

## Polycentric Regional Ocean Governance Opportunity in the Benguela Current Convention

Naldoo, Ashley ; Hamukuaya, Hashali ; Hara, Mafaniso; Mngxe, Yamkela ; Raakjær, Jesper

*Published in:*  
Frontiers in Marine Science

*DOI (link to publication from Publisher):*  
[10.3389/fmars.2021.703451](https://doi.org/10.3389/fmars.2021.703451)

*Creative Commons License*  
CC BY 4.0

*Publication date:*  
2021

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Naldoo, A., Hamukuaya, H., Hara, M., Mngxe, Y., & Raakjær, J. (2021). Polycentric Regional Ocean Governance Opportunity in the Benguela Current Convention. *Frontiers in Marine Science*, 8, Article 703451. <https://doi.org/10.3389/fmars.2021.703451>

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

### Take down policy

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.





# Polycentric Regional Ocean Governance Opportunity in the Benguela Current Convention

Ashley Naidoo<sup>1\*</sup>, Hashali Hamukuaya<sup>2</sup>, Mafaniso Hara<sup>3</sup>, Yamkela Mngxe<sup>1</sup> and Jesper Raakjær<sup>4</sup>

<sup>1</sup> Branch Oceans and Coasts, Department of Forestry, Fisheries and the Environment, Cape Town, South Africa, <sup>2</sup> Kameol Management Services, Swakopmund, Namibia, <sup>3</sup> Institute for Poverty, Land and Agrarian Studies, University of the Western Cape, Cape Town, South Africa, <sup>4</sup> Centre for Blue Governance, Department of Planning, Aalborg University, Aalborg, Denmark

## OPEN ACCESS

### Edited by:

Sebastian Unger,  
Institute for Advanced Sustainability  
Studies (IASS), Germany

### Reviewed by:

Keven Cochrane,  
Rhodes University, South Africa  
Andrew Serdy,  
University of Southampton,  
United Kingdom

### \*Correspondence:

Ashley Naidoo  
ashleynaidoo22@gmail.com;  
anaidoo@environment.gov.za

### Specialty section:

This article was submitted to  
Marine Affairs and Policy,  
a section of the journal  
Frontiers in Marine Science

**Received:** 30 April 2021

**Accepted:** 02 August 2021

**Published:** 19 August 2021

### Citation:

Naidoo A, Hamukuaya H, Hara M,  
Mngxe Y and Raakjær J (2021)  
Polycentric Regional Ocean  
Governance Opportunity  
in the Benguela Current Convention.  
*Front. Mar. Sci.* 8:703451.  
doi: 10.3389/fmars.2021.703451

The Benguela Current Convention (BCC) has been operational for a decade and has emerged from the precursor natural and fisheries science large marine ecosystem programs. This regional ocean governance institution emerged indigenously as an intergovernmental working arrangement across the Republics of Angola, Namibia, and South Africa. The Convention has been described as a Centralized Authority mode of regional ocean governance. This paper explores this description with reference to the ecosystem-based approach to marine management. The study is focused on the level of working arrangements within the Convention and its Commission across the national and regional scales. It finds that the BCC does meet the theoretical criteria of a polycentric governance mechanism at the resolution of its operations. Polycentric ocean governance mechanisms are valued in regional ocean governance as they potentially offer greater impact through higher levels of coordination, codesign, and integration. Polycentric governance systems incorporate multiple centers of authority that operate at different scales. Existing instances and further opportunities for polycentric governance mechanisms within the working arrangements of the Convention are identified for the Southeast Atlantic.

**Keywords:** polycentricity, Benguela Current Large Marine Ecosystem, transboundary, ecosystem-based approach, ocean governance and management

## INTRODUCTION

Regional ocean governance institutions are being evaluated to assess their role as linking conduits between global ocean governance institutions and national institutions. The Benguela Current Convention (BCC) is one such regional ocean governance mechanism operating in the Southeast Atlantic and covers the national jurisdictions of the three party states. The Convention came into force in 2013 when the Republics of Angola, Namibia, and South Africa deposited the instruments of ratification. The Convention is silent on accession by other states, organizations, and entities. The Benguela Current extends southward of South Africa interacting with the Agulhas Current and the northern extension of the Current occurs north of 10° S (Koseki et al., 2018). This is the boundary zone between the Benguela ecosystem of the South Atlantic and the tropical/equatorial Gulf of Guinea system. The oceanographic influence of this zone possibly extends to the Cabinda Province

of Angola and may then include the Democratic Republic of the Congo (DRC). The DRC although a relatively large country has a narrow coastline of about 40 km compared to much longer coastlines of Angola, Namibia, and South Africa. The Convention creates a governance structure around the Benguela Current Commission where the three countries are formally represented through Commissioners. The work in the Commission is directed by an Inter-ministerial Conference that is also created by the Convention as a permanent structure.

The first Strategic Action Program (SAP) of the Convention was signed by 12 high-level government representatives. These included four per country with Angolan and South African representation being at Ministerial level, while Namibian representation was at Deputy Minister and Permanent Secretary level. Government political portfolios covered by these high-level representatives ranged across marine living and non-living resources as well as environmental management. The history and organizational structure as set out by the Convention is described in Hamukuaya et al. (2016). The political support is evidenced in Neto et al. (2016), a paper co-authored by some of the ministerial representatives from each of the countries.

The Benguela Current Large Marine Ecosystem is described as the “ecosystem associated with the Benguela Current and characterized by distinct bathymetry, hydrography, productivity, and trophically dependent populations” (Benguela Current Convention, 2013, art. 3). The area of application of the Convention is described as extending from the high-water mark to the limit of the areas within national sovereignty and jurisdiction, as defined by the United Nations Convention on Law of the Sea (UNCLOS) for the three countries that are party to this Convention. This includes all territorial waters and ocean spaces claimed as Exclusive Economic Zones. BCC party states are in various stages of the Extended Continental Shelf Claim procedure afforded by the UNCLOS. This will expand the direct influence of the Convention.

The BCC states its aims around the central theme of ecosystem-based sustainable development and management. The stated Objective of the Convention is captured as: “promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement, and sustainable use of the Benguela Current Large Marine Ecosystem, to provide economic, environmental, and social benefits” (Benguela Current Convention, 2013, art. 2).

Two recent studies of regional ocean governance mechanisms advocated for more theoretical exploration of governance conceptualizations (Mahon and Fanning, 2019a,b). One of these review papers presents a Governance Modality Spectrum which illustrates a classification of categories of governance modalities or types. The authors classify several existing regional ocean governance arrangements into these modalities. The BCC was described in this spectrum as falling within the Centralized Authority modality (Mahon and Fanning, 2019a).

This paper responds to the call for higher resolution case studies of indigenous or regional ocean governance institutions. It examines the theoretical concept of polycentricity with regards to the BCC and investigates its classification as a Centralized Authority.

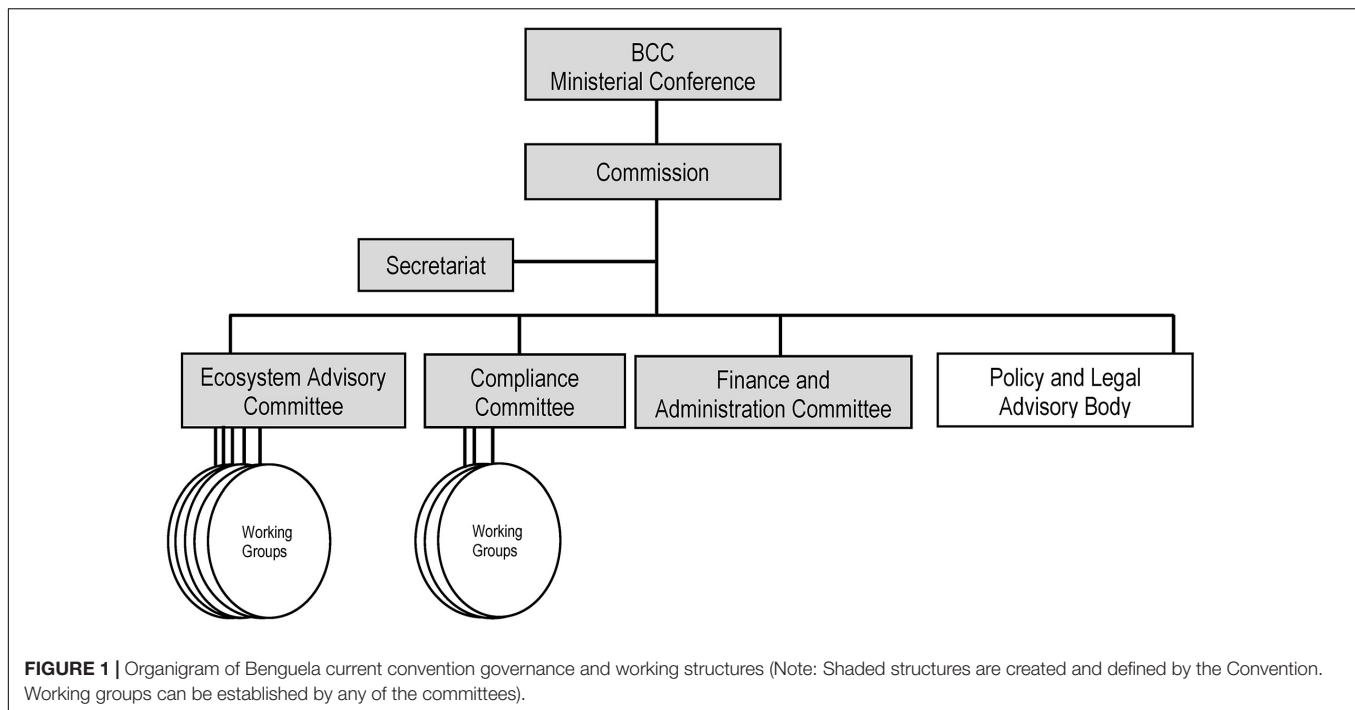
The BCC and its implementing structure and mechanisms are investigated for polycentricity through the proposed Governance Modality Spectrum. The polycentric criteria of multiple centers overlapping with a common cause is applied to the structure and functioning of the Convention’s operational structures. Transboundary ecosystem-based management (EBM) is used as the common cause on which the BCC ocean governance is assessed.

