

Spatial Planning of Climate SMART and Resilient Port Cities in the WIO Region: A case for Mombasa, Durban & Moroni.



**Sustainable Port Development WIO Stakeholders Workshop
16-17 August 2022**

Obakeng Molelu (PhD) - COMRED



MACQUARIE
University
SYDNEY · AUSTRALIA



TECHNICAL UNIVERSITY OF KENYA
Education and Training for the Real World

Background

- Mega Projects in WIO Port- Cities leading to socio-spatial, planning and ecological challenges that require improved port-city relationship to reduce the negative impact
- Bandari Bora project is based on a Land Use Land Cover change analysis over 20 years and models what the next 20 years may look like
- Port expansion and City development negative and positive impacts on
 - Ecology, urban population, local economy, national-regional economy, capacity to achieve sustainable development goals



Project Objectives

The goal of this study is to bridge key data and information gaps on: trends and patterns of land use and land cover change in WIO port cities and use the data and information in a decision support tool for planning. Hence, the objectives of the study are:

Why?

- Build on growing body of knowledge
- Practical recommendations that can be impactful



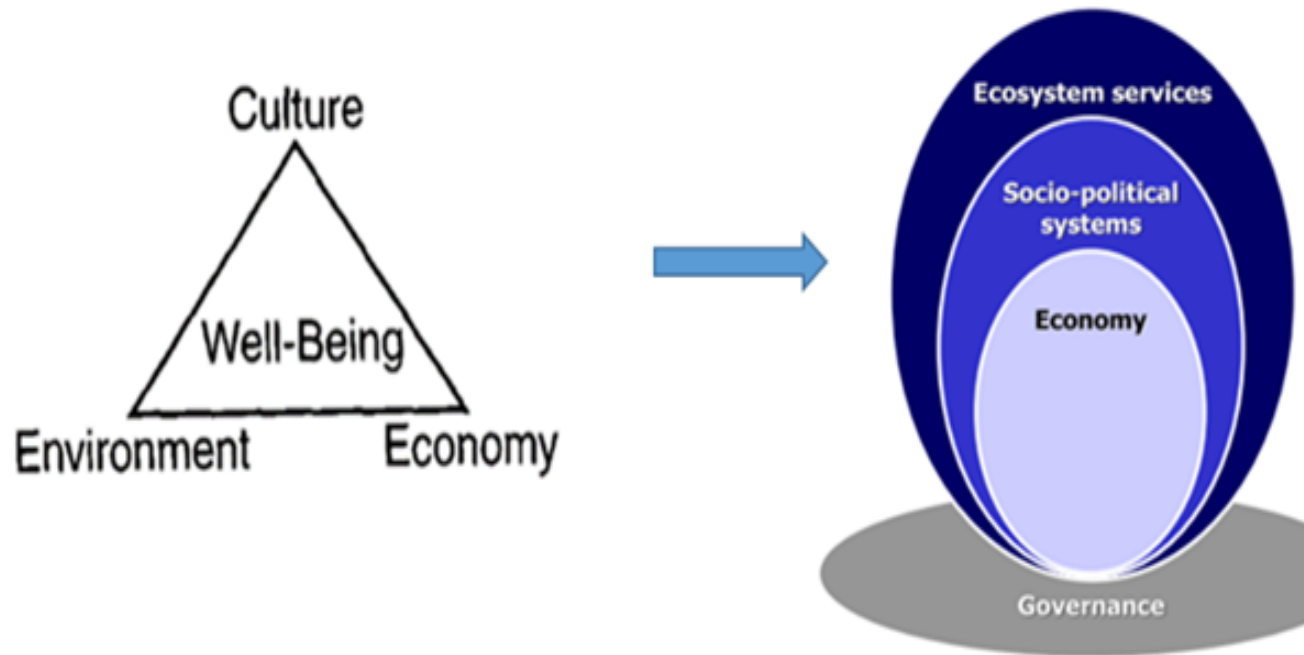
1. To evaluate the **impacts of port development** and operations on urban socio-spatial arrangements and related **policies**.



2. To develop and apply an **integrated spatial development framework/DST** that can inform both current and future **coastal planning and management policy options** across the WIO region.

Sustainable Port-Cities

Based on the definition of sustainable development and anchored in governance



- A port city that focuses on balancing sustainable environmental, economic and social aspects (Glavovic, 2007)
- Promotes economic development and employment while mitigating negative impacts on the environment (Ying Zheng, 2020)
- Connotes coordinated development of the environment, economy and society
- emphasis on environmental protection, conservation and human development (Glavovic, 2007)
- Need to understand interactions between urban environmental, social and economic issues within the port city system

(Moomaw, 1996; Department of Environmental Affairs, 2015)



Established data and knowledge gaps
Literature review and expert knowledge



Understanding port city interactions
System Thinking Approach



Enlisting Stakeholders
Stakeholder mapping and engagement



Social and Land Use Spatial Arrangements
Field work surveys and Geospatial analysis



