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Pathways to integrate Indigenous and local knowledge in ocean governance processes: Lessons from the Algoa Bay Project, South Africa

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The Introduction of this paper argues that current coastal and ocean management approaches like marine spatial planning (MSP) often do not adequately acknowledge and integrate Indigenous and Local Knowledge (ILK). This is problematic because how humans value and perceive coastal and marine resources is integrally linked to how they use and manage these resources, especially in adapting to social-ecological change. Coastal and marine resources are situated within complex social-ecological systems that are culturally, economically, historically and politically embedded. Therefore, management approaches have to integrate transdisciplinary and contextual perspectives in order to be relevant, sustainable and adaptive. Following extensive research in Algoa Bay, South Africa this article highlights several pathways to bridge the gap between existing ILK and current coastal and ocean management approaches. The Methods section discusses how the authors worked in tandem with a bottom-up (engaging with Indigenous and local coastal and marine resource users) and top-down (engaging with coastal governance authorities and practitioners) approach. In order to answer the primary research question "How can ILK be integrated into area-based ocean management like MSP"? the authors employed arts-based participatory methods as well as in-depth interviews and workshops with coastal governance authorities and practitioners over several months. This work then culminated in a one-day multi-stakeholder workshop which brought both ILK holders and coastal authorities and practitioners together to collaboratively identify pathways to integrate this knowledge into coastal and ocean management. In the Results and Discussion section the authors present and discuss five co-identified pathways to integrate ILK in coastal and ocean management which include: adopting contextual approaches to coastal and ocean management; increasing transparency and two-way communication between coastal authorities and

users; increasing access to relevant and useable information; reviewing and amending relevant MSP legislation towards a stronger connection between MSP and Indigenous knowledge legislation; as well as amending legislation pertaining to access to coastal and marine areas. In the Conclusion it is argued that ILK coastal communities want to be meaningfully included in how their coastline and ocean resources are managed and also seek increased access to coastal areas. By highlighting pathways to include ILK and the knowledge holders themselves, this paper seeks to contribute to improved protection and sustainable management of marine resource use.

1 Introduction

Indigenous and Local Knowledge (ILK) holders remain largely excluded in ocean governance in South Africa (see Sowman and Sunde, 2018; Strand et al., 2022a), on the African continent (see Okafor-Yarwood et al., 2020) and even on global scales (Saunders et al., 2020; Vierros et al., 2020). ILK and cultural heritage, especially intangible cultural heritage, continue to be unrepresented in ocean governance approaches, especially in area-based ocean management processes such as marine spatial planning (MSP) and marine protected areas (MPAs) (Gee et al., 2017; Saunders et al., 2020; Adams and Kowalski, 2021; Stephenson et al., 2021). This lack of recognition and acknowledgement of ILK, knowledge holders and cultural heritage results in a lack of understanding of how ILK and marine cultural heritage impacts on these processes. This is problematic because how humans value and perceive coastal and marine resources is integrally linked to how they use and manage these resources, especially in adapting to social-ecological change (Strand et al., 2022a).

In South Africa, inadequate and non-inclusive ocean governance has resulted in food insecurity, loss of livelihoods, fracturing of coastal identities and other negative socio-cultural impacts (Sowman and Sunde, 2018; Strand et al., 2022a). This is particularly relevant in a post-apartheid South African context where access to coastal areas and the management thereof has been largely exclusionary of marginalized communities, both in the past and present (Sowman and Sunde, 2018; Musavengane and Leonard, 2019). The importance of recognising and integrating both ILK and cultural heritage in area-based ocean management in South Africa cannot be understated. Social and cultural knowledge of the ocean 'will impact ecological and economic aspects of these systems, and vice versa, and must therefore be considered on an equal basis to ensure ocean governance efforts achieve their objectives' (Strand et al., 2022b).

This research forms part of the Algoa Bay Pilot Project in the Eastern Cape of South Africa (see Figure 1 below), which has as its overall goal to understand how to develop and implement the newly introduced MSP legislation in a South African context. The Algoa Bay Project was initiated in 2017 as the first pilot project to explore the legislative, biophysical and socio-economic practicalities involved in applying the country's MSP legislation in order to inform the development of the first marine area plan (the Southern Area Plan, see Figure 2 below). Algoa Bay was chosen as the pilot site as the Bay has the longest standing biophysical monitoring along the country's shoreline (Dorrington et al., 2018). The project is a civil society-led initiative led by Rhodes University and a multi-institutional community of practice funded by the South African government's Department of Science and Innovation (DSI) through the National Research Foundation. Over the years the project has broadened in scope to include other aspects of ocean governance such as blue economy, ocean culture, climate change in coastal cities, environmental and human rights and capacity strengthening. Phase I of the overall project (Sept 2017 - August 2019) focused on the biophysical and legal aspects of MSP in South Africa, while Phase II (July 2020 to December 2022) has investigated the socio-cultural aspects of MSP in the Bay and is where this paper finds its salience.

