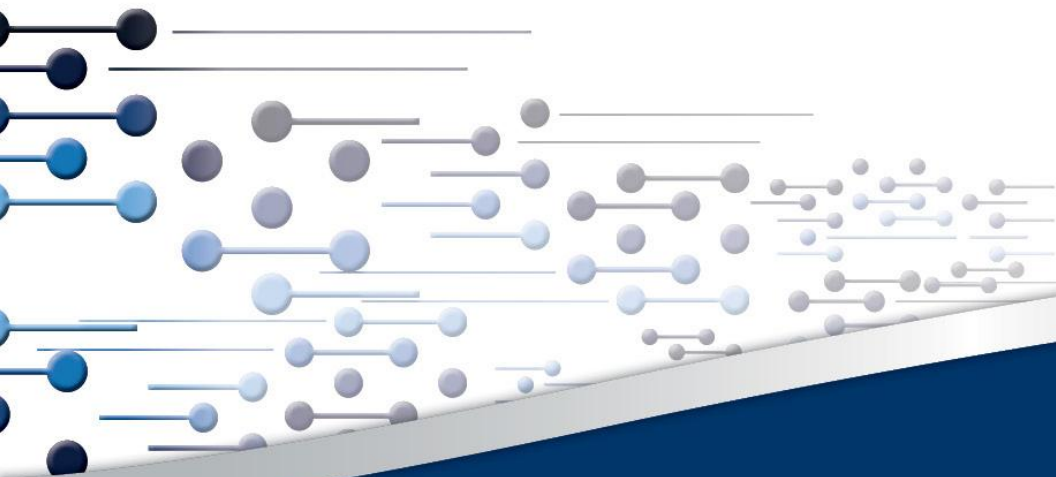


Estuaries and Climate Change

Lara van Niekerk





Klein Estuary

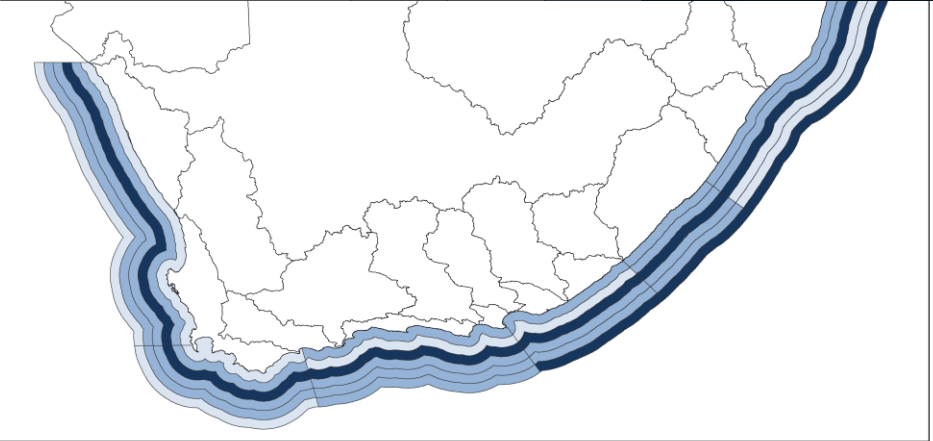
Estuaries Climate Change plot....



- **Developed a conceptual model**

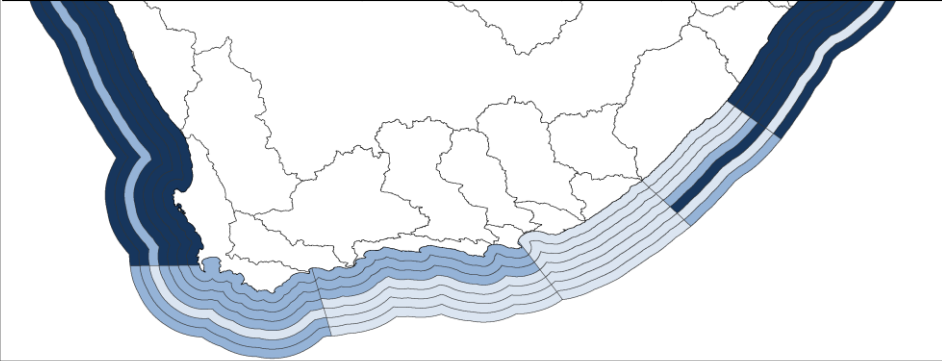
Change in coastal /ocean circulation patterns and temperature regime

Feature/process	West Coast	Western Cape	Southern Cape	Eastern Cape	Wild Coast	KwaZulu Natal
Current location and velocity	L	L	M	M	M	M
Upwelling	M	M	L	L	M	M
Land temperatures	H	H	H	H	H	H
Sea temperatures	M ⁻	M ⁻	M ⁺	M ⁺	M ⁺	L
Community composition along land-sea gradient	M	M	M	M	M	L
Species range extensions along coast	L	L	M	H	H	H



