

Kenya in the Western Indo-Pacific Realm its coral reefs in space and time

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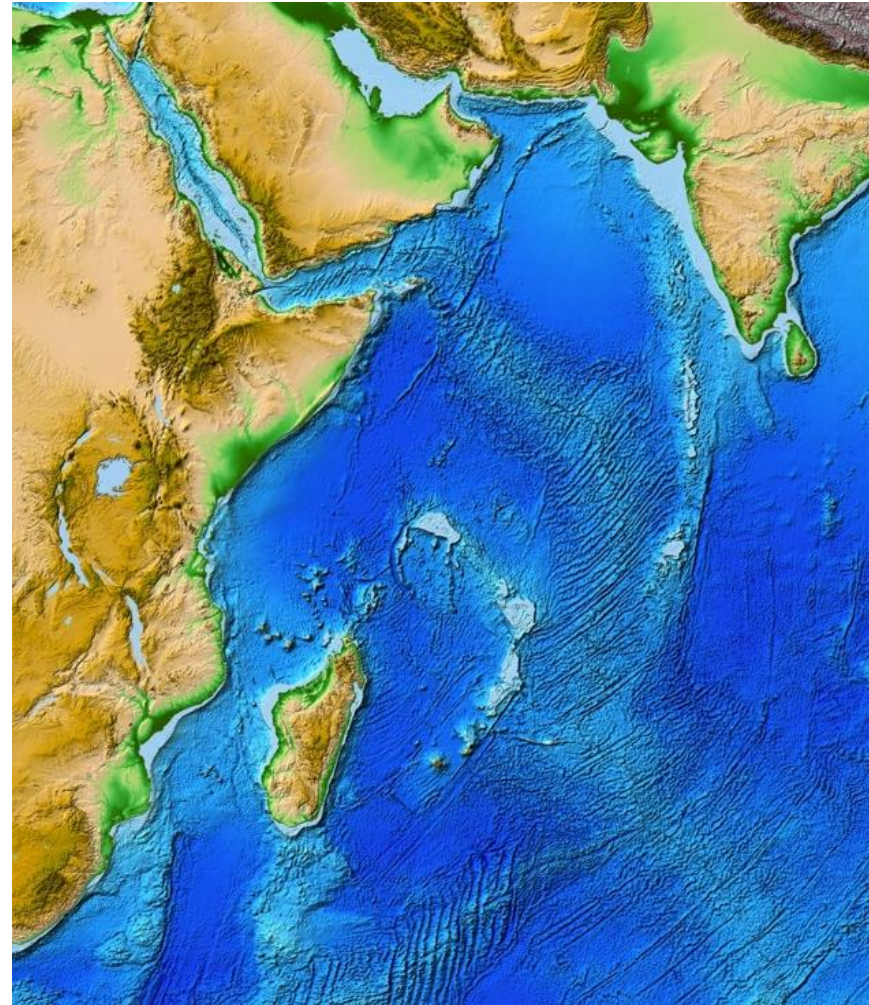


Talk outline:

1) Kenya's position in the diversity and evolutionary origins of Western Indian Ocean corals

1) Current status of Kenya's coral reefs

2) Future prospects – are we preparing for the future?

