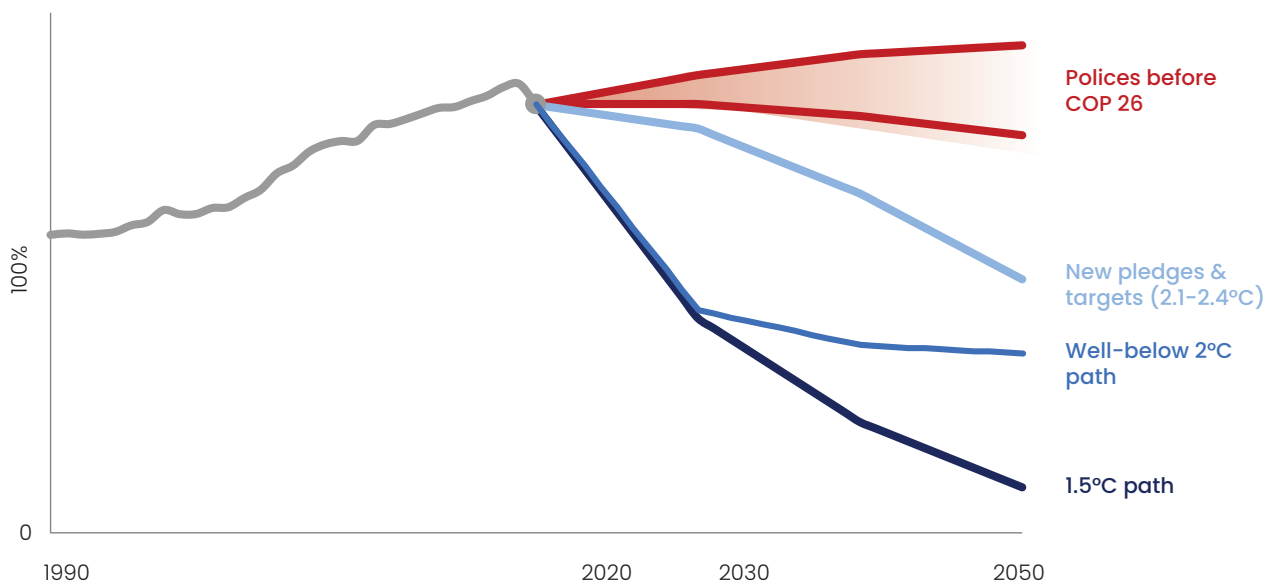
which amplifies these vulnerabilities, thus making the consequences of climate change an urgent concern. The marked increase in the number of climate events compared to the last decade, indicates that this trend is expected to worsen.

Compounding this challenge is the global disparity in climate change responses⁶. Developing regions like Lagos often face a steeper climb in building resilience due to gaps in policy, and access to finance. The estimated global funding gap for adaptation and resilience, estimated at \$90-\$250bn annually⁷, underscores the magnitude of this challenge.

The city cannot afford to solely rely on global mitigation efforts, which are lagging the required pace to avert catastrophic climate impacts. Instead, it needs to chart a course in building resilience as well. The city must proactively build its resilience to not only safeguard its present but also to secure its future. This is a path that requires innovation, collaboration, a clear plan, and a deep commitment to sustainable development, ensuring that Lagos not only survives but thrives in the face of climate change.

Figure 2: Global GHG emissions trajectory confirming the urgency of adaptation action

Greenhouse gas emissions, globally



Source: IEA, Climate action tracker, NASA’s Goddard Institute for Space Studies

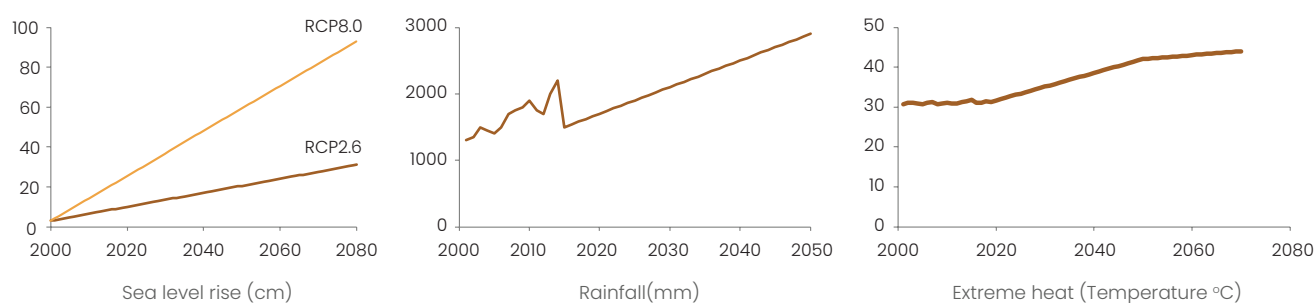
- Source: IEA, Climate action tracker, NASA’s Goddard Institute for Space Studies, EDGAR 5.0, FAO, PRIMAP-hist v2.1, Global Carbon Project, IPCC, UNEP Emissions Gap Report, WRI, Nature (May 2020)
- Globally several threats exist including drought, landslides, cyclones, sea-level rise, etc., however Lagos is primarily exposed to three: sea-level rise, extreme heat, and extreme rainfall
- Source: Brookings, International Monetary Fund (IMF)
- Adaptation Gap Report 2022

Vulnerability of Lagos – Impact of Key Climate Impact Drivers

The city’s vulnerability is multifaceted and linked to the three main climatic impact drivers (CIDs).

- **Sea Level Rise (SLR):** Lagos is witnessing an alarming rise in sea level. Current projections indicate that the sea level could rise between 31cm (under RCP⁸2.6 scenarios) to a staggering 93cm (under RCP8.0 scenarios) by the year 2080⁹. This significant rise would have a profound impact on coastal areas with up to 3m SLR by 2050, potentially displacing communities, and damaging vital infrastructure.
- **Extreme Rainfall (ER):** Cases of extreme rainfall are increasing in frequency over time. Predictions suggest that precipitation in Nigeria could increase by about 40mm per year. Such extreme rainfall not only disrupts daily life but also increases the risk of flash floods, particularly in low-lying areas.
- **Extreme Heat (EH):** The city is also grappling with rising temperatures. By the end of this century, Lagosians could experience an additional ~25 days¹⁰ of severe heat annually. Temperatures are projected to soar, reaching 42°C by 2030, 44°C by 2050, and an overwhelming 46°C by 2070¹¹. Such intense heatwaves can have severe health implications on residents- as high as 10 in 100,000 deaths expected.

Figure 3: Trend lines showing projections in seas level rise, extreme rainfall and extreme heat¹²



Source: Temporal Analysis Of The Present And Future Climate Of The Lagos Coastal Environment (2019)

Moreover, the impacts of these 3 climate impact drivers pose significant challenges to Lagos’s social, economic, and natural systems.

- **Social Impact:** Defined as the effect on the community and its individuals, 29.4% of Lagos’s population is considered poor¹³, making them especially vulnerable to the adverse effects of climate change. People living below the poverty line are more vulnerable to climate risks due to their often-precarious living conditions in geographically hazardous areas, the absence of resilient infrastructure, and limited access to information and resources. This heightened exposure is compounded by their economic reliance on climate-sensitive sectors such as
- **Economic Impact:** Referring to the influence on the city’s producing sectors (e.g., financial and industrial sectors), Lagos faces a potential 6–30% loss in the city’s GDP by 2050. The city’s infrastructure is under threat, with ~7,000 assets exposed to climatic risks. Out of these, 6,500 are classified as highly vulnerable,¹⁴ representing an estimated value of \$17.4 billion. The tourism, leisure, and entertainment sectors, projected to contribute 5–6%¹⁵ of the city’s GDP, also stand at risk due to the potential damage to coastal zones.

8. Representative Concentration Pathways - climate change scenarios used to project future levels of greenhouse gas concentrations
 9. Lagos state Climate Risk Assessment
 10. Additional days of severe heat may range from 8–55 days.
 11. Temperature figures refer to peak temperature for respective years.
 12. Source: Lagos state Climate Risk Assessment 2021, Temporal Analysis Of The Present And Future Climate Of The Lagos Coastal Environment (2019), IPCC
 13. Nigeria multidimensional poverty index (2022)
 14. At Risk of severe physical damages from climate change
 15. Publicly stated target at the Groundbreaking Ceremony for the Lagos Film City at Ejirin, Epe Local Government Area

- **Natural Impact:** This relates to the effects on ecosystems and biodiversity. The city's water bodies and wetlands¹⁶, which cover over 40% of the state area, are at risk from rising sea levels and pollution. There is also potential for significant biodiversity loss and a decline in ecosystem services due to climate events. Loss of 82% of wetlands and endangerment of species due to inundation, saline water intrusion and coastal erosion contribute to biodiversity losses.

Projected impacts from the identified key climate drivers underscore the urgent need for a comprehensive resilience and adaptation strategy for Lagos. As the city continues to grow and evolve, addressing these vulnerabilities becomes paramount to safeguard its people, protect its economy, and preserve natural resources.

Climate Urgency in Lagos

Lagos is an economic powerhouse

Lagos's economic importance in the Nigerian context cannot be overemphasized. The city's

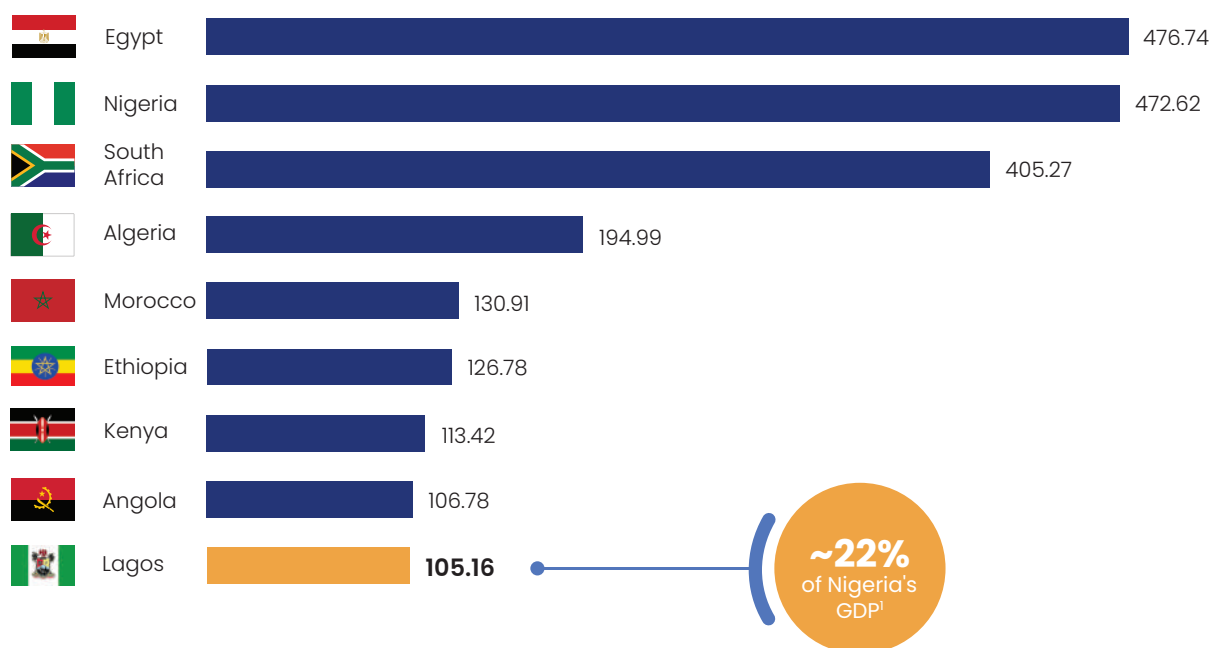
bustling ports, financial centres, commercial zones, and industrial zones collectively paint a picture of relentless economic activity. With a Gross Domestic Product (GDP) of over \$100 Billion, Lagos contributes a staggering 22% to Nigeria's GDP and ranks as the 9th largest economy in Africa. This is a testament to its status as a commercial hub in Africa, attracting investments and fostering industries across major sectors.

Lagos has a dynamic and growing population

Beyond its economic significance, Lagos is a melting pot of cultures and ethnicities, with over 27 million people¹⁸ calling the city home. Moreover, the state is also the most densely populated state in Nigeria (Figure 5). Its population is projected to surpass 32 million by 2050 as migration continues to rise from other states and West African countries. The increasing population density will continue to present new challenges in the form of increased pressures on infrastructure and services.

Figure 4: GDP of the largest African countries (by size of economy) in 2022, including Lagos State¹⁷

Biggest economies in Africa by GDP (\$bn)



¹Country figures as obtained from World Bank National Accounts Data and OECD National Accounts Data Files for 2022.

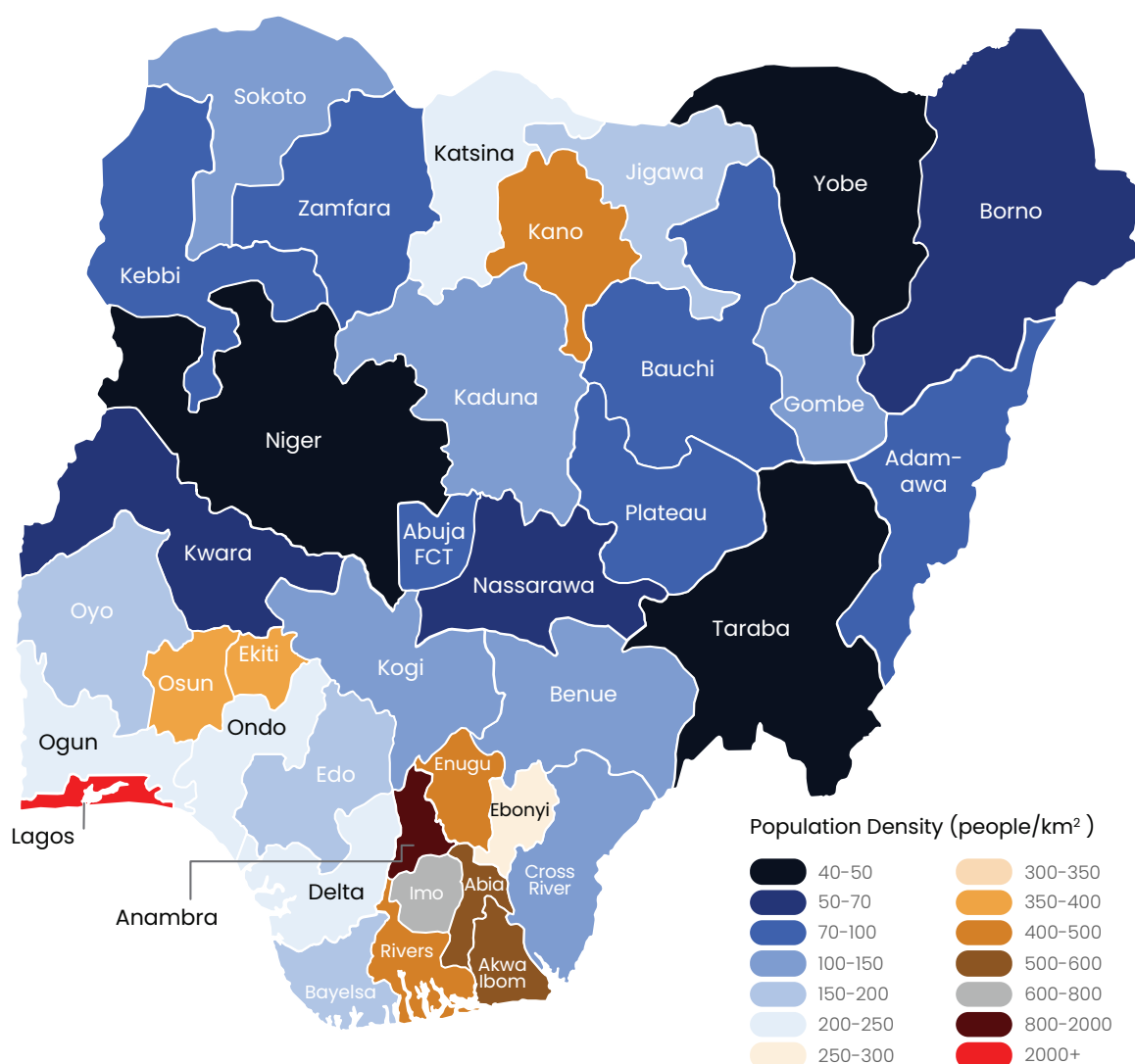
¹ Lagos' figures estimated based on BudGit report 'State of States' on the GDP of Lagos as of 2021 (\$102bn) and National Bureau of Statistics' report on Nigeria's growth rate as of 2022 (3.10%).

¹⁶ Wetlands are crucial for maintaining ecological balance, providing natural water filtration, reducing flood risks, and supporting biodiversity.

¹⁷ Country figures as obtained from World Bank National Accounts Data and OECD National Accounts Data Files for 2022. Lagos' figures estimated based on BudGit report 'State of States' on the GDP of Lagos as of 2021 (\$102bn) and National Bureau of Statistics' report on Nigeria's growth rate as of 2022 (3.10%).

¹⁸ 2023 estimate based on LASG office of the SDGs data: ~21million in 2015, applying a population growth rate of 3.2%

Figure 5: Population density distribution in Nigeria



As a coastal city with inland waterways, its maritime advantages are a double-edged sword

Lagos’s location strategically positions it to lead international trade by serving as a gateway to Nigeria and the West African region. Lagos is home to the strategically located Apapa port, which is one of Africa’s largest ports and the fourth busiest port on the continent, as well as the recently developed Lekki deep seaports – a project that further underlines its advantages as a coastal city. 75% of Nigeria’s imports pass through Lagos ports and approximately 50% of cargo movements in the North and Central African sub - region pass through the state’s borders.

The city’s network of inland waterways further enhances its geographical significance. These waterways are currently being developed to

become major conduits for local transportation. In the future, these waterways will play a pivotal role in commercial activities, impacting logistics and trade sectors crucial to the city’s and, by extension, the country’s economy.

However, this coastal advantage comes with its share of challenges. Issues such as coastal erosion and flooding are constant threats and are exacerbated by climate change. It is projected that sea levels will increase by up to 3 meters by 2050, and potentially up to 4 meters when there are instances of extreme rainfall. Low-lying topography, continued land subsidence (less than 2 meters above sea level), and urban development pressures serve to exacerbate these challenges. These issues are projected to result in economic vulnerabilities¹⁹

19. Bongarts Lebbe, T., Beguin Billecocq, I., Vegh, T., & Sarkozy-Banoczy, S. (2022) Investment Protocol: Unlocking Financial Flows for Coastal Cities Adaptation to Climate Change and Resilience Building

affecting port operations and other ocean-based activities including transportation, imports, etc.

The Need for LCARP – Why Previous Actions Are Limited

Recognizing the threat posed by climate change, Nigeria and Lagos have initiated several climate action plans and strategies. Notable among these are the Lagos Climate Action Plan, Lagos State Climate Risk Assessment, Lagos Resilience Strategy, and National Adaptation Framework.

Lagos Climate Action Plan (CAP)

The Lagos Climate Action Plan (CAP) is a critical document designed to address climate change challenges in Lagos State. It was developed through thorough research and data collection by state officials, in collaboration with C40 Cities and international experts. This plan is a result of Lagos State's commitment to the C40 Cities Deadline 2020 initiative and is in line with the Paris Agreement's objective to achieve a carbon-neutral Lagos by 2050. The CAP identifies the primary sources of greenhouse gas emissions in the state as the energy, waste, and transport sectors. It presents ambitious plans to reduce emissions, including comprehensive strategies for mitigating climate impacts and bolstering resilience. The plan envisions transforming Lagos into a state that is cleaner, greener, healthier, more stable, and prosperous, despite the challenges posed by climate change. While it outlines strategies for reducing emissions, the CAP does not adopt advanced data analytics or set specific adaptation finance goals or funding strategies.

Lagos State Climate Risk Assessment

The Lagos State Climate Risk Assessment (CRA) is an in-depth study conducted to understand and address the risks associated with climate change in Lagos. This assessment underscores the city's susceptibility to flooding, extreme weather, and rising sea levels, which disproportionately affect the economically disadvantaged population of Lagos. The CRA has pinpointed key climate threats, including floods, ocean surges, coastal subsidence, heatwaves, and erosion. It highlights the vulnerability of nearly 7,000 infrastructure assets, significant segments of the tourism and agriculture

industries, and a sizeable portion of the population. This thorough assessment underscores the critical need for immediate action to safeguard the city's inhabitants and infrastructure against these looming risks. While the CRA identifies these climate risks, it falls short in applying detailed grid-level analytics and lacks clear financial strategies and governance frameworks for climate adaptation.

Lagos Resilience Strategy

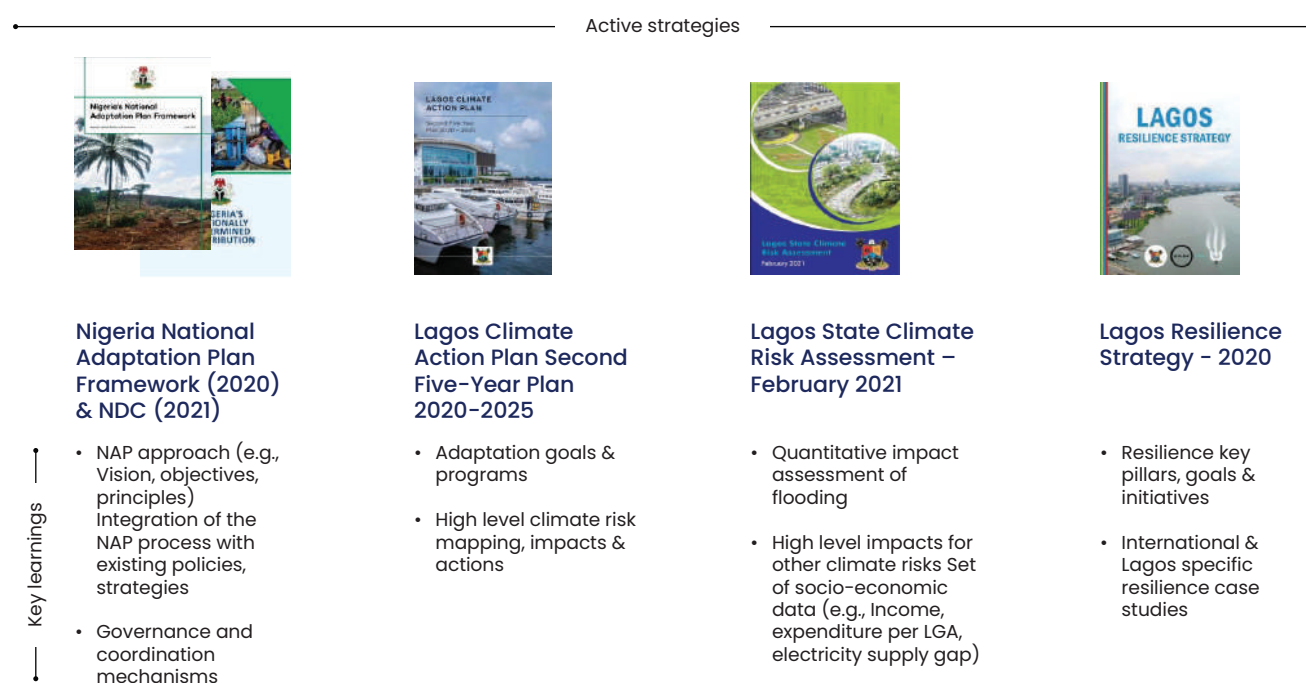
The Lagos Resilience Strategy, developed as part of the city's commitment to the 100 Resilient Cities Network, is a comprehensive plan addressing the myriad challenges faced by Lagos, including rapid urbanization, infrastructural deficits, and environmental degradation. The strategy is designed to improve the city's capacity to withstand and recover from acute shocks and chronic stresses. It includes a detailed assessment of the city's vulnerabilities and proposes targeted interventions across various sectors. By fostering partnerships, enhancing data-driven decision-making, and prioritizing inclusive development, the strategy aims to build a more resilient, sustainable, and liveable Lagos for all its residents. The strategy focuses on resilience against various challenges but is missing a multi-hazard approach²⁰, detailed data analytics, and specific funding strategies.

Nigeria's National Adaptation Plan Framework

Nigeria's National Adaptation Plan Framework is a strategic response to climate change at the national level, designed to integrate climate adaptation into planning and development processes across various sectors. This framework outlines the country's vision, objectives, and strategies for building resilience to the impacts of climate change. It identifies key vulnerable sectors, including agriculture, water resources, and health, and proposes adaptation measures to mitigate risks. The framework emphasizes a participatory approach, involving stakeholders from government, private sector, civil society, and local communities, ensuring a coordinated and inclusive response to the challenges posed by climate change. This national-level initiative is crucial for guiding Nigeria's efforts to adapt to changing climatic conditions and to protect its population, economy, and natural resources from the adverse impacts of climate change. This framework integrates climate adaptation at the national level but lacks detailed analytics, solutions, and adaptation goals for each sub-national unit such as Lagos.

20. A multi-hazard approach involves mapping the interdependencies between climate hazards i.e. understanding how one hazard impacts another.

Figure 6: Lagos Climate Action Plans and Strategies



While these plans have set the groundwork for addressing climate challenges, there are a few gaps in their execution and scope in relation to building resilience in resource constrained environment. Opportunities for improvement were identified in areas such as comprehensive risk analysis, the development of a robust analytical framework, defining adaptation ambitions, establishing clear project prioritization bases, enhancing funding strategies and mechanisms, and coordinating stakeholder engagement and governance

What LCARP Brings to the Table?

Acknowledging the critical gaps in previous climate strategies, the Lagos Climate Action and Resilience Plan (LCARP), not only addresses these shortcomings but innovates beyond them, employing a multifaceted strategy that integrates advanced risk assessment, data analytics, clear adaptation objectives, structured financing, and enhanced governance.

1. Integrated Risk Assessment

LCARP introduces a comprehensive risk assessment framework, incorporating a multi-hazard approach. This methodology ensures a thorough understanding of climate risks, their interdependencies, including direct and indirect socio-economic impacts.

2. Advanced Analytics and Data-Driven Decision Making

As part of LCARP, Lagos has developed a climate analytics and risk assessment tool that provides a more robust framework for decision-making. This approach enables a clearer understanding of current and future risks, aiding in the prioritization of adaptation strategies and estimating the cost of inaction.

3. Clear Adaptation Goals and Project Development

Unlike previous plans, LCARP defines specific adaptation ambitions e.g., adaptation finance needed per year, and translates adaptation actions into actionable projects to be funded.

4. Structured Funding Strategy

LCARP develops a comprehensive funding strategy, addressing previous gaps in financing and implementation. This includes identifying potential funding sources and establishing mechanisms to secure necessary finance. This aims to serve as an umbrella for adaptation finance, bringing together several fragmented approaches to reaching out to partners.

5. Enhanced Coordination and Governance

The plan emphasizes the importance of synchronized efforts across various stakeholders, including government entities, private sector, and local communities. It also includes mechanisms for improved governance and accountability in climate adaptation efforts.



chapter 2



Lagos Climate Risks and Impact Assessment

Recall, Lagos State contends with three primary Climate Impact Drivers (CIDs): sea-level rise, extreme heat, and extreme rainfall. In response, the Lagos Climate Action and Resilience Plan (LCARP) was initiated to navigate the state towards resilience. At the heart of LCARP is an evidence-based methodology that harnesses a sophisticated Climate Artificial Intelligence (Climate AI) tool. This tool forecasts the potential impacts of these climate drivers, such as flooding from rising sea levels, and facilitates the modeling of various scenarios, analysing socioeconomic effects, devising solutions, and assessing the effectiveness of these interventions across the state. The overall objective of this risk assessment is to understand the overall cost of inaction, to enable policymakers make budgetary and fundraising decisions and to actually quantify the main risks that climate change poses to Lagos’ citizens.

The Climate AI Tool: Navigating Climate Impacts in Lagos State

The Climate AI Tool serves as an advanced online data science and analytics platform, featuring a user-friendly dashboard interface that allows users to explore the natural, social, and economic impacts of various Climate Impact Drivers (CIDs) in Lagos State. This tool²¹ has enabled Lagos State to effectively address three critical questions essential for understanding climate risks and prioritizing adaptive actions for resilience:

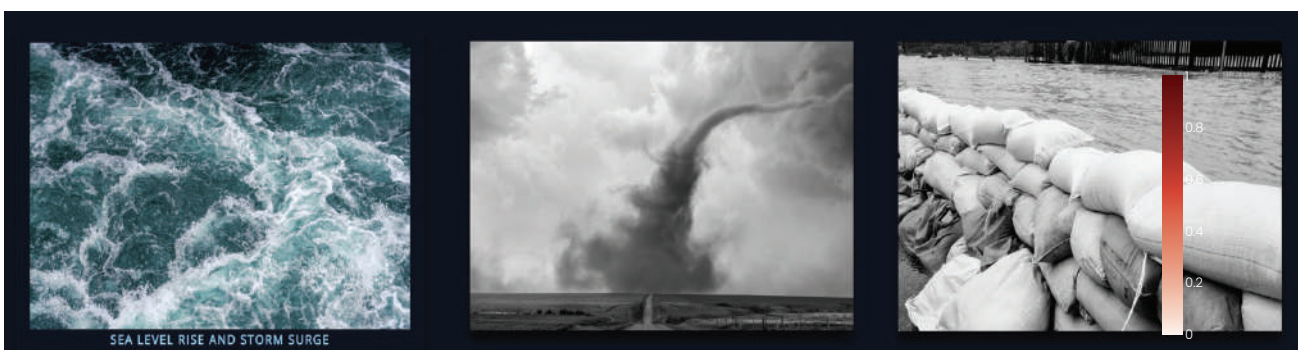
1. **Regional Exposure:** Which regions in Lagos will be most exposed to identified CIDs and extreme events?
2. **Impact Assessment:** In the most affected regions, what are the anticipated social, economic, and natural impacts?
3. **Solution Mapping:** Based on adaptation priorities, what solutions should be implemented to mitigate the impacts of identified CIDs?

Employing analytical modeling, the Climate AI tool develops scenarios specific to each prioritized climate impact driver, incorporating relevant natural or human factors such as land subsidence for sea-level rise. A Risk Index approach is utilized to pinpoint areas most susceptible to each CID, with scores ranging from 0 to 1 – where 1 indicates regions predicted to be most at risk. This model’s findings are illustrated in Figure 8, 9 & 10 which detail the risk assessments.

Further, the tool analyzes the infrastructure and socio-economic activities vulnerable to each CID, estimating potential damage costs to infrastructure and impacts on economic metrics, including GDP. It also proposes tailored solutions for each CID, complete with a cost-benefit analysis to aid in decision-making.

The dashboard within the Climate AI Tool displays comprehensive results from the analysis of each CID, providing a crucial resource for state planners and decision-makers in managing climate-related challenges.