Ecosystem-based management is selected as the common cause because it is the stated objective of the BCC. The implementation of EBM in regional ocean spaces will be necessary to meet the globally agreed sustainability targets. Sustainability is the intended outcome of environmental governance. The United Nations formulated Sustainable Development Goals (SDGs) present the most recent common framework of ambitious targets to address the interconnectedness of poverty, hunger and human well-being to sustainable use of the natural environment. The seventeen SDGs recognize the role of the oceans generally, but specifically within the SDG 14: Life Below Water. This Goal includes 10 thematic areas ranging from sustainable fisheries management, ecosystem and biodiversity protection, pollution impact, specifically ocean acidification and plastics, and fair accessing of benefits derived from the ocean. Progress toward the SDGs will require greater transitions toward sustainable ocean governance (Rudolph et al., 2020). Effective ocean management requires integration around an EBM approach (Winther et al., 2020a,b). Polycentric governance discussions present one mechanism for assessing horizontally and vertically integrated management across various ocean sectors.

## THE GOVERNANCE STRUCTURE OF THE BENGUELA CURRENT CONVENTION

The Convention establishes the Commission and sets out the objective, area of application, principles, operational structures, and rules of procedure. **Figure 1** adapts a previous organigram to include the newly established operational structures that are not defined in the Convention (Hamukuaya et al., 2016). The Ministerial Conference is the highest decision-making component of the Convention and is expected to meet every 2 years. This Conference approves the strategic political direction of the Convention, work programs and budgets submitted by the Commission. Like all structures of the Convention, this Conference is chaired on a rotational basis by each of the party states. Government ministers are the expected participants in the Conference.

The Commission meets annually and provides strategic direction in the formulation and implementation of the work plans and budget. The Convention defines the tasks of the Commission as establishing transboundary actions that may be required to meet the objectives of the Convention such as pollution mitigation interventions, conservation and management measures, or any sharing arrangements for fishery



resources. Commission level representation to date has been at senior government official from Director and above.

The Secretariat, headed by the Executive Secretary, is the administrative support unit of the Commission. It seeks to implement the strategy, business plans and budget adopted by the Commission and the Inter-ministerial Conference. The Secretariat also has the key function of sourcing additional funding for programs approved by the Commission. Each state party is expected to pay an annual contribution via the Secretariat. The annual contribution amount is approved by the Commission and is primarily used toward the funding of the Secretariat operations and core staff.

The Finance and Administration Committee serves to develop financial management policy and audit processes. This Committee also works with the Secretariat to develop and recommend annual budgets to the Commission.

The Compliance Committee collates information and makes recommendations to the Commission on compliance measures, specifically toward coordinating these across the three party states. This Committee also seeks to coordinate such activities with the other Committees reporting to the Commission. The Compliance Committee will be a key functional unit if the Commission were to implement any regional compliance or reporting programs.

The Ecosystem Advisory Committee (EAC) has two major functions. Firstly, it must establish and manage a science program. Secondly based on science and information, the EAC must develop and recommend management measures to the Commission.

The Commission, in addition to the defined structures, has created the Policy and Legal Advisory Body (PLAB) and potentially 14 Working Groups. The Convention allows for the

creation of subsidiary bodies in terms of Article 8n. The PLAB provides policy and legal advice to the Commission on both corporate administrative issues as well as ocean and ecosystem governance matters.

Existing and planned scientific working groups include the Small Pelagic Fisheries, Demersal Fisheries, Top Predators, Environmental Monitoring and Assessment, and Climate Change. While not undertaking science investigations directly, the Science Infrastructure and Logistics, Data and Information, and Training and Capacity Development Working Groups also function to bring together country experts on these topics. More recently the Regional Ecological and Biological Significant Areas (EBSA) and Marine Spatial Planning (MSP) Working Groups were also established under the Marine Spatial Management and Governance Program (MARISMA) project. The Working Groups function to identify issues, undertake collaborative studies or investigations and report to the EAC on possible interventions. The Compliance Committee has initiated the creation of four working groups: Ballast Water, Pollution, Fisheries, and Oil Spills.

The flow of communication is bi-directional for all the linkages. The strategic direction flows from the Ministerial Conference to the Commission and its sub-structures. Scientific and other technical advice flows from the Working Groups via Committees to the Commission. The Commission then interacts with the Inter-ministerial Conference on such ecosystem management advice.

The party states can nominate officials from any of the represented ministries and their associated departments to these formal structures and working groups of the Commission. **Table 1** illustrates the Government Department Representation by the party states, as identified from the signatories to the

SAP (Benguela Current Commission Strategic Action Program 2015–2019).

The three BCC party states are also party to various international and regional agreements. International agreements that Angola, Namibia and South Africa are party to include the United Nations and global multilateral agreements such as the Convention on Biological Diversity (CBD) and the Framework Convention on Climate Change (UNFCCC). All three countries are members of the International Seabed Authority (ISA) and International Maritime Organization (IMO). While there is no regional agreement on ocean mining guidelines, the ISA does undertake discussions on best practice and risk mitigation further to its permitting functions.

Regional agreements in which the BCC party states participate are summarized in the Transboundary Waters Assessment Program (TWAP) and include COMHAFAT – Ministerial Conference on Fisheries Cooperation among the African States Bordering the Atlantic, ICCAT – International Convention for the Conservation of Atlantic Tunas, SEAFO – South East Atlantic Fisheries Organization, and the Abidjan Convention and Protocols (Fanning et al., 2015). The TWAP did not include the Southern African Development Community Fisheries Protocol. Angola, Namibia, and South Africa are signatories to this Fisheries Protocol. Namibia and South Africa also participate in CCAMLR – Convention for the Conservation of Antarctic Marine Living Resources. All three BCC states are members of the Food and Agricultural Organization of the United Nations (FAO) which promotes coherence in fisheries management and monitoring and ecosystem approaches to fisheries management. The three party states have also acknowledged the need to implement an Ecosystem Approach to Fisheries Management (Shannon et al., 2004; Cochrane et al., 2009; Jarre et al., 2018; Kainge et al., 2020).

## POLYCENTRICITY, GOOD GOVERNANCE, AND EFFECTIVE GOVERNANCE FOR ECOSYSTEM-BASED MANAGEMENT

Polycentricity, as a concept, is often used in Euclidean geometry to denote structures or shapes with multiple centers. The Mahon and Fanning papers argue that effective transboundary

ocean governance requires polycentricity as effective governance must incorporate local, national, regional, and global agendas. This vertical integration must be balanced with a horizontal dimension across institutions exercising authority over the various active sectors in the ocean space. The influence across these various centers must be bi- and even multi-directional. A critical measurement of management effectiveness is that the polycentric or overlapping management interventions must cumulatively advance one or more common causes or outcomes.

Mahon and Fanning (2019a) draw from climate change governance considerations and using a more liberal approach to the overlapping or polycentric criteria propose a five-phase Governance Modality Spectrum. Their definition of polycentricity considered is “all systems comprising multiple governing arrangements under a common set of rules.” Their Governance Modality Spectrum progressed from Centralized Authority to Polycentric Fragmented, Polycentric Bricolage, Polycentric Codesigned, and Functional Polycentric. Centralized Authority arrangements are hierarchical in nature, with a single authority that directs all activities. The remaining four modalities are differentiated from the Centralized Authority in that they have multiple centers of authority. The differentiating characteristic among these are the levels or complexity of interactions and codesigned integration. Fragmented Polycentric demonstrates very little interaction; Polycentric Bricolage has an emerging or operational coordinating body; Codesigned Polycentric offers evidence of coexisting authorities’ intentions to design an integrating mechanism; and Functional Polycentric implements an operational codesigned integration mechanism.

In presenting the Governance Modality Spectrum the paper clarifies its assumption that moving toward functional polycentricity will realize more effective governance and implementation of EBM.

Effective is differentiated from good governance in studies on governance including those on regional oceans. Good governance is aligned to corporate mechanisms or business and administrative processes in commercial and private sectors. Effective governance achieves the desired outcomes of the intervention (van Leeuwen et al., 2014; Vousden, 2016; Chandrakumar and McLaren, 2018; Gattuso et al., 2018; Bennett et al., 2019; Fanning and Mahon, 2020), which often requires good governance structures and processes.

Effective regional ocean governance will advance the implementation of EBM. Effective polycentric regional ocean

**TABLE 1 |** BCC party state representation at formal structures of the BCC commission.

BCC structures	Country ministries*		
	Angola	Namibia	South Africa
Inter-Ministerial, Commission and Committees	Agriculture and fisheries**	Fisheries and marine resources**	Environmental affairs**
	Environment	Environment and tourism	Agriculture forestry and fisheries
	Transport	Works and transport	Transport
	Petroleum	Mines and energy	Mineral resources

\*These are the names of the signing ministries where commissioners are based. Some ministry names have changed since the signing of the strategic action plan. \*\*Lead ministry that nominates BCC commissioner.