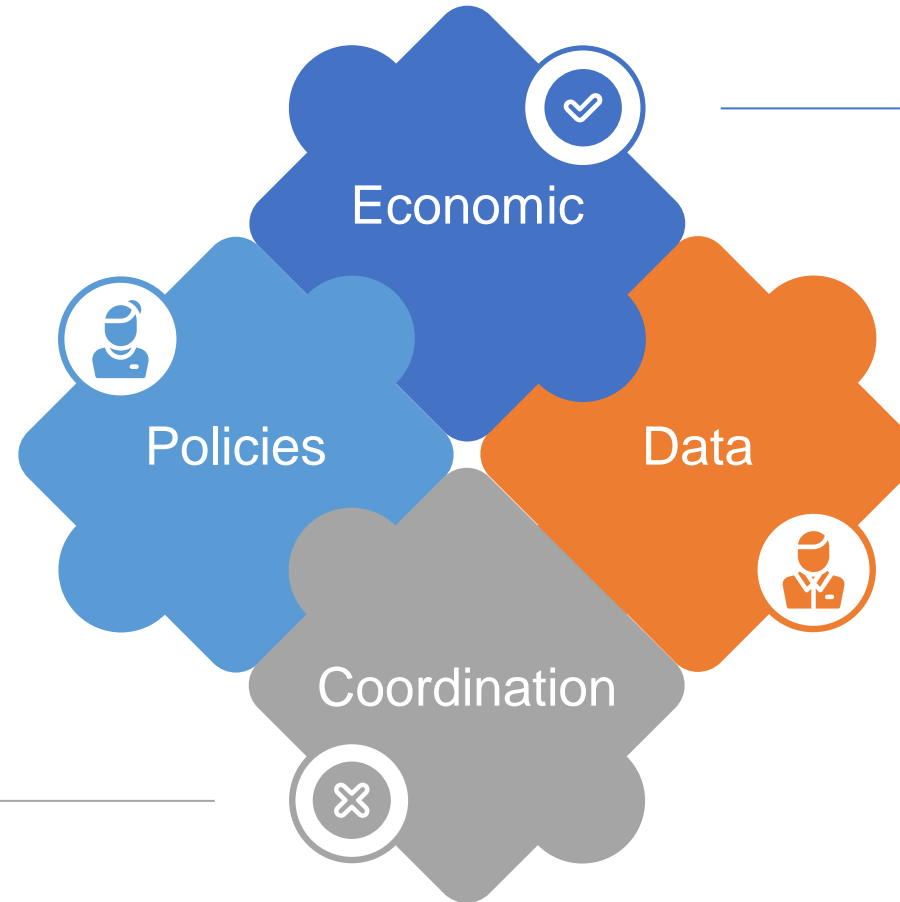
Peer to Peer Learning Exchange

01

Establish data and knowledge gaps

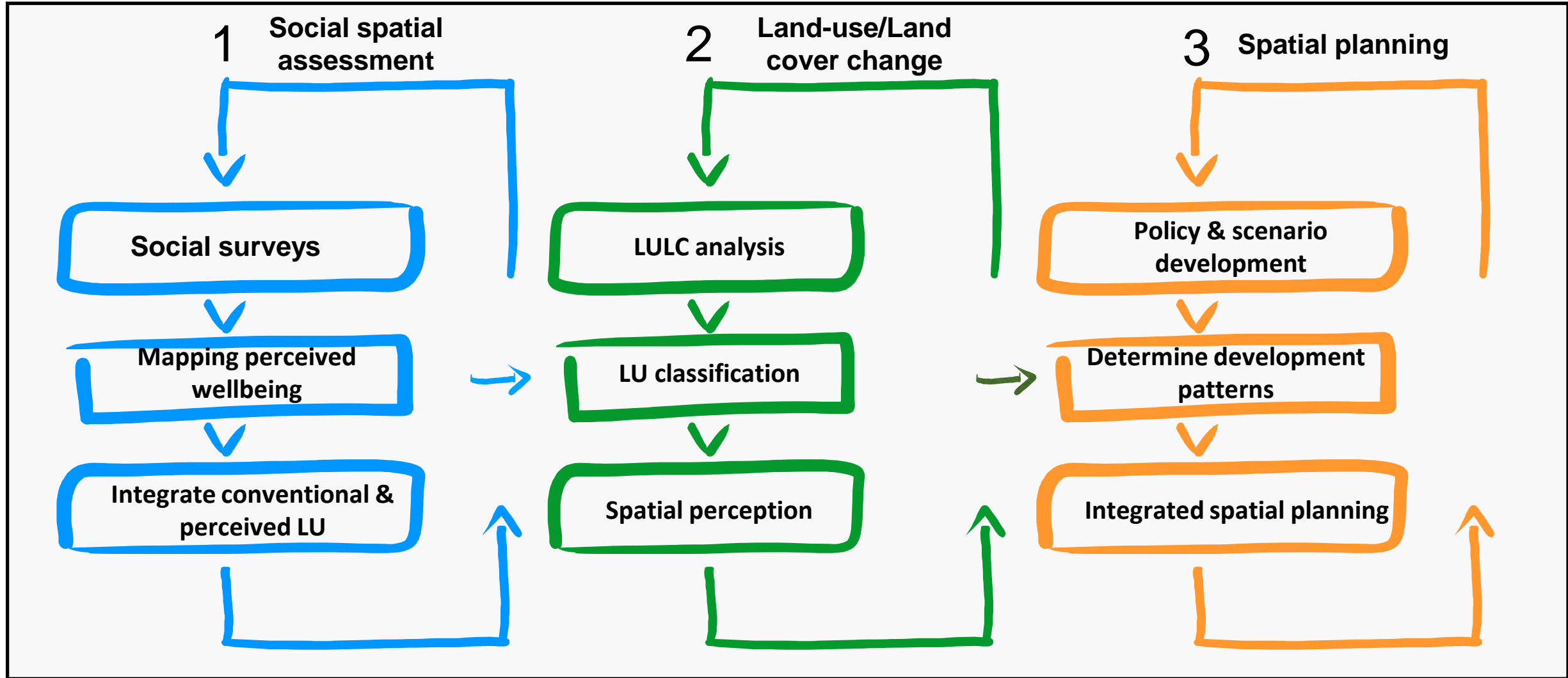
Partial implementation of strategic planning policies for the port and city

Conflicting land uses due to sectoral planning and management.



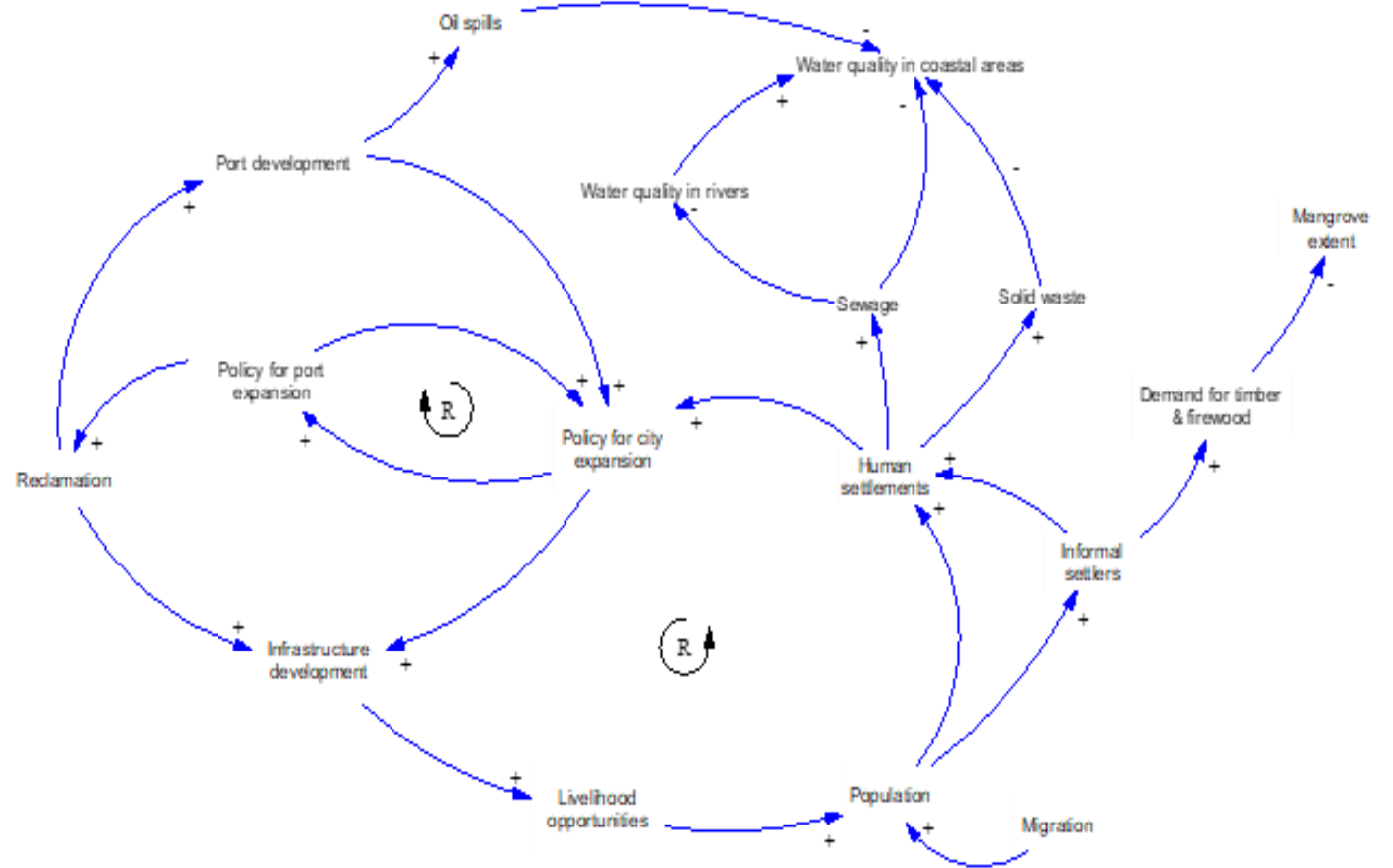
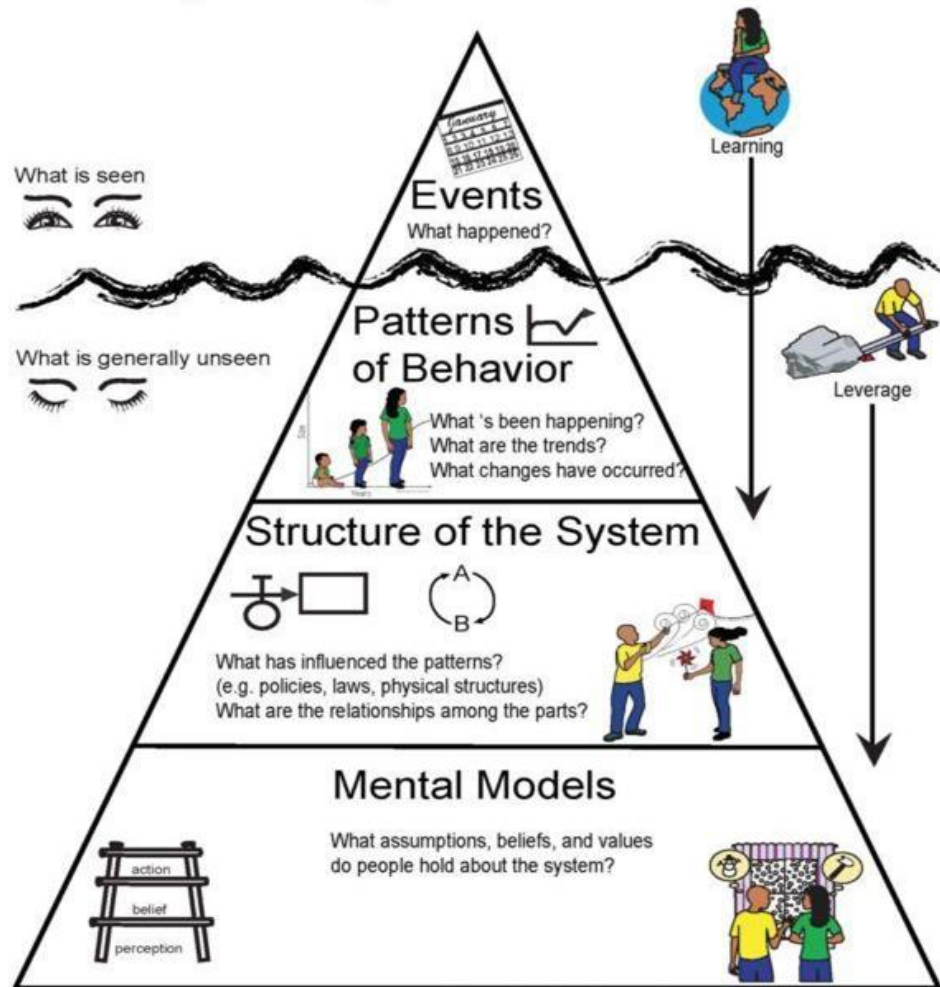
Inadequate financial resources allocated for city planning

Lack of data repository



Integrated spatial planning framework and
Decision Support Tools for planning

Understanding port city interactions



Your Research Topic abstract was accepted

Dear Majambo Jarumani Gamoyo,

Many thanks for contributing to the Research Topic "**African Ocean Stewardship: Navigating Ocean Conservation and Sustainable Marine and Coastal Resource Management in Africa**" with your abstract "**PORT-CITY INTERACTIONS AND CHALLENGES FOR THEIR SUSTAINABILITY IN AFRICA**".