Figure 7: Climate AI Dashboard – Homepage



21. The Climate AI tool will be used by relevant MDAs in Lagos state, to facilitate decision making to drive A&R solutions or initiatives

For each Climate Impact Driver (CID), the dashboard presents a range of analytical views, including:

- **Heat Maps and Bar Charts:** These visual tools depict the climate impact hazards in Lagos under various specified scenarios and configurations, offering an intuitive understanding of spatial and temporal variations.
- **Comparative Analyses:** This feature provides side-by-side comparisons of climate impact hazards across different scenarios, configurations, or Local Government Areas (LGAs), facilitating strategic decision-making.
- **Cost and Impact Assessments:** Detailed assessments are available that outline potential capital costs, GDP impacts, and populations vulnerable to climate change, providing a comprehensive economic and social outlook.
- **LGA Visualizations:** Visual tools highlight the LGAs most affected by specific CIDs, identifying high-risk areas that may require prioritized interventions.

Below, a high-level overview is provided of the methodologies, principal data sources, and results from the impact modelling for each of the climate impact drivers. This section aims to offer insights into the analytical processes and data integrity that underpin the robustness of the findings presented²².

1. Sea Level Rise

Methodology and Models:

For sea-level rise, the risk index incorporates multiple dimensions to pinpoint the most affected areas. These include the intensity of flood risk within each 50m x 50m grid, infrastructure damage costs, population vulnerability (focusing on the elderly and those in extreme poverty), and economic impacts (GDP factor).

The “bathtub model” was used to analyze the effect of sea-level rise. This model integrates global tide gauge records and satellite observations to develop flooding maps. It applies an eight-way hydrological connectivity rule to project sea level scenarios.

Major Data Sources:

The analysis utilized a combination of open-source and proprietary data, including:

- **NASADEM:** A digital elevation model and ocean mask.
- **NASA IPCC Sea Level Projections:** Projected sea level rise up to 2150.
- **IHE’s Coastal Futures:** Projected extreme events up to 2100.

Results:

Figure 8 identifies the 10 LGAs most vulnerable to sea-level rise, with Eti-Osa being the most at risk. This key business district faces potential damages estimated at approximately \$4.7 billion due to infrastructure and GDP losses. Eti-Osa, bordered to the north by the Lagos Lagoon and to the south by the Atlantic Ocean, hosts a mix of residential and commercial activities including prestigious buildings and international businesses. Current challenges include coastal erosion, land subsidence, saltwater intrusion, and pluvial flooding. The analytics model projects that approximately 29.3 km² (about 15% of Eti-Osa’s landmass) will be inundated, displacing around 100,000 people by 2030 if no measures are taken.

Statewide, the total Cost of Inaction from sea-level rise amounts to an estimated \$22–29 billion. This figure accounts for severe disruptions and damages to over 700 km of roads, 26 jetties and ports, 34 power grids, and more than 450 commercial and 2,000 residential settlements. Other impacts include the displacement of over 1.5 million people, disruption of economic activities, increased risk of water and airborne diseases, reduced water quality, and loss of biodiversity and natural ecosystems.

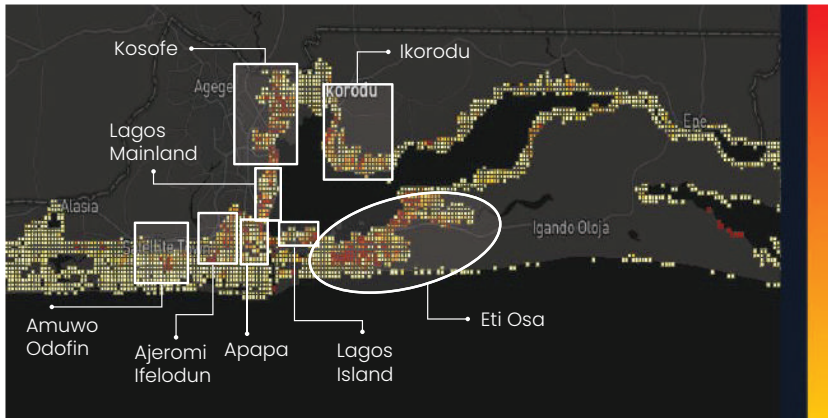
2. Extreme Heat

Methodology and Models

The risk index for extreme heat takes into account factors such as the vulnerability of the population, built-up areas, land without sun covers, vulnerable economic sectors (such as manufacturing and agriculture), and adaptive capacity, which includes proximity to hospitals, water bodies, and the coast. Regional Climate Models (RCMs) were utilized to forecast temperature increases and their effects on water systems. Additionally, a Generalized Linear Model with a Quasi-Poisson link function was employed to estimate the potential increase in mortality rates. These direct impacts, including water losses and fatalities, contribute to secondary losses such as decreased agricultural productivity.

Figure 8: LGAs most exposed to Sea Level Rise in Lagos

Dashboard view – Risk Index Heatmap



10 most exposed LGAs

LGA	Risk index ¹	Cost of inaction (\$)
Eti-Osa	1	4.7 bn
Ajeromi/Ifelodun	0.9	2.4 bn
Epe	0.76	3.6 bn
Badagry	0.70	2 bn
Kosofe	0.65	1.9 bn
Apapa	0.48	2.6 bn
Lagos Island	0.42	0.6 bn
Lagos Mainland	0.36	0.9 bn
Amuwo Odofin	0.30	1.7 bn
Ikorodu	0.29	1.9 bn

¹ Normalized risk index
Source: Dashboard

Major Data Sources

The analysis incorporated regional climate change studies, demographics, economic data, and historical temperature records from sources such as Copernicus Bioclimatic Indicator Projections, ESA Land Cover Data, Corteva Food security index weights and historical data, Lagos Bureau of Statistics, Department of Agriculture, International Labour Organization, etc.

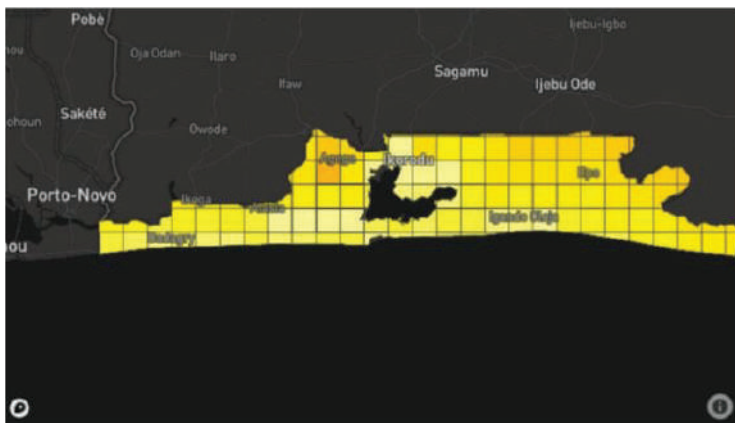
Results:

Figure 9 highlights the top 10 Local Government Areas (LGAs) most susceptible to extreme heat.

Ajeromi-Ifelodun, identified as the most affected LGA, is a densely populated residential and commercial district, home to over 2.2 million people and critical infrastructure such as the Suru-Alaba railway station, Ajeromi General Hospital, military barracks, and the Kirikiri Federal Correctional Center. Without proactive measures, the residents of these LGAs face severe health risks that could lead to an increased death toll and negatively impact the area’s contribution to the state’s GDP. The projected cost of inaction in addressing extreme heat is estimated at \$5 billion.

Figure 9: LGAs most exposed to extreme heat in Lagos

Dashboard view – Risk Index Heatmap



10 most exposed LGAs

LGA	Risk index ¹
Ajeromi Ifelodun	1
Mushin	0.95
Alimosho	0.93
Lagos Island	0.90
Surulere	0.85
Agege	0.85
Shomolu	0.85
Kosofe	0.80
Eti Osa	0.75
Oshodi Osolo	0.73

¹ Normalized risk index
Source: Dashboard

3. Extreme Rainfall

Methodology and Models

The risk index for extreme rainfall employs a similar approach to that used for sea-level rise, considering factors such as flood risk intensity within each 50m x 50m grid, infrastructure damage costs, and vulnerabilities of specific populations such as the elderly and those in extreme poverty. However, unlike the sea-level rise index, it does not include the economic impact (GDP factor). The Gradient Boosting model, known for its predictive accuracy regarding flood occurrences, assessed changes in rainfall patterns based on historical events and future climate scenarios. Additionally, the bathtub model was applied to simulate flood spread, taking into account variables like land subsidence.

Major Data Sources

- **Copernicus:** Data from the European Union’s space program
- **Jupiter Intelligence:** Specialized provider of climate risk analytics

- **Historical Flood Events:** Documented flood occurrences and related damages in Lagos
- **The Humanitarian Data Exchange (HDX):** An open platform offering access to global humanitarian data

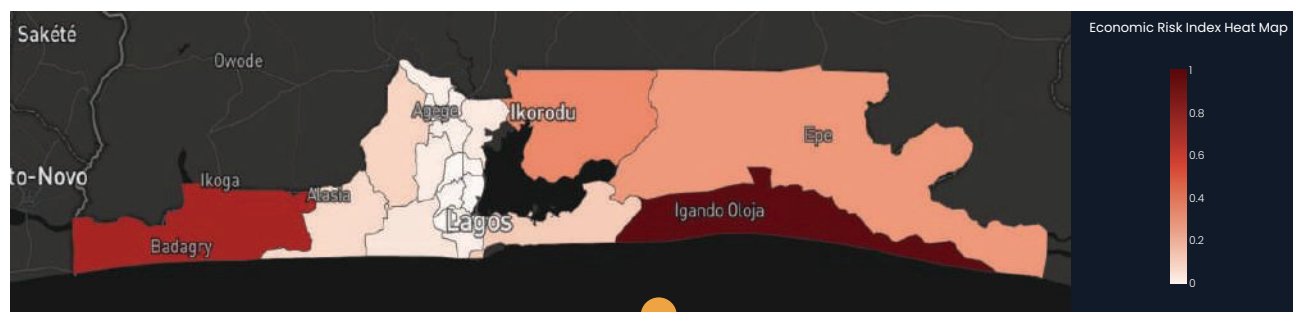
Results:

The analytical model pinpoints the top 10 Local Government Areas (LGAs) most vulnerable to extreme rainfall. These regions, characterized by a blend of residential and commercial zones, house over 45% of the state’s population and constitute major economic centers. In the absence of mitigative measures, these areas are likely to experience increased instances of flash flooding, landslides, erosion, water contamination, and heightened health risks. The estimated economic impact of unaddressed extreme rainfall, including damage to homes, commercial buildings, factories, hospitals, and schools, is projected at \$5 billion

Additionally, human activities and factors exacerbate the effect of the three CIDs.

Figure 10: LGAs most exposed to extreme precipitation in Lagos

Dashboard view – Heat map of flood impact³



LGA ¹	Economic Risk Index	Socio-Economic Risk Index	Cost of damage (m\$ per
Ibeju/Lekki	1	1	44.3
Badagary	0.82	0.84	36.6
Ikorodu	0.42	0.56	18.8
Epe	0.37	0.57	16.9
Eti-Osa	0.2	0.19	9.39
Alimosho	0.17	0.5	8.02
Ojo	0.15	0.26	7.21
Amuwo Odofin	0.1	0.16	4.78
Kosofe	0.08	0.35	4.19
Oshodi/Isolo	0.06	0.1	3.16

¹ Local Government Area ² Average year cost of damage in the LGA / total cost in Lagos per year estimated at 166 million \$3. 2030 projection of flood event extent from extreme rainfall based on a <2°C by 2100 pathway and current rate of land subsidence
Source: Analytics model dashboard

- **Sea-level Rise:** In Lagos, activities such as sand mining, groundwater extraction, and oil and gas extraction significantly contribute to land subsidence. Driven by rapid urbanization and population growth, these activities have caused an average land subsidence of 0.5 meters over the past decade, particularly affecting areas like Epe, Ikorodu, Ojo, Ibeju Lekki, and Eti Osa. This subsidence reduces the elevation of the land, heightening its vulnerability to flooding and amplifying the adverse effects of rising sea levels. Consequently, the risk to infrastructure, habitats, and communities in these regions increases significantly.
- **Extreme Heat:** Urban development transforms natural vegetative landscapes into urban zones, replacing them with buildings, roads, and other infrastructure. Natural vegetation plays a crucial role in absorbing carbon dioxide and cooling the environment through transpiration. The removal of these green spaces leads to increased surface temperatures and overall warmer conditions. Additionally, the concentration of human activities and energy use in urban areas, along with dense traffic, further escalates urban temperatures, contributing to the city's heat island effect.
- **Extreme Rainfall:** The improper disposal of waste in Lagos severely worsens the problems associated with extreme rainfall. Clogged drainage systems due to accumulated waste hinder water flow, increasing both the likelihood and severity of flooding. During such events, unmanaged waste poses significant health hazards, exposing the population to various contaminants and physical dangers carried by floodwaters. This scenario complicates flood management efforts and heightens health risks during and after flooding, further exacerbating the challenges posed by sea-level rise.

Cost of Inaction – Implications of Sea Level Rise, Extreme Heat, and Precipitation

- LCARP's climate impact model projects that without preventive measures, Lagos could face staggering losses ranging from **approximately \$33 to \$39 billion**²³. These estimates are based on the value of the affected infrastructure, the extent of damage, the impact on GDP, and costs to social systems, spanning social, economic,

and natural realms. These estimates may be conservative given that human activities could worsen the effects.

Social Impacts

Over 1.4 million people, including 530,000 women, are expected to be directly affected by inundation from flooding, placing an additional burden on populations already living under the poverty line. Critical social infrastructures, such as transportation networks, healthcare, and educational systems, are at risk. More than 500 educational centers could be inundated, affecting over 500,000 students. The health sector may also see significant disruptions, potentially impacting 42,000 patients. Additionally, projections include 20,000 heat-related fatalities and a 5% increase in dependency ratios among children and the elderly due to job losses.

Economic Impacts

The city's infrastructure, crucial for its thriving economy, faces potential damages estimated at \$5 billion. This includes significant disruptions to vital systems such as transportation, power, and communication, which are essential for supporting the city's rapid urbanization. Relocation costs for nearly 770,000 residents from permanently flooded areas are estimated at \$6 billion. Furthermore, an estimated \$5 billion loss in GDP is anticipated due to 44 additional unproductive days and agricultural yield losses from extreme temperatures. The broader economic outlook predicts an annual GDP loss of \$17 billion due to disruptions in economic activities in inundated areas²⁴.

Natural Impacts

Approximately 165 km² across 14 out of the 20 Local Government Areas (LGAs), including Ajah/Eti-Osa, Victoria Island, and Kosofe, are projected to be inundated. The state's natural ecosystems, which form the backbone of local biodiversity, are under significant threat, with a predicted 82% of wetlands facing potential biodiversity losses. Additionally, water bodies are expected to lose about 0.7 meters of water due to evaporation, further complicating biodiversity challenges.

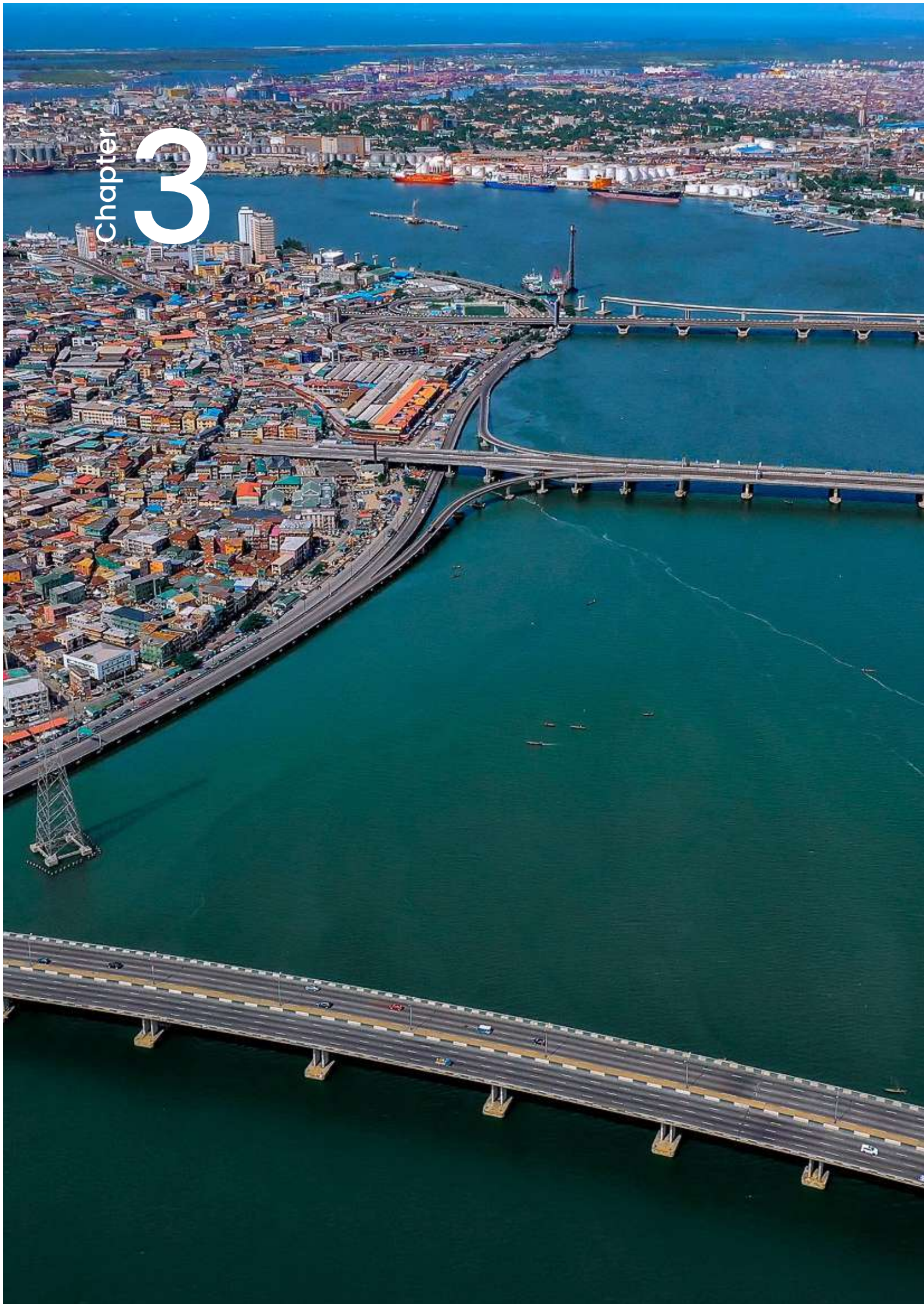
These projections underscore the urgent need for immediate, sustained, and strategic actions to safeguard the future of Lagos and the well-being of its inhabitants.

23. Assuming one-off cost of relocation in 2030 (\$40k/household of 5 people, assuming conversion rate at \$1 = N420)
Source: Climate Analytics Dashboard

24. Cumulative damages across 10 years

Chapter

3



Introducing the Lagos Climate Adaptation and Resilience Plan (LCARP)

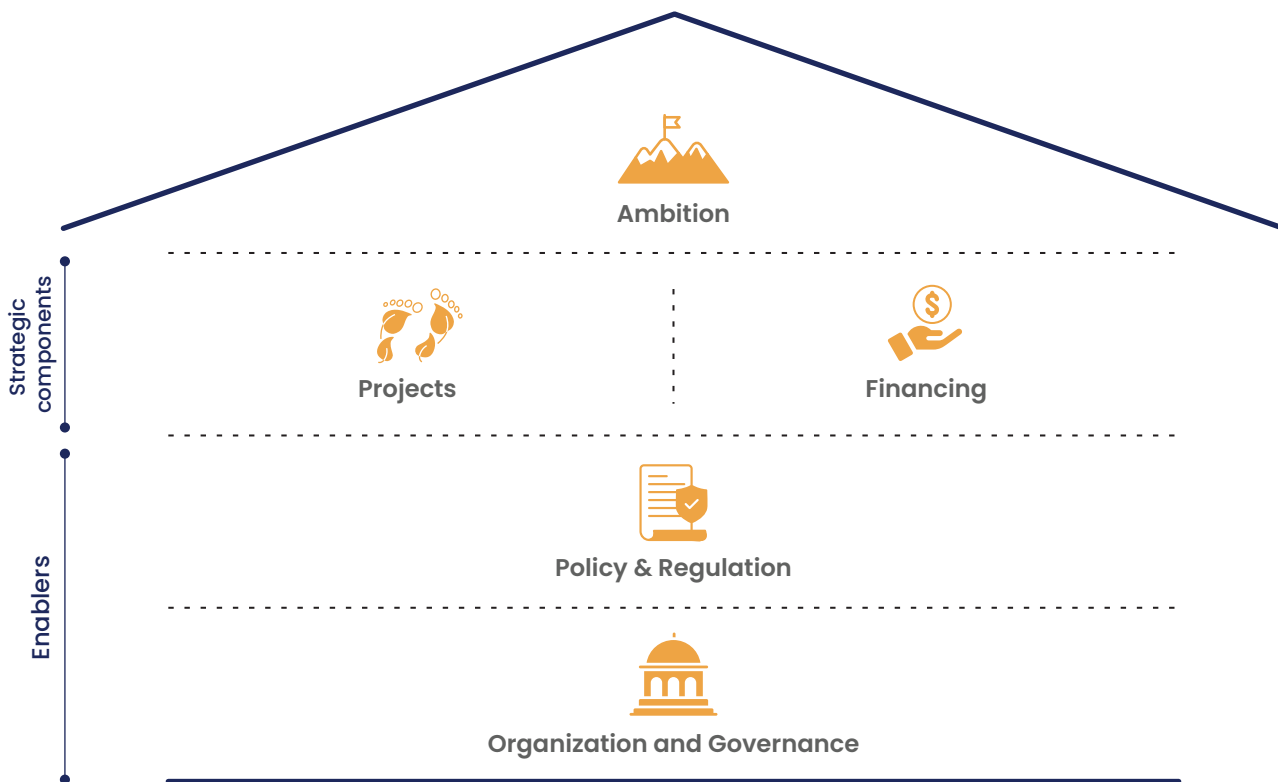
Overview

The Lagos Climate Adaptation and Resilience Plan²⁵ (Figure 11) represents a comprehensive framework crafted specifically as a roadmap to guide climate adaptation initiatives for Lagos. This plan outlines a well-defined and deliberate path forward, focusing primarily on measures designed to secure financing for state adaptation efforts. It articulates the overarching adaptation financing goal and delineates the strategic elements essential for achieving this objective effectively.

This plan is a tailored blueprint, carefully aligned with Lagos’s unique environmental and socioeconomic contexts, ensuring that the proposed initiatives are actionable and effective in enhancing the city’s resilience to climate change. At the forefront of the plan is the ‘Ambition’, the overarching goal that propels all efforts. This ambition represents the ultimate vision the state aims to achieve and serves as a guiding beacon for all subsequent initiatives.

Beneath this top-level goal, the plan is supported by two critical strategic components: ‘Projects’ and ‘Financing (Mechanisms and Sources)’. The Projects component is dedicated to creating a curated list of

Figure 11: LCARP Strategy



Source: BCG analysis

25. A framework designed to offer both a holistic view and a deep dive into the various components essential for effective climate adaptation financing.

impactful, practical projects specifically designed to address the distinct climate impact challenges faced by the state. The Financing component, on the other hand, focuses on developing a comprehensive financing strategy. This includes outlining potential mechanisms and sources of funding that the state can leverage to bring these projects to fruition.

Moreover, the plan emphasizes two vital enablers critical for realizing these goals and implementing the projects: 'Governance, Policy & Regulation'. A robust combination of sound policies, stringent regulations, and strong governance is crucial for the successful development of projects and securing investment from international funders.

The subsequent sections will delve deeper into each of these framework elements, providing a detailed exploration of their roles and functions within the LCARP.

The Ambition

Lagos aspires to be a model climate resilient city with a clear adaptation and resilience goal to respond to emerging climate risks. Thus, a critical pillar of LCARP is the ambition. The LCARP ambition is to **counteract the cost of inaction of ~\$40bn by unlocking \$700mn–\$1.3bn in climate finance investment annually** to build resilient infrastructure and public spaces; ensure resilient communities and protect vulnerable populations; and anticipate risk and improve response to crises.

This ambition has been carefully calibrated through three distinct methodologies:

- **Alignment with National Ambitions:** This methodology anchors Lagos State's financing goals within the broader national priorities, setting the state's adaptation finance ambition as a proportion of Nigeria's annual climate financing needs of \$17.7bn, reflecting Lagos's contribution of 30% to Nigeria's GDP. Given that global standards suggest adaptation costs should constitute 20–25% of total climate finance costs, Lagos's estimated adaptation needs amount to approximately \$1.3 billion per annum.
- **Benchmarking against other countries:** Adaptation financing needs were also benchmarked against countries with similar economic contexts and climate change

challenges, such as India, Indonesia, the Philippines, and Morocco. This comparison established an estimated annual need of \$2.5 billion for Nigeria. Lagos State's share, based on its GDP contribution of 30%, is calculated to be around \$750 million annually.

- **Project based estimations:** A more direct approach involved calculating the total capital costs required to implement all the Adaptation and Resilience (A&R) projects identified within the LCARP. The annual financing needed to support these adaptation projects and build resilience is estimated at approximately \$900 million²⁶.

By integrating these methodologies, it is suggested that Lagos should aim to mobilize between \$700 million and \$1.3 billion annually to meet its adaptation needs effectively.

Projects

Putting Lagos on the path to resilience requires three key adjustments:

- **Build Resilient Infrastructure & Public Spaces:** Develop solutions to lessen the exposure of critical infrastructure, such as transportation networks, power grids, and communication assets, and to create a climate-proof city.
- **Ensure Resilient Communities and Protect Vulnerable Groups:** Implement adaptation solutions aimed at reducing the exposure of especially vulnerable populations (including all age groups and genders living below the poverty line) to climate events.
- **Anticipate Risk and Improve Crisis Response:** Integrate climate risks into decision-making processes, laws, and policies, and enhance the capacity to efficiently and effectively respond to climate-related disasters

The LCARP has identified a \$9 billion project portfolio across three archetypes that offer the highest socioeconomic return on investment, enabling Lagos to build resilience against climate impacts:

1. **Projects Requiring Grants:** 9 projects needing approximately \$1 billion in investments. These projects focus on protecting the most vulnerable (e.g., relocation) and enhancing the state's ability to anticipate and respond to climate risks (e.g.,

early warning systems). Grant funding is essential for the technical preparation and implementation of these high social impact projects.

2. **Projects Requiring Concessional Finance:** 10 projects, with an investment need of about \$5–6 billion. These high-capital projects have limited returns and include infrastructure developments like the construction of drainage channels. Grants are sought to complete design studies, after which concessional financing will be utilized for implementation.
3. **Bankable Projects:** 14 projects requiring roughly \$3 billion in investments. These projects are designed to protect business assets or enhance supply chain resilience and include Public-Private Partnerships (PPPs) with clear market returns and GHG offset initiatives. Funding from private or development sources is needed for the technical preparation of PPP arrangements.

Progress on Bankable Projects

Focus was placed on bankable projects to address the significant gap in mobilizing private sector investments towards climate adaptation finance. Bankable projects in the portfolio are already advancing along the project lifecycle with appraisal studies for 14 bankable solutions and pre-feasibility for 2 projects. Appraisal studies for the 14 bankable projects indicate high A&R impact, high commercial potential, and feasibility for implementation within the Lagos context. Additionally, Lagos has progressed two of these projects to pre-feasibility: a waste-to-energy plant (approximately \$400 million CAPEX with 12% IRR) and a wastewater treatment plant (approximately \$900 million CAPEX with 7% IRR). These pre-feasibility studies were conducted to demonstrate a clear commercial case for private sector investments, with feasibility assessments recommended for full validation.

Further details on these projects, including their classifications and funding models, are elaborated in Chapter 4.

Financing – Mechanisms and Sources

The LCARP utilizes a diverse range of climate finance mechanisms, selected based on project types and their development stages within the Adaptation and Resilience (A&R) portfolio:

- **Non-bankable Early-stage Projects²⁷:** Require government instruments and grants, including technical assistance and development grants.
- **Varied Bankable Early-stage Projects:** Can be financed through a combination of government instruments, grants, equity, and blended finance structures.
- **Near Bankable Mature-stage Projects:** Best suited for blended finance structures and nature-based finance.
- **Varied Bankability Mature-stage Projects:** Require a mix of debt instruments, including climate and sustainability loans/bonds, green bonds, and social impact bonds.

Despite a heavy reliance on concessional debt, accounting for approximately 57% of Nigeria's adaptation finance due to underdeveloped capital markets and limited alternative financing expertise, Lagos seeks to diversify and deepen its financial sources to enhance resilience and sustainability and tap into a balanced array of financing options and unlock an optimal mix across debt, blended, grants, nature-based and disaster risk financing to match global averages

- **Debt & Equity Instruments:** Down to 30–40% of the funding mix by developing a strong pipeline of bankable projects
- **Blended Finance:** Represents 30–40%, focusing on bankable projects through Public-Private Partnerships (PPPs).
- **Grants:** Grow to 20% focusing on enhancing the state's capacity to secure funding for early-stage bankable adaptation projects
- **Nature-Based and Disaster Risk Financing:** Aim for these to constitute 10% of the mix, with instruments like debt-for-nature swaps and parametric insurance.

The funding instrument mix targets are informed by the benchmarks from global peers i.e., Delhi, Jakarta and Casablanca

Expanding Climate Finance Opportunities

Opportunities exist for Lagos to leverage significant climate finance investments from five key funding sources, responsible for over \$56 billion in global climate investments in 2021, with future commitments to Africa exceeding \$200 billion:

27. Early stage projects refers to pre-feasibility and feasibility studies stage

- Multilateral Funders
- Bilateral Funders
- Climate Funds
- Impact Investors
- Commercial Investors

These entities provide a vast potential for funding, each with distinct commitments and operational focuses, from large-scale project financing by multilateral and bilateral funders to targeted investments by climate funds and impact investors.

Further details on financing mechanism and sources are elaborated in Chapter 5.

Policy Recommendations

Lagos' climate policy landscape is crucial for unlocking funding for the climate Adaptation and Resilience (A&R) portfolio. While current policies such as the Lagos State Climate Adaptation and Resilience Plan (LCARP) and the ongoing initiative to issue green bonds are steps in the right direction, there remains substantial room for enhancing policies to improve access to climate finance.

Enhancing Climate Policies

Improving climate policies in Lagos could expedite A&R investments by demonstrating political commitment, fostering a stable investment environment, and facilitating the implementation of bankable projects. Despite current efforts, the annual A&R finance received is significantly lower than the city's actual needs.

