

RESILIENT PALMA, MOZAMBIQUE

WORKSHOP REPORT
DESIGNING TO PRESERVE NATURAL CAPITAL

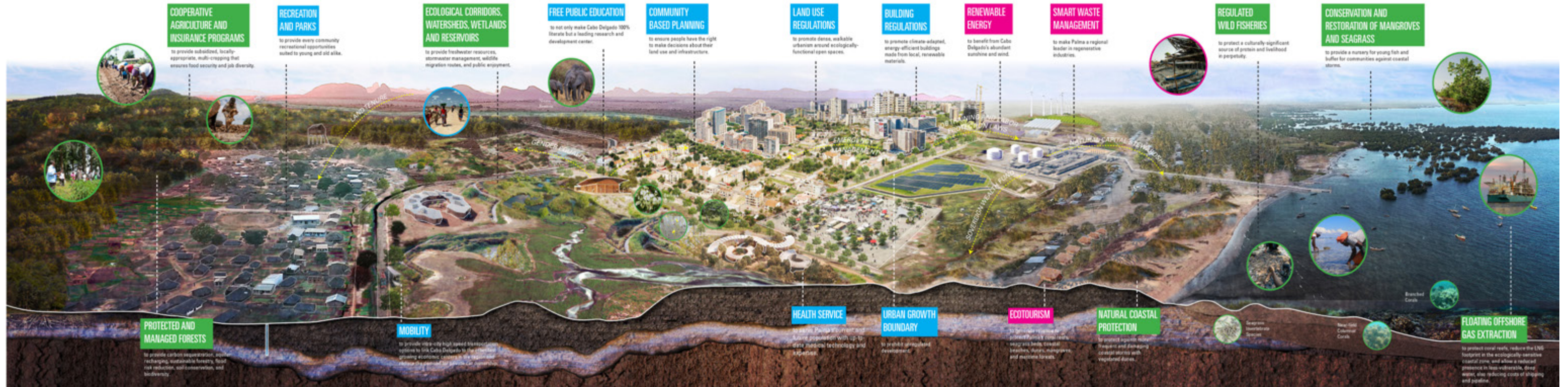
JUNE 2019



COLUMBIA

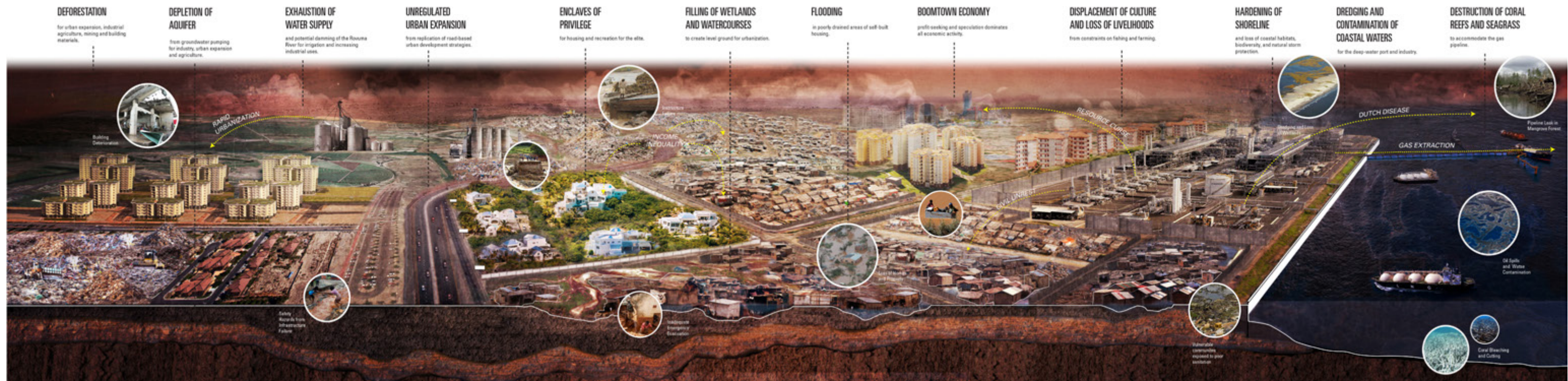
Center for
Resilient Cities
and Landscapes

BUSINESS AS USUAL: WHAT IS AT RISK WHEN WE DON'T PRIORITIZE NATURAL CAPITAL



RESILIENT PALMA:

HOW DO WE PROTECT AND ENHANCE NATURAL AND HUMAN CAPITAL?



CENTER FOR RESILIENT CITIES AND LANDSCAPES

The Center for Resilient Cities and Landscapes (CRCL) uses planning and design to help communities and ecosystems adapt to the pressures of urbanization, inequality, and climate uncertainty. Through interdisciplinary research, visualization of risk, project design scenarios, and facilitated convenings, CRCL works with public, nonprofit, and academic partners to deliver practical and forward-thinking technical assistance that advances project implementation. Through academic programming, CRCL integrates resilience thinking into design education, bringing real-world challenges into the classroom to train future generations of design leaders.

Founded in 2018 at the Columbia University Graduate School of Architecture, Planning and Preservation with a grant from The Rockefeller Foundation, CRCL extends Columbia’s leadership in climate-related work and support of the interdisciplinary collaborations and external partnerships needed to engage the most serious and challenging issues of our time. CRCL is allied with the Earth Institute’s Climate Adaptation Initiative and works across the disciplines at Columbia by bridging design with science and policy to improve the adaptive capacity of people and places.

WWF

The World Wide Fund for Nature (WWF) is one of the world’s largest and most experienced independent conservation organizations, with over five million supporters and a global network active in more than 100 countries. WWF’s mission is to stop the degradation of the planet’s natural environment and to build a future in which humans live in harmony with nature, by conserving the world’s biological diversity, ensuring the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

Mozambique Natural Capital Program

The goal of the Natural Capital Program is to integrate Nature-Based Infrastructure (NBI) such as rivers, forests, and mangroves in the planning, design, and operation of built infrastructure, industries, and cities for lasting, shared human prosperity, economic productivity, and climate resilience. NBI is the interconnected ecological structural elements and processes in a landscape or seascape that deliver critical services and benefits to people, businesses, and biodiversity.

This project was made possible by the generous support of WWF.

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With Special Thanks and Contributions from Collaborating Agencies and Partners

Government of Mozambique: The Ministry of Land, Environment and Rural Development (MITADER), and the Ministry of Economy and Finance (MEF), Ministry of Sea, Inland Waters and Fisheries (MIMAIP), Ministry of Public Works and Water (MOPH), District Services for Planning and Infrastructures (SDPI) from Palma, District Services for Economic Activities (SDAE) from Palma, National Institute for Disaster Management (INGC)

Public Sector: WWF, African Development Bank (AfDB), Council for Scientific and Industrial Research (CSIR), UNHABITAT, Columbia University, and Lúrio University

Workshop Participants: Eni S.p.A., Exxon Mobil, Association of the Environment (AMA), Kreditanstalt für Wiederaufbau (KfW), The World Bank, National Road Administration (ANE) Mozambique, INFATEC, Centro Terra Viva (CTV)

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HOW WILL THE DEVELOPMENT OF LIQUEFIED NATURAL GAS AND ASSOCIATED URBANIZATION IMPACT MOZAMBIQUE'S NATURAL AND SOCIAL CAPITAL?

EXECUTIVE SUMMARY

Cabo Delgado, Mozambique is a place of great ecological and cultural wealth. It also contains Africa's fourth-largest known deposit of liquefied natural gas offshore. The extraction of this gas and subsequent urban growth is assured in the years to come. The town of Palma is expected to grow from 20,000 to at least 200,000. How these developments will affect the country's existing natural and social capital remains to be seen.

From the spring of 2018 until the summer of 2019, the Center for Resilient Cities and Landscapes (CRCL) worked with World Wide Fund for Nature (WWF) to help the government of Mozambique explore scenarios for the future of Cabo Delgado. These scenarios are not intended to be comprehensive or predictive, but instead are a means to visualize existing trends and begin a conversation about how policies and initiatives could counter those trends or introduce more climate-resilient development pathways.

To understand existing conditions in Cabo Delgado, WWF and faculty from Columbia University's Graduate School of Architecture Planning and Preservation (GSAPP) conducted a five-day workshop in Maputo in August 2018. The workshop brought together faculty and students

in architecture, urban design, planning, business, and environmental management from Columbia University; architecture students and faculty from Lúrio University (Pemba, Cabo Delgado); and other participants from local and international NGOs, public, and private sectors. This diverse group from many places and many sectors came together to build an understanding of the interconnected risks to the flows of natural capital in northern Mozambique. By describing how the existing forests, rivers and bays provide food, water, shelter and energy today, they began to sketch a future vision of sustainable, resilient development based on harnessing and enhancing natural capital. This workshop provided a forum for the major stakeholders in the economic development of northern Mozambique—government, civil society, communities, and the private sector—to collectively understand the threats and opportunities that gas exploration, rapid growth, climate change, and related factors pose to the region. The workshop featured presentations from each stakeholder on proposed development plans, followed by breakout group discussions. On the last day, students from GSAPP, Columbia University Business School, and Lúrio University made short presentations of what they learned and developed visualizations of potential future development in northern Mozambique.

EXECUTIVE SUMMARY

After the workshop, CRCL research scholars used the knowledge gleaned from the workshop and independent research to develop visualizations of potential futures for Palma. A “business-as-usual” scenario draws on precedents from other extraction sites in Mozambique and elsewhere in Africa to show the consequences of unregulated pollution, unmanaged growth and climate change. An alternative “resilient” scenario is intended to illustrate how climate resilience, social justice, and circular and sustainable economies can protect and enhance the region’s natural capital and the many benefits it provides to local communities.

In Late May 2019, CRCL and WWF traveled to Pemba for a workshop with local officials and NGOs. This workshop

was conducted in close proximity to ongoing relief and recovery work after two devastating cyclones had landed to the north in Ibu and south in Beira in the previous months. During this workshop, CRCL tested the scenarios and received valuable feedback. With this feedback the scenarios became more robust better calibrated to local conditions. Moreover, they helped to facilitate conversation among multiple actors about the long term future of Cabo Delgado. These conversations continued in Maputo with national leadership in MITADER and MEF, and with the leadership of Anadarko.

This report contains a summary of both the outcomes of the scenario planning research as well as the process by which they were developed. It also contains simple recommendations for collective action to ensure resilience in Cabo Delgado.

On behalf of partners from the Center for Resilient Cities and Landscapes, WWF, and the Natural Capital Program.



**Mangrove Forest in Quionga, near Palma, Mozambique
Image: WWF / Green Renaissance Photography**



(TOP OF PAGE) VIEW OF THE CITY OF PEMBA IN CABO DELGADO. (ABOVE) STUDENTS AND FACULTY FOLLOW LOCAL FARMERS IN FIELDWORK. (RIGHT) LOCAL FARMER OFFERING US CASSAVA.

VISUALIZING NATURAL CAPITAL IN PALMA

Mozambique is one of the poorest countries in the world and, as two recent cyclones demonstrated, is extremely vulnerable to the impacts of climate change. The discovery of natural gas off the coast of Cabo Delgado has ignited hopes for economic development for some. For others, it has stoked fears that resource extraction will cause irreparable harm to this ecologically-precious landscape of mangroves, seagrasses, and coastal reefs. There is also concern that gas exploration will deepen social unrest which has manifest in a series of recent terrorist attacks.

The World Wildlife Fund (WWF) invited us to help visualize scenarios for the future of the town of Palma, a collection of fishing and farming villages. This region will likely experience explosive urbanization with the development of a liquefied natural gas (LNG) facility to supply markets in China and India. In August 2018, we traveled with Columbia University Graduate School of Architecture, Planning, and Preservation (GSAPP) and Business School students and faculty from Lurio University to Maputo to learn about the cities and landscapes of coastal Mozambique. With WWF and representatives from Mozambican government and civil society, the

students facilitated a workshop which explored how Mozambicans’ water, energy, housing and food all come from “natural capital” -- the vast stock of forests, rivers, wetlands and coastal ecologies. Together we conceived strategies to enhance and protect the natural capital in perpetuity.

After the workshop, we worked with WWF International and WWF Mozambique to develop two scenarios for Palma. In the “business as usual” scenario, the natural capital is plundered while widening inequality leads to social unrest. In an alternative resilient scenario, ecological, social and economic growth are mutually supportive. A public priority is placed on mitigating fossil fuel emissions and adapting to the effects of climate change on people and the environment. In June 2019, we presented these scenarios to officials in Cabo Delgado and to the energy company Anadarko responsible for extracting the natural gas. A pamphlet of these scenarios is being sent to all the relevant government agencies, businesses, and NGOs involved in the gas extraction of Coastal Mozambique. We will continue to press the fossil fuel industry to be accountable for the social and ecological risks they pose to communities and ecosystems here and elsewhere.

“THESE SCENARIOS ALLOW US TO SEE WHAT WE WANT TO HAPPEN. IT GIVES US HOPE BECAUSE WE CAN SEE IT.”

