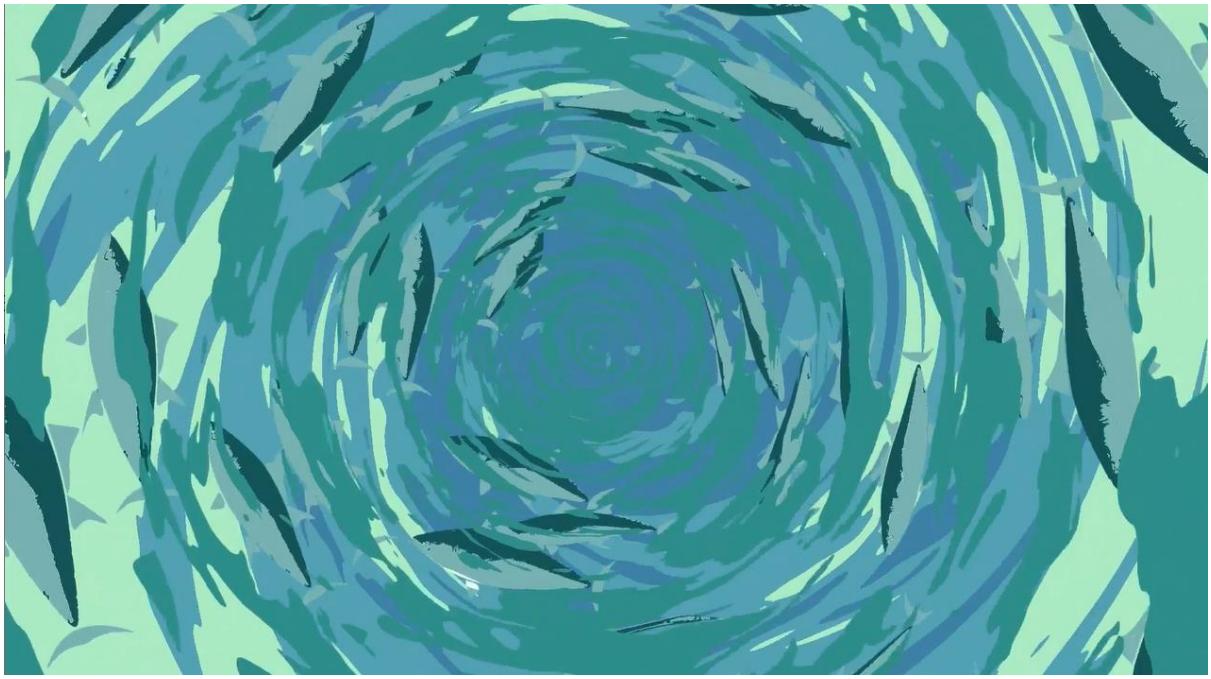
FINAL REPORT -

Belmont Forum Collaborative Research: Marine Research and Innovation for a Sustainable management of Coasts and Oceans (MARISCO)



NELSON MANDELA UNIVERSITY

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Contents

Introduction

This technical report gives feedback on the work done by the NMU team over the contract period for the MARISCO project (Award 03F0836A), that was funded by the National Science Foundation. Co-funding was received from: Algoa Bay Marine Spatial Planning Community of Practice supported by the National Research Foundation (NRF) of South Africa [grant number: 129498], and One Ocean Hub [grant number: NE/S008950/1]. The Humpback Dolphin research was also supported by the Rutherford Foundation.

Project Objectives and Expected Outputs – NMU Team

Objectives

- Develop, merge and synthesize interdisciplinary, global knowledge for understanding the future projections of 25 human pressures on the ocean.
- Develop dynamic ocean management tools, with alternative management strategies;
- Combine natural and social science approaches in management systems

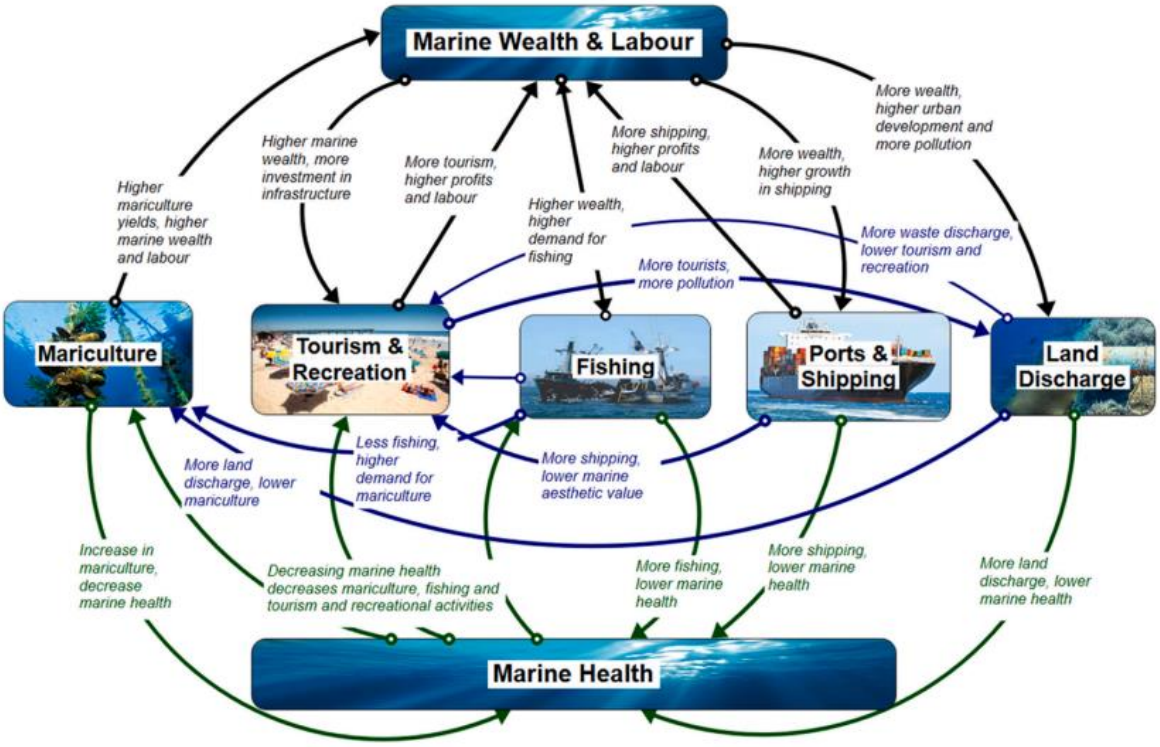
Outputs

- Knowledge needed to define targets for sustainable marine ecosystem management
- Strategies and tools to help ocean managers to implement management approaches

Summary of what has been achieved

A. Publications and Reports

1. A system dynamics model to support marine spatial planning in Algoa Bay, South Africa



Status: Published Vermeulen-Miltz, E., Clifford-Holmes, J.K., Scharler, U.M. and Lombard, A.T., 2023. A system dynamics model to support marine spatial planning in Algoa Bay, South Africa. Environmental Modelling & Software, 160, p.105601. https://doi.org/10.1016/j.envsoft.2022.105601