We are pleased to inform you that your abstract has been accepted by the Guest Editors. Congratulations on your achievement!

03

Enlisting Stakeholders

Goal

The goal was to enlist stakeholders participation in three cities

Workshop outputs - Mombasa

1. Technical Report
2. Workshop Proceedings
3. Technical Working Group

Workshop outcome - Mombasa

1. Buy in from stakeholders & inform on the importance of the project and their expected roles
2. Visioning of the project
3. Embedding Spatial Planning of Climate SMART and Resilient Port Cities into the MSCF
4. Have a climate change adaptation and planning sector dialogue

Workshop outcome – Durban

1. Terms of reference with eThekweni
2. Five officials assigned to assist in the Durban component
3. One official to act as gateway to representation from Transnet



Durban-Pinetown Bus Rapid Transport Station

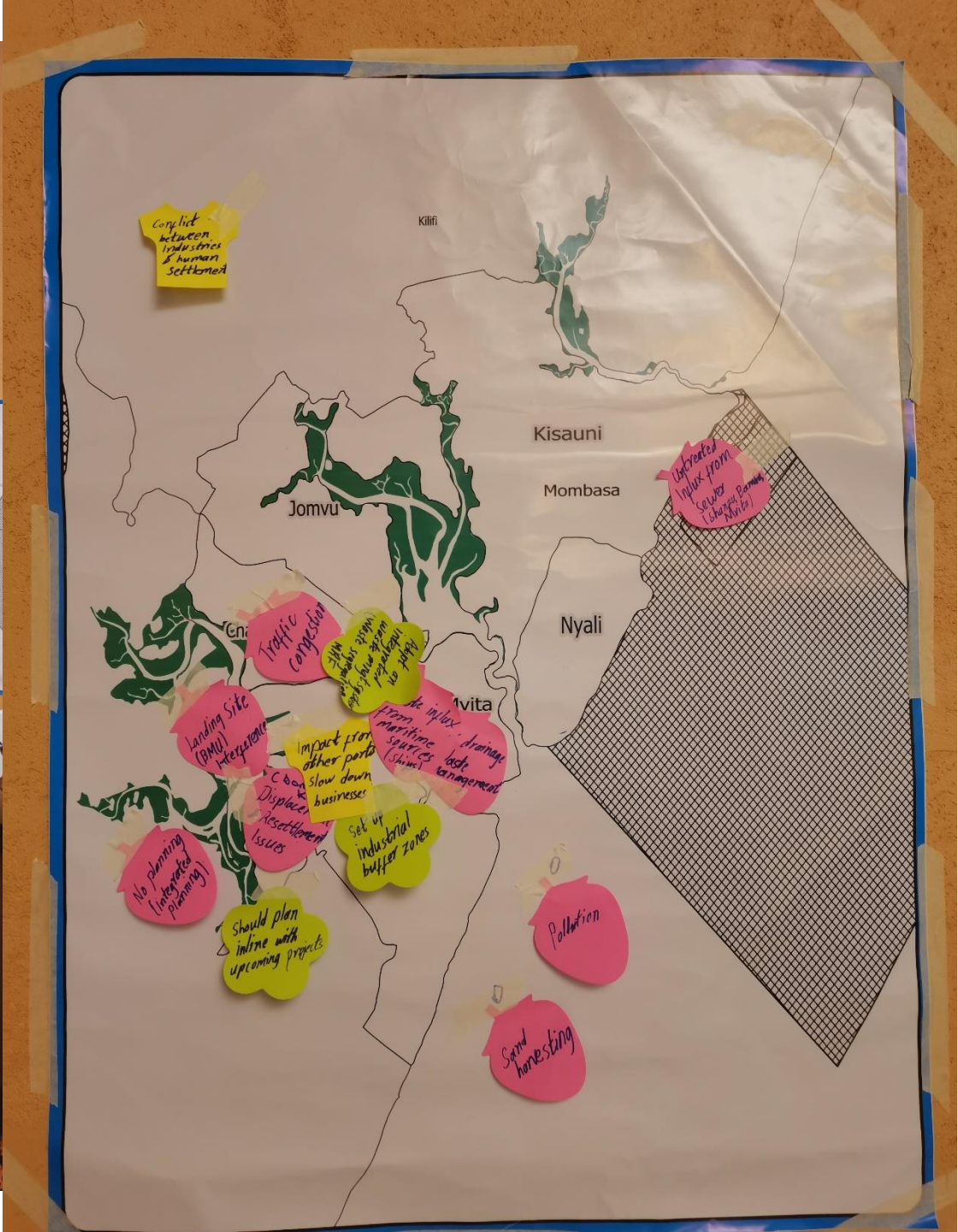
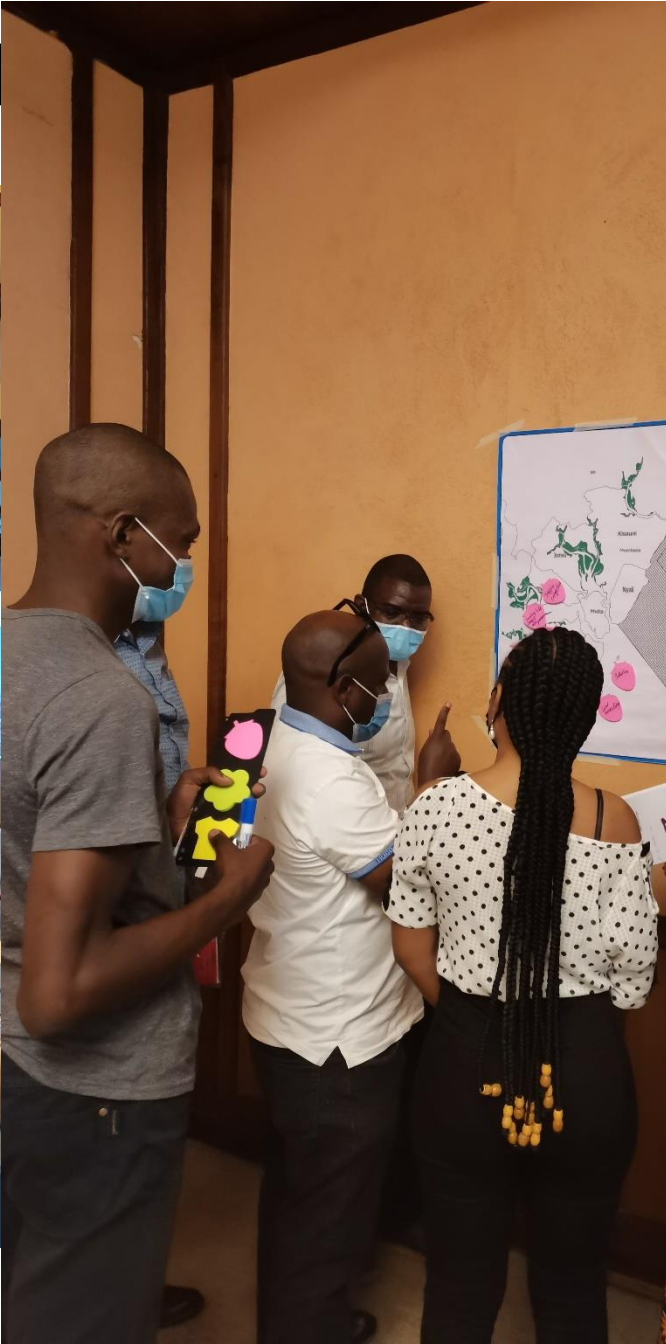


