

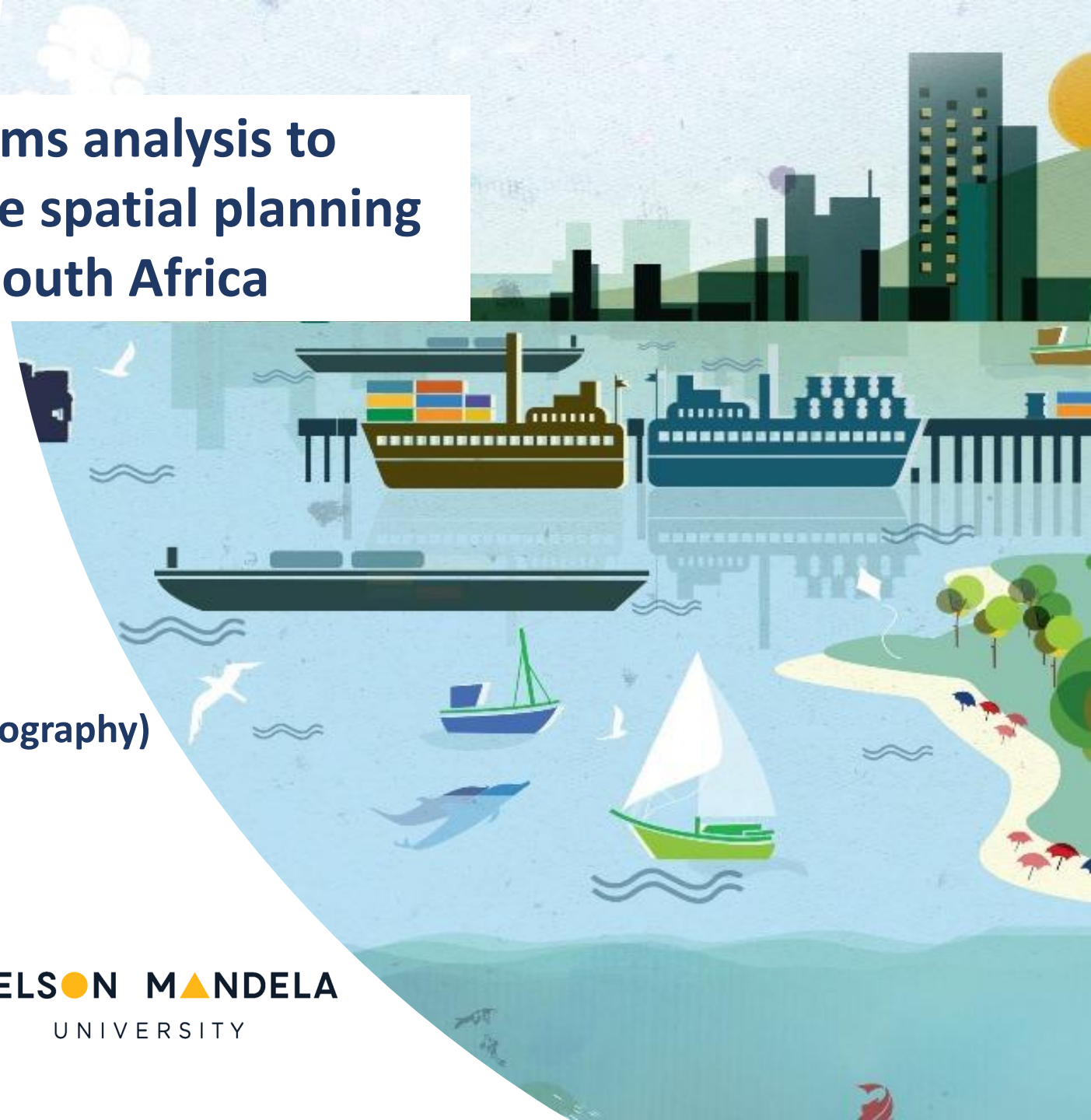
Applying systems analysis to support marine spatial planning in Algoa Bay, South Africa