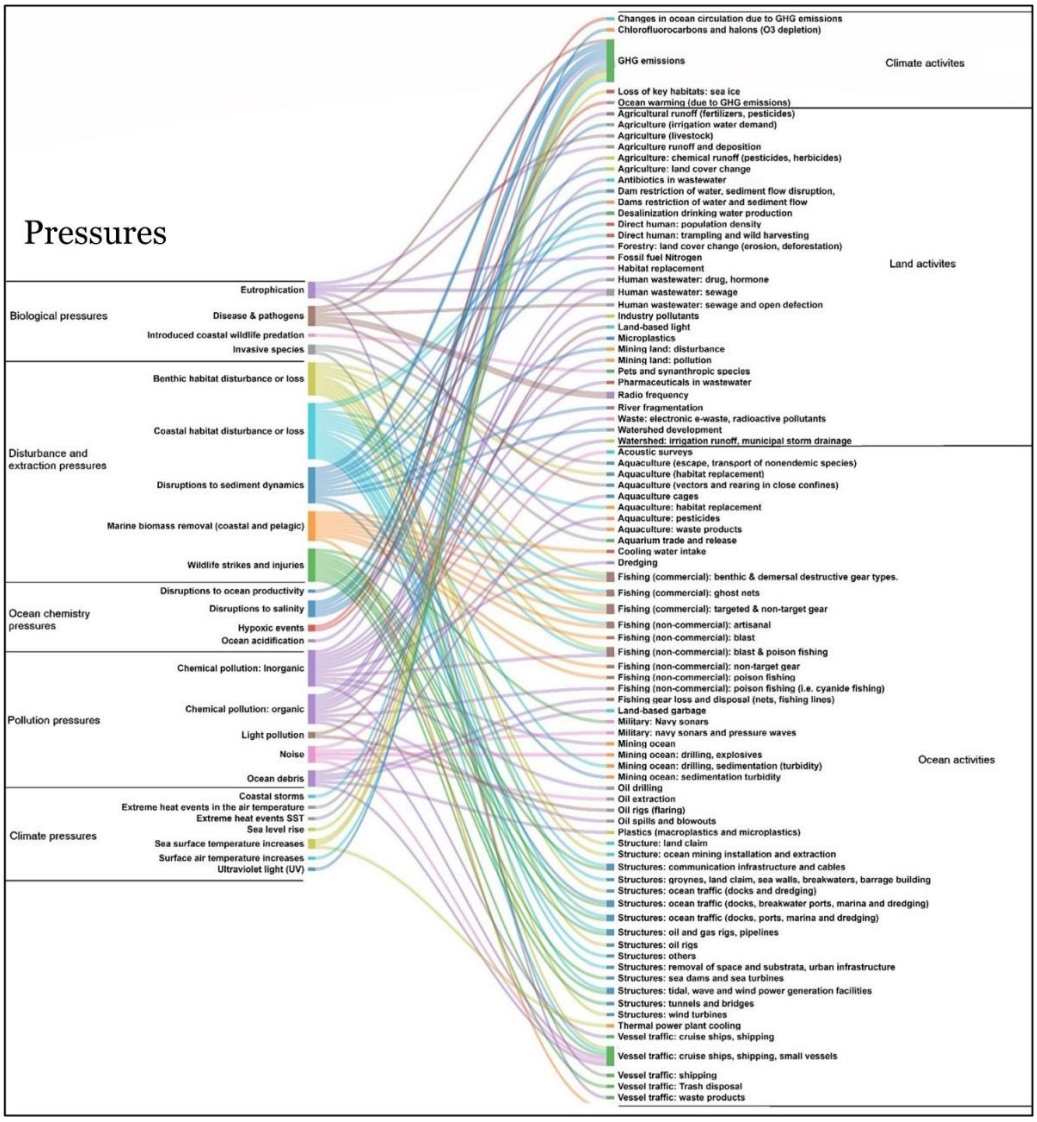
2. Knowns and Unknowns in Future Human Pressures on the Ocean

The article assesses the current state of knowledge of globally forecasted human pressures on the ocean, by means of a literature review of future trends of 25 anthropogenic pressures and the activities that create these pressures. The review covered 1681 articles, of which 67 met the criterion for selection.

The identified 25 pressures were divided into 5 categories – biological disruption, disturbance removal, ocean chemistry, pollution and climate change. A comprehensive framework of all the activities that contribute to pressures was compiled.

The review showed that all pressures that had been forecasted are expected to worsen in the future under business-as-usual scenarios (or similar), and that important, but under-researched pressures exist that need significant attention due to their potential magnitude of influence. The paper highlights research areas that need attention in the next decade and recommends that good precautionary measures and adaptation policies need models that forecast and integrate multiple co-occurring pressures and interactions. These pressures should be prioritised for future research are diseases and pathogens, coastal predation, wildlife strikes, light and noise pollution, organic and inorganic chemical pollution, and disruptions to sediment dynamics.

Status: Published Vargas-Fonseca, O.A., Frazier, M., Lombard, A.T. and Halpern, B.S., 2024. Knowns and unknowns in future human pressures on the Ocean. *Earth's Future*, *12*(9), p.e2024EF004559. https://doi.org/10.1029/2024EF004559



3. From science to policy: evolving marine biodiversity targets

Collaborative analysis of biodiversity targets set out in the Global Biodiversity framework, and the inclusion of additional essential biodiversity variables.

Status: Submitted and reviewed in the journal fronters in Ecology and Environment – waiting publication. Authors; Jan-Claas Dajka, Anne K. Eilrich, Andrea Franke, Benjamin S. Halpern, Kimberley Peters, Bernadette Snow, Amanda Lombard, Ute Jacobs, Silke Laakman, Amelie Luhede, Helmut Hillebrand.

4. Natures Contribution to People survey, Algoa Bay and Wadden Sea

A survey was done by means of sending questionnaires to stakeholders working in ocean management in the Nelson Mandela Bay Metro and Wadden Sea. Through a survey of experts on biodiversity change, we assess what changes in Essential Biodiversity Variables (EBVs) of certain marine organism groups (phytoplankton, macrozoobenthos, birds, fish) mean for coastal NCPs. We found a disproportionate influence of biodiversity change on non-material NCPs compared to material and regulating NCPs.

Status: the survey was done in 2023. Results from both surveys are being collated in an article by Jan-Claas Dajka and Bernadette Snow titled: “Marine biodiversity change presents the most consequences for non-material Nature’s Contributions to People”.

Paper submitted. Authors include Dajka, JC; Verstraeten, A; Levi, S; Menendez, VA; Smith, M; Snow, B; Clark, B; Vargas, A; Hillebrand, H

5. **Policy Brief: Conservation of the Indian Ocean Humpback Dolphin (*Sousa plumbea*) in South Africa**

The article is a policy brief that can serve as a guide towards a multi-disciplinary approach to address pressing threats that the Indian Ocean Humpback Dolphin (*Sousa plumbea*) is facing in South Africa. Globally, *S. plumbea* is classified as Endangered by the IUCN in 2023 and is currently recognised as the most endangered dolphin species in South Africa. The ultimately goal is to develop a Biodiversity Management Plan for the species.

Status: The paper has been edited by more than 10 co-authors that are key stakeholders and future implementors of the Biodiversity Management Plan. It is currently *in prep*, incorporating the comments.