Diani-First Mombasa SH meeting

Durban, Mombasa and Moroni Stakeholders

Stakeholder Group	Specific Stakeholder by City
Municipal Level	Mombasa County: Environment, Waste Management and Energy, Transport & Infrastructure, Lands, Planning and Housing
	eThekweni Municipality: Transport Planning, Strategic and Development Planning, Climate Change and Environment, Economic Development, International Relations
	Moroni: Department of GIS and Cartography and City Planning
Port Authority	Kenya Port Authorities: Environment and Economic Planning departments Kenya Maritime Authority: Environment
	Transnet National Port Authority: Planning Department
	Moroni: National Agency of Maritime Affairs
Other Stakeholders	WWF Kenya, NEMA, Kenya Association of Manufacturers, Lafarge Ecosystems (Bamburi Cement), CORDIO East Africa
	South Durban Community Environment Alliance
	N/A

Stakeholder



Workshop Outcome: Issues and Interventions

1	Issues	Interventions
2	Lack of intergrated planning	Coordinated planning among various departments
3	congestion	Proper EIA to analyze the effects and impacts
4	Environmental degradation	Awareness and education on benefits of ecosystem protection
5	politics	Multisectoral engagements in matters of port and city planning
6	Marine Spartial planning	Integrated port-city planning
7	Zoning of port development	Access- traffic management planning
8	Pollution-air, water discharge, waste in reception facility	Conducting EIA and restorative responses to combat environmental degradation
9	Regulatory Framework	Consistent dialogues with stakeholders
10	Habitat destruction/ecosystem damage	Coordinated development through planning and marine spaces
11	Decline infish stocks	Thematic zoning of land bordering the port
12	Conflicts land and Ocean uses	Proper waste management policies- reception facilities
13	Uncoordinated planning	Review and develop proper legislation
14	Traffic Congestion causing road deterioration	Integrated approach in implementing issues and involvement of all parties
15	Support infrastructure and Service	Incorporate the community in decision making- change management programmes
16	Social- cultural	Enhance security
17	informal settlement along ocean fringe	Move industries far from port cities
18	growing competition and other port cities	Designate levy- CSM
19	increased freight rates	Green Port Policy implementation beyond the borders
20	lack of planning	Policies, laws and enforcement
21	land use conflicts	Integrated spatial planning
22	emergent of industries related to port	Land use planning
23	port encroachment	Land use reallocation and compensation
24	sea reclamation, dumping and dredging	Continuous renewal of laws, policies and process to reflect technological changes
25	marine technological advancement and upcalling of ship sector	Develop waste management infrastructure to serve populations

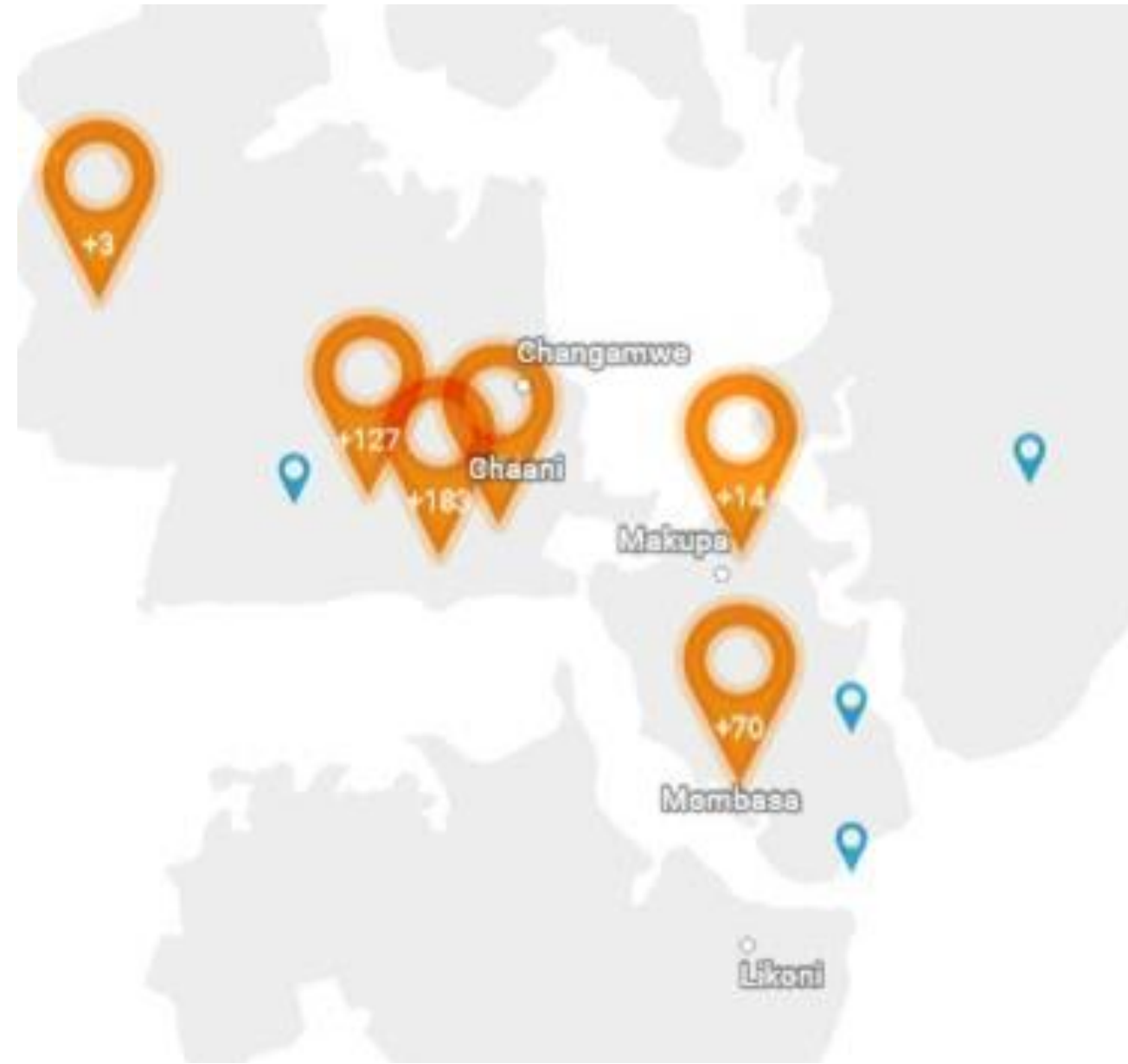
Environmental degradation due to pollution caused by increased activities	Coordinated and strategic prioritization of needs and fair allocation through sustained CSR from agencies operation within
Lack of industrial waste treatment facilities	Allocate land for a possible PPP of a recycling facilities
Water problem	Explore of water desalination options
Conflicting development plans	Review and harmonise sectoral, county and national development plans
Resources utilization	Map out resource availability and volumes

Social and Land Use Spatial Arrangements Mombasa



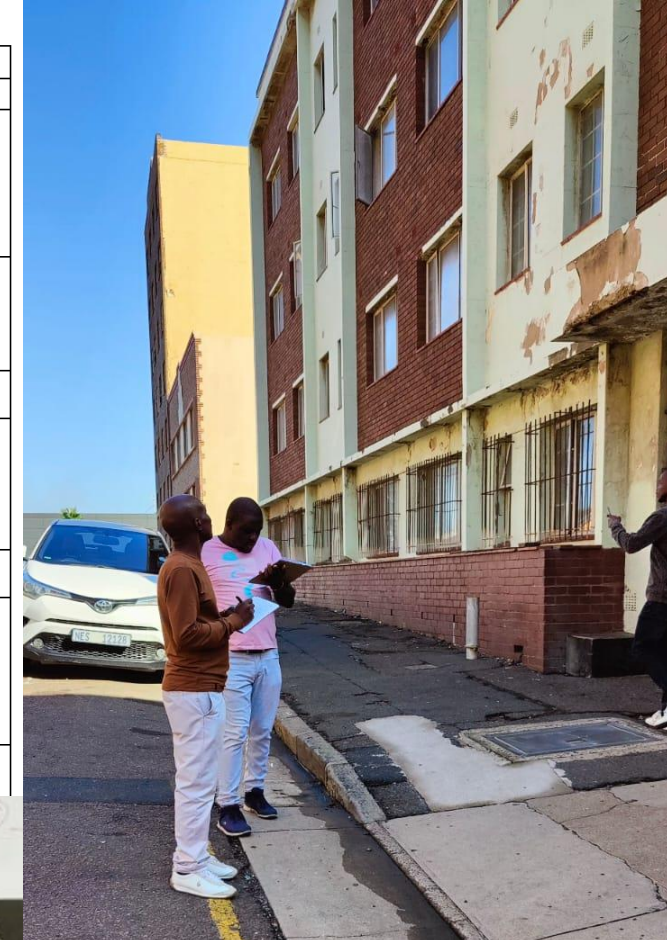
Household Survey-Mombasa

- Collect data and understand Socio-spatial planning in Mombasa
- Survey conducted on mobile phones using ODK Collect
- Themes
 - Demographic Information (place of birth, time living in Mombasa, why move to Mombasa)
 - Family Demographic information
 - Transport (public or private)
 - Livelihood Strategy (self employed/employed, time working)
 - Problems experienced daily
 - Role of port in their daily lives
 - Household assets, ownership, type of energy, type of dwelling



