

Coral reef and coastal vulnerability to climate change in East Africa

GEO BLUE PLANET: OCEAN OBSERVATION AND PREDICTION FOR COASTAL SUSTAINABILITY IN AFRICA

Date: 06 June 2023 Time: 2 pm to 5pm EAT

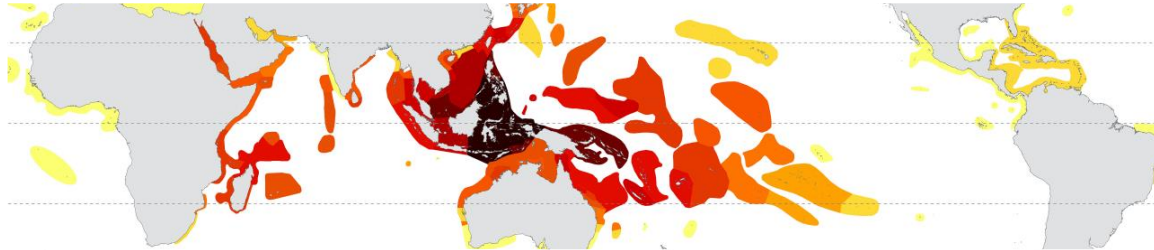
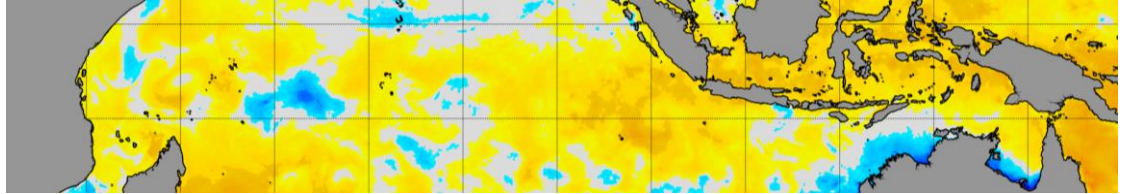
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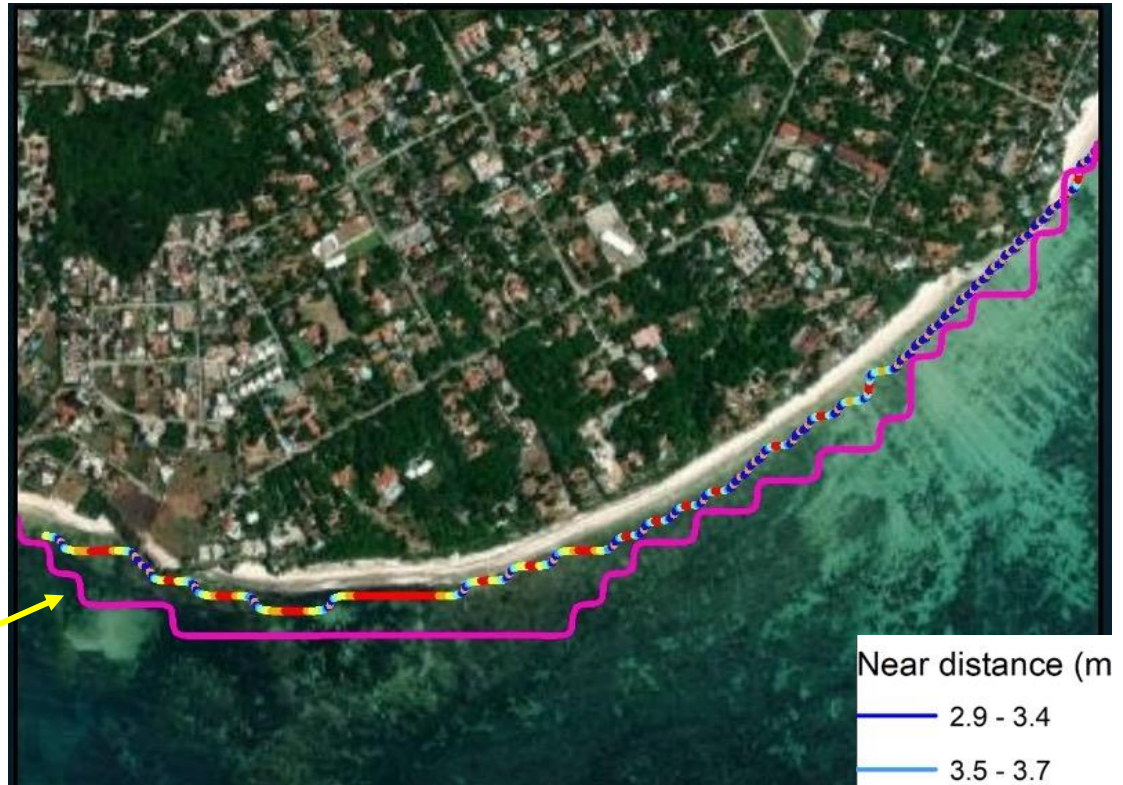
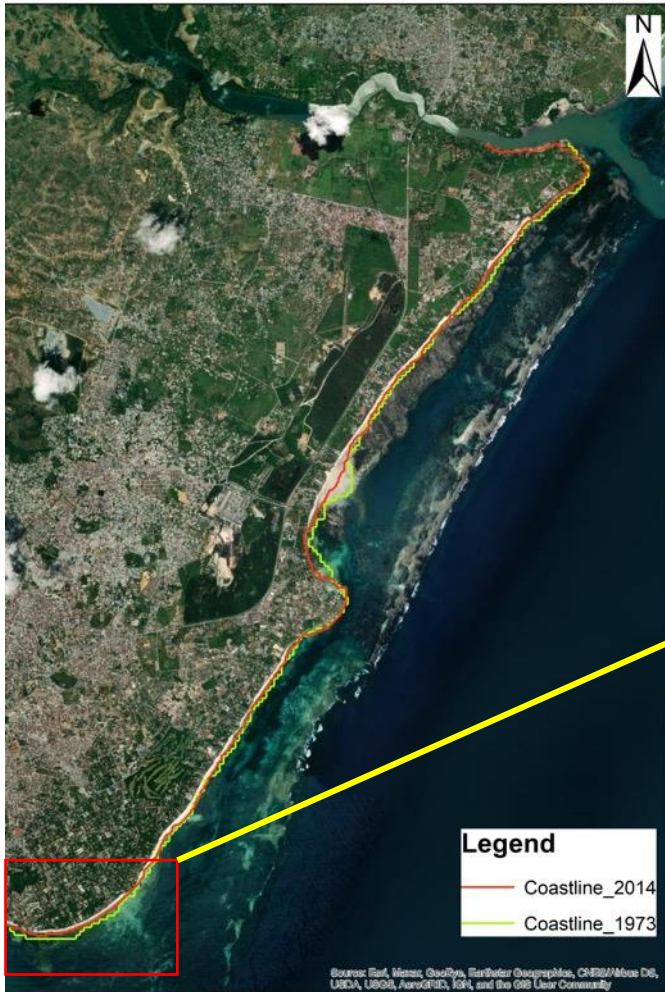


