

INTEGRATING the ocean, climate change adaptation and mitigation, biodiversity (ecosystem restoration) and human rights IN PRACTICE:

Evidence of multiple benefits and replicable methods from Algoa Bay, South Africa

THIS case study summarizes evidence of multiple benefits and replicable methods in integrating the ocean, climate change adaptation and mitigation, biodiversity (ecosystem restoration) and human rights.

This evidence and methods arise from the research carried out in Algoa Bay, Eastern Cape Province, South Africa, by a multi-funded project at Nelson Mandela University (the “Algoa Bay project”), to which One Ocean Hub researchers and funding contribute to different extents to support integration across scales and synergies across different ocean research projects.

Connecting research actions across scales

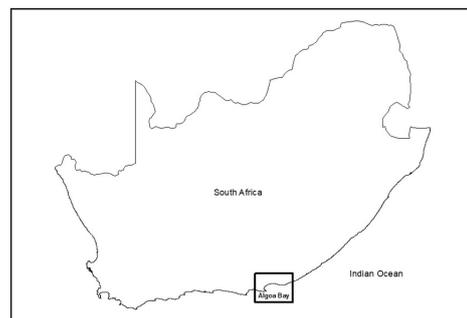
The research team focused on the “restoration of estuaries using a social-ecological framework¹” in Swartkops Estuary and catchment area. Estuaries (land/ocean interface) are negatively impacted in the Bay, by industrial, household and agricultural discharges (heavy metals, nitrogen, phosphates) –examples of land use that drive biodiversity loss and marine pollution.

Multiple nature-based solutions are being researched (wetlands, algal ponds), sustainable urban drainage systems and biomimicry (using sedimentation, filtration, ozonation, biodegradation and floating wetlands) to clean water from pollution without the use of chemical substances.

Algoa Bay as a case study for addressing jointly ocean, climate and biodiversity

Algoa Bay, Eastern Cape Coast of South Africa:

- is a **biodiversity** hotspot (with marine ecosystems ranging from coral reefs, muddy bottoms, estuaries, open ocean, and islands)
- has an interesting and complicated **oceanography** owing to the regional weather system and proximity to the Agulhas Bank and Agulhas Current;
- encompasses vibrant **socio-economic systems**, encompassing various sectors that can both benefit from healthy ecosystems, and can also be drivers of biodiversity loss (eco-tourism, fisheries, ports, trade, international water sports); and
- has experienced **climate change impacts** resulting in severe flooding, weather events and storm surges and lately a crippling drought. As of November 2021, only 11% of water is available in the dams for the Bay.



¹ Adams, JB, et al. WATER RESEARCH COMMISSION Project C2020/2021-00076

Co-benefits arising from ecosystem protection and restoration

The estuary ecosystem restoration contributes to

- enhancing **human health**: women’s and children’s health negatively impacted by poor water quality when using the estuaries and nearby beaches;
- **Climate mitigation**: protecting salt marshes and submerged seaweeds contributing to carbon absorption, which are negatively impacted by pollution;
- **climate adaptation**: ensuring access to fresh water in the face of water shortages due to climate change impacts;
- **further biodiversity benefits**: healthier wetlands and algal ponds that provide habitat for many bird species;
- **Cultural services**: supporting continued spiritual/religious connections along the estuary (Sangoma ritual sites; church for christening);
- Supporting the local **livelihoods** of subsistence fishers and bait collectors; and
- Supporting **tourism and recreation**, as improvement of water quality improves attractiveness and safety of use.



Gavin Snow

Subsistence Fishers collecting bait to sell.



CMR

Urban estuaries heavily impacted by industry.

THE RESEARCH TEAM took a participatory action research approach: they included affected communities in setting up restoration interventions, hosting water quality analysis equipment, and integrating their knowledge in tool design.

Continued involvement is supported by smart approaches to governance: an environmental legislation smart tool is being developed to provide an effective guide to stakeholders and users of the Swartkops Estuary and catchment area. This tool will outline legislation surrounding specific land-use activities, responsible authorities that implement the legislation, the type of authorization required and the process that needs to be followed. The tool also identifies enforcement actions and fines in the case of non-compliance².

The **One Ocean Hub** is supporting the sharing of learning across scales to maximize international impact. Hub research clarifies how these benefits contribute to the protection of local communities’ human rights to health, water, culture and food, as well as women’s and children’s rights (including lessons learnt and methodologies). This is particularly crucial to contribute to the UN Decade for Ecosystems Restoration, where coastal and marine ecosystem restoration is under-represented; the UN Decade for Ocean Science; international human rights processes; the Convention on Biological Diversity; and the International Year of Artisanal Fisheries.

² Mmachaka, T. (2020). Smart catchment management and application in Swartkops River. PhD Thesis, Proposal, Department of Botany, Nelson Mandela University, South Africa.

Consolidating progress with further linkages

- **Integrating land and freshwater into Marine Spatial Planning:** coastal and marine ecosystems are managed separately, from a legal and administrative perspective, in South Africa, and this is also true for land and freshwater. To integrate ecosystem protection and restoration, as well as climate responses, the team supported the integration of land and freshwater ecosystems into marine spatial planning. This is in consideration that on the one hand, ocean (circulation system/upwelling) determines the climate that supports ecosystem services in the area, and, on the other hand, that climate change requires changes in marine space and land use.
- **Combined nature-based solutions with urban planning:** addresses infrastructure break-downs that are also responsible for ocean/freshwater ecosystem protection and restoration as part of building resilient cities through the Cities & Climate Change in Coastal Western Indian Ocean project. This project identifies capacity to mitigate and adapt to climate change, and through co-design develop climate services, towards resilient cities.

THE ONE OCEAN HUB is an international research collaboration for transformative ocean science. It brings together coastal people, 130 researchers (marine and social sciences, law, humanities and arts) and decision-makers (from local to international) to learn from different knowledge(s) and voices to support inclusive and integrated ocean governance so that people and the planet can flourish.

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Innovative participatory approaches

- **Collaborative system modeling for working across sectors:** the team co-developed Dynamic Models with maritime sectors (eco-tourism, fisheries, shipping). First, they are collecting these sectors' stories (how they've seen the system responding to change) and the researchers model this knowledge, using scientific data to support identified trends in their stories. This in turn led to creating visual user-interfaces to support decisions (identification of levers of change, entry points & winners/losers) to understanding dynamic changes that can't be shown in marine spatial plans.
- **Respectfully integrating traditional knowledge:** the team run co-researchers' workshop to produce data with indigenous and local knowledge holders. Art-based methodologies such as photo stories, film and representations of value (art, poem, stories) are used to reflect their knowledge and allow space for their knowledge to be considered in the design of governance tools. As part of this process, co-researchers map (geo-locate) culturally important spaces that allows marine planners to overlay cultural data into marine spatial plans.

Both innovations allow to integrate dynamic (space/time) into marine spatial planning.



Heather Snow

Motherwell Canal, Swartkops River.