Social and Land Use Spatial Arrangements Durban

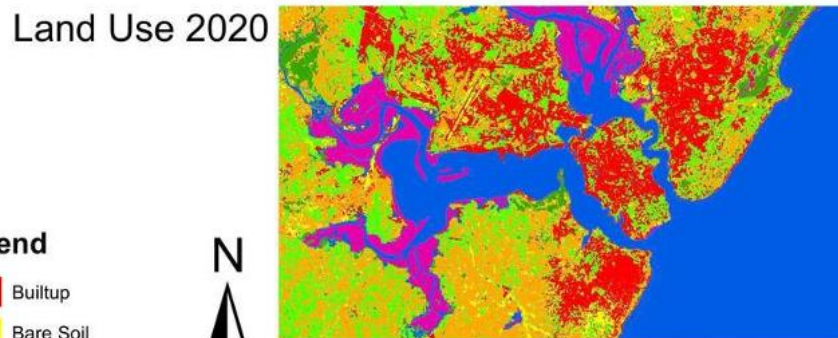
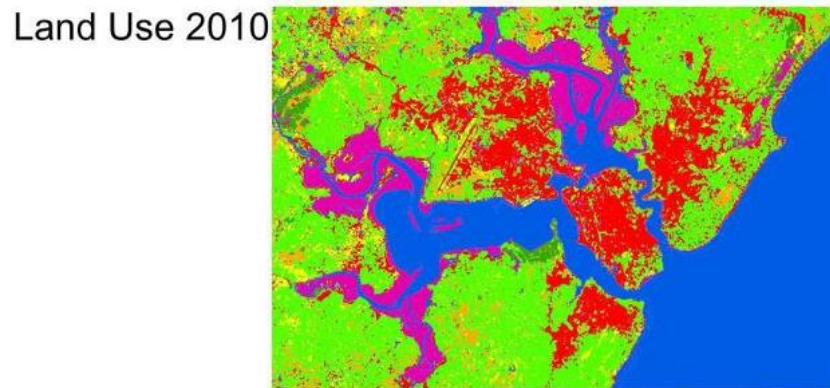
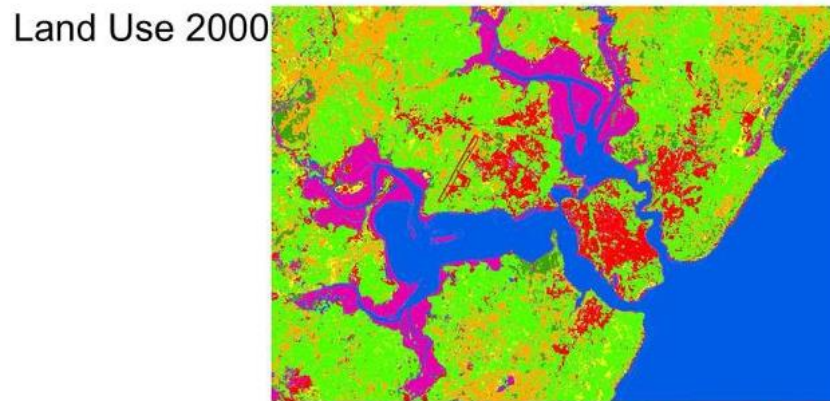
PRECINCT - TWO DIGIT	BLOCK - THREE DIGIT	SITE - FOUR DIGIT
11 Household Units	110 Dwelling Houses	1100 - 1101 Dwelling house - detached 1102 Dwelling house - semi-detached 1103 Dwelling house - semi-detached in rows 1104 Dwelling with ancillary business 1105 Dwelling with ancillary health service (eg. Doctors room 1106 Dwelling house with ancillary creche
	111 Flats, Apartments, Duplex	1110 - 1111 Flats - Apartments - Low rise < 4 1112 Flats - Apartments - High rise > 4 1113 Duplex - Low rise 1114 Duplex - High rise 1115 Attached housing
	112 Maisonettes	1120 - 1121 Maisonettes
	113 Cluster Housing	1130 - 1131 Cluster housing (detached dwellings) 1132 Informal housing and other uses 1133 Collective Residential 1134 Insitu Upgrade 1135 Derelict house with ancillary informal housing
	114 Group Housing	1140 - 1141 Group housing
	115 Other group quarters and buildings used for residential purposes	1150 - 1151 Defence force staff 1152 SA Police Services housing 1153 South African Police Services barracks 1155 Prison staff 1156 Home for Nuns 1158 Compounds 1159 Royal residence
	116 Other quarters and buildings used for residential accommodation	1160 - 1161 Garden flat 1162 Stump



Land-Use survey in Durban areas adjacent to the port.
 Maps and survey method used from eThekweni
 eThekweni are currently capturing coded maps



Durban Cadastral Map and aerial photograph

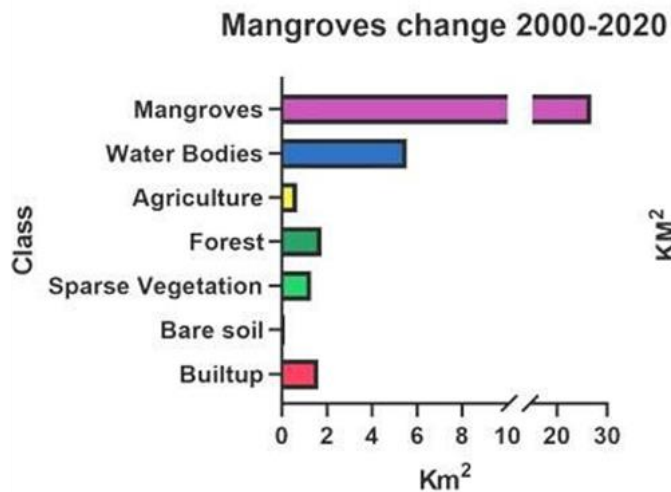


Legend

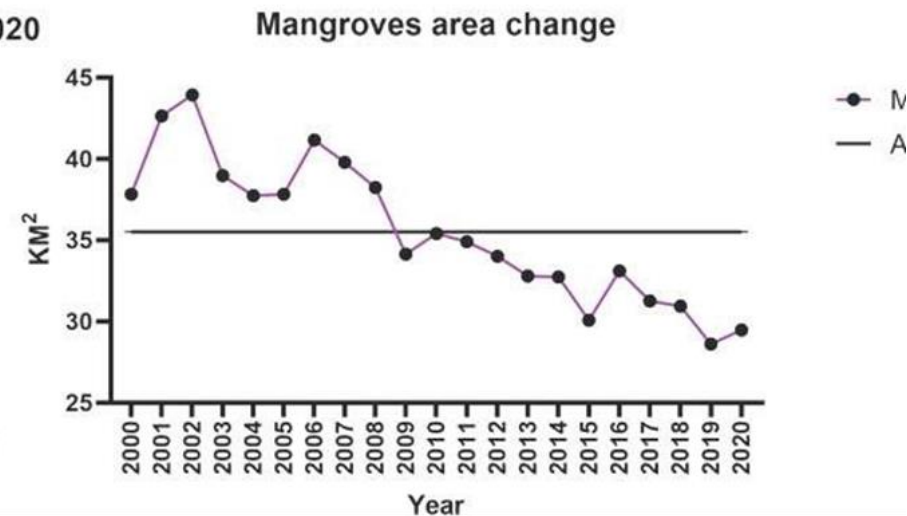
- Builtup
- Bare Soil
- Sparse Forest
- Forest
- Agriculture
- Water Bodies
- Mangroves



A)

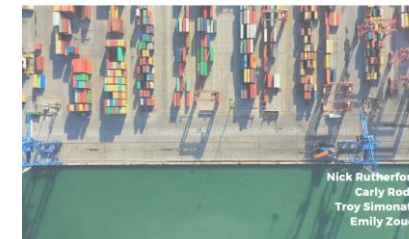


B)