Outline

- Sea level rise and coastal vulnerability
- Coral reefs and climate vulnerability
- Using data, decision support
- Societal relevance of environmental data – SDGs

Coastal vulnerability and sea level rise

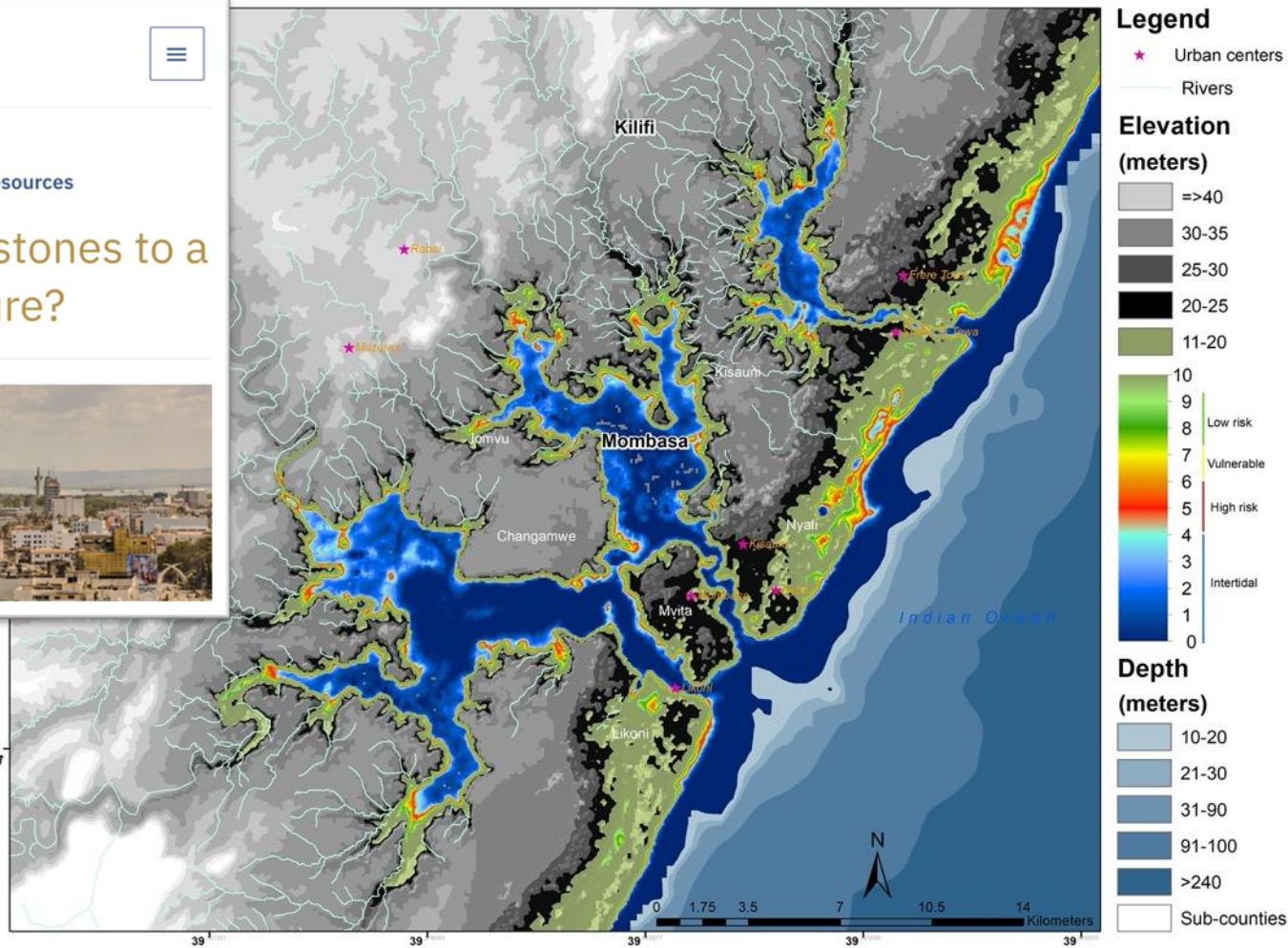
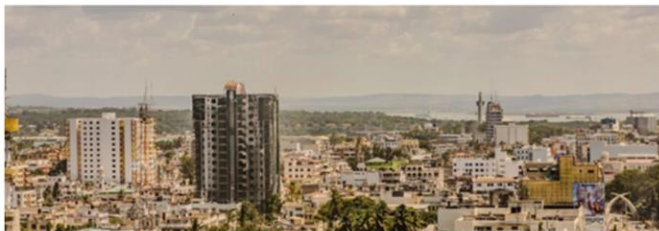
Risk Shore line change (e.g., 1973-2014)