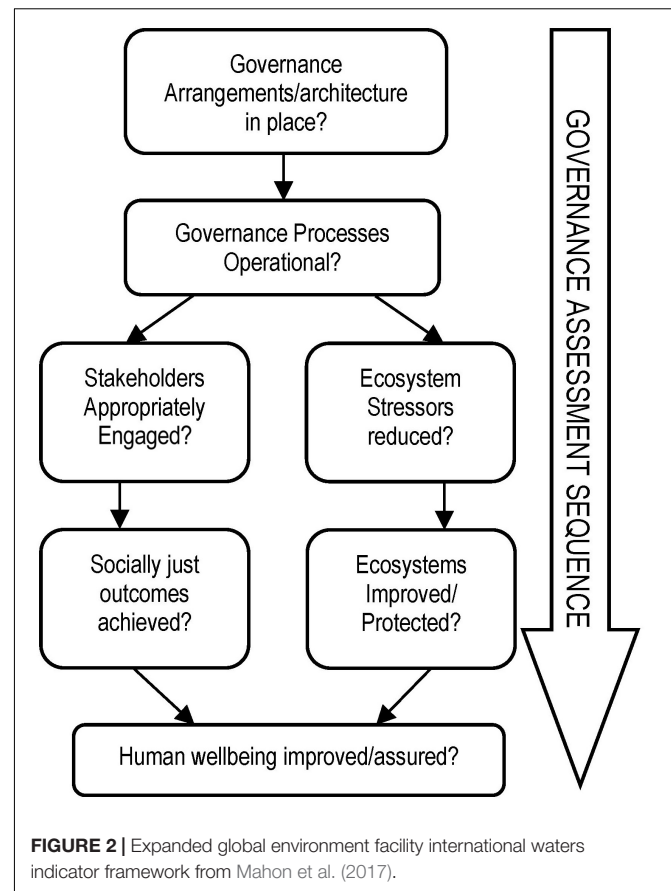


governance will be evidenced by multiple centers of authority successfully working through levels of integration toward achieving a common cause. The common cause selected for this review of the BCC governance modality is the implementation of EBM. Implementation of EBM is assessed in terms of formulation of objectives, resultant actions and project outcomes from the Convention's first SAP.

Ecosystem-based management is articulated in Principle 6 of the BCC (art. 4) which specifically includes "Conservation of the Marine Ecosystem." The Convention includes in its definitions (art. 1) an expansive definition of the terms Ecosystem and Environment. Ecosystem being defined as: "a dynamic system of plant, animal and micro-organisms communities and their non-living environment interacting as a functional unit." The Environment is defined as: "includes, but is not limited to, the whole or any component of (a) nature, which includes air, water (including the sea, and the seabed), land (including soils and minerals), energy and living organisms other than humans; (b) the interaction between the components of nature and between those components and humans; and (c) physical, aesthetic, and cultural qualities or conditions that affect the health and well-being of humans." When reading both the definitions together human dimensions are intrinsically included in the ecosystem conceptualization. For this study a fuller definition of EBM is considered which includes both a transboundary management component and the human dimensions of ecosystems (Alexander et al., 2018; Belgrano and Villasante, 2021). The TWAP (Fanning et al., 2015; Mahon et al., 2015) observed that the BCC had a structured governance arrangement with an established Commission. It further assessed that the structured governance can be associated with a low level of risk to transboundary arrangements and a high level of integration with regards to the six regional agreements considered in the review. Observations in the TWAP focused on the extent to which governance arrangements are established and if state parties participated in working across the identified major agreements in the region. From a business architecture or administrative process perspective, the BCC and its Commission appear to be meeting higher standards of operation and are profiled as having less risk exposure to administrative governance failure. The previous TWAP review is here taken to a higher resolution to include the working arrangements within the Commission and its established structures.

Following from the TWAP, Mahon et al. (2017) proposed an enhanced Transboundary Assessment Framework, where effective management interventions are measured ultimately by positive improvement and outcomes for human well-being. This proposed assessment for projects of the International Waters Program sets the following categories of indicators to be measured: Arrangements/Architecture in place; Governance processes operational; Ecosystem stressors reduced; Ecosystems improved/protected; Stakeholders appropriately engaged; Socially just outcomes achieved; and Human well-being improved/assured. This expanded assessment framework is illustrated in Figure 2.

In this proposed framework, four new categories were added around the second, third, and fourth previously established



categories for assessments of the International Waters Program (Duda, 2002). The proposed framework better balances the good governance and effective governance aspects and places the human well-being category as the outcome of both social justice outcomes and improved or protected ecosystems.

The inclusion of human-wellbeing as the desired impact of ocean governance reflects the fuller definition of the EBM, which includes the human dimension. The enhanced framework recognizes the emerging concepts of sociological ecosystems and integrated ecological assessments and indicators (Link and Browman, 2017; Link et al., 2017; Dunford et al., 2018; Spooner et al., 2021; Williams et al., 2021).

The BCC's overall objective is to deliver on the human well-being indicator of sustainable use through EBM of the Benguela Current Large Marine Ecosystem. In investigating governance effectiveness of the BCC this study follows the enhanced framework by assessing governance structure as well as EBM implementation. The extent to which this is achieved is measured by evaluating the transboundary or ecosystem-wide strategies and interventions that have been identified in the SAP or decided on and implemented by the Commission. This assessment of achieving the common cause of EBM is undertaken as a measure of effectiveness and impact of the BCC. EBM with the objective of managing, maintaining and enhancing the availability of ecosystem services has over the last decade been established as the operational standard for transboundary and

large marine ecosystem governance (Raakjaer et al., 2014; Smith et al., 2017; Gonzales et al., 2019; Le Heron et al., 2020; O'Higgins et al., 2020). Taking into consideration the recently proposed International Waters Assessment Framework indicators, effective EBM implementation by the BCC and other transboundary ocean regimes must include the human dimensions. These dimensions include impact caused and opportunity for the promotion of well-being.

In their review of regional ocean governance mechanisms Mahon and Fanning (2019a) classify the BCC as a Centralized Authority form of polycentric governance arrangement. The Centralized Authority category or mode is at the furthest end away from Functional Polycentricity in the proposed Governance Modality Spectrum. The authors discuss that such a Centralized Authority is an expected reaction to the complex and diverse management issues and mechanisms that potentially exist in transboundary large marine ecosystems. They also argue that functional polycentricity may offer a better balance of strategic objectives or common cause and management resolution. Polycentricity will facilitate codesign of actions and focus where several management arrangements must work in concert to deliver impact. In their discussion of the advantages of such a sector-focused implementation, the nested approach previously described in transboundary ocean governance is considered (Gruby and Basurto, 2013; van Leeuwen et al., 2014; van Tatenhove, 2017).

Polycentricity offers the multi-dimensional approach required in transboundary large marine ecosystem management.

The two review papers by Mahon and Fanning on regional ocean governance arrangements concluded with a clear call for more theoretical and case study examinations of regional ocean governance approaches and institutional mechanisms. The BCC and its implementing structure and mechanisms are investigated for polycentricity through the Governance Modality Spectrum.

This paper responds to the call for higher resolution case studies of indigenous or regional ocean governance institutions. It examines the theoretical concept of polycentricity with regards to the BCC and investigates the classification as a Centralized Authority. The concepts of polycentricity, governance efficacy and effectiveness through the implementation of the EBM by the BCC Commission are explored. The paper concludes that while BCC is a Centralized Authority as an institutional governance structure its operational functioning within this architecture is polycentric. The BCC allows for interaction and objective setting across sector departments while state parties operate independently. This polycentric nature places the BCC as a supportive governance framework for implementing transboundary EBM.

## MATERIALS AND METHODS

### Polycentricity

The Working Groups, their country representativeness, and terms of reference were requested from the Secretariat of the Commission and current chair or coordinator of the EAC and the Compliance Committee. Not all the Working Groups had

fully developed terms of reference at time of query in the first quarter of 2021. In assessing the extent of polycentricity the representativeness in the operational structures by the national departments mandated to regulate the various ocean sectors in three party states was determined. In a second assessment of polycentricity the themes of the various working groups were investigated to determine the scope covered. The inclusion of diverse ocean sector ministries and departments, overlapping participation in global and regional agreements and the scope of the specialist Working Groups set up by the Commission are indicators of polycentricity. Each government department represents a center of authority. These centers are offered a common governance objective through EBM of the Benguela Current Large Marine Ecosystem, through the BCC.

### Ecosystem-Based Management Implementation

The primary document assessed was the SAP of the BCC with an intended implementation period from 2015 to 2019 (BCC Secretariat, 2014). The SAP was assessed to identify which of the proposed Action Responses relate to EBM. Action Responses contributing to EBM were identified in two ways. The criteria used for EBM primarily relate to the inclusion of whole ecosystem or transboundary working arrangements and planned impact. This is the primary criteria selected as the BCC is a regional governance mechanism, and so the critical success indicator will be regional interventions as opposed to EBM that may be implemented successfully but only within one of the participating states. Secondly, EBM, has evolved to be as inclusive as possible of whole natural ecosystem functioning including human dimensions. As the human dimension is here interpreted as impacting all communities of the three party states, Action Responses referring to the inclusion of human dimensions are also regarded as contributing to EBM.

The Action Responses identified as contributing more directly to EBM were then assessed in terms of the extent to which they have been implemented. Recent projects of the BCC were interrogated to identify how these Action Responses were implemented. The extent to which the Action Responses were achieved over the 2015 to 2019 period were assessed through published project outcomes and reports archived on the BCC and project specific websites or in published literature.

These Action Responses are then scored to illustrate the extent of implementation. The scoring provides for a basic quantification of the subjective assessment of EBM implementation. Scores were awarded across a range from 0 to 2. Zero was awarded where no ecosystem-wide product or intervention of any form responding to the Action Response was observed, 1 awarded if there exists a science or technical report or working group established responding to the Action Response and 2 awarded if the Commission decided on a transboundary action or management intervention, including any guidelines to countries regarding the Action Response.

The Commission's project documents analyzed in this assessment included the MARISMA; the Enhancing Climate Change Resilience in the Benguela Current Fisheries System



Project; the Improving Ocean Governance in the Benguela Large Marine Ecosystem (BCLME III) Project; the Development of Ecological Sustainable Fisheries Practices in the Benguela Current Large Marine Ecosystem (ECOFISH) Project and the BCC – Norwegian Science Plan. The project documents for these projects were accessed from the BCC website (BCC Secretariat, 2021). Prior to 2008 three major projects were undertaken: The First and Second Benguela Current Large Marine Ecosystem Projects (BCLME I and II) and the Benguela Environment Fisheries Interaction and Training Programs. These were characterized largely as natural science research programs and provided and collated much of the foundational knowledge and motivation for the creation of the Convention. These programs are not included for detailed analysis of their outcomes in this study.