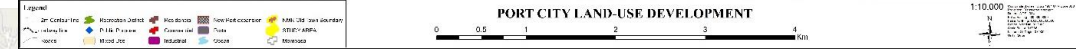
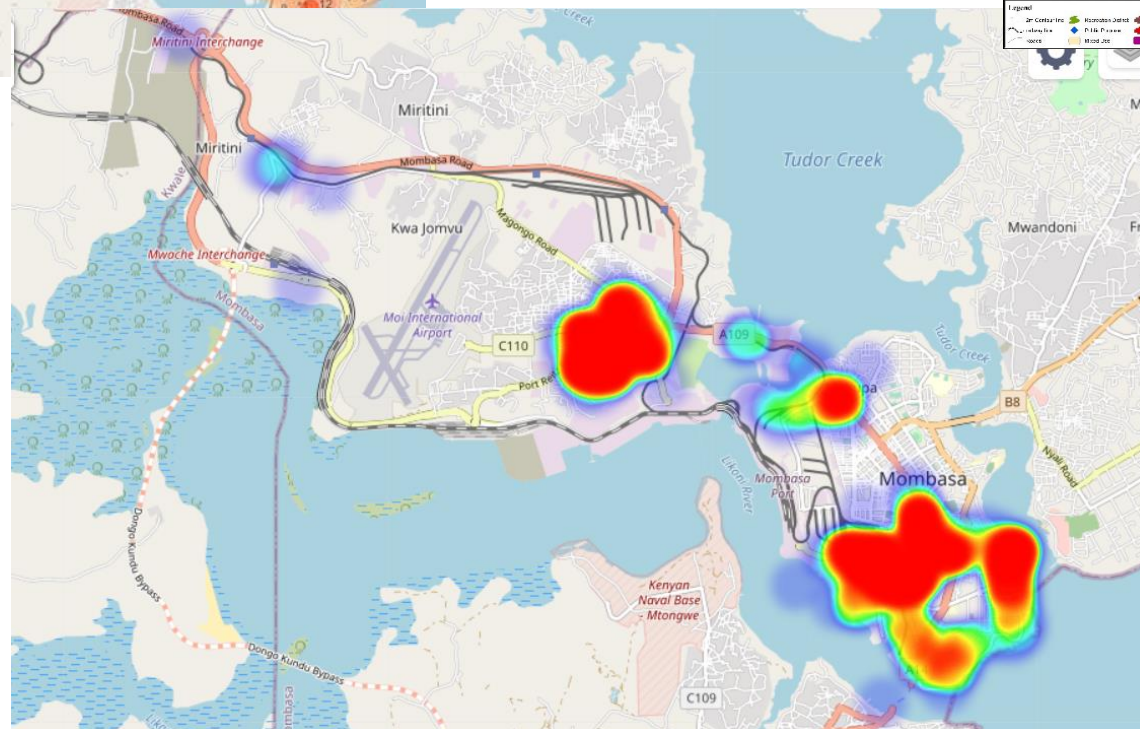
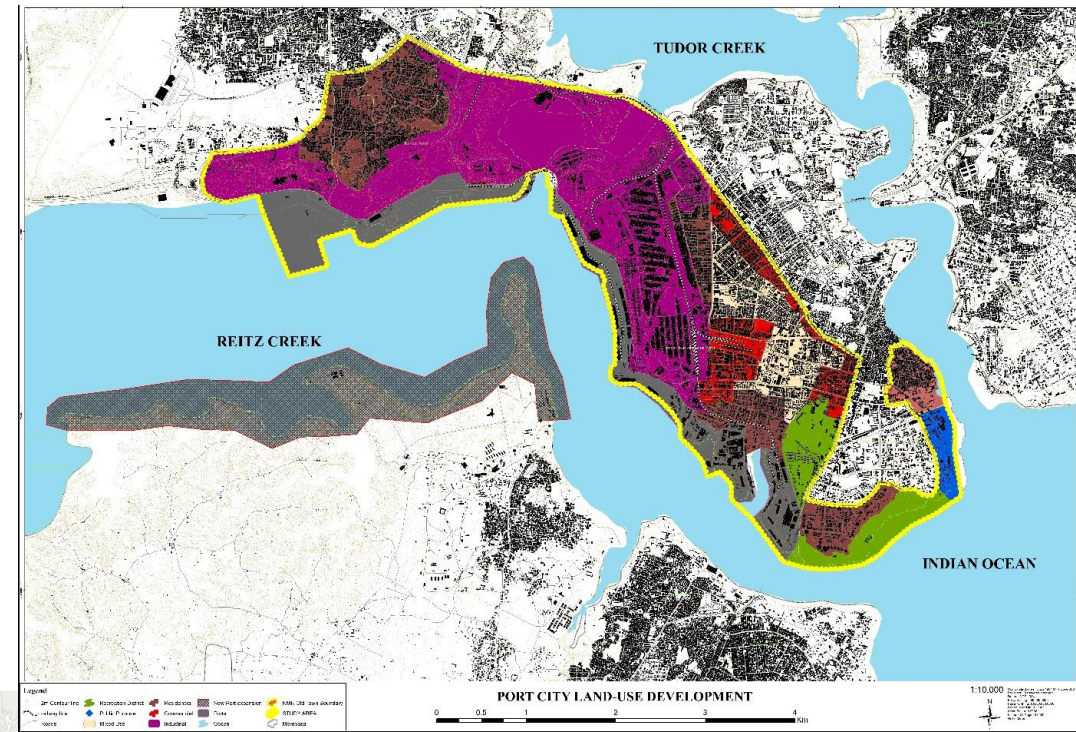
Ref. Collaboration between UNEP and Bandari Bora