In order to understand how to integrate both ILK, knowledge holders and cultural heritage into ocean and coastal governance, and MSP more specifically, we adopted a transdisciplinary knowledge co-production approach guided by two primary objectives: i) to identify ILK that currently exists in the Bay and ii) to co-identify knowledge integration pathways[1] to integrate ILK and knowledge holders into current and future coastal and ocean management approaches, working *with* Indigenous and local knowledge holders as well as with

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1 We understand knowledge integration pathways as processes or mechanisms that can help integrate different forms of knowledge and knowledge holders into area-based ocean management such as approaches, processes, tools, platforms, methods and techniques.
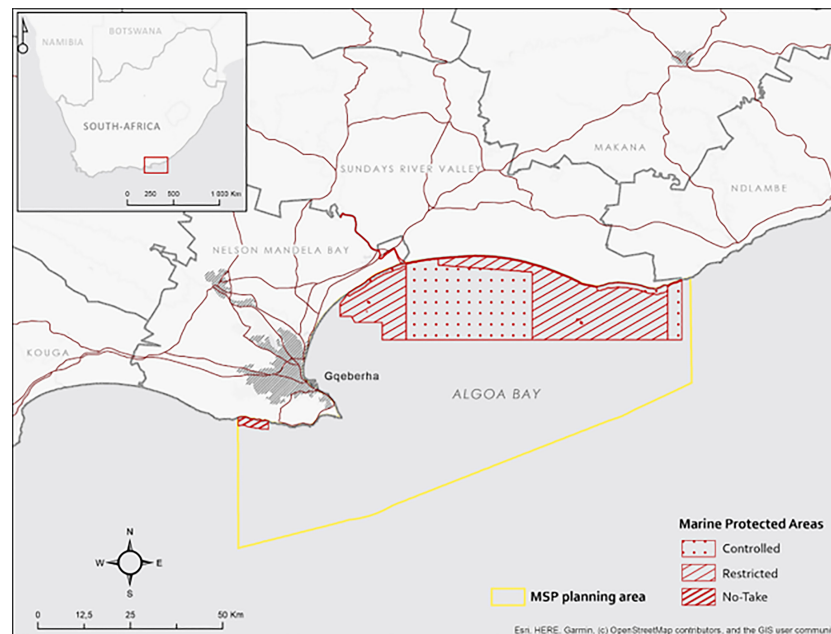
FIGURE 1
Location of Algoa Bay, Eastern Cape, South Africa.

coastal governance authorities and practitioners. The knowledge integration pathways were therefore identified by ILK resource users, coastal governance authorities and practitioners and the authors in an effort to develop more sustainable and impactful ways to govern the ocean and coast.

2 Literature review

2.1 Social-ecological systems approach

This study takes as its starting point an appreciation for and understanding of the interdependencies between human and nature, with these understood as part of one social-ecological system (SES) which should therefore be managed as such (see Biggs et al., 2021). This systems-oriented approach calls for more nuanced and integrated solutions to better manage complex social-ecological systems. Acknowledging that human cultures impact behaviors and interactions with marine ecosystems, this study set out to identify mechanisms and enablers to integrate ILK and knowledge holders in integrated ocean management approaches in the Algoa Bay SES (see Figure 3 below).

Governance of coastal and ocean SESs are complex, with multiple drivers and stakeholders with differing and oftentimes conflicting worldviews, values and agendas. Therefore, integrated, adaptive and knowledge–based coastal management is required, building on a growing recognition that it is essential

to integrate human-nature linkages into adaptive management approaches that build in processes for learning and time for the development of social capacity to adapt to social, ecological, political and economic changes (Jacob et al., 2021).