5th IMCC 2018
Kuching, Sarawak

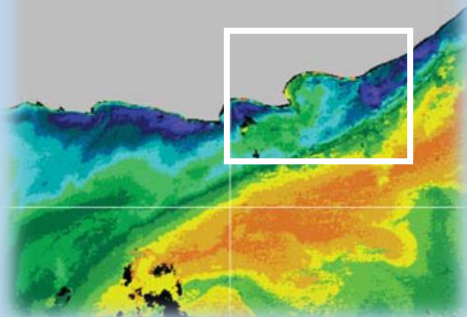
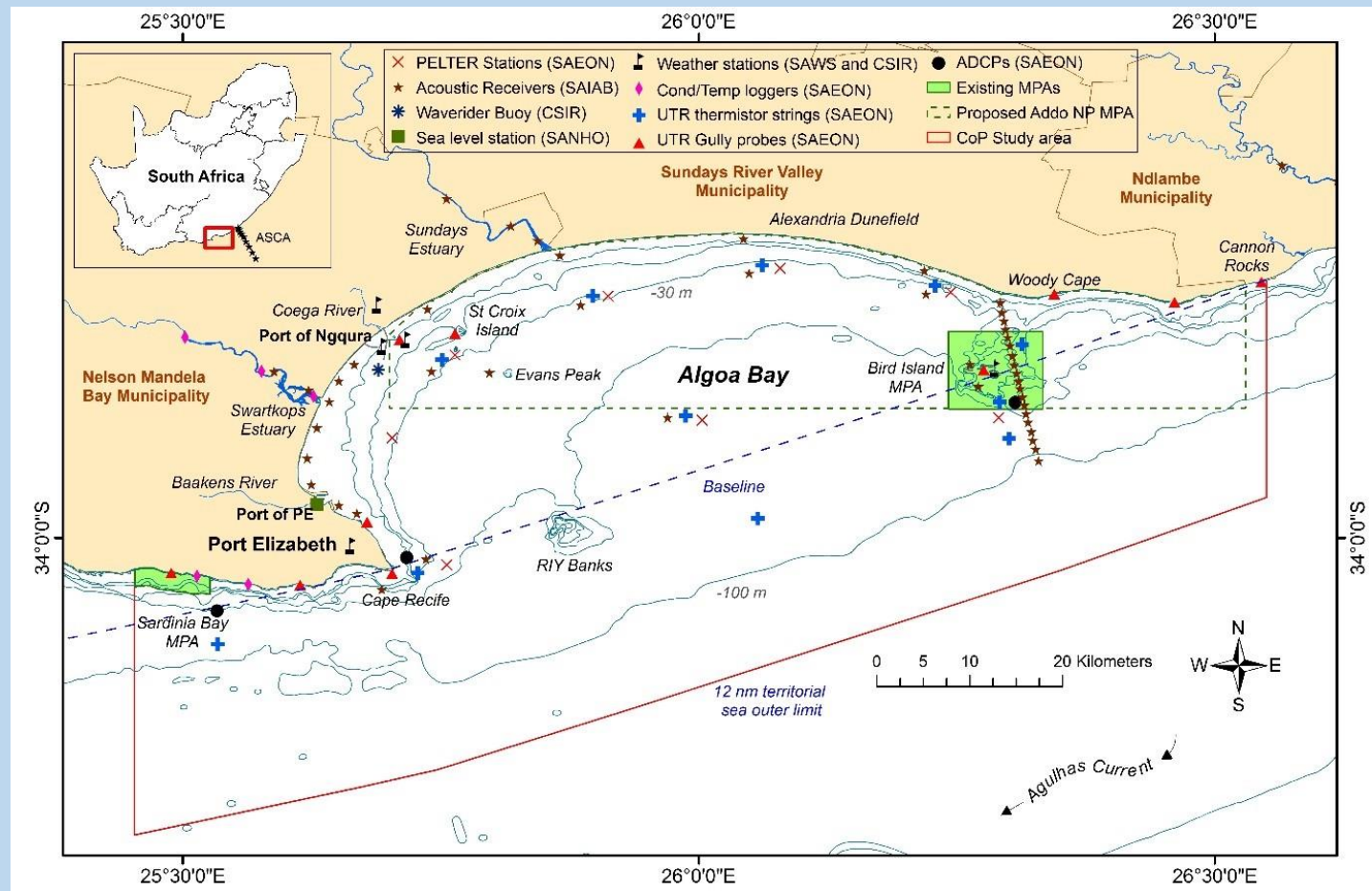
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(MSc. Physical Oceanography)