Best Practice Policy Initiatives

Benchmarking has identified eight sound practice policy initiatives to boost A&R funding and investments in Lagos by comparing the current ecosystem against other high-performing African and non-African cities:

1. **Climate Adaptation Strategy Roadmap:** Develop a comprehensive outline of the city's A&R needs to demonstrate governmental commitment to resilience.
2. **Government-Managed Database of Funding-Ready A&R Projects:** Create a public database

that showcases pre-assessed A&R projects ready for investment.

3. **Investor Databank:** Establish a repository of resources and information on climate risks and events to assist investors or funders in conducting their analyses.
4. **Sector-Specific Policy Reforms:** Reform policies in key sectors to make them more attractive for climate-related investments.
5. **Climate-Tagged Budget Allocation:** Allocate specific budgetary funds for A&R, signaling strong political will and attracting co-funded projects.
6. **Green Financial Instruments:** Issue diverse green instruments like loans, bonds, and grants, offering subsidies and tax benefits to attract further investment.
7. **Project Development Unit:** Set up a government unit with direct access to the highest governing authority to enhance project funding and tackle policy obstacles.
8. **Liberal Foreign Investment Regime:** Maintain a regime with minimal restrictions on cash repatriation and business-friendly policies to draw more funders and investors.

Further details on these policies are elaborated in Chapter 6.

Governance

To place Lagos on a definitive path to climate resilience, three critical opportunities have been identified to bolster climate Adaptation and Resilience (A&R) governance:

1. **Enhanced Accountability Across MDAs:** The current framework provides an opportunity to establish a more transparent hierarchical structure with defined reporting lines, which will streamline decision-making and boost operational efficiency.
2. **Clear Definition of Roles, Responsibilities, and Reporting Structures:** There is a need to clearly delineate functions among committees and departments to eliminate role overlaps and optimize the governance model.

3. Improved Structured Collaboration: Establishing a systematic approach for stakeholder engagement is crucial for fostering an inclusive and effective climate governance framework.

Further details on best practice Governance structure are elaborated in Chapter 7.

In conclusion, this chapter has detailed a multifaceted plan designed to advance Lagos towards significant climate resilience and adaptation. Across the various subsections, we have introduced several strategic initiatives under the LCARP framework.

These initiatives span across enhancing governance structures, optimizing financial mechanisms, and strengthening policy frameworks to ensure that Lagos not only addresses its current climate challenges but also fortifies its infrastructure and communities against future environmental risks. The comprehensive approach laid out in this chapter underscores the commitment of the Lagos State Government to enact a transformative climate strategy, setting a robust foundation for sustainable development and environmental stewardship.





LCARP

Projects Portfolio

Overview

Recall that Lagos State is vulnerable to three primary climate impact drivers: sea-level rise, extreme heat, and extreme rainfall. To counter these threats, the LCARP has outlined a robust set of Adaptation and Resilience (A&R) projects, categorized under three critical types of interventions designed to enhance the city's resilience: building resilient infrastructures and public spaces; ensuring resilient communities and protecting vulnerable groups; and anticipating risks and improving response to crises.

1. **Building Resilient Infrastructures & Public Spaces:** This category focuses on designing solutions that reduce the vulnerability of critical infrastructure. Efforts include fortifying key assets such as transportation systems, power grids, and communication networks, thus fostering a climate-proof urban landscape. Initiatives such as constructing sea walls to counteract sea-level rise, rehabilitating drainage systems to prevent flooding, and enhancing waste collection and disposal systems to bolster health resilience are pivotal.

2. **Ensuring Resilient Communities & Protecting Vulnerable Groups:** This intervention aims to develop adaptation solutions that mitigate the impact of climate events on the population, particularly focusing on vulnerable demographics. Strategies include relocating vulnerable populations and launching awareness programs about sanitation and hygiene to ensure their safety and well-being.

3. **Anticipating Risks & Improving Crisis Response:** This approach emphasizes the proactive integration of climate risks into the city's decision-making, legal, finance frameworks, and policies. By enhancing the city's capacity to respond to climate-induced disasters, Lagos aims to stay ahead efficiently and promptly in managing and mitigating potential threats. Implementing early warning systems and developing emergency response funds are key examples.

In alignment with these strategic interventions, the LCARP has identified a portfolio of 33 A&R projects with an estimated cost of \$9 billion.

Figure 12: Types of interventions required to build resilience


- 01  **Build resilient infrastructures & public spaces**
Solutions designed to reduce exposure of key infrastructures (e.g., transportation infrastructure, power grids, communication assets) and build a climate-proof city
- 02  **Ensure resilient communities and protect vulnerable groups**
Adaptation solution with the objective to reduce the number of people exposed to climate events in particular vulnerable population (All age groups and genders living below the poverty line)
- 03  **Anticipate risk and improve response to crisis**
Integration of climate risks into decision-making, laws, and policies and build capacity to efficiently and promptly respond to climate risk disasters

Figure 13: Classification of Projects by types of intervention required to build resilience²⁸

Build resilient infrastructures & public spaces	Ensure resilient communities & protect vulnerable groups	Anticipate risk & improve response to crisis
<p>01 Reinforcement of existing 18km of coastal embankment and building additional 10km of sea walls in 5 LGAs</p> <p>02 Construct larger stormwater channels, to handle increased rainfall and minimize flooding risks in priority areas</p> <p>03 Construct of 1,100km+ network of primary drainage system in 4 regions</p>		<p>32 Early warning systems to alert residents about imminent weather events, including flooding, enabling timely actions</p>
<p>04 Construction and rehabilitation of critical transport links i.e., inner-city roads that will be inundated across 10 the vulnerable LGAs</p> <p>05 Build 30 transfer stations & purchase waste collection vehicles to remove local solid waste, reducing clogging of drains</p> <p>06 Floodproofing of 42 affected power assets and 44 affected communication assets to bolster flood resilience</p> <p>07 Retrofit or relocate-350 public health facilities with flood protection systems and upgrade facilities and equipment across these centres</p>		<p>33 Disease surveillance and sanitation solutions: Implement surveillance systems for existing and new disease risks addressing heat and water-related disease</p>
<p>08 Build new & rehabilitate existing secondary drainage systems that feed the primary channels</p> <p>09 Transport Links (Waterways) - Construction & rehabilitation of critical waterways including ~26 jetties and docks inundated by flooding</p> <p>10 Rehabilitate/cap old landfills and construct 3 new landfills and waste to energy plants</p> <p>11 Transport links (highways) - Construction and rehabilitation of critical highways and interstate roads to prevent flooding and damage from flooding</p> <p>12 Retrofit or relocate ~500 public schools with flood protection systems</p>		
<p>13 Build pumping stations - Actively remove water, maintaining proper water flow and reducing the risk of flooding in vulnerable areas</p> <p>14 Sewage treatment plant: Build a sewage treatment plant reducing water contamination in floods</p> <p>15 Medical Infrastructure Blueprint: Build of new hospitals and primary health care facilities in underserved parts of Lagos</p> <p>16 Rehabilitate and maintain existing 300+ urban parks across Lagos to foster heat reduction in addition to improving air quality and carbon capture</p> <p>17 Commercial rainwater harvesting - Harvested rainwater can serve a substantial portion of their water needs, reducing flooding and water costs</p> <p>18 Re-design 5 LGAs for heat reduction (e.g., street grid, shading structure)- Badagry, Ikorodu, Ibeju Lekki, Epe and part of Eti-Osa</p>		
<p>19 Digitalization of healthcare system - Increasing use of electronic medical records and smart health Information Platform</p> <p>20 Retrofit 350 manufacturing plants with cool surfaces, green building envelopes and cooling systems - Kosofe, Apapa and Eti-Osa</p> <p>21 Retrofitting of 1,800km roads with cool pavement in 5 most impacted LGAs to alleviate the impact of extreme heat and the associated health and productivity impacts</p> <p>22 Constructing barriers or levers to protect vulnerable areas from flood events due to extreme rainfall</p> <p>23 Nature-based inland flood solutions e.g., Bioswales, rain gardens etc., reducing the impact of inland flooding</p> <p>24 Restore 11-ha of mangrove across 5 LGAs, acting as natural wave barriers reducing overland flooding made more common by sea level rise</p> <p>25 Develop alternative water supply (1.3bn gallons/-day) to minimize ground water extraction reducing land subsidence</p> <p>26 Plant 50,000 climate-resilient trees annually across Lagos to alleviate the impact of extreme heat and the associated health and productivity impacts</p>	<p>27 Relocate 320k vulnerable persons in 10 exposed LGAs</p> <p>28 Regenerative agriculture/agroforestry: Convert un- and under-used Lagos State agricultural lands into water sinks with the creation of natural floodplains</p> <p>29 Flood resistant low-income housing: Build flood-resistant housing complexes, ensuring safety for residents and continuous rent collection during flood events</p> <p>30 Provide health insurance to ~320k vulnerable populations in exposed LGAs</p> <p>31 Create aquaculture facilities resilient to flooding, turning a problem into a solution, and generating income from the sale of fish and seafood</p>	

28. Some projects can cut across multiple types of intervention

This portfolio includes projects prioritized for their high A&R impact and socioeconomic returns, diversified into 14 bankable projects, 10 requiring concessional finance, and 9 needing grants.

Projects in the Portfolio Lifecycle

Significant progress has been made in advancing projects within the portfolio. Appraisal studies have been completed for the 14 bankable solutions, with two flagship projects—a waste-to-energy plant and a wastewater treatment initiative—undergoing high-level commercial pre-feasibility studies that affirmed their viability and impact potential.

Project Portfolio Development

The development of the \$9 billion LCARP project portfolio was guided by a data-driven approach, focusing on risk analysis across Local Government Areas (LGAs) to identify best practice solutions and integrating plans from relevant Ministries, Departments, and Agencies (MDAs). The project development followed two steps: prioritizing of most impactful projects and clustering of projects based on financing needs

1. Prioritizing the most impactful projects

This process involved identifying the most vulnerable locations, consolidating adaptation solutions, and conducting cost-benefit analyses based on four guiding principles:

- **Projects are inclusive and equitable:** Ensure that every gender, age group and income class is considered in the adaptation solution with special attention to vulnerable groups.
- **Solutions consider environment and sustainability:** Priority is given to adaptation solutions that preserve the natural compositions and biodiversity of the environment.
- **Room for private participation:** Opportunities for private sector through investments and technical support
- **Aligned with government’s institutional capabilities:** A&R projects are mainstreamed across government’s entities, processes, and policies.

Project pipeline development criteria

Building on these principles, the project pipeline was prioritized following three steps:

Figure 14: Project pipeline development

Projects to achieve these adjustments have been prioritized based on three criteria ...



Most vulnerable locations in Lagos i.e., the 10 identified LGAs



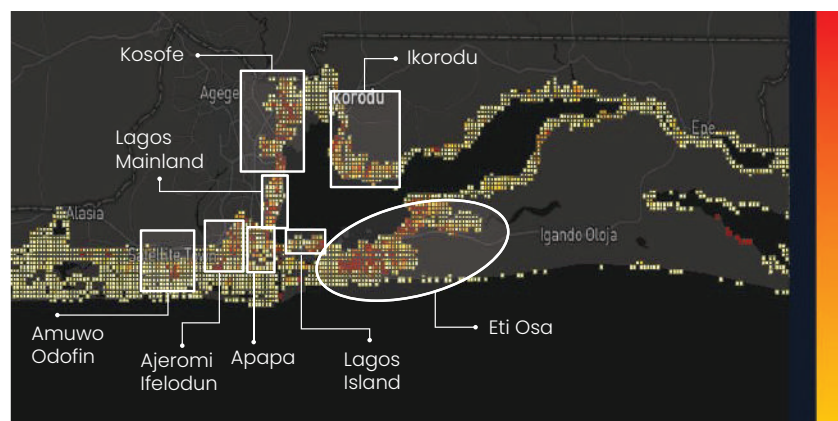
Consolidation of adaptation solutions & feasibility assessment



Cost-benefit analysis of applicable solutions

Figure 15: Recall – Most exposed LGAs due to Sea level rise

Dashboard view – Risk Index Heatmap



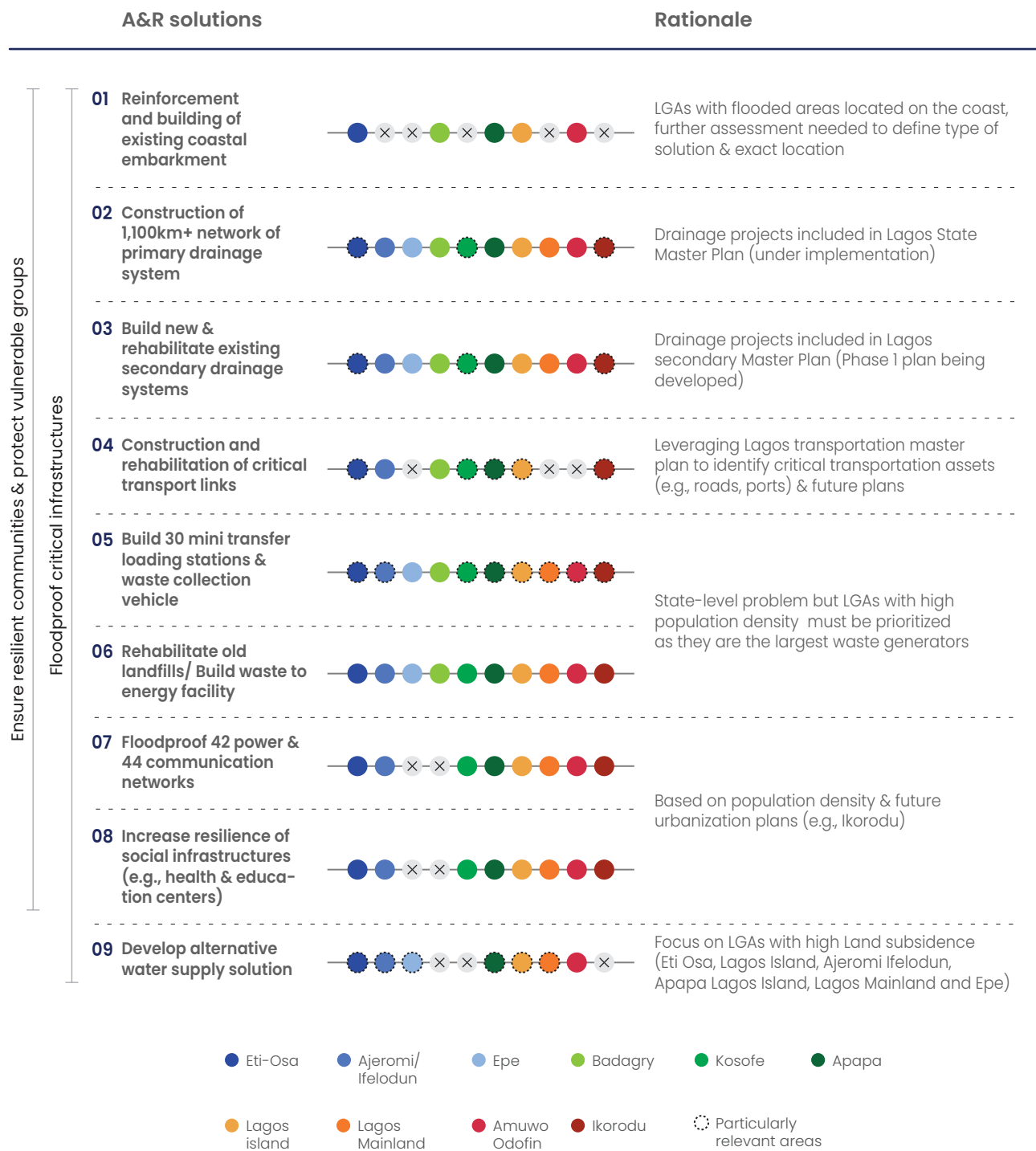
10 most exposed LGAs

LGA	Risk index ¹	Cost of inaction (\$)
Eti-Osa	1	4.7 bn
Ajeromi/Ifelodun	0.9	2.4 bn
Epe	0.76	3.6 bn
Badagry	0.70	2 bn
Kosofe	0.65	1.9 bn
Apapa	0.48	2.6 bn
Lagos Island	0.42	0.6 bn
Lagos Mainland	0.36	0.9 bn
Amuwo Odofin	0.30	1.7 bn
Ikorodu	0.29	1.9 bn

¹ Normalized risk index
Source: Dashboard

- 1. Identification of Vulnerable Locations:** The process began by pinpointing the locations in Lagos most vulnerable to each Climate Impact Driver (CID). Utilizing climate analytics, a risk index was developed to determine which Local Government Areas (LGAs) are most affected by each specific climate impact driver. This analytical approach ensures targeted and effective planning for resilience initiatives across the city.
- 2. Consolidation of Adaptation Solutions:** Following the identification of the most vulnerable areas, the subsequent step involved consolidating adaptation solutions and conducting feasibility assessments. This entailed a comprehensive analysis of applicable measures to mitigate the identified risks. The range of solutions considered includes ongoing projects spearheaded by various Ministries, Departments, and Agencies (MDAs), as well as best-in-class strategies that have been successfully implemented in similar environments. These solutions were systematically mapped across the most exposed LGAs. The feasibility of each solution was rigorously evaluated, focusing on interventions such as mangrove restoration, development of alternative water supply systems, and the implementation of early warning systems.
- 3. Cost-Benefit Analysis and Focus on Institutional Capabilities:** A cost-benefit analysis was conducted to assess the economic viability of the proposed solutions, utilizing outputs from the climate analytics model, particularly the cost of inaction data. This analysis was instrumental in comparing the economic impacts²⁹ averted to the projected costs of the projects, thereby aiding in the efficient allocation of resources. This method ensures that investments are directed towards interventions that provide the most significant economic benefits relative to their costs.

Figure 16: A&R Solution Mapping across high-risk LGAs for Sea Level rise

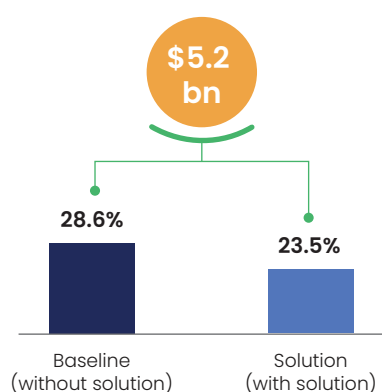


Source: Dashboard, BCG experience

Figure 17: Cost-benefit (Economic impact averted) for the construction of 1,100km+ network of primary drainage system across priority areas.



Economic value (\$bn)



- >400k Population living in areas exposed to severe flooding will be protected
- \$759mn in capital cost will be protected from being impacted by sea level rise
- \$4.4bn in GDP will also be protected
- 0.7x ROI achieved from avoided capital cost and preserved GDP

The development of the \$9 billion portfolio was a rigorous process that merged data-driven risk analysis with strategic project prioritization. By leveraging best-in-class solutions around the world and aligning with the priorities of the relevant Ministries, Departments, and Agencies (MDAs), this approach ensured that interventions were targeted to the most vulnerable locations. The solutions proposed were not only practical and effective but were also designed to maximize socio-economic returns and foster long-term resilience.

2. Clustering of Projects based on Financing Needs

Projects in the \$9 billion portfolio were categorized into three financial archetypes—bankable projects, projects requiring concessional finance, and projects

requiring grants³⁰—to tailor subsequent development steps such as concept note development, feasibility studies, and execution planning to their specific financing requirements. Projects were classified into these three financial archetypes based on financing of similar projects in other countries and regions.

1. Projects Requiring Grants (9)

These are high impact policy and public infrastructure projects.

Portfolio Size: ~\$1 billion

Next Steps: Six projects require concept studies to progress, and three projects are ready-to-execute. See projects list with financing needs and next steps in Table 1:

30. Project costs are high-level estimates based on identified benchmarks in other geographies.

Table 1: Projects Requiring Grants

S/N	Project Name	Financing category	Estimated cost	Next step
1	Retrofit or relocate ~350 public health facilities with flood protection systems and upgrade facilities and equipment across these centres i.e., comprehensive health centres, primary centres, and health posts	Grants	~300mn	Concept studies
2	Retrofit or relocate ~500 public schools with flood protection systems	Grants	~10mn	Concept studies
3	Relocate 320k vulnerable populations in 10 exposed LGAs including empowerment programs for the dis-placed	Grants	~500mn	Ready to execute
4	Plant 50,000 climate-resilient trees annually across Lagos to alleviate the impact of extreme heat and the associated health and productivity impacts	Grants	~1.5mn	Ready to execute
5	Rehabilitate and maintain existing 300+ urban parks across Lagos to foster heat reduction in addition to improving air quality and carbon capture	Grants	~50mn	Ready to execute
6	Nature-based inland flood solutions: Bioswales, rain gardens etc., reducing the impact of inland flooding	Grants	TBD	Concept studies
7	Build pumping stations: Actively remove water, maintaining proper water flow and reducing the risk of flooding in vulnerable areas	Grants	TBD	Concept studies
8	Build storm water management systems: Construct larger stormwater channels, to handle increased rain-fall and minimize flooding risks in priority areas	Grants	TBD	Concept studies
9	Artificial flood barriers: Constructing barriers or lev-ers to protect vulnerable areas from flood events due to extreme rainfall	Grants	TBD	Concept studies

2. Projects Requiring Concessional Finance (10)**Portfolio Size:** ~\$5 billion.

These projects include high capital initiatives with limited returns, such as the construction of drainage channels, protection of vulnerable populations, and projects to increase the state's capacity to anticipate and respond to climate risks.

Next Steps: Six projects require pre-feasibility studies to progress, while four projects are ready to execute. See projects list with financing needs and next steps in Table 2:

Table 2: Projects requiring Concessional finance

S/N	Project Name	Financing category	Estimated cost	Next step
1	Reinforcement of existing 18km of coastal embankment and building additional 10km of sea walls in 5 LGAs	Concessional finance	~0.9-1.2bn	(Pre) feasibility
2	Construct of 1,100km+ network of primary drainage system in 4 regions	Concessional finance	~3bn	(Pre) feasibility
3	Build new & rehabilitate existing secondary drain-age systems that feed the primary channels	Concessional finance	~170mn	(Pre) feasibility
4	Construction and rehabilitation of critical transport links i.e., inner-city roads that will be inundated across 10 the vulnerable LGAs	Concessional finance	~350mn	(Pre) feasibility
5	Retrofit 350 manufacturing plants with cool surfaces, green building envelopes and cooling systems – Kosofe, Apapa and Eti Osa	Concessional finance	~45mn	Ready to execute
6	Retrofitting of 1,800km roads with cool pavement in 5 most impacted LGAs to alleviate the impact of extreme heat and the associated health and productivity impacts	Concessional finance	~70mn	(Pre) feasibility
7	Medical Infrastructure Blueprint: Build of new hospitals and primary health care facilities in un-derserved parts of Lagos	Concessional finance	TBD	Ready to execute
8	Digitalization of healthcare system - Increasing use of electronic medical records and smart health Information Platform	Concessional finance	~500mn	Ready to execute
9	Health insurance solutions: Provide health insurance to ~320k vulnerable populations in exposed LGAs	Concessional finance	~20mn	Ready to execute
10	Re-design 5 LGAs for heat reduction (e.g., street grid, shading structure)- Badagry, Ikorodu, Ibeju Lekki, Epe and part of Eti Osa	Concessional finance	~2mn	(Pre) feasibility

3. Bankable Projects (14)

These projects include initiatives like protection of business assets, building supply chain resilience, PPPs (Public-Private Partnerships) with clear market returns, and GHG (Greenhouse Gas) offset projects.

Portfolio Size: ~\$3 billion.

Next Steps: All 14 bankable projects require feasibility studies to progress. Specifically, the feasibility

study and project preparation for the Transport links (waterways) project is ongoing³¹. The project involves the construction & rehabilitation of critical waterways including ~26 jetties & docks inundated to create resilient transport channels.

See the project list with financing needs and next steps in Table 3:

Table 3: Bankable projects

S/N	Project Name	Financing category	Estimated cost	Next step
1	Transfer stations and waste collection: Build 30 transfer stations & purchase waste collection vehicles to re-move local solid waste, reducing clogging of drains	Bankable	~2.5mn	(Pre) feasibility
2	Landfills/Waste to Energy: Rehabilitate/cap old land-fills and construct 3 new landfills and waste to energy plants	Bankable	~450mn	(Pre) feasibility
3	Alternative water supply: Develop alternative water supply (1.3bn gallons/day) to minimize ground water extraction reducing land subsidence	Bankable	~1bn	(Pre) feasibility
4	Sewage treatment plant: Build a sewage treatment plant reducing water contamination in floods	Bankable	~275mn	(Pre) feasibility
5	Commercial rainwater harvesting: Harvested rainwater can serve a substantial portion of their water needs, reducing flooding and water costs	Bankable	~3mn	(Pre) feasibility
6	Transport links (highways): Construction and rehabilitation of critical highways and interstate roads to prevent flooding and damage from flooding	Bankable	~270mn	(Pre) feasibility
7	Transport links (waterways): Construction & rehabilitation of critical waterways including ~26 jetties & docks inundated to create resilient transport channels	Bankable	~300mn	Implementation
8	Floodproofing power and communication assets: Floodproofing of 42 affected power assets and 44 affected communication assets to bolster flood resilience	Bankable	~115mn	(Pre) feasibility
9	Disease surveillance and sanitation solutions: Implement surveillance systems for existing and new disease risks addressing heat and water-related disease	Bankable	~50mn	(Pre) feasibility
10	Early warning systems: Systems to alert residents about imminent weather events, including flooding, enabling timely actions	Bankable	~20mn	(Pre) feasibility
11	Flood resistant low-income housing: Build flood-resistant housing complexes, ensuring safety for residents and continuous rent collection during flood events	Bankable	~275mn	(Pre) feasibility
12	Regenerative agriculture/agroforestry: Convert un- and under-used Lagos State agricultural lands into water sinks with the creation of natural floodplains	Bankable	~7mn	(Pre) feasibility
13	Aquafarming Facilities: Create aquaculture facilities resilient to flooding, turning a problem into a solution, and generating income from the sale of fish and sea-food	Bankable	~50mn	(Pre) feasibility
14	Mangrove restoration: Restore 11-ha of mangrove across 5 LGAs, acting as natural wave barriers reducing overland flooding made more common by sea level rise	Bankable	~25mn	(Pre) feasibility

Significant progress has been made in advancing projects within the portfolio. Appraisal studies have been completed for the 14 bankable solutions, with two flagship projects—a waste-to-energy plant and a wastewater treatment initiative—undergoing high-level commercial pre-feasibility studies that affirmed their viability and impact potential.

Bankable Project Pipeline

The bankable project list encompasses initiatives across sectors such as water, sanitation, transportation, energy, technology, real estate, and agriculture. These projects are structured to attract private sector financing through clear market returns and revenue models such as collection/usage fees, taxes, tolls, and carbon credits as shown in Figure 17 below.

Figure 18: LCARP Bankable projects with potential Revenue models

Project	Description	Revenue models	Est. Investment	CID ¹	
Water and Sanitation	1. Transfer stations and waste collection	Build 30 transfer stations & purchase waste collection vehicles to remove local solid waste, reducing clogging of drains and improve community health in floods	Collection fees, taxes	~2.5M	 
	2. Landfills/ Waste to Energy	Rehabilitate/cap old landfills and construct 3 new landfills or waste to energy plants to remove local solid waste, reducing clogging of drains and improve community health in floods	Collection fees, taxes	~450M	 
	3. Alternative water supply	Develop alternative water supply (1.3bn gallons/day) to minimize ground water extraction reducing land subsidence and providing water clean of contamination in flood events	Usage fees, taxes	~1B	 
	4. Sewage treatment plant	Build a sewage treatment plant through collaboration between Lagos water corporation and Lagos wastewater management office, reducing water contamination in floods	Usage fees, taxes	~275M	 
	5. Commercial rainwater harvesting	In commercial properties (malls, offices, condos), harvested rainwater can serve a large portion of their water needs, reducing flooding and water costs	Interest-bearing loans, sewage surcharges on non-participants	~3M	
Transport	6. Transport links (highways)	Construction and rehabilitation of critical highways and interstate roads incl (Lekki-Epe and Gbagada-Apapa) to prevent flooding and damage from flooding	Tolls, license fees, fuel taxes	~270M	 
	7. Transport links (waterways)	Construction & rehabilitation of critical waterways including ~26 jetties and docks inundated to create resilient transport channels	Farebox/ non-farebox revenues	~300M	 

 In-progress, AFD (Agence Francaise de Développement) has completed feasibility study

Energy	8. Floodproofing power and communication assets	Floodproofing of 42 affected power assets (power grid and power substations) and 44 affected communication assets (Communication mast) to bolster flood resilience	Energy and cellular charges	~115M	 
	Tech	9. Disease surveillance and sanitation solutions	Implement surveillance systems for existing and new disease risks incl. a fully equipped level 4 bio security infectious diseases facility addressing heat and water-related disease	Fees for service, insurance	~50M
Real Estate		10. Early warning systems	Systems to alert residents about imminent weather events, including flooding, enabling timely actions	Cellular fees	~20M
	Nature/ Agriculture	11. Flood resistant low-income housing	Build flood-resistant housing complexes, ensuring safety for residents and continuous rent collection during flood events.	Rents, property appreciation	~275M
Nature/ Agriculture		12. Regenerative agriculture/ agroforestry	Convert un- and under-used Lagos State agricultural lands into water sinks with the creation of natural floodplains, water-resistant crops, contour ploughing, terracing, and crop-covering	Produce sales, carbon credits	~7M
	13. Aquafarming Facilities	Agriculture or seafood companies could create aquaculture facilities resilient to flooding, turning a problem into a solution and generating income from the sale of fish and seafood.	Produce sales	~50M	 
	14. Mangrove restoration	Restore 11-ha of mangrove across 5 LGAs, acting as natural wave barriers reducing overland flooding made more common by sea level rise	Carbon credits	~25M	 

 Sea level rise

 Extreme heat

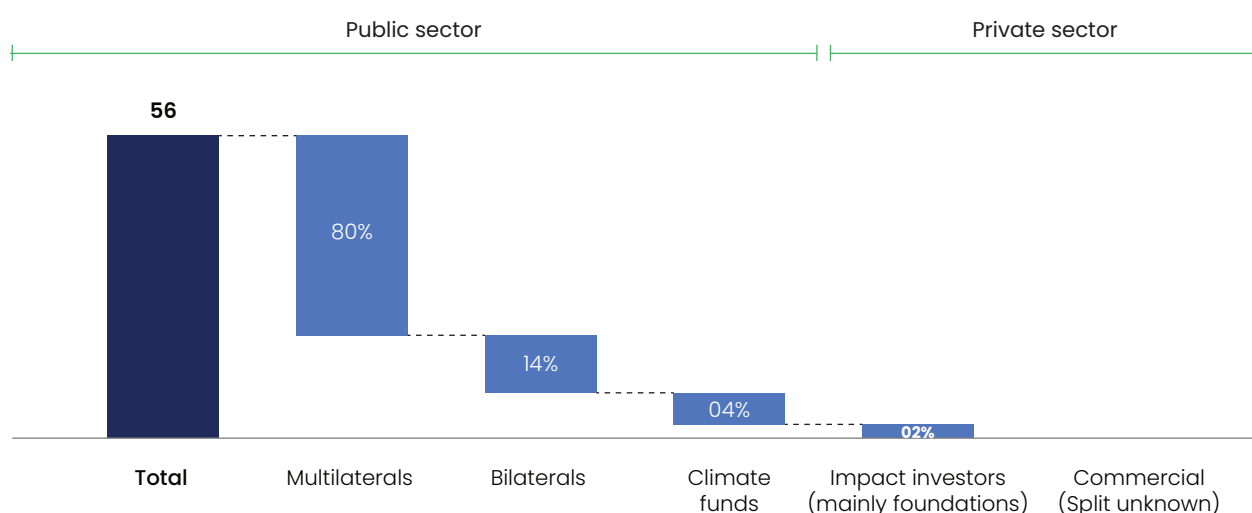
 Extreme rainfall

Despite the potential, the private sector's contribution to climate adaptation finance in Lagos remains limited, with private sector contributions amounting to a mere 2% of the total global funding³². The LCARP aims to bridge this gap by developing compelling

business cases for adaptation projects that outline both environmental benefits and paths to profitability.