—ANABELA RODRIGUES, COUNTRY DIRECTOR OF WWF-MOZAMBIQUE

BY THE NUMBERS

Mozambique ranks **180 out of 189 globally on the human development index** with almost 19 million Mozambicans living in extreme poverty. 25% of Mozambicans do not have access to electricity.

Cyclone Idai in April 2018 was the worst storm in Mozambique history. **It killed more than 1,000 people and affected more than 3 million.** 90% of structures in the City of Beira were damaged. Just two weeks later Cyclone Kenneth brought further damage, this time to Cabo Delgado.

Anadarko and Exxon are expected to invest up to **\$40 Billion to extract 150 trillion cubic feet of gas from Cabo Delgado**, enough to heat 150 US homes for 15 years. So far, they have pledged only \$100 Million in corporate social responsibility to help the community that will experience the environmental and social impacts of this extraction.

VALUING
NATURAL
CAPITAL



Situ Island, Quirimbas National Park



RESILIENCE RECOMMENDATIONS FOR FUTURE REGIONAL PLANNING IN PALMA

The extractive industries know there is enormous wealth to gain in Mozambique. The recent cyclones should also have made it clear that the imminent effects of climate change require smart and diversified investments. Despite the world becoming more interconnected and imperiled, the ancient impulse to plunder and move on is regrettably not yet obsolete. Resilience is an understanding that mistakes have been made and we can learn, anticipate and do better. As a collective process involving citizens, government and the private sector, building resilience starts with a common understanding of the challenges ahead based on measurable facts, proceeds with developing creative strategies and implementing the best strategies with a shared ownership of the results.

UNDERSTANDING EXISTING VULNERABILITIES AND ANTICIPATE FUTURE SHOCKS

- Produce localized climate change projections including sea level rise, updated hydrodynamic modeling of storm surge and storm tracks, precipitation and riverine flooding, extreme heat and impacts on infrastructure, housing, livelihoods, and ecosystems.
- Survey local population to better understand the conditions of housing, nutrition, educational attainment, physical, mental and reproductive health.
- Analyze demographic and migration trends to extrapolate population projections.
- Develop emergency plans and “pre-covery” plans to have coordinated response and recovery efforts after future cyclones and floods.

PROTECT AND ENHANCE EXISTING ASSETS

- Develop a comprehensive inventory of natural capital in and around Palma and the Afungi Peninsula.
- Develop an economic model of benefits of natural capital under multiple scenarios and time frames, including with a global carbon tax.
- Study the expansion of boundaries of existing national parks Quirimbas and Niassa and the pathway to creating new ecological service areas (parks) along the Rovuma River and its distributaries.

CONSIDER MOBILITY, EQUITY AND LAND USE SIMULTANEOUSLY

- Expand on the existing spatial plans for the Afungi Peninsula with a comprehensive regional land use plan for the region around Palma.
- Include in this plan specific recommendations for transportation investments, with priority given to investments such as mass transit that will benefit all segments of society.
- Conduct spatial planning in coordination with just land readjustment policies.

CLUSTER HOUSING AROUND PUBLIC SPACE AND SOCIAL INFRASTRUCTURE

- Create high quality public space by preserving natural capital in and around Palma as a blue-green network of parks that stretches from the coastline to the interior.
- Around this public space, develop clustered housing achieving economies of scale, energy efficiency and home affordability.

INVEST IN INFRASTRUCTURE WITH MULTIPLE BENEFITS

- Leverage every infrastructure investment to achieve multiple benefits across sectors: What can this investment do beyond its initial purpose? Can this road project restore habitat? Can this water project provide educational opportunities?
- Develop planning protocols for infrastructure that include climate change projections and integration across sectors.

ESTABLISH COLLABORATIVE PLANNING PROCESSES

- To achieve all of the above, promote transparency and collaboration across society and government.
- Invest the necessary time and energy to build partnership between government and citizens.
- Prioritize resources for a committed local planning staff and community-based leadership with the standing to represent the population.
- Develop formal and informal processes for explaining projects and priorities to the public and gathering feedback.

LEVERAGE PRIVATE INVESTMENT FOR PUBLIC GOOD

- Support a relentless campaign to empower the public sector-in partnership with Civil society actors like WWF to influence the extractives industry and other private sector actors to make long term decisions for the greater good.
- Develop metrics to hold the private sector accountable over time, not just created and dollars spent but the real impacts of maintaining and strengthening to natural and human capital.

BUSINESS AS USUAL:

WHAT IS AT RISK WHEN WE DON'T PRIORITIZE NATURAL CAPITAL?

CONTEXT

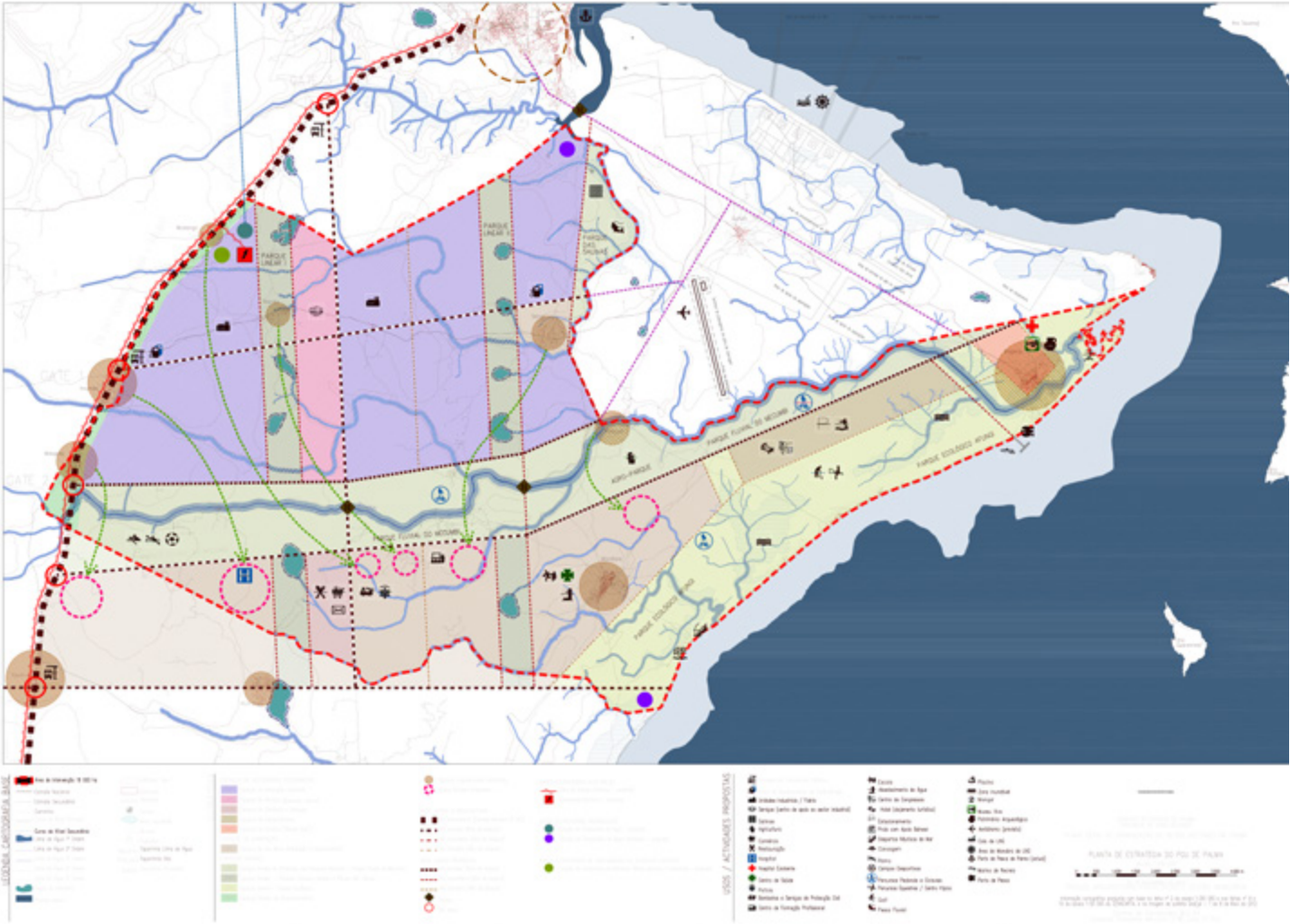
There is no way to predict the future, but history has a lot to tell us about the challenges faced by places that grow fast with natural resource extraction. The “resource curse” is a term used to describe how the long-term health and prosperity of societies and ecosystems can be compromised for short-term profits that usually end up in the hands of a lucky few. This visualization is intended to show the potential impact of the resource curse on Palma in the not so distant future if natural and human capital is not protected. Resource extraction, rapid urbanization, and climate change can combine in surprising and devastating ways far outside any imagination; nevertheless, the general patterns are knowable and therefore, avoidable.

PLAN OF THE DEVELOPMENT OF THE DISTRICT OF PALMA (PDUT)

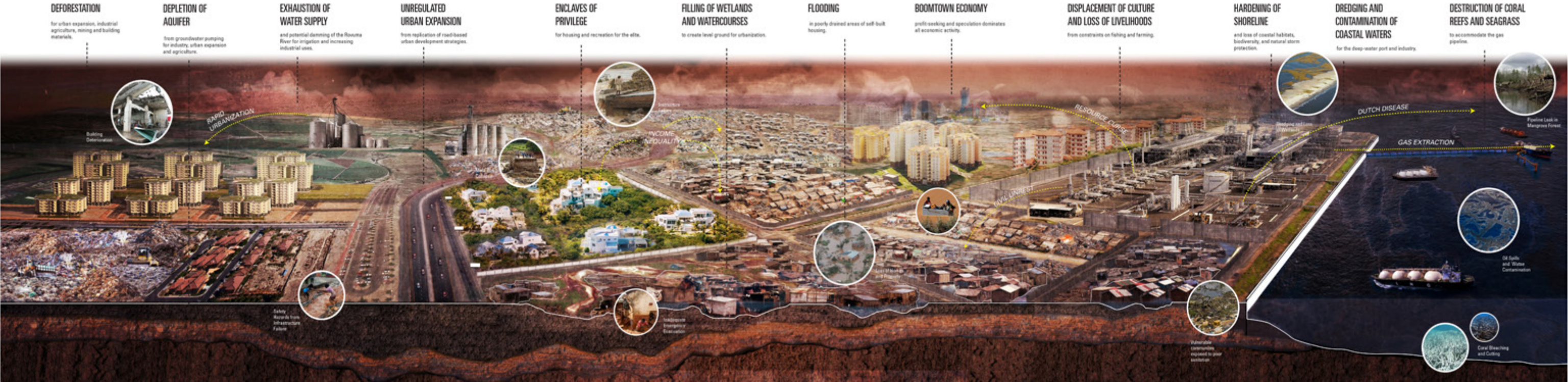
The zoning strategy of the District Land Use Plan of Palma (PDUT) includes the integration of local communities, ecological preservation, and connecting the industrial zone with the LNG factory. The land uses in the PDUT area are subdivided into three categories: community, urban, and green spaces with programmatic divisions of industry, business, housing, commerce, tourism, and infrastructure.



PROJECTION OF CABO DELGADO LAND COVER WITH EXTRACTIVES IN 2040



PROPOSED URBANIZATION PLAN AND LNG OPERATIONS IN PALMA
SOURCE: REPUBLIC OF MOZAMBIQUE, GOVERNMENT OF THE DISTRICT OF PALMA

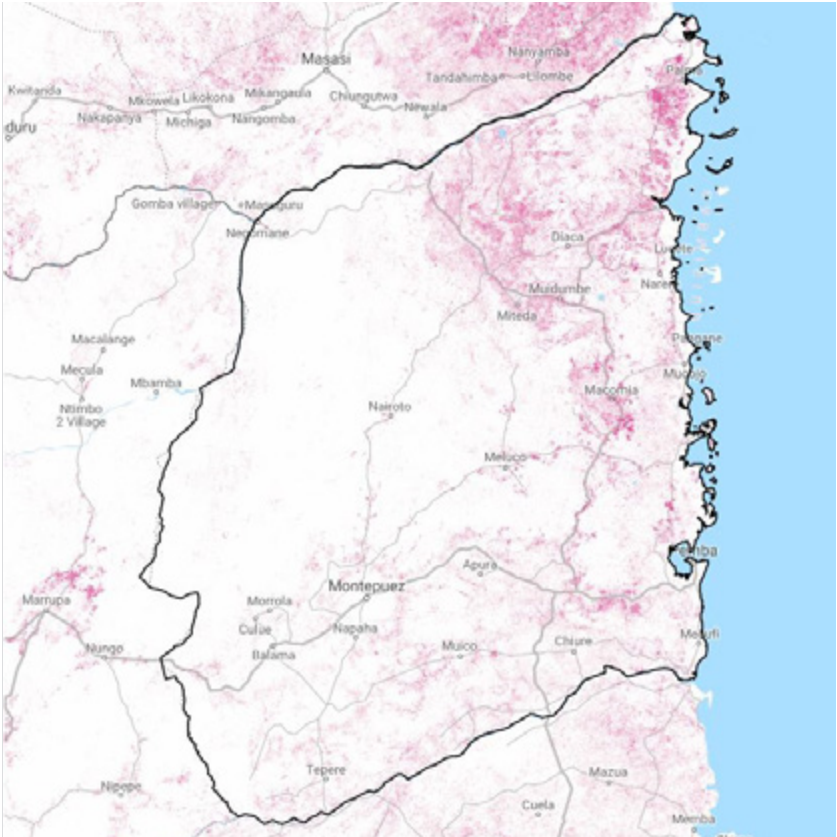


DEFORESTATION

FOREST COVER IN CABO DELGADO

Forests surrounding Palma are a vital ecological service area that provide essential carbon sequestration, aquifer recharge, and wildlife habitat, while ensuring harvesting of timber and other renewable resources to communities. As population increases, urban expansion, industrial agriculture, and increased demand in building materials will undoubtedly contribute to the deforestation rate of forests in Cabo Delgado, which has already deceased 9% since 2000 according to Global Forest Watch.

