

ICM LEKGOTLA

FROM SCIENCE TO POLICY AND BEYOND

FUTURE-PROOFING ICM – WHAT IS THE SCIENCE POINTING TO?

NATIONAL RESEARCH IN SUPPORT OF ICM AND IMPLICATIONS FOR FUTURE POLICY



Oceans and Coasts



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10 – 11 SEPTEMBER 2019
THE RIVER CLUB, OBSERVATORY



WHAT DID WE HEAR YESTERDAY?

Dr Omar:

- Set the scene of ICM in national as well as a Western Cape context
- Science and how it should be used to influence policy
- Pushing the need for socio-economics to be integrated with natural science

Prof Sowman:

- Research capacity & trends in SA for ICM
- Complex socio-ecological system we have to work in
- Spectrum of multi – interdisciplinary – transdisciplinary approaches

Prof Isaacs:

- Complexities around communities and their involvement in decision-making processes
- Rights of individuals versus corporations
- Concept of Blue Justice and unpacking what that means within Operation Phakisa

Mr Sibiya:

- Issues around community engagement
- Management of conservation estate versus community expectations

Provinces highlighted their own needs within their own priorities and systems & that changes from Province to Province



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**IT IS A COMPLICATED
MESS!**



WHAT ARE THE NATIONAL CONSIDERATIONS?

South Africa finds itself with the following socio-economic issues to consider when looking ahead:

- A period of HUGE uncertainty
- Economic growth of $< 1\%$
- Shrinking Fiscus
- State-Owned Enterprises on the brink of non-functionality
- Energy crisis
- Facing a Ratings Agency downgrade
- Unemployment of $\sim 30\%$, mainly YOUTH
- Triple Challenge of unemployment, poverty and inequality still exists



WE HAVE JUST HAD ELECTIONS AND A NEW ADMINISTRATION THAT HAS TO CLAW OUR WAY BACK WITH NEW AND INNOVATIVE ECONOMIC POLICIES



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**IT IS A DOUBLE
COMPLICATED MESS!**



LETS COMPLICATE THIS A LITTLE MORE!!

30% UNEMPLOYMENT

- ANY Government will prioritize Large investment into industries to build an economy that will generate the MOST jobs in the quickest way – **however can it be done in a Circular Economy model?**
- HOWEVER.....The success of the Ocean Economy Strategy is highly dependent on KNOWING WHAT EXISTS within the Ocean space that will unlock economic development, HOW it will unlock economic development & WHO will benefit
- And in South Africa we do not have a full inventory of what exists

INCLUDING IN THE MARINE SPACE:
FISHERIES
TOURISM



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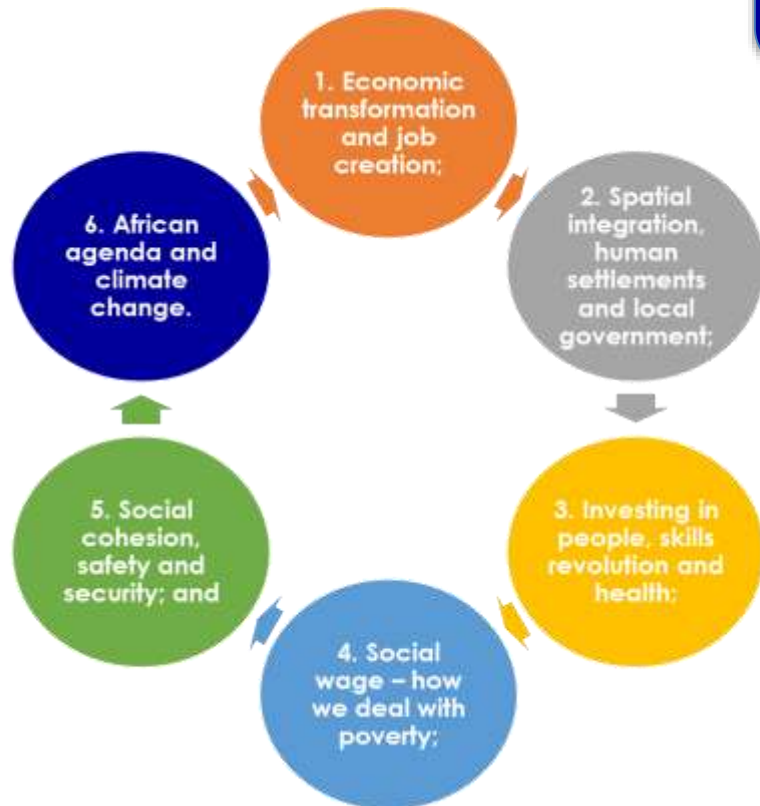
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HOW DO WE BALANCE SUSTAINABLE
DEVELOPMENT AND COMMUNITY
BENEFICIATION – FINE BALANCING ACT