32. Source: CPI – Global Landscape of Climate Finance reports (2021), IMF – Closing the Gap: Concessional Climate Finance and Sub-Saharan Africa (2023)

Figure 19: Global adaptation finance flows by funding sources, 2021 (\$bn)



LCARP is dedicated to navigating the complexities of climate finance by creating an environment conducive to private investment. At the heart of this endeavor is the formulation of clear and compelling business cases for adaptation projects—bankable A&R projects. These business cases must not only highlight the environmental benefits but also outline a clear path to profitability and risk mitigation, thereby aligning with the fiscal expectations of the private sector. However, developing these business cases involves challenges, including the need for significant technical and financial expertise to accurately evaluate and articulate the potential returns and associated risks.

The effectiveness of LCARP relies on transforming climate adaptation and resilience projects into bankable initiatives capable of attracting private capital. Achieving this requires not only the creation of robust, financially viable project proposals but also the establishment of a supportive policy framework that reduces risks and enhances the investment climate. To this end, Lagos State could play a proactive role by offering guarantees or subsidies, reducing regulatory barriers, and encouraging partnerships between public agencies and private investors.

Integrating private sector investments into the climate adaptation and resilience framework is vital for the sustainable development of areas like Lagos. By developing projects that are attractive to private investors and utilizing innovative financing mechanisms such as concessional and blended

finance, Lagos can significantly increase private sector participation in its climate resilience efforts. This collaborative approach is crucial not only for bridging the current funding gap but also for ensuring the long-term viability and success of climate adaptation strategies.

Spotlight on Key Projects – Waste to Energy and Wastewater Treatment

Two standout projects from LCARP’s prioritization, the Waste to Energy facility and the Wastewater Treatment facility, have been selected for commercial pre-feasibility assessments³³ due to their potential high impact.

Waste to Energy Plant

The Waste to Energy Plant is an innovative project designed to convert waste into energy, addressing both efficient waste management and energy generation for Lagos State. With approximately 80% of landfill capacity nearing the end of its life, 63% formal waste collection coverage³⁴, and 67% of households resorting to illegal dumping³⁵, Lagos faces significant waste management challenges. These issues contribute to flooding during extreme weather events by blocking drainage systems. The plant aims to enhance waste collection and treatment, reducing reliance on methane-emitting landfills.

Additionally, Lagos requires approximately 10,000 MW of electricity to ensure a stable power supply,

33. Detailed Pre-feasibility study for the two projects includes the case for change, proposed solution, potential operating model, financial model and risk mitigation
 34. Estimate based on input from the Lagos state waste management agency.
 35. A study used a total of 600 households drawn from 30 enumeration areas - Determinants of household’s waste disposal practices and willingness to participate in reducing the flow of plastics into the ocean: Evidence from coastal city of Lagos Nigeria – Nnaemeka Andegbe et al.

currently receiving only about 2,000 MW³⁶. This project offers a crucial opportunity to increase generating capacity by leveraging municipal solid waste as a resource for energy generation. Key details include:

- **Capacity:** The plant will process 760,000 tons of Municipal Solid Waste (MSW) per year, serving an additional 15% of the state's population
- **Energy Generation:** It is expected to generate approximately 532 GWh of electrical energy annually.
- **Location and Investment:** The facility will be located at Epe with a projected Capital Expenditure (CAPEX) of around \$400 million³⁷.
- **Timeline:** Implementation is expected to span 3 years.
- **Financial Outlook:** The project anticipates an Internal Rate of Return (IRR) of 12% over a 20-year operating period, underpinned by electricity pricing and the introduction of a tipping fee.

Wastewater Treatment Plant

The Wastewater Treatment Plant (WWTP) is designed to efficiently manage wastewater and sewage, enhancing sanitation and public health while addressing water-related climate challenges. Current infrastructure can treat only about 2% of sewage, and compliance with septic tank standards is low, at around 5%. No formal facilities exist for the reuse of wastewater and sludge, exacerbating the impacts of climate change.

The WWTP is considered a viable investment as more than 90% of residents already incur costs for septic tank pumping and treatment. The project will provide substantial public health and environmental benefits by improving wastewater management. This project will feature water and wastewater sewer pipes, as well as a plant for treatment. Key details include:

- **Service Area:** The plant is projected to serve up to 2 million people in the Eti-Osa & Lagos Island Local Government Areas.
- **Investment:** The Capital expense (CAPEX) for this project is approximately \$750 million³⁸.
- **Financial Performance:** It is expected to yield an IRR of 7% over 30 years, reaching a break-even point in year 14³⁹.

Both the Waste to Energy and the Wastewater Treatment projects are pivotal initiatives within the LCARP, addressing critical climate adaptation challenges in Lagos State. These projects demonstrate innovative solutions to waste management and wastewater treatment, emphasizing sustainability, public-private partnerships, and economic viability.

Key LCARP Initiatives to Drive Project Development

The 33 A&R projects encompassed by the LCARP are at varying stages of development. To facilitate their progression to implementation, three strategic initiatives have been established:

1. **Initiative 1: 20 Pre-Feasibility and Feasibility Studies** - This initiative is committed to detailed planning and risk mitigation through comprehensive studies. It encompasses a thorough analysis of project viability, including design, technical specifications, and preliminary cost evaluations for 20 projects including the two spotlight projects. This meticulous approach ensures that the projects are well-defined, and their feasibility clearly understood before further development.
2. **Initiative 2: 6 Concept Studies⁴⁰** - This initiative focuses on developing detailed project concepts that are strategically aligned with LCARP's goals. By laying a solid groundwork for viable project ideas, this step prepares them for detailed planning and subsequent feasibility assessments, ensuring that each project is robustly conceptualized to meet strategic objectives.
3. **Initiative 3: 7 Ready-to-Execute Projects** - Designed to transition projects efficiently from planning to execution, this initiative involves structuring deals, securing necessary funding, forging private sector partnerships, and moving projects into the execution phase. This proactive approach aims to swiftly bring well-developed projects to life, facilitating immediate impact and benefits.

These initiatives are integral to advancing the LCARP projects from conceptual stages through to implementation, ensuring each project is not only viable but also strategically positioned for successful implementation.

36. Projected energy needs for Lagos as estimated by the office of the SDG, LASG

37. Energy output and CAPEX estimated based on benchmarks with cities of similar waste composition, to be validated with a feasibility study.

38. High-level estimates done based on benchmarks - \$500m for pipe network and \$250m for the wastewater plant.

39. For more information on input assumptions, please contact the ministry of environment.

40. A brief outline of an initial project idea

chapter 5



LCARP Financing Mechanisms and Sources

Overview

Recall, Lagos State aims to raise approximately \$9 billion in climate funding across three project archetypes: bankable projects, projects requiring concessional finance, and projects requiring grants. This chapter delves into two critical aspects of financing that will assist the state in raising adaptation finance: (i) Financing mechanisms, and (ii) Funding sources.

Financing Mechanisms

This section provides insights into achieving the optimum mix of financial instruments for Lagos. It begins with an overview of the top financing instruments suitable for the city, focusing on blended finance, nature-based finance, and disaster risk finance. A central feature of this section is the Project Financing Matrix. This tool links LCARP's projects with potential financing mechanisms based on the project maturity stage and bankability levels, serving as a practical tool for matching project needs with the appropriate financial instrument.

Additionally, this section includes a comparison of Lagos's financing methods with global standards. This comparison highlights Lagos' overreliance on concessional debt and helps establish a potential target mix for the city. The section concludes by discussing initiatives for achieving a balanced mix of mechanisms, including setting up a grant accelerator program, issuing a green bond, developing a voluntary carbon market, and strengthening disaster risk finance.

Overview of Financing Mechanisms – Top Five Instruments for Lagos

Having identified potential A&R solutions to address Lagos's exposure to Climate Impact Drivers (CIDs), it is crucial to explore financing options to ensure the implementation of this project pipeline. Lagos intends to leverage five

climate finance mechanisms applicable to a sub-national government⁴¹:

1. Traditional Debt and Equity

Involves borrowing funds (debt) to be repaid with interest and raising capital by selling shares (equity). Examples include Green Bonds for projects with environmental benefits, Green Loans for eco-friendly projects, and Concessional Debt featuring favorable terms, typically with reduced interest rates.

2. Nature-Based Finance

Supports projects that harness natural processes for environmental benefits, like flood mitigation. Examples are Debt-for-Nature Swaps, Carbon Credits for projects that mitigate emissions, and Biodiversity Credits for biodiversity conservation.

3. Blended Finance

Combines public, private, and philanthropic funds to leverage substantial capital for development projects. This includes concessional and commercial capital deployed through various instruments like first-loss capital, guarantees, risk transfer instruments, and traditional blended approaches where grant funding catalyzes private sector investment.

4. Grants

Non-repayable funds from governments, organizations, or foundations to support specific projects or initiatives. Examples include Development Grants for project initiation or expansion, Technical Assistance Funding for expert support, and Partnership Initiatives for collaborative projects with shared goals.

5. Insurance & Disaster Finance

Financial tools designed to manage risks associated with disasters and climate impacts, providing funds for recovery and resilience building. Examples include Catastrophe Bonds

41. CPI Climate Adaptation Finance, 2023

for specific risks like natural disasters, Parametric Insurance based on specific triggers, and Climate Resilient Debt Clauses in debt agreements for climate-induced triggers.

Deep Dives – Blended Finance, Nature-Based Finance, and Disaster Risk Finance

Blended Finance

To attract the appropriate level of private capital for adaptation needs, the investment must be appealing within a broader risk-return profile to satisfy stakeholders' interests. Blended finance helps to better define this investment structure. Thus, it can be utilized for near bankable to bankable LCARP projects, as it has the potential to attract significant private investment.

- **Instrument Structure**

Blended finance combines development funding (public & philanthropic funders) with commercial capital. It includes concessional (below market rate), and commercial (market rate) capital mobilized and deployed through various instruments:

- » **First loss capital:** Private equity or debt funds augmented with concessional public

or philanthropic first-loss funding to attract institutional investments.

- » **Guarantees:** Bonds or notes, often issued for infrastructure projects, are combined with guarantees or insurance from public or philanthropic funders to enhance security.

- » **Traditional blended:** Grants that catalyze private sector investment, thus enhancing the financing facility's capacity to achieve both financial and social returns.

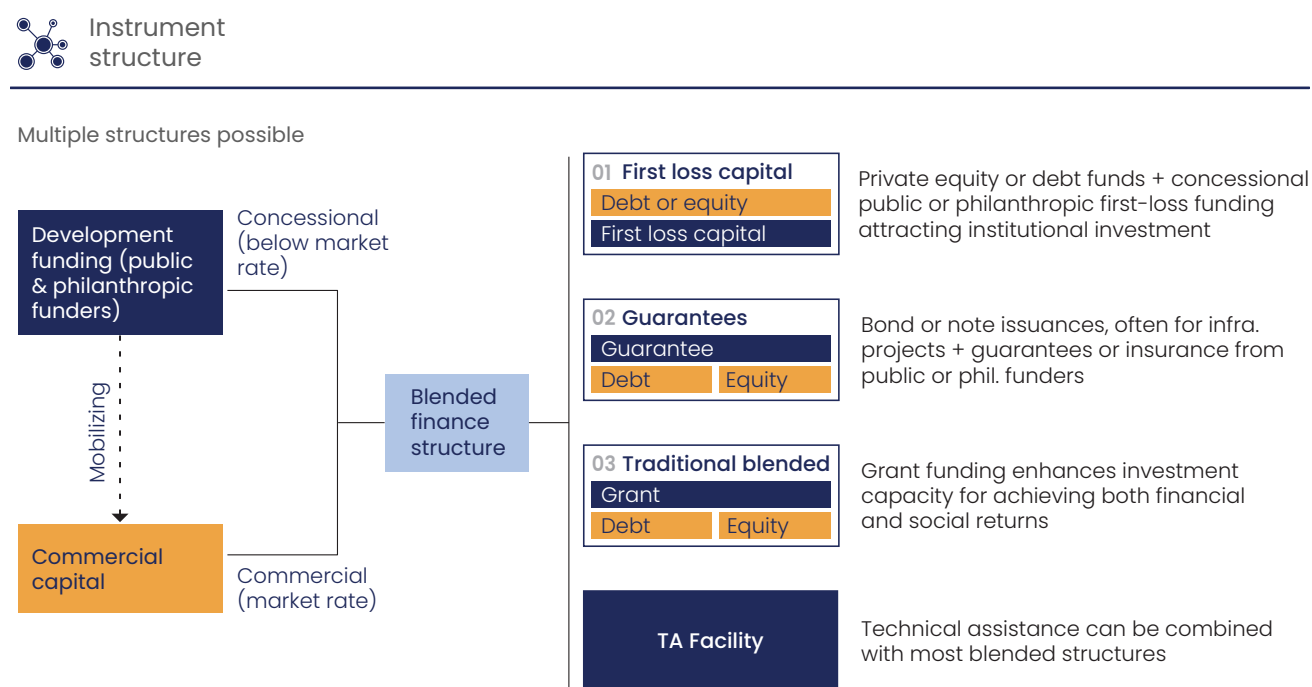
- **Project Suitability Criteria**

Blended finance is versatile across near bankable and bankable projects and is appropriate for projects ranging from small (less than \$50 million) to large (over \$500 million). It can be implemented at various phases of a project, including feasibility, planning, and implementation.

- **Enabling Structures**

1. **Policy & Regulation:** Sector policy and regulatory frameworks allowing for cost recovery of investments at risk-adjusted returns and policy reforms addressing obstacles faced by private investors in the local context are important enablers.

Figure 20: Blended finance instruments structure



Source: CPI Climate Adaptation Finance, 2023

2. Data and monitoring: A transparent and common monitoring and evaluation framework is crucial, providing clear data for informed decision-making and ensuring accountability in project outcomes and impacts.

- **Advantages & Disadvantages**

Advantages

The main advantage of blended finance is that it catalyses and mitigates risk for private investors for projects that they would otherwise not be able to invest in by leveraging development finance to mobilize additional private capital.

Disadvantages

Employing blended finance mechanisms presents challenges particularly around handling the complexity of structuring such financial arrangements, the need to balance the interests of diverse stakeholders involved, and the potential for miscommunication regarding risk-sharing mechanisms.

Nature-Based Finance – Carbon credits

Nature-based finance is predominantly used for projects that promote nature conservation, restoration, and biodiversity, with the financing directly tied to the environmental impact of the

projects. Carbon credits represent the most common form of nature-based finance and are applicable to projects that either avoid or remove greenhouse gas emissions. The reduction or avoidance of emissions is quantified into credits, which can then be sold to entities aiming to offset their carbon footprint.

- **Instrument Structure**

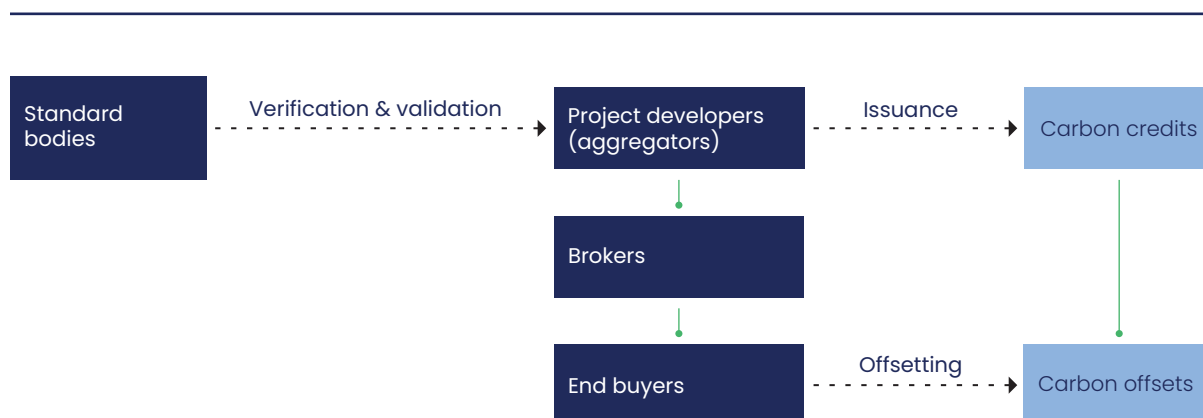
Carbon credits financing operates under established criteria set by standard bodies for eligible projects. Once these benchmarks are defined, project developers initiate projects that adhere to these standards, subsequently generating carbon credits. Before these credits can be traded, they undergo a rigorous process of verification and validation to ensure their authenticity. Brokers play a crucial role in this ecosystem by bridging the gap between the generated credits and potential end buyers. Buyers or investors purchase these credits as a means of carbon offsetting, thus compensating for their own greenhouse gas emissions. Importantly, investors can engage at the early stages of project development.

- **Project Suitability Criteria**

Carbon credits are applicable to near bankable and fully bankable projects, suitable for small, medium, and large-scale projects. They can be

Figure 21: Nature based finance instrument structure – Carbon credits financing

Structure



implemented during specific stages, particularly during planning and implementation. For larger projects, carbon credits can be leveraged to enhance the Internal Rate of Return (IRR), making an already bankable project even more financially attractive.

- **Enabling Structures**

1. **Policy & Regulation:** Certification of sustainability or green practices from independent third-party organizations is required to qualify for carbon credits
2. **Data and monitoring:** A reliable mechanism for reporting and tracking environmental impacts is essential to ensure transparent and accurate documentation of sustainability efforts

- **Advantages & Disadvantages**

Advantages

Nature based financing harnesses ecosystem services for climate resilience, encourages sustainable resource management and has the potential for innovative financial mechanisms integrating nature conservation.

Disadvantages

The execution of nature-based finance can

be complex, often requiring robust monitoring systems. Additionally, the scalability of these solutions may be limited, and the valuation of ecosystem services can pose significant challenges.

Disaster Risk Finance – Catastrophe Bond

Disaster risk finance is a category of climate finance that is used to help mitigate the negative economic impact of climate disaster and to help recover losses. It utilizes financial instruments such as insurance to manage, mitigate, and cover financial risks from events like floods, landslides, etc. A catastrophe bond is a specific type of disaster risk finance instrument that pays out the bond principal in the event of a specified disaster occurring.

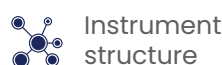
- **Instrument Structure**

A special purpose entity (SPE) is established to facilitate bond transactions. Terms of the bond, including the trigger mechanism, are predefined. Investors risk losing all or part of the principal if a disaster occurs but receive full principal payment if no disaster occurs by the bond’s maturity date.

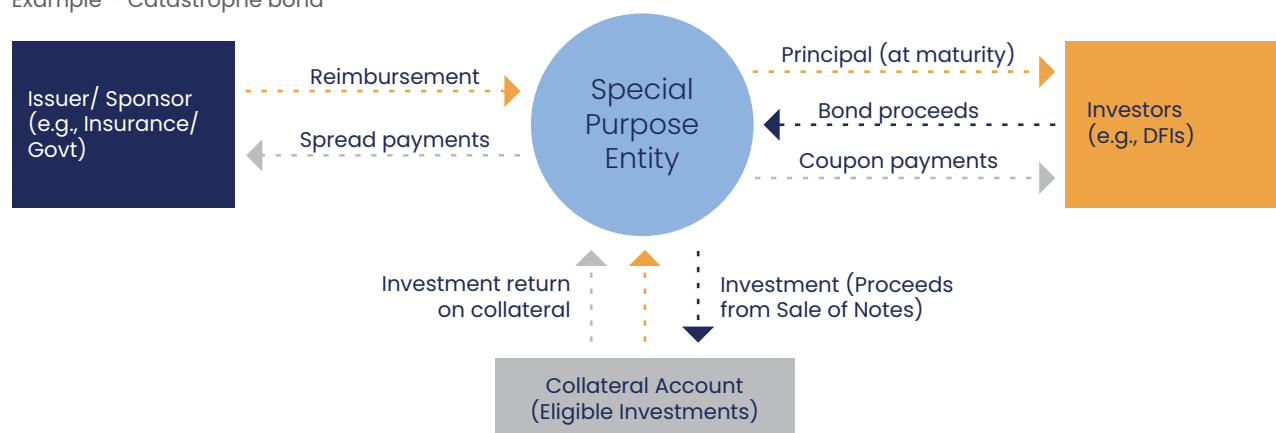
- **Project Suitability Criteria**

Catastrophe bonds are particularly applicable for non-bankable disaster preparedness initiatives.

Figure 22: Disaster risk finance instrument structure



Example – Catastrophe bond



- - ► Cashflows relating to the deal launch - - ► Cashflows relating to triggering or maturing of the bond - - ► Ongoing cashflows

Source: CPI Climate Adaptation Finance, 2023

- **Enabling Structures**

1. **Policy & Regulation:** Implement mandates for climate-related financial risk disclosures concerning adaptation and disaster risks to enhance transparency and boost investor confidence in catastrophe bonds. This ensures that potential vulnerabilities and mitigation plans are comprehensible and transparent.
2. **Data access:** Improve access to robust climate information and accurate data to enhance risk assessment and financial decision-making.
3. **Capacity building:** Develop the capabilities of local financial institutions, such as pension funds and insurance companies, to foster a more robust market for catastrophe bonds.

- **Advantages & Disadvantages**

Advantages

Provides financial protection against unexpected climate-related events, reduces financial volatility for project developers and communities, and attracts risk-tolerant investors seeking unique investment opportunities.

Disadvantages

Significant regular premium costs for bonds must be paid by the issuer, requires complex risk modelling and assessment, coverage might not extend to all types of climate risks, and might not be accessible for all aspects of a project.

Linking Projects with Financing Landscape

Engagement with potential investors has highlighted that financing mechanisms are particularly sensitive to two key parameters: the project archetypes (bankable, near bankable, and non-bankable opportunities) and the maturity/lifecycle stage of the projects in the portfolio (concept & pre-feasibility, feasibility assessment, and implementation).

Project Archetypes

- **Bankable Projects:** These projects exhibit a high degree of certainty in terms of profitability and success. They have clear revenue streams and strong appeal to investors and stakeholders due to their proven market viability and robust returns on investment. Examples include the development of a waste-to-energy facility and a sewage treatment plant.

- **Near Bankable Projects:** This category includes projects that show significant potential but require considerable effort, such as revenue diversification and capital cost optimization, to achieve an acceptable ROI. Although promising, these projects carry a moderate level of risk and need further development to become fully bankable. Examples include the construction and rehabilitation of critical transport links and the digitalization of the healthcare system.
- **Non-bankable Projects:** These projects do not present a clear path to profitability and are typically not immediately attractive to traditional investors, often being viewed as serving the public good. Examples include the relocation of vulnerable populations and retrofitting public schools with flood protection systems.

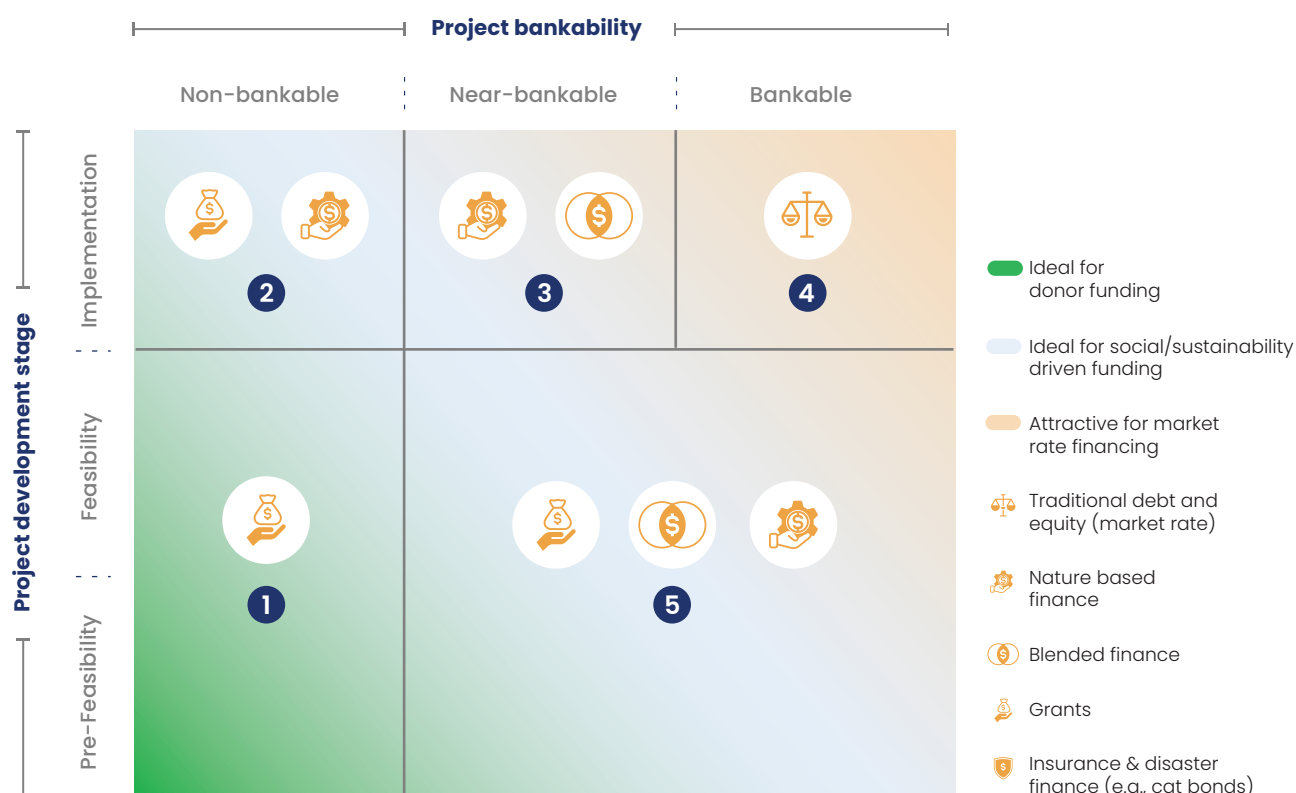
Maturity/Lifecycle Stage

There are three maturity stages in a project lifecycle, which represents the extent of preparation currently conducted for the project. These stages include Concept/pre-feasibility, feasibility, and implementation.

- **Concept & Pre-feasibility:** This initial stage involves developing a concept note or conducting a feasibility study that outlines initial project ideas, market understanding, a high-level evaluation of technical and financial viability, risk identification, and preliminary design.
- **Feasibility:** At this stage, project design is fleshed out through detailed technical feasibility assessments, supplier selection, regulatory compliance, and the establishment of a robust project management framework.
- **Implementation:** This final stage includes reaching financial close and moving into construction, focusing on resource mobilization, execution of construction tasks, maintaining quality standards, and continuous progress monitoring.

Mapping the identified financing instruments against project archetypes and maturity stages provides insights into how each project can be best positioned for financing. This strategic mapping exercise classifies projects into five main clusters, which are detailed in Figure 22, facilitating targeted and effective financial planning for each project

Figure 23: Financing instrument matrix



category. This approach ensures that each project receives the appropriate type of financing at the right stage of its development, optimizing resource allocation and enhancing the likelihood of successful project implementation.





- 1. Non-Bankable Early-Stage Projects:** These initial stage projects lack the profitability or stability needed to attract traditional bank financing. Suitable funding instruments for these projects include government-sourced instruments and grants, such as technical assistance and development grants.
- 2. Non-bankable Mature-Stage Projects:** These are high-impact, advanced-stage projects that suffer from low profitability and stability, making them less attractive to investors. A combination of grants and nature-based finance can be utilized for funding.
- 3. Near Bankable Mature-Stage Projects:** These more developed projects are close to achieving bankability and have a higher likelihood of generating stable returns. They are primarily financed using blended finance structures, supplemented by nature-based finance options.

- 4. Varied Bankable Early-Stage Projects:** Early-stage projects that demonstrate potential for profitability and stability are somewhat attractive to various investors. Financing for these projects may involve government source instruments, grants, equity investments, and blended finance structures.
- 5. Bankable Mature-Stage Projects:** These late-stage projects have a proven track record of profitability and stability, making them highly attractive to a broad range of investors. With well-established revenue streams, clear market demand, and solid operational history, these projects can typically be financed through traditional market-rate debt and equity.

This matrix provides a strategic framework to identify the most suitable financial instruments for each project stage and level of bankability, thereby optimizing resource allocation for climate adaptation and resilience efforts in Lagos.⁴²

42. This mapping and matrix are intended only as a guide, project specific variations may occur.

Figure 24: Comparison of Lagos' financing mechanism mix⁴³

A&R finance mix	 Debt and Equity	 Grants	 Blended finance	 Nature-based and disaster finance
Current State	90%	10%	~1% Few blended finance climate adaptation projects	~0 No evidence of nature based or disaster finance
Global average	20%	17%	Increasing uptake of blended finance solutions	~21%

Source: AATIF website, AfDB projects website; BCG analysis

Comparison of Lagos with Global Financing Mechanisms Landscape

A landscape analysis of Lagos's adoption of relevant financial instruments, compared to global averages, reveals a skewed preference towards debt and an underutilization of other important instruments. Further investigation into similar geographies that have explored diverse financing mechanisms highlights key success factors for replication within Lagos' context.

Debt & Equity

Globally, debt and equity instruments are extensively utilized, especially for funding substantial infrastructure projects. In Lagos, however, there is a pronounced overreliance on this form of financing, with concessional debt constituting about 90% of its current adaptation and resilience finance mix. This stark contrast with the global landscape underscores the need for Lagos to diversify its financing mechanisms. The target for Lagos is to reduce its dependency on debt and equity to a more balanced range of 30–40%.

