



Ocean observation and prediction for coastal sustainability in Africa

The Go Blue Project

Connecting People, Cities and the Ocean

6th June 2023
Mohamed Ahmed




Introduction

An aerial photograph of a coastal town, likely in Kenya, showing a dense cluster of buildings along a sandy beach. The town is surrounded by green vegetation and a few larger structures. The ocean is visible on the right side, with several small boats anchored near the shore. The overall scene is bright and clear, with a mix of urban development and natural coastal features.

- Partnership GoK & EU – advance the **Blue Economy** agenda for the coastal counties of Kenya.
- Funding - EUR 24.7Million for the period 2021 – 2024.
- Three main Result Areas:
 - **Blue growth** – GIZ (TVET), AICS (support cassava production & fisheries), Camoes (Tourism & Culture).
 - **Environment** – UNEP and UN-Habitat (land-sea planning).
 - **Maritime Security** – Expertise France.

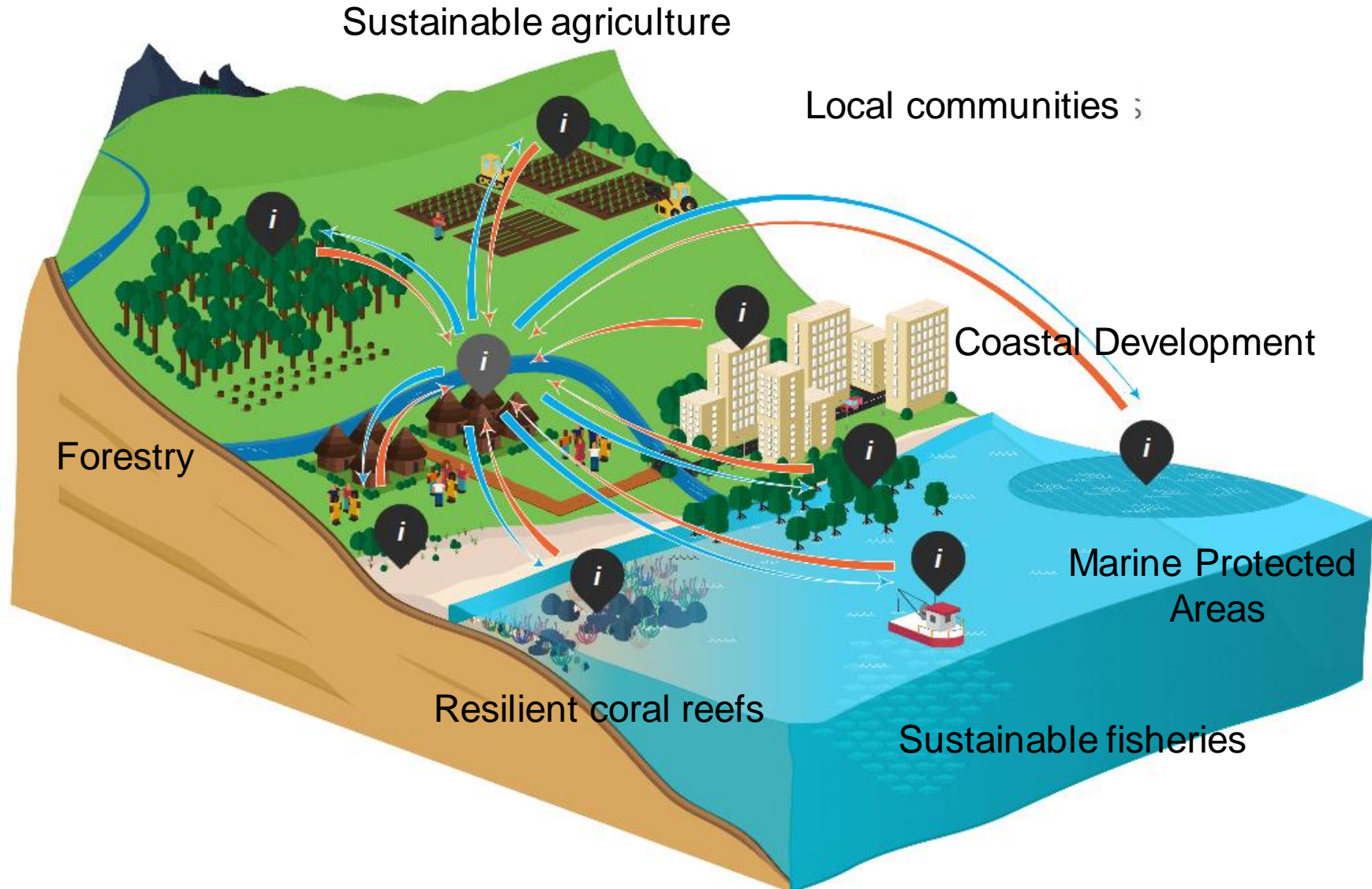
Outcomes

- 
1. **Data** - strengthened capacity for data collection and information management in the six JKP counties.
 2. **Integrated land-sea planning** - enhanced capacity for the coastal counties and coastal cities in land-sea planning and management for climate change adaptation and mitigation.
 3. **Pilots** - enhanced environmental, social and economic benefits for communities and cities through pilot implementation of the land-sea plans.
 4. **Knowledge sharing** - approaches and benefits from integrated land-sea planning disseminated to county and national stakeholders.

1. **Data** - strengthened capacity for data collection and information management in the six JKP counties.
2. **Integrated land-sea planning** - enhanced capacity of the JKP counties and coastal cities in land-sea planning and management for climate change adaptation and mitigation.