## RESULTS

### Polycentricity

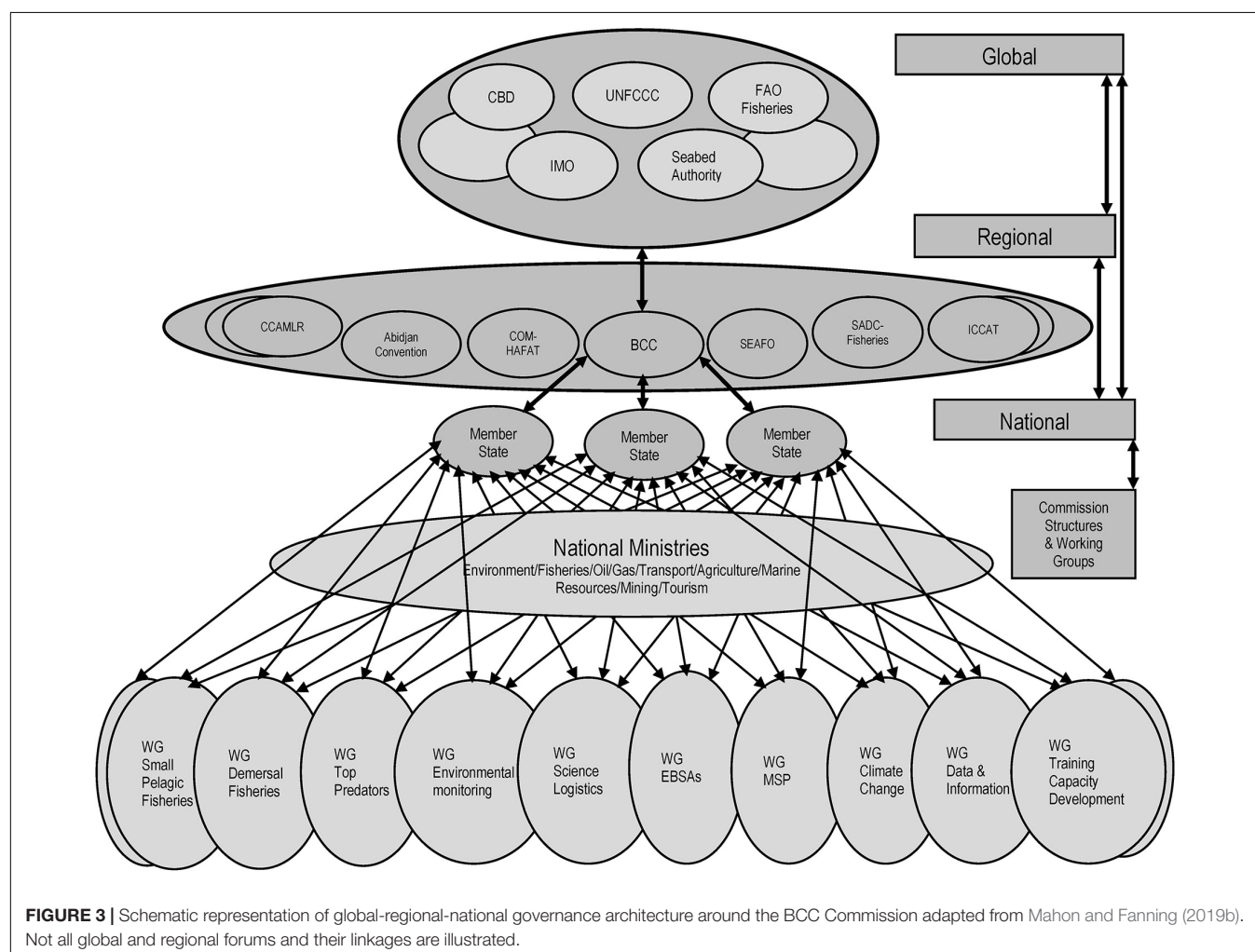
The BCC Strategic Action Plan reflects a total of 12 ministries as signatories. These ministries cover living and non-living

marine resources, tourism, agriculture, transport, works or infrastructure, and environmental management. Participating ministries are described in **Table 1**. Ministries from the three party states nominate members to serve in the various scientific and technical working groups as illustrated in **Figure 3**. The Working Groups are created, tasked by and report to the Committees such as the EAC and the Compliance Committees (**Figure 1**). The various ministries represent centers of regulatory authority in each of the party states. The BCC Commission, its Committees, and Working Groups offer a coordination mechanism for these various centers of authority. Cumulatively the Working Groups can provide advice on EBM at the scope of the large marine ecosystem.

### Ecosystem-Based Management Implementation

The SAP proposes several Strategic Solutions to the identified Challenges. The Solutions in the SAP are categorized into eight areas that identify Action Responses to the Challenges.

The Action Responses that directly referenced transboundary interventions or actions around shared resources numbered 31



**TABLE 2 |** Strategic solutions and associated action responses in the strategic action plan (SAP) of the Benguela Current Commission.

	Strategic solution	SAP action response	EBM human dimension	EBM Trans-boundary	Assessment score (0–2)
1	Living marine resources	1. Ascertain which stocks are marine transboundary resources.		✓	1
		2. Manage shared stocks cooperatively by harmonizing research and management planning and implementation.		✓	0
		3. Implement ecosystem-based management.		✓	1
		4. Ensure compliance with management and conservation measures.			
2	Non-living marine resources	5. Understand the ecosystem impacts of exploration and extraction activities.		✓	1
		6. Integrate and implement international standards for exploration and extraction.		✓	0
		7. Adoption and use of Integrated Ocean and Coastal Management		✓	0
3	Productivity and environmental variability	8. Improve the understanding of the BCLME ecosystem.		✓	2
		9. Improve the understanding and predictability of climate change impacts and climate variability at seasonal inter-annual and longer time scales.	✓		1
		10. Improve the understanding of harmful algal blooms and hypoxia.			
4	Pollution	11. Monitor and manage coastal water quality around pollution “hotspots.”	✓		1
		12. Improve the understanding of river pollution in the BCLME.		✓	1
		13. Prevent, abate, mitigate and prepare for oil spills.			
		14. Prevent, abate and mitigate against marine litter.			
		15. Understand the impacts of noise pollution and mitigate as necessary.			
		16. Reduce emissions of greenhouse gasses.			
5	Ecosystem health and biodiversity	17. Reduce threats to species and habitats.		✓	1
		18. Strengthen ability to monitor ecosystem health.		✓	1
6	Human dimensions	19. Ensure consistency of human dimension data across countries.		✓	0
		20. Expand the knowledge base in respect to human dimensions in the BCLME region.		✓	1
		21. Incorporate human dimensions into resource management decision-making.	✓		1
		22. Implement regional cooperation for safety-at-sea.		✓	
		23. Develop constructive participation by stakeholders and reduce conflicts.	✓		1
		24. Enhance the economic development potential.	✓		0

(Continued)

TABLE 2 | Continued

	Strategic solution	SAP action response	EBM human dimension	EBM Trans-boundary	Assessment score (0–2)
7	Enhance the economic development potential	25. Adoption and use of Integrated Ocean and Coastal Management.		✓	0
		26. Develop a supportive funding and revenue model for infrastructure and operations in marine transport.			
		27. Develop adequate infrastructure such as port facilities, pipeline networks to enable successful offshore oil and gas exploration.			
		28. Develop an integrated plan for skills development for offshore oil and gas sector.		✓	0
		29. Establish a funding mechanism to address challenges in financing aquaculture and improve market accessibility.			
		30. Conduct research to better understand methods for extracting minerals in a responsible and sustainable manner.			
		31. Manage competition for shared resources/space by employing adequate spatial planning.		✓	0
8	Governance	32. Enhance key economic sectors, e.g., marine transport and manufacturing; offshore oil and gas; fisheries; integrated ocean governance and protection to achieve sustainable ocean development through integrated ocean governance and marine spatial planning.		✓	1
		33. Harmonize mitigation measures related to extraction activities to minimize environmental impacts and ensure that monitoring standards are of international quality.		✓	1
		34. Strengthen national human capacity to participate in BCC processes.		✓	1
		35. Strengthen national institutional capacity and mechanisms to implement the SAP and IP (Implementation Plan).	✓		1
		36. Strengthen and harmonize policy and legislative frameworks.		✓	1
		37. Strengthen information, communication and awareness mechanisms.	✓		1
		38. Strengthen the governance structures and procedures for the BCC.	✓		2
		39. Strengthen regional and international cooperation.		✓	0
		40. Establish sustainable financing mechanisms.	✓		1
		41. Review and monitor progress in implementing the SAP.	✓		2

Action responses that directly relate to ecosystem-based management are highlighted with an assessment of achievement.

of 41 when both the human dimension and transboundary aspects are considered together. When only the transboundary consideration of EBM was used 21 of the 41 Action Responses are accounted for. All the Action Responses contained in the Ecosystem Health and Biodiversity, Human Dimensions and Governance themes are interpreted as contributing to EBM. It can therefore be contemplated that the Action Responses are largely responding to EBM. The wording of these responses is not always framed at interventions and outcomes at the transboundary or ecosystem-wide scale. For instance, oil spill response is not directly related to standard

operation procedures for the three countries, nor approaches to land-based sources of pollution or standardization of methods and thresholds to monitor ecosystem health. Oil spill response does have a BCC Working Group set up within the Compliance Committee but is not identified as an EBM response in **Table 2**. The transboundary or human dimension, although implied in all the pollution Action Responses, is not reflected in the phrasing of the Oil Spill Action Response.

The scoring of achievement around the Action Responses was challenging because the SAP did not have an implementation or

business plan attached to it. The Commission operates through its Secretariat comprising a few staff based in Swakopmund, Namibia. Taking direction from the SAP, the Secretariat coordinates efforts of the members to draft and submit proposals to various international funding agencies and donor countries. The projects implemented by the Commission during the 2015–2019 Strategic Action Plan did not directly reference the Strategic Solutions or Action Response items in their proposed work plans. The projects did produce several reports and science outcomes that can be related to the eight Strategic Solutions categories.