6. **Rostrum abnormalities in the endangered Indian Ocean humpback dolphin (Sousa plumbea) in South Africa**

Status: Published Frainer, G., Elwen, S., Dines, S., James, B., Vermeulen, E., Penry, G., VARGAS-FONSECA, O.A., Atkins, S., Conry, D. and Gridley, T., 2023. Rostrum abnormalities in the endangered Indian Ocean humpback dolphin (Sousa plumbea) in South Africa. *Integrative Zoology*, *18*(4), pp.616-629. https://doi.org/10.1111/1749-4877.12685

7. **Cetacean Red List assessment. Endangered Wildlife trust. Humpback dolphins and bottlenose dolphins**

Status: Under review

8. **International Whale Commission (IWC). Indian Ocean Humpback Dolphin Conservation Network (HuDoNet): Collaborating to enhance conservation efforts for the Endangered Indian Ocean humpback dolphin (*Sousa plumbea*)**

Status: Submitted by the Indian Ocean Humpback Dolphin Conservation Network (led by Shanan Atkins)

9. **Cumulative impacts to global marine ecosystems projected to more than double by mid-century. Halpern, B. S., Frazier, M., Vargas-Fonseca, O. A., Frazier, M., Lombard, A. T. Science.**

Status: Under Review

10. **Early Career Ocean Professionals Declaration on Ocean Negative Carbon Emissions For Our Ocean and Future.**

Status: Published Shenghui Liu et al, The innovation (D-24-01829).

11. **Capacity for ocean conservation in the Global South: Solutions to the challenges faced by conservationist in the Global South. The capacity development workshop at IMCC7**

Status: In Prep

B. Research Projects

1. An exploratory study of the traditional ecological knowledge about whales and dolphins in four coastal areas in South Africa

The research project will document Traditional ecological knowledge (TEK) of whales and dolphins in South Africa and integrate this cultural knowledge into policy making to enhance cetacean conservation.

Status: Ethics approval was granted in April and September 2024. Twenty-five interviews have been held with Traditional knowledge holders from 4 of the 7 study areas along the coastline (Tsitsikamma, Algoa Bay, Coffee Bay, uThukela MPA, Kranshoek, Punta de Oro, and Pondoland). The aim is to complete all interviews and workshops before April 2025.

C. Tools

1. Algoa Marine System Analysis Tool (AlgoaMSAT)

Is an exploratory framework using systems dynamics modelling. The tool incorporates temporal dimensions and supports decision makers and sectors during the marine spatial planning process. The management framework exploratory tool provides a holistic, cross-sectoral overview of human use dynamics and provides a platform for scenario and trade-off analyses. The tool is available for free here: exchange.iseesystems.com/public/esteevermeulen/the-algoa-marine-systems-analysis-tool-algoamsat-user-interface/index.html#page1

2. Development of a Management Plan for Humpback Dolphins

South African government and non-government stakeholders are collaborating to design and implement the planning process for the development of a Biodiversity Management Plan (BMP) of Indian Ocean humpback dolphin (*Sousa plumbea*). Collaborators include representatives from SouSA, DFFE, CapeNature, SANParks, KZN Department of Economic Development, Tourism and Environmental Affairs and the KZN Sharks Board. The process is guided by the Conservation Planning Specialist Group, IUCN. *Sousa plumbea* is the most endangered dolphin in South Africa and is at high risk of extinction, unless a concerted conservation effort takes place. A spatially explicit threat map for humpback dolphins in South African waters that includes their distribution and a hypothesis of where and why particular threats may be causing the population decline and their interaction is being developed. A Population Viability Analysis will use insights gained from the threat analysis to explore population dynamics and assess the predicted efficacy of alternative management strategies designed to improve opportunities for population persistence. A structured action planning workshop involving all stakeholders with expertise in the species and its habitat, and from government and industry, will be used to design a strategy with specific implementation activities that could improve prospects for species conservation. This will culminate in the development of the BMP, which will be submitted to the Minister of Forestry, Fisheries, and the Environment for approval and gazetting.

Status: the project is on hold due to lack of funding.

3. Development of a MOOC – Lessons Learnt in Developing a Marine Spatial Plan for Algoa Bay

A Pilot Marine Spatial Plan has been developed for Algoa Bay. To share lessons learnt with others who may be undertaking a similar process, or who are interested in ocean management, the process that was used to develop the MSP has been compiled in a Massive Open Online Course (MOOC). The MOOC includes 5 Modules and is put together in a manner that is intended to be non-technical, easily accessible, and interactive. The development of the Algoa Bay MSP is built on an ecosystem-based management approach and recognises the notion of the complex socio-ecological ecosystem of the Bay. The value of participatory stakeholder engagement is emphasised, and the novel approach used in the Algoa Bay MSP is illustrated in the MOOC.

The draft MOOC was tested with the Nelson Mandela Bay Municipality Ocean Science Steering Committee and other municipal officials in February 2024. This provided useful feedback on the contents and format of the MOOC, that helped shape the final product. The workshop brought awareness around Marine Spatial Planning and the availability of environmental data in the Metro. The value of the work being done at the University and SAEON in marine monitoring and science to the municipality and how they can better manage the coastal and marine environment was brought across in the workshop (indirectly), and new (or renewed) partnerships were formed. Officials identified the need for specific training around what would be required of the municipality in developing and implementing an MSP.

Status: The MOOC was launched on the Nelson Mandela University's Engage Platform in January 2025. Adverts have been compiled by means of social media images, leaflets and a video. Examples of these are inserted below. The video advert can be viewed at **https://youtu.be/_g2PxfPKVOQ**

MARINE SPATIAL PLANNING

Lessons Learnt in Algoa Bay, South Africa

The Institute for Coastal and Marine Research (and collaborators) is offering a free Massive Open Online Course (MOOC) to share lessons learnt in developing the Algoa Bay Marine Spatial Plan (MSP).

The Algoa Bay MSP is a pilot project for South Africa, which provided researchers an opportunity to test various methods to develop a relevant and inclusive Plan. This Plan aimed to meet national legislation and framework objectives, and respond to the dynamic and diverse environmental, economic and social-cultural features of the local area.

Many valuable lessons have been learnt through the process of developing the MSP for Algoa Bay. The MOOC aims to share the approach and these lessons with others to help build area-based plans; or just for interest.

The MOOC will take you through a series of :

a) 5 Narrated and ***Illustrated Modules***

b) Self-Evaluation and ***Reflection Questions***

The MOOC will be available for free on the Nelson Mandela University's Engage platform and can be accessed at any time by anybody around the World!

If you are interested in doing this Course, please register online. The Engage platform and MOOC can be accessed using the ***link*** below or by ***Scanning*** the ***QR Code*** To Register:

https://cmr.mandela.ac.za/Online-courses

4. A Framework to guide an inclusive systems approach to capacity development and management of Marine Protected Areas

A capacity-development course for conservation staff, stakeholders and communities in the catchment area of the uThukela Marine Protected Areas was done in 2024. The process started with a Terms of Reference to develop capacity of conservation staff through training (online) and an in-person field excursion, addressing marine and estuary management focusing on an Ecosystem-Based Adaptation approach. The process evolved from its inception to its end in January 2025, to adapt to the specific needs of the local context, and to facilitate the development of an inclusive process.