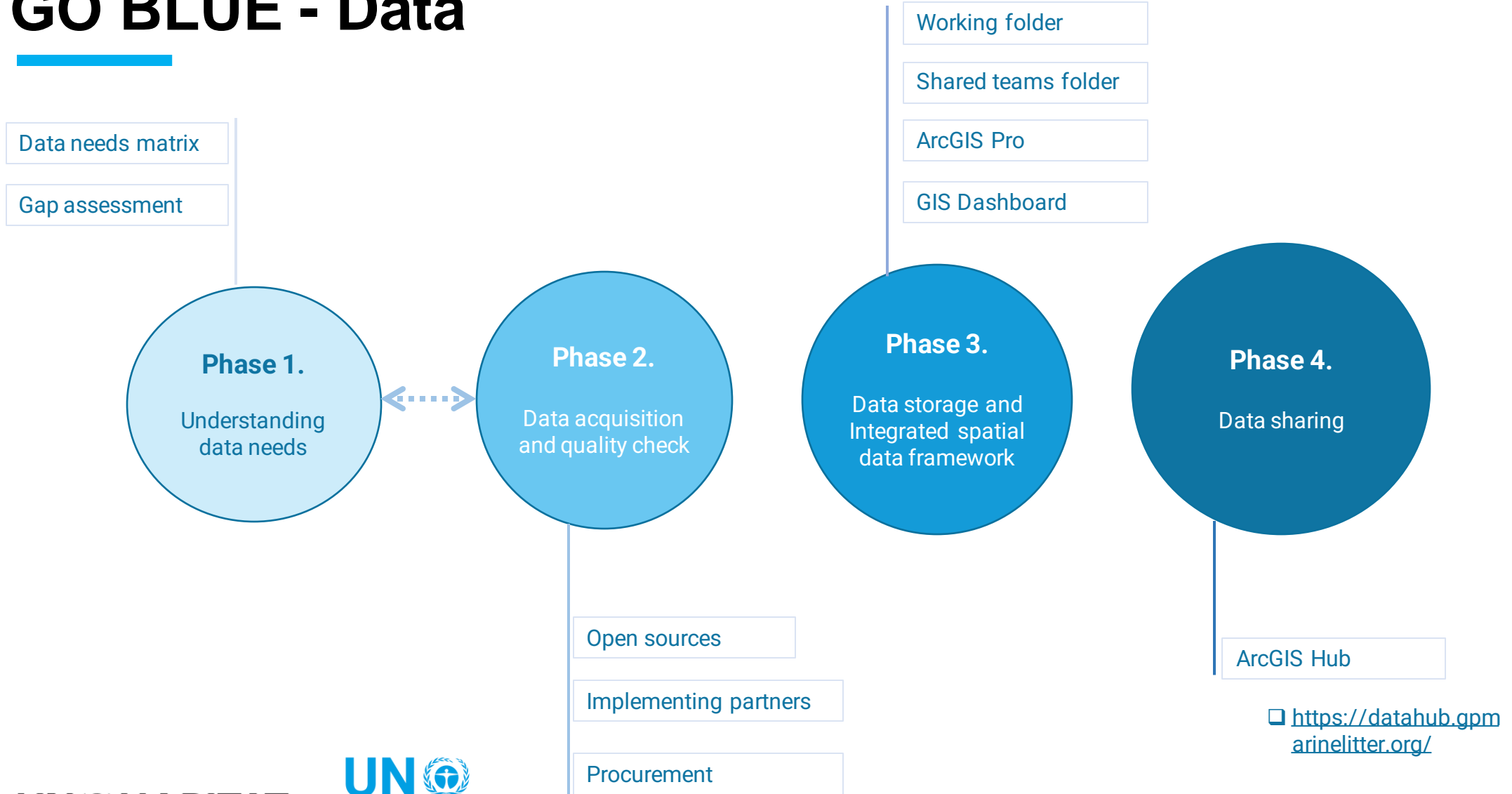


Holistic approach to sea-land planning and management to ensure long-term sustainable blue economies: *Link to National MSP Framework and BE*



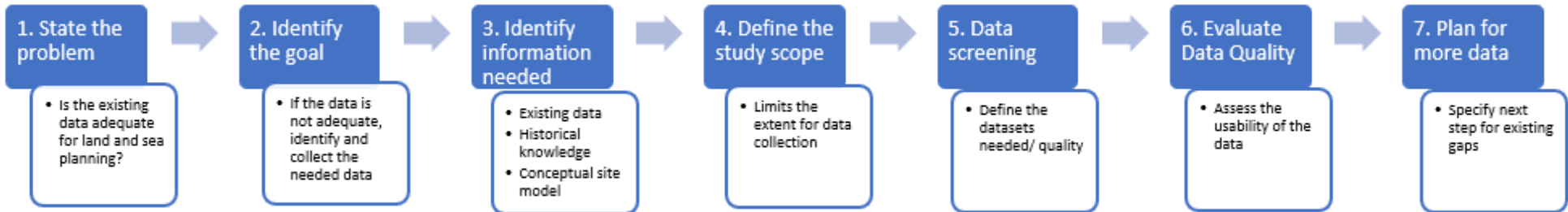
- Recognize the interdependence of land and offshore systems
- SBE - healthy coastal ecosystems for resilient communities.
- Integrate planning guidelines to the MSP process.
- Data is needed.