These project outcomes did not yet translate into transboundary decisions at the BCC Commission or Inter-Ministerial Meeting levels. The only Action Responses that received a score of 2, denoting a decision at the Commission level, were those of Improving the understanding of the BCLME; Strengthen governance structure and procedures of the BCC; and Review and monitor progress in implementing the SAP. The first of these Action Responses confirms a focus on generation of knowledge of the BCLME through science programs and the creation of specialist working groups. These science products build on the transboundary science programs that preceded the formal drafting of the Convention. The other responses scoring 2 denote the BCC Commission establishment and improvement of its start-up structure through the setting up of EAC and similar committees, and the review undertaken of the implementation of the first SAP.

There are existing or planned science products within recently-implemented and ongoing projects that can be foundational to regional EBM interventions. These knowledge outcomes of the projects are described briefly below.

## The Marine Spatial Management and Governance Program

The MARISMA project is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, with in-kind co-funding contributions by the BCC party states. The project is implemented by the German Development Cooperation (GIZ). Like other major projects of the BCC, the MARISMA project office is based in Swakopmund, Namibia.

The MARISMA Project has two broad areas of output namely MSP implementation or institutionalization and the identification and description of EBSA (Mausolf, 2014). The project aims to produce marine spatial plans at the National and Regional level and to update atlases of EBSAs in the BCLME. The MSP and EBSA outcomes align directly with the EBM approach. Individual and aggregated pressures on the ecosystem will have to be identified with suitable management interventions developed and recommended during the MSP processes. The EBSA identification process will guide countries and the Commission in management interventions selected for these areas. The Project's approach has been to set up national and regional working groups for MSP and EBSAs. The Project produced a Regional MSP Strategy that has been adopted by the Commission. This can be viewed as regional endorsement of MSP as a governance approach. The three party states are at

different phases of MSP policy development and implementation (Finke et al., 2020).

## Enhancing Climate Change Resilience in the Benguela Current Fisheries System

This project is presented as delivering climate change adaptation strategies to marine fisheries and aquaculture sectors. The project objective is to build resilience and reduce vulnerability to climate change and to ensure food and livelihood security. The Project is funded by the Global Environment Facility (GEF) with in-kind contributions from the Convention party states (International Waters Learning Exchange and Resource Network, 2014).

This climate change adaptation project contributes to EBM in that it seeks to identify ecosystem shifts, change and variability and then seeks to create human resilience through adaptation. The project does highlight that environmental responses to climate change will include ecosystem-wide changes. These will impact the availability of ecosystem goods and services to coastal communities such as the availability of fish stocks. The project seeks to have impactful interventions at pilot sites. It therefore does not suggest a single overarching common transboundary outcome, as within country interventions at the pilot sites will be site specific. The governance outcome of encouraging and facilitating the incorporation of mitigation measures in policies of the three party states, could, however, be broadly considered an ecosystem-wide policy level intervention. Specific policy interventions at the national level may or may not be similar across the three states, as states may opt for implementing different response strategies.

The Project, although still being implemented, does list some key outcomes such as the Community-Level Socio-ecological Vulnerability Assessments in the Benguela Current Large Marine Ecosystem; Training Manual and Guidelines for Conducting Community-level Rapid Vulnerability Assessments and the Community-level Rapid Vulnerability Assessment to inform adaptation planning in Henties Bay, Namibia (Raemaekers and Sowman, 2015; Price et al., 2017; Sowman et al., 2017). Outcomes also included vulnerability and adaptability of large-scale fisheries (Cochrane et al., 2020).

## Improving Ocean Governance in the Benguela Large Marine Ecosystem Project

The BCLME III Project builds on the BCLME I and II Projects, which supported the creation of the Convention (Global Environment Facility, 2014). These earlier projects were also funded by the GEF and implemented in cooperation with the United Nations Development Program.

The Objective of this third funding phase is to further promote in actionable ways the cooperative and shared governance of the BCLME. It aims to achieve this by mainstreaming transboundary benefits and concepts into the national policies of the three party states. The Outcomes of this Project are described in Four Components: Improved Ocean and Coastal Governance; Stakeholder Engagement and Partnership Collaborations; Capacity Development and Training; and

Marketing, Resource Mobilization and Fiscal Sustainability. The project generally aims to improve both the governance impact and efficiencies and sustainability of the Convention.

The Project fully recognizes the transboundary requirement for implementing EBM, and that EBM must incorporate an integrated perception of the economic, environmental and social benefits. Implementation of the project is ongoing and no final output reports could be identified yet.

Significantly, planned outcomes of the project include reviewing the SAP and improving regional governance and cooperation. A draft SAP high-lighting priority areas of focus has been distributed to party states for comment in early 2021. This includes a review of the functioning of the BCC structures toward improving governance. Criteria for the success of this project must be the measurement of articulated and implemented transboundary policy interventions. The project outcomes appear to be a recognition that the Commission needs to function more impactfully at the ecosystem-wide scale, including human dimensions.

## Development of Ecologically Sustainable Fisheries Practices in the Benguela Current Large Marine Ecosystem

The ECOFISH Project was funded by the European Union and was implemented from 2010 to 2016. It focused on reviewing and enhancing fisheries and fishery stock assessment science. The Project has completed a number of reports, and has produced post-graduate degrees in addition to other short training interventions such as seminars and workshops (Hamukuaya, 2018). The project reviewed stock assessment techniques across the three countries, developed inter-calibration models across party states, and established evidence for distinct and shared transboundary stocks.

The Project, although focused on fisheries, illustrated the transboundary nature of the Benguela Ecosystem through system processes and shared fish stocks. Its work and knowledge products strongly motivated that the BCLME be managed as a shared ecosystem. In the process of undertaking its work program, the Project supported the establishment and work of the BCC Demersal and Small Pelagic Fisheries Science Working Groups. These Working Groups continue to provide a forum to facilitate ecosystem-wide discussions and collaborations, securing the sustainability of the methods and scientific processes developed and implemented during the project. While the project has identified shared fish stocks in the region, there has been no decision on shared management models for any species or group of species at the Commission level that could be determined from currently reported work.

## Benguela Current Convention – Norwegian Science Plan (2016–2017)

The BCC website acknowledges Norwegian support for various ocean science programs over the recent decades. These initially focused on fish stock surveys of the major offshore fish stocks in the region. These surveys were undertaken with the research ship the *Dr. Fridtjof Nansen*, through a FAO program and produced

several reports on fish stock status (Norwegian Ministry of Foreign Affairs, 2017).

More recently and in apparent response to the SAP Response Actions, work programs and outcomes of this project appeared to be more EBM focused. The BCC-Norwegian collaboration implemented an EBM science and capacity building program. This program produced several ecosystem related reports including: Reduced Threats to Species and Habitats; Strengthening Ability to Monitor Ecosystem Health; Strengthening the Fisheries Management in the BCLME through the Application of Ecosystem Risk Assessment; and Identifying, Monitoring and Managing Pollution at Hotspot Locations (Hamukuaya, 2017). The program also funded the drafting of water quality guidelines, including environmental monitoring and indicator considerations. Prior to the focused EBM support program, similar Norwegian-FAO partnership programs delivered reports and recommendations on the inclusion of human dimensions in fisheries management, including consideration of small-scale fishers in the region (Paterson et al., 2012).

The BCC ecosystem assessment objectives continue to be reflected within the 2019 Ecosystem Approach to Fisheries (EAF) Nansen Program (Food and Agricultural Organisation of the United Nations, 2021). In addition to fish stock surveys, the program also includes several fisheries science and management training programs and interventions. This program appears to build capacity toward EBM both in the collection of environmental observations and management training interventions.

## DISCUSSION

### Polycentricity at the Benguela Current Convention

The Commissioners of the three countries represent various configurations of ocean related ministries. At present, with the Fisheries Management portfolio returning to the Environmental Affairs portfolio in South Africa, all the lead Departments that nominate Commissioners have Fisheries Management as one of their primary mandates. The Convention incorporates all aspects of the ecosystem functioning and marine resource categories. The Commission therefore includes several ministries: environmental affairs, biodiversity conservation, agriculture, mining, oil, gas, marine resources, tourism, and transport. There are several overlapping mandate or governance areas represented in the Commission structure of the Convention. The three party states are also signatory to a host of regional and international agreements within each of the various ocean sectors.

Polycentricity is represented at the BCC Commission through the various ocean sector government departments or agencies that participate in the organizational structures. These represented sectors include the environment and conservation sectors, as well as various industry sectors. Polycentric representation occurs through the government departments bringing in their national mandates and regulatory authority over their various sectors. An additional layer of



polycentricity is achieved through the party states bringing to the Commission their international commitments and agreed policy objectives at the various international forums.

While showing an initial bias toward fisheries, the scope of the BCC Working Groups is now demonstrating a wider ecosystem approach. These Working Groups cover a range of aspects from fisheries assessments, environment (pollution and biodiversity) monitoring and assessment, MSP, climate change, data management, and human capacity development. Industrial sectors other than fisheries such as mining and transport do not have dedicated Working Groups, but this does not exclude discussion on these aspects from occurring as cross-cutting issues in Working Groups such as those dealing with environmental monitoring, MSP and fisheries compliance.

## The Benguela Current Convention and Implementing the Ecosystem-Based Approach to Marine Management

Implementing EBM is complex. This complexity is demonstrated in an increasing trend across management agencies toward addressing polycentricity through the incorporation of several dimensions and interactions across the environment, society and economy (Arkema et al., 2006; Karsenti et al., 2011; Link and Browman, 2014, 2017).

Effective ocean management must be undertaken at the functional ecosystem level. This is because perceiving drivers and formulating responses at a scale lower than this will be incomplete and ineffective. Management interventions that are determined at a scale lower than the ecosystem level may be spurious and have unintended consequences. This will apply for example to adult and pre-adult distributions of fish and other marine life such as migratory seabirds, whales, seals and turtles. To implement EBM in the ocean space, the basic, regional-scale ecosystem unit has been widely accepted as the large marine ecosystem (Sherman, 2014a,b; Sherman and Hamukuaya, 2016; Duda, 2019).