Grants

Grants are crucial in the global financing landscape, particularly for projects that may not be commercially viable but offer high social or environmental benefits. Currently, Lagos uses grants modestly, making up only 10% of its financing mix. This situation indicates significant potential for Lagos to increase the use of grants, especially for high-impact social projects.

Blended Finance

Blended finance, which combines concessional funds with private investments, is gaining popularity globally. In contrast, Lagos's engagement with blended finance is nascent, barely reaching 1% of its finance mix, with plans to expand this to 30–40%. This indicates a significant gap between Lagos's current engagement and the global trend, highlighting an urgent need for Lagos to enhance its use of blended finance.

Nature-Based & Disaster Finance⁴⁴

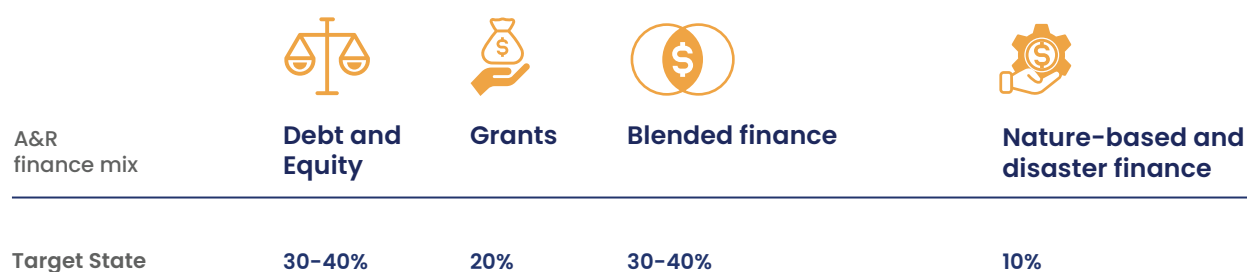
The fields of nature-based and disaster finance, relatively new and innovative forms of financing, are increasingly recognized for their focus on environmental sustainability and financial resilience. In Lagos, there is a noticeable absence of these financing mechanisms, with no current usage and a target to introduce and expand its share to about 10%. This gap emphasizes a significant area for development as Lagos seeks to integrate these innovative finance solutions into its portfolio.

Lagos is aiming for a more balanced approach in its financing options. The city plans to reduce its heavy reliance on concessional debt, increasing the use of grants, blended finance, and introducing nature-based and disaster finance into its portfolio. This strategy ensures financial viability while maximizing the social and environmental impacts of the LCARP projects.

43. Source: Africa Agriculture and Trade Investment Fund (AATIF), AfDB projects

44. Disaster financing mechanisms only apply in case of disaster and are not used to fund projects.

Figure 25: Lagos’ target funding instrument mix



Source: AATIF website, AfDB projects website; BCG analysis

Key LCARP Initiatives for Achieving a Balanced Funding Mix

LCARP outlines four key initiatives aimed at enabling Lagos to achieve an optimal financing mix to unlock approximately \$9 billion in adaptation and resilience (A&R) funding by 2035. These initiatives encompass various funding mechanisms, each with specific goals and strategies:

- **Initiative 4: Grants and Technical Assistance Accelerator Program**

This program is designed to attract and increase grant funding, focusing especially on early-stage and small-scale A&R projects. It aims to enhance the capacity of projects that might otherwise struggle to secure funding, thereby ensuring a broader range of projects can contribute to Lagos’s climate resilience.

- **Initiative 5: Develop and Issue a series of Green Bonds:**

Lagos State plans to issue a green bond as part of its strategy to diversify its debt portfolio and improve the balance between debt and blended finance. The proceeds from this bond will be used to finance a broad range of climate-related projects. This initiative not only diversifies the state’s financial sources but also specifically earmarks funds for impactful projects.

- **Initiative 6: Facilitate the Development of a Voluntary Carbon Market**

This involves establishing a framework for Lagos State’s participation in the voluntary carbon market. This initiative enables Lagos to unlock carbon finance opportunities enabling businesses and organizations to offset their carbon emissions by facilitating investments in local climate projects, thus creating a new stream of funding

for carbon avoidance and removal initiatives. This aligns with plans of the federal government of Nigeria and the Africa Carbon Markets Initiative (ACMI), as they journey towards paving a way for Carbon markets in Nigeria and Africa respectively.

- **Initiative 7: Strengthen Disaster Risk Financing**

Undertake an assessment of how to improve Lagos disaster preparedness, including the possibility of utilizing financial instruments such as catastrophe bonds and parametric insurance. These instruments are designed to enhance Lagos State’s preparedness and response to natural disasters. They provide a mechanism to quickly mobilize funds in the event of a disaster, thereby reducing the financial impact and accelerating recovery efforts.

By diversifying funding mechanisms, including grants, debt instruments, carbon credits, and disaster risk financing tools, Lagos aims to secure the necessary resources to effectively address the challenges posed by climate change and to build a resilient future for the city.

Funders

This section identifies potential funders for LCARP projects by leveraging insights from global and local climate investment trends to understand roadblocks and initiatives for unlocking adaptation funding. The strategy primarily targets public sector funds from multilaterals and bilaterals, while also considering climate funds, impact investors, and commercial investors.

A significant challenge identified is the underutilization of climate funds in Africa, often due to complex processes and slow funding disbursements.

Lagos plans to actively engage with these funds to access a portion of the \$200 billion globally earmarked for climate adaptation and resilience by 2025. The strategy includes identifying suitable funders, crafting compelling proposals, and building robust relationships with major climate funds.

Central to attracting investment is the initiative to de-risk climate projects. Like other emerging markets in Africa, Lagos is often viewed as a high-risk investment destination. To alter this perception and attract investors, Lagos will conduct thorough risk assessments and develop mitigation strategies, such as offering payment guarantees for priority projects.

This section outlines a comprehensive strategy for Lagos to secure funding for its climate A&R objectives, emphasizing the diversification of funding sources and the implementation of risk management strategies to achieve the city’s climate goals.

Overview of Five Funding Sources and Opportunities for Lagos

LCARP highlights five key funding sources for climate A&R finance, each providing unique opportunities for Lagos to enhance or tap into new funding streams. Funding for climate initiatives is predominantly provided by the public sector, both globally and in Nigeria. However, there is potential to access funds from a diverse range of channels, including private and alternative financing options.

Figure 26: Global adaptation finance flow by funding sources, 2021 (\$Bn)⁴⁵

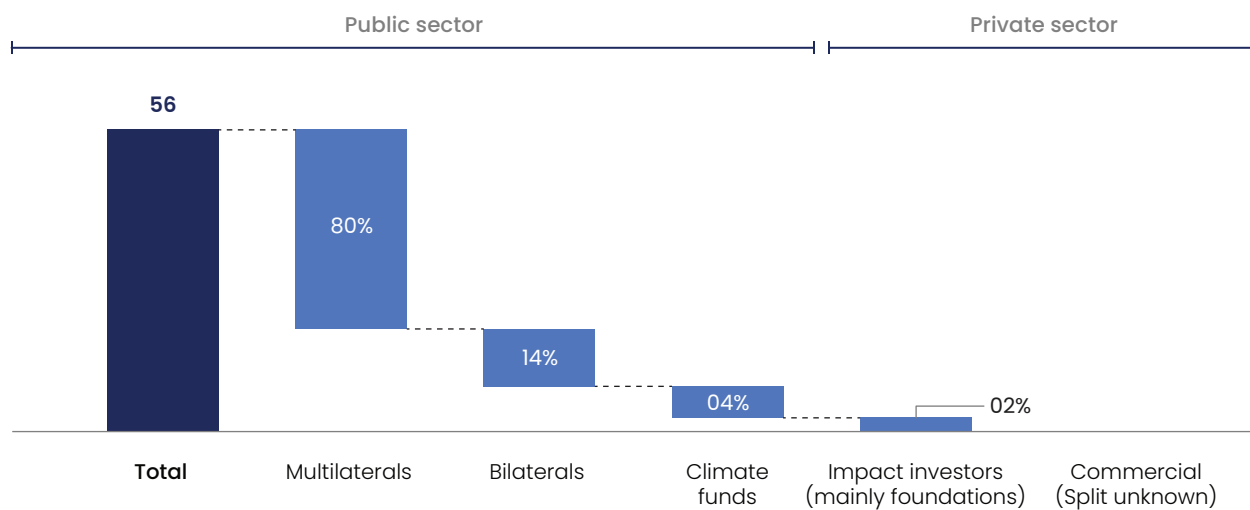
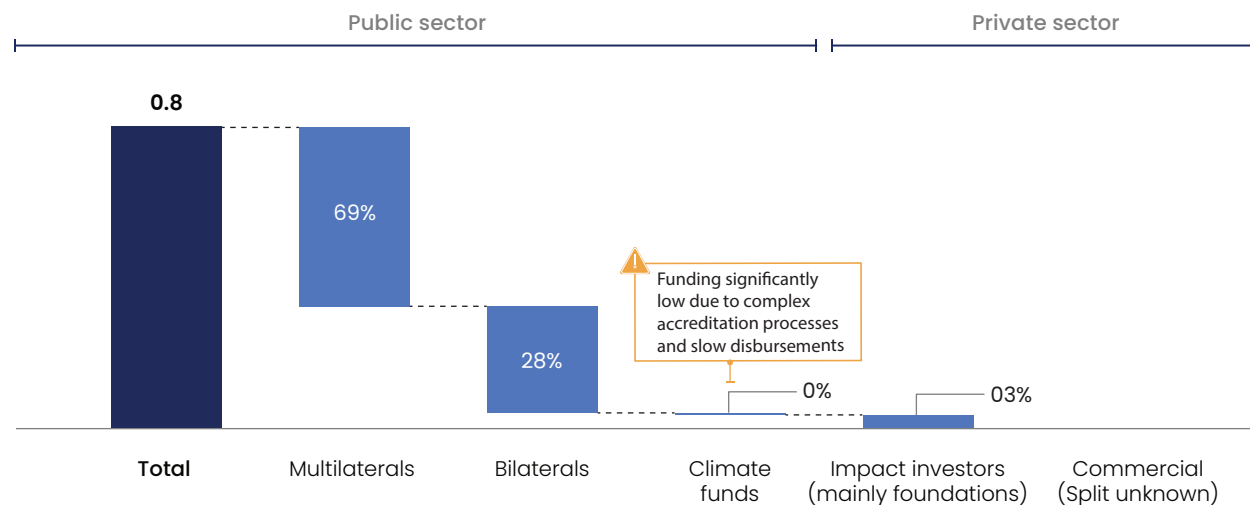


Figure 27: Nigeria’s adaptation finance flows by funding source, 2021 (\$Bn)



45. Impact investors classified as: Foundations, Donors, High net-worth individuals, Philanthropic organizations. Note: Sector split done by using 2020 sector breakdown as proxy for 2021 total. Source: CPI – Global Landscape of Climate Finance reports (2021), IMF – Closing the Gap: Concessional Climate Finance and Sub-Saharan Africa (2023)

Multilaterals

These institutions, which contribute 80% of global adaptation finance and 69% in Nigeria, offer substantial funding opportunities. Lagos can increase engagement with multilateral organizations like the World Bank by aligning its projects with their strategic goals.

Bilaterals

Bilateral agencies account for 14% of global and 28% of Nigerian adaptation finance. These agencies fund projects that align with their countries' foreign policy objectives. Lagos could tap into these funds by aligning its environmental and developmental projects with the goals of potential bilateral partners.

Climate Funds

Although only representing about 4% globally and nearly 0% in Nigeria, climate funds are vital for targeted climate initiatives. Lagos faces challenges with complex accreditation processes and slow

disbursements. Efforts to streamline application processes and build administrative capacity are crucial.

Impact Investors

This group includes entities interested in funding innovative and high-impact projects. While their current contribution is limited, they represent a growing source of climate finance. Lagos can attract these investors by demonstrating the potential for sustainable impact and clear returns on investments.

Commercial/Private Sector

Currently, a minor contributor, the private sector holds significant potential for funding climate adaptation and resilience initiatives. Lagos can engage this sector by creating a conducive environment for private investment, developing public-private partnerships, structuring projects to increase bankability, and offering incentives for private sector participation.

Figure 28: Pledged A&R funding for highlighted sources⁴⁶

Funding Source	Historic funding	Commitments	Examples
Multilateral¹	~\$62bn	\$180bn	
Bilateral²	~\$20bn	~\$87.1bn	
Climate funds³	-	~\$20bn	

¹ The top 7 multilaterals globally ² The top 9 bilaterals globally ³ The top 10 climate funds globally
 Source: MDB 2020 report; BCG analysis; Multilateral DFIs annual reports; OECD Annual CRDF Reports; COP26 Presidency; Compilation of 2021-2025 Climate Finance Commitments; BCG analysis

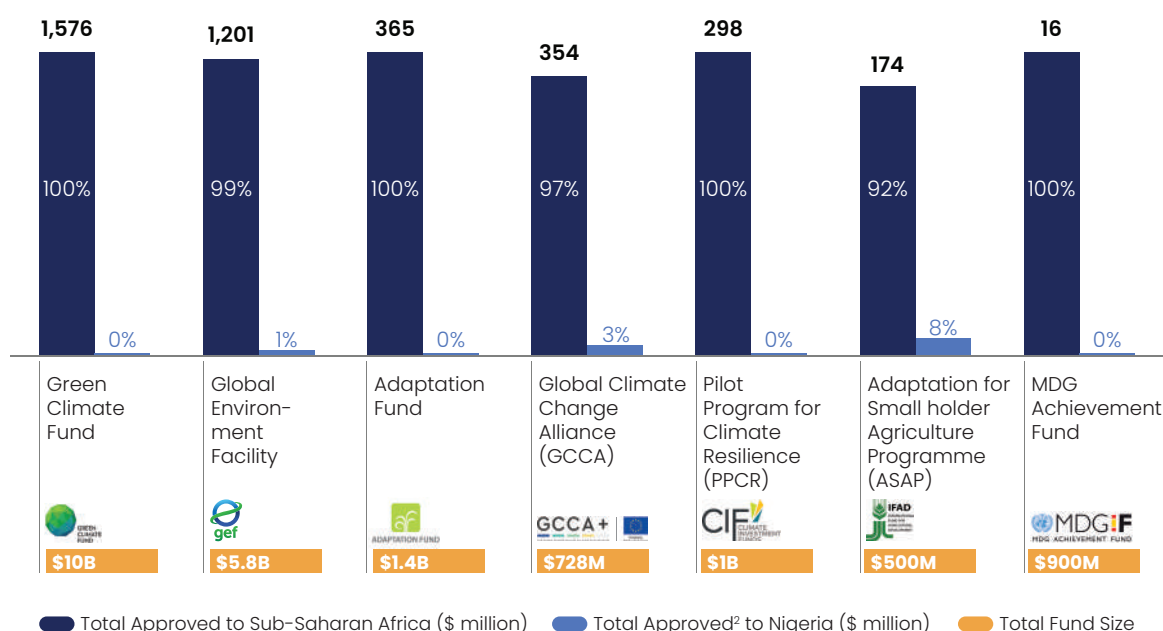
Nigeria's Opportunity

With over \$200bn in pledged A&R funding across Multilaterals, Bilaterals and Climate funds (Figure 27), the opportunity is huge for a developing country such as Nigeria to act now and tap into this available pool.

Lagos has a substantial opportunity to increase funding for climate adaptation and resilience

projects by strategically engaging with all five sources by establishing a strong vision, building long-term relationships that bring the private sector through a clear engagement approach, and matching investors to the right type of projects. This would involve aligning projects with the goals and requirements of different funding bodies, streamlining application and accreditation

46. Multilateral figures obtained from the top 7 multilaterals globally, Bilateral commitments summed from the top 9 Bilaterals globally, Climate funds figures sourced from the top 10 climate funds globally (All ranked based on historical A&R funding)

Figure 29: Total funding from climate funds to SSA, 2009 – 2022, \$million⁴⁷

processes, demonstrating the potential for A&R impact and commercial viability for returns on investments.

Addressing Roadblocks to Unlock Funding

LCARP has identified the limited diversification of funding sources for A&R projects in Nigeria as a significant barrier to increasing finance flows to Lagos. Currently, only 3% of Nigeria's A&R funding comes from outside traditional multilateral and bilateral sources. This minimal impact of climate funds, despite their substantial role in Sub-Saharan Africa, underscores the need for a broader engagement strategy.

The underutilization of diverse funding streams is a result of four critical roadblocks:

- 1. Project Readiness:** Many A&R projects in Lagos and Nigeria at large face challenges in reaching a stage of development that is attractive to a wide array of funders. This includes the lack of comprehensive project planning, feasibility studies, and clear implementation strategies, which are often prerequisites for securing funding, especially from non-traditional sources.
- 2. Technical Capacity:** There is a gap in technical expertise required to navigate the complex landscape of global climate financing. This includes understanding the specific requirements and standards of various funding bodies,

preparing robust proposals, and effectively managing large-scale climate projects. This hinders the ability to access and efficiently utilize available funds.

- 3. Relationship Management:** Building and maintaining relationships with a diverse set of funders, including international climate funds, private investors, and other non-traditional sources, is crucial. Currently, there is a shortfall in establishing these vital connections and networks, which are essential for unlocking access to various funding opportunities.
- 4. Sovereign Risks:** Concerns related to political stability, policy continuity, and economic conditions in Nigeria pose sovereign risks that can deter potential funders, especially those from the private sector. These risks create a challenging environment for securing investment, as they increase the perceived risk of funding projects in the region.

Key LCARP Initiatives to Deepen Relationships with Funders

Addressing these roadblocks is crucial for Lagos to diversify its funding sources for climate adaptation and resilience projects. By strengthening engagement with climate funds and de-risking climate A&R projects, Lagos can unlock a broader spectrum of funding opportunities, which are essential for the

47. Note: Most of the funds are replenished annually therefore fund size is subject to change
Source: Climate Funds Update Databas

successful implementation of its LCARP initiatives. Equally important is the commitment to maintaining and strengthening relationships with current funders, ensuring a continuous and sustainable long-term partnership.

- **Initiative 8: Strengthening Engagements with Climate Funds**

This initiative focuses on enhancing the capacity to effectively engage with various climate funds. It involves identifying potential funders aligned with Lagos' climate objectives and developing detailed, compelling proposals to attract these funds. The goal is to secure financing from both international and domestic sources for climate initiatives. The implementation process includes funder landscaping, proposal development, structured follow-ups, negotiating terms, and ongoing relationship management. Success in this initiative requires a deep understanding of the funders' criteria and ability to handle changes in the strategies of these funds. Moreover, crafting proposals that are technically sound and appealing to these funders is critical. The insights gained from strengthening engagement

with climate funds will provide valuable lessons applicable to engaging other types of funders, such as bilateral and multilateral agencies, thereby enhancing the overall funding strategy.

- **Initiative 9: Develop tools to De-risk Climate A&R Projects**

The focus of this initiative is on reducing the financial risks associated with climate projects, making them more attractive to a wider range of investors, especially from the private sector. This involves conducting a comprehensive analysis of potential risks that may deter investors and developing strategies to mitigate these risks. The objective is to enhance the appeal of these projects to investors by demonstrating robust risk management. The implementation process includes thorough risk assessments for each project, engaging necessary stakeholders in developing mitigation solutions, and implementing risk mitigation tools and processes. Effective monitoring and adjustment of these strategies are required to ensure that the projects remain attractive to investors and adapt to changing risk landscapes.



chapter 6

NIGERIA PAVILION



FLOODING



IS GREEN
STMENT



LCARP Policy Recommendations

Overview

Establishing an effective and enabling climate policy landscape is crucial for unlocking the necessary Adaptation and Resilience (A&R) financing to fulfill Lagos State’s ambition of securing over \$9 billion by 2035. Enhancing climate policies and regulations is key to accelerating A&R investments by demonstrating strong political commitment, fostering a stable investment environment, and enabling the implementation of bankable projects.

Through comprehensive benchmarking against leading peers in Africa, Asia, and developed countries, the LCARP has identified eight best practice government and policy initiatives that are instrumental in creating an enabling environment for A&R finance and investors. These insights and implications for Lagos are detailed further in this chapter.

Enhancing Climate Finance through Policy

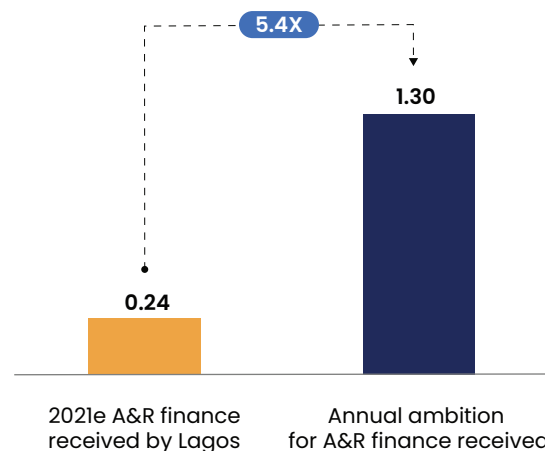
Despite significant progress in formulating policies such as the Lagos Resilience Strategy, Lagos Climate Action Plan, and Lagos State Climate Risk Assessment, Lagos State’s adaptation and resilience (A&R) financing in 2021 accounted for only approximately 18% of the LCARP’s annual financial target (see Figure 29 below). This substantial gap between the financing received and the state’s needs highlights the urgent requirement for more robust policy measures to foster an enabling environment for A&R investment.

1. Narrative and Information Gaps

- A critical challenge facing climate finance and adaptation efforts in Lagos is the lack of comprehensive data and robust analytics on climate risks and the associated benefits of timely adaptation measures. This inadequacy has

Figure 30: A&R finance ambition and receipt, 2021 (\$bn)

A&R finance ambition and receipt, 2021 (\$'B)



Note: 2021 A&R finance received by Lagos is estimated as 30% on the total A&R finance received by Nigeria (-0.8 \$bn)

several implications that ultimately discourage investment in climate-related initiatives including uncertain risk projections, lack of evidence based decision-making, perceived high risk, and difficulty in measuring benefits.

- Opportunity to strengthen the narrative for action: Another fundamental obstacle is the weak narrative for action. This issue manifests in two primary ways: the insufficient quantification of the 'cost of inaction' and the existing perspectives that are narrowly focused and sector-specific.

2. Gaps in Policies, regulations, and enforcement

- Policies are frequently developed and implemented within isolated departments such as urban development, water management, transportation, and environmental conservation. This approach hinders the ability to coordinate investments across interconnected sectors.
- While numerous policies have been designed and well documented, there is a need for stronger enforcement to ensure their practical impact and effectiveness e.g., policies against improper dumping of waste, standards for building sewage septic tanks, etc.

3. Political Will

- Investors require reassurance of government commitment, especially in emerging markets.
- Many Public-Private Partnership (PPP) models necessitate long-term transactional relationships and commitments with the government.

Addressing these issues effectively can transform the policy landscape in Lagos, thereby accelerating investment into bankable A&R projects by:

• Supporting the Implementation of Bankable Projects:

Effective climate policies provide a clear roadmap and regulatory support, facilitating the planning and completion of climate projects by reducing roadblocks and creating favorable conditions for project success.

• Attracting Private and Foreign Investors:

Sound climate A&R policies create a stable and predictable regulatory environment, reassuring

investors of the government's commitment to sustainability and fostering confidence in the long-term economic viability of their investments.

• Demonstrating Political Will:

Demonstrating political will is crucial alongside a supportive policy landscape and is a significant factor considered by international and private sector investors. It underscores the government's commitment to adaptation and resilience.

By improving these policy and regulatory frameworks, Lagos can significantly enhance its ability to attract and secure the necessary funding for its climate A&R goals, ensuring a more resilient future for the city.

Policy Benchmarking and Baseline

To identify potential policy and regulatory initiatives that could improve the environment for A&R finance in Lagos, a comprehensive benchmarking exercise was undertaken. The objective of this exercise was to first understand the policies and actions that leading cities in A&R financing employ to bolster their investment environments. Following this, the exercise aimed to determine how Lagos could adapt these sound practices to its unique context.

Benchmark City Selection

There was a three-step process for the selection of benchmark cities.

1. Rank large cities^{48,49} based on A&R finance received.
 - » Rationale: Important to benchmark Lagos to cities that are best-in-class in terms of attracting finance for adaptation and resilience.
2. Filter out cities that do not have a similar level of economic development as Lagos.
 - » Cities with a GDP per capita below \$1,000 USD or above \$5,000 USD were excluded from the analysis.⁵⁰
 - » Rationale: It is important to compare Lagos to cities with a similar level of economic development

48. Largest city per country included in the ranking.

49. Country data was used as a proxy as global city level data was not available.

50. Source World Bank 2021

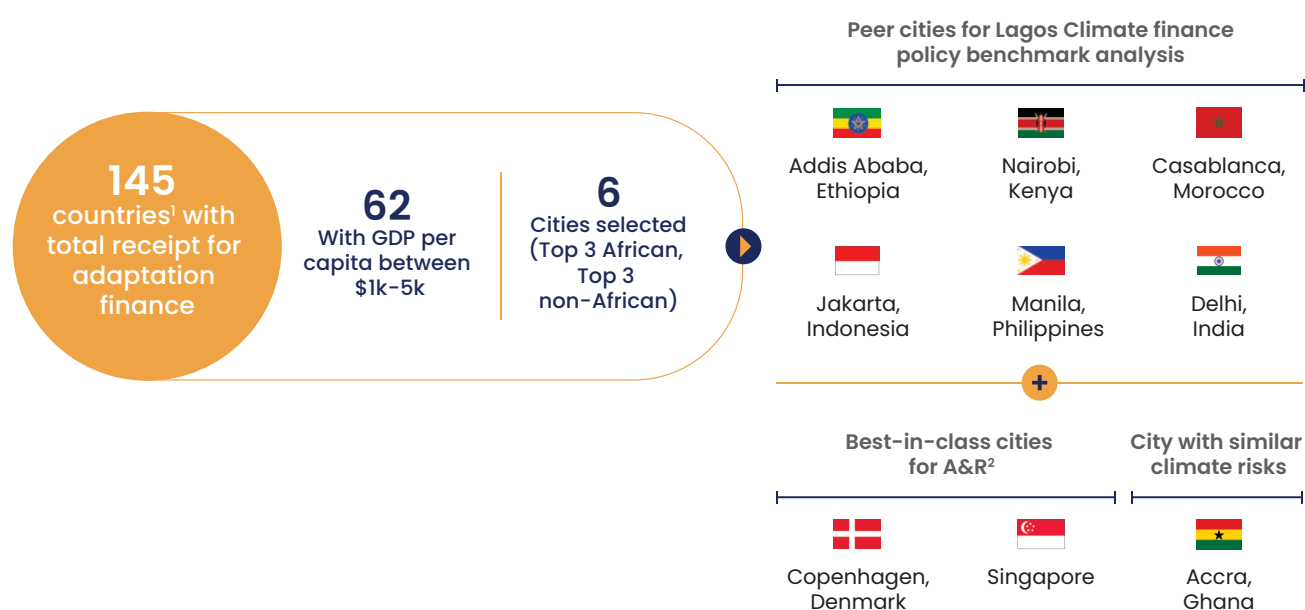
3. Select the top 3 African Cities and the top 3 Asian cities in terms of A&R finance received for benchmarking purposes⁵¹

- » The top 3 African cities were Addis Ababa (Ethiopia), Nairobi (Kenya), and Casablanca (Morocco)
- » Top 3 Asian cities were Jakarta (Indonesia), Manila (Philippines) and Delhi (India)

» In addition to the above 6 cities, 2 leading A&R cities globally – Copenhagen (Denmark) and Singapore (Singapore) – and a city with similar climate risks Accra (Ghana) were added to the analysis.

» Rationale: It is important to get a strong understanding of the different actions being taken by cities across a range of geographies

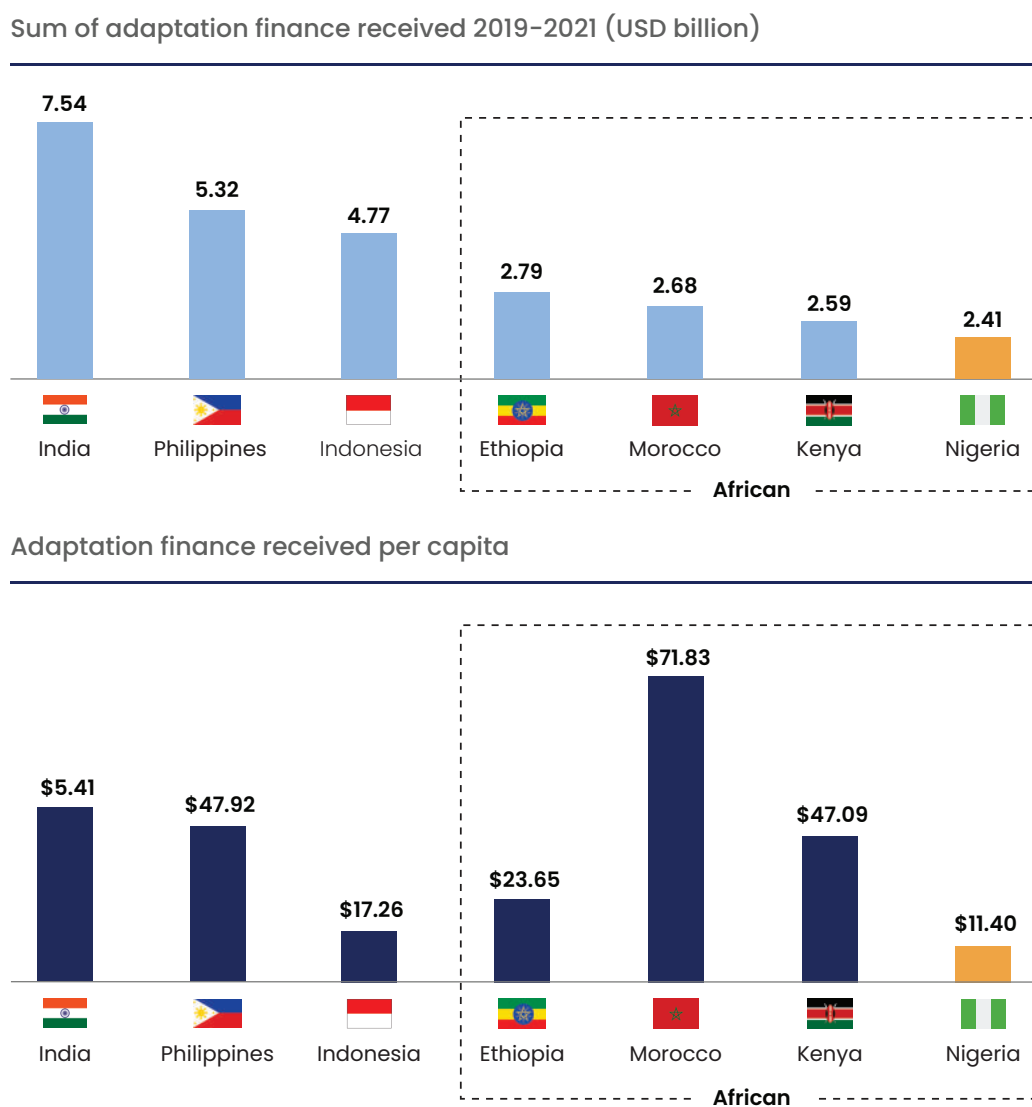
Figure 31: Benchmark Selection Process



¹ Country data used as a proxy for finance ranking and GDP per capita ² Top 2 cities according in terms of readiness according to the ND-Gain Index. Readiness measures a country's ability to leverage investments and convert them to adaptation actions Source: OECD Climate Change: OECD DAC External Development Finance Statistics, 2022, BCG Analysis

Highlight: The top 3 Asian and top 3 African benchmarks have each received more A&R finance than Nigeria⁵² and on a per capita basis, only India – a country of 1.4 billion people – has received less A&R finance per capita than Nigeria.