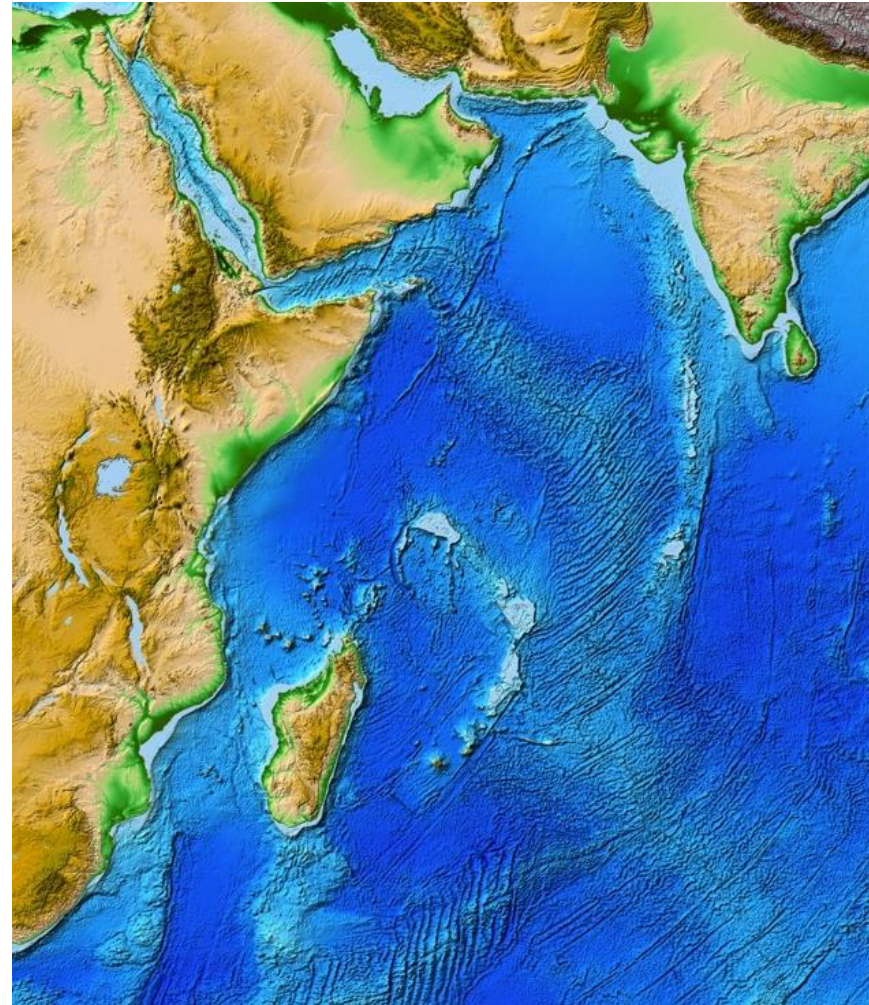


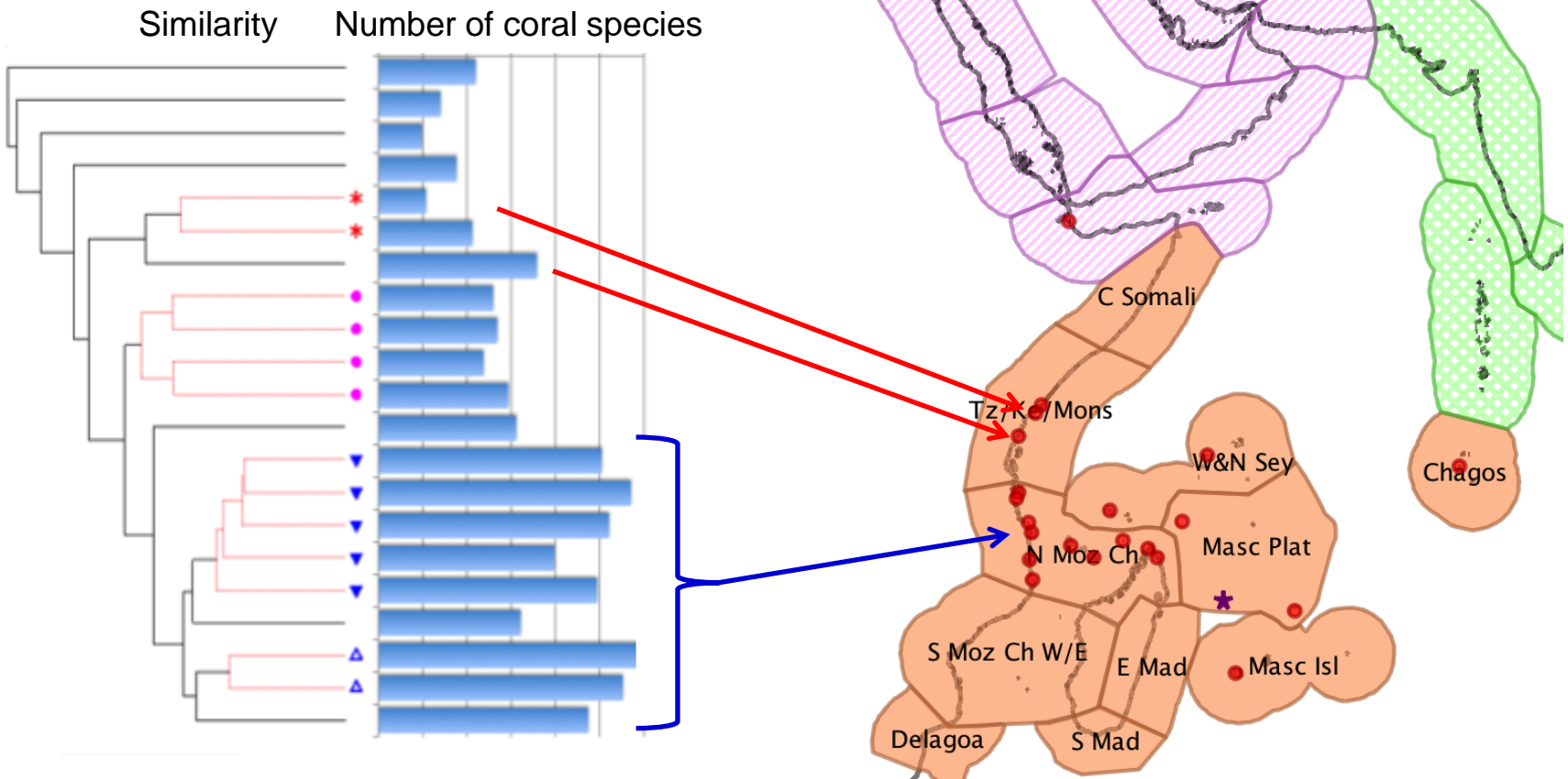
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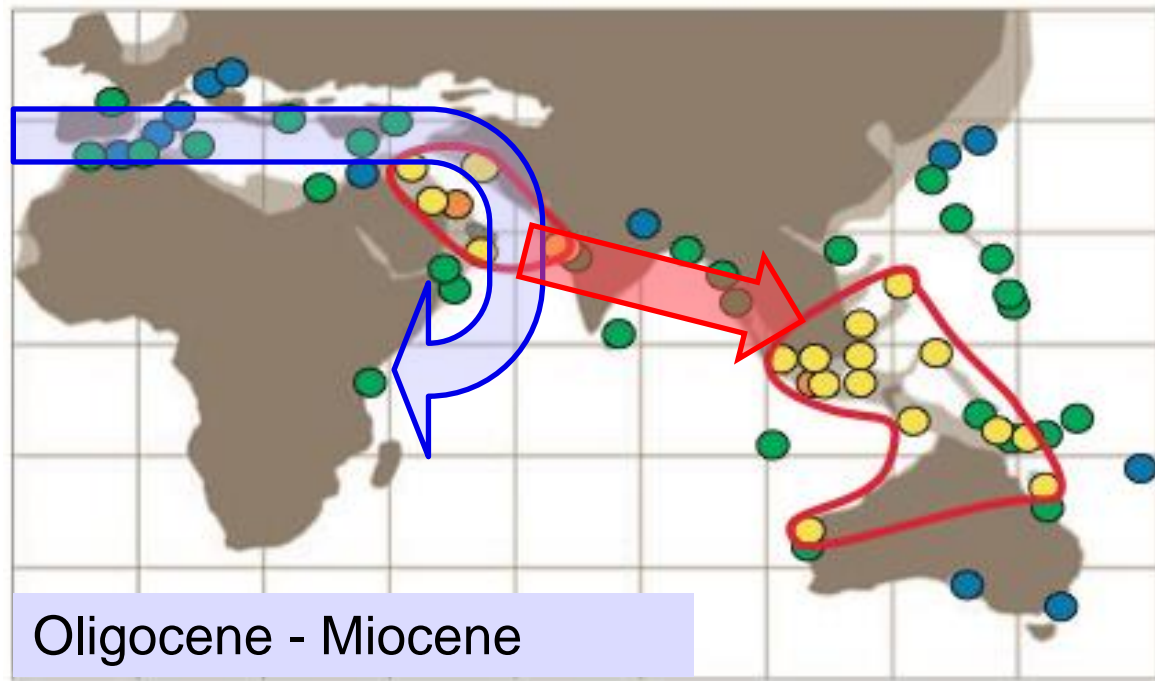
Field dataset on corals – WIO + Chagos

- Highest diversity and most similar coral communities - **Northern Mozambique Channel**
- Of 369 species, **37 (10%) were restricted to the Indian Ocean** from Sri Lanka/South India westwards.

The Indian Ocean as a '2nd center of dispersion' (Rosen 1971, Pichon 1978)

What is/are the origin(s) of the 10%?

During the closure of the Tethys Sea and East Africa-Arabian Plate, relict species from this region were preserved along the the East African coast.



A broad range of factors involved:

1. Plate tectonics (crustal collision, oceans and seas)
2. Hotspots and islands/banks
3. Connectivity
4. Climate

Examples of these species ...

Indian Ocean endemic mono-specific genera

Coscinaraeidae...

Benzoni et al. 2012

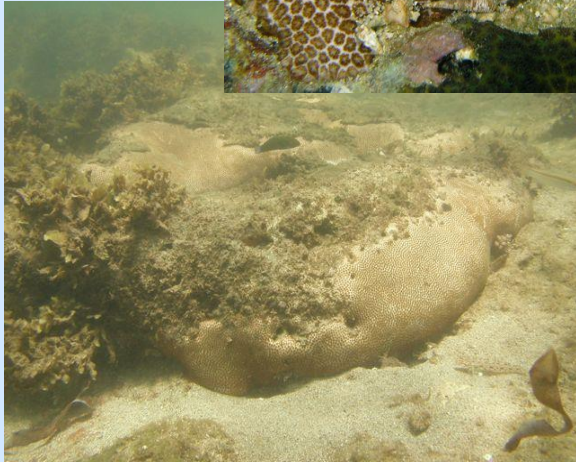
North, West IO and Red Sea distributions



***'Orphan' regional species
previously just grouped into
other larger families
=> Previously unrecognized
regional variation, an EAAP
taxon that failed to migrate
with the hotspot, and has
limited radiation potential***



Siderastrea



Phylogenetic tree suggests Indo-Pacific species (*S. savignyana*) is differentiated into two separate clades, by samples from Oman/Kenya (ancestral), versus Taiwan/Australia (Chuang 2006).

Oman/Kenya populations similar to the Atlantic species (Obura et al. 2007)

Stylophora



Three branching morphs are distinguished (Stefani et al. 2010), with most nominal species split among two of these.