Governance and legal frameworks, along with basic knowledge generation of the ecosystem and communication across various stakeholders are identified as primary challenges to implementing EBM at regional or large marine ecosystem scales (Marshak et al., 2017). The BCC responds to these challenges with varying levels of success. The Commission itself, as a regional body that meets regularly, represents a governance framework that can develop cooperation around the understanding and management of the Benguela Current Large Marine Ecosystem. The improved understanding of the Benguela Current Large Marine Ecosystem is evidenced by the several science reports produced and technical BCC Working Groups created. From the early transboundary initiatives that were focused on fish stock assessments, more recent reports, produced by the major projects, have included ecosystem considerations including human dimension aspects. The primary challenges of governance and legal frameworks in implementing EBM at the regional scale are then potentially addressed by the BCC and the Commission with its associated working structures.

The 2015–2019 BCC Strategic Action Program poses Challenges and Action Responses leveled at optimizing the sustainable use of the Benguela Current Large Marine Ecosystem. Not all the Action Responses are, however, specifically framed as transboundary actions. A realistic option is a combination of transboundary and national or local Action Responses so that objectives and outcomes are strategically aligned. Local implementation will have the flexibility to respond to local conditions while enjoying the benefits of shared experiences and learnings.

The human dimensions will have to be material and grown in the formulation of impact targets and indicators. To operate at the large marine ecosystem scale and optimize investment, efficiencies and impact, the Commission can consider framing its Action Responses in more direct transboundary terms in subsequent SAPs. This will have the added advantage of focusing proposal drafting and funding applications at ecosystem-wide outcomes.

The BCC and its Commission, therefore, does contribute positively to EBM by providing both an ecosystem-level governance institution and by developing a growing knowledge base on the functioning of the large marine ecosystem. The Commission provides a three-country forum for ecosystem-level discussions, knowledge assimilation and framing of interventions. This forum begins the response to the challenges of regional governance and legal frameworks, ecosystem-scale knowledge platforms and improved communications as outlined in reviews of EBM operationalization (Jay et al., 2016; Buhl-Mortensen et al., 2017; Marshak et al., 2017; Österblom et al., 2017). These reviews do, however, also highlight the challenge of implementing governance and management measures. While interventions may be framed through intercountry processes, implementation of these must occur at the country level. Individual countries in any Large Marine Ecosystem, including the Benguela Current, have their individual set of processes, for national policy formulation, stakeholder engagement and implementation – all of which are driven by national priorities.

The assessment of the implementation of Action Responses shows that the Commission has yet to move beyond science reports to making decisions on EBM implementation at the large marine ecosystem level. Several of the projects implemented by the Commission over the last decade have had a focus on ecosystem functioning and management, specifically the recent joint BCC-Norwegian Science Program, that focused (in part) on ecosystem health and the MARISMA project focusing on MSP and the identification of EBSA. The creation of the Regional MSP Working Group will provide a forum and opportunity for alignment and coherence across national marine spatial plans. Possible interventions based on existing science products, could have been shared management for fish stocks where science project outcomes have indicated transboundary stocks (Hamukuaya et al., 2016). The BCC can also actively seek to facilitate through transboundary projects the implementation of the ecosystems approaches to fisheries management, including mainstreaming biodiversity considerations as promoted by the CBD and FAO (Friedman et al., 2018). Such approaches will also support the maintenance and application of export

standards like the Marine Stewardship Council (MSC), which currently certifies fisheries in the region for export to the northern hemisphere markets. The hake fisheries of Namibia and South Africa are certified by the MSC. The Namibian final draft assessment report notes for instance the need for cooperation on joint assessment and management approaches to the shared hake fisheries between South Africa and Namibia (Namibian Msc Final Draft Report on Hake Demersal and Longline Fishery, 2020). Uniform approaches toward mitigating pollution including common approaches to or thresholds for chemical pollutants also present opportunities for ecosystem-wide interventions. There are existing global and regional agreements on the need for pollution mitigation (Valiullina et al., 2019). Some Pacific Island countries have initiated collaboration on Regional Seabed Mining Guidelines (Miller et al., 2018). The BCC could follow in developing such regional guidelines.

The Commission, through the science programs it supported, has produced extensive basic descriptions of ecosystem functioning, and early descriptions of social and economic dimensions (Sumaila, 2016) of the BCLME. An evolution of this science information will be to implement the use of indicators for various aspects of ecosystem health of the BCLME. Included in the use of indicators must be thresholds or limits, upon which the party states must act. This could be similar to European Union Directive on measuring good environmental status of marine waters (European Commission, 2017). The formulation of indicators and thresholds is increasingly being motivated in ecosystems management. The identification of indicators and thresholds allows for discussions on tipping points in the functioning of the system. Tipping points in the functioning of systems signal significant changes in the system's ability to maintain and provide its ecosystem services (Tallis et al., 2012; Österblom et al., 2017; Lombard et al., 2019). The development of indicators, thresholds and tipping points will facilitate discussions on areas of linkages and feedback mechanisms across the local, national and regional scales.

## CONCLUSION

Like any regional multilateral institution, the BCC Commission, is constrained in the extent to which it can impact policy formulation and implementation at the national level. There is an argument that the regional seas governance frameworks must be able to move out of their constraint of being subject to national policy if they are to be more effective (van Tatenhove, 2013; Raakjaer et al., 2014; van Leeuwen et al., 2014). van Tatenhove (2017), for instance, suggests that Transboundary Marine Spatial Planning must be developed as a “reflexive governance arrangement,” where transboundary policy formulation must challenge existing norms and directions of nationally focused MSP. If the Commission operated in a manner that developed and implemented such transboundary intervention across the three party states (across the mandated centers of authority in each national ministry) it would more closely meet the

description of the Centralized Authority as described in Mahon and Fanning (2019a) Governance Modality Spectrum.

The Commission allows the party states and their respective national ministries and departments to continue their implementation independently while providing a forum for polycentric discussions across the various ocean sector governance agencies. States and ministries define their policies and implementation mechanisms.

This then places the Commission to the right of Centralized Authority in the Governance Modality Spectrum where Centralized Authority is on the extreme left and Functional Polycentric on the extreme right. The Commission does not function as an authority in regional ocean governance. It does not facilitate binding policy and implementation mechanisms at the sector or national level. At the resolution of its operations the BCC can be categorized at one of the intermediate modalities of Polycentric Fragmented or Polycentric Bricolage. The requirements for consideration of being placed further into the right half of the modality spectrum such as harmonizing of architecture and principles or codesign of interventions and outcomes across the various ocean management sectors is not evident.

**Figure 3** illustrates a global-regional-national governance architecture and is adapted from the Mahon and Fanning (2019b). It illustrates some of the global and regional forums that are at play within the BCLME as well as the interactions between the various national ministries and the established BCC Working Groups. The individual party states, Angola, Namibia, and South Africa interact at the level of the Commission and operationally through sending representatives to the various permanent structures and the technical working groups. The Commission and its permanent structures like the EAC and the Compliance Committee can draw on attendees from all the representative government ministries or departments. This presents the polycentric governance forum where coherence can be sought across policy objectives and management actions. The BCC Working Groups offer another technical level of polycentric governance opportunity. Working group representatives from the various state departments can develop and undertake inter-sector science programs or develop EBM implementation actions.

The BCC party states can also engage with other regional and global forums where they retain their status as sovereign states. This engagement can be reinforced through representation at these forums as a BCC group. Advancing polycentric governance further toward the right of the Governance Modality Spectrum will occur when actions both through individual party states and through the BCC at the regional and international forums promote coordinated and coherent governance initiatives. Both vertical and horizontal linkages and working arrangements are required for functional polycentric governance to occur.

Even beyond the transboundary governance arguments and assessments, some authors are motivating that management considerations for the ocean must include planetary or earth system scales. This is because social and more especially the economic trends that drive local behavior operate at the global scale in the modern world (Galaz et al., 2012;

Österblom et al., 2017). Österblom et al. (2017) describes these global issues as distal interactions and includes such concepts as advancing technological solutions across marine industries, safety and security, global politics, international trends in trade and commerce, and climate change. These factors do influence how marine ecosystems are used and managed locally. Their influence is not as easily discernible as the more local or proximal interactions such as fishing or habitat loss. However, drivers of proximal impacts such as fishing, and habitat loss may have their origin in the more distal or removed influences.

Beyond its provision of providing a regional governance and legal framework for EBM, the BCC Commission can play a role in linking and perceiving the interactions between proximal and distal influences on marine ecosystems. This can be achieved through fulfilling a vertical and horizontal linking role across global environmental and ocean sector forums such as the CBD, UNFCCC, ISA, IMO, and the FAO Fisheries programs to itself, as a regional governance organization, and then to the three national states party to the Convention. Similarly, horizontal linkages can be made across the regional agreements, such as fisheries management organizations, to identify dynamics in fish demand and industry dynamics.

The BCC, through the structuring of its Commission and associated groups created basic requirements for polycentric ocean governance discussions across the party states and their various national ocean management agencies. The Convention can achieve high levels of functional polycentric governance through defining cross-sector and codesigned transboundary governance programs and interventions.