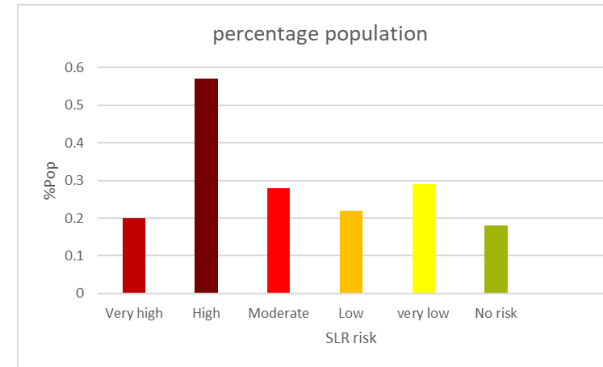
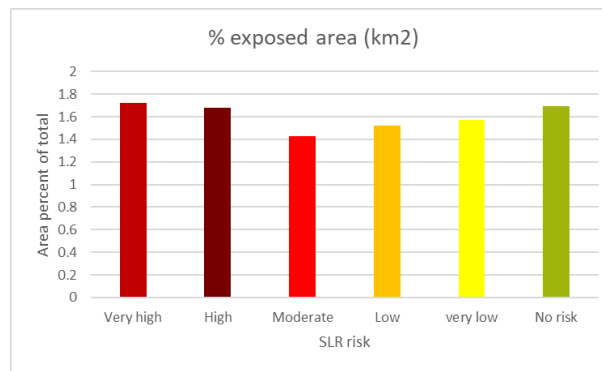
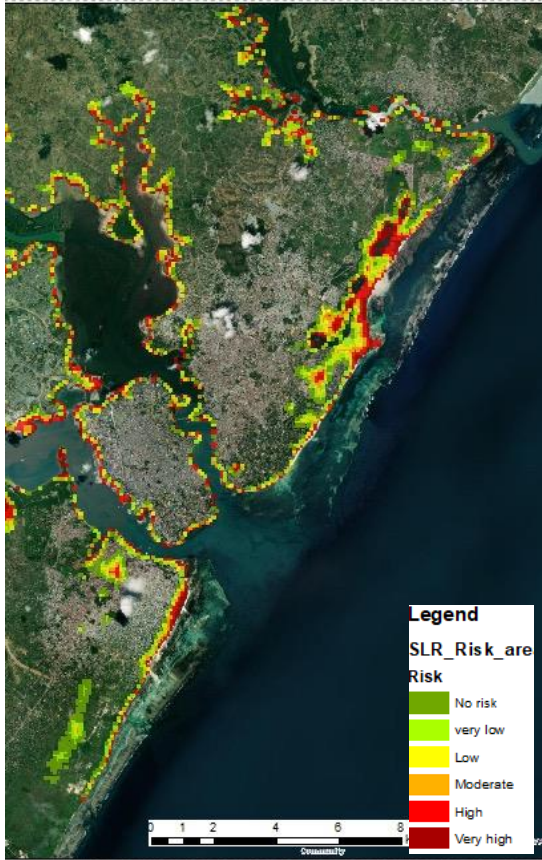


Policy Insights | Climate Change, Natural Resources

Mombasa: Stepping stones to a climate-resilient future?