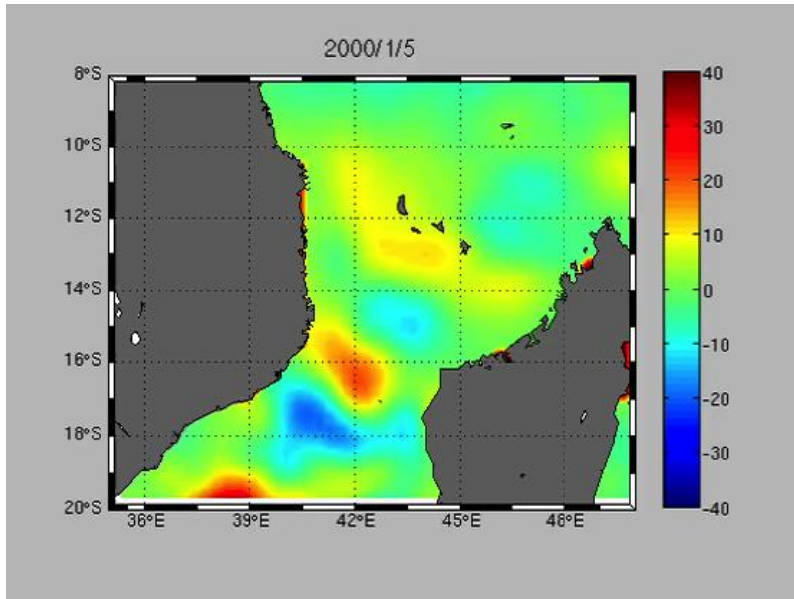
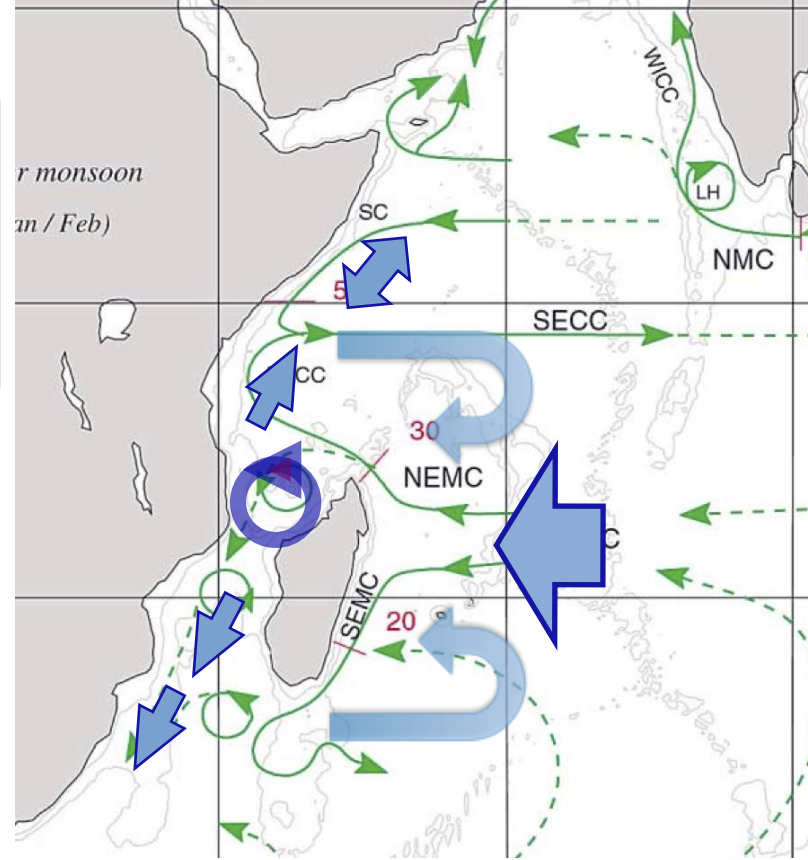
Most diverse in the WIO (Flot et al. 2011)


Unpublished results (Keshavnamurthy, Chen and colleagues, in prep)


Present oceanographic features that support these patterns

1) South Equatorial Current - East-west transport of corals across the Indian Ocean from the Indonesian region.

2) Mozambique channel gyres & eddies result in high connectivity across the northern Mozambique Channel and potential for accumulation of genetic and larval material



 Anti-cyclonic eddies – counter-clockwise rotation, positive sea level anomalies, warm core eddies.

 Cyclonic eddies – clockwise rotation, negative sea level anomalies, cold core eddies.

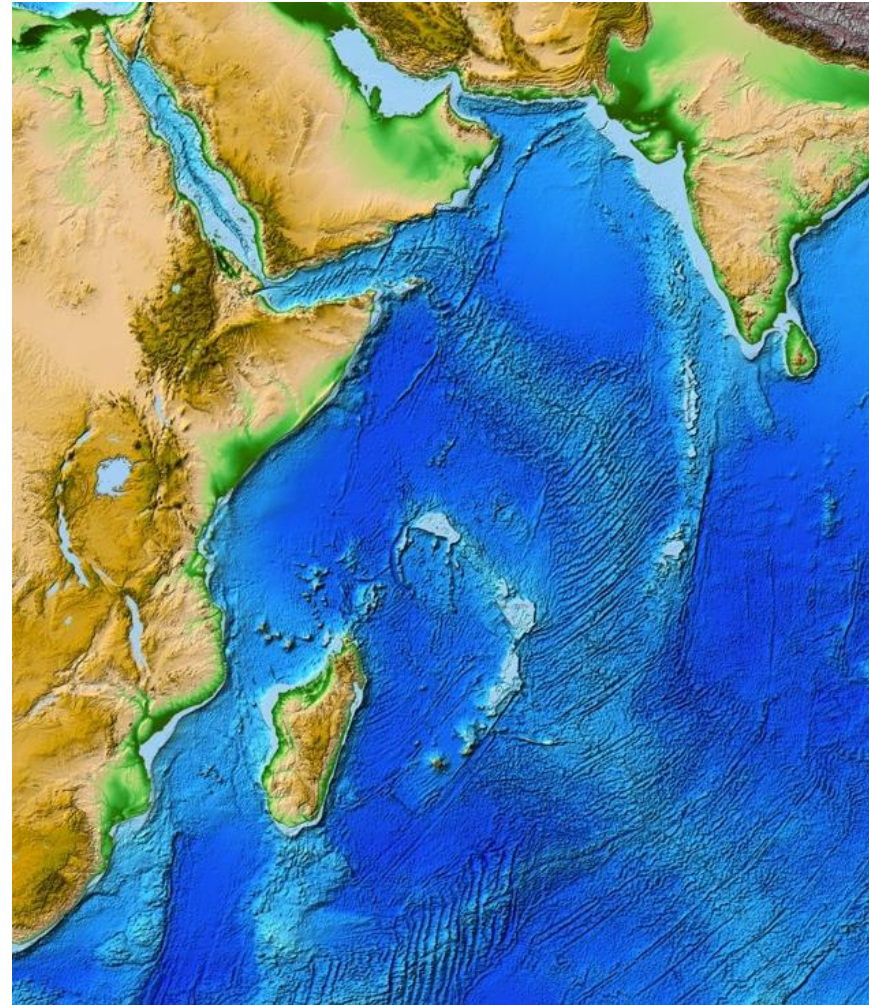
3) Currents flow north and south from the northern Mozambique Channel, with reversing currents in the Somali current system transporting species from Red Sea/Gulf of Aden