GO BLUE - Data



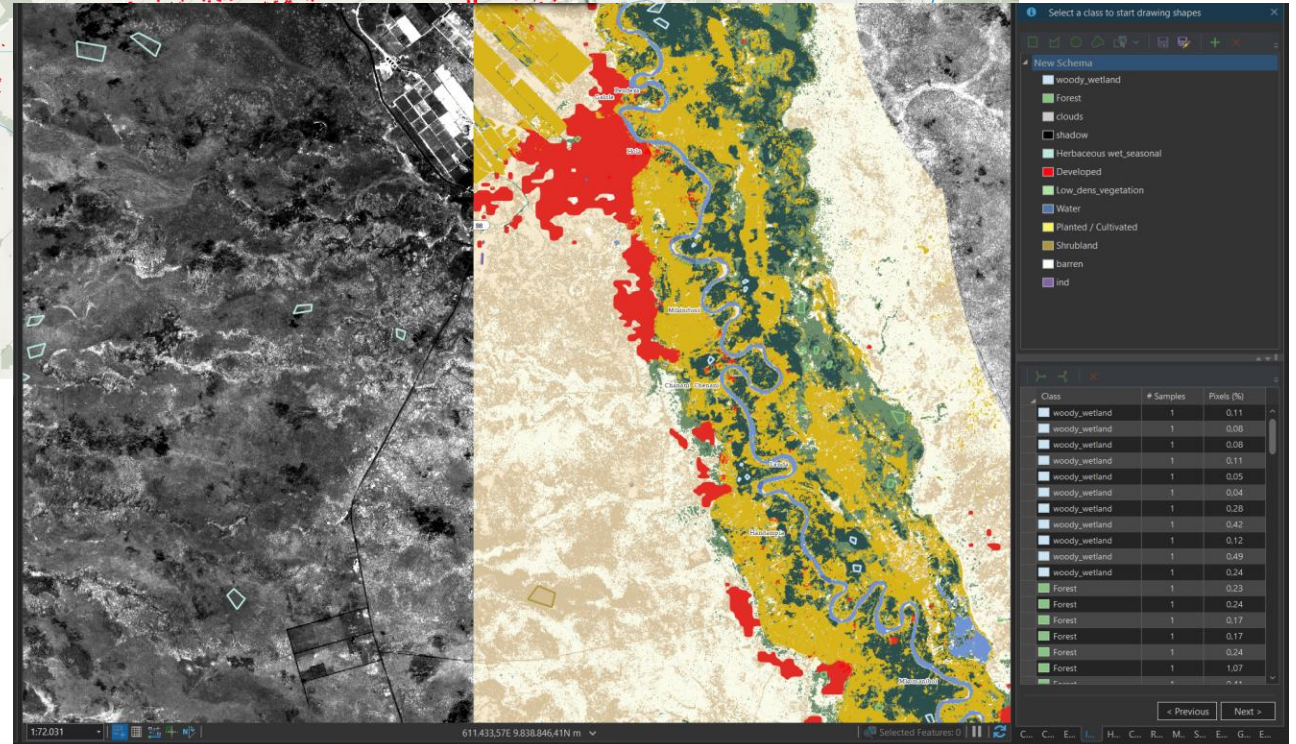
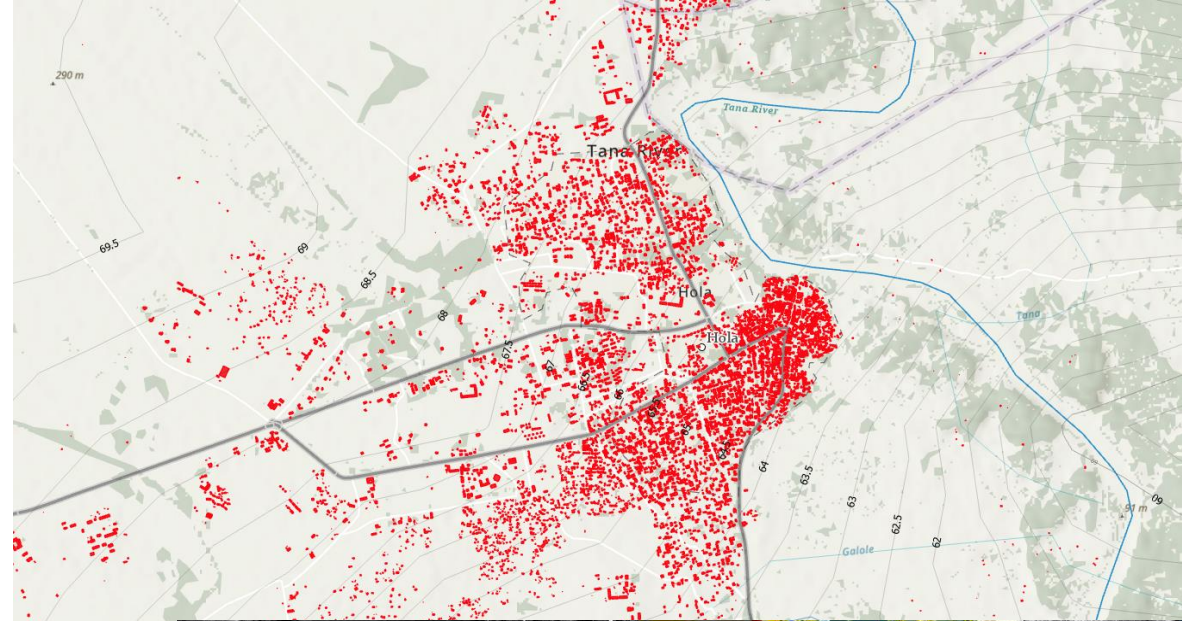
Data – 1. Mapping needs and gap assessment