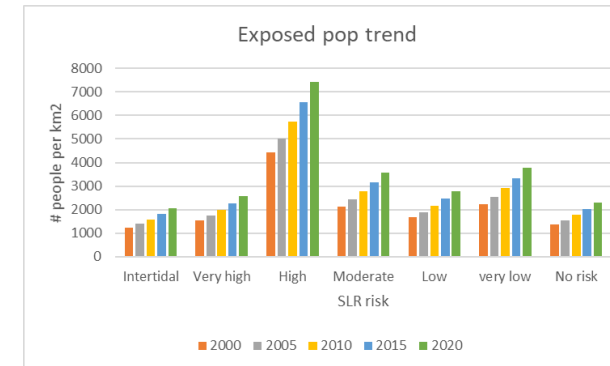


Sea level rise - Risk areas

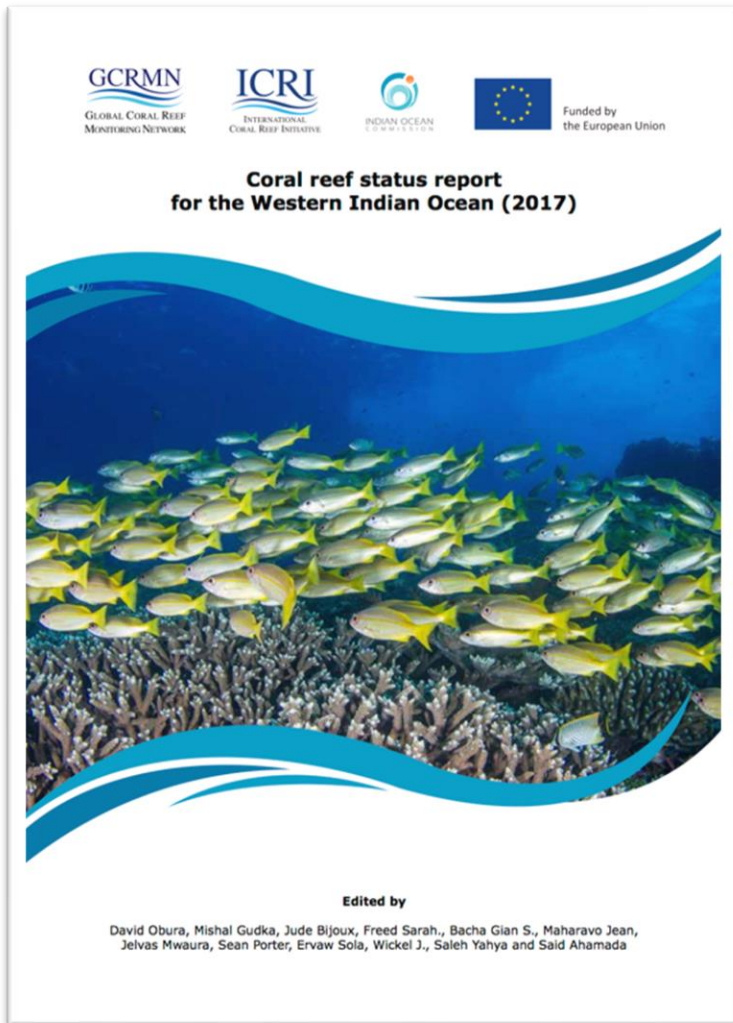


Exposure/risk mapping-Products

- Coastal flooding-exposed area
- Exposed population-(temporal 2005-2020)