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Current status of Kenya's coral reefs

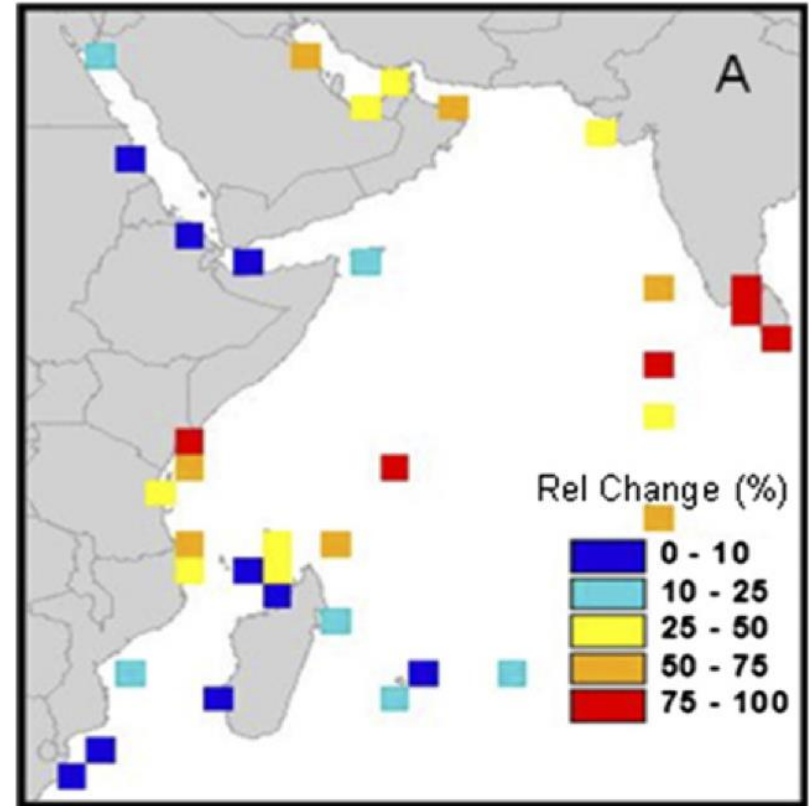
1) Fishing, overfishing and destructive fishing