NELSON MANDELA
UNIVERSITY



ALGOA BAY



Research Aim:

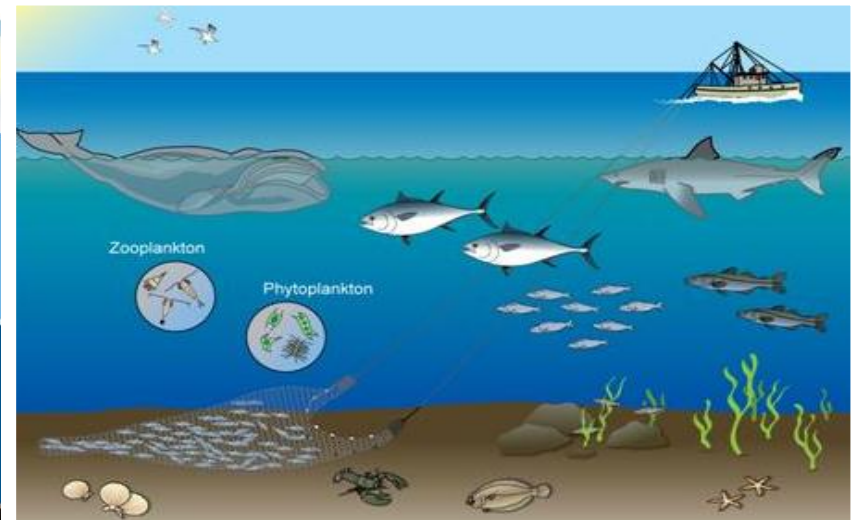
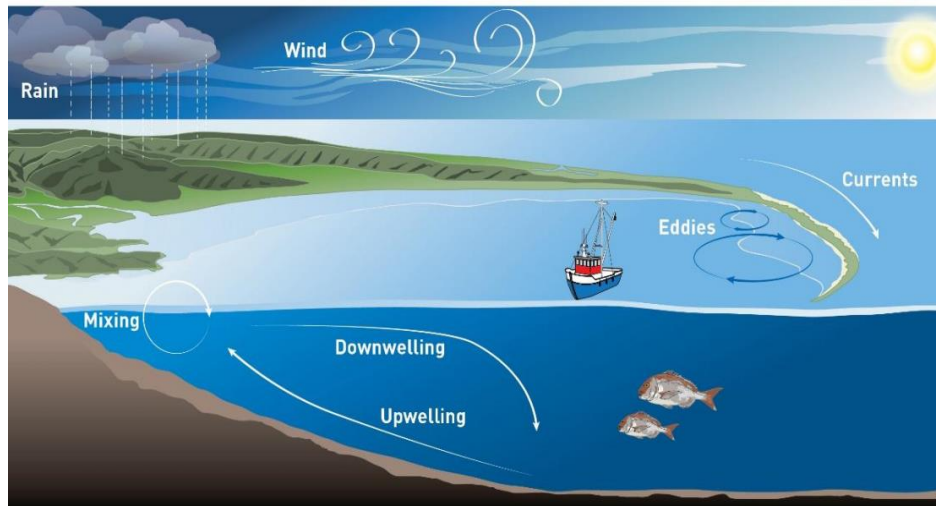
To apply a **systems analysis** framework to marine spatial planning and to explore the use of **system dynamics modelling** as a decision support tool.

Objective:

Develop **system dynamics models** to simulate the complex biophysical marine environment in Algora Bay spanning certain habitats, physical oceanographic processes and levels of biodiversity to identify and evaluate trade-offs between human and environmental needs.