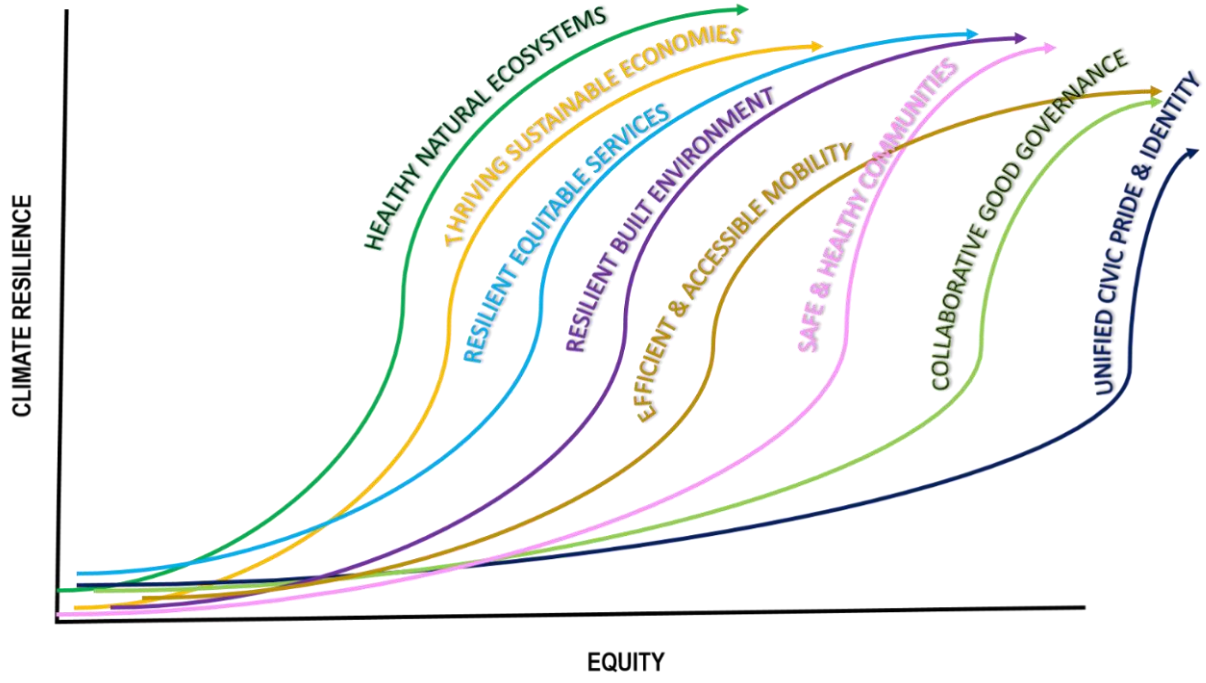
Many important lessons were learned, leading to the development of a Framework that can be used by others to guide an inclusive systems-level process when 1) planning a new MPA 2) developing a Management Plan for an existing MPA or 3) developing capacities for management of an existing MPA. The framework is useful for Algoa Bay for integrated management including the Addo elephant National Park (including MPA) and the marine spatial planning process.

The Framework aims to set general steps to follow in any scenario (i.e. a Generic Framework) based on the uThukela MPA case study. This will be tested and updated if needed during the iSimangaliso MPA case study in 2025.

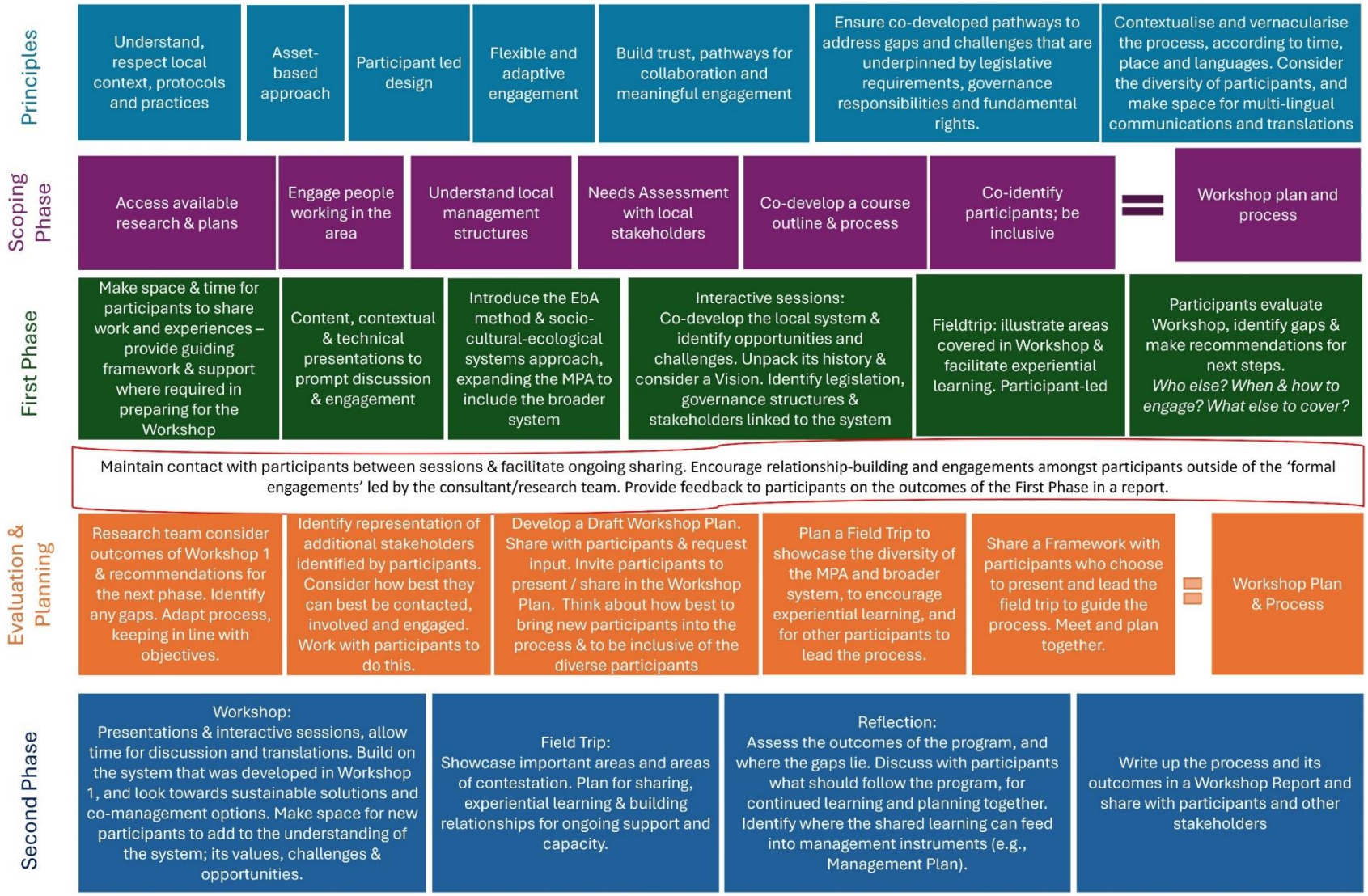
Note: The Framework is inserted on the following page (after Item 5).

5. Integrating Marine Health into a Metro-Scale Climate Resilience Score Card

The Nelson Mandela Bay Municipality (inclusive of Algoa Bay) was selected by the Presidential Climate Commission as a Pilot area for testing the development of a Climate Resilient Development Strategy and Action Plan. A local team has been working with stakeholders to develop the Strategy, which is near completion (target date 12 March 2025). Scoping and extensive engagement has resulted in set of pathways to lead the Metro towards achieving 8 resilience outcomes. These are shows in the image below.