2.2 Indigenous and local knowledge in South Africa

In South Africa the management of coastal and marine resources is still very much top-down, due in large part to fortress conservation approaches as a legacy from colonial and Apartheid rule. Fortress conservation refers to a nature protection strategy which sees the need to 'fence' people out from wilderness where it is assumed they do not belong. In this fortress conservation discourse, 'encroaching' local populations are often seen as the primary threat to wilderness areas, resulting in Indigenous and local populations being dispossessed or displaced from protected areas such as marine no-take zones (Siurua, 2006:74; Sand, 2012). Poorer, marginalised coastal communities therefore are often excluded from management decisions pertaining to how the coastal resources they rely on for their livelihoods are used and managed (see Sowman and Sunde, 2018; Strand et al., 2022a). This is particularly true when it comes to ILK holders, and the context of Algoa Bay is no exception.

In this paper, Indigenous knowledge refers to "beliefs and culture that have been handed down through generations, often
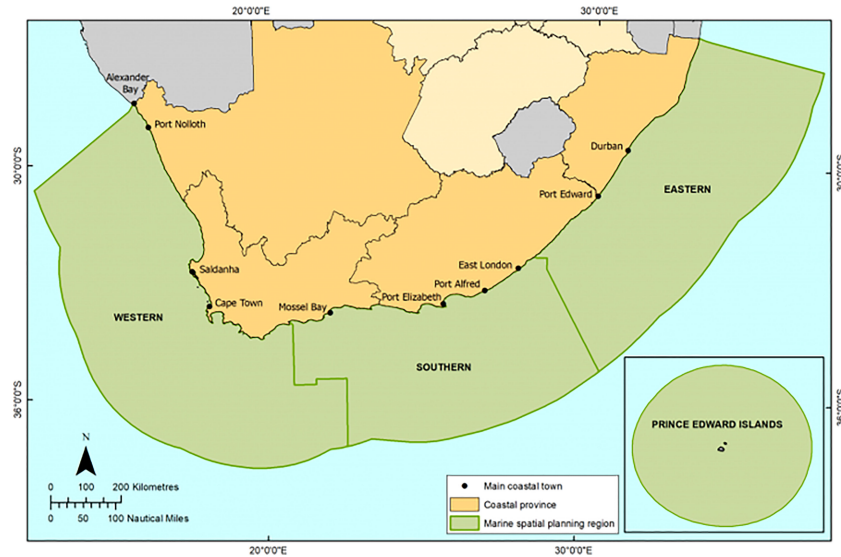
FIGURE 2
South Africa's four Marine Planning Areas (source DFFE, 2021).
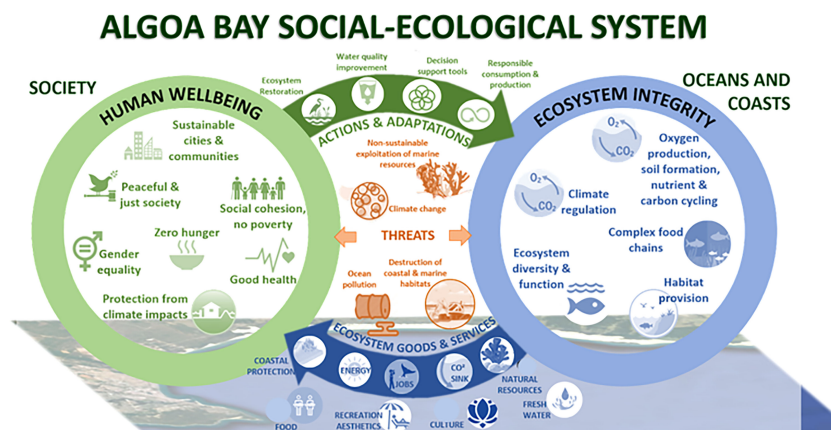

FIGURE 3
Algoa Bay social-ecological system (adapted by A.T. Lombard from Visbeck et al., 2017 for the Algoa Bay Project, 2022).

by word of mouth, practices, rules and traditional rituals, and that is unique to a culture or a specific people group" (Strand et al., 2022a:3), such as Indigenous Khoisan communities living in and nearby Algoa Bay. Local knowledge refers to "values, beliefs and culture of people living in, around and identifying with the area of Algoa Bay, and this can be anything from youth to fishers, bait collectors and recreational ocean users such as swimmers and surfers" (Strand et al., 2022b:2). The reason for referring to ILK in the context of Algoa Bay, instead of separating the two, is captured in Strand et al. (2022a:3), explaining the 'blending or merging of cultural values, kinship

and practices between Indigenous Khoi and San, the amaXhosa, amaZulu, and other ethnic groups of South Africa such as the Cape Malay, Indian, Dutch, Afrikaans and English communities that have settled in and around Algoa Bay since the early 1500s'. ILK, within a South African context, is culturally diverse and complex, it is dynamic and not easily bounded (Boswell and Thornton, 2021; Strand et al., 2022a). ILK can therefore broadly be defined as culture, values and beliefs that are 'handed down through generations by cultural transmission about the relationship of living beings, with one another and with their environment' (Gadgil et al., 1993:151).