Coral reefs and climate vulnerability

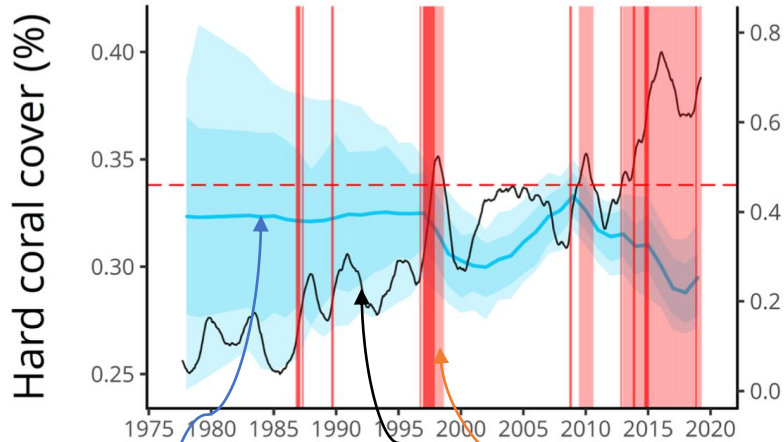


Regional and global reporting

Global coral bleaching events

1998

2010 2016

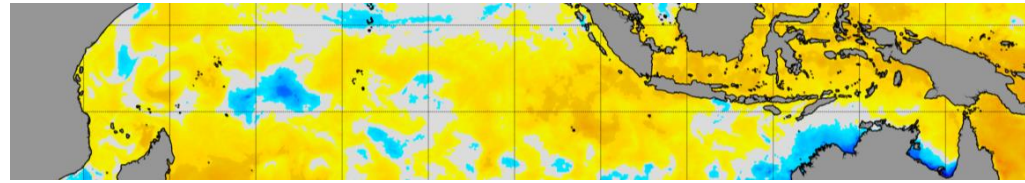


Coral cover

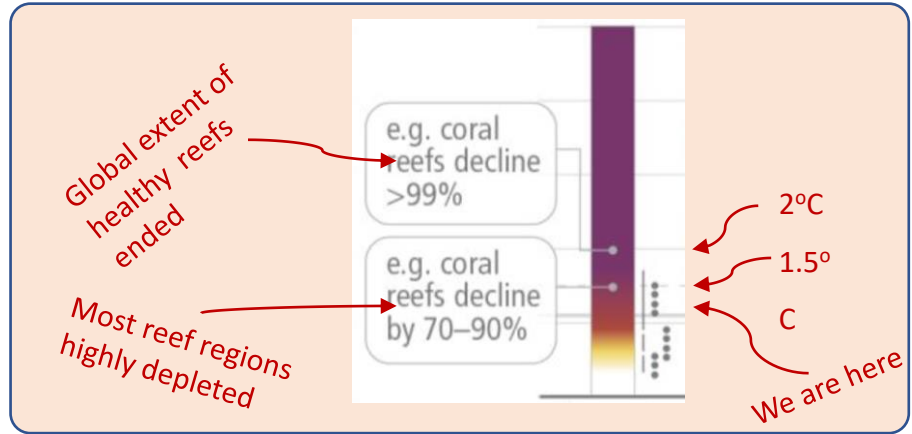
Sea Surface Temperature

Marine heatwaves

SST anomaly

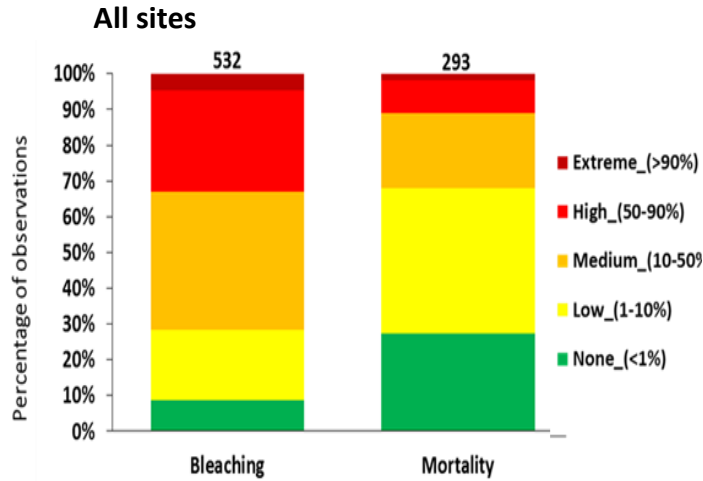


- Very strong association between global hard coral cover and mean global SST anomaly
 - Rapid increases in the global SST anomaly (dark red)
 - Periods of sustained SST anomalies (light red)

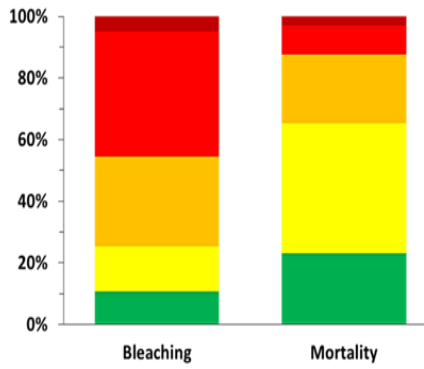


Bleaching observations in 2016

Citizen science



103 re-surveyed sites



Total Observation: 885

Reporting country(s)

Mayotte	145
Reunion	132
Tanzania	120
Mauritius	119
Kenya	114
Seychelles	82
Madagascar	76
Iles eparses	55
Comoros	24
Mozambique	12
Maldives	6
0 Reports since 2016	200

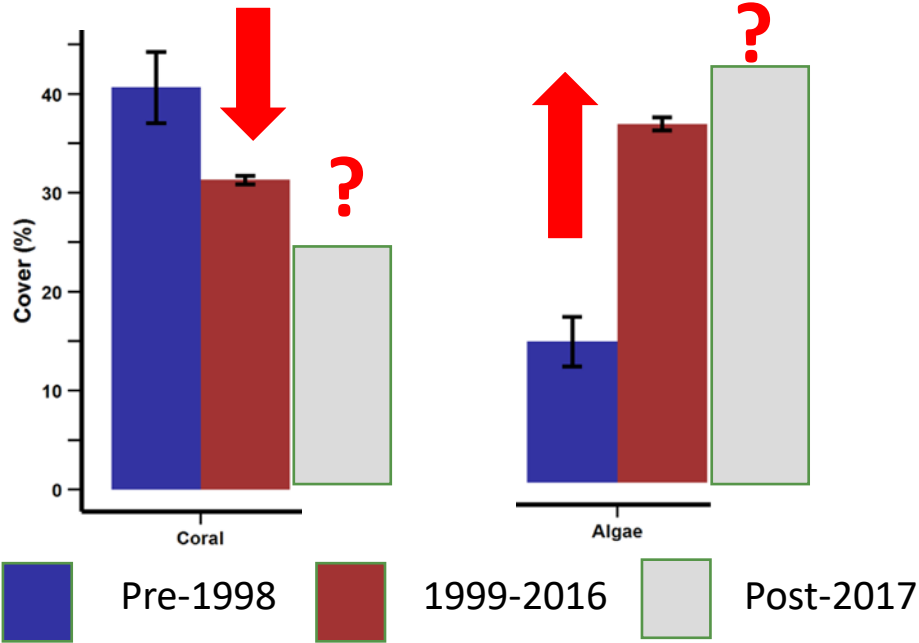
Coral Bleaching Severity

Coral Mortality

Charts show the seasonal (Jan-July) breakdown of coral bleaching and mortality observation grouped by year. Each bar shows the month and the categories represent the severity of bleaching/mortality reported as a percentage of coral cover.