SOURCE: GLOBAL FOREST WATCH / CABO DELGADO, MOZAMBIQUE



FILLING OF WETLANDS

OIL AND GAS EXPLORATIONS IN NIGER DELTA

Nigeria’s economy is heavily dependent on the extraction of crude oil, natural gas, and logging in the Niger Delta. Since the discovery of oil, the Niger Delta’s ecosystems have been at high risk of pollution and degradation. The timber, oil, and natural gas industries have built roads, excavated channels, and filled in wetlands and watercourses throughout the Niger Delta, leading to the destruction of fish habitats and freshwater ecosystems. With more than 7,000 kilometers of pipelines, the Delta’s freshwater ecosystems have been subject to numerous oil spills with a loss of approximately 3 million barrels of oil in the region from 1976 to 2001.



SOURCE: PENN STATE COLLEGE OF AGRICULTURAL SCIENCES, DEPARTMENT OF AGRICULTURAL ECONOMICS, SOCIOLOGY, AND EDUCATION

FLOODING

EFFECTS OF CYCLONE IDAI AND KENNETH IN BEIRA AND PEMBA

On March 2019, the Mozambican city of Beira was heavily impacted by Cyclone Idai destroying almost 90 percent of the city’s infrastructure, homes, and natural resources. Severe flooding occurred, exceeding the banks of the Pungwe and Buzi rivers with the city remaining at risk due to dams reaching full capacity. The cyclone resulted in 447 deaths, 72,793 people living in accommodation centers, and a total of 1.85 million people directly impacted. Just two weeks later Cyclone Kenneth affected 243,300 people in the Provinces of Nampula and Cabo Delgado, with approximately 37,300 houses partially or completely destroyed.

SOURCE: AFRICA IS A COUNTRY / MOZAMBIQUE’S NATIONAL INSTITUTE FOR MANAGEMENT OF CALAMITIES (INGC) / UN OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS / WORLD FOOD PROGRAMME



DEPLETION OF AQUIFER

WATER CRISIS IN SOUTH AFRICA

“70 percent of the 250 million people living in South Africa rely on groundwater for drinking, sanitation, the support of livelihoods, agriculture, ecosystem, health and industrial growth.” The drought in the Western Cape of South Africa (June 2015 to June 2018) left nearly four million people without municipal water supply. Groundwater extraction was used as an immediate response; but as the drought progressed, groundwater extraction threatened environmentally sensitive areas.

SOURCE: UNIVERSITY OF CAPE TOWN / CITY LAB



DREDGING + CONTAMINATION OF COASTAL WATERS

GULF COAST OF LOUISIANA

Louisiana’s coastal wetlands have suffered as a result of infrastructure built to regulate flooding of the Mississippi River. The physical impact of the construction of levee systems has limited sediment flow and restricted nourishment of wetlands to the river channel, resulting in wetlands sinking below sea level. The loss of wetlands has become a crucial threat as coastal lands become more exposed to the Gulf of Mexico, reducing storm-buffering protection and accelerating the erosion of barrier islands that protect isolated bayou communities and the New Orleans Metropolitan area.

SOURCE: INSTITUTE FOR ENVIRONMENTAL STUDIES, LOUISIANA STATE UNIVERSITY

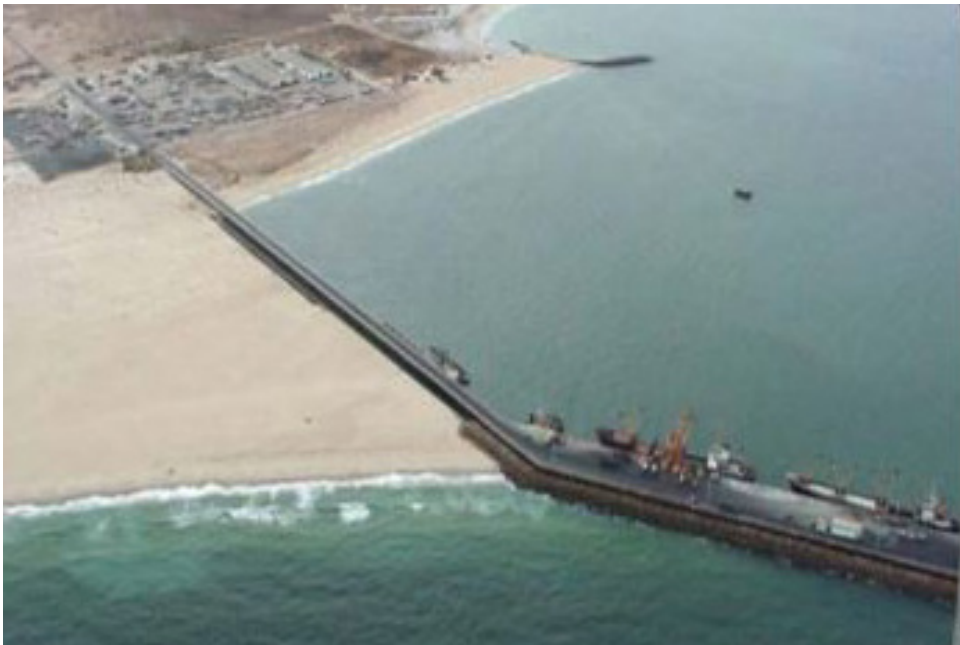


HARDENING OF SHORELINE

SOIL EROSION AT NOUAKCHOTT HARBOUR, MAURITANIA

As the concentration of population and infrastructure along the coast of the Nouakchott Harbour in Mauritania increases, the consequences of coastal erosion on natural coastal areas are more significant. Shoreline hardening, the extraction of materials, and dams reduce the amount of sediment deposits within fragile coastal areas. Starved of sediment, these areas are at higher risk of erosion and sea level rise.

SOURCE: WEST AFRICAN ECONOMIC AND MONETARY UNION (UEMOA)



DESTRUCTION OF CORAL REEFS AND SEAGRASS

PIPELINE THROUGH THE GREAT BARRIER REEF

The Australian government has initiated a plan to build a natural gas pipeline within the boundaries of the Great Barrier Reef. The pipeline threatens hundreds of endangered species including green and loggerhead sea turtles, saltwater crocodiles, and dugongs. The Great Barrier Reef has already suffered from coral bleaching due to global greenhouse gas emissions, resulting in reduced growth and declines in genetic and species diversity. This has resulted in damages to the reef and reduced economic value of tourism.

SOURCE: HUFFINGTON POST / REEF RESILIENCE



CIVIL UNREST

INCOME INEQUALITY IN BONNY ISLAND, NIGERIA

Oil operations in Nigeria’s Bonny Island and Delta for decades have resulted in environmental injustice, conflict, and poverty. Oil spills and acid rain caused by gas flares compromise clean water and healthy crops. Although the Bonny Island Liquefied Gas terminal is the largest of its kind in the Niger Delta, none of the local inhabitants living in surrounding villages work in the LNG facility. Disparities in wealth and access to jobs has led to civil unrest here and places with similar stories around the world.

IMAGE SOURCE: ED KASHI/CORBIS



RAPID URBANIZATION

LNG DEVELOPMENT IN SOYO, ANGOLA

Built in 2006, the LNG facility in Soyo, Angola has attracted many people from other parts of the country and led to significant urban development. As a result “the capacity of existing infrastructure had been overwhelmed”. Unplanned urbanization can result in “profound social instability, threats to critical infrastructure, potential water crises and the spread of disease.” If responsible planning efforts do not accommodate new inhabitants and increased expectations of population growth, it can result in widespread poverty and infrastructure gaps.

SOURCE: ROYAL INSTITUTE OF INTERNATIONAL AFFAIRS / ZURICH INSURANCE COMPANY



ENCLAVES OF PRIVILEGE

FORMAL HOUSING IN SOYO, ANGOLA

Gated residential developments and formal housing developed through urbanization efforts and income inequality can create a significant divide between the rich and poor, while limiting sociability within communities. Alongside LNG development in Soyo, Angola, formal housing has developed, creating separation from local communities and unplanned settlements. Gated communities provide a sense of security for some, but they often create barriers between neighborhoods and prevent the formation of mixed-income communities that can improve upward social mobility for the less fortunate.

SOURCE: INTERNATIONAL JOURNAL OF URBAN AND REGIONAL RESEARCH



INCOME INEQUALITY

KILAMBA NEW CITY IN ANGOLA

In the early 2010s, the Kilamba New City in Angola was built by Chinese developers in exchange for oil with the intention of building new homes to replace slums near the country’s capital of Luanda. With the average wage of Angolans at 2 dollars per day, many could not afford to live in the nearly 700 apartment blocks of eight floors. Many people also had difficulty accessing mortgages, resulting in the apartments to be left unoccupied. It wasn’t until 2013 that the state was obliged to propose a heavily “subsidized-rent-to-purchase” scheme in order to ensure apartment ownership and resident occupancy.

SOURCE: ALLAN CAIN / AFRICA URBAN FANTASIES: PAST LESSONS AND EMERGING REALITIES



RESILIENT PALMA: HOW DO WE PROTECT AND ENHANCE NATURAL AND HUMAN CAPITAL?

NATURAL CAPITAL PROGRAMME IMPLEMENTATION FRAMEWORK

Optimising the performance of ecological and built infrastructure to transform cities, communities, markets and regional industries into more inclusive, productive and resilient systems.

“The national Natural Capital Programme was created to institutionalise natural capital under a dynamic national Resilient Ecological Infrastructure Network (REINs) of vital public interest for shared and lasting prosperity. The REINs will support thriving communities and cities, industries and supply chains. It will be based on a complex of spatially explicit natural capital critical service areas (including service-sheds, nodes and corridors) for water, forests, soil, the ocean and renewable energy. The natural capital critical service areas will be identified and managed in a landscape / seascape approach through poly-centric governance arrangements i.e. with management objectives and systems co-created and collaboratively managed by community resource stewards, Government, civil society, academia and private sector, from the local level up to the district, provincial, national, regional and international level. These improved governance systems will enable and incentivise

communities to enhance natural assets and value chains in a restorative and regenerative circular economy approach to drive income and job growth.”

NATURAL CAPITAL CRITICAL SERVICE AREAS

“Natural capital Critical Service Areas will be legally formalised in terrestrial, freshwater and marine spatial legislation. They will be protected under national safeguard systems (e.g. Environmental Impact Assessment/EIA and Strategic Environmental Assessment/SEA) and integrated in the National Planning and Budgeting System/ SNPO for national policy formulation, planning and budgeting. At local level they will be managed under inclusively agreed benefit, risk, cost and income distribution management systems that recognise the dynamics of climate, infrastructure, communities, industries and cities.

Goods and services flowing from natural capital Critical Service Areas – the anchors of value chains and foundation of the National Ecological Infrastructure Network – will be inclusively managed by communities, together with private sector, civil society, government and academia.”