Despite the growing recognition of the importance of acknowledging, valuing and integrating ILK and knowledge holders in integrated ocean management approaches (Flannery et al., 2018; Okafor-Yarwood et al., 2020; Saunders et al., 2020), largely government-led top-down processes continue to exclude both, or merely consult knowledge holders through tick-box stakeholder engagement processes (Sowman and Sunde, 2018). Existing legal frameworks underpinning coastal and ocean management in South Africa encourage 'relevant' stakeholders in public participation processes as contained in the National Environmental Management Act of 1998 (NEMA), the Integrated Coastal Management Act of 2008 (ICMA), the Marine Spatial Planning Act of 2018 (MSPA), and environmental impact assessments. However, meaningful and inclusive participation and uptake of alternative knowledge into decision making is continuously lacking.

2.3 Marine spatial planning as an emerging *integrated* ocean management approach

For the last two decades, MSP has emerged as the preferred process to manage marine resources in Western/Northern Europe, North America, Australia and China (Ehler, 2021). MSP is a public and political process that allocates portions of the coast and marine areas for different human activities in order to achieve a balance between ecological, economic and social objectives (Ehler and Douvere, 2007). It is now recognized that holistic, Ecosystem-Based Approaches are best suited to achieve these objectives. Historically linked to the concepts of Integrated Coastal Zone Management and Large Marine Ecosystem Management, Ecosystem-Based Approach frameworks acknowledge both connectivity among natural systems and the interlinks between ecological, social economic and institutional systems (McLeod et al., 2005). A literature review conducted in 2016 showed that most MSP processes were embracing Ecosystem-Based Approaches, although the authors reported an unbalanced integration of the ecological, social and economic components (Domínguez-Tejo et al., 2016). When fostered by national development strategies, MSP processes can sometimes be biased toward economic growth. This can often lead to conflicts between economic and environmental interests and between commercial and socio-cultural interests. Economic growth agendas challenge the mainstreaming of ecosystem-based approaches to MSP into policy and decision making globally, and in South Africa more specifically. Given South Africa's high unemployment rate and challenging economic situation, it is understandable that the state emphasizes economic growth and job creation, however, such prioritization need not, and indeed should not, come at the expense of environmental sustainability and the natural capital on which many jobs and livelihoods depend.

The 1982 Law of the Sea Convention influenced the development of MSP in recent years through its exhortation that "… all problems of ocean space are closely interrelated and need to be addressed as a whole …" which gave rise to discussions around how to address ocean management problems as a whole, otherwise known as integrated ocean management. In 1992, at the Rio de Janeiro Earth Summit, integrated coastal zone management was introduced as an approach that considers all aspects of coastal zones, including geographical and political boundaries, in an attempt to achieve sustainability. Integrated coastal zone management is therefore the forerunner of MSP in the evolution of how coastal and marine areas are governed. The first international MSP workshop was held in 2006 and by 2021, 75 countries worldwide were experimenting with MSP as a practical approach toward ecosystem-based marine management (Ehler, 2021).

2.3.1 Marine spatial planning in Africa

Blue growth agendas and the increased demand for ocean space and marine resources is increasing on the African continent, especially with initiatives like the 2050 Africa's Integrated Marine (AIM) Strategy and the Africa Blue Economy Strategy (African Union, 2012:26; AU-IBAR, 2019:16). Within the 2050 AIM Strategy, MSP is recommended as a means to balance frequently competing sector-based interests to enable: a) efficient and sustainable use of marine resources, b) knowledge-based decision-making and, c) greater legal certainty for investors to encourage blue economic development in Africa (African Union, 2012). With the overall aim of sustainably developing Africa's economic growth through the ocean economy, the African Blue Economy Strategy also encourages African states to institutionalize MSP as an ocean governance tool "to balance sustainable use and conservation imperatives and mitigate conflicts and create synergies amongst the users…" (AU-IBAR, 2019:16).