6 PRIORITIES OF GOVERNMENT



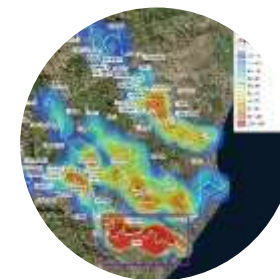
Ensure the effective implementation and coordination of National responsibilities in terms of the National Environmental Management Act and Integrated Coastal Management Act)



Development of a national coastal **vulnerability assessment** for SA's coastline and estuaries



Coastal **water quality guidelines** for the natural environment and mariculture



Source-to-Sea pilot project in KwaZulu-Natal to curb the problem of **plastic pollution** to sea



Comprehensive review of **estuarine management** to improve coordination and implementation of estuarine management system

Implementation of the **National Access Strategy** to secure improved fair and equitable access by general public

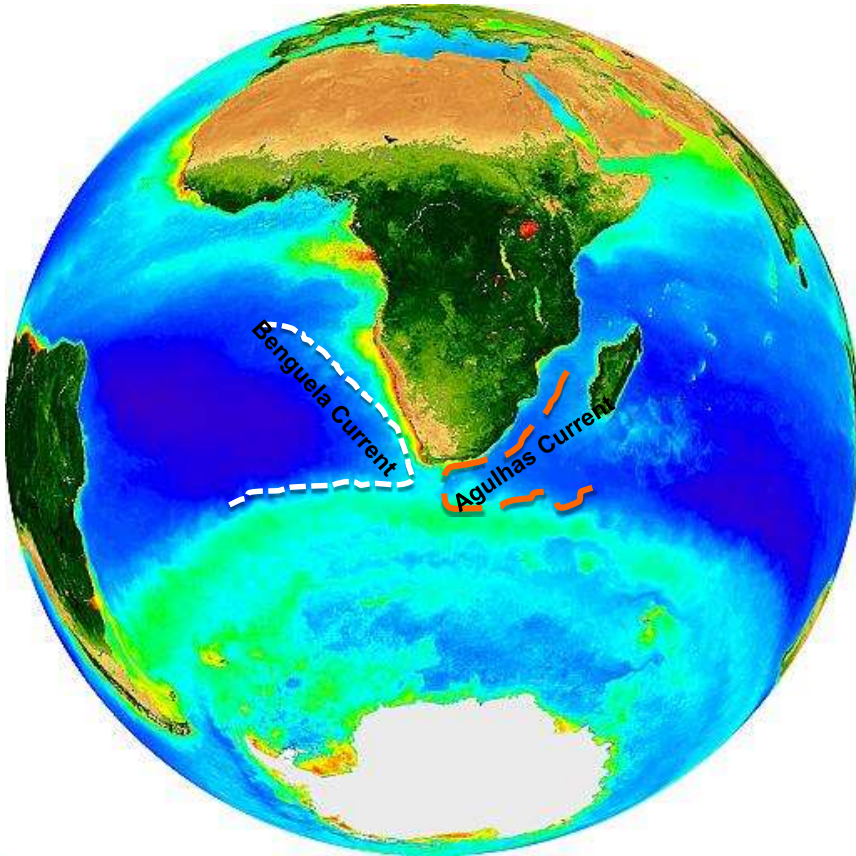


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BUT WHILE ALL THIS IS HAPPENING IN THE COMPLEX SOCIO-ECONOMIC SYSTEM, SOMETHING ELSE IS TICKING IN THE BACKGROUND?