FUTURE REGIONAL PLANNING IN WITH ECOLOGICAL SERVICE AREAS

ECOLOGICAL RESILIENCE

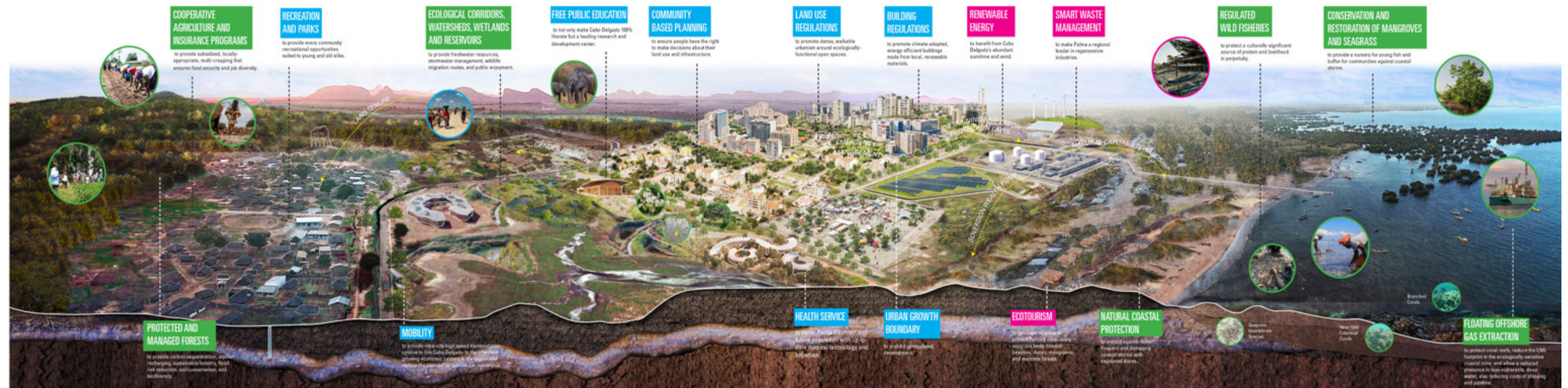
As cities and landscapes are interconnected socio-ecological systems, mitigating threats to the ecology of a place also protects people and their livelihoods. Mangroves, wetlands and coral reefs can reduce the impacts of severe storms. Forests can protect soils, and hold water and recharge aquifers to protect against drought. Managing ecosystem resilience against shocks like tropical storms and stresses like pollution and encroachment of urbanization requires in-depth local knowledge; best available data on climate, atmosphere, water and soil; inclusive and enforceable processes for regional planning; and most of all, the leadership and commitment of the local people.

ECONOMIC RESILIENCE

Like ecosystems, economies require diversity for resilience. A diverse economy provides both stability in the face of disruption and opportunity for upward mobility. To build a resilient economy, Mozambique can incentivize investment in businesses that have the long-term appreciation of natural and human capital at the core to their mission. By promoting renewable energy and zero waste industries, Palma can become a hub for the blue-green economy, in which all externalities are internalized.

SOCIAL RESILIENCE

Social resilience is the foundation of healthy and happy society. A city isn't just buildings, roads, pipes and bridges; it is a place for people. Every investment in physical infrastructure should be matched equally with an investment in social infrastructure: schools, hospitals, libraries, social housing, and other investments that cohere and sustain communities. It is also critical that these communities remain safe through the adoption and enforcement of building codes and emergency management protocols.



PROTECTED + MANAGED FORESTS

PARTICIPATORY FOREST MANAGEMENT IN ETHIOPIA

The commercial timber industry and agricultural expansion in Ethiopia has contributed to a devastating amount of forest loss, accounting for almost 140,000 hectares each year, challenging food security, community livelihoods, and sustainable development. In the 1990s, Farm Africa and the Ethiopian government introduced Participatory Forest Management (PFM), a process where the local community could be employed as stewards of their own forest. PFM made remarkable improvement in living conditions, health, and general household income.

SOURCE: FAO SUBREGIONAL OFFICE OF EASTERN AFRICA (SFE) / FARM AFRICA



PROTECTED + MANAGED FORESTS

MANGROVE RESTORATION IN MADAGASCAR

On the west coast of Madagascar, WWF has implemented a landscape conservation programme within the Melaky region to improve traditional fisheries through community-based initiatives. The people from the village of Manombo have taken action through conservation and restoration with the support of a local Mangroves Landscape Leader. The benefits of mangrove restoration to local communities includes building resilience against climate change and improving access to fish and crab stock, which provide a regular income.

SOURCE: WWF-MADAGASCAR



PROTECTED + MANAGED FORESTS

COSTA RICA'S PAYMENT FOR ECOSYSTEM SERVICES (PES)

Through the National Forestry Financing Fund (FONAFIFO), Costa Rica's Forestry Law created Payment for Ecosystem Services (PES) to ensure compensation to people who protect the forest in Costa Rica. FONAFIFO defined the rights to sell four key ecosystem services with government funding: protection of biodiversity, protection of water sources, landscape beauty, and carbon sequestration. Funds were distributed across private forest owners, cooperatives, indigenous communities, and legal entities for companies and businesses. Agro-forestry contracts provided an introduction of imported native or fruit trees, which allowed for a direct impact and an increase of value in farmers' agricultural lands.

SOURCE: NATIONAL FORESTRY FINANCING FUND (FONAFIFO) / MINISTRY OF ENVIRONMENT AND ECOLOGY / COSTA RICA



COOPERATIVE AGRICULTURE

ALLIANCE FOR A GREEN REVOLUTION IN AFRICA (AGRA) IN MOZAMBIQUE

The Alliance for a Green Revolution in Africa (AGRA) assists millions of smallholder farmers to boost their productivity and revenue. Through the partnership of the Rockefeller Foundation and the Bill and Melinda Gates Foundation, AGRA supported the “efforts to develop and deliver better seeds, increase yields, improve soil fertility, upgrade storage facilities, improve market information systems, strengthen farmers’ associations, expand access to credit for farmers and suppliers, and advocate for national policies that benefit smallholder farmers.” Through the AGRA program in Mozambique, farmers were provided training in business development and agricultural practices, access to land and harvesting of disease-resistant crops, improved seed varieties, and grants to set up local shops to support farming needs.



SOURCE: ALLIANCE FOR A GREEN REVOLUTION IN AFRICA (AGRA) / ROCKEFELLER FOUNDATION AND THE BILL AND MELINDA GATES FOUNDATION

AGRICULTURE INSURANCE PROGRAM

ONE ACRE FUND CROP INSURANCE IN KENYA

Crop insurance is a proven tool for crop resilience amongst farmers and agricultural land, while ensuring food security and protecting poor harvests against weather conditions and climate change. One Acre Fund “provides crop insurance subsidy for Kenya’s government, extending coverage to our 350,000 Kenyan clients in 2018”. The program increased coverage for small-scale farms that produce 70 percent of Kenya’s maize, incentivizing them to adopt adaptation measures.

SOURCE: ONE ACRE FUND



FLOATING OFFSHORE GAS EXTRACTION

SHELL’S PRELUDE IN AUSTRALIA AND PETRONAS IN MALAYSIA

Floating Liquefied Natural Gas (FLNG) technology allows countries to extract natural gas more responsibly. Through offshore gas extraction, there is no need for extended pipelines, compression units to pump the gas to shore, dredging and jetty construction or the onshore construction of an LNG processing plant, all of which significantly reduce the project’s environmental footprint, while preserving marine and coastal environments. Successful FLNG facilities include Shell’s Prelude in Australia and PETRONAS in Malaysia.

SOURCE: PETRONAS FLNG / SHELL PRELUDE FLNG



REGULATED FISHERIES

TEMPORARY FISHING AND OCTOPUS CLOSURES QUIRIMBAS NATIONAL PARK

Quirimbas National Park, with the support of WWF, set out to “conserve marine resources and benefit local users, particularly fishermen.” The park instituted temporary octopus fishery closures in the Songossawe and Tchamba reef flats. Catches had been poor in quantity and quality due to frequent overfishing, but after the temporary closure, there were substantial increases in catch volume and income for local fishermen and women.

SOURCE: WWF-MOZAMBIQUE



RENEWABLE ENERGY

WORLD BANK GROUP SOLAR + WIND INVESTMENTS IN MOZAMBIQUE, SENEGAL, + GHANA

Recent investments in low-carbon energy systems through the World Bank have allowed for access to affordable, reliable, and sustainable energy within rural areas across Sub-Saharan Africa. In Macuba, Mozambique, the World Bank Group’s International Finance Corporation (IFC) is supporting the country’s first solar power plant which will power approximately 175,00 households. In Senegal, the World Bank Group’s Multilateral Insurance Guarantee Agency is supporting the largest wind project in Sub-Saharan West Africa, generating power for 300,000 household. In Ghana, the World Bank invested in solar-mini grids that provides reliable electricity to 10,000 island communities in Lake Volta, which reduced the use of carbon-based fuels such as kerosene or firewood.



SOURCE: THE WORLD BANK GROUP

SMART WASTE MANAGEMENT

WECYCLERS IN LAGOS, NIGERIA

Wecyclers is an innovative approach to address waste management in low-income communities in Lagos, Nigeria. The social enterprise allows for local residents to profit from recycling through the deployment of cargo bicycles for collection of waste in the streets. With only 40 percent of the city’s trash collected, Wecyclers provides this service while also creating employment opportunities. Using an SMS-based point system, Wecyclers provides families with opportunities to exchange waste for other consumer goods. As a corporate social and environmental responsibility, recycling companies purchase Wecyclers’ collection for use in repurposed products.



SOURCE: WECYCLERS

ECOTOURISM

COMMUNAL CONSERVANCIES IN NAMIBIA

Namibia was the first African country to include environmental protection laws within its constitution. The Namibian government provided opportunities for communal conservancies which allowed people to manage and benefit from their natural resources and wildlife. “Since 1998, Namibia has created 82 communal conservancies, covering nearly 20 percent of the country with approximately 189,000 participating community members.” Through ecotourism, managed conservation has allowed local people to directly benefit from more than \$7 million a year in tourism revenue, while supporting anti-poaching, wildlife management, education and health initiatives, and restored wildlife populations.



SOURCE: WWF

HOUSING PROGRAMS + POLICIES

CASA MELHORADAS IN MAPUTO, MOZAMBIQUE

The Casa Melhoradas project creates affordable housing and eliminates city slums in Maputo, Mozambique. The focus of project includes alternative, low cost construction methods to improve building quality; initiating new housing typologies for more sustainable urban development; and providing renting opportunities through public-private partnerships. As part of the project, multi-story housing typologies are designed to cater to existing residents in Maputo. Within the slum area, Polana Canico, a vertical addition was made to an existing house.



SOURCE: ORGANIZED BY THE ROYAL DANISH ACADEMY OF FINE ARTS SCHOOLS OF ARCHITECTURE, MOZAMBIKAN NGO ESTAMOS, UNIVERSIDADE EDUARDO MONDLANE (FAPF) AND THE DANISH BRANCH OF ARCHITECTS WITHOUT BORDERS (AUG)

EMERGENCY MANAGEMENT

TSUNAMI EVACUATION PARK IN PADANG, INDONESIA

The City of Padang is highly vulnerable to earthquakes and tsunamis. Nearly one million people live in this densely built city with limited routes for coastal evacuation. GeoHazards International has helped the City prototype a Tsunami Evacuation Park, a public space on high ground that can accommodate 46,000 people in the event of a tsunami.



SOURCE: GEOHAZARDS INTERNATIONAL

BUILDING REGULATIONS

GANDO PRIMARY SCHOOL IN BURKINA FASO

Many of Francis Kéré’s architectural designs, similarly to the Gando Primary School in Burkina Faso, promote traditional building techniques and community-led construction. The design of the primary school included low-tech and sustainable techniques that facilitated communal participation, while providing modern engineering methods to ensure quality building solutions and construction practices for workers. Thoughtful use of local materials such as a clay / cement hybrid for brick provides thermal protection against hot climate. The raised, overhanging roof is made out of corrugated metal with a perforated clay ceiling underneath to allow air for ventilation while minimizing the building’s ecological footprint.

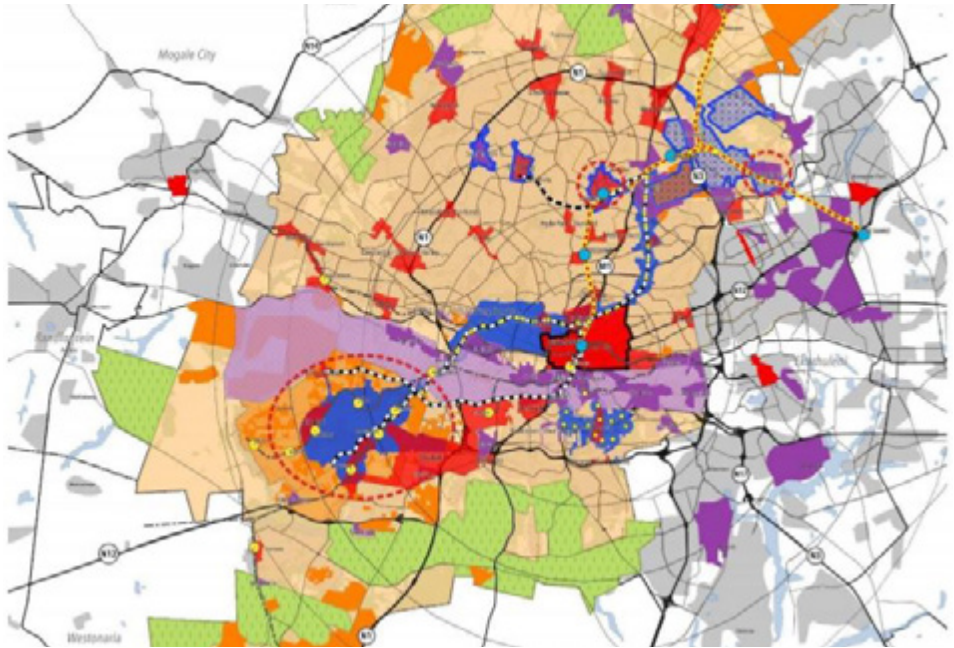


SOURCE: FRANCIS KÉRÉ ARCHITECTURE / GANDO VILLAGE COMMUNITY / KÉRÉ FOUNDATION V

MOBILITY

SPATIAL DEVELOPMENT FRAMEWORK 2040 IN JOHANNESBURG

The Spatial Development Framework (SDF) 2040 is a proposed, transformational vision for the future spatial organization of Johannesburg through the urban development around transit nodes and the extension of the city centre. Anticipating rapid population growth within the city by 2040, the planning of SDF allows for a shift in a sprawled city to a compact urban form that promotes public transportation opportunities and increased accessibility to jobs and amenities to people. The proposal aims to make Johannesburg a more vibrant, walkable city with limitations on building heights and boundary walls to encourage pedestrian traffic, rather than vehicular congestion.