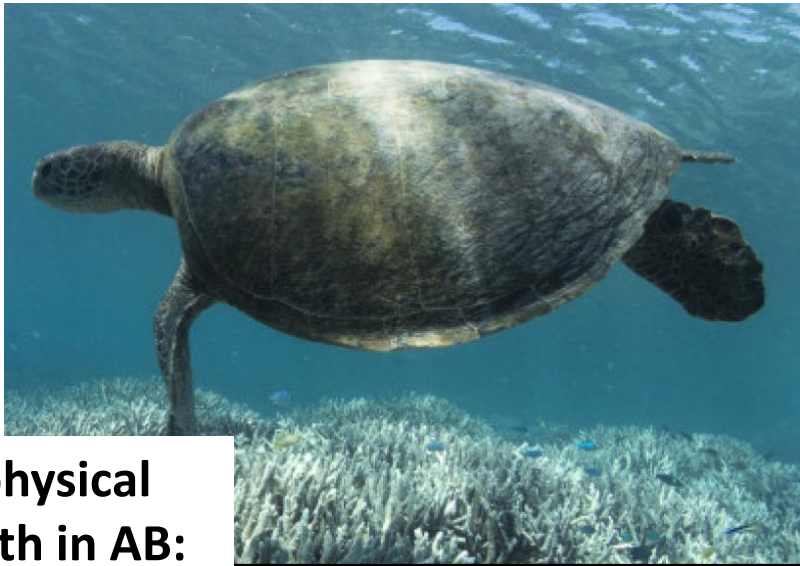
Systems Thinking approach :

Systems thinking is a **holistic approach** to analysis that focuses on the way that a system's constituent **parts interrelate** and how systems work **over time** and within the context of larger systems. The systems thinking approach differs from traditional analysis, by breaking systems down into their separate elements. Systems thinking can be used in any area of research (e.g. medicine, environment, politics, economics).