Key findings

Benthos

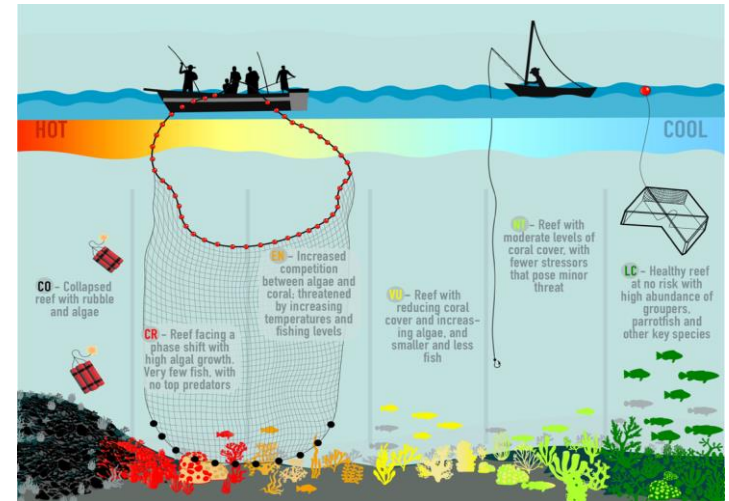
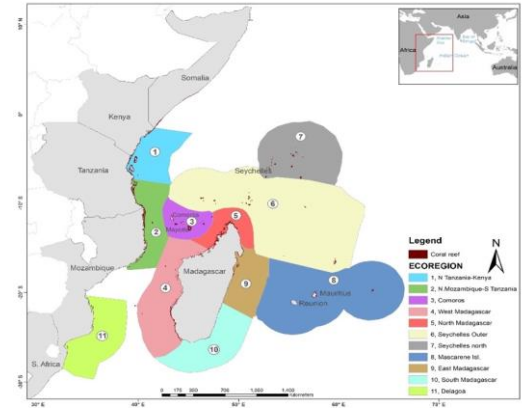
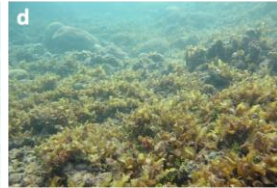
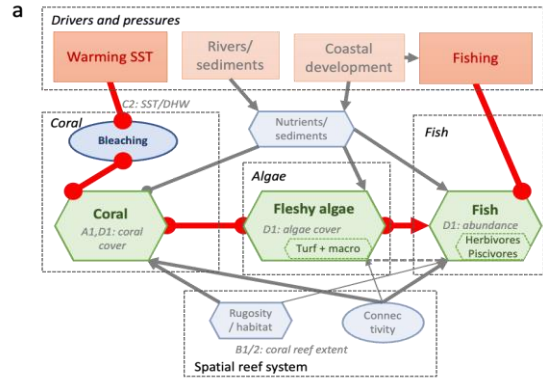


Does this mean lower resilience of corals and/or shift to algal-herbivory system?

Using data – decision-support

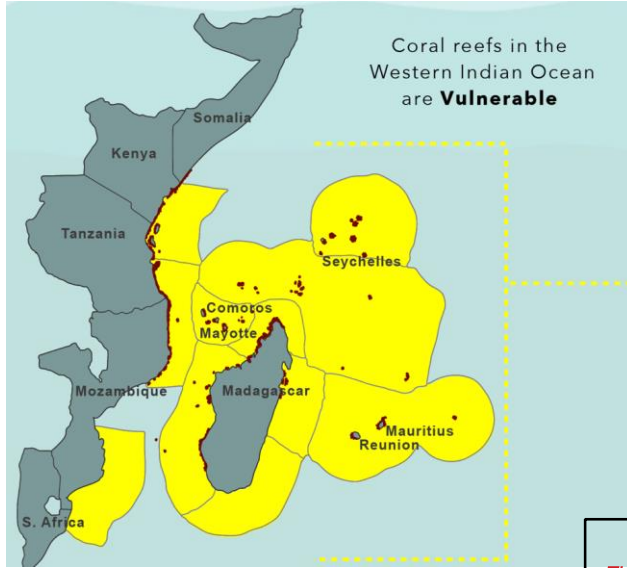
Vulnerability to collapse of coral reef regions.

The Red List of Ecosystems, applied to the Western Indian Ocean

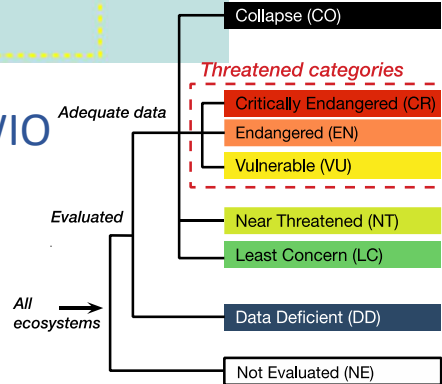


Results

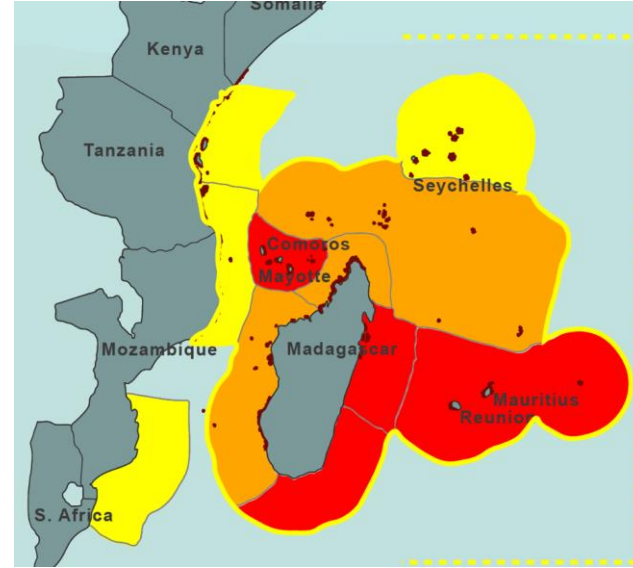
Whole region



Coral reefs of the WIO are **VU** to collapse!