SOURCE: UN-HABITAT / SPATIAL DEVELOPMENT FRAMEWORK (SDF) 2040

WORKSHOP SCHEDULE

MAY 30TH, 2019

9:00 – 9:10 AM	Opening DPTADER Introductory Notes Arlindo Dgedge, Provincial Director	1:15 - 2:00 PM	Presentation and Discussion Session 1: How will the regional landscape transform in the future for Cabo Delgado? WWF, Columbia University
9:10 -9:25 AM	Government Introductory Notes António Domingos Mapure, Permanent Secretary	2:00 - 3:00 PM	Presentation and Discussion Session 2: Identifying Coastal Risks WWF, Columbia University
9:25 – 9:30 AM	WWF-Mozambique Introductory Notes Anabela Rodrigues, Country Director, WWF-Mozambique	3:00 - 3:20 PM	Coffee Break
9:30 – 9:50 AM	Outline on Palma’s urban and industrial development prospects Valige Tauabo, Administrator of Palma	3:20 - 4:00 PM	Presentation and Discussion Session 3: Specific Inland Risks WWF, Columbia University
9:50 – 10:30 AM	Tools for Greener, Nature-Based Approaches to Disaster Risk Reduction and Recovery Judy Oglethorpe, WWF-US	4:00 - 5:00 PM	Plenary Discussion WWF, Columbia University
10:30 – 10:45 AM	Coffee Break	5:00 PM	Closing
10:45 – 11:15 AM	Lessons from Spatial and Land Use Planning for Large Scale Infrastructure in Kenya Nathan Mutunga, WWF Kenya		
11:15 – 11:45 AM	Framing the Approach: WWF’s Support for Green/Blue Economy and a Natural Capital Approach to Development for Resilience Ryan Bartlett, WWF		
11:15 AM – 12:15 PM	Understanding Interconnected Risks: Climate Change, Urbanization, and Inequality Thad Pawlowski, Columbia Univeristy Examples from the global movement to use resilience concepts to help cities holistically address risk and Busines As Usual development scenario		
12:15 – 1:15 PM	Lunch		

“If we are able to rebuild with new guidelines that take into consideration of natural capital, we will be better prepared for these challenges ---But this requires the participation of all.”

—ANABELA RODRIGUES, COUNTRY DIRECTOR OF WWF-MOZAMBIQUE

WORKSHOP



ANABELA RODRIGUES, COUNTRY DIRECTOR, WWF-MOZAMBIQUE

On May 30, 2019, CRCL and WWF traveled to Pemba to deliver the workshop: “Building a More Resilient Future in Palma and Cabo Delgado” with local officials and NGOs. Following weeks after the devastating cyclones of Kenneth and Idai impacting north in Ibo and south in Beira, the workshop focused on building resilience and valuing natural resources through Mozambique’s Natural Capital Program, developed by the inter-ministerial Green-Blue Economy Group. The objective of the workshop was to ensure development and inclusive prosperity for industrial activities, agriculture, fisheries, and tourism; provide a forum for main stakeholders, local government, civil society, and sustainable development; and reinforce discussions surrounding future spatial planning in Palma and Cabo Delgado.



WWF-MOZAMBIQUE COUNTRY DIRECTOR ANABELA RODRIGUES AND PROVINCIAL DIRECTOR ARLINDO DREDGE



WORKSHOP PARTICIPANTS WORKING DURING GROUP DISCUSSIONS



DAY 1



During this workshop, CRCL presented the research and visualizations of a future “business-as-usual” and an alternative resilient scenario for Palma to workshop participants and received valuable feedback. The scenarios help to reinforce and facilitate conversation surrounding the long term future of Cabo Delgado. The workshop also included presentations from WWF experts Judy Oglethorpe, Ryan Bartlett, and Nathan Mutunga on disaster reduction and recovery, spatial and land use planning, and support for green / blue economy utilizing natural capital. These conversations continued in Maputo with national leadership in MITADER and MEF, and with the leadership of Anadarko.

DAY 1

“The concept of building resilience and valuing natural resources has been gaining relevance over the past few years. Our country has embraced this with partners such as WWF and input from academic leaders such as Columbia University.”

— ARLINDO DREDGE, PROVINCIAL DIRECTOR

“We have not prepared communities for disasters, like the cyclone [Idai]... We need the concrete data to prevent and anticipate natural disaster events.”

— VALGIE TAUABO, ADMINISTRATOR OF PALMA



ARLINDO DREDGE, PROVINCIAL DIRECTOR



VALGIE TAUABO, ADMINISTRATOR OF PALMA

TOOLS FOR GREENER, NATURE BASED APPROACHES TO DISASTER RISK REDUCTION AND RECOVERY

JUDY OGLETHORPE

To build resilience for future disasters, we need to reconstruct in a way that will not over-exploit natural resources or damage ecosystems. We need to take climate change into account. This is an opportunity to reduce past environmental pressures, and ‘build back safer and greener’. Judy Oglethorpe, Senior Director of WWF-US, presented opportunities for green recovery and reconstruction through project design, monitoring and evaluation; environmental impact assessment tools and techniques, and strategic site selection and development. Other approaches include management of debris, resilient construction and building material practices, energy conservation, sanitation and waste management, and planning sustainable livelihoods. Oglethorpe suggested to restore / maintain ecosystem services for disaster risk reduction, take future climate extremes and climate change into account, and work with communities, government and others to find solutions at different scales.

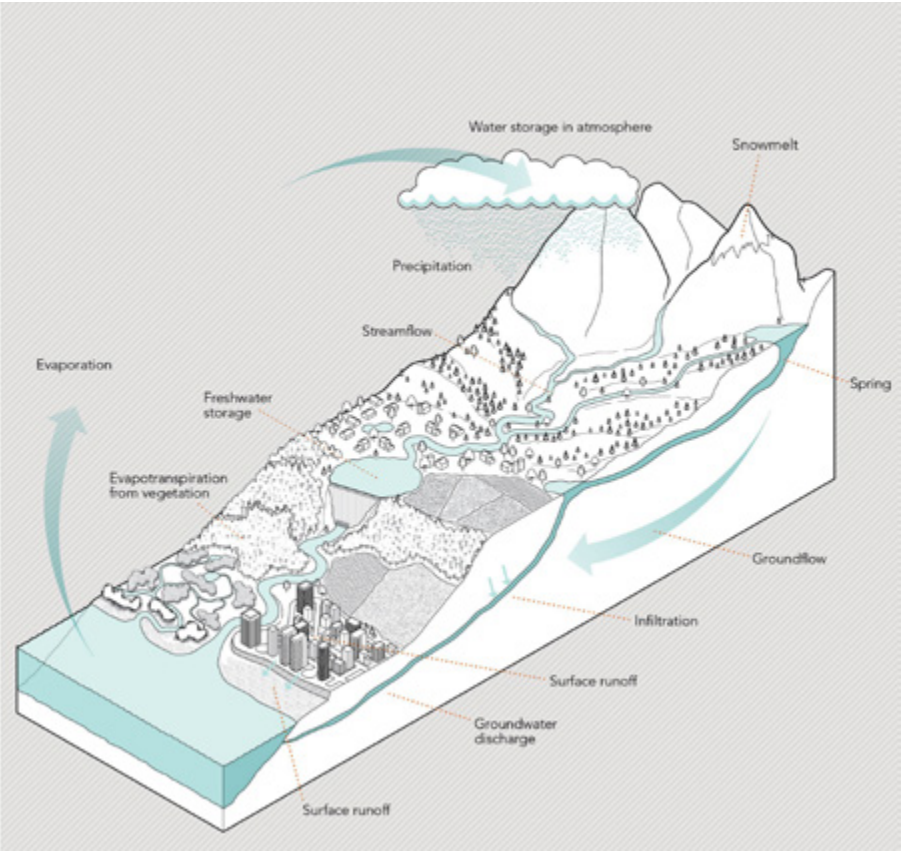


JUDY OGLETHORPE, SENIOR DIRECTOR, WWF-US

Take a Watershed Approach – Manage Risk

Where are you in the watershed?

WWF FLOOD GREEN GUIDE, 2016



LESSONS FROM SPATIAL AND LAND USE PLANNING FOR LARGE SCALE INFRASTRUCTURE IN KENYA

NATHAN MUTUNGA

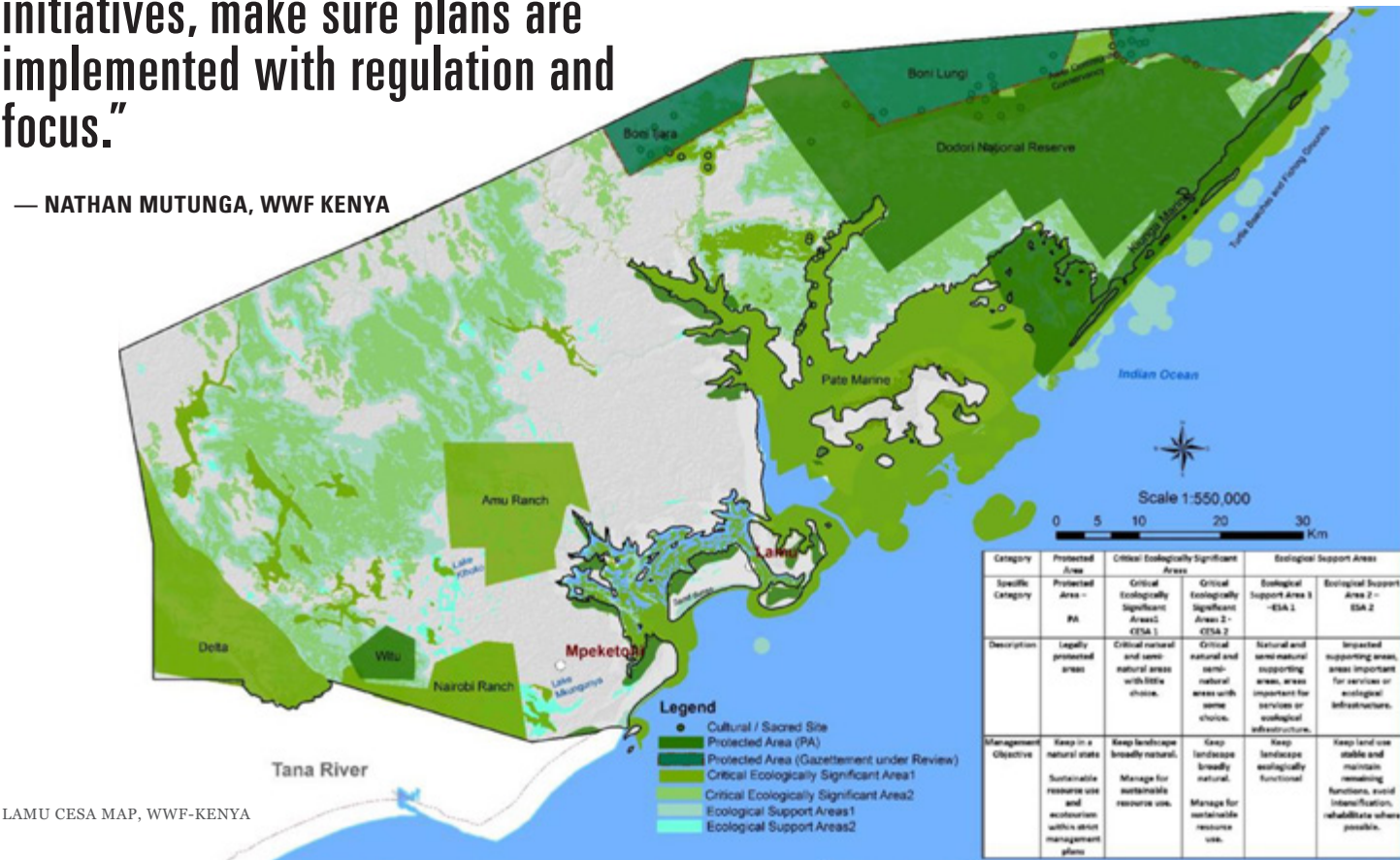
WWF developed a spatial plan for Kenya for national level policies and legislations through the National Land Use Policy, developed by the Ministry of Lands and Physical Planning. The land use policy allowed for planning to enhance sustainable development and promote environmental conservation. Nathan Mutunga, Spatial Planner of WWF-Kenya, presented a project led by WWF of natural capital analyses that ultimately led to the relocation of the development of a port corridor in Lamu, Kenya away from vulnerable coastal wetlands. Mutunga identified the lessons learned which suggest creating advocacy with policy makers right from the beginning, encouraging multi-stakeholder led processes, advocating for adequate budgetary allocations to ensure the process doesn't stall, phasing of projects, and the monitoring and implementation of frameworks in plans.

