

SHORT SUMMARY

4.20.003 Tools to assess cross-sector interactions

INTRODUCTION

The report reviewed the tools being used to assess trade-offs among industries when planning for blue industries. A survey of ocean industry stakeholders was undertaken to identify the tools they currently use and key challenges they face in assessing cross-sector interactions.

KEY POINTS

Multiple ocean sectors compete for space and resources, creating potential conflicts but also opportunities to plan for synergistic outcomes that benefit multiple sectors.

The review highlighted the different modelling tools (that vary in complexity) that are needed at different stages of the planning process, including to support site selection for new infrastructure and the management of cross-sector interactions.

- △ stakeholder concerns regarding obtaining social licence;
- △ limitations in baseline and monitoring data;
- △ cross-sector interactions and feedbacks between sectors and the environment; and
- △ use of integrated-assessments to address site selection and operational impacts of multiple sectors.

THE CHALLENGE

Marine coastal areas are quickly becoming space-limited as blue economy industries expand. The cumulative effects of their expansion and overlap can negatively impact marine environments. Furthermore, interactions across industry sectors cause trade-offs in economic, spatial and operational outcomes.

The assessment of cross sector interactions can be time consuming due to the fundamental lack of readily accessible data to support stakeholder engagement and planning, a lack of clear guidance on the data that needs to be synthesized, and lack of appropriate tools to assess cross-sector interactions.

THE OPPORTUNITY

A number of modelling tools have been developed that assess the significant issue of cross sector impacts, though they vary in their complexity, data needs and application.

By reviewing and identifying the tools and frameworks previously utilised to support blue development planning, this project helps identify environmental, economic and social wins and help streamline impact assessments for legislative approvals processes.

By also surveying industry experts, we were able to identify addition tools that were not identified in the literature review, helping bridge the gap between information in industry and academia.

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OUR RESEARCH

Literature review

We reviewed and classified modelling tools into four categories: conceptual/semi-quantitative models, spatial static tools, spatial prioritization tools, and process/dynamic modelling tools. We found that multi-sector studies generally approach the assessment of cross-sector interactions using a range of tools that fall within spatial modelling and prioritization frameworks. The most well-developed modelling tools for assessing multiple Blue Economy sectors are spatial prioritisation tools such as Marxan and multi-criteria decision support tools, and spatial static tools such as cumulative effect mapping using GIS.

In contrast, dynamic ecosystem and oceanographic models are well developed for single sectors, particularly commercial fisheries, but have been less commonly applied in multi-sector studies.

The review also found studies that had site selection as a priority primarily utilised spatial prioritisation approaches, whereas studies examining operational impacts tended to use conceptual and semi-quantitative methods to assess trade-offs. In both instances, tools that simulate change in ecosystems over time are under-utilised, and our results indicate that there is room to develop and utilise more complex approaches to assess cross-sector interactions.

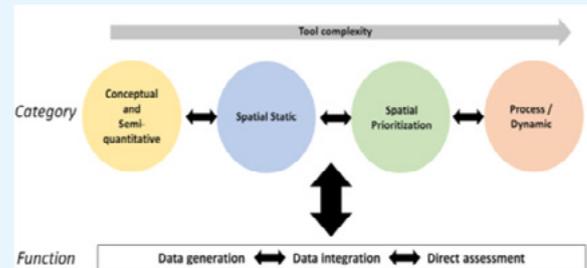


Figure 1. Conceptual integrated modelling toolbox to support complex decision making for the Blue Economy. A variety of different modelling tools with varying complexity and function are needed throughout the planning and implementation process.

Industry survey and challenges

The survey of industry stakeholders identified four primary needs. First, there was a need to address stakeholder concerns, primarily to obtain social licence, and address negative social perceptions of industries. Second, there was a need for more baseline and monitoring data for environmental impacts assessments, including understanding of the social and cultural values of coastal and marine environments. Third, there was a need to address cross-sector interactions and account for feedbacks among multi-sector operations and the environment. Finally, the survey identified a desire for more integrated assessments (e.g., ecological and economic) and real-time data integrated web tools for assessing cross-sector interactions and site selection.

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OUTCOMES

A number of different modelling tools (with varying complexity) are needed at different stages of the planning process to support site selection and the management of cross-sector interactions. Assessing the environmental, and operational suitability of sites for blue infrastructure in conjunction with operational impacts, trade-offs and decommissioning considerations requires:

- △ a toolbox of approaches that covers a range of spatial, temporal and trophic scales (e.g., biogeochemical to ecosystem; instantaneous monitoring to system lifecycle; and plankton to large marine mammals).
- △ tools that capture interactions and feedbacks among sectors, and between sectors and the environment, without being unnecessarily complicated (i.e. they must be tractable to use and allow for effective communication of content and findings).
- △ continued synthesis of approaches and tools across disciplines (e.g., aquaculture, fisheries, marine renewables, oil and gas).
- △ finally, information generated by planning tools must be easily accessible, as stakeholders identified the need for integrated and accessible online tools for assessing multi-sector impacts.

NEXT STEPS

Tools vary in their complexity, data needs, and function, therefore no single tool or process can comprehensively satisfy all stakeholder objectives. We make a number of recommendations to the BE CRC to address cross-sector interactions and stakeholder concerns. These recommendations should be explored in conjunction with the development of a toolbox to support complex decision making that involves complex trade-offs for the Blue Economy.

1. The BE CRC should use a participatory approach to stakeholder and community engagement when developing tools. A participatory approach is aided by modelling frameworks that are transparent and encourage stakeholder participation, such as multi-criteria decision analysis.
2. The BE CRC should identify critical information data gaps in regions that may have potential for Blue Economy development, and invest in technology supporting the collection of baseline and monitoring data.
3. The BE CRC should further develop dynamic modelling tools that can assess operational impacts and interactions among sectors. These tools can capture dynamic and non-additive feedbacks among sectors, as well as support direct scenario comparisons. Dynamic tools are well developed for single sectors, but their application to multiple Blue Economy sectors is nascent and needs further development (e.g., modelling of energy infrastructure-fishery interactions). This must be done with care to ensure that tools remain useful rather than being overwhelmed by complexity, especially in dimensions where there is little available data for validation.
4. The BE CRC should investigate implementing an overarching management framework such as Management Strategy Evaluation to analyse complex interactions between sectors. This approach would incorporate dynamic feedbacks, account for uncertainty (potentially through multiple-model ensembles) and can make explicit and transparent the trade-offs in triple bottom line performance.

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PROJECT REPORTS/PUBLICATIONS

Turschwell, MP et al. (2020). 4.20.003 Tools to assess cross-sector interactions - Final Project Report. Blue Economy Cooperative Research Centre.