C	D	E	F	G	H	I	J	K	L	M
Activ_name	Description	Data_avail	Data_Gap	Activ_code	County	Sub_county	Ward	Agency	Scale	Activ_nam2
0 Ecosystem services mapping, assessment and valuation		County, Coral Reef, Maritime boundary, Mangrove habitats,	Ecosystem category, Ecosystem Services, Socio-economic	1.1,6	Kilifi			UNEP	Regional	Ecosystem services mapping, asses
1 Training and Capacity building				3.1.1, 3.1.4	Kwale			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
2 Ecosystem services mapping, assessment and valuation		County, Coral Reef, Maritime boundary, Mangrove habitats,	Ecosystem category, Ecosystem Services, Socio-economic	1.1,6	Lamu			UNEP	Regional	Ecosystem services mapping, asses
3 Assess and identify wastewater hotspots in Mombasa (quality, sources and impact)		Roads, Subcounty, Roads, Rivers, Buildings, landuse, econ	Wastewater hotspot, Waste drainage	3.6,1	Mombasa			UNEP	County	
4 Training and Capacity building				3.1.1, 3.1.4	Taita Taveta			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
5 Training and Capacity building				3.1.1, 3.1.4	Tana River			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
6 Ecosystem services mapping, assessment and valuation		County, Coral Reef, Maritime boundary, Mangrove habitats,	Ecosystem category, Ecosystem Services, Socio-economic	1.1,6	Tana River			UNEP	Regional	Ecosystem services mapping, asses
7 Training and Capacity building				3.1.1, 3.1.4	Lamu			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
8 Carry out waste audit and develop source inventory in at the whole coast, with a fo		Roads, Settlements, Buildings, Rivers, land use, Neighbor	Waste disposal sites, Waste management systems, Landfill	3.5.1, 3.5.3, 3.5.4	Taita Taveta			UNEP	County	Update and upgrade solid waste recy
9 Ecosystem services mapping, assessment and valuation		County, Coral Reef, Maritime boundary, Mangrove habitats,	Ecosystem category, Ecosystem Services, Socio-economic	1.1,6	Kwale			UNEP	Regional	Ecosystem services mapping, asses
10 Training and Capacity building				3.1.1, 3.1.4	Kilifi			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
11 Study feasibility to apply these techniques and technologies at pilot site in Momba				3.6,2	Mombasa			UNEP	County	
12 Ecosystem services mapping, assessment and valuation		County, Coral Reef, Maritime boundary, Mangrove habitats,	Ecosystem category, Ecosystem Services, Socio-economic	1.1,6	Mombasa			UNEP	Regional	Ecosystem services mapping, asses
13 Training and Capacity building				3.1.1, 3.1.4	Mombasa			UNEP & UNHABITAT	Regional	Strengthening inter-governmental (co
14 Build 1 GIS data center at JKP level and 6 GIS data nodes at County level	GIS Nodes	Administrative, Natural environment, Land cover, Population	Detailed Land use, infrastructure	1.1,4	Kilifi			UNHABITAT	County	
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19 Build 1 GIS data center at JKP level and 6 GIS data nodes at County level	GIS Nodes	Administrative, Natural environment, Land cover, Population	Detailed Land use, infrastructure	1.1,4	Tana River			UNHABITAT	County	
20 Integrate the Spatial Development Framework (SDF) and Ecosystem Management				2.1,1	Taita Taveta			UNEP & UNHABITAT	Regional	
21 Organise EGMs to customize framework	Organise EGMs to customize framework (urban planne			2.1,2, 2.1,3	Kilifi			UNEP	County	Organise stakeholder training worksh
22 Organise EGMs to customize framework	Organise EGMs to customize framework (urban planne			2.1,2, 2.1,3	Kwale			UNEP	County	Organise stakeholder training worksh
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26 Organise EGMs to customize framework	Organise EGMs to customize framework (urban planne			2.1,2, 2.1,3	Tana River			UNEP	County	Organise stakeholder training worksh
27 Neighbourhood Plan	Public space neighborhood assessment.	Transport, Vegetation, Roads, Soil, Topography	Specific site, Land use, Cadastre, Detailed Building, Econom	2.4,3	Kilifi			UNHABITAT	Neighborhood	
28 Integrated coastal management plan for a selected area in Kilifi			Specific Site	2.4,3	Kilifi			UNHABITAT	City	
29 ISUD (LPLDP) Plan for Hola Municipality		Roads, Rivers, Protected area, Land cover, Soil, Farm land	Socio-economic data, Buildings, Forests, Detailed satellite im	2.4,2	Tana River	Garsen, Galole	Kinakomba, Mikinduni, C	UNHABITAT	City	
30 Study feasibility of blue carbon project (carbon stock and ecosystem service asse		Mangrove, Settlement, Land Cover, Vegetation	Carbon stock, ecosystem service, seagrass	3.4.1, 3.4.2, 3.4.3	Kilifi			UNEP	County	Support the communities to access t
31 Study feasibility of blue carbon project (carbon stock and ecosystem service asse		Mangrove, Settlement, Land Cover, Vegetation	Carbon stock, ecosystem service, seagrass	3.4.1, 3.4.2, 3.4.3	Kwale			UNEP	County	Support the communities to access t
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34 Study feasibility of blue carbon project (carbon stock and ecosystem service asse		Mangrove, Settlement, Land Cover, Vegetation	Carbon stock, ecosystem service, seagrass	3.4.1, 3.4.2, 3.4.3	Tana River			UNEP	County	Support the communities to access t
35 Develop a solid waste management strategy in at least one town in Taita Taveta (V		Road network,	Specific sites, Land use, Waste collection points, Infrast	3.5,2	Taita Taveta	Voi, Wundanyi,		UNEP	City	
36 Apply technique and technology in Shimo La Teva, Mombasa	Apply technique and technology to at least one site in	Roads, buildings	Detailed plans, socioeconomic data	3.6,2	Mombasa	Kisauni		UNEP	City	
37 Outcome 4: Enhanced dissemination of good practices, innovations and benefits f	Support the design of a JKP online knowledge sharing			4.1.1, 4.1.2, 4.1.3, 4.1.4,4.2.1,4.3.1,4.3.2,4.3.3	All			UNEP & UNHABITAT	Regional	Strengthening coastal counties' capa
38 Study the feasibility of conservation effectiveness (MPAs)	Cost-benefit analysis for establishing MPAs; Support	Protected areas, conservation areas, Land use, Land cover,	Ecological system, mangrove, forests, population, economic	3.2.1,3.2.2,3.2.3,3.2.4,3.2.5	Kwale			UNEP	County	Develop MPA management plan, imp
39 Provide and customise and offer training materials and courses for the managem				3.3.1, 3.3,2	Kwale			UNEP	County	Offer alternative livelihood opportuni
40 Design, develop and enhance the functionality of an urban coastal public space (e		Fish landing sites, Public beach front	Cultural heritage sites, Buildings, Hotels,	3.1,2	Kilifi			UNHABITAT	County	
41 Design, develop and enhance the functionality of an urban coastal public space (e		Fish landing sites, Public beach front	Cultural heritage sites, Buildings, Hotels,	3.1,2	Mombasa			UNHABITAT	County	
42 Build a GIS and data system	GIS Shapefiles, Socio-economic, coastal ecosystem	Administrative boundaries, Road infrastructure, Natural feat	Buildings, Land use, Parcel, Office infrastructure	1.1.3, 1.1,1	Kilifi			UNEP & UNHABITAT	County	Data availability mapping and gap ar
43 Build a GIS and data system	GIS Shapefiles, Socio-economic, coastal ecosystem	Administrative boundaries, Road infrastructure, Natural feat	Buildings, Land use, Parcel, Office infrastructure	1.1.3, 1.1,1	Kwale			UNEP & UNHABITAT	County	Data availability mapping and gap ar
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45 Build a GIS and data system	GIS Shapefiles, Socio-economic, coastal ecosystem	Administrative boundaries, Road infrastructure, Natural feat	Buildings, Land use, Parcel, Office infrastructure	1.1.3, 1.1,1	Mombasa			UNEP & UNHABITAT	County	Data availability mapping and gap ar
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2. Data collection

- ✓ Open source data acquisition
- ✓ Data Extraction using AI and Machine learning (Eg. Google Earth Engine, ArcGIS Pro)
- ✓ Secondary data compilation
- ✓ Data gaps analysis
- ✓ Socio-economic surveys



3. Data Storage

DASHBOARD

Spatial Representation of GIS Data and Project Sites within the 6 JKP counties (ArcGIS Software)

- ✓ Data needs mapping
- ✓ Available GIS Datasets
- ✓ Status of the project
- ✓ Responsible agency
- ✓ Integrated view with links to partners and relevant documents
- ✓ Consolidate a solid Data Base System to share with the JKP Counties for the Data Centers

GoBlue Activities and Data Availability
Connecting People, Cities and the Ocean: Innovative Land-Sea Planning and Management for a Sustainable and Resilient Kenyan Coast.