“In terms of implementation, consider weekly updates, build initiatives, make sure plans are implemented with regulation and focus.”

— NATHAN MUTUNGA, WWF KENYA



NATHAN MUTUNGA, SPATIAL PLANNER, WWF-KENYA



LAMU CESA MAP, WWF-KENYA

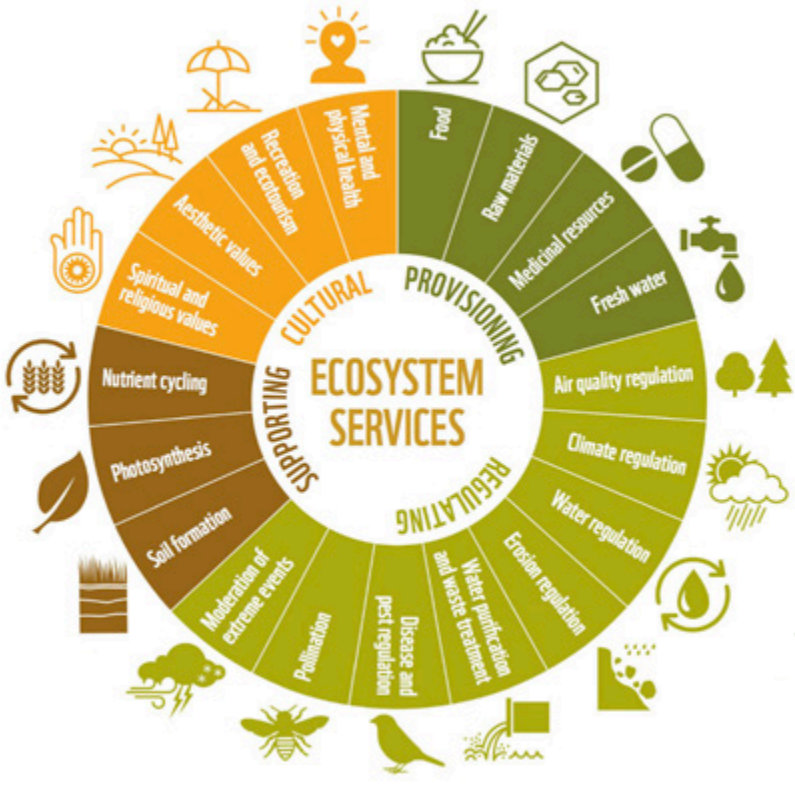
SUPPORT FOR GREEN / BLUE ECONOMY AND A NATURAL CAPITAL APPROACH TO DEVELOPMENT FOR RESILIENCE

RYAN BARTLETT

Nature provides services such as supporting, regulating, and provisioning ecosystem services. The intention of WWF's and the Natural Capital Program is to promote the benefits of standard economic development in relationship to what nature provides. Ryan Bartlett, Lead Climate Risk Management of WWF-US presented how natural capital can support resilience and the Green / Blue economy approach in Mozambique. By identifying freshwater, forests, soil, energy, and ocean to be managed; Cabo Delgado will be better prepared to unlock economic productivity, human prosperity and climate resilience. Phase 1 of WWF's work started in Cabo Delgado and Niassa by looking at ecological infrastructure to determine where the water source areas are coming from and the value of water supplies upstream to plan for a regional approach. WWF is currently working with the UN Environment World Conservation Monitoring Centre for mapping Mozambique's freshwater and forest; biodiversity, and crop suitability. Through these results, they were able to quantify US dollar estimates for natural capital including mangroves, coral reefs, seagrasses through economy revenue, storm protection, ecotourism, and fish provisioning services.



RYAN BARTLETT, LEAD CLIMATE RISK MANAGEMENT, WWF-US



HOW DOES NATURE SUPPORT PEOPLE?

Especially important for climate resilience

EXERCISES

KEY QUESTIONS

- How is Cabo Delgado likely to change in the future given climate change, gas extraction and migration/urbanization? What's at risk?
- How could the natural capital program build more resilience and sustainability? What other instruments should be used?
- How will these trends affect the coastal ecosystems and communities?
- What can be done to protect ecosystems and livelihoods on the coast?
- How will these trends affect grasslands, forests, and farm communities?
- How will they affect the town of Palma?
- What can be done to protect ecosystems and communities?



DAY 1

WORKSHOP EXERCISES

GROUP 1

Within Group 1, conversations surrounding regional risks involved the overdependence and exhaustion of natural resources, the presence of future natural disasters, the disruption of marine environments and ecology, pollution, and the displacement of local communities and their livelihoods. Other coastal and inland risks include coastal erosion, floods, poor sanitation, destruction of mangroves and corals, and lack of social investment in education and skills training. Opportunities that arose in discussion included efficient planning at both the regional and local scale with community feedback; regulations that promote ecological conservation and restoration; sustainable use of resources; alternative building construction and materials; ecotourism; and funding to support initiatives for improvements in education, data collection, and natural capital investments.

FACILITATOR

Anabela Rodrigues, Country Director, WWF-Mozambique



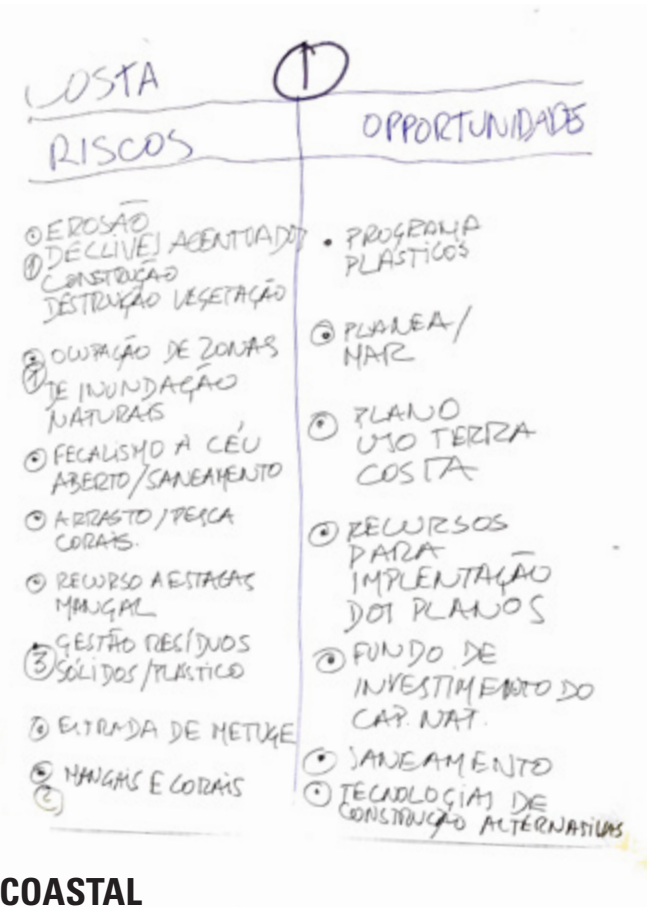
REGIONAL

HOW IS CABO DELGADO LIKELY TO CHANGE IN THE FUTURE GIVEN CLIMATE CHANGE, GAS EXTRACTION AND MIGRATION/URBANIZATION? WHAT'S AT RISK?

- Dependence on natural resources
- Presence of floods
- Presence of the cyclone
- Destruction of mangroves
- Abandonment of native species
- Underwater blasting and disruption of marine ecology
- Poaching
- Health hazards- Fisheries using mosquito nets
- Air and ocean/ river pollution
- Ecological imbalance
- Illegal exploitation of mineral resources
- Emergence of new settlements without urban planning
- Unplanned roads
- Hardening of shoreline / coasts through urbanization
- Lack of urbanization
- Industrialization
- Mechanical monoculture agriculture
- Displacement of the population and abandonment of agricultural area

HOW COULD THE NATURAL CAPITAL PROGRAM BUILD MORE RESILIENCE AND SUSTAINABILITY? WHAT OTHER INSTRUMENTS SHOULD BE USED?

- Rational use of water resources
- Community-based urban planning
- Urban and regional planning
- Water drainage
- Policies that prohibit the destruction of mangroves (Mangroves Protection)
- Ecotourism
- Conservation and restoration of mangroves
- Coastal marine protection
- The sustainable use of forest resources
- Reforestation
- Regulate fishing
- To promote the community association for the exploration of mineral resources
- Provide subsistence alternative for rural communities
- Commission for public and private infrastructures



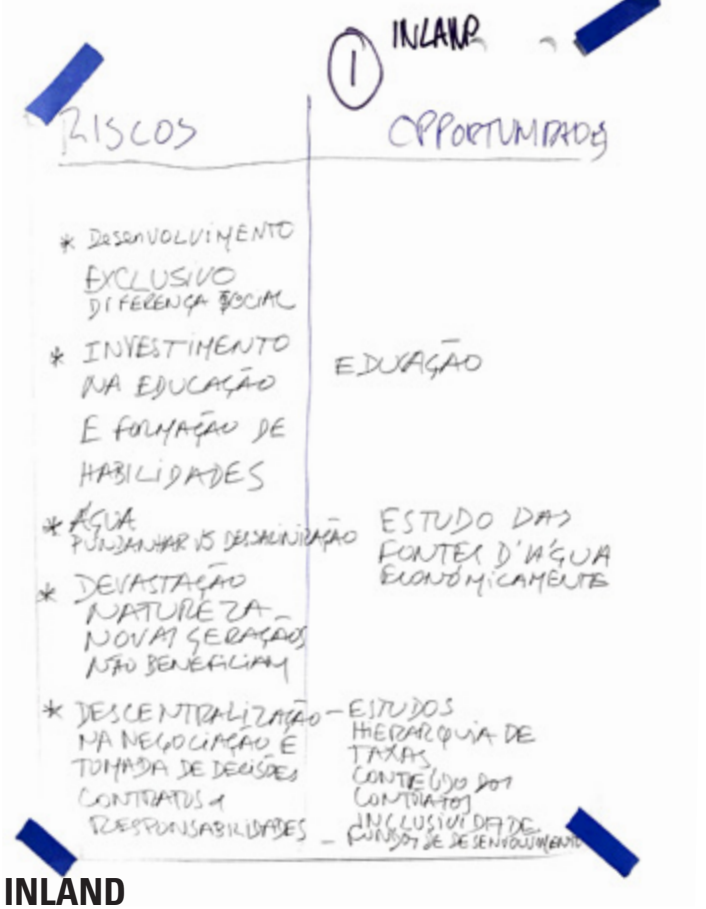
COASTAL

HOW WILL THESE TRENDS AFFECT THE COASTAL ECOSYSTEMS AND COMMUNITIES?

- Coastal Erosion
- Construction and vegetation destruction
- Natural flood zones
- Poor sanitation
- Coral trawling (dragged fishing line/ fish net) / excessive fishing
- Destruction of mangroves and corals
- Poor solid / plastic waste management
- The Metuge Road

WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND LIVELIHOODS ON THE COAST?

- Program for managing plastic waste
- Land use plan for the coast
- Resources for implementing plans
- Natural Capital Investment Fund
- Sanitation
- Alternative building construction technologies



INLAND

HOW WILL THESE TRENDS AFFECT GRASSLANDS, FORESTS, AND FARM COMMUNITIES?

- Exclusive Development / Social Difference
- Lack of investment in education and skills training
- Poor water management near Pundanhar, Mozambique and lack of desalination / water treatment
- Decentralization in negotiation and decision-making

HOW WILL THEY AFFECT THE TOWN OF PALMA AND WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND COMMUNITIES?

- Education
- Study of water sources economically
- Studies of hierarchy / contracts for inclusivity
- Development funds

WORKSHOP EXERCISES

GROUP 2

Within Group 2, conversations surrounding regional risks involved lack of social infrastructure, health and education services; natural disasters, excess use of natural resources, rapid urbanization and rural migration, and the emergence of informal settlements. Other coastal and inland risks include lack of coastal protection and rising sea levels, loss of biodiversity, social inequality, informal economies, pollution, and groundwater contamination. Opportunities that arose in discussion included improving infrastructure such as roads, renewable energy, and water sources; employment opportunities and job training; ecotourism; low cost housing and state subsidies; regulations to protect vulnerable ecological areas; and greener transportation.

