

The Algoa Bay Marine Planning Tool: An Exploratory System Dynamics Model to Support Marine Planning and Management.

Estee Ann Vermeulen^{*1,2}, Jai Kumar Clifford-Holmes^{2,3}, Teun Sluijs², Ursula M. Scharler⁴, Amanda Talita Lombard²

¹ *Department of Oceanography, Nelson Mandela University, Port Elizabeth, South Africa*

² *Institute for Coastal and Marine Research, Nelson Mandela University, Port Elizabeth, South Africa*

³ *Institute for Water Research, Rhodes University, Grahamstown, South Africa*

⁴ *School of Life Sciences, University of Kwa-Zulu Natal, Durban, South Africa*

**esteever01@gmail.com*

Keywords:

Algoa Bay, Blue Economy, Integrated Ocean Management, Marine Spatial Planning, Marine System

Abstract:

Algoa Bay, the largest Bay in the Eastern Cape, South Africa, is a densely utilised marine space. The high degree of dependency of human activities on the marine environment poses significant pressure on the health of this environment and further introduces conflict between users in the marine space. Future coastal and marine development in Algoa Bay is expected to exacerbate these pressures and conflicts, stressing the need for a holistic, integrated approach to ensure strategic and sustainable management of the area. Integrated Ocean Management (IOM) approaches, such as Marine Spatial Planning (MSP), require context-specific assessments of socio-ecological marine systems in order to develop targeted, feasible policies and progress their implementation. To do this, multiple competing and conflicting sectoral objectives need to be integrated to improve decision-making in MSP. An appropriate analytical tool to achieve this goal is a system dynamics model that incorporates various sectors and provides solutions that can be translated into planning and policy. This study reports on the development process of the Algoa Bay Marine Planning Tool, a system dynamics model that aims to explore the socio-ecological dynamics of human uses in Algoa Bay. The involvement of stakeholders through the Algoa Bay Collaborative Dynamic Modelling Process (AB CoDyM) assisted in model formulation and verification and demonstrated a collaborative approach to MSP through a shared understanding of the conflicts associated with marine planning and management. Such tools and collaborative processes are critical towards developing marine policies and management pathways for a sustainable blue economy.