THE EARTH SYSTEM:

- A balanced interaction between **ocean-atmosphere-land/geology** that exert an influence on humans – largely through Climate
- But humans have also influenced how this system operates and how it maintains that delicate balance
- However within an ICM context that interaction between humans and the Earth System happens in the Coastal Zone which has become increasingly densely populated
- It is also the Coastal Zone that will have to face the imminent extremities brought about by **Climate Change**



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**IT'S A CONFUSING MESS AND SCIENTISTS
DON'T MAKE IT ANY EASIER !!!!
COMMUNICATION IS KEY**



GLOBAL CONTEXT:



United Nations
Framework Convention on
Climate Change



International environmental treaty adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992. It then entered into force on 21 March 1994, after a sufficient number of countries had ratified it

The Intergovernmental Panel on Climate Change, established in 1988, is an intergovernmental body of the United Nations, dedicated to providing the world with an objective, scientific view of climate change, its natural, political and economic impacts and risks, and possible response options

The IPCC produced several reports for Policy Makers to consider the impacts of Climate Change. Latest Report in 2018 considered a world experiencing a 1.5°C Global Temperature Increase



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Cumulative emissions of CO₂ and future non-CO₂ radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

Global warming relative to 1850–1900 (°C)

Observed monthly global mean surface temperature

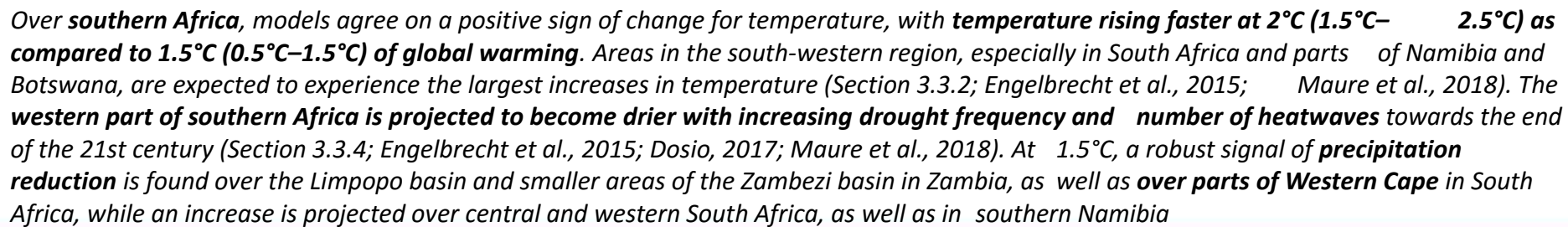
Estimated anthropogenic warming to date and likely range

likely range of modeled responses to stylized pathways

Equivalent CO₂ emissions must not rise to 2020 while net non-CO₂ radiative forcing is reduced after 2020 (grey in b, c & d)

Higher CO₂ reductions (blue in b & c) result in a higher probability of limiting warming to 1.5°C

No reduction of net non-CO₂ radiative forcing (green in d) results in a lower probability of limiting warming to 1.5°C



GLOBAL CONTEXT WILL NOT SOLVE YOUR LOCAL PROBLEMS:

IPCC – looks at the Global Scale, however always associated with degree of ERROR/CONFIDENCE

- Over the last decade, IPCC and regional work have Increased the Confidence of Projections due to greater effort in collecting ocean data.
- Recognition that Ocean covers more than 70% of Earth's surface & therefore must play a critical role in Climate Debate.
- Some Ocean Services: Balance & Equality in Earth System
 - Ocean take-up excess Atmospheric Carbon
 - Uptake of additional heat (upper 700m of ocean)

OCEANS & COASTS RESEARCH THEREFORE UNDERTAKE LONG-TERM MONITORING & RESEARCH TO UNDERSTAND (1) TRENDS, (2) VARIABILITY AND (3) CLIMATE CHANGE IMPACTS