Ecoregional level



All ecoregions are in threatened categories

- **VU** – 4 ecoregions → fishing
- **EN** – 3 ecoregions
- **CR** – 4 ecoregion } warming

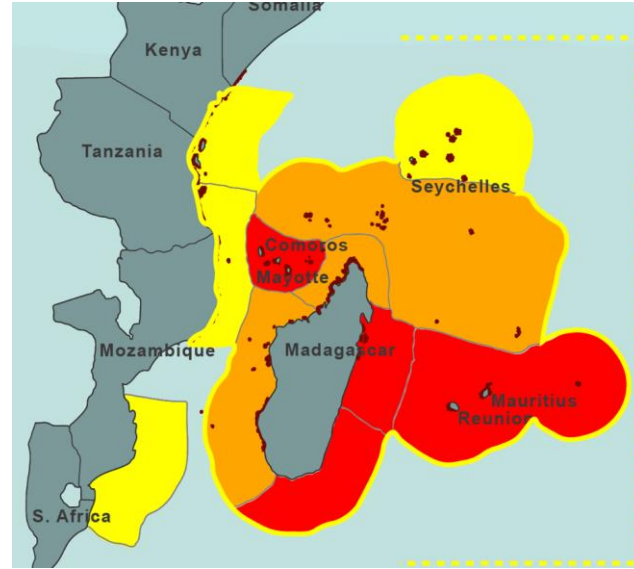
Western Indian Ocean – RLE results in a nutshell

Recommendations

- Management recommendations include full portfolio from climate mitigation/ adaptation to fisheries/ ecosystem-based management

Next steps

- National policy processes – Kenya, Tanzania, Mozambique – through ‘National Coral Reef Assessments’
- Extend RLE coral reefs to other GCRMN regions for global coverage within 3-4 years
- Extend RLE assessment to mangrove and seagrass systems for integrated approach



Convention on Biological Diversity

- Global Biodiversity Framework
Headline indicators A1

Societal relevance of environmental data

The SDGs as a narrative or model

What is the role of a coral reef in sustainable development?



*Governance,
knowledge,
cooperation*

*Societal benefits,
welfare, good
quality of life*

*Ecosystem goods
and services, contri-
butions to people*

*Nature,
biodiversity, the
environment*

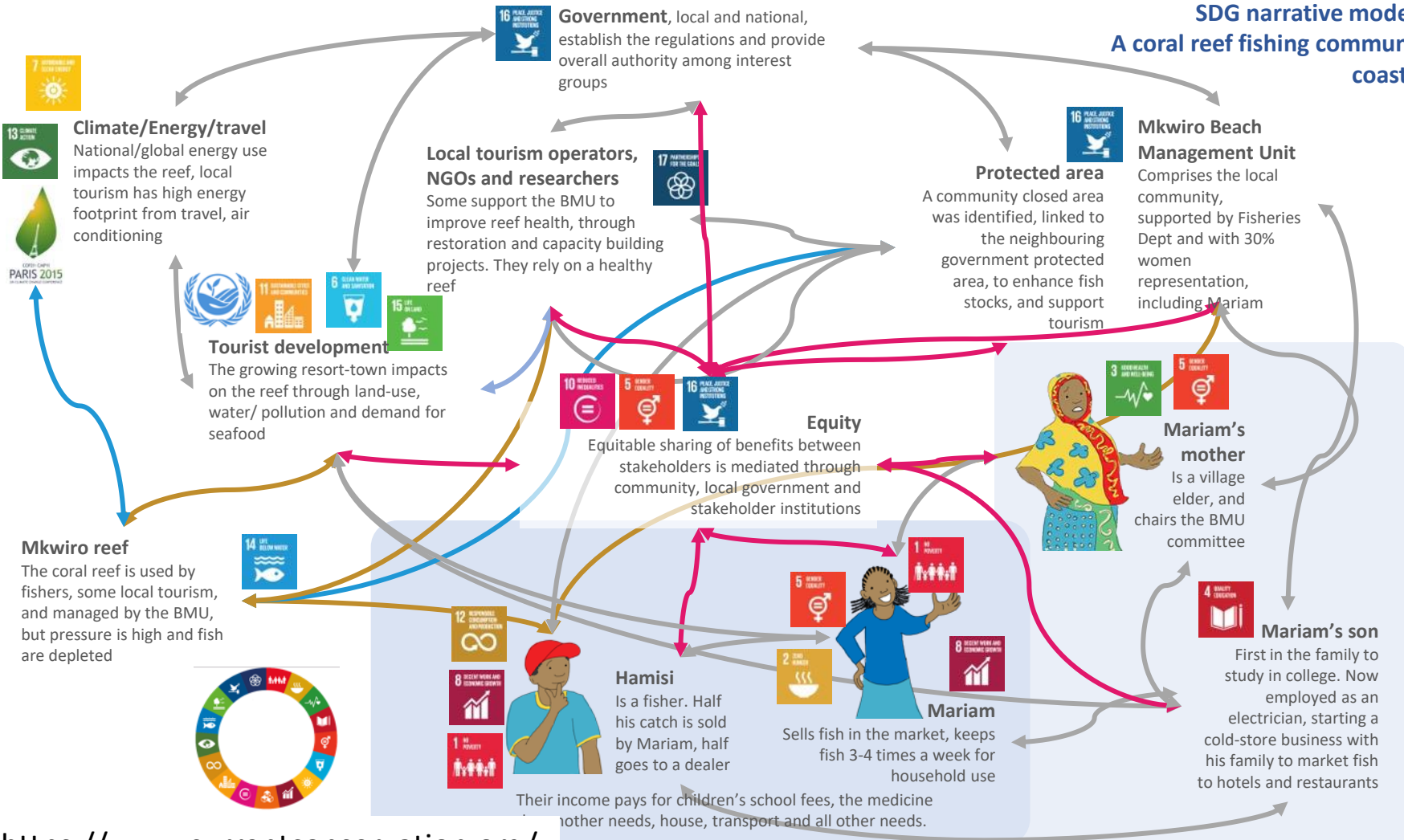
4) ... the whole requiring knowledge, good governance and engagement of all in society