Figure 32: Total and per capita A&R finance received across benchmarks



Source: OECD Climate Change: OECD DAC External Development Finance Statistics, 2022; BCG analysis

Policy Dimensions for assessment

After an analysis of policies and government actions undertaken by each benchmark, 8 distinct dimensions were chosen for the benchmarking analysis. These 8 dimensions are outlined below.

- 1. Strength of Climate finance ecosystem:** Market has track record of issuing instruments including green finance instruments (e.g., green bonds), to facilitate project funding.
- 2. Budget allocation or fund:** Financial appropriations by the government to support climate adaptation projects, demonstrating political will.
- 3. Green taxes and subsidies:** Tax benefits for investing in green finance instruments.
- 4. Policies on Climate finance:** Laws or statutes that affect climate financing including green bonds law, national green banking policies, carbon trading policy, etc.

52. Where specific city data was unavailable, country-level data was utilized as a proxy

5. **Government A&R project database:** Public data repository with full details about completed, ongoing, and future A&R climate projects e.g., carbon offset registry.
6. **Existence of Public Private Partnership (PPP) policy & Project Development Unit (PDU):** How easily can PPP projects take place in the city? Is there a PDU unit that helps remove policy roadblocks?
7. **Ease of doing business:** Are there any lengthy licensing process or delays in permit approval for projects?
8. **Restriction on foreign capital flow:** Factors or regulations that could restrict the flow of foreign capital.

For each dimension of assessment, 3 categories of criteria were created – strong performance, ok performance, and room for improvement. The definitions for each of these criteria per dimension are outlined in Table 5 below.

Table 4: Benchmarking assessment criteria for each dimension

	Dimension	Description
Climate Funding Mechanisms	1. Strength of Climate finance ecosystem	Variety of green instruments; green bonds, loans, pension funds, securities, grants, etc.
	2. Budget allocation or fund	Presence of climate tagged budget for A&R, co-funded climate adaptation funds
Climate Finance policies	3. Green taxes and subsidies	Carbon taxes, green subsidies and incentives for energy efficiency, green initiatives
	4. Policies on Climate finance	National and city climate strategy and climate finance guidelines for green instruments
	5. Government A&R project database	Existence of carbon registry or government database for adaptation projects
Foreign Investment Ease	6. Existence of PPP policy & PDU unit	Extensive PPP regulation, operational PDU or PPP unit & government incentives
	7. Ease of doing business ⁵³	Ranked 1st -55th, Easy business registration, tax simplicity, low corruption, few trade restriction
	8. Macroeconomic environment / restriction on foreign capital flow	Open investment regime, stable currency, minimal regulation on repatriation

Leveraging the assessment criteria in Table 5, Lagos is deemed to have room to improve across 4 of the identified dimensions.

53. Latest edition of the world Bank Ease of Doing business rankings

Key Insights from Baseline and Corresponding Actions in LCARP

The results of the benchmarking exercise combined with a careful analysis of actions taken by benchmark countries resulted in identifying 7 initiatives which Lagos State can take to create a more attractive environment for A&R investment. These 7 initiatives are outlined below in Table 5. These initiatives will, collectively, support the development of LCARP

projects across the project lifecycle, from conceptual design to project construction.

In terms of status, all 7 of these initiatives are incorporated into the LCARP strategic initiatives, which highlights measures that will enhance the state's climate governance performance. The LCARP strategic initiatives are summarized and outlined in Table 7 section 8.1 of this document.

Table 5: Seven identified policy actions for Lagos State⁵⁴

Initiative	Explanation	Status
National or City A&R Strategy Roadmap	A roadmap that defines A&R financing needs of the city and outlines prioritized sectors to help donors or investors know how and where they can support A&R	
Public government database of funding ready A&R projects	A government managed database that highlights and outlines pre-assessed A&R project concepts for funders to driver forward	Core part of LCARP
Investor databank for climate risk and event	Public data resources or models for investors or funders to access information and conduct own analysis on climate need and vulnerability	
Policy reforms in sectors that require A&R interventions (e.g., water sector)	Sector specific policy reforms address pain points or roadblocks for investment in specific sectors (e.g., reform water tariff policy)	Addressed with LCARP strategic initiatives 11, 12, 13, 14
Climate tagged budget allocations	Ensuring government or ministry budgets are tagged for A&R demonstrates political will to investors	Addressed by LCARP strategic initiative 15, 16
Variety of green finance instruments and incentives	Lagos issuing a green bond or taking out a green loan helps to develop the climate finance ecosystem in the state, demonstrates political will, and catalyses additional private sector investment	Addressed by LCARP strategic initiatives 4,5,6,7
Define and establish a Project Development Unit (or a similar function within govt.)	Establishing government units that are responsible for developing project concepts and engagement with potential funders for A&R projects	Addressed by LCARP strategic initiatives 4, 8, 9

54. The overall Macroeconomic environment and restriction on foreign capital flow is not addressed in the seven identified policy actions as that is not a policy dimension that can be addressed at the subnational level.

Key LCARP Sector-Specific Policies to Attract Investments

LCARP has identified 5 sector specific policies thus far that aim to improve the city's overall resilience to climate change while enhancing the investment environment in specific sectors. These policies will cut across various MDAs in Lagos. These 5 sector specific policies are outlined below in strategic initiatives 10-14.

Initiative 10: Water Quality Management - Set up and enforce standards for water purity, ensuring safe and clean water for all sectors.

LCARP Initiative 11: Sanitation and hygiene awareness - Implement public education programs focused on promoting hygiene and health practices.

LCARP Initiative 12: Post-disaster emergency response policy - Create a policy and procedures to ensure a rapid and efficient system for managing and mitigating the aftermath of natural disasters.

LCARP Initiative 13: Climate Resilient Building Code Policy - Update the policy and mandate the adoption of building standards that are resilient to climate change impacts.

LCARP Initiative 14: Waste Management and Circularity Policy - Implement a policy focusing on increasing circularity of Lagos by improving collection, transforming waste into resources through advanced recycling and energy recovery methods, and minimizing landfill use.

Chapter 7



LCARP Governance

Overview

To achieve its ambitious goal of securing over \$9 billion in climate Adaptation and Resilience (A&R) finance by 2035, Lagos State needs a robust climate governance structure. Current assessments indicate strong climate leadership but highlight the need for improved collaboration and monitoring. A three-tier governance layer, led by the Governor and supported by the LCARP Steering Committee and a Core Working Team, will oversee the implementation. This structure is designed to enhance overall climate governance and align with the city’s broader climate initiatives. The Core LCARP Working Team will drive the implementation of 17 strategic initiatives critical for achieving Lagos’s A&R financing goals, coordinating closely with the Director of Climate Change and Environmental Planning, who acts as the Secretariat for both governance systems.

Environmental Planning. This structured approach is designed to effectively manage climate change initiatives across various levels of governance.⁵⁵

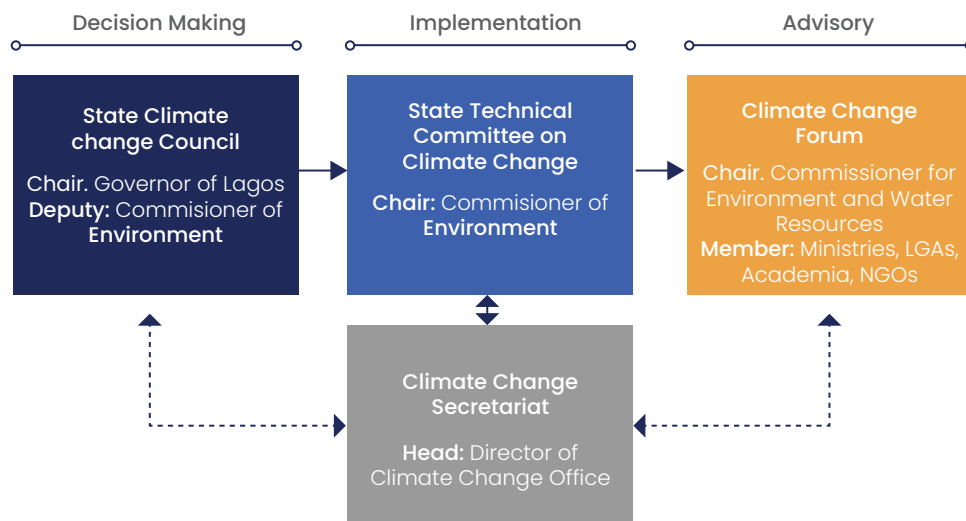
Overview of roles and responsibilities

1. **State Climate Change Council:**
 - **Members**⁵⁶: Commissioners of ministries involved with, related to, or impacted by climate change.
 - **Responsibilities:** Sets the overall policy direction for climate initiatives and ensures adequate allocation of financial and human resources.
2. **State Technical Committee on Climate Change:**
 - **Members:** Permanent secretaries from all ministries in the State Climate Change Council, state-supported research institutions, and selected reputable NGOs.
 - **Responsibilities:** Develops and implements key policies on climate change.
3. **Climate Change Forum:**
 - **Members:** Representatives from all ministries, Local Government Areas (LGAs), Local Council Development Areas (LCDAs), academia, NGOs/ CDAs, youth, and women’s groups.

Governance Structure Assessment

Lagos’s current climate governance structure operates as a clearly defined three-layer system, coordinated by the Climate Change Secretariat, currently led by the Director of Climate Change and

Figure 33: Lagos’ Current Climate Governance Structure



55. First developed as part of the Lagos Climate Action Plan

56. Members include: The Honourable Commissioners of Environment & Water Resources, Energy & Mineral Resources, Finance, Economic Planning & Budget, Waterfront & Infrastructure Development, Transportation, Justice, Education, Agriculture, Health, Physical Planning & Urban Development, Special Duties, Women Affairs & Poverty Alleviation, and Science & Technology

- **Role:** Serves as an advisory forum that consolidates input from all external stakeholders impacted by climate change.
4. **Climate Change Secretariat:**
- **Role Performed By:** The Director of Climate Change and Environmental Planning Department.
 - **Responsibilities:** Coordinates the activities across the three layers of the climate governance structure.

A benchmarking exercise was conducted to assess Lagos’s climate governance against leading practices identified in other regions such as Addis Ababa, Jakarta, and Delhi⁵⁷. These cities were chosen for their established climate commitments, their ability to attract significant climate finance, and their sub-national governance structures comparable to Lagos.

The benchmarking results indicate that Lagos performs well in having a well-defined climate leadership structure and clear role definitions. However, there are areas for improvement in monitoring infrastructure and enhancing collaboration with national entities and across MDAs⁵⁸ within the state government.

Detailed assessment results for each dimension are as follows:

1. Climate Leadership Structure

- Lagos has a clearly defined leadership structure governed by the State Climate Change Council, chaired by the Governor, including commissioners from all relevant ministries.

2. Role Definition

- The three-tier climate governance structure is well-defined with specific roles and responsibilities outlined, including coordination by the Climate Change Secretariat. There is potential to enhance role delineation across MDAs.

3. Monitoring Infrastructure

- A proposal for enhanced monitoring infrastructure has been developed but is still in the implementation phase across MDAs.

4. Collaboration

- Structured collaboration with the national government is well established through the NCCC. However, there is significant potential to improve engagement with climate funds and across MDAs within the Lagos State government.

The initiatives identified in LCARP are designed to strengthen Lagos’s performance across these four dimensions, thereby enhancing its climate governance and helping to achieve its ambitious goal of increasing investment in A&R.

Figure 34: Four Best Practice Governance Dimensions

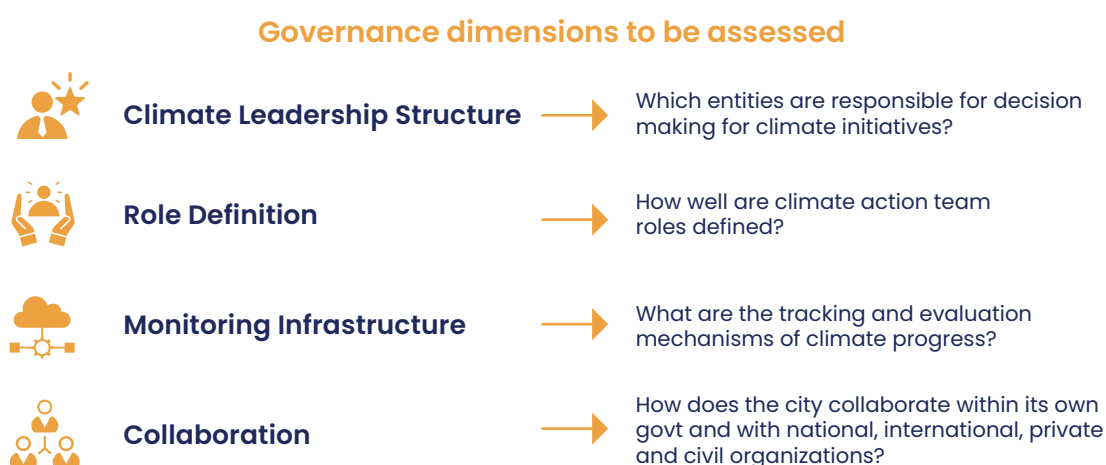


Table 6: How Best Practice Governance Dimensions are addressed by LCARP Initiatives

Governance Dimensions	LCARP Initiative addressing dimension (numbering aligns w/ initiative number)	Rationale
Climate Leadership Structure	10. Water Quality Management	<ul style="list-style-type: none"> The 4 Policy Initiatives will provide strategic direction, ensuring cohesive and targeted climate action plans. These initiatives will foster a unified leadership approach, crucial for effective climate governance and policy enforcement.
	11. Sanitation and Hygiene Awareness	
	12. Post-Disaster Emergency Response Policy	
	13. Climate Resilient Building Code Policy	
	14. Waste Management and Circularity Policy	
Role Definition	4. Grants and Technical Assistance accelerator program	<ul style="list-style-type: none"> The grants and technical assistance accelerator program will build local capacity, enabling more effective funding application cohesiveness. Establishing the LCARP governance and monitoring processes will further help to define roles and delineate any overlap in roles that currently exist within the Lagos State climate governance structure.
	15. Develop LCARP Governance, monitoring, and reporting processes	
Monitoring Infrastructure	15. Develop LCARP governance, monitoring, and reporting process	<ul style="list-style-type: none"> The Monitoring, Evaluation, and Reporting Process although designed for LCARP, can be leveraged to provide critical data for measuring the effectiveness of all climate policies and initiatives.
Collaboration	4. Grants and Technical Assistance Accelerator Program	<ul style="list-style-type: none"> Both the grants and technical assistance accelerator program and the initiative to strengthen engagement with climate funds will create vital partnerships and enhance resource mobilization for climate
	8. Strengthen engagement with climate funds	
	15. Implement the LCARP organization and governance structure	<ul style="list-style-type: none"> This approach will strengthen multi-stakeholder engagement, crucial for comprehensive and inclusive climate action.
	16. Define the LCARP data collection and monitoring processes	<ul style="list-style-type: none"> Once successfully established, the LCARP governance and monitoring process will enhance inter-agency collaboration across Lagos State Governance not only for LCARP projects but for all climate initiatives.
17. Establish LCARP PMO		

Figure 35: LCARP Governance Structure



LCARP governance structure

The proposed structure of the LCARP governance mirrors the existing three-layer structure of Lagos State’s overall climate governance and will be coordinated by the same body – the Climate Change Secretariat.

1. Governor of Lagos

- Sets the overall direction and responsible for taking key decisions with regards to LCARP

2. LCARP Steering Committee⁵⁹

- **Chairman:** Honourable Commissioner for Environment and Water Resources
- Responsible for overseeing the development and delivery of LCARP initiatives.

3. Core LCARP Working Team

- **Members:** Director of Climate Change and Environmental Planning, Chief Resilience Officer, Director of Partnership Development
- Drives the implementation of LCARP, including cross-MDA communication and engagement with potential partners and funders.

4. Climate change Secretariat

- Role performed by: The Director of Climate Change and Environmental Planning

- Coordinates the three layers of the climate governance structure.
- Ensures LCARP initiatives and status are fully aligned and integrated with Lagos’s overall Climate Change agenda.

The specific processes and operational protocols for the LCARP governance structure will be established through three strategic initiatives designed to enhance accountability and ensure sustainability.

Key LCARP Governance Initiatives

Initiative 15: Implement the LCARP organization and governance structure to drive accountability and ensure long-term sustainability.

Initiative 16: Define the data collection and monitoring processes to maintain transparency for LCARP and, more broadly, climate actions across the state

Initiative 17: Establish an LCARP Project Management Office (PMO) responsible for driving the implementation of LCARP, coordinating with stakeholders within and outside the government, and providing necessary interventions to keep implementation on track as needed.

59. Members include Commissioner for Economic Planning and Budget, Commissioner for Transportation, Commissioner for Health, Commissioner for energy and Mineral Resources, SA Environment, SA office of SDGs, SA Climate Change, Chief Resilience officer and director of Partnership Development, as well as the Permanent Secretaries for each of the ministries on the SteerCo.



Chapter 8



Concluding Thoughts

Summary of LCARP Initiatives

LCARP has outlined 17 strategic initiatives that Lagos State will pursue as the next steps to successfully implement the LCARP and achieve

its ambitious goal of raising over \$9 billion in Adaptation and Resilience (A&R) financing by 2035. These initiatives encompass every aspect of the LCARP Strategic Framework and collectively aim to establish Lagos as an appealing destination for A&R finance.

Figure 36: LCARP Initiatives



The Core LCARP Working Team, under the guidance of the LCARP Steering Committee, is tasked with driving the implementation of these 17 initiatives.

Table 9 below provides a summary of these initiatives and identifies the key stakeholders responsible for ensuring their successful execution.⁶⁰

Table 7: 17 Identified LCARP Initiatives

S/N	Initiative	Description	Key Stakeholders
1	20 Pre-feasibility and Feasibility Studies	20 LCARP projects require project planning and analysis to de-risk them and purpose for the next phase	<ul style="list-style-type: none"> LCARP Core Working Team Ministry of the Environment and Water Resources
2	6 Concept Studies	Conduct in-depth concept studies for 6 LCARP projects, including design, technical specifications, and preliminary cost estimates	<ul style="list-style-type: none"> MDAs with relevant LCARP projects Ministry of Economic Planning and Budget
3	7 Ready-to-execute	7 LCARP projects are at turnkey stage, ready for execution and require funding and collaboration with private sector	
4	Grants and technical assistance accelerator program	<p>Establish a program to streamline grant acquisition and build the capacity of local teams in managing these resources.</p> <p>Programs key responsibility is to sour funding and expertise for LCARP projects and facilitate capacity building</p>	<ul style="list-style-type: none"> LCARP Core Working Team Ministry of the Environment and Water Resources Ministry of Economic Planning and Budget (Department of Partnership Development)
5	Develop and issue a green bond	<p>Issue a green bond to mobilize funds for a diverse range of A&R projects, covering various levels of bankability.</p> <p>Requires aligning on projects to include, developing a Lagos green bond framework, and engaging with potential investors</p>	<ul style="list-style-type: none"> LCARP Core Working Team Ministry of the Environment and Water Resources Ministry of Finance Debt Management Office
6	Facilitate the development of voluntary carbon markets	Develop a strategy for Lagos to actively participate as a developer in the voluntary carbon market	<ul style="list-style-type: none"> LCARP Core Working Team Ministry of the Environment and Water Resources Ministry of Finance MDAs with relevant LCARP projects

60. More information on each initiative is available upon request, please reach out to the Lagos State Department of Climate Change, under the Lagos State Ministry of Environment

7	Strengthen Disaster Risk Financing	Develop mechanisms (e.g., catastrophe bonds) for financing response to climate disasters	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources • Ministry of Finance • Debt Management Office
8	Strengthen engagement with climate funds	Enhance strategic partnerships with global climate funds (e.g., GCG, AF and GEF) to maximize access to international climate finance	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources • Ministry of Economic Planning and Budget (Department of Partnership Development)
9	Develop tools to de-risk climate A&R projects	Create mechanisms to reduce risks in A&R projects, thereby increasing their bankability and appeal to private investors	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources • Ministry of Economic Planning and Budget • Ministry of Finance • Debt Management Office
10	Water Quality Management	Establish and enforce standards for water purity, ensuring safe and clean water for all sectors.	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources
11	Sanitation and Hygiene Awareness	Implement public education programs focused on promoting hygiene and health practices.	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources
12	Post-Disaster Emergency Response Policy	Create a policy and procedures to ensure rapid and efficient system for managing and mitigating the aftermath of natural disasters.	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources
13	Climate Resilient Building Code Policy	Update the policy and mandate the adoption of building standards that are resilient to climate change impacts.	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources • Lagos State ministry of Works and Infrastructure

14	Waste Management and Circularity Policy	Implement a policy focusing on instituting policies to increase circularity of Lagos by improving collection, transforming waste into resources through advanced recycling and energy recovery methods, and minimizing landfill use	<ul style="list-style-type: none"> • LCARP Core working Team. • Ministry of the Environment and Water Resources Ministry of Economic Planning and Budget
15	Implement the LCARP organization and governance structure	Implement the proposed LCARP governance structure, including establishing related governance processes and meeting cadences	
16	Define the LCARP data collection and monitoring processes	Establish the required data collection, reporting and monitoring processes to ensure ongoing transparency on LCARP as well as more broadly climate topics across the state	<ul style="list-style-type: none"> • LCARP Core Working Team • Ministry of the Environment and Water Resources • All MDAs involved in LCARP steering committee and working on LCARP projects
17	Establish LCARP Project Management Office (PMO)	Responsible for driving the implementation of LCARP, coordination across the stakeholders within and outside government and providing the relevant interventions to keep implementation on track as needed	

The Road Ahead – Concluding Remarks

The successful implementation of the Lagos Climate Action and Resilience Plan (LCARP) is contingent upon overcoming a fundamental challenge: securing sustainable financing. At the heart of this challenge is the need for extensive partnerships and stakeholder engagement. Collaborative efforts with international organizations, private entities, and local communities are crucial. These partnerships not only provide diverse perspectives but also open avenues for innovative financing solutions.

Diversifying funding sources is a strategic imperative. A balanced mix of financing avenues will establish a resilient financial foundation for adaptation projects, mitigate over-reliance on any single source, and ensure a continuous stream of investment. Policy

and regulatory enhancements are equally critical. By creating an environment conducive to investment and innovation, Lagos can attract both domestic and international financial support. This requires streamlining processes and offering incentives aligned with resilience and sustainability goals.

Developing projects with clear value propositions and potential for sustainable returns is essential to attract private investment. These projects should address environmental challenges while also offering economic viability, appealing to a broader range of investors. Moreover, employing innovative financing mechanisms, such as blended finance, nature-based solutions, and risk finance, will be pivotal in bridging funding gaps. These strategies can leverage public funds to attract significant private capital, which is vital for the large-scale implementation of resilience measures.

While the challenges of securing adequate financing for LCARP are formidable, they are not insurmountable. Through a strategy that emphasizes learning from past experiences, fostering partnerships, diversifying funding sources, enhancing policies, developing valuable projects, and maintaining transparency, Lagos is well-positioned to effectively tackle these challenges. This comprehensive approach will enable Lagos to

become a resilient, sustainable, and exemplary city in the realm of climate adaptation.

To realize this vision, we extend an invitation to partners from all sectors to join us on this critical journey by supporting the implementation of the LCARP initiatives outlined. Your collaboration and support are essential for building a resilient future for Lagos.





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Chapter
9

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Appendix

LCARP Projects pipeline

Table 10 shows a full list of LCARP projects across the three project types: Bankable projects, projects

requiring concessional finance, and projects requiring grants.

Table 8: LCARP Project pipeline

S/N	Project Name	Financing category	Estimated cost	Next step
1	Transfer stations and waste collection: Build 30 transfer stations & purchase waste collection vehicles to remove local solid waste, reducing clogging of drains	Bankable	~2.5mn	(Pre) feasibility
2	Landfills/Waste to Energy: Rehabilitate/cap old landfills and construct 3 new landfills and waste to energy plants	Bankable	~450mn	(Pre) feasibility
3	Alternative water supply: Develop alternative water supply (1.3bn gallons/day) to minimize ground water extraction reducing land subsidence	Bankable	~1B	(Pre) feasibility
4	Sewage treatment plant: Build a sewage treatment plant reducing water contamination in floods	Bankable	~275mn	(Pre) feasibility
5	Commercial rainwater harvesting: Harvested rainwater can serve a substantial portion of their water needs, reducing flooding and water costs	Bankable	~3mn	(Pre) feasibility
6	Transport links (highways): Construction and rehabilitation of critical highways and interstate roads to prevent flooding and damage from flooding	Bankable	~270mn	(Pre) feasibility
7	Transport links (waterways): Construction & rehabilitation of critical waterways including ~26 jetties and docks inundated to create resilient transport channels	Bankable	~300mn	Implementation
8	Floodproofing power and communication assets: Floodproofing of 42 affected power assets and 44 affected communication assets to bolster flood resilience	Bankable	~115mn	(Pre) feasibility

S/N	Project Name	Financing category	Estimated cost	Next step
9	Disease surveillance and sanitation solutions: Implement surveillance systems for existing and new disease risks addressing heat and water-related disease	Bankable	~50mn	(Pre) feasibility
10	Early warning systems: Systems to alert residents about imminent weather events, including flooding, enabling timely actions	Bankable	~20mn	(Pre) feasibility
11	Flood resistant low-income housing: Build flood-resistant housing complexes, ensuring safety for residents and continuous rent collection during flood events	Bankable	~275mn	(Pre) feasibility
12	Regenerative agriculture/agroforestry: Convert un- and under-used Lagos State agricultural lands into water sinks with the creation of natural floodplains	Bankable	~7mn	(Pre) feasibility
13	Aquafarming Facilities: Create aquaculture facilities resilient to flooding, turning a problem into a solution, and generating income from the sale of fish and seafood	Bankable	~50mn	(Pre) feasibility
14	Mangrove restoration: Restore 11-ha of mangrove across 5 LGAs, acting as natural wave barriers reducing overland flooding made more common by sea level rise	Bankable	~25mn	(Pre) feasibility
15	Reinforcement of existing 18km of coastal embankment and building additional 10km of sea walls in 5 LGAs ¹	Concessional finance	~0.9-1.2bn	(Pre) feasibility
16	Construct of 1,100km+ network of primary drainage system in 4 regions ²	Concessional finance	~3bn	(Pre) feasibility
17	Build new & rehabilitate existing secondary drainage systems that feed the primary channels	Concessional finance	~170mn	(Pre) feasibility
18	Construction and rehabilitation of critical transport links i.e., inner-city roads that will be inundated across 10 the vulnerable LGAs	Concessional finance	~350mn	(Pre) feasibility
19	Retrofit 350 manufacturing plants with cool surfaces, green building envelopes and cooling systems – Kosofe, Apapa and Eti Osa	Concessional finance	~45mn	Ready to execute
20	Retrofitting of 1,800km roads with cool pavement in 5 most impacted LGAs to alleviate the impact of extreme heat and the associated health and productivity impacts	Concessional finance	~70mn	(Pre) feasibility
21	Medical Infrastructure Blueprint: Build of new hospitals and primary health care facilities in underserved parts of Lagos	Concessional finance	TBD	Ready to execute

S/N	Project Name	Financing category	Estimated cost	Next step
22	Digitalization of healthcare system - Increasing use of electronic medical records and smart health Information Platform	Concessional finance	~500mn	Ready to execute
23	Health insurance solutions: Provide health insurance to ~320k vulnerable populations in exposed LGAs	Concessional finance	~20mn	Ready to execute
24	Re-design 5 LGAs for heat reduction (e.g., street grid, shading structure)- Badagry, Ikorodu, Ibeju Lekki, Epe and part of Eti Osa	Concessional finance	~2mn	(Pre) feasibility
25	Retrofit or relocate~350 public health facilities with flood protection systems and upgrade facilities and equipment across these centres i.e., comprehensive health centres, primary centres, and health posts	Grants	~300mn	Concept studies
26	Retrofit or relocate ~500 public schools with flood protection systems	Grants	~10mn	Concept studies
27	Relocate 320k vulnerable populations in 10 exposed LGAs including empowerment programs for the displaced	Grants	~500mn	Ready to execute
28	Plant 50,000 climate-resilient trees annually across Lagos to alleviate the impact of extreme heat and the associated health and productivity impacts	Grants	~1.5mn	Ready to execute
29	Rehabilitate and maintain existing 300+ urban parks across Lagos to foster heat reduction in addition to improving air quality and carbon capture	Grants	~50mn	Ready to execute
30	Nature-based inland flood solutions: Bioswales, rain gardens etc., reducing impact of inland flooding	Grants	TBD	Concept studies
31	Build pumping stations: Actively remove water, maintaining proper water flow and reducing the risk of flooding in vulnerable areas	Grants	TBD	Concept studies
32	Build storm water management systems: Construct larger stormwater channels, to handle increased rainfall and minimize flooding risks in priority areas	Grants	TBD	Concept studies
33	Artificial flood barriers: Constructing barriers or levers to protect vulnerable areas from flood events due to extreme rainfall	Grants	TBD	Concept studies

Bankable Projects Appraisal

Appraisal studies and project prioritization in LCARP were conducted for the 14 bankable projects using a set of scoring criteria as defined earlier in Chapter 4. The criteria were divided into four main categories:

- Feasibility (20% score):** Technical feasibility evaluated using a qualitative scorecard, based on past concept implementations and skill availability using the PESTEL framework. Legal and political feasibility, and human impact averted, using benchmarks and stakeholder inputs, and assessing the change in at-risk population before and after the proposed solution.
- A&R Impact (20% score):** Economic impact measured in terms of economic return and

GDP impact, sourced from secondary research and benchmarks. Socioeconomic co-benefits evaluated based on job creation, equity, mitigation, and Sustainable Development Goals (SDGs).

- Financials (20% score):** Commercial Return on Investment (ROI) determined using multiple metrics obtained through benchmarking.
- Investor Interest (40% score):** The scale of investor interest based on the number and level of interested investors.