Scenario matrix

MSP Governance: **Good**



Biophysical
health in AB:
Poor



Biophysical
health in AB:
Good



MSP Governance: **Poor**

Modelling the marine environment using system dynamics

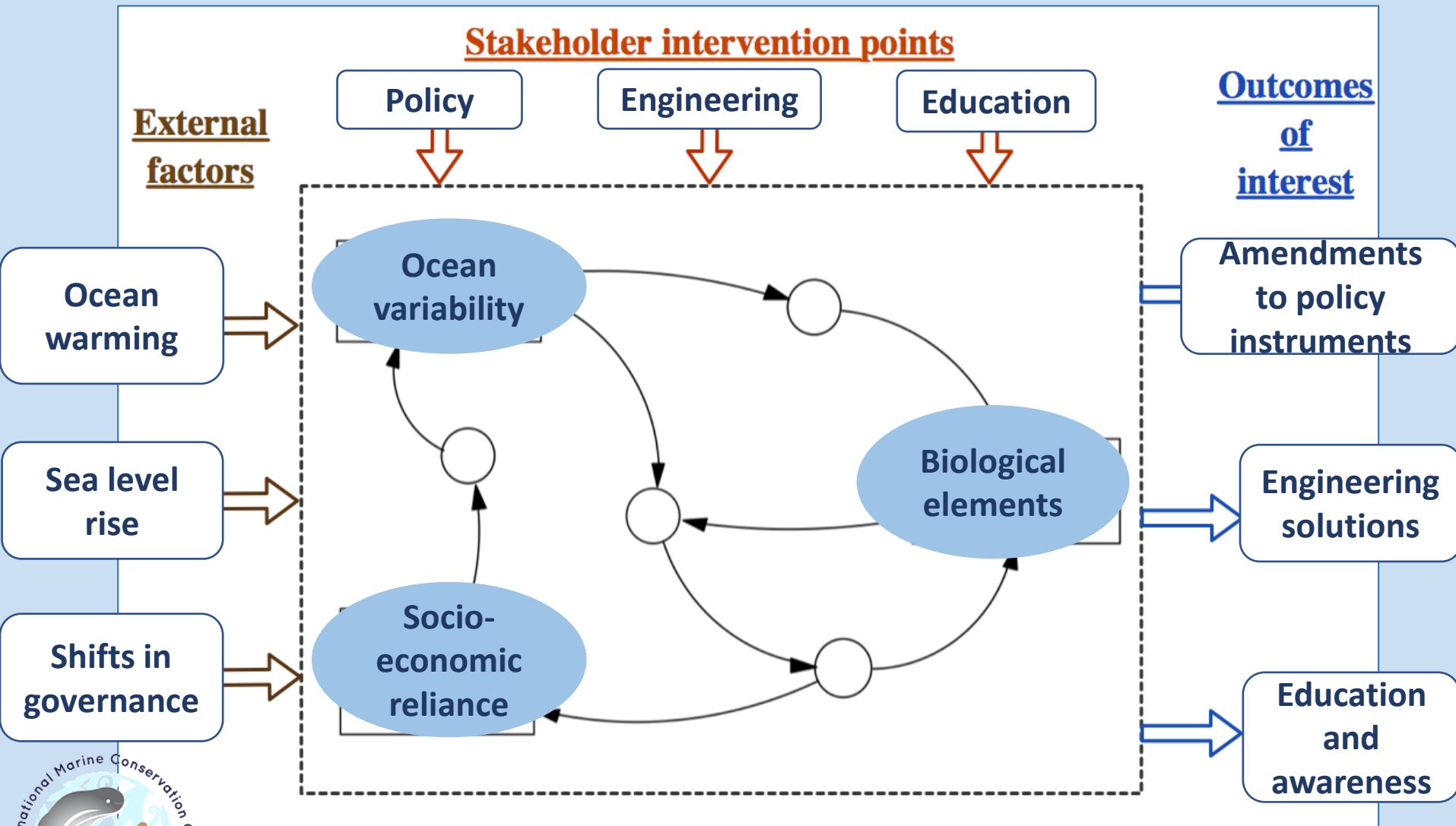
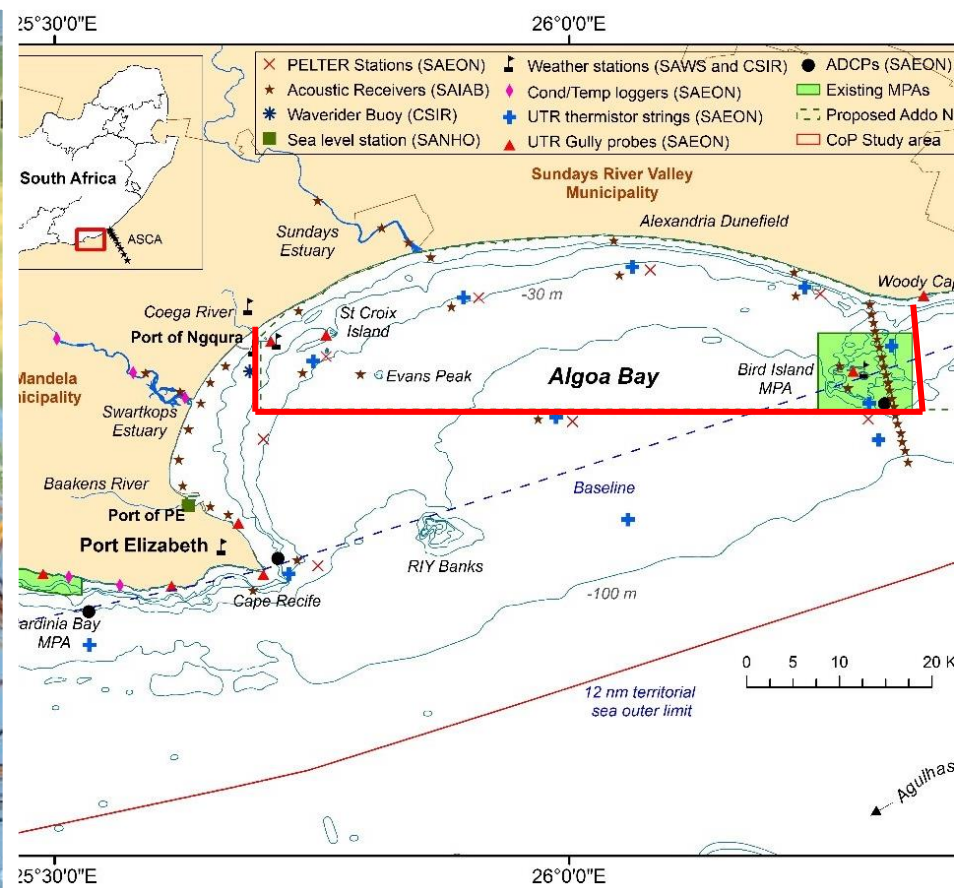
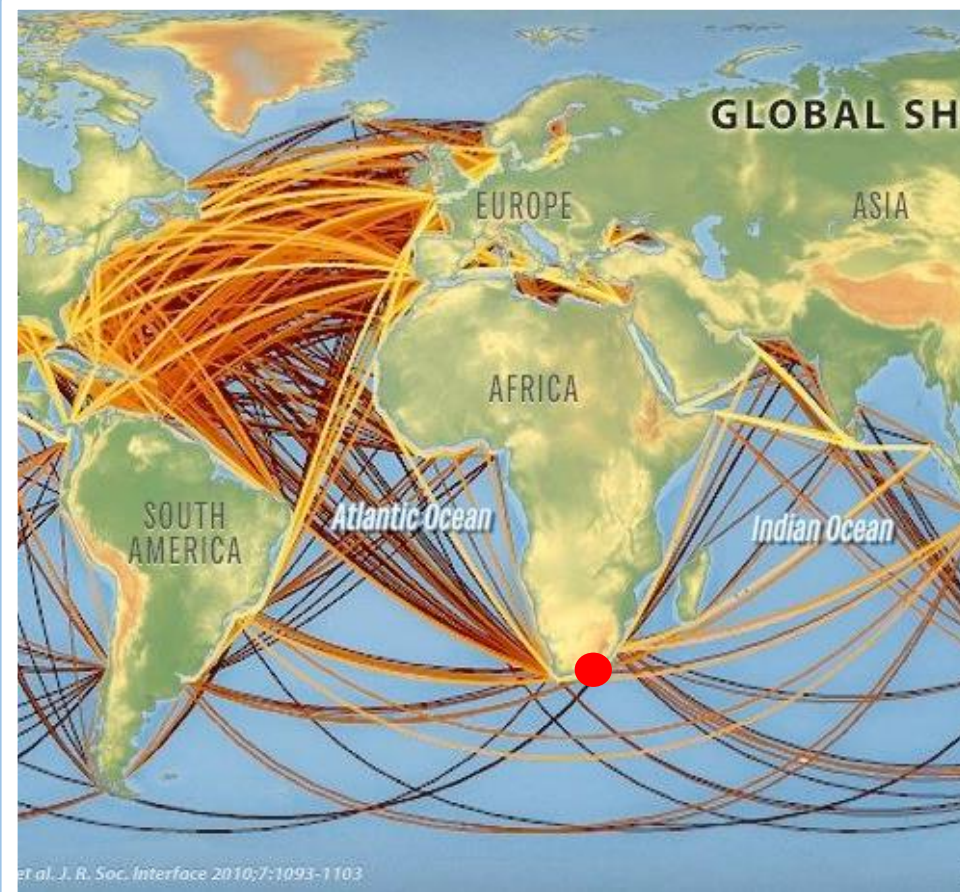