3) ...that support **INDIRECT** benefits of human well-being and societal welfare

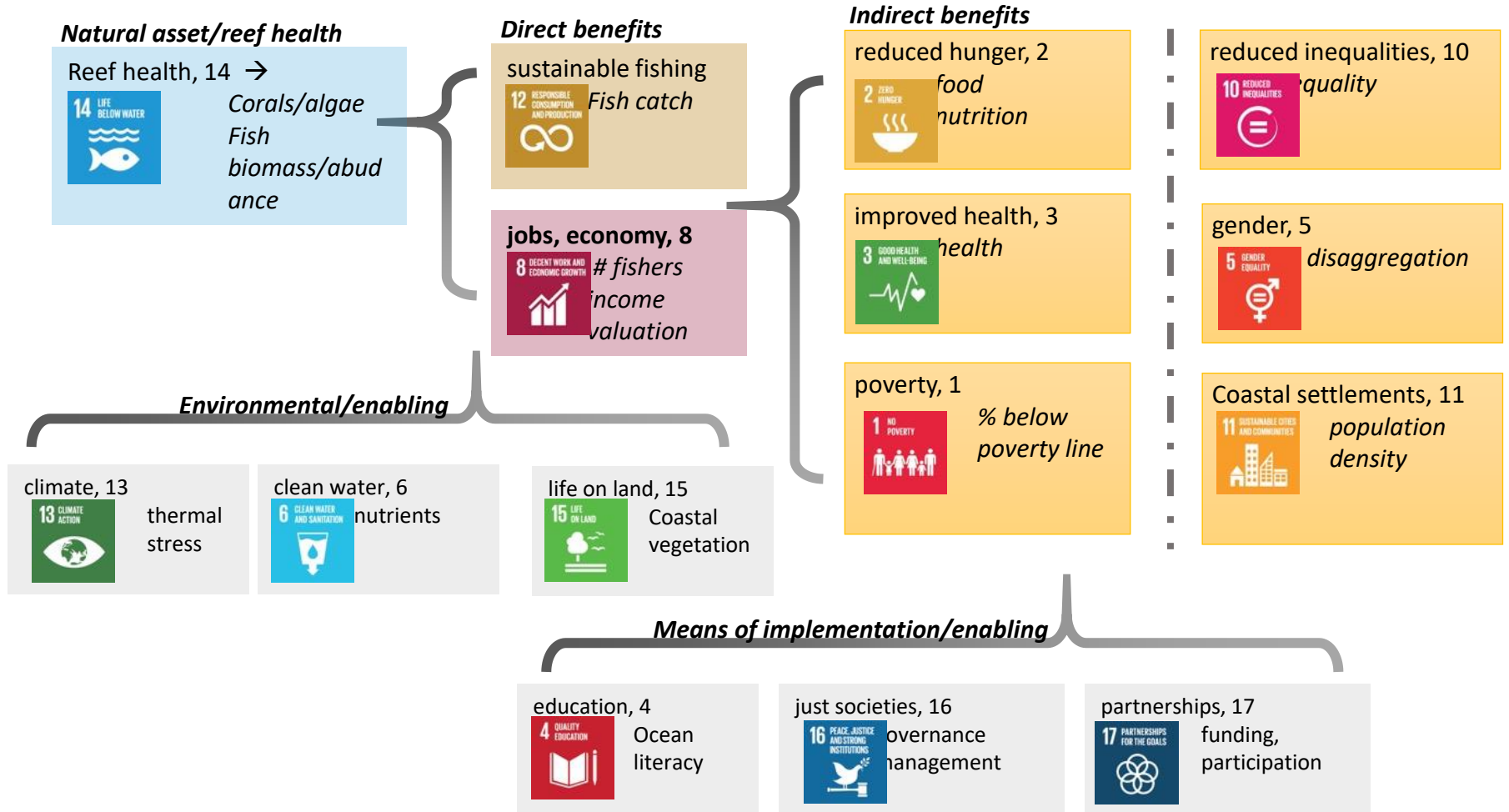
2) ... generates **DIRECT** benefits through ecosystem services and other material flows

1) The ocean, interacting with the land and freshwater, and affected by climate change

SDG narrative model example A coral reef fishing community on the coast of Kenya



Monitoring a system holistically ... coral reef fisheries



A **sustainable use** perspective enables a focus on tangible materials from nature (consumed and non-consumed), and benefits to people (direct and indirect) – sustaining the former and optimizing and sharing the latter

An **SDG model** allows addressing all stakeholder interests under the condition they don't harm any other SDG. Each stakeholder can 'enter the circle' from their own perspective (global -> national -> local)