FOCUS ON ESSENTIAL OCEAN VARIABLES (EOVs) AS DEFINED BY THE GLOBAL OCEAN OBSERVING SYSTEM

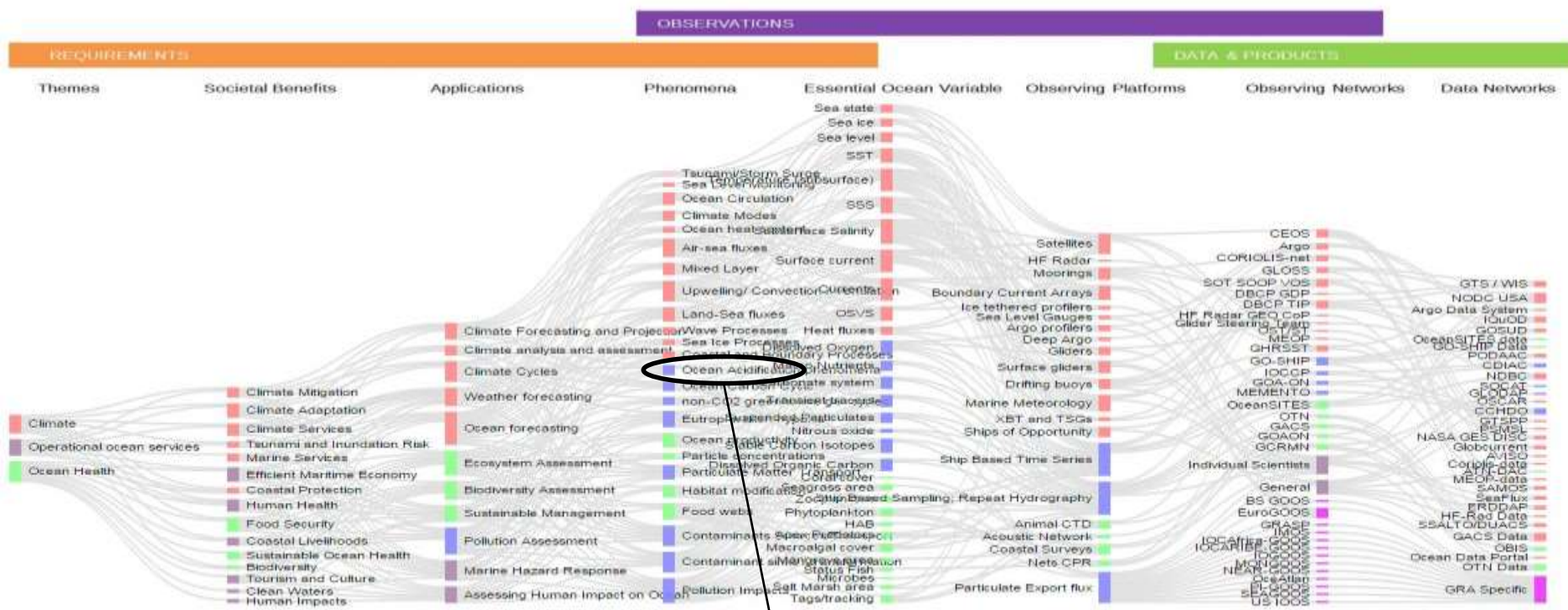


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ESSENTIAL OCEAN VARIABLES



Application to Climate and Mitigation/Adaptation, Food security, Ecosystem and human health, Biodiversity.....

Ocean Acidification:
Loss of Biodiversity
And an end to marine life as we know it

Long term measurements made by DEA only within the EEZ from RV *Algoa*:

- Temperature
- Nutrients
- CO₂
- Carbon
- pH
- Oxygen



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EOVs can be applied to estuaries, coastal and deep waters



WHAT DO OCEANS & COASTS RESEARCH MEASURE ROUTINELY:

- **Coastal Vulnerability**

Sea-Level Rise	(Increasing?)
Storm Surges/Waves	(Increasing)
Ocean Currents	(Changing?)
Winds	(Stronger or Weaker)
Erosion	

HOW DOES THIS AFFECT YOUR ICM “SETBACK LINES”

- **Water Quality & Pollution**

Nutrients	(partly)
Heavy Metals	(national)
Ocean acidification	(west coast)
Microplastics	(partly)
Eutrophication & Chlorophyll	(west coast)
Low Oxygen	(west coast)