Diagram: Enserink, B et al., 2010. Systems Analysis. In *Policy Analysis of Multi-Actor Systems*.



Offshore bunkering vs. Marine Protected Area

Application of System Dynamics Modelling in Algoa Bay

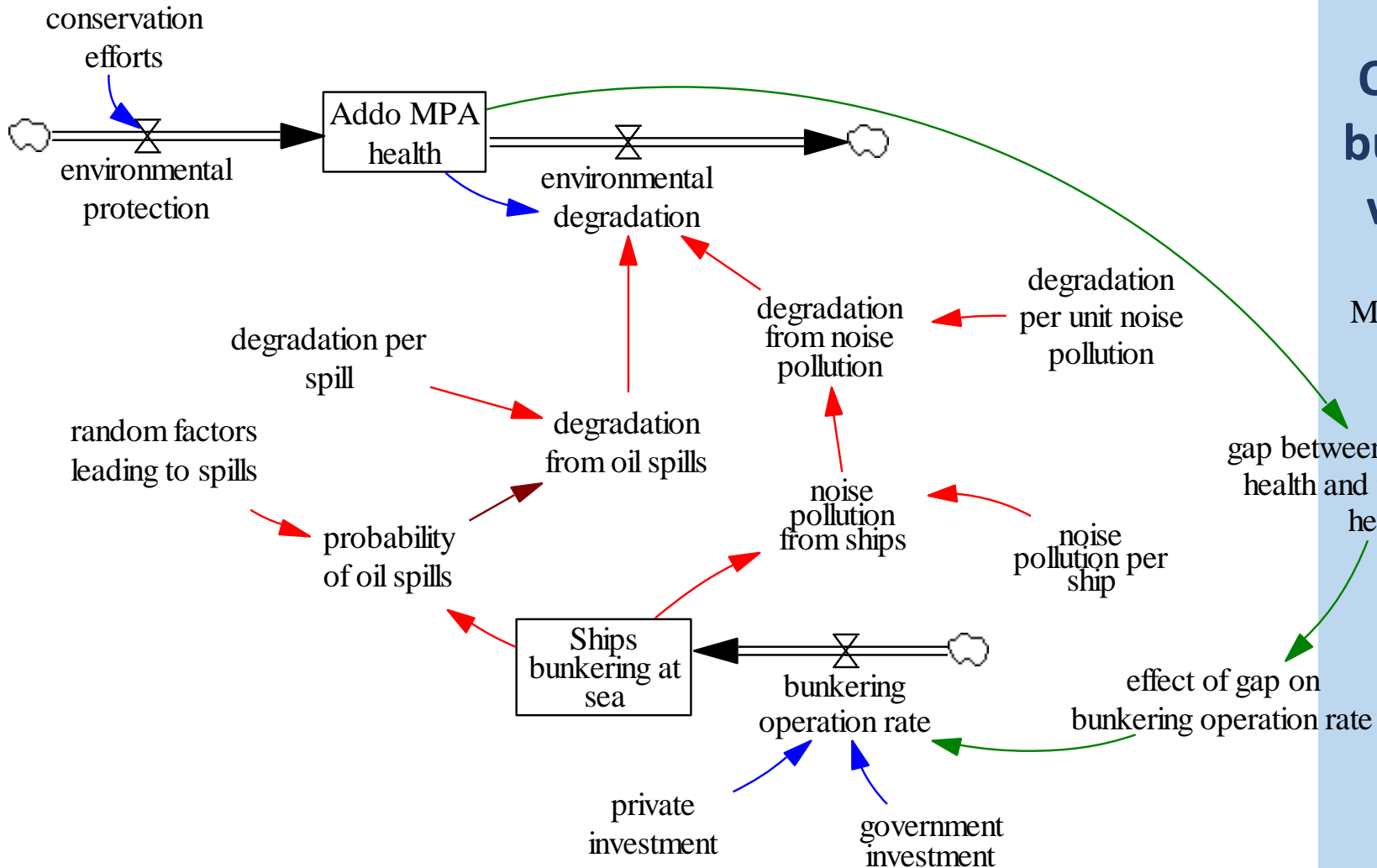


Offshore bunkering vs. MPA

MPA health target

gap between actual MPA health and target MPA health

effect of gap on bunkering operation rate



How does systems analysis support MSP?