## REFERENCES

- Alexander, K. A., Hobday, A. J., Cvitanovic, C., Ogier, E., Nash, K. L., Cottrell, R. S., et al. (2018). Progress in integrating natural and social science in marine ecosystem-based management research. *Mar. Freshw. Res.* 70, 71–83. doi: 10.1071/MF17248
- Arkema, K., Abramson, S., and Dewsbury, B. (2006). Marine ecosystem-based management: from characterization to implementation. *Front. Ecol. Environ.* 4:525–532. doi: 10.1890/1540-9295(2006)4[525:memfct]2.0.co;2
- BCC Secretariat (2014). *The Benguela Current Commission Strategic Action Programme 2015 - 2019*. Available online at: [https://www.benguelacc.org/index.php/en/component/docman/doc\\_download/684-bcc-strategic-action-programme-2015-2019-eng](https://www.benguelacc.org/index.php/en/component/docman/doc_download/684-bcc-strategic-action-programme-2015-2019-eng) (accessed July 17, 2019).
- BCC Secretariat (2021). *Benguela Current Convention Website*. Available online at: <http://www.benguelacc.org/index.php/en/> (accessed January 15, 2021).
- Belgrano, A., and Villasante, S. (2021). Linking ocean's benefits to people (OBP) with integrated ecosystem assessments (IEAs). *Population Ecol.* 63, 102–107. doi: 10.1002/1438-390X.12064
- Benguela Current Convention (2013). The Benguela Current Convention between the Government of the Republic of Angola and the Government of the Republic of Namibia and the Government of the Republic of South Africa. Available online at: [www.benguelacc.org](http://www.benguelacc.org) (accessed July 5, 2019).
- Bennett, N. J., Niccolini, F., Franco, A. D., Milazzo, M., Calò, A., Nethery, E., et al. (2019). Local support for conservation is associated with perceptions of good governance, social impacts, and ecological effectiveness. *Conserv. Lett.* 12:e12640. doi: 10.1111/conl.12640
- Buhl-Mortensen, L., Galparsoro, I., Vega Fernández, T., Johnson, K., D'Anna, G., Badalamenti, F., et al. (2017). Maritime ecosystem-based management in practice: lessons learned from the application of a generic spatial planning framework in Europe. *Mar. Policy* 75, 174–186. doi: 10.1016/j.marpol.2016.01.024

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

## FUNDING

Some results and discussion included in this article were produced in the Doctoral Thesis of AN, a study that was supported by the South African National Department of Forestry, Fisheries and the Environment.

## ACKNOWLEDGMENTS

The assistance from the BCC Secretariat staff with information on the functioning of the Commission is appreciated. The two reviewers are gratefully acknowledged for their detailed comment on the manuscript.

- Chandrakumar, C., and McLaren, S. J. (2018). Towards a comprehensive absolute sustainability assessment method for effective Earth system governance: defining key environmental indicators using an enhanced-DPSIR framework. *Ecol. Indicators* 90, 577–583. doi: 10.1016/j.ecolind.2018.03.063
- Cochrane, K. L., Augustyn, C. J., Fairweather, T., Japp, D., Kilongo, K., Iitembu, J., et al. (2009). Benguela current large marine ecosystem—governance and management for an ecosystem approach to fisheries in the region. *Coastal Manag.* 37, 235–254. doi: 10.1080/08920750902851187
- Cochrane, K. L., Ortega-Cisneros, K., Iitembu, J. A., dos Santos, C. L., and Sauer, W. H. H. (2020). Application of a general methodology to understand vulnerability and adaptability of the fisheries for small pelagic species in the Benguela countries: Angola, Namibia and South Africa. *Afr. J. Mar. Sci.* 42, 473–493. doi: 10.2989/1814232x.2020.1844798
- Duda, A. (2002). Monitoring and Evaluation Indicators for GEF International Waters Projects Monitoring and Evaluation Working Paper 10. Available online at: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.908.2744andrep=rep1&doctype=pdf> (accessed April 30, 2021).
- Duda, A. M. (2019). Contributing to ocean security: global environment facility support for integrated management of land-sea interactions. *J. Int. Affairs* 59, 179–201.
- Dunford, R., Harrison, P., Smith, A., Dick, J., Barton, D. N., Martín-López, B., et al. (2018). Integrating methods for ecosystem service assessment: experiences from real world situations. *Ecosyst. Serv.* 29, 499–514. doi: 10.1016/j.ecoser.2017.10.014
- European Commission. (2017). Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU. *Official J. Eur. Union* 2017, 32.

- Fanning, L., and Mahon, R. (2020). Governance of the global ocean commons: hopelessly fragmented or fixable? *Coastal Manag.* 48, 527–533. doi: 10.1080/08920753.2020.1803563
- Fanning, L., Mahon, R., Baldwin, K., and Douglas, S. (2015). Transboundary waters assessment programme (TWAP) assessment of governance arrangements for the ocean. volume 1 transboundary large marine ecosystems. *IOC Tech. Series* 119:80.
- Finke, G., Gee, K., Gxaba, T., Sorgenfrei, R., Russo, V., Pinto, D., et al. (2020). Marine spatial planning in the benguela current large marine ecosystem. *Environ. Dev.* 36:100569. doi: 10.1016/j.envdev.2020.100569
- Food and Agricultural Organisation of the United Nations (2021). *EAF-Nansen Programme Newsletter*. Rome: Food and Agricultural Programme of the United Nations.
- Friedman, K., Garcia, S. M., and Rice, J. (2018). Mainstreaming biodiversity in fisheries. *Mar. Policy* 95, 209–220. doi: 10.1016/j.marpol.2018.03.001
- Galaz, V., Crona, B., Österblom, H., Olsson, P., and Folke, C. (2012). Polycentric systems and interacting planetary boundaries - Emerging governance of climate change-ocean acidification-marine biodiversity. *Ecol. Econ.* 81, 21–32. doi: 10.1016/j.ecolecon.2011.11.012
- Gattuso, J. P., Magnan, A. K., Bopp, L., Cheung, W. W. L., Duarte, C. M., Hinkel, J., et al. (2018). Ocean solutions to address climate change and its effects on marine ecosystems. *Front. Mar. Sci.* 5:337. doi: 10.3389/fmars.2018.00337
- Global Environment Facility (2014). *Realizing the Inclusive and Sustainable Development in the BCLME Region Through the Improved Ocean Governance and the Integrated Management of Ocean use and Marine Resources (BCLME III Project Identification Form)*. Available online at: [https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/InternationalWaters/Regional-\(5753\)-RealizingtheInclusiveandSustainableDevelopmentmen/03-21-14\\_PIF\\_Document\\_revised\\_version.pdf](https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/InternationalWaters/Regional-(5753)-RealizingtheInclusiveandSustainableDevelopmentmen/03-21-14_PIF_Document_revised_version.pdf) (accessed May 8, 2019).
- Gonzales, A. T., Kelley, E., and Bernad, S. R. Q. (2019). A review of intergovernmental collaboration in ecosystem-based governance of the large marine ecosystems of East Asia. *Deep-Sea Res. Part II Top. Stud. Oceanogr.* 163, 108–119. doi: 10.1016/j.dsr2.2019.05.014
- Gruby, R. L., and Basurto, X. (2013). Multi-level governance for large marine commons: politics and polycentricity in Palau's protected area network. *Environ. Sci. Policy* 33, 260–272. doi: 10.1016/j.envsci.2013.06.006
- Hamukuaya, H. (2017). *Benguela Current Commission - SAP Support - Final Report for Grants from the Norwegian Ministry of Foreign Affairs*. Available online at: <https://www.benguelacc.org/index.php/en/publications> (accessed May 8, 2019).
- Hamukuaya, H. (2018). Development of Ecological Sustainable Fisheries Practices in the Benguela Current Large Marine Ecosystem (ECOFISH) Final Narrative Report. Available online at: [https://www.benguelacc.org/index.php/en/component/docman/doc\\_download/877-ecofish-final-narative-report](https://www.benguelacc.org/index.php/en/component/docman/doc_download/877-ecofish-final-narative-report) (accessed May 8, 2019)
- Hamukuaya, H., Attwood, C., and Willemse, N. (2016). Transition to ecosystem-based governance of the Benguela Current Large Marine Ecosystem. *Environ. Dev.* 17, 310–321. doi: 10.1016/j.envdev.2015.06.013
- International Waters Learning Exchange and Resource Network (2014). *Enhancing Climate Change Resilience in the Benguela Current Fisheries System - Project Description*. Available online at: <https://iwlearn.net/iw-projects/5113> (accessed February 9, 2020).
- Jarre, A., Shannon, L. J., Cooper, R., Duggan, G. L., Gammage, L. C., Lockerbie, E. M., et al. (2018). Untangling a Gordian knot that must not be cut: Social-ecological systems research for management of southern Benguela fisheries. *J. Mar. Syst.* 188, 149–159. doi: 10.1016/j.jmarsys.2018.01.004
- Jay, S., Alves, F. L., O'Mahony, C., Gomez, M., Rooney, A., Almodovar, M., et al. (2016). Transboundary dimensions of marine spatial planning: fostering inter-jurisdictional relations and governance. *Mar. Policy* 65, 85–96. doi: 10.1016/j.marpol.2015.12.025
- Kainge, P., Kirkman, S. P., Estevão, V., van der Lingen, C. D., Uanivi, U., Kathena, J. N., et al. (2020). Fisheries yields, climate change, and ecosystem-based management of the Benguela Current Large Marine Ecosystem. *Environ. Dev.* 36:100567. doi: 10.1016/j.envdev.2020.100567
- Karsenti, E., Acinas, S. G., Bork, P., Bowler, C., De Vargas, C., Raes, J., et al. (2011). A holistic approach to marine Eco-systems biology. *PLoS Biol.* 9:e1001177. doi: 10.1371/journal.pbio.1001177
- Koseki, S., Keenlyside, N., Demissie, T., Toniazzo, T., Counillon, F., Bethke, I., et al. (2018). Causes of the large warm bias in the Angola-Benguela Frontal Zone in the Norwegian Earth System Model. *Clim. Dynamics* 50, 4651–4670. doi: 10.1007/s00382-017-3896-2
- Le Heron, E., Le Heron, R., Taylor, L., Lundquist, C. J., and Greenaway, A. (2020). Remaking ocean governance in Aotearoa New Zealand through boundary-crossing narratives about ecosystem-based management. *Mar. Policy* 122:104222. doi: 10.1016/j.marpol.2020.104222
- Link, J. S., and Browman, H. I. (2014). Integrating What? Levels of marine ecosystem-based assessment and management. *ICES J. Mar. Sci.* 71, 1170–1173.
- Link, J. S., and Browman, H. I. (2017). Operationalizing and implementing ecosystem-based management. *ICES J. Mar. Sci.* 74, 379–381. doi: 10.1093/icesjms/fsw247
- Link, J. S., Thébaud, O., Smith, D. C., Smith, A. D. M., Schmidt, J., Rice, J., et al. (2017). Introduction keeping humans in the ecosystem. *ICES J. Mar. Sci.* 74, 1947–1956. doi: 10.1093/icesjms/fsx130
- Lombard, A. T., Dorrington, R. A., Reed, J. R., Ortega-cisneros, K., Penry, G. S., Pichegru, L., et al. (2019). Key challenges in advancing an ecosystem-based approach to marine spatial planning under economic growth imperatives. *Front. Mar. Sci.* 6:146. doi: 10.3389/fmars.2019.00146
- Mahon, R., and Fanning, L. (2019a). Regional ocean governance: integrating and coordinating mechanisms for polycentric systems. *Mar. Policy* 107:103589. doi: 10.1016/j.marpol.2019.103589
- Mahon, R., and Fanning, L. (2019b). Regional ocean governance: polycentric arrangements and their role in global ocean governance. *Mar. Policy* 107:103590. doi: 10.1016/j.marpol.2019.103590
- Mahon, R., Fanning, L., and McConney, P. (2017). Assessing governance performance in transboundary water systems. *Environ. Dev.* 24, 146–155. doi: 10.1016/j.envdev.2017.06.008
- Mahon, R., Fanning, L., Gjerde, K. M., Young, O., Reid, M., and Douglas, S. (2015). *Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean Volume 2 Areas Beyond National Jurisdiction*. Paris: Intergovernmental Oceanographic Commission Technical Series, 91.
- Marshak, A. R., Link, J. S., Shuford, R., Johannesen, E., Bianchi, G., Robin Anderson, M., et al. (2017). Editor 's Choice International perceptions of an integrated, multi-sectoral, ecosystem approach to management. *ICES J. Mar. Sci.* 74, 414–420. doi: 10.1093/icesjms/fsw214
- Mausolf, E. (2014). *Benguela Current Marine Spatial Management and Governance (MARISMA)*. Bonn: GIZ Worldwide.
- Miller, K. A., Thompson, K. F., Johnston, P., and Santillo, D. (2018). An overview of seabed mining including the current state of development, environmental impacts, and knowledge gaps. *Front. Mar. Sci.* 4:418. doi: 10.3389/fmars.2017.00418
- Namibian Msc Final Draft Report on Hake Demersal and Longline Fishery (2020). *Marine Stewardship Council [Online]*. Available online at: <https://fisheries.msc.org/en/fisheries/namibia-hake-trawl-and-longline-fishery/@assessments> (accessed June 15, 2021).
- Neto, V. de B., Jardim, M. de F., Vasconcelos, J.M.B. de, Tomás, A. da S., Naruseb, A., Esau, B., et al. (2016). Two decades of inter-governmental collaboration: three developing countries on the move towards ecosystem-based governance in the Benguela Current Large Marine Ecosystem. *Environ. Dev.* 17, 353–356. doi: 10.1016/j.envdev.2015.11.007
- Norwegian Ministry of Foreign Affairs (2017). Final Report for Grants from the Norwegian Ministry of Foreign Affairs (MFA) - Implementing the BCC Strategic Action Programme (SAP) to Realise Ecosystem-Based Management in the BCLME Region. Available online at: <http://www.benguelacc.org/index.php/en/activities/science-programme> (accessed May 8, 2019).
- O'Higgins, T. G., Lago, M., and Dewitt, T. H. (2020). "Using the concepts and tools of social ecological systems and ecosystem services to advance the practice of ecosystem-based management," in *Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity - Theory, Tools and Applications*, eds T. G. O'Higgins, M. Lago, and T. H. Dewitt (Cham: Springer Open), doi: 10.1007/978-3-030-45843-0
- Österblom, H., Crona, B. I., Folke, C., Nyström, M., and Troell, M. (2017). Marine ecosystem science on an intertwined planet. *Ecosystems* 20, 54–61. doi: 10.1007/s10021-016-9998-6