FACILITATORS

Alima Taju, Natural Capital Senior Officer, WWF-Mozambique
Georine Pierre, Associate Research Scholar, CRCL



REGIONAL

HOW IS CABO DELGADO LIKELY TO CHANGE IN THE FUTURE GIVEN CLIMATE CHANGE, GAS EXTRACTION AND MIGRATION/URBANIZATION? WHAT'S AT RISK?

- Lack of social infrastructure and health and education services
- Cyclones
- Floods
- Soil Erosion
- Rural Migration / Rapid Urbanization
- Emergence of Informal Settlements near new road development
- Deforestation

HOW COULD THE NATURAL CAPITAL PROGRAM BUILD MORE RESILIENCE AND SUSTAINABILITY? WHAT OTHER INSTRUMENTS SHOULD BE USED?

- Solid Waste Management
- Protection of Coastal Habitats
- Select appropriate areas for agriculture
- Define areas for fisheries
- Tourism (Coastal / Maritime Forests)
- Employment / Job Training
- Safari and Tourism near Rovuma River
- Improving Infrastructure – roads, renewable energy, water
- Waste Treatment (Sewage)
- Reservoirs
- Vegetation near Water Areas / Environmental Conservation



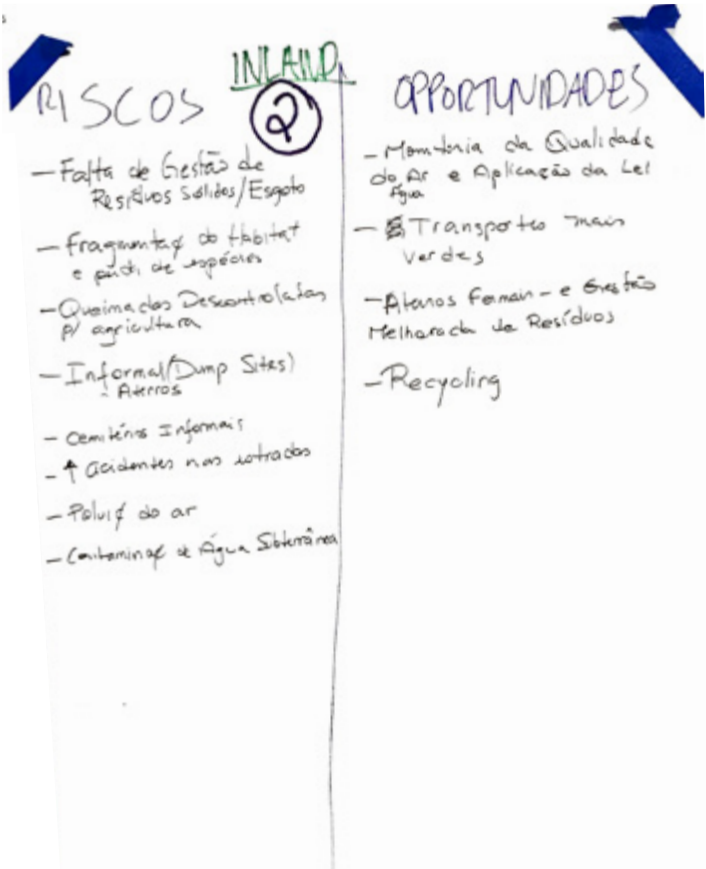
COASTAL

HOW WILL THESE TRENDS AFFECT THE COASTAL ECOSYSTEMS AND COMMUNITIES?

- Lack of Coastal / Fishing Access
- Cutting of mangroves for construction / firewood
- Lack of coastal protection (mangrove cutting)
- Rising sea levels
- Social inequality
- Informal markets / commerce
- Construction / informal settlements near rivers / high-risk coastal zones

WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND LIVELIHOODS ON THE COAST?

- Road to provide access to beaches
- Promoting formal employment
- Integration system - String of values
- Waste management and education program
- Law enforcement / restriction of construction in coastal areas
- Integration of sectoral development plans / land use (territorial) planning including ecological zoning
- Low-cost housing / state subsidy



INLAND

HOW WILL THESE TRENDS AFFECT GRASSLANDS, FORESTS, AND FARM COMMUNITIES?

- Lack of solid waste / sewage management
- Fragmentation of habitat and loss of species
- Uncontrolled burning near agricultural farms
- Informal dump sites / Landfills
- Informal cemeteries
- Accidents on the roads
- Air pollution
- Groundwater contamination

HOW WILL THEY AFFECT THE TOWN OF PALMA AND WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND COMMUNITIES?

- Air quality monitoring and water law enforcement
- Greener transportation
- Formal landfills - waste management improvement
- Recycling

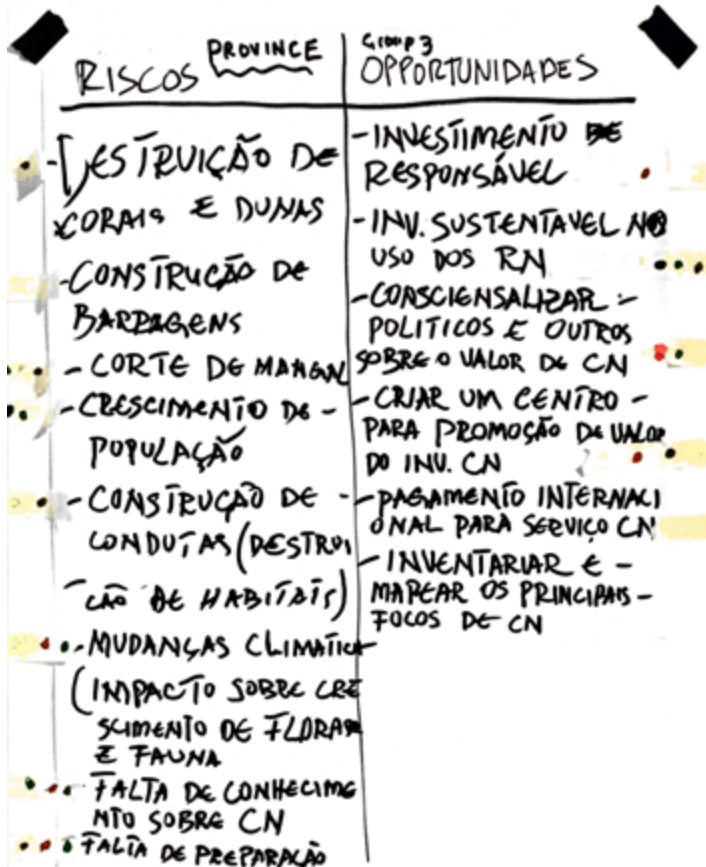
WORKSHOP EXERCISES

GROUP 3

Within Group 3, conversations surrounding regional risks involved rapid population growth, climate change, destruction of marine habitats, and lack of knowledge and preparation about natural capital and emergency management. Other coastal and inland risks include urbanization near the coasts, destruction of coastal ecology, poor planning and displacement of communities, pollution and unregulated waste. Opportunities that arose in discussion included awareness, inventory, and payment for the services of natural capital; ensuring conservation of critical natural capital service areas; tourism management; and adapting regulations and the readjustment of the Mozambican government’s current plan for Palma with consideration of natural capital.

FACILITATORS

Judy Oglethorpe, Senior Director, WWF-US
Thaddeus Pawlowski, Managing Director, CRCL



REGIONAL

HOW IS CABO DELGADO LIKELY TO CHANGE IN THE FUTURE GIVEN CLIMATE CHANGE, GAS EXTRACTION AND MIGRATION/URBANIZATION? WHAT'S AT RISK?

- Destruction of corals and coastal dunes
- Construction of dams
- Mangrove cutting
- Population growth
- Pipeline construction (destruction of marine habitats)
- Climatic changes (impact on growth of flora and fauna)
- Lack of knowledge about natural capital
- Lack of preparation

HOW COULD THE NATURAL CAPITAL PROGRAM BUILD MORE RESILIENCE AND SUSTAINABILITY? WHAT OTHER INSTRUMENTS SHOULD BE USED?

- Responsible Investment
- Sustainable investment in the use of natural capital
- Awareness - political and other about the value of natural capital
- Create a center - for promotion of value of investment natural capital
- International payment for natural service capital
- Inventory for the main sources of natural capital



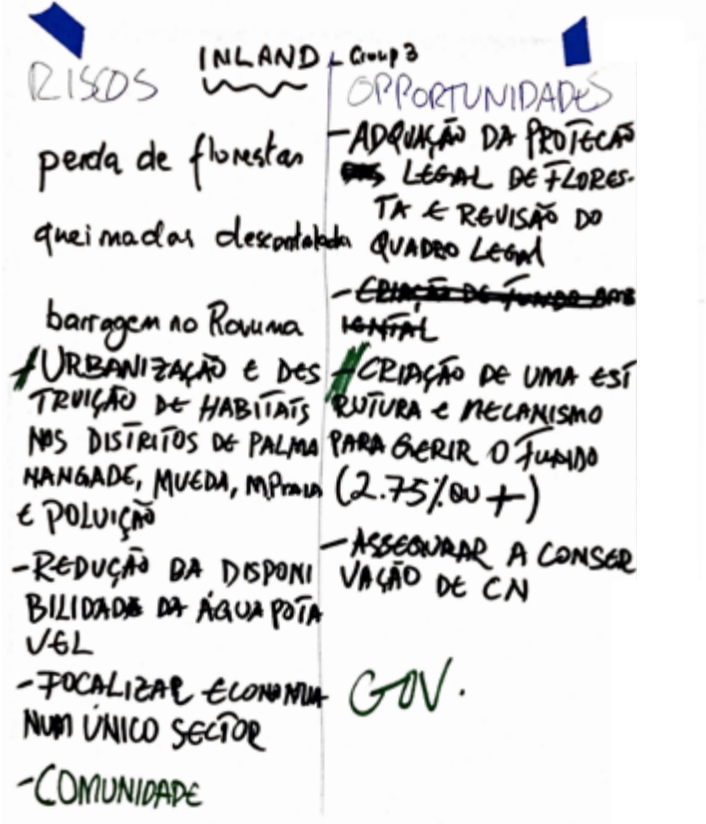
COASTAL

HOW WILL THESE TRENDS AFFECT THE COASTAL ECOSYSTEMS AND COMMUNITIES?

- Coastal erosion
- Sewage pollution
- Destruction of coastal ecosystems (corals, mangroves, and seagrass)
- Industrial zones and urbanization near the coast
- Floods
- Lack of zoning
- Displacement of communities and livelihoods
- Tourism operations

WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND LIVELIHOODS ON THE COAST?

- Propose readjustment of the Mozambican government’s current plan of Palma
- National commission
- Use natural capital as one of the tools to analyse the project proving – multi-sectoral commission
- Adapt regulations considering natural capital - government / HR



INLAND

HOW WILL THESE TRENDS AFFECT GRASSLANDS, FORESTS, AND FARM COMMUNITIES?

- Uncontrolled forest fires
- Dam in the Rovuma River
- Urbanization and destruction of habitats in the districts of Palma, Nangade, Mueda, and Mpraia
- Pollution
- Reduction in the availability of drinking water
- Focus on a single sector economy
- Displacement of communities and livelihoods

HOW WILL THEY AFFECT THE TOWN OF PALMA AND WHAT CAN BE DONE TO PROTECT ECOSYSTEMS AND COMMUNITIES?

- Acquisition of legal forest protection and revision of the legal framework
- Tourism management
- Ensure conservation of natural capital



CONCLUSION

At the end of the workshop, participants identified six key barriers as:

- (1) Inadequate planning that guides decision for regulations and legislation
- (2) Lack of local capacity and inclusive community participation with appropriate translation services
- (3) Lack of knowledge about the value of Natural Capital and mapping
- (4) Inappropriate implementation of projects with lack of funding
- (5) Lack of investment of human capacity with low levels of schooling and education
- (6) Weak monitoring and the continuity of the loss of accumulated experience and knowledge

THE NEXT STEPS FOR NATURAL CAPITAL PROGRAMME:

- Communicate nationwide natural capital & climate assessments identifying Resilient Ecological Infrastructure Networks (REINs)
- Mapping and valuation of natural capital in Quirimbas National Park
- Connect Palma Urbanization (PNDT) planning process with REINs
- Set-up blended finance vehicles for investments in REINs
- Proposals to support REINs in the Global Environment Facility, Green Climate Fund, and the Adaptation Fund

DAY 1



WORKSHOP PARTICIPANT PRESENTING RESULTS FROM GROUP DISCUSSION EXERCISES

ACTIONS

- TRAINING AT ALL LEVELS / COMMUNITY COUNCILS
- TAKE OWNERSHIP OF THE VALUE AND IMPORTANCE OF NATURAL CAPITAL
- ADVOCACY TO ADJUST LEGISLATION OUT OF THE CONSIDERATION OF NATURAL CAPITAL
- TRANSLATE NATURAL CAPITAL INTO FINANCIAL VALUE
- ANTICIPATE AND QUANTIFY FUTURE LOSS OF LAND FROM URBANIZATION AND INDUSTRIALIZATION
- ALTERNATIVES TO COMMUNITIES, ENERGY, CONSTRUCTION MATERIALS
- EMPHASIZE VALUE OF NATURE THROUGH THE SUPPORT OF RELIGIOUS ORGANIZATIONS
- INCLUSIVE PLANNING WITHIN ALL SECTORS

On June 2, 2019, the team from CRCL and WWF arrived in Maputo for meetings with national leadership, MITADER and MEF, as well as presentations for WWF’s New Deal for Nature and People, Thirdway Africa, and the Eduardo Mondlane University’s School of Architecture and Planning.