2) Climate change impacts,

- Coral reefs and mangroves
- Other ecosystems
- Species
- Key resources

3) Current development

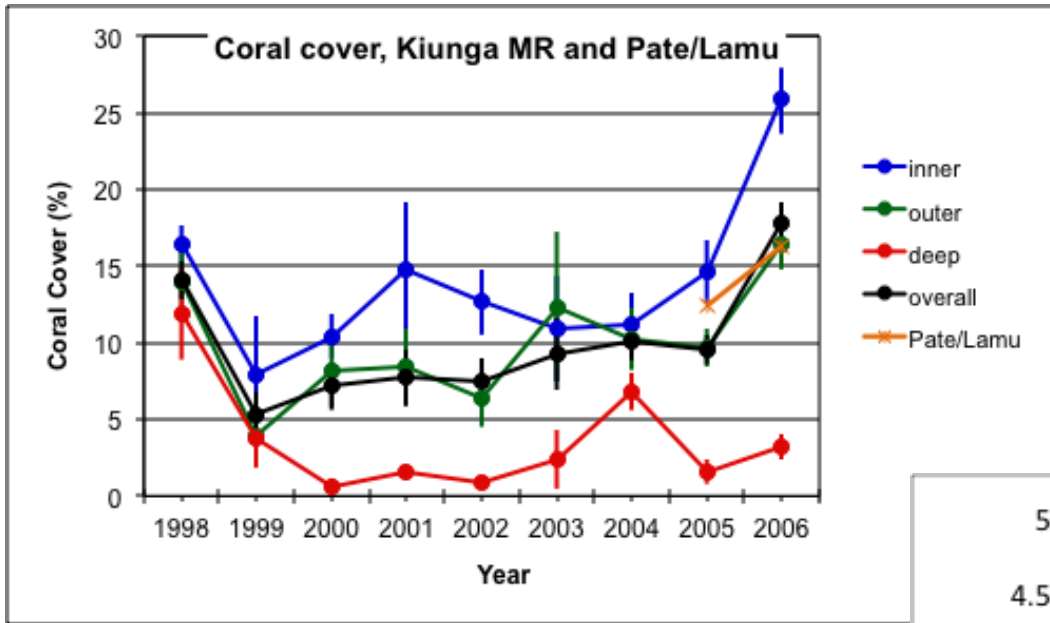
- Economic growth
- Population growth



Atewerbehan et al. 2010

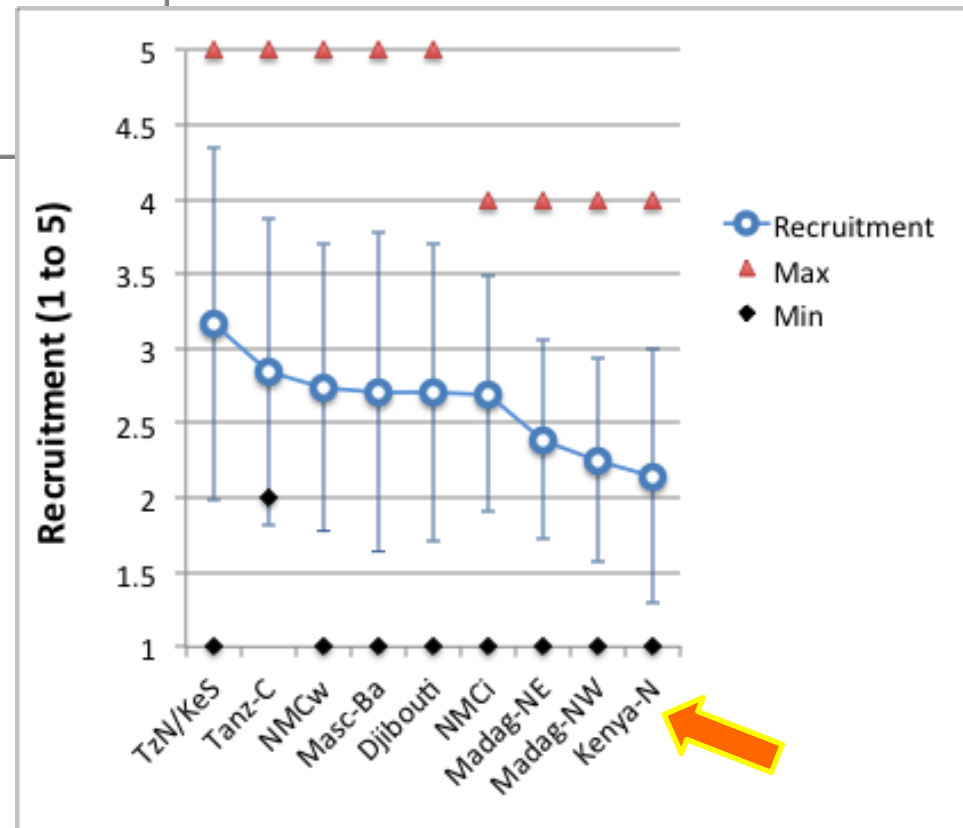
*Focus on northern
Kenya (Lamu County)*

Coral reef status, Lamu County



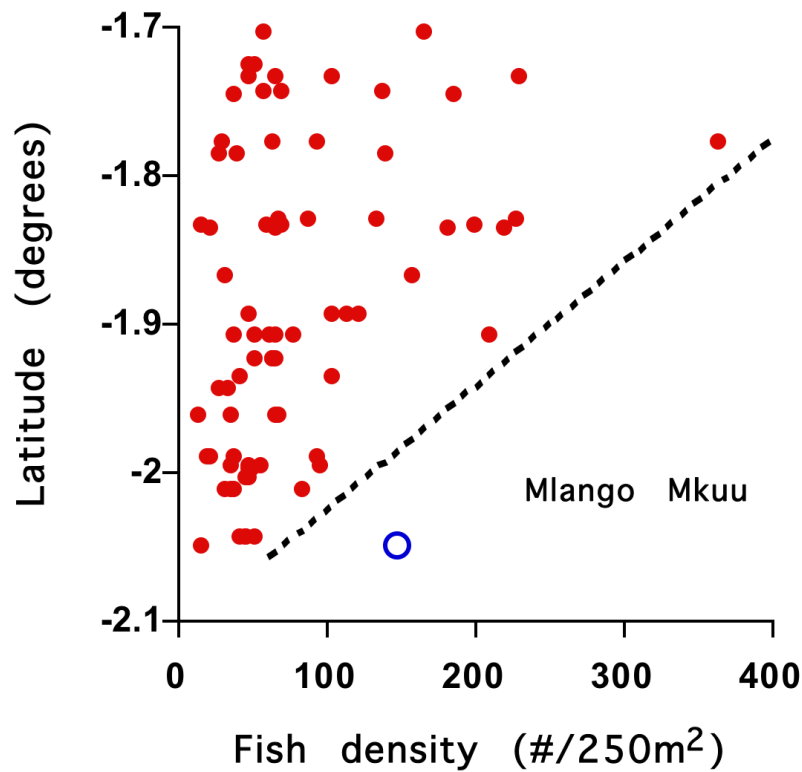
Kiunga reefs strongly impacted by warming in 1998

Coral recruitment in Northern Kenya reefs is lower than anywhere else in the WIO



Fish/resource status, Lamu County

Fish communities to the north (more remote) are less impacted by fishing



Current status of Kenya's coral reefs

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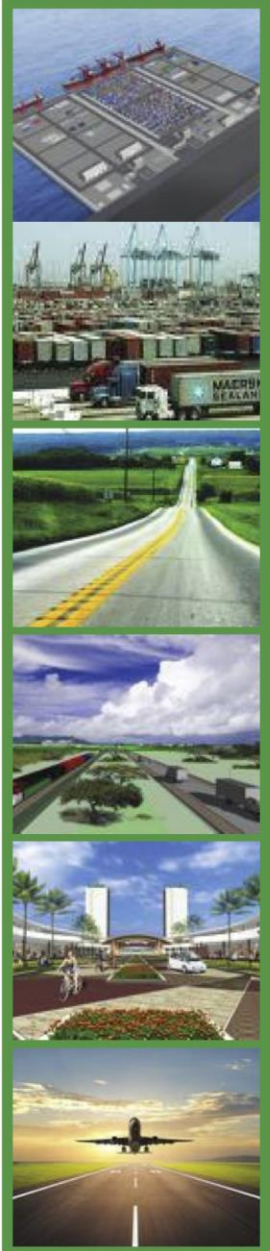
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- Global/market changes

Lamu County - LAPSSET project



THE PRESIDENCY



LAPSSET CORRIDOR DEVELOPMENT AUTHORITY

LAMU PORT – SOUTH SUDAN – ETHIOPIA TRANSPORT (LAPSSET) CORRIDOR PROJECT

Building Africa's ' Transformative and Game Changer Infrastructure to Deliver a Just and Prosperous Kenya

PRESENTED DURING KENYA – UK INVESTMENT CONFERENCE, LONDON, 3RD DECEMBER 2013.

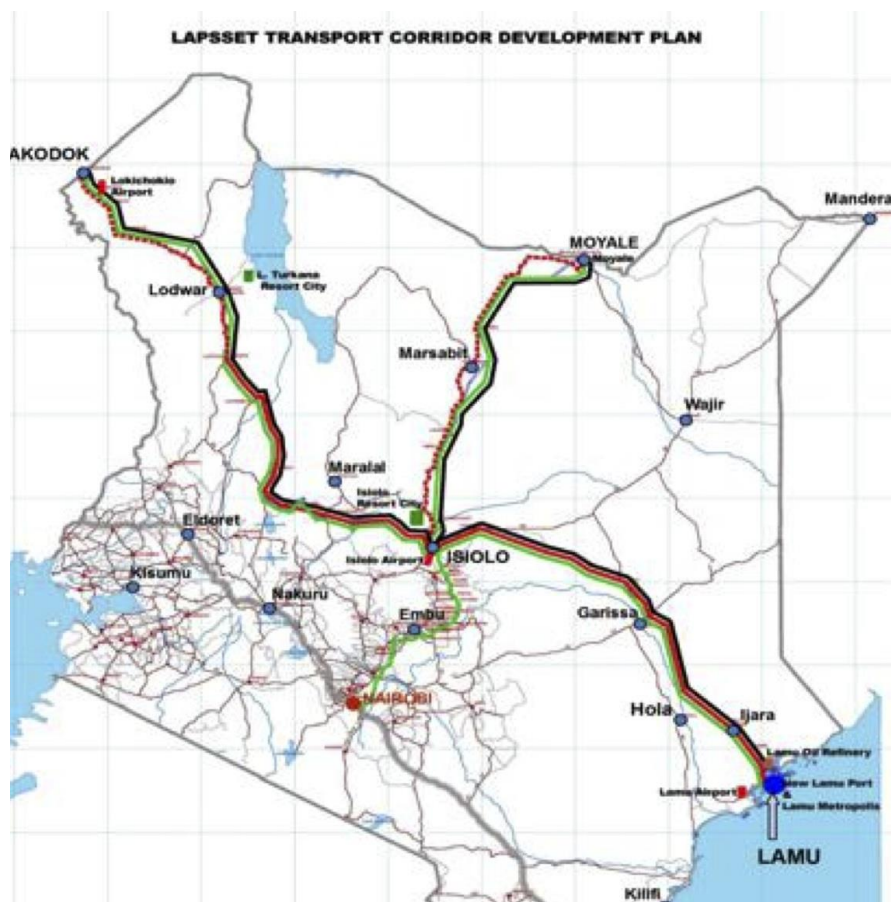
by: **Silvester KASUKU, MBS, CMILT**

Director General/CEO

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**KENYA
VISION 2030**
TOWARDS A GLOBALLY COMPETITIVE
AND PROSPEROUS NATION

“Kenya’s piece”