Activities

- Integrated coastal management plan for a selected area in Kilifi **Kilifi County**
- Apply technique and technology in Shimo La Tewa, Mombasa **Mombasa County**

Responsible Agency

Agency	Count
UNEP	40
UNEP & UNHABITAT	30
UNHABITAT	10

Activity Implementation Status

0%

Data Availability

- Roads, buildings
- Roads, Subcounty, Roads, Rivers, Buildings, landuse, economic hubs
- Administrative, Natural

Data Gaps

- Ecosystem category, Ecosystem Services, Socio-economic survey
- Detailed Land use,

Data availability: Non-spatial data

Marine Spatial & Environmental Action Plan

- Tana River Environmental Action Plan

Sea Land

GoBlue Activities and Data Availability
Connecting People, Cities and the Ocean: Innovative Land-Sea Planning

Integrated coastal management plan for a selected area in Kilifi **Kilifi County**

Responsible Agency

Agency	Count
UNEP	40
UNEP & UNHABITAT	30
UNHABITAT	10

Activity Implementation Status

0%

GoBlueProject Counties v1: Technical support to national Marine Spatial Planning conceptual framework

Activ_name	Technical support to national Marine Spatial Planning conceptual framework
Agency	UNEP
County	Tana River
Data_avail	
Data_Gap	

Data Availability

- Roads, buildings
- Roads, Subcounty, Roads, Rivers, Buildings, landuse, economic hubs
- Administrative, Natural environment, Land cover, Population, Transport
- Administrative, Natural environment, Land cover, Population, Transport

Data Gaps

- Ecosystem category, Ecosystem Services, Socio-economic survey
- Detailed Land use, infrastructure
- Specific site, Land use, Cadastre, Detailed Building, Economic hub