The health of the Algoa Bay ecosystem (that is the focus of the NMU team under the MARISCO project) is part of the 'Healthy Natural Ecosystems' resilience pathway. The Strategy is working towards developing a 'resilience tracking score card', that includes key indicators for each of the pathways that will gauge how well the Metro is doing in shifting towards a more resilient state. The intention is to make the score card accessible to anybody, and to promote the integration of citizen science and community monitoring and reporting into the system. Indicators of marine health that have been developed in the various tools under the MARISCO project are being incorporated in the tracking system. Discussions are underway with the NMBM, other government and parastatal stakeholders, and researchers at SAEON and NMU as to how best to integrate the variables in a user-friendly 'App'.



A Generic Framework to guide the design of a process for development of an MPA and a Management Plan.

D. Workshop with 'Ocean Managers' to engage around MARISCO outputs

A workshop was held with ocean managers whose work has bearing on Algoa Bay in January 2025. People who work at the Municipality, the Coega Development Corporation, Transnet National Ports Authority, the Business Chamber, the Coastal and Marine Research Unit, and private sector attended.

The workshop aimed to:

- Share the various tools, resources and management plans that have been developed for integrated governance and management of Algoa Bay.
- Engage around the products and hear feedback from officials around how they can be used, where the gaps lie, and where further support is needed.
- Consider together what needs to be done to prepare for using the products.

The Workshop was a combination of presentations, interactive discussions and group work. The workshop covered research done around:

1. Cumulative ocean pressures
2. The Biodiversity Management Plan for the Indian Ocean humpback dolphin
3. The ongoing study of TEK and cetaceans
4. The Algoa Marine Systems Analysis Tool (AlgoaMSAT)
5. The Algoa Bay Marine Spatial Plan and the MOOC

In discussions and groupwork, participants were encouraged to reflect on the presentations, and consider the research in relation to the Algoa Bay context and their work. Some of the key feedback and learnings from the various sessions is summarised below:

Cumulative Ocean Pressures

1. The under-researched pressures identified in the literature review done by Alejandra Vargas are relevant to Algoa Bay for
    a. Diseases and pathogens: where rabies outbreaks in seals are a pressure
    b. Coastal predation: especially relevant to ground nesting birds and the Islands in Algoa Bay
    c. Wildlife strikes: a growing significant pressure related to increased shipping activity in Algoa Bay, and boat-based whale watching
    d. Noise pollution: also a growing pressure related to increased shipping, impacting cetaceans and the African penguin
2. A mentimetre survey was done where participants were asked to provide 3 pressures to Algoa Bay, based on their knowledge and experience. Those that were similar to pressures and activities identified in the global literature survey are climate change, pollution and overfishing. Additional pressures identified by participants that were not

identified in the literature review are crime (especially abalone poaching), governance challenges, and poverty and unemployment.

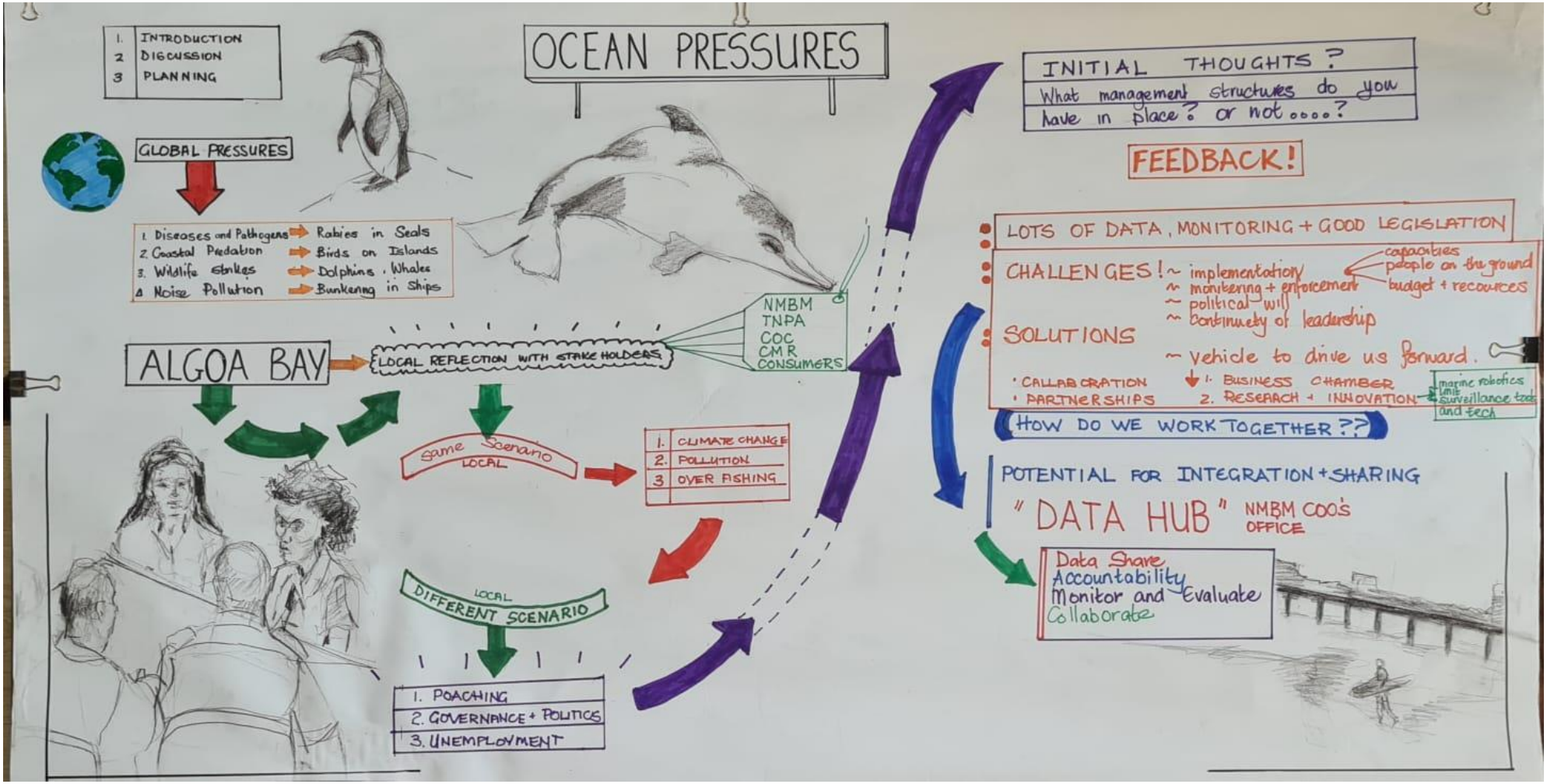
3. Participants discussed in groups what management tools they currently use in their work that help address pressures and management of activities that impact on Algoa Bay. Varied feedback was provided, but majority reported that there is good legislation (i.e. the NEM: Integrated Coastal Management Act, the Environmental Impact Assessment Regulations) and plans are available (e.g. the NMBM Coastal Management Plan (although outdated)). Transnet National Ports Authority identified the many monitoring and management plans they are currently developing. The key challenge highlighted by participants is implementation of tools, legislation and plans, which is a factor of:
    a. Lack of capacity and resources
    b. Political challenges
    c. Poor compliance and enforcement

    Despite these challenges, participants agreed that they should find a vehicle to take them forward and looked at opportunities for collaborating across government departments and with the private sector. The Business Chamber emphasised their drive to expand business in the Metro and the need to retain skills, and the link with a healthy and safe environment.