Preliminary Assessment of Historical Environmental Change



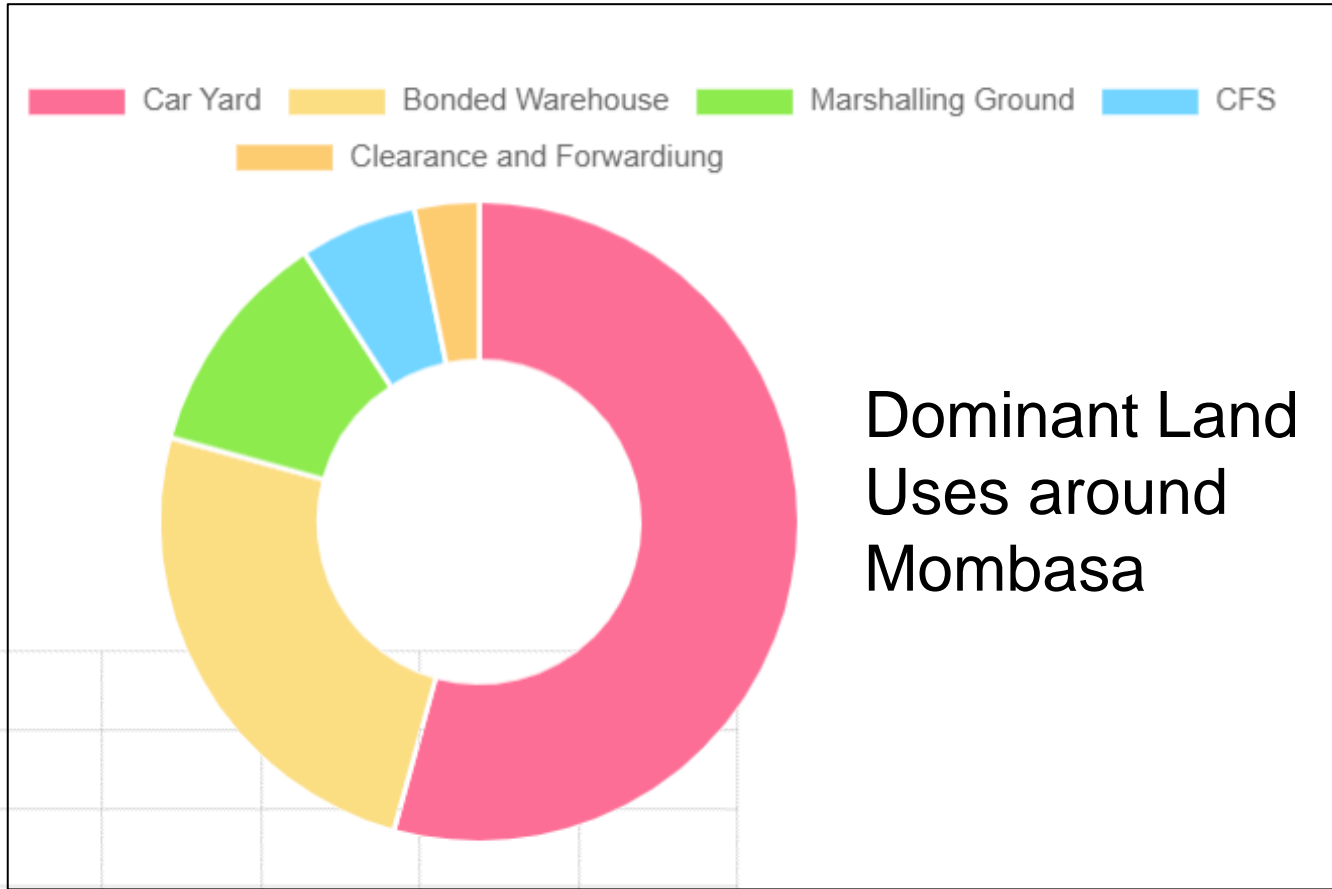
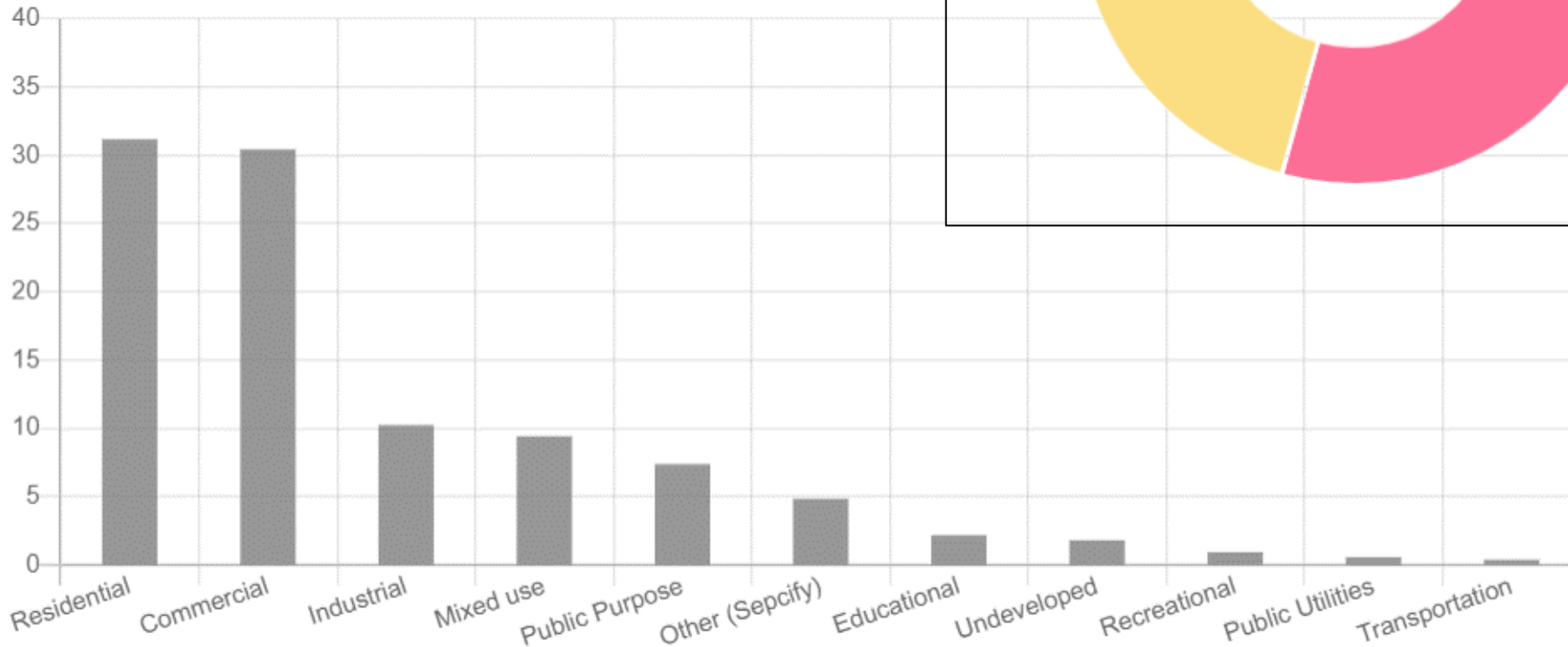
Preliminary LULC findings

A total of 1613 entries was collected



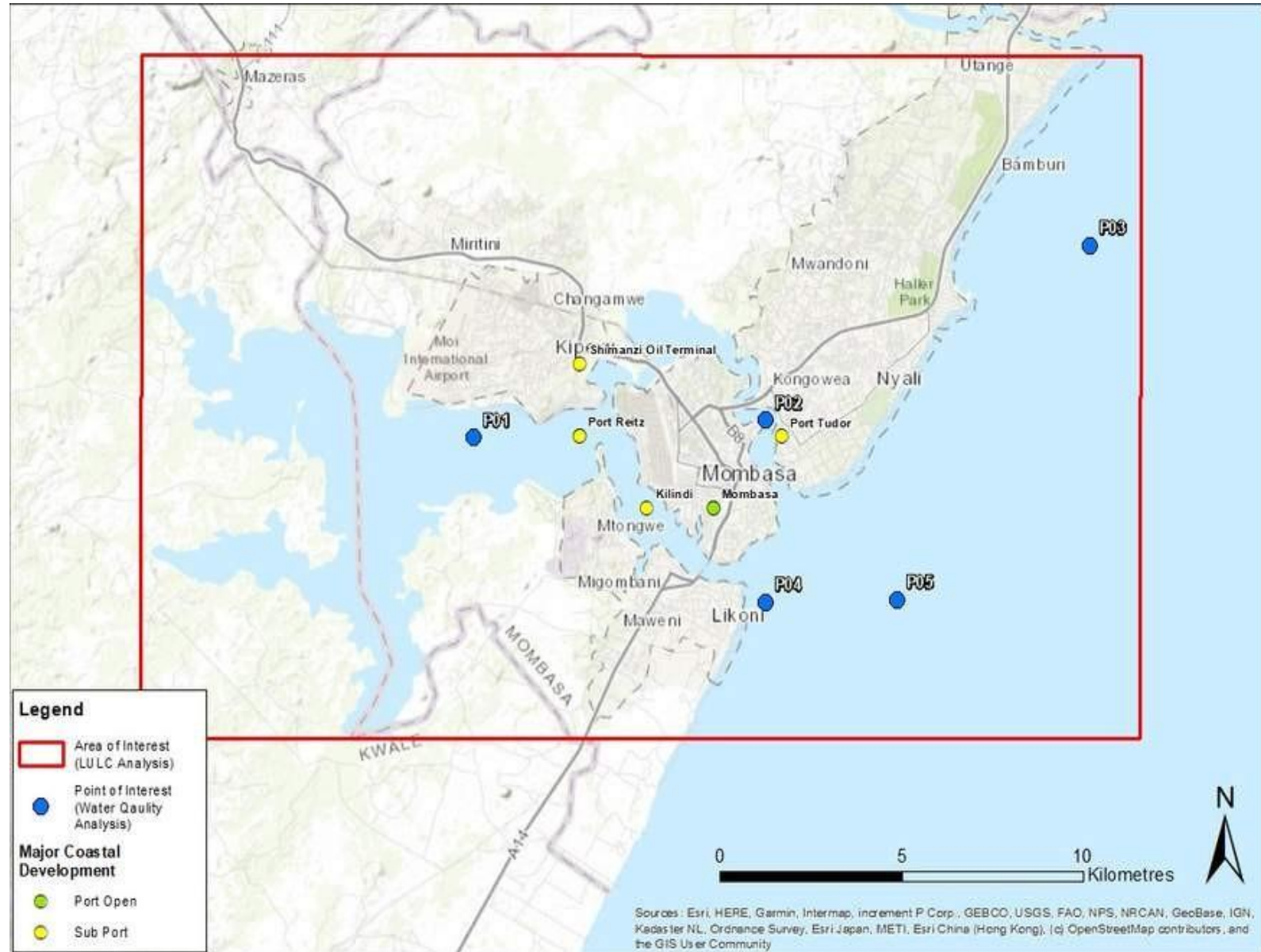
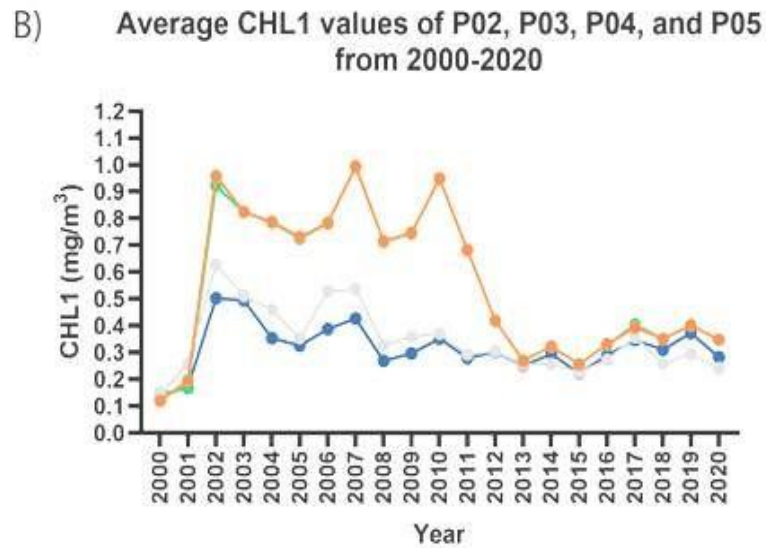
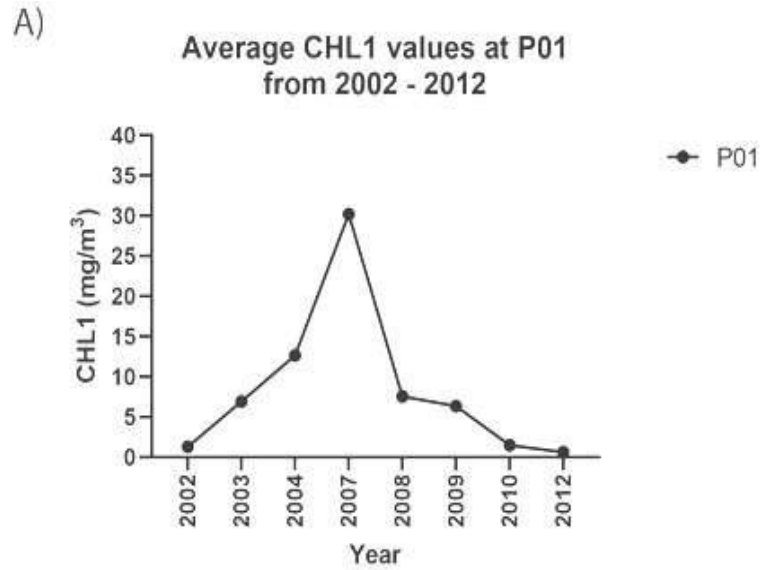
Street level emerging issues