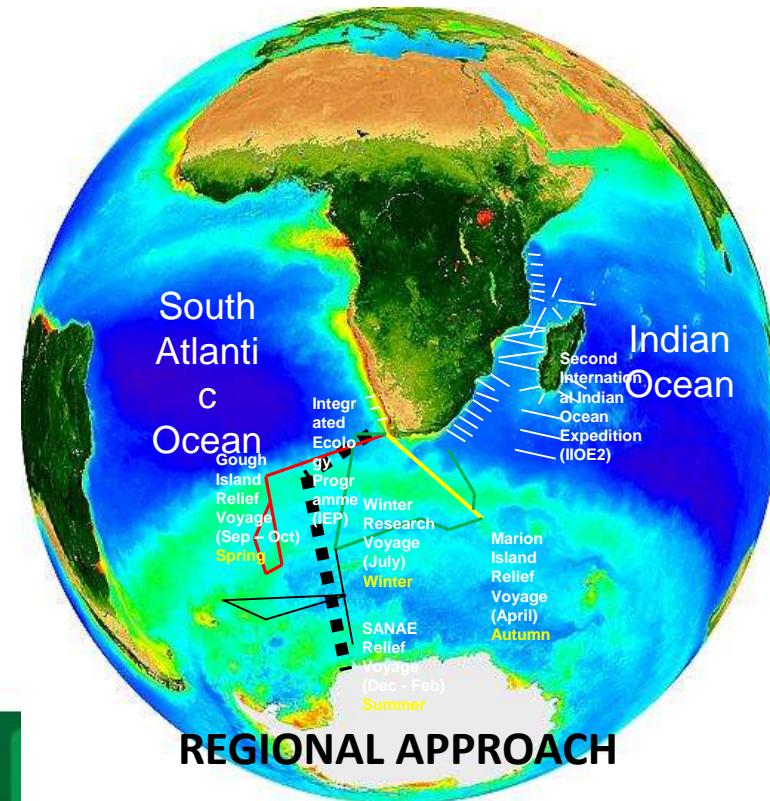
National Lab at WSU (for Water Quality Monitoring)

HOWEVER THIS SETS UP THE OCEAN ENVIRONMENT
FOR THE BIODIVERSITY WITHIN THE OCEAN SPACE

- **Pollution**

Benthic ecology & Rocky shore ecology	(national)
Plankton & Fisheries (microplastic ingestion)	(W&S Coasts)
Top Predators & Protected Species	(national)

GEOGRAPHIC DIS/ADVANTAGE



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**Data to be housed in
OCIMS as well as for
modelling
projections**

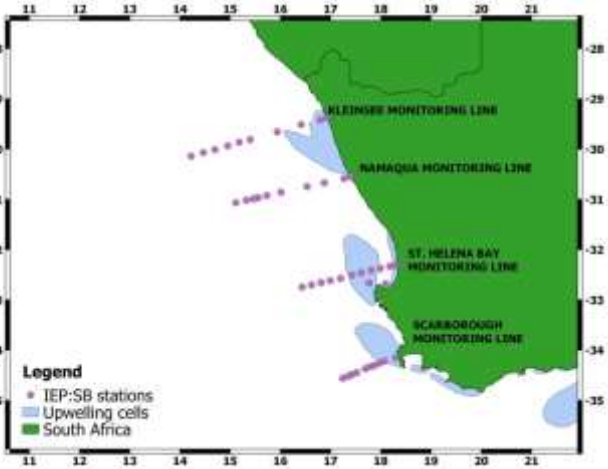
COLLABORATION:
UCT, UWC, NMU,
SAEON, RU, UKZN,
CSIR, etc



HOW DO WE DO IT WITHIN SOUTH AFRICA

ONE EXAMPLE:

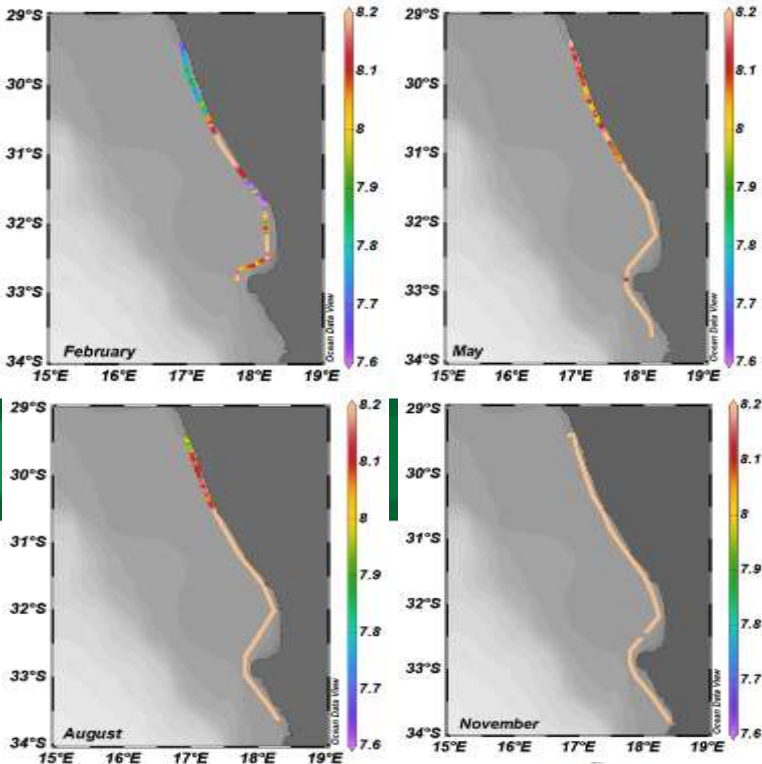
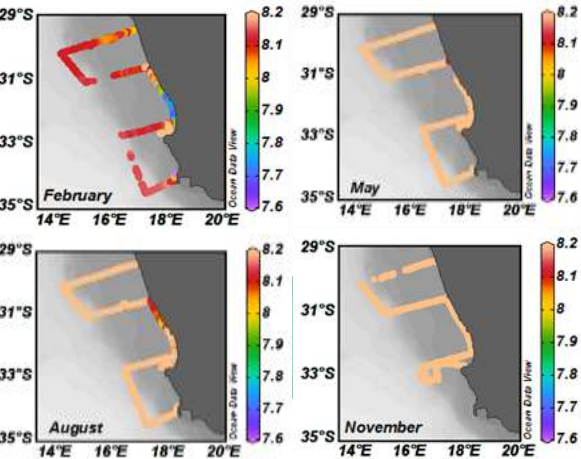
INTEGRATED ECOSYSTEM PROGRAMME – WEST COAST



Other measurements:

- Temperature
- Winds
- Microplastics
- Rocky shore ecology
- Benthic biodiversity
- Seal population dynamics
- Seabird population dynamics
- Whales
- Fisheries
- Orange River Estuary
- Low Oxygen
- Nutrients

Project	EOVs monitored/being developed	Long-term or New
Hydrography	salinity, temperature	Long-term
Currents	wave direction and speed	Long-term
Chemistry	oxygen, chlorophyll, nutrients, pH, inorganic carbon, pCO ₂	Long-term & New
Microbes	biomass/abundance and community structure	New
Primary Production	primary production rates	New
Phytoplankton	biomass/abundance, size structure and community structure	New
Microzooplankton	biomass/abundance, size structure and community structure	New
Mesozooplankton	biomass/abundance, size structure and community structure	Long-term
Benthos	biomass/abundance and community structure	New
Seabirds	biomass/abundance	New
Whales	biomass/abundance	New



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COASTAL MANAGEMENT RESEARCH INITIATIVES WITHIN OCEANS & COASTS:

SOUTH AFRICA'S OCEANS AND COASTS ANNUAL SCIENCE REPORT, 2018

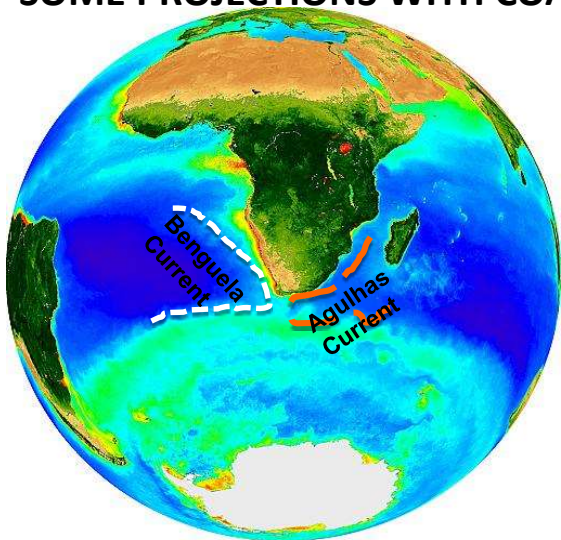
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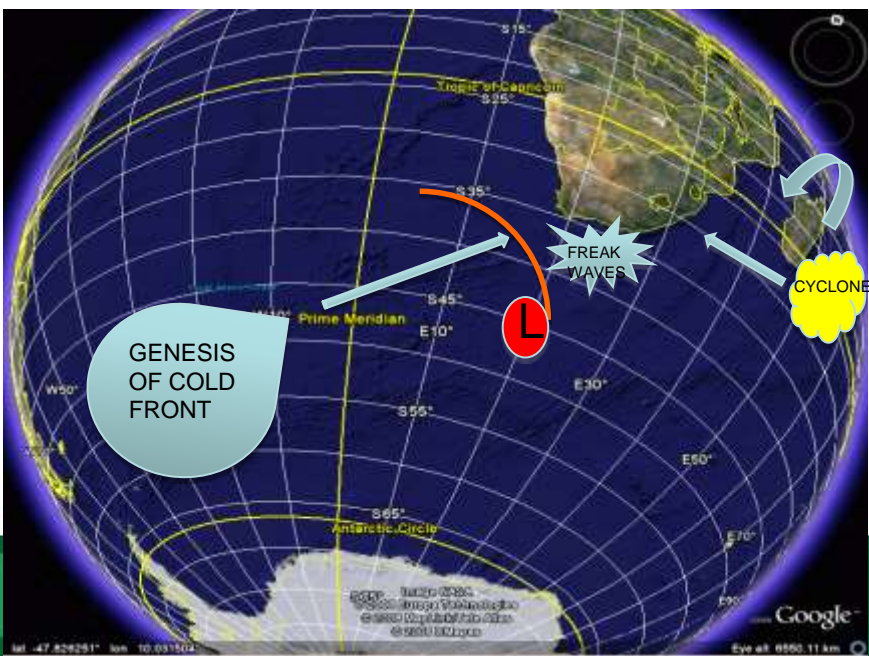
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SOME PROJECTIONS WITH COASTAL IMPACTS



- The uniqueness of South Africa’s geographic position allows for the interaction between a warm and cold current regime.
- It’s a zone of basin water exchange between the Indian and Atlantic Oceans
- Indian Ocean is warming faster than other ocean basins
- Southern Ocean is warming

- Cold fronts are formed in the Southern Oceans to the east of South America
 - has an unobstructed pathway to Southern Africa
 - every few years cold fronts are much stronger due to increased sea surface temperatures
- Due to warmer sea surface temperatures over Agulhas Current tropical cyclones have the ability to reach northern KZN more frequently
- Increased Freak Wave activity with generally rougher seas and more storminess.



World Bank Study: Knysna coastline (1 of 3)

BUT Natural Science is only ONE input into decision making process, must be supplemented by social science, economics as well as indigenous knowledge

- BUT ALL THE BIO-PHYSICAL DATA GIVES US IS HOW THE NATURAL SYSTEM IS CHANGING, BOTH NATURALLY AS WELL AS HUMAN-INDUCED, AT CERTAIN LOCATIONS AROUND THE COASTLINE.
- IT IS NOT A FULL NATIONAL OR REGIONAL UNDERSTANDING
- OCEANS AND COASTS ARE GLOBALLY INTERCONNECTED
- THE STUDIES MEAN VERY LITTLE IF ONE DOES NOT ADDRESS THE IMPACTS OF THESE CHANGES ON PEOPLE, COMMUNITIES, ECONOMICS
- THIS CANNOT BE DONE WITHOUT PARTNERSHIPS FROM GOVERNMENT, ACADEMIA, SCIENCE COUNCILS, PRIVATE SECTOR

MY APPEAL: For the sake of our clients (The Citizens)

- Lets work together at a national, provincial & municipal levels to develop a truly comprehensive natural-social-economic sciences programme that will respond to the needs of our people
- Once developed the Department can engage DST on how to be fund this programme



IT'S A MOVING TARGET



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Thank You



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