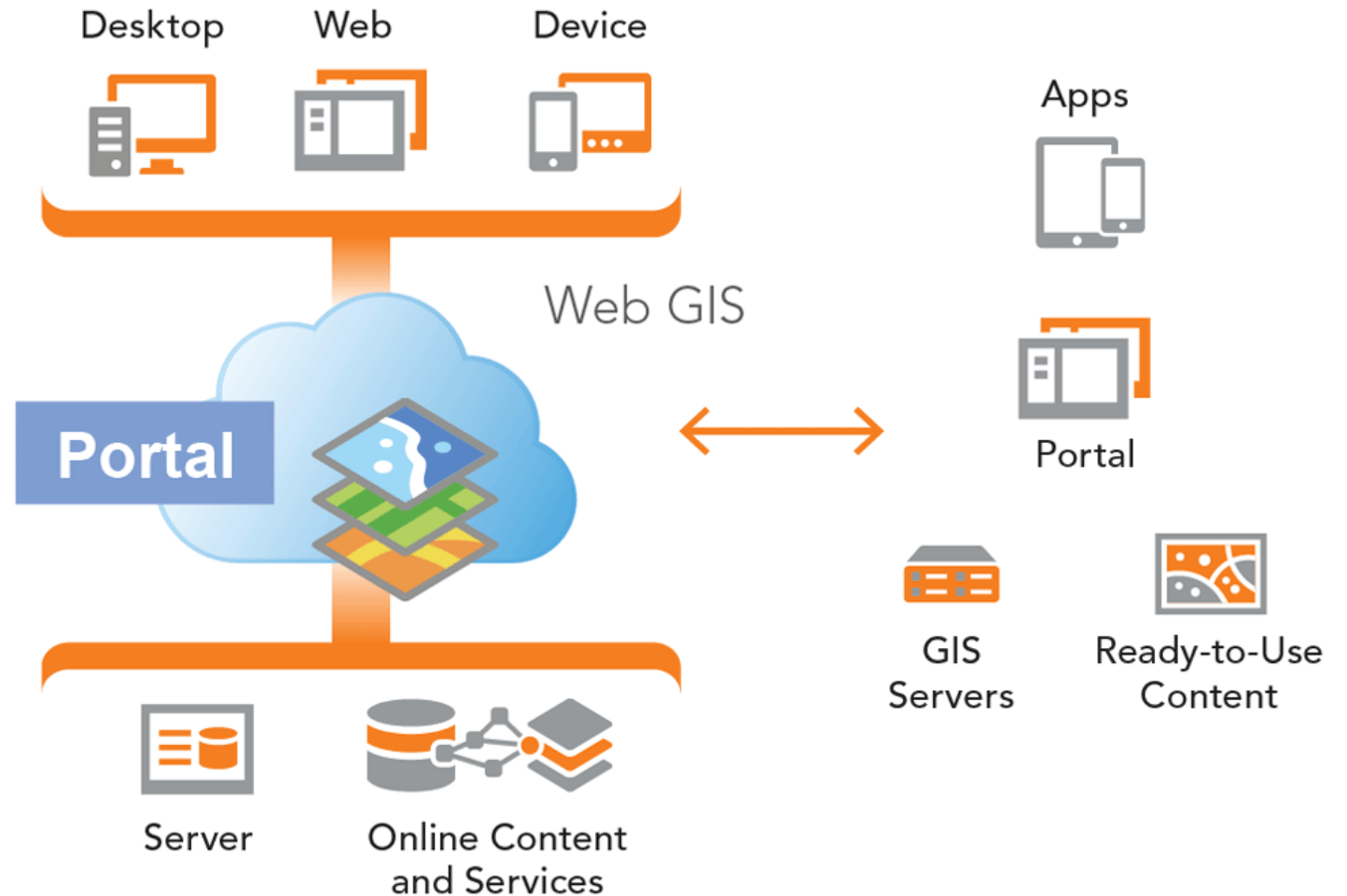
Data availability: Non-spatial data

Marine Spatial & Environmental Action Plan

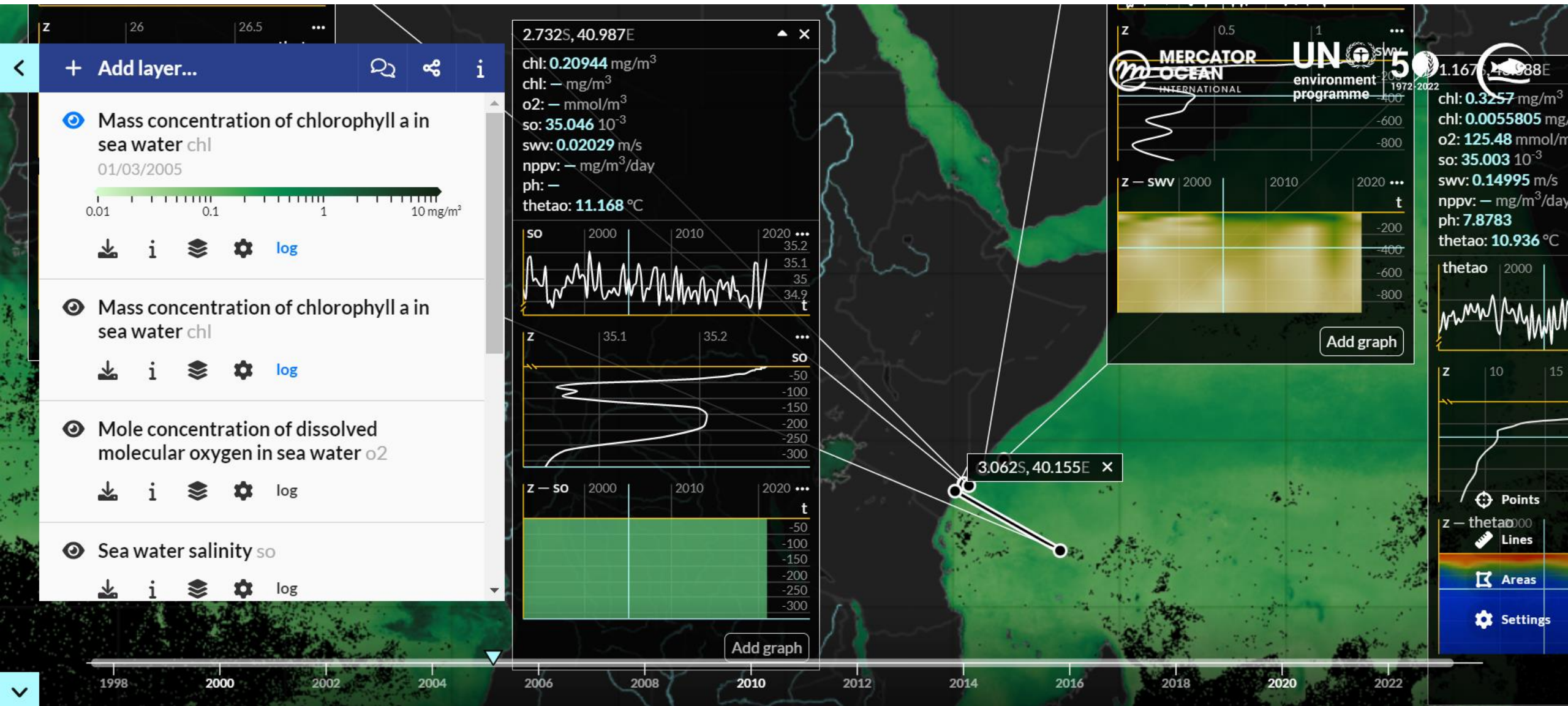
- Tana River Environmental Action Plan 2009 - 2013
- Tana River Delta Strategic Environmental Assessment 2014

Build GIS and data systems

- 1 GIS data center at JKP level and 6 GIS data nodes at County level.
- Plotter and network system.
- RCRMD – station set-up, networking and regular maintenance.
- Organize training course on data/information & planning.



Collaboration with [GEMS Ocean](https://unep-viewer.mercator-ocean.eu/) for the marine data – satellite and InSitu observation



<https://unep-viewer.mercator-ocean.eu/-/lzmatfmr6w>

Ecosystem services mapping, assessment and valuation

- UN System of Environmental Economic Accounting Ecosystem Accounting ([SEEA EA](#))
- Built on five core accounts:
- Implementing partner - UoN