- Transportation land use a major challenge e.g. truck parked along 12 road reserve
- Informal settlement transitioning port industrial areas



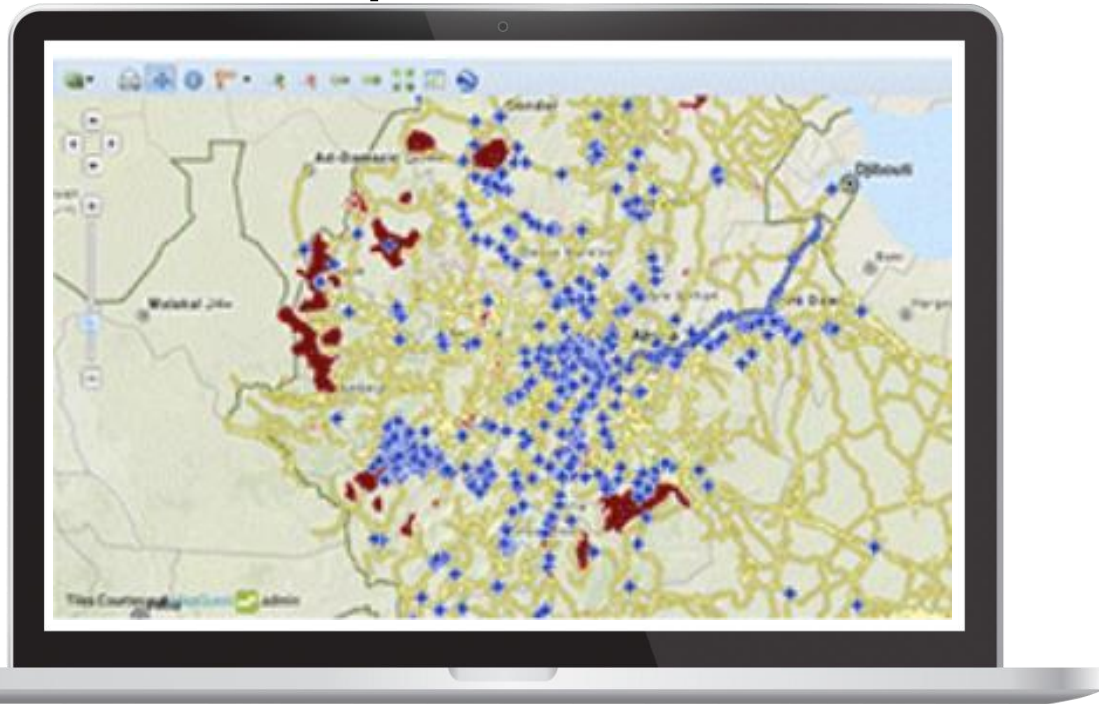
Dominant Land Uses around Mombasa

Satellite derived Water Quality (Chlorophyll a)



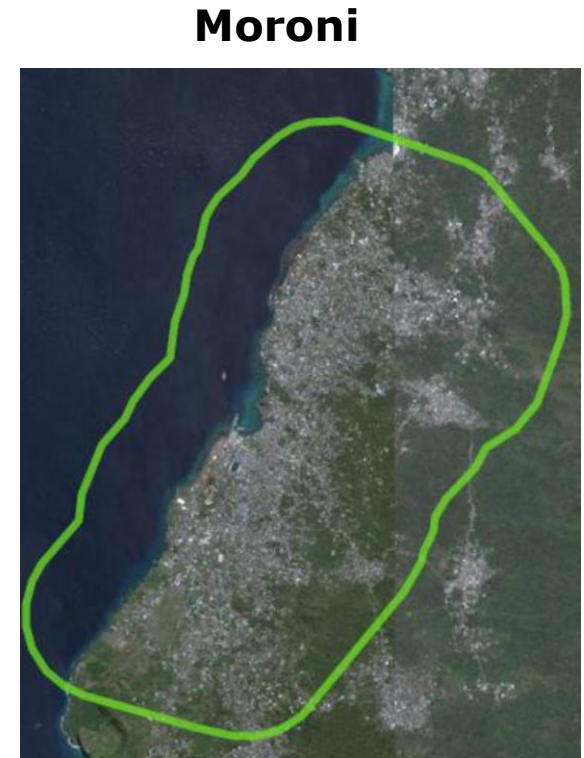
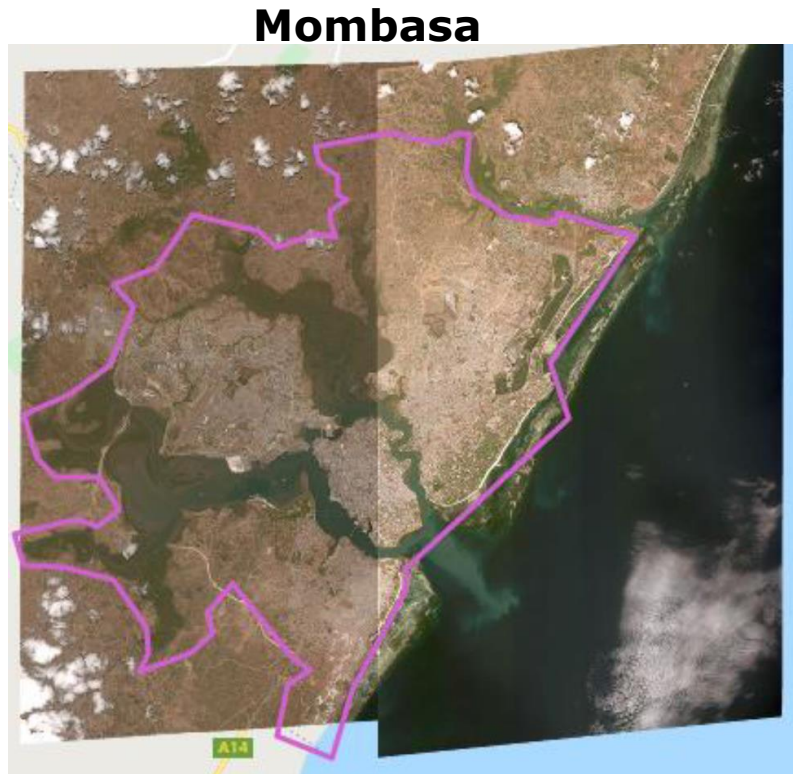
Opensource big-data platforms for integrated spatial planning of sustainable coastal cities

Geospatial Portal



- To develop an open-source geospatial big-data platform
- Apply Big data to a case study - integrated planning for sustainable port-cities of Mombasa

High Resolution (~50 cm) multi temporal satellite imagery (2000; 2010; 2015; 2022)



- Derive Essential Variables for monitoring sustainability in port cities
- Modelling land-use change and urban expansion for sustainable port cities

05

Peer to Peer Learning Exchange

- Durban 19-20 July 2022
- eThekweni Municipality, Transnet National Port Authority, SDCEA, CSIR
- Mombasa
- Moroni
- Bandari Bora Team-COMRED





Thank You