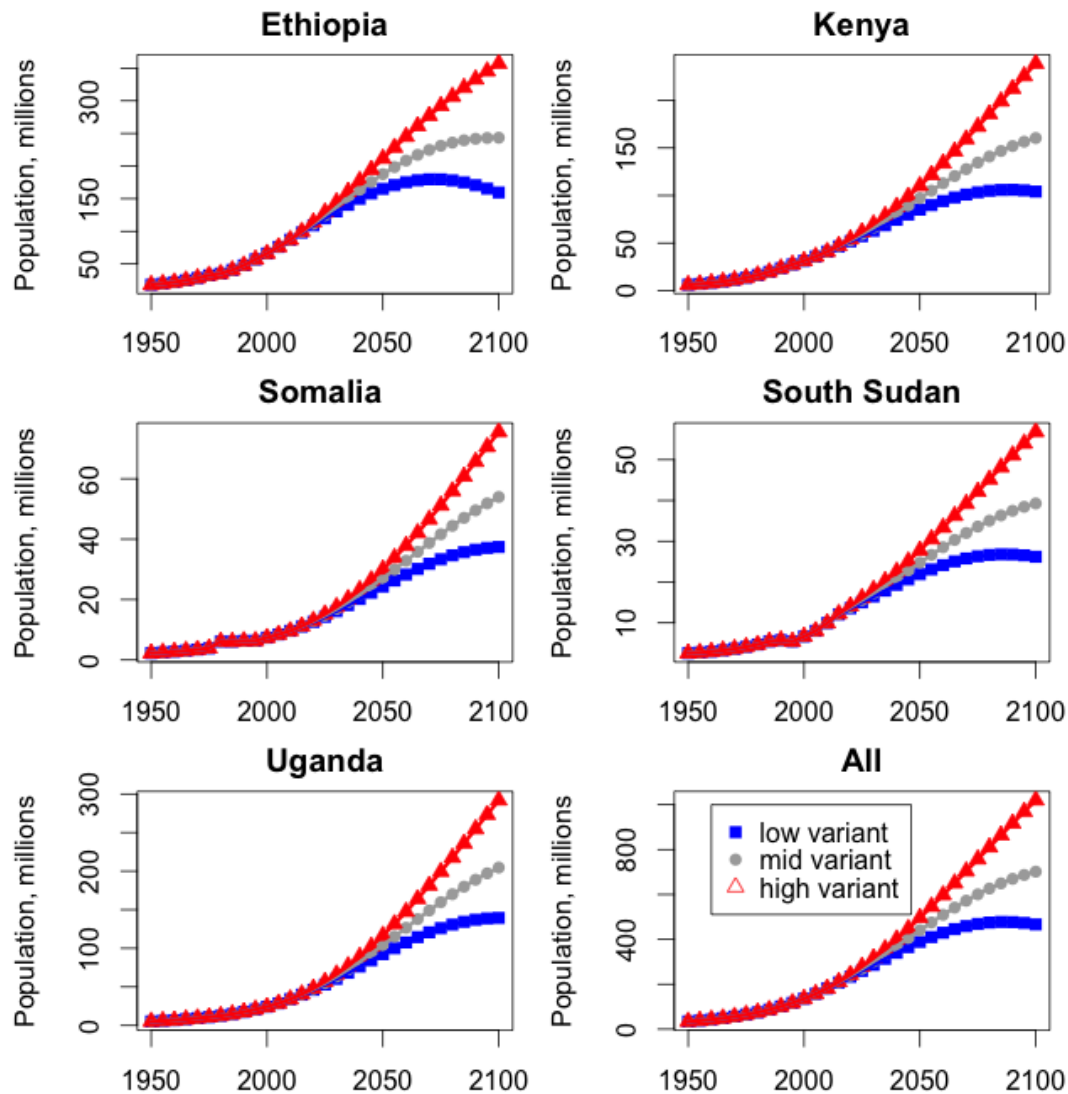


Lamu county ...



General Information (2009)	Lamu	Rank ^a	Kenya ^b
Population	101,539	47	821,491
Surface area (km ²)	6,273	21	12,368
Density (people per km ²)	16	40	66
Poverty rate, based on KIHBS (%)	32.7	7	47.2
Share of urban population (%)	19.9	22	29.9
Urban population in largest towns			
- Lamu	18,382	90	

National populations (millions)



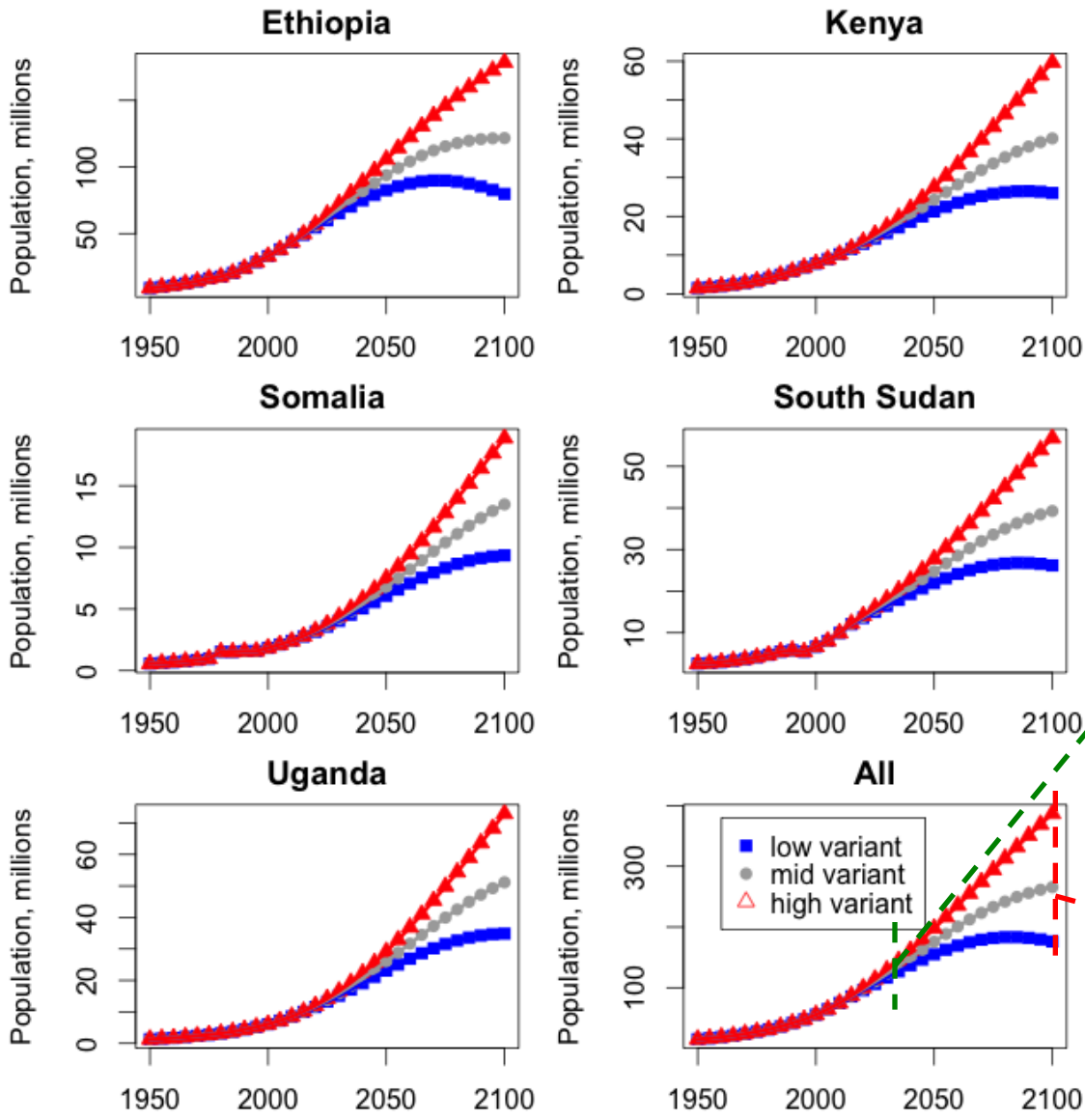
Low, medium and high 'variants'