MITADER + MEF

On July 5, 2019 the CRCL, WWF, and the UN Environment World Conservation Monitoring Centre (WCMC) met with the Ministry of Land, Environment, and Rural Development (MITADER) and the Ministry of Finance and Economy (MEF) to share the research and visualizations that can contribute to the planning of Mozambique’s Five-Year National Territorial Development Plan. The meeting allowed for an opportunity to share various experiences and perspectives among national leadership in regards to the future planning of Palma and Cabo Delgado. Representatives from MITADER discussed the launch of the Manual of Environmental Education that would be implemented in local schools to provide awareness to environmental decisions and promote environmental stewardship. MITADER also hopes to deliver a campaign to encourage teaching on environmental issues within Mozambique through the Natural Capital Programme, implemented in partnership with WWF.

CRCL presented their scenario planning research that visualized a “business-as-usual” scenario to show the consequences of unregulated pollution, unmanaged growth and climate change. Additionally, the research presented an alternative “resilient” scenario intended to illustrate how climate resilience, social justice, and

circular and sustainable economies can protect and enhance the region’s natural capital and the many benefits it provides to local communities. WCMC presented their work on mapping and estimating financial value for Mozambique’s freshwater, forests, biodiversity and crop suitability. WCMC intends to continue their work with WWF and support the Natural Capital Programme’s incentives and implementation for bankable projects regarding ecological infrastructure in Mozambique. Participants of the meeting mentioned their concerns for how the integration of natural capital can be done, especially within a private–sector approach. Participants also communicated the need for determining the investments that are vital to the existing biodiversity within the region. Within conversation, there becomes an opportunity to merge the work of CRCL and WCMC to embed financial value with planning, while also considering SDGs. Lack of coordination within planning efforts and the implementation of this research was also identified as a main issue among meeting participants. Anabela Rodrigues, Country Director of WWF-Mozambique, encourages the government’s commission within the Green Economy Action Plan, a vital and necessary financial resource to ensuring the maps and visualizations can be incorporated into the planning process.

“Our goal is to bring contributions to the study from Columbia University and provide our ‘know-how’... This work will directly influence the results of the mapping for the land planning/projects for the future of Cabo Delgado.”

— NATIONAL DIRECTOR OF THE MINISTRY OF FINANCE AND ECONOMY



MEETING



DAY 2



CRCL, WWF, AND WCMC TEAM PRESENTING RESEARCH AND VISUALIZATIONS TO MITADER AND MEF OFFICIALS

MEETING



“The study that will be presented is an instrument to promote development and build the city in an inclusive way, respecting the environment, and ensuring that we do not put natural resources at risk.”

—ANABELA RODRIGUES, COUNTRY DIRECTOR OF WWF-MOZAMBIQUE

“One of our main issues is coordination. How are we going to ensure that we are mainstreaming these maps / visualizations to incorporate with our planning? How do we ensure from the ground that this work is being implemented into the next planning cycle?”

—MEETING PARTICIPANT

NATIONAL DIRECTOR OF THE MINISTRY OF FINANCE AND ECONOMY

“It is important to present this ongoing work. We need to see how we can take advantage so we can not overlay / lose efforts. In regards to the issue raised on development planning, it is important to show what and where it must be valued to help with district, national, provincial planning.”

NATIONAL DIRECTOR OF THE ENVIRONMENT

“We are developing action plans on climate change for the Natural Capital program. We already started on the coast and have yet to plan inland for the town of Palma and the districts of Cabo Delgado. We have a district plan. With these initiatives, the Palma district would be the priority for adaptation. We are planning to have a joint plan with the Department of Ministry of Finance (MEF). There is an opportunity to go in with a local adaptation plan for climate change. We only have two districts—Palma and Mecombe... It is important to provide development for land plan to avoid conflict in the future. It is important to combine tools to oversee this in the future.”



CRCL MANAGING DIRECTOR THADDEUS PAWLOWSKI PRESENTING VISUALIZATIONS OF RISK AND OPPORTUNITIES WITHIN FUTURE PALMA

WWF NEW DEAL FOR NATURE AND PEOPLE

CELEBRATION OF NATURE

On June 6, 2019, WWF-Mozambique hosted an event and presentation for the launch of the New Deal for Nature and People. The event celebrated World Environment and World Oceans. The evening began with opening remarks from Anabela Rodrigues, Country Director of WWF-Mozambique followed by a video of WWF’s “How We Plan to Save Our Planet”. Thaddeus Pawlowski, Managing Director at CRCL, presented the

Center’s ongoing work for a more resilient future in Palma and opportunities for green recovery and reconstruction. Rodrigues concluded with a presentation on the launch of the new agreement for nature and people. Presentations were followed by questions and discussions from attendees of the event, including major stakeholders, academic institutions, and representatives from Anadarko.



CRCL MANAGING DIRECTOR THADDEUS PAWLOWSKI PRESENTING CRCL’S WORK IN PARTNERSHIP WITH WWF’S NATURAL CAPITAL PROGRAM

PRESENTATION

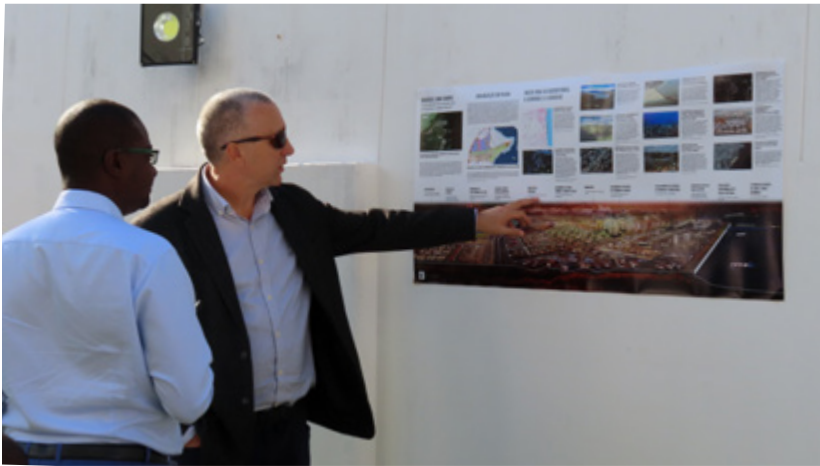


ANABELA RODRIGUES, COUNTRY DIRECTOR, WWF-MOZAMBIQUE



ATTENDEES OF THE LAUNCH FOR WWF’S NEW DEAL FOR NATURE AND PEOPLE

THIRDWAY AFRICA: BLENDED FINACE



ATTENDEES REVIEWING WORK FROM CRCL'S SCENARIO PLANNING RESEARCH

Thirdway Africa and the Confederation of Economic Associations of Mozambique (CTA) hosted a Round Table for the Development of Blended Finance, which took place at CTA headquarters building in Maputo. The presentations involved the challenges to access private sector finance in Mozambique, an introduction to the Blended Finance Concept, and WWF's introduction to the Natural Capital Program. Blended Finance is the strategic use of capital from public or philanthropic development for the mobilization of private commercial finance and sustainable development. The work of CRCL's visualization for Palma was displayed, along with a demonstration of WCMC's mapping and estimated financial value for Mozambique's natural capital. The presentations were followed by a discussion session with about 35 stakeholders and attendees.

UNIVERSIDADE EDUARDO MONDLANE - SCHOOL OF ARCHITECTURE AND PLANNING

On July 7, 2019 CRCL and WWF met with faculty and students from the School of Architecture and Physical Planning at Eduardo Mondlane University in Maputo. CRCL shared the scenario planning research and visions for Cabo Delgado and Palma, along with other work done in New York City after Hurricane Sandy and some samples of student work from Columbia University's Graduate School of Architecture, Planning, and Preservation (GSAPP). Students and faculty asked questions concerning regional planning in Mozambique, lessons learned from project development and disaster recovery in New York City, and ways to address resiliency and ecological awareness within their professional careers. Alima Taju from WWF explained "natural capital" to the architecture students, laying the groundwork for potential collaboration between the school and WWF.



PROFESSOR ANSELMO CANI REVIEWING WORK FROM CRCL'S SCENARIO PLANNING RESEARCH

Professor Anselmo Cani, faculty at Eduardo Mondlane University, will also work with Columbia GSAPP for a joint urban design studio focused on emergency management and recovery in Beira, Mozambique.

PRESENTATION



ATTENDEES AT THE ROUND TABLE FOR THE DEVELOPMENT OF BLENDED FINANCE



CRCL MANAGING DIRECTOR THADDEUS PAWLOWSKI PRESENTING CRCL'S WORK TO STUDENTS AND FACULTY AT EDUARDO MONDLANE UNIVERSITY

ANADARKO

CRCL and WWF attended a meeting at Anadarko’s headquarters in Maputo to hear an update on the progress of the LNG construction and associated development work. The meeting was also attended by about 20 other members of various NGOs and civil society organizations, mostly focusing on human rights and human development. Anadarko started by presenting updated physical plans for the LNG site, including overhead renderings that showed the LNG facility appearing at harmony within the existing landscapes of mangroves and sand dunes. WWF and CRCL asked many questions to clarify the impact of these plans, most of which had to be referred to expertise that was not in the room. Open questions include whether they

had done any future-looking towards sea level rise and flooding projections when designing this facility, if there are any plans for the decommissioning of the plant, had they explored off-shore solutions, and more generally, how they were prioritizing their corporate social responsibility investments. The second half of the presentation listed various programs they are designing for the local population--- job training, school improvements, and even a program to educate local children on how to not get hit by trucks coming in and out of the plant. They deflected many questions including those about local content and managing social problems that come with imported labor such as sex trafficking.

MEETING



ANADARKO OFFICE IN MAPUTO, MOZAMBIQUE



DAY 4



CONCLUSION

The future of cities is too important to be left to agents of the status quo: short-sighted politicians and profit-seeking consultants. Columbia University and WWF are among those seeking to provide a step up to future leaders in the built environment in fast growing, climate-vulnerable cities to meet the challenges of the 21st century.

Mozambique has doubled in population in the first two decades of the 20th century, and will likely double again in the next two decades. Much of the growth is occurring in unplanned cities on the coast and near extractives areas in the north, particularly offshore natural gas. Mozambique has ample natural resources to support its population, with 3,000 miles of coastline abundant with coral reefs, mangroves, and sea grasses and 32 million hectares of pristine forests, rich soil, and vast stores of freshwater as the outlet for many of southern Africa’s largest rivers. While this natural capital can support a robust and diverse blue-green economy of agriculture, fisheries, tourism; today, all of this natural capital is at risk of over-exploitation.

Cyclones Idai and Kenneth earlier this year—the strongest cyclones in Mozambique’s recorded history—demonstrated that Mozambique’s rapidly urbanizing coastline is one of the most vulnerable locations on earth to future extreme weather events from climate change. A recent and ongoing water crisis in Maputo made apparent the need to radically rethink urban infrastructure. Engineering solutions of the past, such as those that rely on upstream flows from neighboring countries, put today’s population at risk and are incompatible with future growth.

Government officials and civil society organizations recognize that lack of capacity in spatial planning is the primary barrier to making better decisions about land use, freshwater and marine resource management, and infrastructure development and its critical relationship with, and reliance on, natural wealth. The limited planning that does occur is often from consultants beholden to the extractives industries, and does not take into account the services provided by natural capital such as mangroves, coral reefs and forests. Although less openly acknowledged, corruption in government also threatens to sanction the plundering of resources and the failure to build environmentally-sound infrastructure or conserve the country’s enormous natural wealth that serves the people.

Following this year-long collaboration between CRCL, WWF and the Mozambican government, we are prepared to redouble our efforts to train the next generation of leaders in planning Mozambique’s built environment. To this end, we are currently planning an urban design studio in 2020 with architecture faculty at Eduardo Mondlane University, in which we will further explore protecting Mozambique’s natural capital in the areas recovering from 2019’s cyclones. We hope this will in turn lead to more future collaboration with our partners in Mozambique who are now building more sustainable, resilient and equitable cities and protecting the landscapes on which they depend for perpetuity.