These criteria were weighted, scored, and normalized to create a comprehensive ranking methodology for projects. The result of this assessment is shown in Figure 36:

Figure 37: Ranking of Bankable projects based on Appraisal criteria (I)

Rank	Project Name	Cost (\$)	Weights				Total Score /10	Material -ity ²	Rationale
			Feasibility	A&R Impact	Financial ROI	Investor Interest ¹			
01	Build sewage treatment plant and transfer stations	275M	8.33	8.80	6.00	7.00	7.43	<ul style="list-style-type: none"> Feasibility: Numerous similar projects in neighbouring countries funded in past 5 years A&R Impact: \$1.46B economic impact averted, and 5.4M impacted population Commercial ROI: Projects receiving both concessional and market rate loans, depending on structure Investor Interest: High in early conversations, driven by potential for energy generation 	
02	Rehabilitate old and construct 3 new landfills/waste-to-energy plants	450M	9.33	6.42	8.00	5.80	6.83	<ul style="list-style-type: none"> Feasibility: Successful projects around the world and in Lagos, though new behaviours will be needed A&R Impact: \$300M in economic impact averted, and estimated 8500 units flooding prevented Commercial ROI: Medium-high due to user-pay, energy generation, and carbon credit capture Investor Interest: Very high, but score reduced due to size of project requiring very large commitments 	
03	Establish warning/observation systems for flood and heat	20M	9.33	4.63	7.00	6.33	6.73	<ul style="list-style-type: none"> Feasibility: Projects funded around the world, and new funding from UN WMO available A&R Impact: \$51M estimated economic impact averted, 120k impacted population, with low price Commercial ROI: Successful funding mechanisms utilizing cellular service tariffs, short payback period Investor Interest: Medium-high, ticket size is low for some, may be funded entirely by UN WMO 	
04	Transfer stations and waste collection	2.5M	9.33	5.50	6.00	5.67	6.43	<ul style="list-style-type: none"> Feasibility: Successful projects around the world and in Lagos, though new behaviours will be needed A&R Impact: \$90M in economic impact averted, 2500 units flooding prevented, enables landfills Commercial ROI: Medium, potential for platform for local operators, private sector engagement Investor Interest: Medium, may be bundled with landfill project for more compelling overall package 	
05	Construction & rehabilitation of critical transport links (waterways)	300M	8.00	8.67	7.00	3.93	6.31	<ul style="list-style-type: none"> Feasibility: Feasibility report completed by AFD; project underway. Similar solutions in other cities A&R Impact: \$2.58B economic impact averted, with high co-benefits. 2M population directly affected Commercial ROI: Medium-high, with private for profit and subsidized operators globally Investor Interest: Low interest from investors spoken too, but AFD and EIB currently funding 	
06	Construction & rehabilitation of critical transport links (highways)	270M	8.67	6.53	8.00	3.67	6.11	<ul style="list-style-type: none"> Feasibility: Tolling infrastructure proven in Nigeria, though pending government approval may affect score A&R Impact: \$1.7B economic impact averted, though only 4000 residents were directly impacted by flooding Commercial ROI: Projects receiving both concessional and market rate loans, PE interest Investor Interest: Medium-low, pending localization. Limited appetite for tolling existing infrastructure 	

¹ Currently estimated based on preliminary investor meetings and portfolio review

² A measure of the total amount of the problem addressed by the full implementation of this project, full rationale in appendix

Figure 38: Ranking of Bankable projects based on Appraisal criteria (II)

Rank	Project Name	Cost (\$)	Weights				Total Score /10	Materiality ²	Rationale
			Feasibility	A&R Impact	Financial ROI	Investor Interest ¹			
07	Water-resilient regenerative agriculture/ agroforestry	7M	6.67	6.42	6.00	5.20	5.90	<ul style="list-style-type: none"> Feasibility: Evidence of commercial opportunity strong, but little data for flood prevention A&R Impact: \$725M in economic impact averted at high ROI, 450k residents protected from flooding Commercial ROI: Medium, returns driven by sale of agricultural products on otherwise valuable land Investor Interest: Low until further validation possible 	
08	Build alternative water supply	1B	8.33	7.43	6.00	3.67	5.82	<ul style="list-style-type: none"> Feasibility: Successful projects around the world and in Lagos, though many residents drill own boreholes A&R Impact: \$1.7B economic impact averted, 500k impacted population, scalable, large benefit to women Commercial ROI: Receiving largely concessional loans, including 25–40-year terms from World Bank IDA Investor Interest: Medium-low, concerns about local cooperation. Very expensive. Concessional funds available 	
09	Floodproofing 42 power and communication assets	115M	10.00	7.86	6.00	1.67	5.44	<ul style="list-style-type: none"> Feasibility: Technically very common, government investment also common globally, but rare in Nigeria A&R Impact: \$976M economic impact averted, 6000 people directly impacted by flooding Commercial ROI: Mix of private and development financing depending on the country Investor Interest: Low, with investors looking to private operators to make required investors 	
10	Mangrove restoration	25M	4.00	8.49	9.00	2.33	5.23	<ul style="list-style-type: none"> Feasibility: Science is feasible, but projects to prevent urban flooding are early stage with limited results A&R Impact: \$2.6B in economic impact averted, 510k averted inundations, from Phase I model [in review] Commercial ROI: High due to carbon credits, but market is volatile Investor Interest: Target area for funds, but volatility, low feasibility reduce interest. Specialty funds available 	
11	Build flood resistant low-income housing	275M	10.00	3.14	6.00	3.47	5.21	<ul style="list-style-type: none"> Feasibility: Long history of affordable housing schemes with Lagos State investment, high delivery rates A&R Impact: Full estimates pending Extreme Rainfall model, but at least 55k relocated Commercial ROI: Medium, can be structured as a restricted deed property investment with sunset Investor Interest: Commercial lenders interested but business case will need to be strong 	
12	Commercial rainwater harvesting	3M	8.67	3.44	4.00	4.33	4.95	<ul style="list-style-type: none"> Feasibility: Successful projects around the world, usually framed for water supply, sound science A&R Impact: \$80M in economic impact averted at low price, 1200 units flooding prevented Commercial ROI: Low, essentially credit facility with market interest rates to building owners Investor Interest: Medium, seen as a credit facility to property owners with market return rates 	
13	Implement surveillance systems for existing and new disease	50M	8.33	4.56	8.00	1.67	4.85	<ul style="list-style-type: none"> Feasibility: Similar solutions implemented globally, though usually not to address A&R challenges A&R Impact: \$10.5M economic impact averted, but 2.5M impacted population, large benefit to women Commercial ROI: Generates billable medical services, and collaboration potential on global projects Investor Interest: Medium, with early advice to pursue health funding sources 	
14	Aquafarming facilities	50M	8.00	5.70	6.00	1.67	4.61	<ul style="list-style-type: none"> Feasibility: Successful projects around the world and in Lagos, though not framed in terms of A&R A&R Impact: Low \$12.5M in economic impact averted, but 500k people benefited via food security Commercial ROI: Currently commercially profitable with private capital, medium term repayment Investor Interest: Low, with several smaller funders interested in agriculture but prioritizing carbon reduction 	


¹ Currently estimated based on preliminary investor meetings and portfolio review

² A measure of the total amount of the problem addressed by the full implementation of this project, full rationale in appendix

Rehabilitation of Landfills & Waste to Energy (incl. transfer stations)

Build waste to energy facility

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Part of an integrated waste management solution to minimize waste at landfills; Gathers significant investor interest and socio-economic ROI	~\$450M required	91/100
Locations Affected	Project Overview		Key Insights	



- Current waste collection and disposal systems are not adapted with only 63%¹ of municipal waste collected for treatment. This project would build 3 new landfills and harden existing infrastructure to fill the capacity shortfall
- The current waste situation leads to clogged drainage systems increasing flooding impacts
- Waste-to-energy projects like that in Addis Ababa have been entirely privately funded
- Methane reduction yields climate mitigation credit opportunities

Overview of bankability metrics

Feasibility¹ 10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype

- ✓ Technology demonstrated in final form
- ✓ Demonstrated under operational mission conditions

= TRL 9

A&R Impact²

Economic



- 35% assumed damage cost reduction due to flooding
- \$4mn GDP will also be protected

Human

Impact mechanism:  Flood prevention

Direct beneficiaries: **>11,000 protected**
avg: 900,000

- 11k population living in areas exposed to severe flooding will be protected
- 10.7M benefit from sanitary waste disposal with accompanying reductions in disease

Financials¹ 20/20



Market Rate Loans Addis Ababa (completed) and Nairobi (in development) waste-to-energy funded by private ECAs with trash collection cashflows



Concessional Loans World Bank GEF funding is a mix of grants and concessional loans

Grants Equity

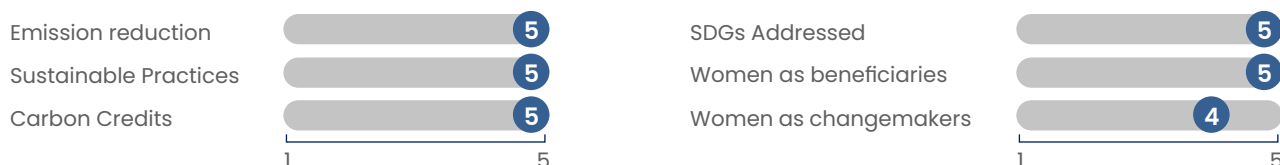
¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model

Legal and Political

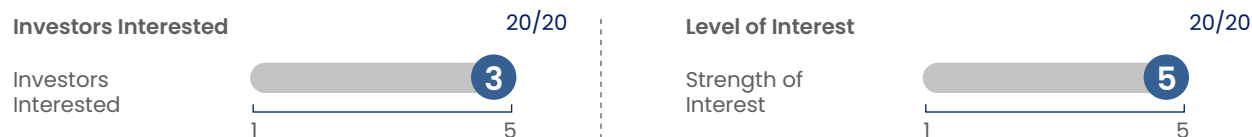
Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³



Investor Interest⁴



Rehabilitate and Build New Landfills/ Waste to Energy

Climate Impact Drivers

Project	Location	Cost	Funders	Funding Model	Impacts	Climate Impact Drivers		
						SLR	EH	ER
Innovations In Africa's Waste Material Management	Addis Ababa, Ethiopia	\$120mn to serve 80% of 6 mn people	China National Electric Engineering Co., Ltd., Cambridge Industries Energy, RAMBOLL	Market rate loans, Equity	Waste-to-energy plant meets 30% of cities energy needs. Expected 26mn net annual cashflows.			
Mali: The World Bank is Increasing Access to Water and Sanitation Services in Bamako	Bamako, Mali	\$250mn including solid waste and sewage	International Development Association – World Bank Group	Concessional Loans	Landfill capacity to serve the city of 2.9mn for next 20 years, incl. sewage for 700,000			
Improving Solid Waste Management and Income Creation in Host Communities – Rehabilitation of Ekaider Landfill	North Shuneh, Jordan	\$100mn over multiple phases ⁵	Global Affairs Canada, Affaires mondiales Canada, UNDP, Ministry for Foreign Affairs of Finland	Grants	Meant to address needs of 1.3mn migrants in addition to 11mn population			

³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework


⁴ Summary of interviews conducted


⁵ Handover ceremony of the sanitary cell at Al Ekaider Landfill, European Union, 2018

Sewage Treatment Plant

Build Wastewater treatment plant

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score		A sewage treatment plant offers a strong economic and A&R ROI, and has numerous aligned funders, indicating it can be successfully implemented	83/100
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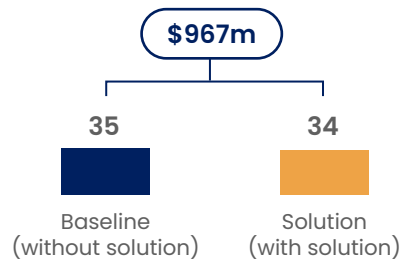

Locations Affected	Project Overview	Key Insights
	<ul style="list-style-type: none"> Build a sewage treatment plant through collaboration between Lagos water corporation and Lagos wastewater mgt. office Bankability derived by charging water customers for additional sewage charges A&R benefits derived from improved health outcomes in inundated areas, preventing contamination of drinking water during flooding events 	<ul style="list-style-type: none"> Political feasibility struggles with only few residents used to paying for treatment Numerous similar projects funded in West Africa in recent years with same funders

Overview of bankability metrics

Feasibility¹ 10/10





Technical	5 <ul style="list-style-type: none"> 9 Proven Operationally 8 Complete, qualified 7 Operational prototype 	<ul style="list-style-type: none"> ✓ Technology demonstrated in final form ✓ Demonstrated under operational mission conditions 	= TRL 9
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A&R Impact²

<p>Economic</p> <div style="text-align: center;">  <p>\$967m</p> <p>35 34</p> <p>Baseline Solution</p> <p>(without solution) (with solution)</p> </div> <ul style="list-style-type: none"> >1million+ Population living in Lagos will benefit and access proper sewage treatment systems Improved health of the population from the reduction in hospitalization and fatalities rates due to poor sanitation and water Healthy population will lead to improved productivity thereby increasing GDP and output 	<p>Human</p> <p>Impact mechanism:  Flood prevention</p> <p>Direct beneficiaries: 2500 avg: 900,000</p> <ul style="list-style-type: none"> Each plant can serve 5mn residents based on the above benchmarks
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Financials¹

12/20

<p>Payback Period </p>	<p>Profitability Index </p>
<p>Concessional Loans</p> <ul style="list-style-type: none"> Received World Bank concessional loans Demonstrated bankability but not high-margin, low risk 	<p> Grants</p> <p> Equity</p>
<p>Market Rate Loans</p> <ul style="list-style-type: none"> Received PPP private funding Demonstrated returns attractive to private investors 	

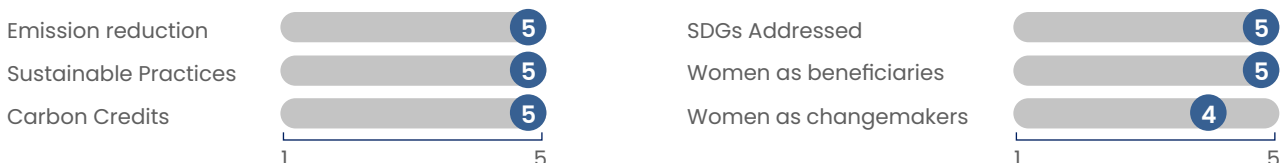
¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model

Legal and Political 8/10

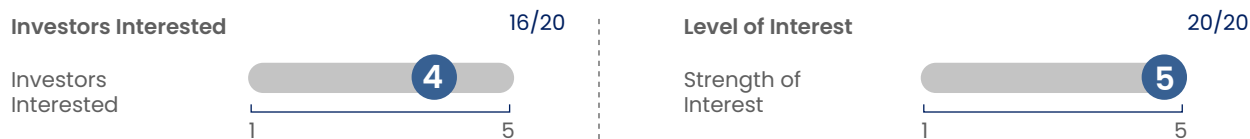
Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³ 4/4



Investor Interest⁴



Build sewage treatment plant


Project	Location	Cost	Funders	Funding Model	Impacts	Climate Impact Drivers		
						SLR	EH	ER
Côte d'Ivoire: Koumassi wastewater treatment plant rehabilitated to cope with flooding	Koumassi Digue, Abidjan, Côte d'Ivoire	\$50mn to serve 900,000 residents	Agence Française de Développement	Concessional Loans, Market Rate Loans	Reduced sickness, flood prevention.			
A US\$ 10 Million Grant from the World Bank to Sustain Palestinian Wastewater Treatment Services	West Bank and Gaza	Not available	World Bank Group	Grants				
North Africa wastewater treatment work floods in	Egypt and Algeria	\$50mn/ plant to serve 300,000 people	World Bank Group	Concessional Loans, Market Rate Loans, Equity	Reduced sickness, flood prevention.			
GHANA: Budapest lends €70mn for the construction of 13 wastewater treatment plants	Ghana	\$77mn for 13 plants to serve 2mn people	Export Bank Biztosito, Hungarian Exim Bank	Market Rate Loans	Reduced sickness, flood prevention.			

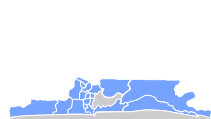
³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework
⁴ Summary of interviews conducted

Early Warning Systems

Early warning system for flood/heat

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Digital warning systems have the potential for significant human impact, typically financed by specialized funds	\$20M	83/100
Locations Affected	Project Overview		Key Insights	



- Early warning systems are efficient tools to anticipate climate risks and prepare for an efficient response, and can be funded by cellular network fees
- By 2050, all of Lagos will be exposed to extreme heat and 14 LGAs will be particularly vulnerable to flooding and EH with severe impacts
- UN World Meteorological Organization creating program for universal early warning systems around the world
- Could be embedded within Lagos State Ministry of Environment and Water Resources

Overview of bankability metrics

Feasibility¹ 10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype

-  Technology demonstrated in final form
-  Demonstrated under operational mission conditions

= TRL 9

A&R Impact²

Economic³

\$51mn

35.0


Baseline
(without solution)

34.95

Solution
(with solution)

- \$51mn in capital cost will be protected from SLR
- 1.6x ROI for these solutions
- An estimated 22% annual GDP loss is expected from the disruption of key economic activities due to climate events
- 10 day warning period can reduce damage by up to 30%⁴

Human

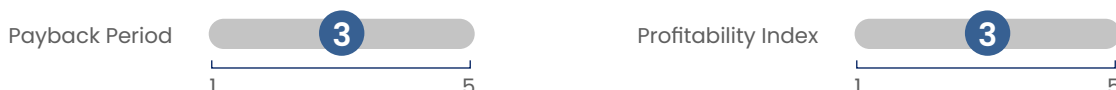
Impact mechanism:  Flood prevention



Direct beneficiaries: **>120,000 protected**
avg: 900,000

- >120k Population living in areas exposed to severe flooding will be protected
- +1.4mn people will be affected by flooding; +1000 education and health centres are expected to be disrupted reducing access to critical social infrastructures for the population

Financials¹

12/20



Grants	<ul style="list-style-type: none"> World Bank's Development Program funding has largely been grants Other organizations have joined 		
Concessional Loans	<ul style="list-style-type: none"> World Bank GEF funding is a mix of grants and concessional loans 	Market Rate Loans	Equity

¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model; Economic impact estimated as a function of GDP impact and capital cost of inundation
³ Resilience strategies for extreme heat – Centre for Climate and Energy Solutions Source: Climate AI dashboard – Year 2030, SSP245, 0.5 confidence, including 10-year return period extreme events; Consultant analysis
⁴ "Early Warning Systems must protect everyone within five years", WMO, 2022

10/10

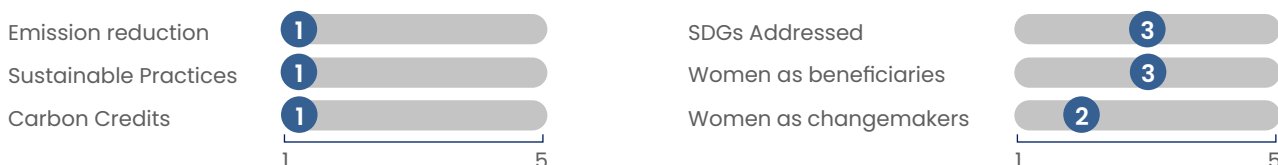
Legal and Political

Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

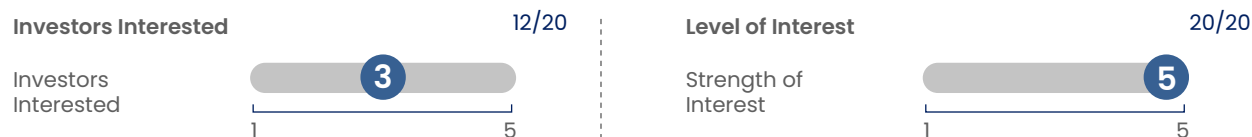
Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits⁵

2/4



Co-Investor Interest⁶



Early warning system for flood/heat

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
Strengthening Climate Information and Early Warning Systems in Uganda	Uganda	\$23.5mn to strengthen national and subnational system	United Nations Development Programme, Global Environment Facility	Concessional Loans, Grants	Total benefits-cost ratio estimated at 4-36 via infrastructure savings	Enabled evidence-based decision making on resource deployment
Saving Lives, Protecting Agriculture Based Livelihoods in Malawi (M-Climes)	Malawi	\$20mn for national network	United Nations Development Programme, Green Climate Fund	Concessional Loans, Grants	57% of farmers adjusted behaviours based on climate data, +19% yields	Exceeded targets for impact on agricultural resiliency to climate change
Regional Project Identification Form - Strengthening Climate Information and Early Warning Systems in Western and Central Africa, May 2012	West Africa (Benin, Burkina Faso, Liberia, +4)	\$96mn for deployment in 7 countries	United Nations Development Programme, Global Environment Facility	Concessional Loans, Grants	Met UNDP primary objectives for responding to climate shocks and planning adaptation	Regional network may benefit Nigeria through integration
Strengthening Climate Information and Early Warning Systems to Support Climate-Resilient Development in Cambodia	Cambodia	\$5mn to bridge gaps in coverage	United Nations Development Programme, Global Environment Facility	Grants	Est 10X ROI, established monsoon and drought warning systems	Lower price may be due to existing starting infrastructure


⁵ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

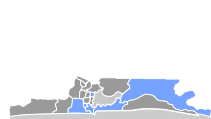
⁶ Summary of interviews conducted

Disease Surveillance and sanitation solutions

Implement surveillance systems for existing and new disease

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Building resilience in the health sector is critical in a developing country, and is expected to have significantly high impact; project is very aligned with LASG priorities	\$50M	69/100
Locations Affected	Project Overview	Key Insights		



- Implement surveillance systems for existing and new disease risks incl. a fully equipped level 4 bio security infectious diseases facility ; implement drinking water and sanitation programs in areas at risk from climate change
- Project preparation is advanced in the ministry of health
- Facility will be the first of it's kind in SSA

Overview of bankability metrics

Feasibility¹ 10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype

-  Technology demonstrated in final form
-  Demonstrated under operational mission conditions

= TRL 9

A&R Impact²

Economic (cost averted)



- Potential for significant impact on health and creating health resilience in Lagos
- Solution not modelled due to difficulty projecting impact

Human

Impact mechanism:  Health
Flood prevention

Direct beneficiaries: **>100,000**
avg: 900,000

- Potential to benefit entire population of Lagos, estimated direct beneficiaries of ~100,000 (similar to early warning system)

Financials¹

10/20



Concessional Loans

- Emerging markets have received concessional funding from World Bank Group and AFD for water infrastructure



Grants

- Many lower income countries have also received grants, though not at the scale required

Market Rate Loans

Equity

¹ From benchmarks (following page) and consultation with Lagos State stakeholders

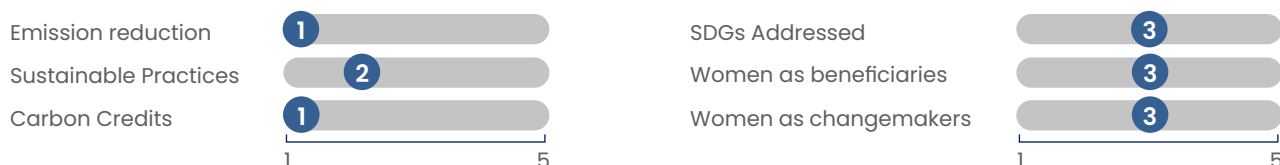
² Output from LCARP climate model; Economic impact estimated as a function of GDP impact and capital cost of inundation

Legal and Political

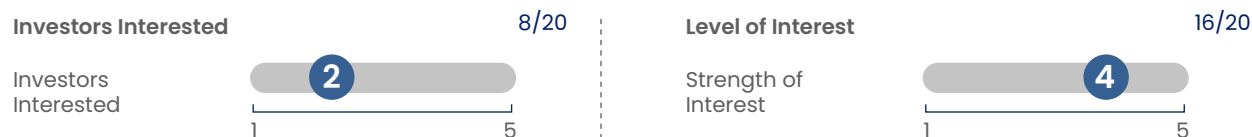
Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³



Co-Investor Interest⁴



Implement surveillance systems for existing and new disease

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
SA regional disease detection programme (Centre for emerging zoonotic and parasitic diseases)	South Africa	TBD	World Health Organization, National Treasury, UNICEF	Grants, Concessional Loans	Operates the only positive pressure suit biosafety level 4 (BSL4) facility on the African continent	Currently focusing on antimalarial resistance monitoring and operational research
National Institute of Virology; Pune (Min Health, possible MIL)	India	TBD	WHO Collaborating Centre for Arbovirus and Haemorrhagic Fever Reference and Research	Grants	Operational 'Biodefense lab', virus epidemiology (Influenza, Nipah, CCHF, KFD, SARS, etc.	

³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

⁴ Summary of interviews conducted

Alternative Water Supply

Alternative water supply

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score		Building resilience in the water sector is critical, particularly in Lagos's context due to the low-lying water tables; huge impact, near bankable with user fees	\$1B	67/100
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Locations Affected	Project Overview	Key Insights
	<ul style="list-style-type: none"> Lagos experiences land subsidence up to 6cm per annum highly contributed by unregulated drilling of boreholes and water extraction from the aquifers <45% of Lagos residents have access to piped potable water This project builds new water supplies and infrastructure for priority LGAs (600M) or the rest of Lagos State (\$1.2B), addressing critical need 	<ul style="list-style-type: none"> The easy availability of free water at shallow depths has led to an expectation of free water Infrastructure for water and sewage may best be laid together, increasing the total size of the investment required

Overview of bankability metrics

Feasibility¹ 10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype

- Technology demonstrated in final form
- Demonstrated under operational mission conditions

= TRL 9

A&R Impact²

Economic

\$1.7bn

35.0

Baseline
(without solution)

33.3

Solution
(with solution)

- \$903mn reduction in capital cost from sea level rise damages, balance from health impacts
- Expected to generate \$4.3bn for 7 years of revenue (up to 2030) from distribution and sales of water

Human

Impact mechanism: Flood prevention

Direct beneficiaries: **>100,000**
avg: 900,000

- >100k Population living in areas exposed to severe flooding will be protected
- 56% of Lagos' population, over 12mn people could benefit from easier access to cleaner drinking water

Financials¹

10/20



<p>Concessional Loans</p>	<ul style="list-style-type: none"> Emerging markets have received concessional funding from World Bank Group and AFD for water infrastructure 		
<p>Grants</p>	<ul style="list-style-type: none"> Many lower income countries have also received grants, though not at the scale required 	<p>Market Rate Loans</p>	<p>Equity</p>

¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model

Legal and Political

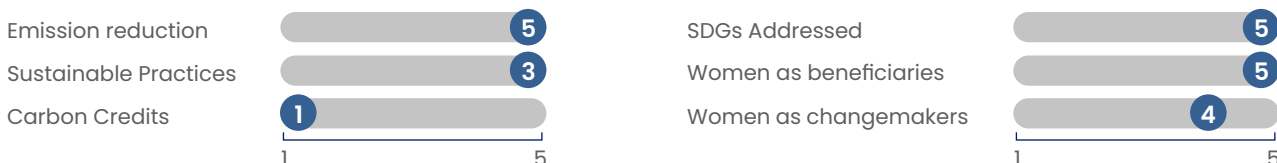
9/10

Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
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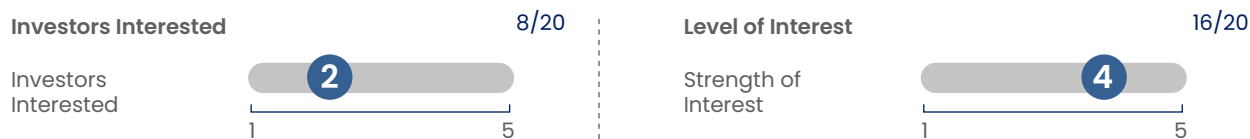
Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³

2/4



Co-Investor Interest⁴



Alternative water supply

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
Project for Promoting Countermeasures against Land Subsidence in Jakarta	Jakarta, Indonesia	Entire A&R need quoted at \$3.2bn, water supply not itemized	Japan Official Development Assistance	Grants, Concessional Loans	10X ROI on A&R measures expected	Cost of inaction estimated at 43% of GDP of DKI by 2050
Cost-benefit analysis of mitigating subsidence damage in Semarang and Demak, Indonesia	Semarang-Demak, Indonesia	\$130mn to serve 3.9mn people	Unfunded, Positive financial ROI projected			\$5.5bn estimated cost of inaction
The Addis Ababa Water Supply Project	Addis Ababa, Ethiopia	\$530mn to serve 3.7mn people with water and sewage	World Bank Group Agence Française de Développement	Equity, Grants	3.7mn total people impacted, including 625k with water	Required building new local delivery infrastructure



³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

⁴ Summary of interviews conducted

Transport Links (highways)

Construction & rehabilitation of critical transport links (highways)

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score  <p>A resilient highway offers a strong A&R ROI, with it's major revenue model arising from tolling options</p>	64/100
Locations Affected	Project Overview	Key Insights
	<ul style="list-style-type: none"> Construct and re-habilitate highways and interstate roads impacted incl. Lekki-Epe Expy, Gbagada-Apapa, inner-city access roads incl. inundated roads across 10 most vulnerable LGAs 	<ul style="list-style-type: none"> A&R benefits derived from improved health outcomes in inundated areas, preventing contamination of drinking water during flooding events

Overview of bankability metrics

Feasibility¹

10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype



Technology demonstrated in final form

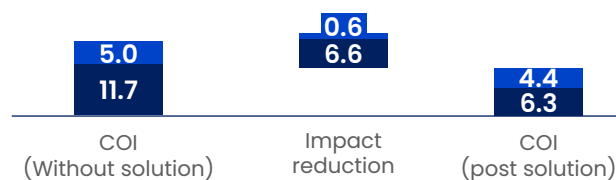


Demonstrated under operational mission conditions

= TRL 9

A&R Impact²

Economic



- \$45mn capital cost will be protected from being impacted by sea level rise
- \$6.5bn in GDP will also be protected from flooding and \$601mn GDP from extreme heat impact
- 9.8x ROI achieved from avoided capital cost and preserved GDP

Human

Impact mechanism:  Flood prevention

Direct beneficiaries: **6000** avg: XX

- >6k Population living in areas exposed to severe flooding will be protected

 Extreme heat

 Sea level rise

Financials¹

12/20

Payback Period



Profitability Index



Concessional Loans

- Received World Bank concessional loans
- Demonstrated bankability but not high-margin, low risk



Grants



Equity

Market Rate Loans

- Received PPP private funding
- Demonstrated returns attractive to private investors

¹ From benchmarks (following page) and consultation with Lagos State stakeholders