    Researchers highlighted the value of partnerships and support that can be provided to address these challenges – for example FishForce (compliance and enforcement), SAEON (long-term ecological monitoring), and the Marine Robotics Unit at ENSA (innovative technology for monitoring and surveillance). The clear link between research and action was demonstrated, where the needs of government stakeholders can be supported by student research, through better collaboration.

    Two participants from the NMBM COO's Office mentioned their work around developing a 'Data Hub' with indicators of municipal service delivery, with the objective of a shared portal for data sharing. Considering the strategic position of the Hub, this has significant potential for linking with a metro-scale (inclusive of Algoa Bay) monitoring and evaluation system, and data sharing (as one mechanism of support).

A local 'image harvester' captured the process and discussions in this first section of the Workshop in the image below:


1. INTRODUCTION
2 DISCUSSION
3 PLANNING
OCEAN PRESSURES
GLOBAL PRESSURES
1. Diseases and Pathogens → Rabies in Seals
2. Coastal Predation → Birds on Islands
3. Wildlife strikes → Dolphins, Whales
4 Noise Pollution → Bunkering in Ships
ALGOA BAY
LOCAL REFLECTION WITH STAKE HOLDERS
NMBM
TNPA
COC
CMR
CONSUMERS
Same Scenario LOCAL
1. CLIMATE CHANGE
2. POLLUTION
3. OVER FISHING
LOCAL DIFFERENT SCENARIO
1. POACHING
2. GOVERNANCE + POLITICS
3. UNEMPLOYMENT
INITIAL THOUGHTS ?
What management structures do you have in place? or not....?
FEEDBACK!
LOTS OF DATA, MONITORING + GOOD LEGISLATION
CHALLENGES! ~ implementation
~ monitoring + enforcement
~ political will
~ continuety of leadership
capacities
people on the ground
budget + recources
SOLUTIONS
~ Vehicle to drive us forward.
• CALLABORATION
• PARTNERSHIPS
1. BUSINESS CHAMBER
2. RESEARCH + INNOVATION
marine robotics
unit surveillance tools and tech
HOW DO WE WORK TOGETHER ??
POTENTIAL FOR INTEGRATION + SHARING
" DATA HUB " NMBM COO's OFFICE
Data Share
Accountability
Monitor and Evaluate
Collaborate

The Algoa MSAT

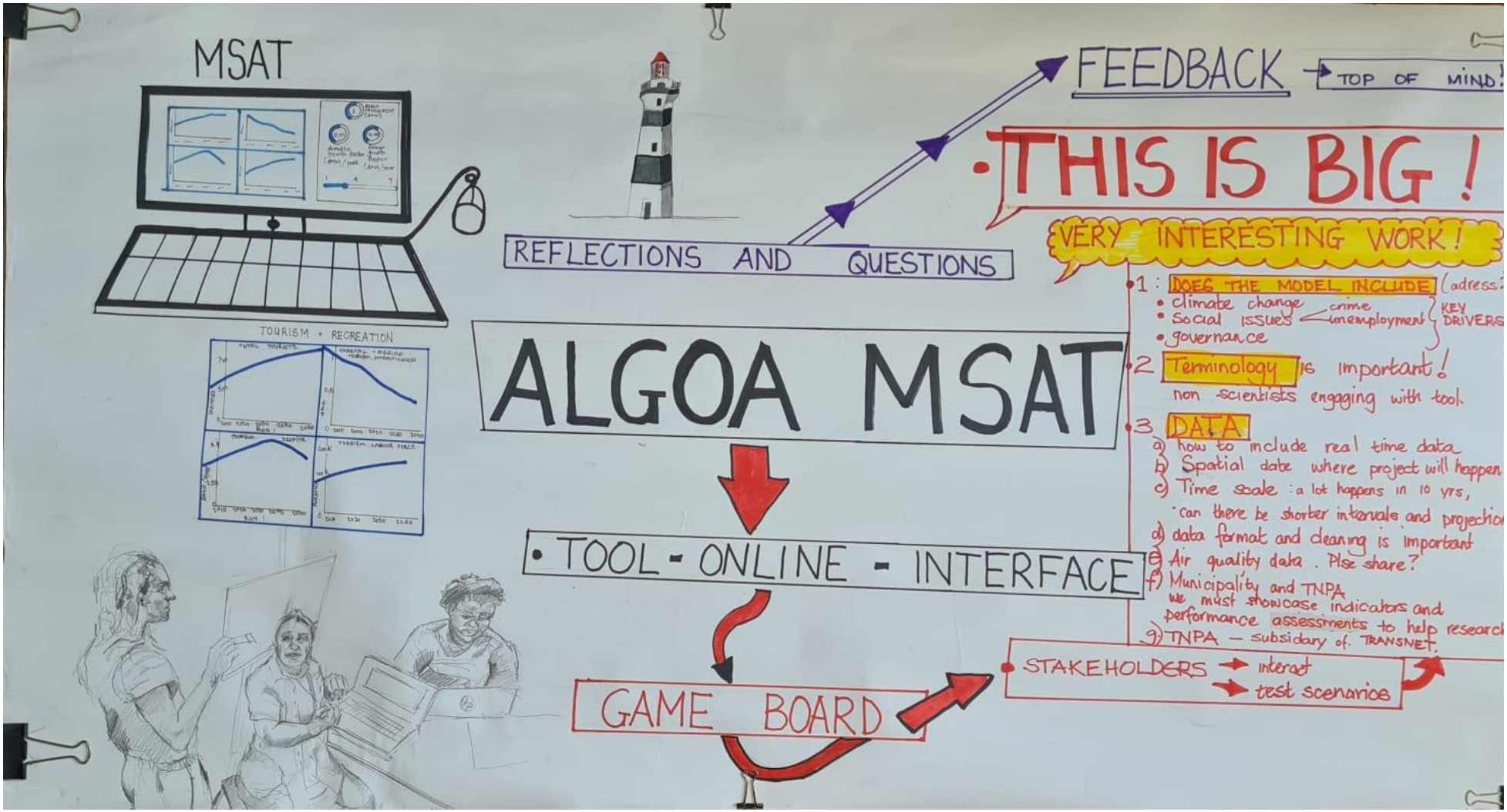
A presentation on how the tool was developed, its application, and its limitations was provided. Participants worked in groups, interacting with the online interface, testing different scenarios. They were requested to reflect on the tool, and provide feedback on the following questions – written feedback is included after each question:

1. What is useful about the tool?
   Yes, the tool helps us to understand the different variables and how they are interconnected. The tool can be very useful in risk management as it allows us to see how impacts affect the marine industry over time. This will be useful to decision-makers.
   Allows for planning and intervention, testing interventions, and monitoring statistical data.
2. What key indicators, for different marine sectors, would be useful to track on a dashboard like this?
   Coastal erosion, dependent on storm water surge frequency, changes in wind velocity and direction. Maybe adding a financial indicator to show how finances can be impacted? Air quality and nutrient levels also need to be included. Measure shipping delays caused by weather events. Crime, capacity, social impact.
   Number of tourist visitors, economic indicators, number of cruise liners, beds occupied in the hospitality industry, job creation, how does cost of living affect tourism?
3. What data do you generate/have that would be useful to incorporate into a tool like this? How could this data be integrated and shared?
   Spatial data is relevant to many fields relevant to mandated areas to manage. For example, taking a spatial map on shipping routes and mapping marine organisms on migration routes.
   Number of vessels in Algoa Bay
   Number of visitors (Tourism), beds occupied in hospitality industry, waste management information
   Air quality, archaeology, palaeontology and built environment – Coega SEZ.
4. What are the gaps?
   The lack of spatial information in the tool – there must be a link between spatial and temporal information.
   There is no real-time availability of data to inform stakeholders/decision makers (i.e. for shorter-term decision making)
   'Clean' data
5. What adaptations would need to be made for your organisation to adopt this kind of tool?
   Using more measurable variables in terms of environmental impacts. For example, measuring nutrient levels of water, and how that relates to economic activity like fishing.
   The tool will need to be simplified for broader application.
   We would need training/workshops on the Tool
   Data should be captured in an open standard format
6. Who would need to work together?
   Work with the University on further education regarding the tool and other research projects regarding sustainable development.
   SAEON
   Municipal directorates
   All 3 spheres of government and state-owned entities
   Multiple stakeholders
7. Further recommendations
   Develop a tool to provide statistics relevant to indicators

A summary of the feedback from discussions is given below:

- The general feedback was that the tool is comprehensive, and has significant potential to help with decision making in the marine space across the various stakeholders that were present
- Questions of clarity were asked around whether climate change, social issues, and governance were incorporated in the sub-models. The limitations of the tool were discussed, including priorities at the time of developing the tool (e.g. the impact of COVID-19 pandemic versus the current emphasis on climate change). Social issues such as unemployment are indirectly reflected under labour and tourism economy, but not directly. These are areas that could be considered for future updates
- A challenge around terminology was mentioned, for non-science users of the tool.
- Questions around data:
    - Can ‘real-time’ data be included?
    - Is it possible to spatially present the projected risks under the different scenarios?
    - Is it possible to include shorter-term projections? A lot changes in 10 years…
    - The importance of ‘cleaning’ data and data format was emphasised
- Officials from TNPA and the NMBM shared that they ‘can do more’ to showcase indicators that they measure in performance evaluations to assist researchers.
- The Coega Development Corporation explained their air quality monitoring system, and expansion plans. This can be shared for inclusion in the Tool. Air emissions from ships is a growing pressure on marine environments that needs to be addressed.
- TNPA mentioned they will soon (in the next 2 years) become a subsidiary of Transnet, that will make it easier for them to make their own decisions, and to interact with tools and collaborate with others.

A local ‘image harvester’ captured the process and discussions in this second section of the Workshop in the image below:


MSAT
TOURISM + RECREATION
FEEDBACK
TOP OF MIND!
THIS IS BIG!
VERY INTERESTING WORK!
REFLECTIONS AND QUESTIONS
ALGOA MSAT
1: DOES THE MODEL INCLUDE (adress?
• climate change
• Social issues ← crime, unemployment } KEY DRIVERS
• governance
2 Terminology is important!
non scientists engaging with tool.
3 DATA
a) how to include real time data
b) Spatial date where project will happen
c) Time scale : a lot happens in 10 yrs,
can there be shorter intervals and projection
d) data format and cleaning is important
e) Air quality data . Plse share?
f) Municipality and TNPA
we must showcase indicators and performance assessments to help research
g) TNPA — subsidary of. TRANSNET.
• TOOL - ONLINE - INTERFACE
GAME BOARD
STAKEHOLDERS → interact
→ test scenarios

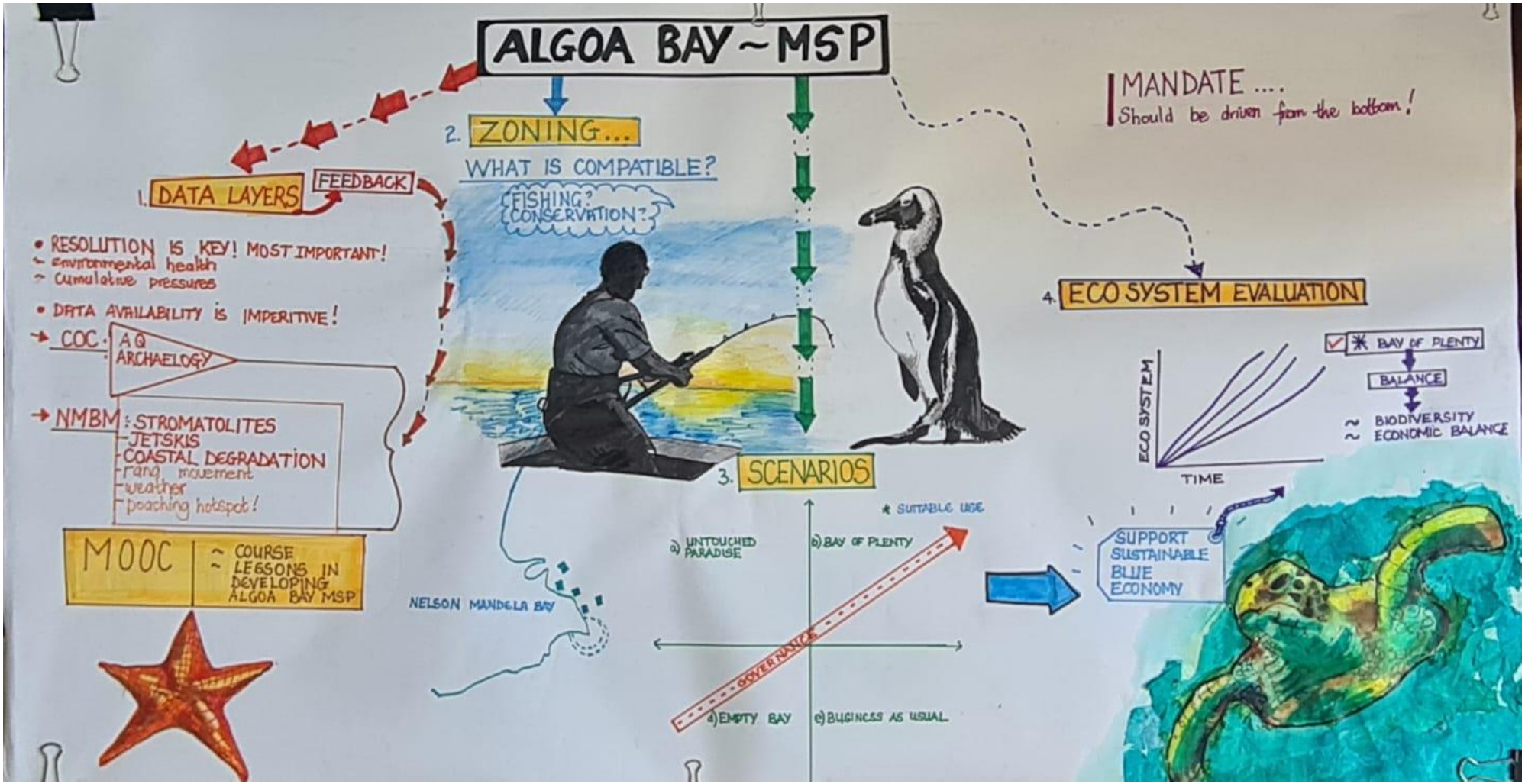
The Algoa Bay Marine Spatial Plan and MOOC

A presentation on the Algoa Bay Marine Spatial Plan was provided in sections, with space for discussion after key concepts: data layers, zonation, scenarios, and ecosystem valuation.