Populations still growing in medium and high variants in 2100

In 2100, regional population > 1 billion for high variant

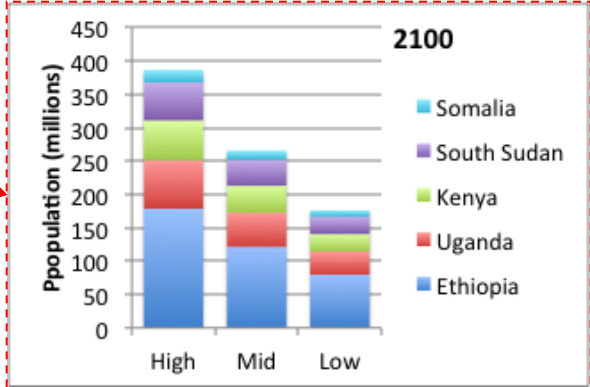
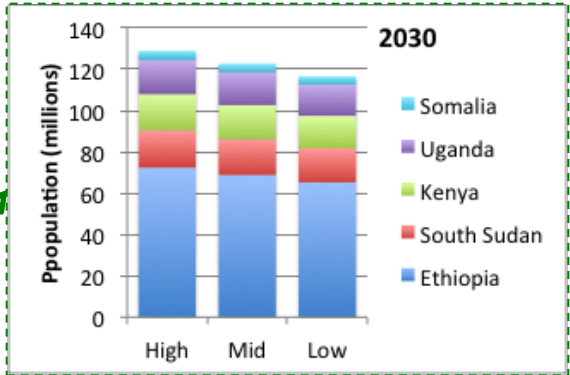
	Proportional
Ethiopia	50%
Kenya	25%
Somalia	25%
South Sudan	100%
Uganda	25%

LAPSSET catchment populations (millions)



Today

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Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2012 Revision, <http://esa.un.org/unpd/wpp/index.htm>