Changes in terrestrial climatic and hydrological processes

Feature/process	West Coast	Western Cape	Southern Cape	Eastern Cape	Wild Coast	KwaZulu Natal
Runoff	H	M	M	L	L	H
Frequency and duration of mouth closure	H	M	M	L	L	H
Salinity regime	H	M	M	L	L	H
Biogeochemical fluxes (nutrients, DO, SS, POM)	H	M	L	L	M	H
Floods & sediment deposition/erosion cycles	M	L	L	L	H	H
Contaminant behaviour & accumulation (e.g. toxic substances)	H	M	L	L	L	L
Shifts in estuary habitat type & nursery function/ availability	H	M	L	L	M	H



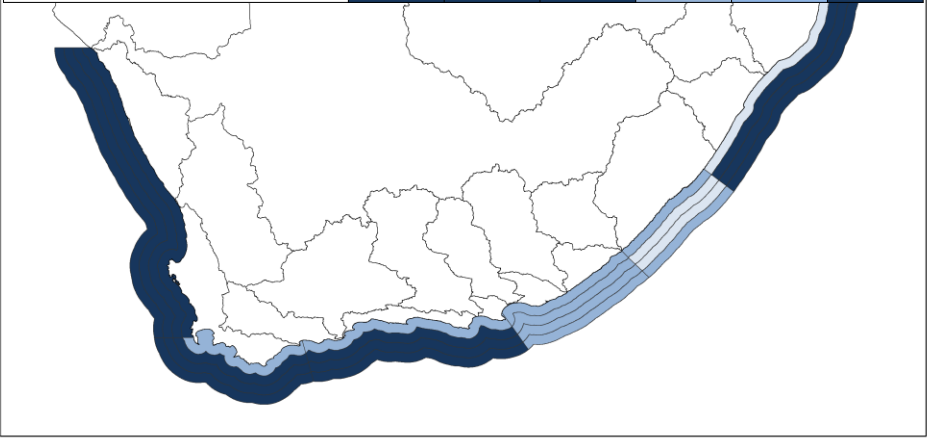
Ocean acidification

Feature/process	West Coast	Western Cape	Southern Cape	Eastern Cape	Wild Coast	KwaZulu Natal
Decrease in pH	M	M	L	L	L	L
Calcifying organisms require more energy to maintain dissolving exoskeleton	M	M	L	L	L	L



Sea level rise (between +0.5 and +1.0 m MSL)

Feature/process	West Coast	Western Cape	Southern Cape	Eastern Cape	Wild Coast	KwaZulu Natal
Increase salinity penetration	H	M	M	M	M	L
Increased tidal flushing/prism	H	H	H	M	L	H
Changes in the frequency and duration of mouth closure	H	H	H	M	L	H
Changes in habitat (e.g. plants) & nursery function/ availability	H	H	H	M	M	H



Estuaries Climate Change plot....



- **Developed a conceptual model**
- **Going to be very difficult to tease out anthropogenic signal from climate change**
- **Using the Estuaries NBA as a platform**
- **Register:**
 - **Trends: Who is monitoring what?**
 - **Responses: What is gov doing about change?**
- **How can we use our existing data sets and response to track and respond to climate change??**

Estuaries NBA Monitoring and Management Register



- 💧 **Lots of noise**
- 💧 **Small community (< 10 groups doing 90% of effort)**
- 💧 **NBA to set criteria/rating system (Gov seems confused about what is monitoring (> 2 years))**
- 💧 **Need information on the drivers:**
 - **River inflow (DWS ~10%, 2 – 30 years)**
 - **Mouth conditions (DWS ~10%, 2 – 30 years)**
 - **pH ?**
 - **Turbidity ?**
 - **Temperature (DWS/SAEON 10%, <5 years)**
- 💧 **Track biotic responses (few long term data sets DAFF/SAIAB/SAEON)**
- 💧 **Slant to the large permanently open systems, but the small Temporarily open estuaries the most vulnerable**

Estuaries Research Agenda



- ♦ **Whitfield bibliography**
- ♦ **NBA high light some research needs**
- ♦ **Consortium of Estuarine Research and Management**
- ♦ **Water Research Commission**

- ♦ **High variability region – need different tools to find the patterns**
 - **Lags**
 - **Cycles with in cycles**
 - **Anthropogenic (flow, fishing, pollution) signal**

- ♦ **Coastal sediments!!!**
- ♦ **pH require better equipment**

Great Brak Estuary

1 : 20 Year Flood - 22 November 2007



Photos: Piet Huizinga

Great Brak Estuary

Very High Waves: 1 September 2008



Photos: Piet Huizinga



Thank you