Participants were requested to provide feedback on the data layers used in the Algoa Bay MSP – to highlight where there are gaps, and to consider how the data could be continually updated and included in future iterations of the plan.

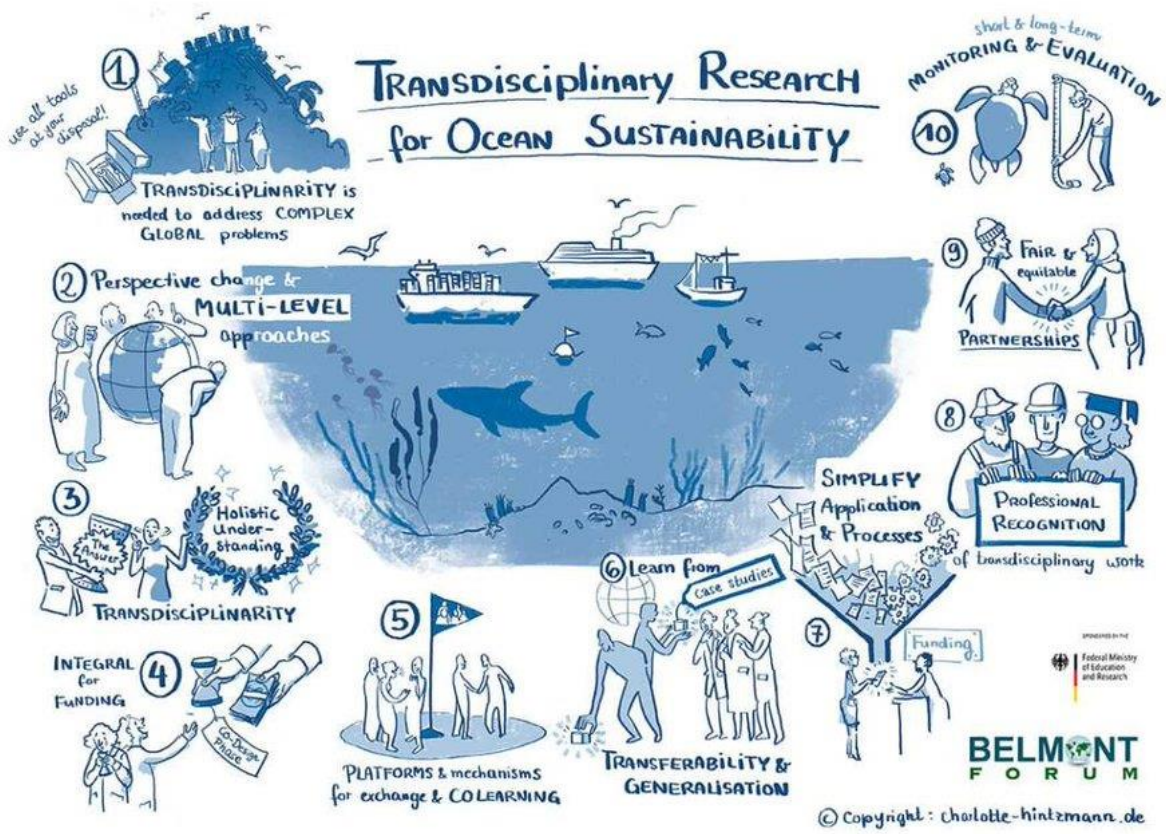
Feedback (written and from discussions) is summarised below:

- Data sharing:
    - The CDC again identified their willingness to share data from the air quality monitoring system, which is extensive and extends beyond the boundaries of the Coega SEZ. Furthermore, they have done archaeological surveys of the SEZ, and results are shared on the SAHRIS system.
    - Request TNPA if possible, to share ships' observations of marine mammals.
    - Data on poaching hotspots: possible obtain from SANParks, DFFE Green Scorpions, SAPS.
- Suggested additions to data layers:
    - Stromatolites, coastal degradation, sand movement, weather data, planned renewable energy infrastructure, poaching, crime, interactions between terrestrial and coastal environments, environmental health features, fish monitoring, wate rand sediment quality, invasive plant species.
- Issues around scale were discussed, where some activities or features need to be mapped at a finer resolution – the importance to develop the MSP at a local scale to incorporate the local context was emphasised
- The value of including stakeholders throughout the process to develop a well-informed plan was recognised
- There was a resounding feeling that data is key to these processes – accessible, 'clean', format, fine-scale
- 'Mandate' to develop and implement the MSP was discussed. All agree that while DFFE is responsible for developing Area-based plans, the process must be bottom-up and local stakeholders must drive the process.


ALGOA BAY ~ MSP
MANDATE ....
Should be driven from the bottom!
1. DATA LAYERS
FEEDBACK
• RESOLUTION IS KEY! MOST IMPORTANT!
~ environmental health
~ cumulative pressures
• DATA AVAILABILITY IS IMPERITIVE!
COC: AQ ARCHAEOLOGY
NMBM: STROMATOLITES
-JETSKIS
-COASTAL DEGRADATION
-rang movement
-weather
-poaching hotspot!
MOOC
~ COURSE
~ LESSONS IN DEVELOPING ALGOA BAY MSP
2. ZONING...
WHAT IS COMPATIBLE?
FISHING? CONSERVATION?
3. SCENARIOS
NELSON MANDELA BAY
SUITABLE USE
a) UNTOUCHED PARADISE
b) BAY OF PLENTY
GOVERNANCE
d) EMPTY BAY
e) BUSINESS AS USUAL
4. ECO SYSTEM EVALUATION
ECO SYSTEM
TIME
BAY OF PLENTY
BALANCE
BIODIVERSITY
ECONOMIC BALANCE
SUPPORT SUSTAINABLE BLUE ECONOMY

Recommendations for future research/work:

1. Continue the development of the Metro's Climate Resilient Development Score Card, including Marine Health indicators developed through the MARISCO programme research tools.
2. Develop a short course for Municipal officials, focusing on capacities required to participate in development of an MSP, and as the implementing agent.
3. Consider comments submitted on the AlgoaMSAT and if it is possible to update the Tool to address these:
    a. Climate change and cumulative pressures
    b. Real-time data and shorter-term projections
    c. Incorporating spatial aspects is a limitation of the tool. Are there other tools that can be used to address this?
    d. How can social and governance challenges be built into the process and tool?
4. Training workshops on the Algoa MSAT with government officials.
5. The need for ongoing **collaboration** and strengthening **partnerships** is clear. This needs to be facilitated.
6. **Transdisciplinary research** enabled participations, ownership and impact. Recommended for future research collaborations with other knowledge holders.



Final CRA project workshop graphic harvester output (Bernadette Snow participated in the workshop – representing MARISCO Algoa Bay) held in Germany.