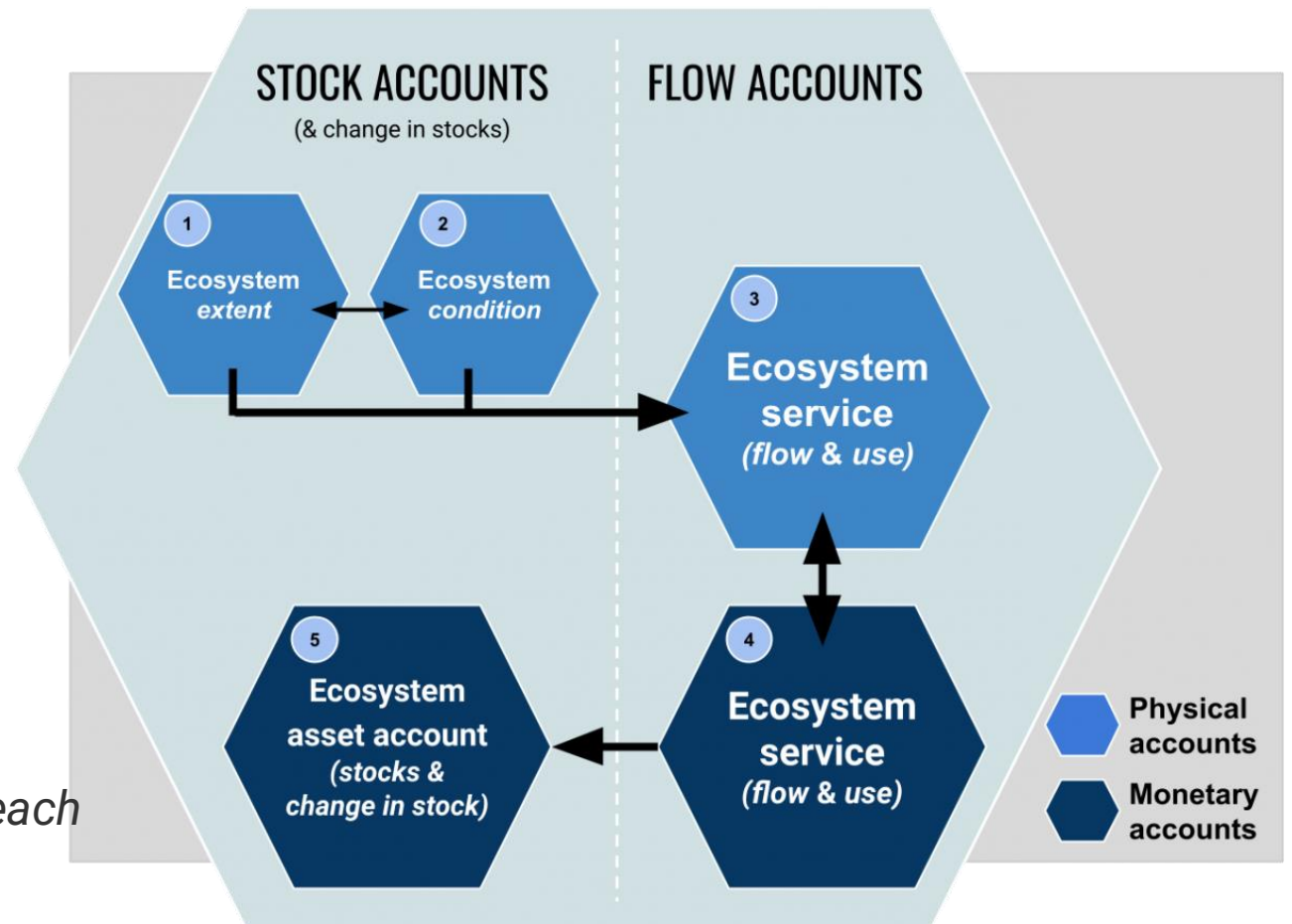
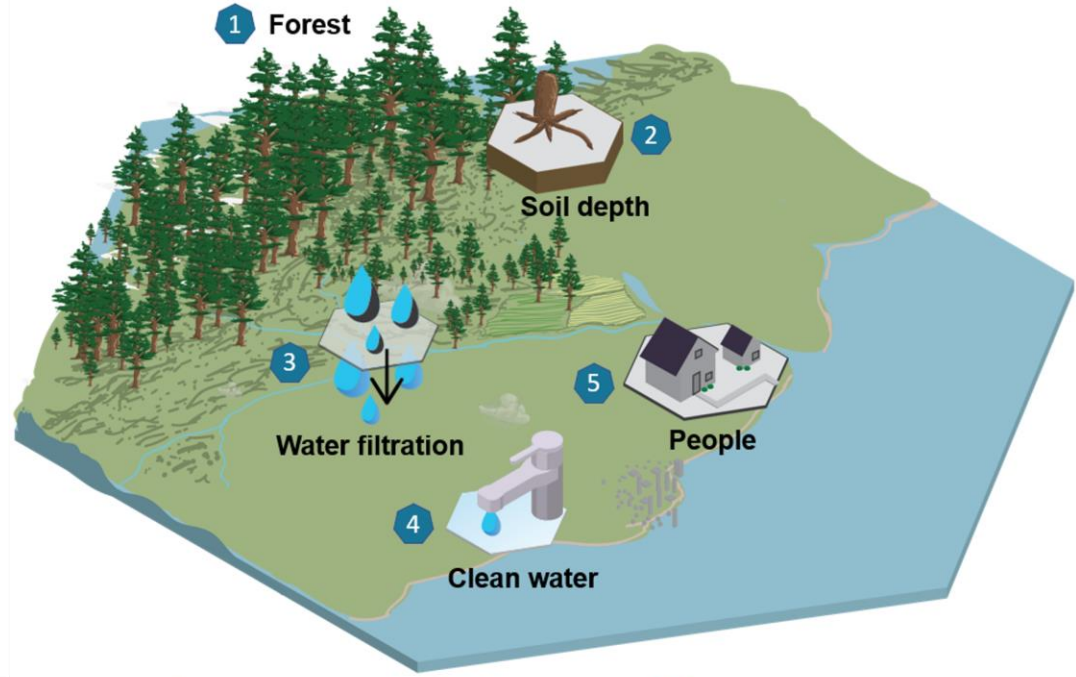


Figure: Ecosystem accounts and how they relate to each other

Example of how ecosystem assets generate ecosystem services to beneficiaries in a spatial relationship



- 1 Asset



Forest
- 2 Condition



Soil depth
- 3 Service



Water filtration
- 4 Benefit



Clean water
- 5 Beneficiaries



People

The model starts with identifying an ecosystem asset, in this case, a forest, that can be measured by its extent (e.g. hectares).

This forest asset can be further described in terms of its condition, through indicators that reflect its overall quality (e.g. soil depth).

The biomass in this forest collects and filters rainfall before it reaches streams and rivers, providing the important ecosystem service of water filtration.

The benefits generated by the filtration service take the form of cleaner water and reduced water treatment costs.

These benefits accrue to the actors in the economy, including businesses and households that produce elements of well-being that can be measured using quantitative economic techniques.