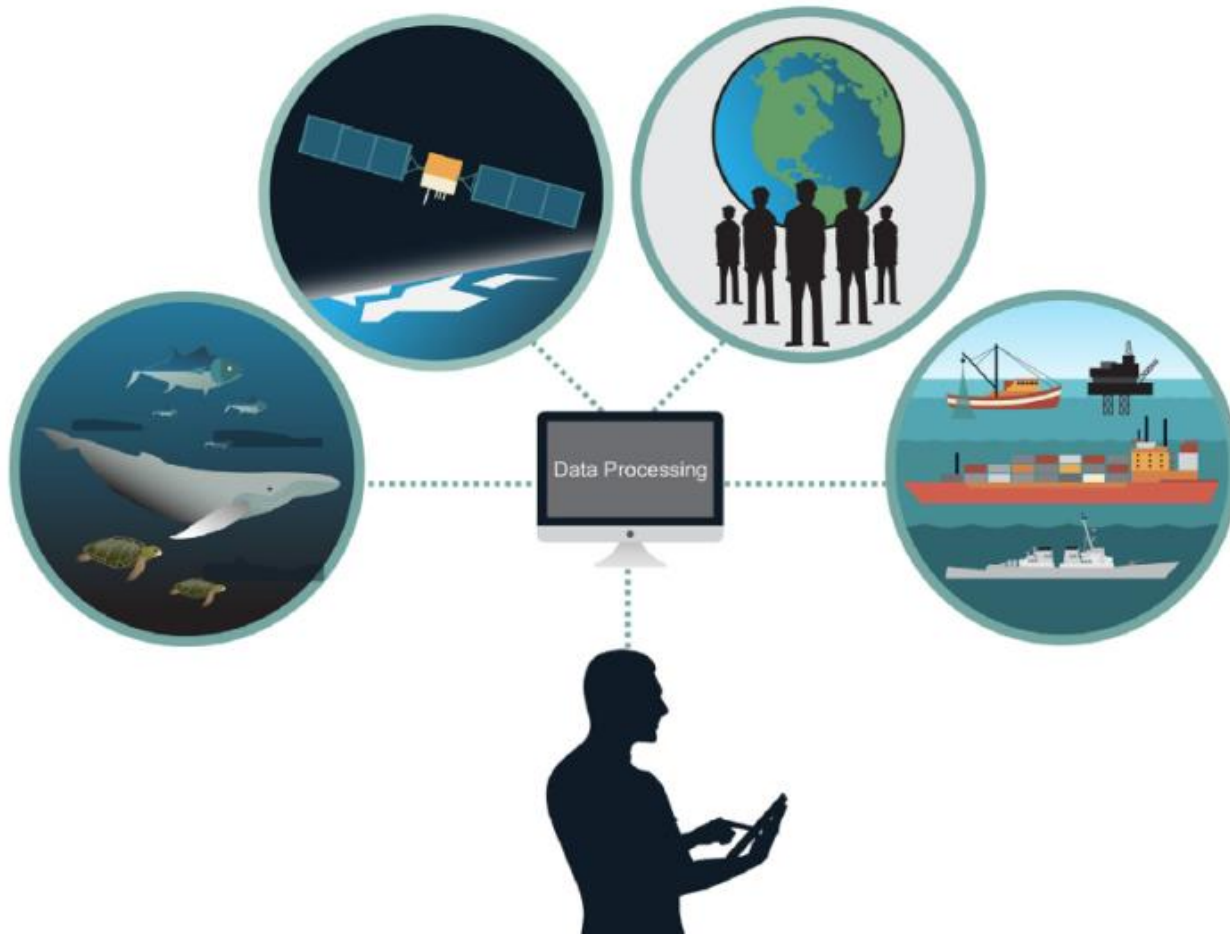
- **Sustainable development**
- **Ecosystem-based management**
- **Spatial efficiency**
- **Collaboration and responsible ocean governance**
- **Precautionary approach**
- **Adaptive management**
- **Coherent planning and management**
- **Use of best available science and information**



Source: Ehler, C. & Douvère, F., 2009. Marine spatial planning: A step-by-step approach toward ecosystem-based management.

“Models are most useful when they lead to counterintuitive results that force the planners to reexamine their intuitive understanding”

– Jay Forrester



Thank you
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