Lamu County

~~Current~~ Future status of ~~Kenya~~ Lamu County's coral reefs

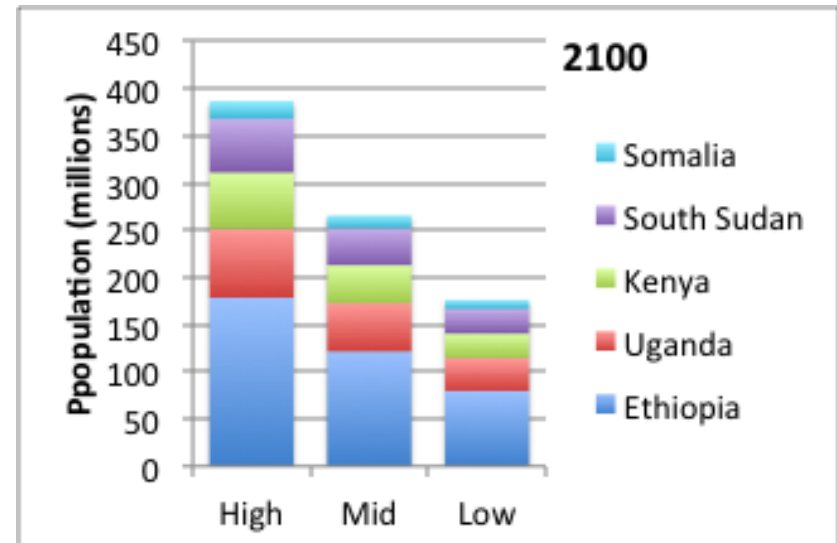
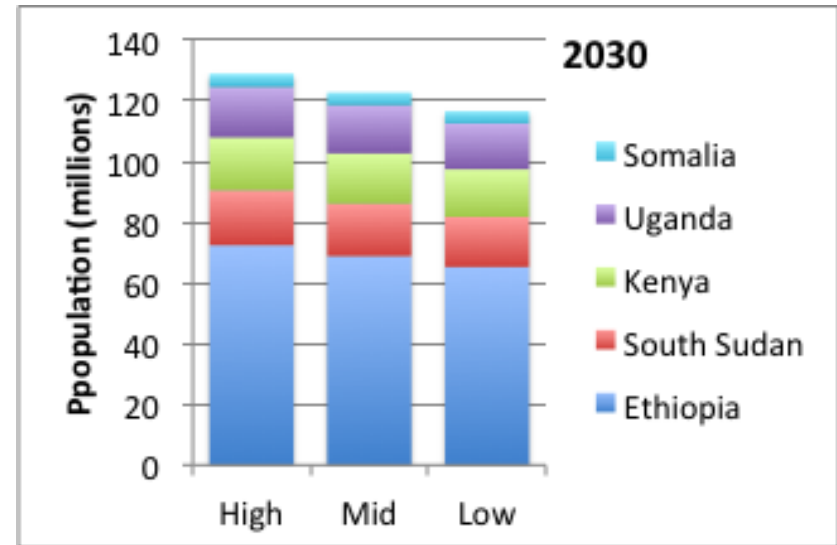
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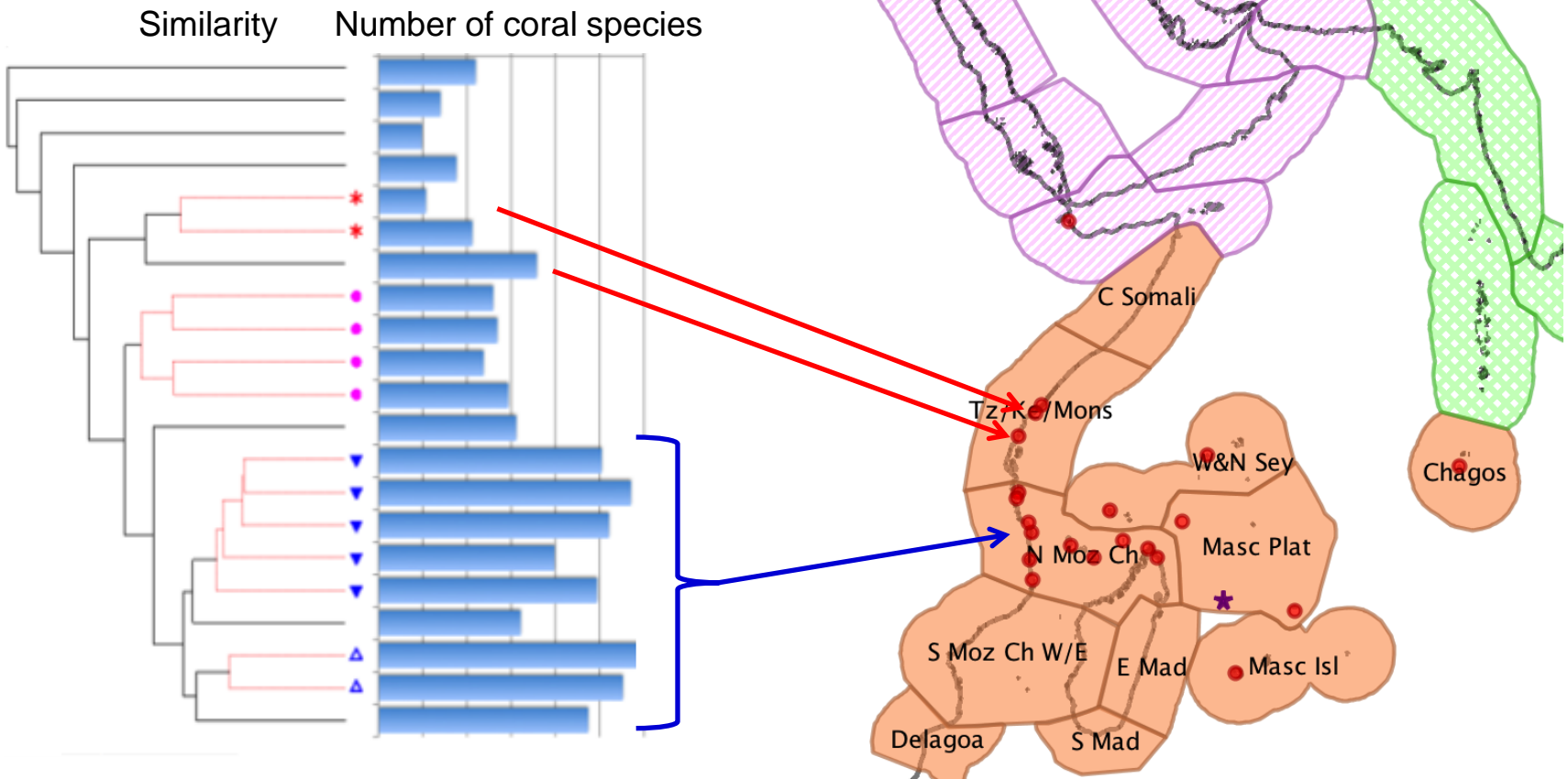
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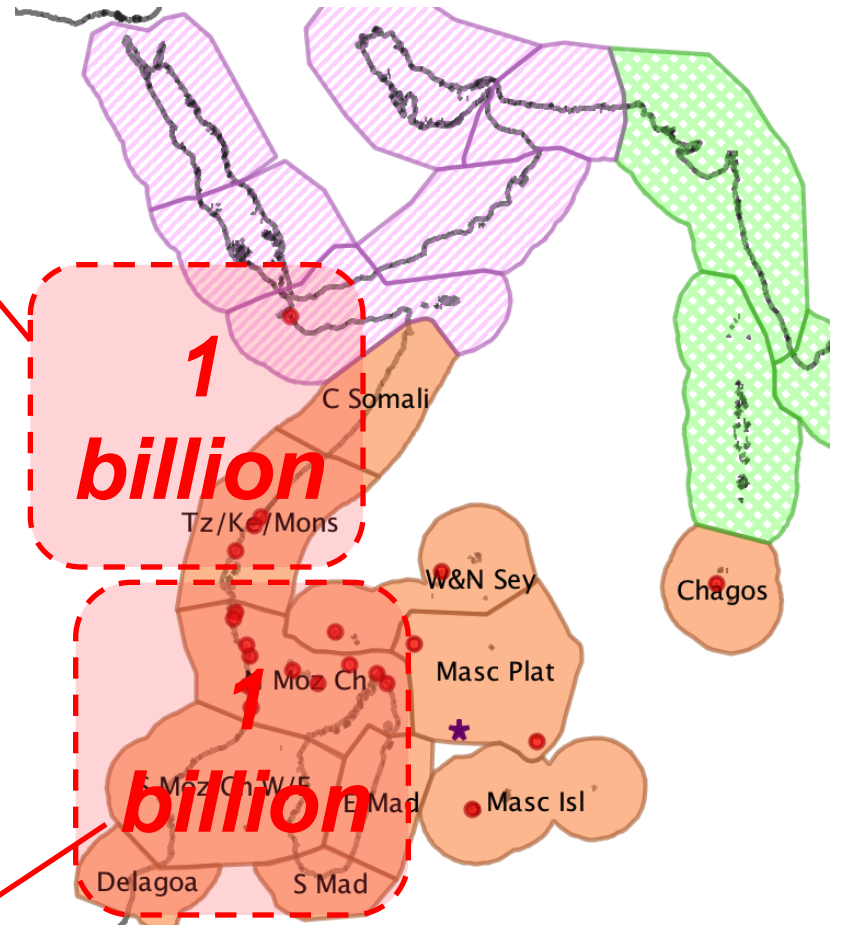
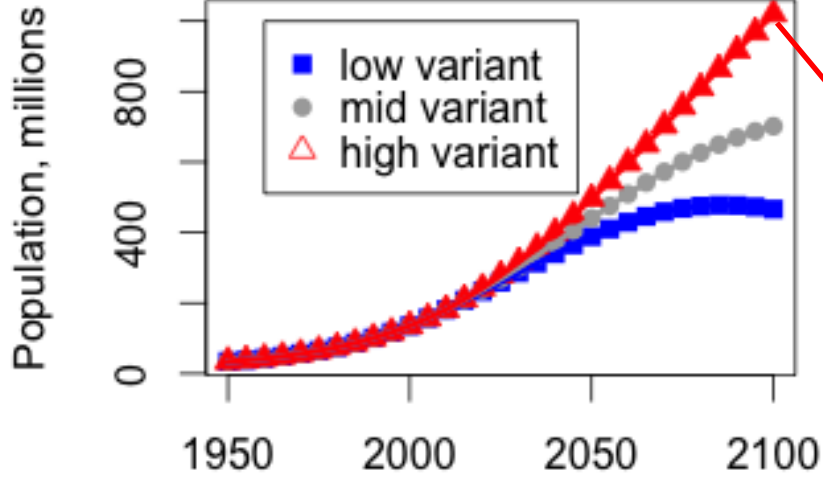
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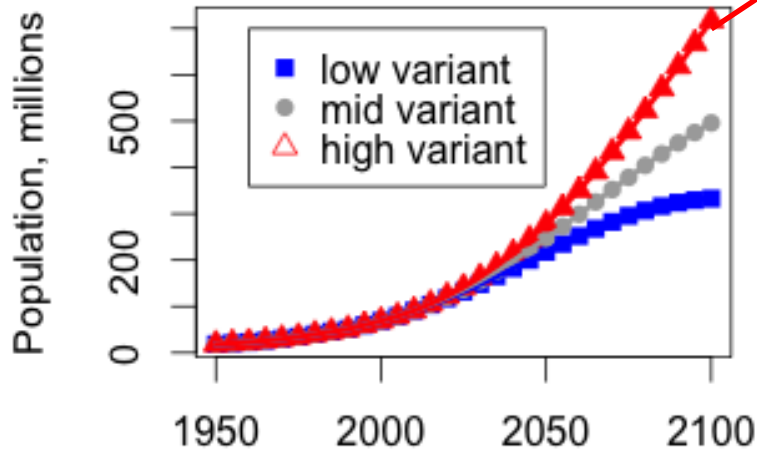
IGAD countries

Kenya, Ethiopia, Somalia, South Sudan, Uganda



Mozambique channel countries

Comoros, Mayotte, Madagascar, Mozambique, Tanzania



Are we preparing for this if nobody is talking about it?

Kwetu Training Center for Sustainable Development

Mtwapa, Kilifi County

Village-based sustainable mariculture
(search for "Kwetu Works" on youtube)