Climate Change Vulnerability Assessment

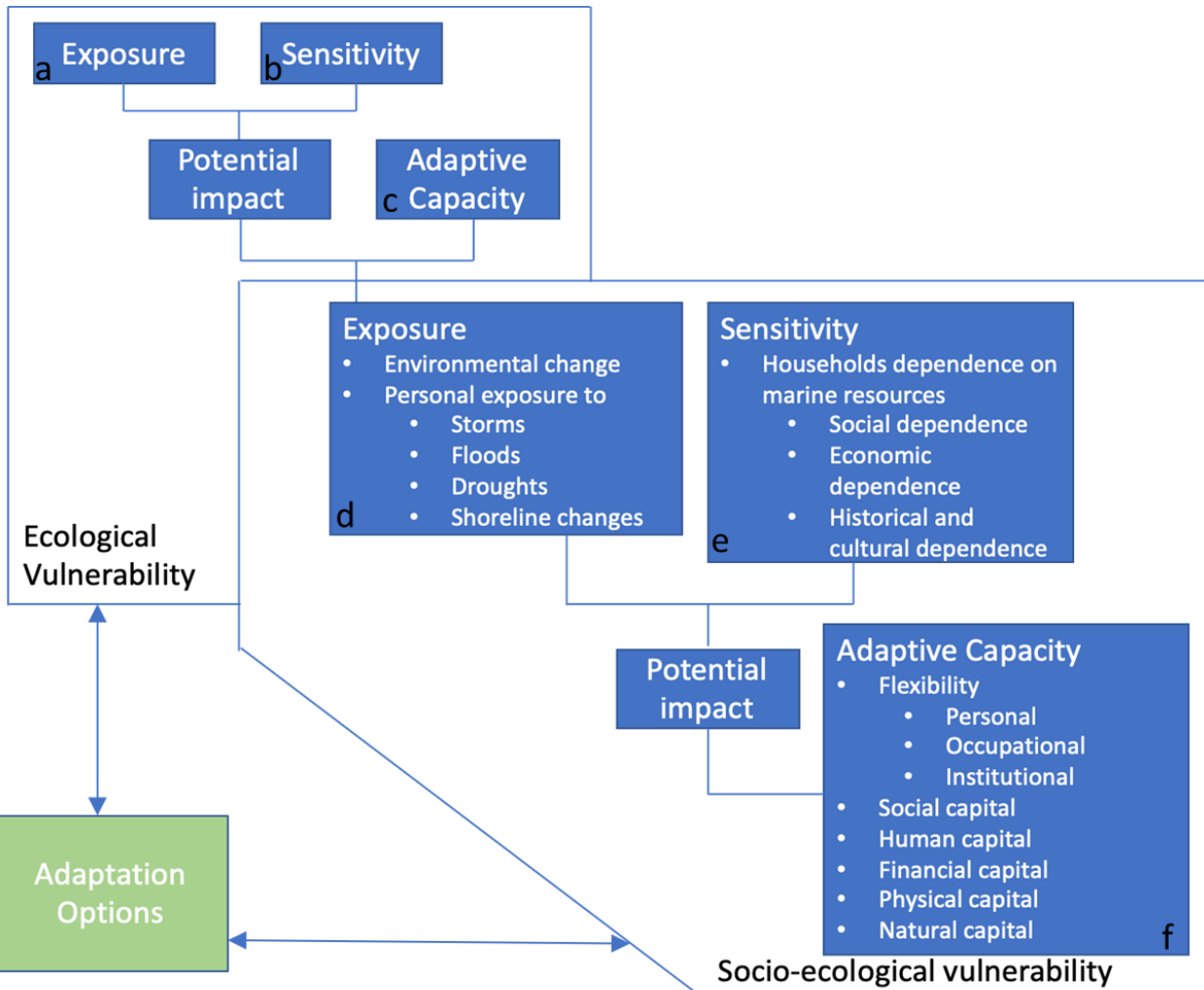
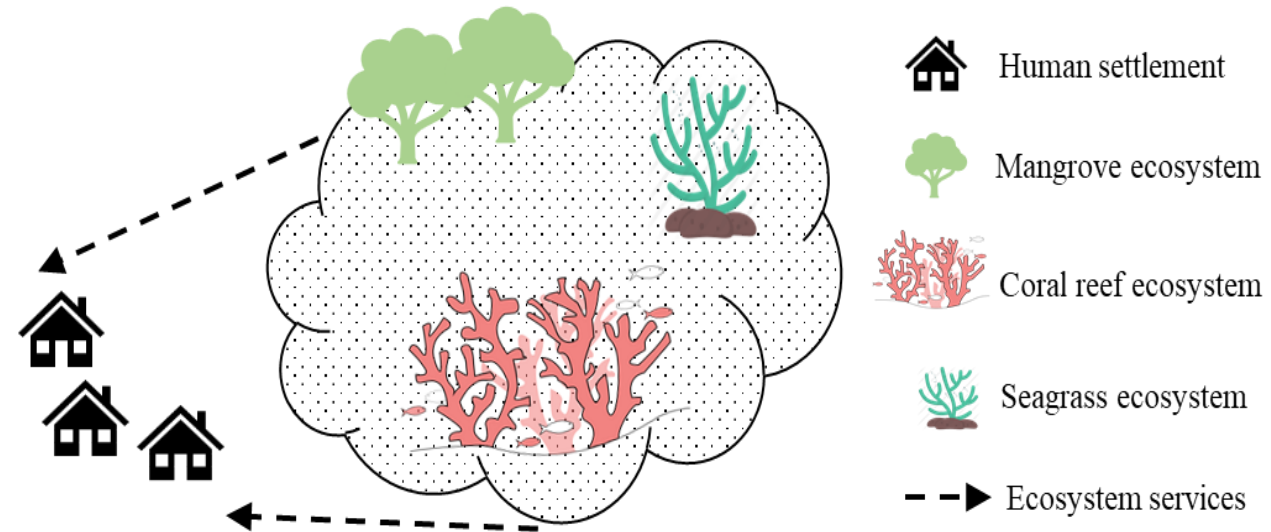
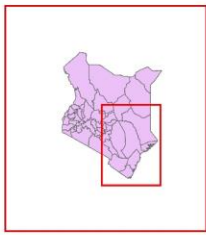


Illustration of range of CCVA Targets subject to detailed investigation









GO BLUE PROJECT

Result Area 2



Legend

 Kilifi	 Mombasa
 Kwale	 Taita Taveta
 Lamu	 Tana River

1. Hola Municipality Plan
2. Report on Land-Sea Nexus for CSP
3. Climate Change Vulnerability Assessment
4. Ecosystems mapping & Valuation

1. Lamu Waterfront Public Space
2. Mangrove Blue Carbon
3. Data Station with socio-economic data
4. Ecosystems Mapping & Valuation

1. Solid Waste Audit
2. Solid Waste Strategy
3. Material Recovery Facility
4. Data Station with socio-economic data
5. Ecosystems mapping & valuation

1. Mazingira Public Park
2. Kilifi Neighbourhood Regeneration Plan
3. Data Station with socio-economic data
4. Ecosystems mapping and valuation

1. Marine Protected Area (MPA)
2. Locally Managed Marine Area (LMMA)
3. Data Station with socio-economic data
4. Ecosystems mapping and valuation

1. Mikindani Constructed Wetland
2. Tudor Urban Water Sports
3. Data Station with socio-economic data
4. Climate Change Vulnerability Assessment
5. Ecosystems mapping and valuation

ZERO WASTE



Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Author: Jeremiah OUGO

GO
Blue

Thank you!

UN 
environment
programme


UN-HABITAT