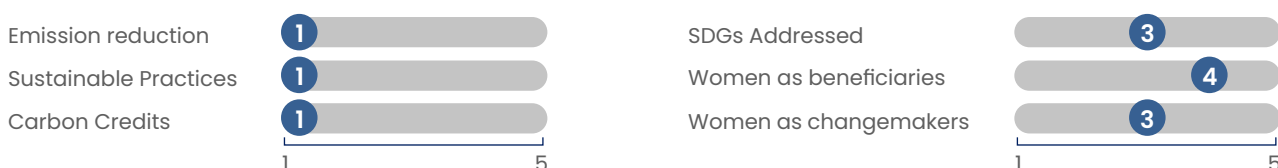
² Output from LCARP climate model

Legal and Political 10/10

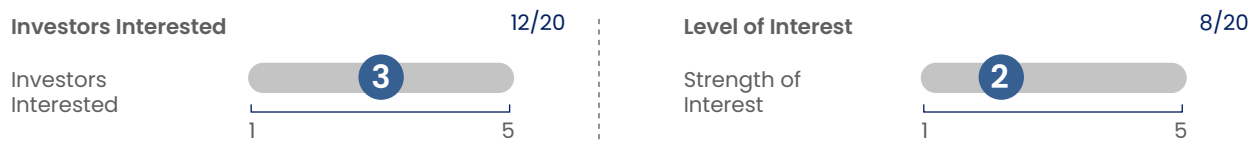
Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³ 2/4



Co-Investor Interest⁴



Construction & rehabilitation of critical transport links (highways)

Climate Impact Drivers
SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
Vietnam – Ho Chi Minh City Flood Risk Management Project	Ho Chi Minh City, Vietnam	\$348 million	The World Bank	Concessional Loans, Market Rate Loans	Reduce flood risk and improve drainage	
Post-Flood National Highways Rehabilitation Project	Pakistan	\$196.9 million	Asian Development Bank	Market Rate Loans	Reduce flood risk and improve drainage	
Flood-proofing in Phase 1 of Limuru	Kenya	Sh64 million	Tilisi: Inspire Invest Imagine	Equity	Reduce flood risk and improve drainage	
Flood-proofing earthworks and construction of carriageway, shoulders, drainage structures between Lena and Tibati	Cameroon	€112 million	Agence Française de Développement	Market Rate Loans	Reduce flood risk and improve drainage; Improve trade relations between Chad and Nigeria	


³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework


⁴ Summary of interviews conducted

Mangrove Restoration

Restore 116ha of mangroves across Lagos

Climate Impact Drivers
SLR EH ER


A&R Intervention	Overall Project Score  <p>There is excitement in investor and conservation circles for mangrove restoration and other NBS, scale may be too small for bankability & impact</p>	\$10.4M	64/100
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Locations Affected	Project Overview	Key Insights
	<ul style="list-style-type: none"> The city's rapid urbanization has resulted in reclamation of wetlands for housing and infrastructures leading to loss biodiversity & valuable ecosystem services By 2030, 82% of wetlands will be inundated. If restored, they can provide a natural protection against SLR and ER 	<ul style="list-style-type: none"> Restoration should happen in Amuwo Odofin, Ikorodu, Kosofe, Eti-Osa & Epe (116ha restorable area) According to the Ocean Wealth, Lagos has a 60% index for mangroves restoration

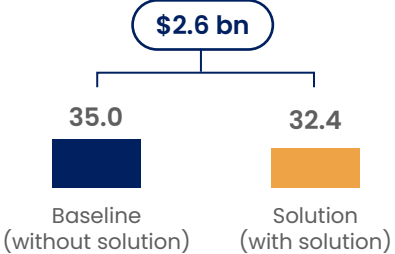

Overview of bankability metrics

Feasibility¹ 6/10

Technical





5	<ul style="list-style-type: none"> <li style="background-color: #d9d9d9; padding: 2px;">9 Proven Operationally <li style="background-color: #d9d9d9; padding: 2px;">8 Complete, qualified <li style="background-color: #003366; color: white; padding: 2px;">7 Operational prototype 	<ul style="list-style-type: none">  Technology demonstrated in final form  Demonstrated in small scales, breaks tidal energy but unable to totally stop floods, to be deployed alongside other solutions 	= TRL 7
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A&R Impact²

<p>Economic</p> <div style="text-align: center;"> <p>\$2.6 bn</p>  <p>35.0 32.4</p> <p>Baseline Solution</p> <p>(without solution) (with solution)</p> </div> <ul style="list-style-type: none"> Revitalized fisheries' activity equivalent to \$23mn \$345mn capital cost and \$2.3bn GDP loss avoided 	<p>Human</p> <p>Impact mechanism:  Flood prevention</p> <p>Direct beneficiaries: >500,000 protected avg: 900,000</p> <hr/> <ul style="list-style-type: none"> 250k tons of CO₂-eq equivalent stored equivalent to \$1.2mn Improved water quality equivalent to \$5mn >510k protected people living in flooded areas³
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Financials¹

14/20

<p>Payback Period </p>	<p>Profitability Index </p>
<p>Grants</p> <ul style="list-style-type: none"> Mostly bilateral funding organizations Small scale grants (<\$20M) 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Market Rate Loans</p> </div> <div style="text-align: center;">  <p>Equity</p> </div> </div>
<p>Equity (Carbon credits)</p> <ul style="list-style-type: none"> Carbon credit financing from potential off-takers 	

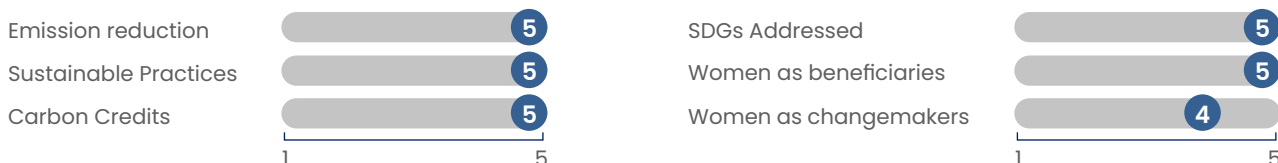
¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model
³ Based on BCG X model for similarly-effective mangrove redevelopment

Legal and Political

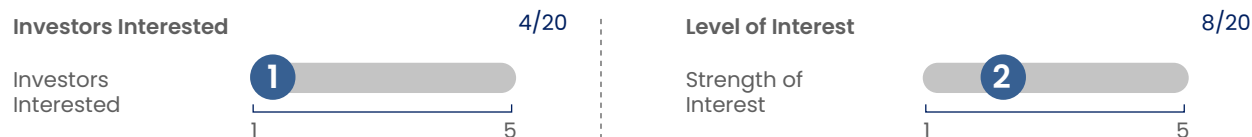
Political	Metric	Score and Notes
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	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
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	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits⁴



Co-Investor Interest⁵



Restore 116ha of mangroves across Lagos

Climate Impact Drivers

Project	Location	Cost	Funders	Funding Model	Impacts	Climate Impact Drivers		
						SLR	EH	ER
Mangrove rehabilitation project in Nigeria	Nigeria	TBD	UN-REDD Programme	Grants, Equity	Controlled the level of water coming in from the rivers and allowed the use of creeks for fishing - > 2000 beneficiaries	Project also helped reduce poverty, improve crop varieties and yields, gender empowerment, biodiversity		
Mikoko pamoja Project	Gazi bay, Kenya	TBD	Aviva, Plan Vivo	Grants, Equity	Coastal protection, nursery habitat for fish, water purification, improving biodiversity CO ₂ mitigation	Primarily a mitigation and preservation project, A&R benefits tangential; 2017 UN Equator prize		
Mozblue Project	Mozambique	TBD	Blue Forest	Equity	Project will offset approximately 200,000 tons of CO ₂ emissions annually	Project to use AI to customize reforestation activities		
TCDP ⁶ Community Mangrove Rehabilitation, Conservation and Sustainable Management in Tsunza Bay	Tsunza Bay, Kenya		Swedish Society for Nature Conservation	Grants	Eliminated threats to the ecosystem; improved economic vitality	Measurable indicators of progress resulted in uncertainty amongst stakeholders		

⁴ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework


⁵ Summary of interviews conducted


⁶ Tsunza Conservation and Development Programme

Water Resilient Agriculture/Agroforestry

Water Resilient Agriculture/Agroforestry

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score  <p>There is excitement in investor and conservation circles for urban agriculture as A&R and food resilience, but solutions are unproven at scale</p>	\$7M	64/100
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Locations Affected	Project Overview	Key Insights
	<ul style="list-style-type: none"> Of Lagos State's 355k hectares of land, 170k hectares is designated for agriculture, yet it is not managed in such a way as to act as a buffer zone for the state's urban core¹. Meticulously designed urban agriculture zones work as buffer zones against flooding like mangroves by directing water back into watersheds² 	<ul style="list-style-type: none"> The agriculture sector in Lagos is highly informal, and not a large political focus. Urban sprawl in Lagos threatens lands. Only select inundated areas can be protected with urban agriculture.

Overview of bankability metrics

Feasibility³ 6/10

Technical

5

9 Proven Operationally

8 Complete, qualified

7 Operational prototype

-  Technology demonstrated in final form
-  Demonstrated under operational mission conditions

= TRL 8

A&R Impact⁴

Economic

35.0

Baseline
(without solution)

35.0

Solution
(with solution)

- Agriculture not highly material for Lagos, limited impact on prevention of economic damage to assets
- Impact of solution cannot be modelled until scale and location of project determined

Human

Impact mechanism:  Flood prevention

Direct beneficiaries: **>500,000 protected**
avg: 900,000

- 510k people protected living in flooded areas⁵
- Direct employment of more than 20,000 people, 75% of whom are women

Financials³ 12/20

Payback Period

3

1
5

Profitability Index

3


1
5

Grants


- Mostly bilateral funding organizations
- Small scale grants (<\$20mn)

Concessional Loans

- Very small concessional loans in one benchmark (<\$5mn)



Market Rate Loans



Equity

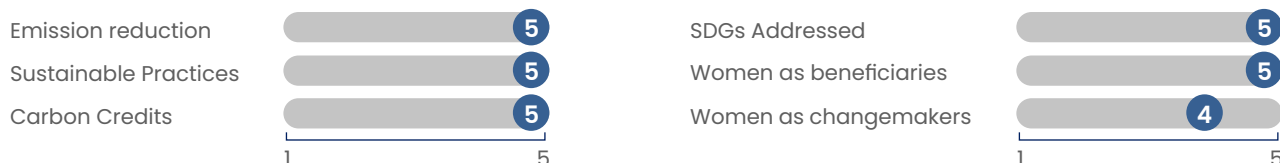
¹ Emerging Opportunities In Agriculture In Lagos State - EFINA Agriculture Workshop
² Review of urban agriculture as a strategy for building a water resilient city 2022
³ From benchmarks (following page) and consultation with Lagos State stakeholders
⁴ Output from LCARP climate model
⁵ Based on BCG X model for similarly-effective mangrove redevelopment

Legal and Political

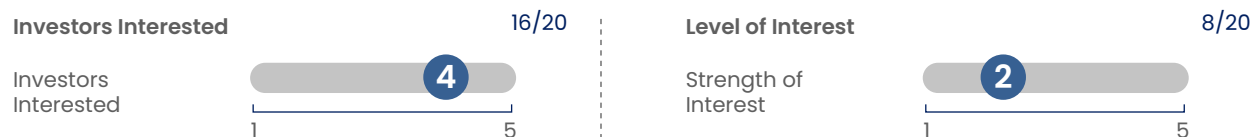
Political	Metric	Score and Notes
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	• Degree of alignment with current political priorities	
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	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits⁶



Co-Investor Interest⁷



Water Resilient Agriculture/Forestry

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
SAFAL for Integrated Water Resource Management (IWRM)	Bangladesh	\$7mn	Kingdom of the Netherlands	Concessional Loans, Grants	90,000 housing farmholds w/ 450,000 people by recharging 80 microwatersheds	Diversified crops, and improved crop yield and income
New 3 million Hectare Project to Promote Regenerative Agriculture in Latin America	Argentina, Colombia, Ecuador, Paraguay, Peru	\$24mn for 5 countries, 3 million hectares total	IKI International Climate Initiative, The Federal Government	Grants	25% agricultural CO ₂ reduction, 22,000 direct beneficiaries	Primarily an agriculture and mitigation project, A&R benefits tangential
Meta-analysis of effectiveness	Accra, Ghana		IDRC CRD International Development Research Centre de recherches pour le développement international;	Grants	Flood-prone areas dedicated to agriculture, acted to recharge watersheds	Urban agriculture zones work as buffer zones against flooding.


⁴ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

⁵ Summary of interviews conducted


Flood Resistant low-income housing

Flood resistant low-income housing

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score  Investors have expressed interest in low-mid income housing, citing guaranteed offtake agreements as a major enabler to implementation	\$275M	62/100
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Locations Affected	Project Overview	Key Insights
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- 
 - #X people living in vulnerable areas estimated to be permanently displaced; sustainable housing plan required
 - Real estate development partners to build flood-resistant housing complexes, ensuring safety for residents and continuous rent collection during flood events


- Lagos has not been able to meet up to 50% of its formal housing demand; experts infer that longer debt tenors are required to implement sustainable solutions in this sector

Overview of bankability metrics



Feasibility¹ 10/10

Technical	<div style="display: flex; align-items: center;"> 5 <div style="border: 1px solid #ccc; padding: 5px;"> <div style="background-color: #003366; color: white; padding: 2px 5px;">9 Proven Operationally</div> <div style="background-color: #ccc; padding: 2px 5px;">8 Complete, qualified</div> <div style="background-color: #ccc; padding: 2px 5px;">7 Operational prototype</div> </div> </div>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Technology demonstrated in final form <input checked="" type="checkbox"/> Demonstrated under operational mission conditions 	= TRL9
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A&R Impact²

<p>Economic 4/8</p> <div style="text-align: center;"> <p>\$47.5mn</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>35.0</p> <div style="background-color: #003366; width: 30px; height: 20px; margin: 0 auto;"></div> <p>Baseline (without solution)</p> </div> <div style="text-align: center;"> <p>34.5</p> <div style="background-color: #f99; width: 30px; height: 20px; margin: 0 auto;"></div> <p>Solution (with solution)</p> </div> </div> </div> <ul style="list-style-type: none"> • Estimated 35% reduction in cost for areas impacted by extreme rainfall 	<p>Human 4/8</p> <p>Impact mechanism:  Flood prevention</p> <p>Direct beneficiaries: >500,000 protected avg: 900,000</p> <ul style="list-style-type: none"> • Impact depends on scale of project (e.g., how many housing developments) • Prohibitive cost to implement for all vulnerable population impacted by flooding in Lagos
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Financials¹ 12/20

<p>Payback Period 2</p> <div style="text-align: center;"> <div style="background-color: #ccc; width: 100%; height: 15px; position: relative;"> 1 5 <div style="background-color: #003366; width: 20%; height: 15px; position: absolute; left: 20%;"></div> </div> </div>	<p>Profitability Index 3</p> <div style="text-align: center;"> <div style="background-color: #ccc; width: 100%; height: 15px; position: relative;"> 1 5 <div style="background-color: #003366; width: 60%; height: 15px; position: absolute; left: 20%;"></div> </div> </div>	
<p>Concessional Loans</p> <ul style="list-style-type: none"> • Emerging markets have received concessional funding from World Bank Group and AFD for low income housing 	<p>Grants</p> <ul style="list-style-type: none"> • Many lower income countries have also received grants 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Market Rate Loans </div> <div style="text-align: center;">  Equity </div> </div>

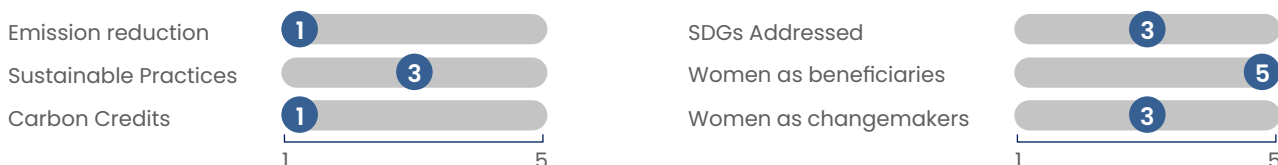
¹ From benchmarks (following page) and consultation with Lagos State stakeholders
² Output from LCARP climate model

Legal and Political

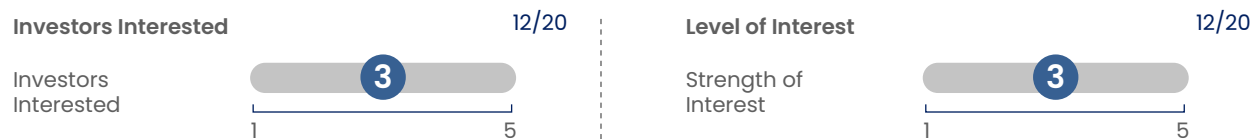
Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
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	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³



Co-Investor Interest⁴



Flood resistant low-income housing

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
The Greater Accra Resilient and Integrated Development (GRID)	Accra, Ghana	\$2.2bn across all workstreams including housing	The World Bank IBRD IDA	Concessional Loans	Housing for 54k people, 41 healthcare facilities, 250k m ³ solid waste treatment, floodwater drainage	Comprehensive and integrated flood resiliency strategy
Kibera Slum Upgrading Initiative	Nairobi, Kenya	\$20mn to build 822 units for 1800 people	Cities Alliance Cities Without Slums, IDA International Development Association World Bank Group, Un-Habitat	Concessional Loans, Grants	New housing had clean water, sewage treatment	Part of 20 year slum upgrading initiatives
Msimbazi Basin Development Project	Dar es Salaam, Tanzania	\$260mn to resettle 6350 households	IDA International Development Association World Bank Group, cooperación, Ministry of Foreign Affairs of the Netherlands	Concessional Loans, Grants	Also addressed drainage issues, will effect 300,000 people overall	Also included emergency financing facilities


³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

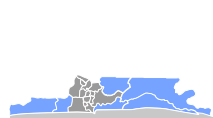
⁴ Summary of interviews conducted

Floodproofing power and communication assets

Floodproofing Power/Communications

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Hardening and modernizing Lago's power grid will make it more resilient to flooding, and offers opportunities to green the grid with decentralized local contributors	\$115M	58/100
Locations Affected	Project Overview		Key Insights	



- By 2030, ~42 critical power assets (~42 critical power assets Powerplants and grids) and 44 communication assets will be inundated, eroding up to 8mn and \$12.8mn in capital cost respectively resulting in a 3.2% GDP reduction
- Floodproofing assets means elevation, walls, and new infrastructure, much of which is in poor repair today, leading to a more reliable grid
- Modern grid components can allow for easy addition of green power sources
- Adaptive grid technology can make the new network more resilient to blackouts and brownouts

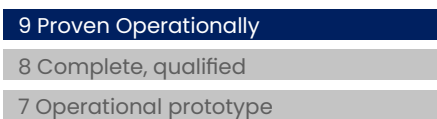
Overview of bankability metrics



Feasibility¹

10/10

Technical

5

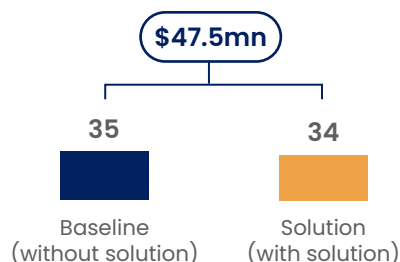


-  Technology demonstrated in final form
-  Demonstrated under operational mission conditions

= TRL9

A&R Impact²

Economic



- \$967mn in capital cost and GDP will be protected from being impacted by sea level rise
- 2.9x ROI achieved from avoided capital cost and preserved GDP

Human

Impact mechanism:  Flood prevention

Direct beneficiaries: **9000**
avg: 900,000

- >6k Population living in areas exposed to severe flooding will be protected

Financials¹

12/20

Payback Period



Profitability Index



Concessional Loans

- Emerging markets have received concessional funding from World Bank Group to strengthen grids



Grants



Equity

Grants

- Private operators and governments have used market rate loans as well.

¹ From benchmarks (following page) and consultation with Lagos State stakeholders

² Output from LCARP climate model

Legal and Political

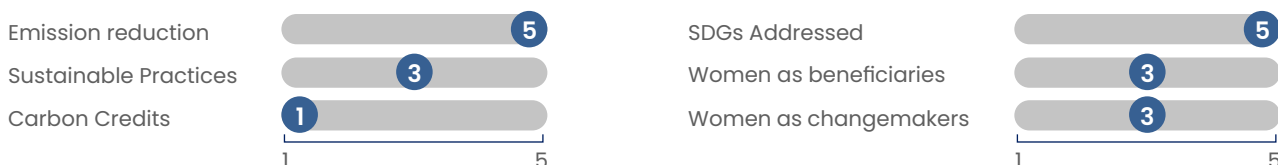
10/10

Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
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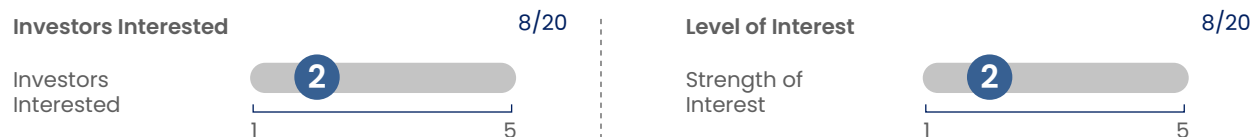
Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³

2/4



Co-Investor Interest⁴



Floodproofing Power/Comms

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
Powering through the storm: Climate resilience for energy systems	Mozambique, Tanzania	2% increase in project budget	World Bank Group	Market rate loans, Equity	Flood resistance to 2-3mn reduced exposure and damage, 4X ROI	Part of all new power projects for World Bank
Additional financing to electricity grid modernization project	Nepal	\$2.3mn, 1.5% cost increase	Asian Development Bank	Concessional Loans	Flood protection to 1.5mn	16km of transmission lines, one substation
Flood defence framework for National Grid substations in United Kingdom	United Kingdom	\$145mn for flood defence for the national grid	National Grid	Grants, Equity	49 critical substations protected	Implement ETR 138 framework


³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

⁴ Summary of interviews conducted

Aquafarming Facilities

Aquafarming facilities

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Developing more resilient aquafarming facilities will reduce the effects of flooding on yield and overall livelihood of Aquafarmers in coastal areas of Lagos	\$50M	57/100
Locations Affected	Project Overview		Key Insights	



- Agriculture or seafood developers to create aquaculture facilities resilient to flooding, turning a problem into a solution and generating income from the sale of fish and seafood
- Many fishing families in Lagos are vulnerable to the impact of climate change because of their low adaptive capacity
- Consequences of flood due to climate change include reduction in fish catch, erosion of human habitat and reduction of income of fishermen

Overview of bankability metrics

Feasibility¹

10/10

Technical

5

- 9 Proven Operationally
- 8 Complete, qualified
- 7 Operational prototype



Technology demonstrated in final form



Demonstrated under operational mission conditions

= TRL9

A&R Impact²

Economic (cost averted)



- Agriculture and aqua farming not highly material for Lagos, limited impact on prevention of economic damage to assets
- Impact of solution cannot be modelled until scale and location of project determined

Human

Impact mechanism:



Flood prevention

Direct beneficiaries:

10,000
avg: 900,000

- Solution not highly material to prevent floods or make Lagos more resilient on a significant scale
- Limited direct impact given difficulties in scaling up solution

Financials¹

12/20

Payback Period



Profitability Index



Concessional Loans

- Emerging markets have received concessional funding from World Bank Group



Market Rate Loans



Equity

Grants

- Many lower income countries have also received grants, though not at the scale required

¹ From benchmarks (following page) and consultation with Lagos State stakeholders

² Output from LCARP climate model

Legal and Political

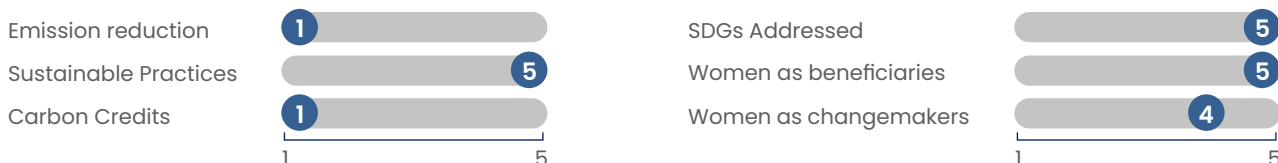
10/10

Political	Metric	Score and Notes
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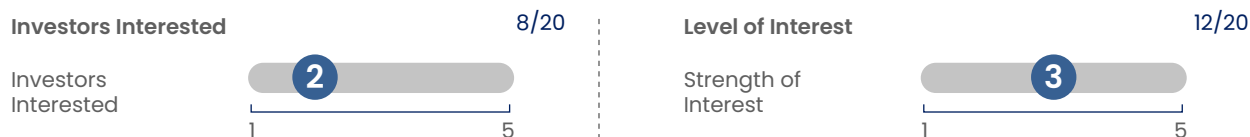
Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³

3/4



Co-Investor Interest⁴



Aquafarming facilities

Climate Impact Drivers

Project	Location	Cost	Funders	Funding Model	Impacts	Climate Impact Drivers		
						SLR	EH	ER
Embracing Food Security and Climate Resilience on the Zambezi Flood Plains	Zambia	\$50.6mn	The World Bank	Concessional Loans, Grants	Introduced more agricultural diversification to improve income, food security, nutrition, and climate resilience			
Improving shrimp farm design in flood-prone areas of India	India				Improved designs for shrimp farms located in flood-prone areas in India			
Water Farming for Climate Resilient Agriculture and Disaster Preparedness in India and Bangladesh by growing crops on floodplains	India & Bangladesh	TBD	Giz (Desutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH)	Grants	At the household level, float farming secured food and raised farmers' earnings by 65–70 percent			


³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

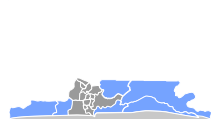
⁴ Summary of interviews conducted

Commercial Rainwater Harvesting

Commercial rainwater harvesting

Climate Impact Drivers
SLR EH ER

A&R Intervention	Overall Project Score 	Commercial rainwater harvesting as an A&R and Agri productivity solution is more suited to rural areas; unlikely to drive impact at scale in urban areas	\$3M	40/100
Locations Affected	Project Overview	Key Insights		



- In commercial properties (malls, offices, condominiums), harvested rainwater can serve a sizeable portion of their water needs, reducing flooding and water costs

- Rainwater harvesting is overly dependent on city/area layout

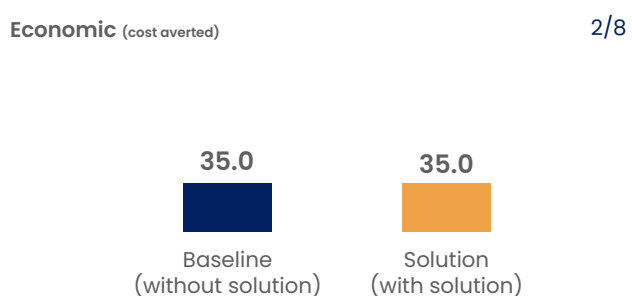
Overview of bankability metrics

Feasibility¹ 8/10


Technical 5

9 Proven Operationally	 Technology demonstrated in final form  Demonstrated under operational mission conditions	= TRL8
8 Complete, qualified		
7 Operational prototype		

A&R Impact²



Human 2/8

Impact mechanism:  Flood prevention

Direct beneficiaries: **10,000**


- Solution to have limited impact on damage caused by flooding given the difficulty of implementing at scale
- Impact of solution cannot be modelled until scale and location of project determined
- Solution not highly material to prevent floods or make Lagos more resilient on a significant scale
- Limited direct impact given difficulties in scaling up solution


Financials¹

6/20


Grants

- Typically seen as a public good in arid or semi arid developing countries, most rainwater harvesting projects are grant based


 Market Rate Loans


 Equity

5/10

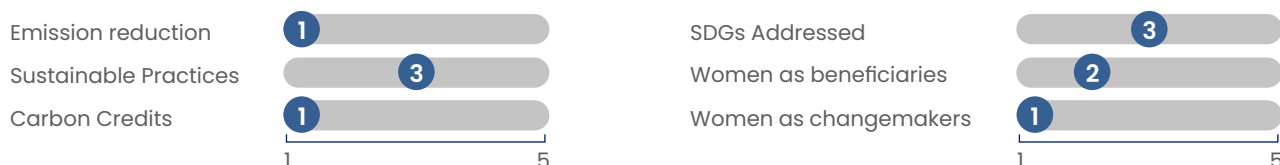
Legal and Political

Political	Metric	Score and Notes
Policy alignment	• Government support for this type of project	
	• Political stability and likelihood of continuity in policies that support the project	
	• Degree of alignment with current political priorities	
Social	• Level of social acceptance and public support	
	• Potential for improving social equity or quality of life	
	• Compatibility with local culture and social norms	
Direct Environmental Impact	• Degree of positive impact on the environment from construction	
	• Level of potential environmental risk or damage	
	• Sustainability of resources required for the project	

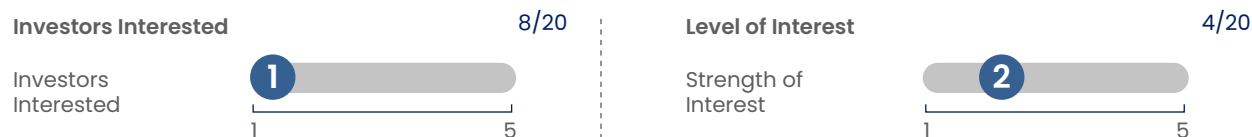
Legal	Metric	Score and Notes
Legal Considerations	• Level of legal hurdles (permits, regulations, etc.)	
	• Alignment with existing laws and regulations	
	• Potential for future legal challenges	

Co-Benefits³

1/4



Co-Investor Interest⁴



Commercial rain water harvesting

Climate Impact Drivers

SLR EH ER

Project	Location	Cost	Funders	Funding Model	Impacts	Notes
Water Harvesting Pilot Project in IGAD	IGAD Region (Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, and Uganda)	~\$0.4mn	African Water Facility Facilite africaine de l'eau, Banque Africaine De Development African Development Bank, Africian Development Funds Africain De Development	Grants	Increased food security in the IGAD region; community-based water-harvesting in the arid and semi-arid areas	Mainly agriculture focused
Integrated Water Harvesting Project in the Mpumalanga Province	South Africa	~\$0.41mn	African Water Facility Facilite africaine de l'eau, Banque Africaine De Development African Development Bank, Africian Development Funds Africain De Development	Grants	Improvement of livelihoods in communities living with protracted periods of low rainfall	Mainly agriculture focused
Water harvesting for water supply and agriculture in rural districts of the Republic of Djibouti	Djibouti	~\$2.3mn	African Water Facility Facilite africaine de l'eau, Banque Africaine De Development African Development Bank, Africian Development Funds Africain De Development	Grants	Improved access to multiple-use water for nomadic rural populations	

³ From benchmarks (following page), BCG analysis, and BCG draft gender-climate action framework

⁴ Summary of interviews conducted