- Paterson, B., Snowman, M., Raemakers, S., and Russell, D. (2012). *Integrating the Human Dimension of an Ecosystem Approach to Fisheries (EAF) into Fisheries Management in the BCC region*. Swakopmund: Benguela Current Commission.
- Price, P., Raemaekers, S., and Sowman, M. (2017). *Community-level Rapid vulnerability assessment to inform adaptation planning in Henties Bay, Namibia*. Swakopmund: Benguela Current Commission.
- Raakjaer, J., Leeuwen, J. v., Tatenhove, J. v., and Hadjimichael, M. (2014). Ecosystem-based marine management in European regional seas calls for nested governance structures and coordination—A policy brief. *Mar. Policy* 50, 373–381. doi: 10.1016/j.marpol.2014.03.007
- Raemaekers, S., and Sowman, M. (2015). *Community-Level Socio-Ecological Vulnerability Assessments in The Benguela Current Large Marine Ecosystem*. Rome: Food and Agriculture Organization of the United Nations.
- Rudolph, T. B., Ruckelshaus, M., Swilling, M., Allison, E. H., Österblom, H., Gelcich, S., et al. (2020). A transition to sustainable ocean governance. *Nat. Commun.* 11:3600. doi: 10.1038/s41467-020-17410-2
- Shannon, L. J., Cochrane, K. L., Moloney, C. L., and Fréon, P. (2004). Ecosystem approach to fisheries management in the southern Benguela: a workshop overview. *Afr. J. Mar. Sci.* 26, 1–8. doi: 10.2989/18142320409504046
- Sherman, K. (2014a). Adaptive management institutions at the regional level: the case of Large Marine Ecosystems. *Ocean Coastal Manag.* 90, 38–49. doi: 10.1016/j.ocecoaman.2013.06.008
- Sherman, K. (2014b). Toward ecosystem-based management (EBM) of the world's large marine ecosystems during climate change. *Environ. Dev.* 11, 43–66. doi: 10.1016/j.envdev.2014.04.006
- Sherman, K., and Hamukuaya, H. (2016). Sustainable development of the world's Large Marine Ecosystems. *Environ. Dev.* 17, 1–6. doi: 10.1016/j.envdev.2015.12.002
- Smith, D. C., Fulton, E. A., Apfel, P., Cresswell, I. D., Gillanders, B. M., Haward, M., et al. (2017). Implementing marine ecosystem-based management: lessons from Australia. *ICES J. Mar. Sci.* 74, 1990–2003. doi: 10.1093/icesjms/fsx113
- Sowman, M., Raemaekers, S., Sunde, J., and Price, P. (2017). *Training Manual and Guidelines for Conducting Community-Level Rapid Vulnerability Assessments (RVA)*. Swakopmund: Benguela Current Commission.
- Spooner, E., Karnauskas, M., Harvey, C. J., Kelble, C., Rosellon-Druker, J., Kasperski, S., et al. (2021). Using integrated ecosystem assessments to build resilient ecosystems, communities, and economies. *Coastal Manag.* 49, 26–45. doi: 10.1080/08920753.2021.1846152
- Sumaila, U. R. (2016). Socio-economic benefits of Large Marine Ecosystem valuation: the case of the Benguela Current Large Marine Ecosystem. *Environ. Dev.* 17, 244–248. doi: 10.1016/j.envdev.2015.10.002
- Tallis, H., Mooney, H., Andelman, S., Balvanera, P., Cramer, W., Karp, D., et al. (2012). A global system for monitoring ecosystem service change. *BioScience* 62, 977–986. doi: 10.1525/bio.2012.62.11.7
- Valiullina, K. B., Hashim, S. J., and Kurdyukov, G. I. (2019). Regional cooperation of states on the issue of protection of the world ocean ecosystems from pollution. *J. Environ. Treat. Tech.* 7, 966–969.
- van Leeuwen, J., Raakjaer, J., van Hoof, L., van Tatenhove, J., Long, R., and Ounanian, K. (2014). Implementing the Marine Strategy Framework Directive: a policy perspective on regulatory, institutional and stakeholder impediments to effective implementation. *Mar. Policy* 50, 325–330. doi: 10.1016/j.marpol.2014.03.004
- van Tatenhove, J. P. M. (2013). How to turn the tide: developing legitimate marine governance arrangements at the level of the regional seas. *Ocean Coastal Manag.* 71, 296–304. doi: 10.1016/j.ocecoaman.2012.11.004
- van Tatenhove, J. P. M. (2017). Transboundary marine spatial planning: a reflexive marine governance experiment? *J. Environ. Policy Plan.* 19, 783–794. doi: 10.1080/1523908X.2017.1292120
- Vousden, D. (2016). Local to regional polycentric governance approaches within the Agulhas and Somali Current Large Marine Ecosystems. *Environ. Dev.* 17, 277–286. doi: 10.1016/j.envdev.2015.07.008
- Williams, G. D., Andrews, K. S., Brown, J. A., Gove, J. M., Hazen, E. L., Leong, K. M., et al. (2021). Place-Based ecosystem management: adapting integrated ecosystem assessment processes for developing scientifically and socially relevant indicator portfolios. *Coastal Manag.* 49, 46–71. doi: 10.1080/08920753.2021.1846154
- Winther, J. G., Dai, M., Douvère, F., Fernandes, L., Halpin, P., Hoel, A. H., et al. (2020a). *Integrated Ocean Management*. Washington, DC: World Resource Institute.
- Winther, J. G., Dai, M., Rist, T., Hoel, A. H., Li, Y., Trice, A., et al. (2020b). Integrated ocean management for a sustainable ocean economy. *Nat. Ecol. Evol.* 4, 1451–1458. doi: 10.1038/s41559-020-1259-6

**Conflict of Interest:** HH was employed by company Kameol Management Services.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Publisher's Note:** All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Copyright © 2021 Naidoo, Hamukuaya, Hara, Mngxe and Raakjaer. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.