With the inception of the United Nations Decade of Ocean Science for Sustainable Development (2021-2031) and the African Union's Agenda 2063: "The Future We Want", that highlights the urgent need to develop and protect Africa's resources sustainably, many African countries are therefore looking to MSP as the appropriate approach to manage their coastlines and marine areas (Lombard et al., 2019). This has resulted in initiatives such as the Western Indian Ocean Marine Spatial Plan (WIOMSP) framework, developed by the United Nations Environmental Programme (UNEP) and Nairobi Convention. The framework takes on a systems approach to marine spatial planning for the region and ecosystems based, taking into account the important ecosystems and environmental processes that connect the region, providing essential ecosystem services. However, according to MSP Global, as of August 2022 only 16 African countries are involved in, or are considering initiating, an MSP process (MSP Global, 2022).

2.3.2 Marine spatial planning in South Africa

In 2017, South Africa became the first African country to draft MSP legislation (Marine Spatial Planning Bill [B9-2017]). MSP in South Africa had its inception in the 'National Environmental Management of the Oceans' (NEMO) White Paper, published in 2014. The Operation Phakisa "Unlocking the Ocean Economy" initiative was also launched in the same year, which emphasizes economic growth by unlocking the economic potential of South Africa's oceans. The initiative is supported through six work streams, one of which is the Marine Protection Services and Ocean Governance workstream. This work stream published the National Marine Spatial Planning Framework or MSP Bill (2017) which outlines a framework that can enable a 'sustainable blue economy' whilst fostering socio-economic development (DEA, 2018). The work stream also supported the recent expansion of South Africa's MPA network in order to protect the ocean environment from illegal activities and to promote multiple socio-economic benefits. In 2018 the MSP Act (MSP Act 2018) was gazetted and in April 2021 came into force, providing mandatory requirements for the establishment of marine area plans for four regions along South Africa's coastline (Rivers et al., 2022) (see Figure 2 below).

2.4 Transdisciplinary knowledge-co production

This study acknowledges the importance of co-creating knowledge with ILK holders, as will become apparent in the recommendations for future pathways to integrate ILK in area-based ocean management (see 5.1). In this light, the study has taken a transdisciplinary research approach, where ILK holders, policy-makers and coastal managers have been recognised as co-researchers (see Strand et al., 2022b). Transdisciplinary research can be defined as 'knowledge co-production with non-academics' (Manuel-Navarrete et al., 2021) and 'co-learning across scientific disciplines to better incorporate (potentially divergent) stakeholder views and values' (Moallemi et al., 2020).

The need for transdisciplinary knowledge co-production that transcends academic institutions is needed to respond to complex social-ecological challenges to find sustainable, relevant and equitable solutions (see Benham and Daniell, 2016; Strand et al., 2022c). Reflecting on transdisciplinarity for transformative ocean governance, Strand et al. (2022c), highlight that transdisciplinary research activities 'need to address power imbalances in existing research methods to achieve knowledge co-production, as opposed to knowledge integration'. This is also the case with existing ocean management approaches, therefore emphasizing the need to co-produce knowledge with ILK holders from the initiation and conceptualization of new projects and protected areas (see 5.1).

2.5 Addressing the problem: Lack of alternative knowledge integration in marine spatial planning

One of the key components of developing an MSP, in line with international best practice calling for such processes to be inclusive and equitable, is that it should be co-developed with the individuals, communities and institutions which will impact upon and be impacted by the MSP the most (Ehler and Douvere, 2009; Schumacher et al., 2018; Grimmel et al., 2019). This includes not only engaging with people who use the ocean for food and livelihoods, but also with those who have cultural connections to the ocean and coast. Historically, both internationally and in South Africa, ILK holders have been excluded from ocean governance decision-making processes, particularly surrounding the establishment and operation of MPAs (Käyhkö et al., 2019; Peer et al., 2022). Reported failures in MPA management is often attributed to lack of or inadequate inclusion of local communities (Christie, 2004; Thomassin et al., 2010; Sowman and Sunde, 2018). Even though there are small changes, this legacy of exclusion has continued to a large extent (Grimmel et al., 2019; McKinley et al., 2019; Parsons et al., 2021).

There are several reasons for this exclusion, including both intentional and unintentional. One primary challenge is to identify and document cultural heritage and intangible cultural values and then link them to specific places or geographical areas which fit the mapping logic of MSP (Gee et al., 2017).

Inadequate understanding and ability to integrate cultural dimensions of marine and coastal ecosystems poses a significant challenge to conservation, planning and management professionals. When coastal communities are not included in coastal and ocean management decisions then conflicts over resource use ensue and inequalities are further compounded as coastal users are prohibited from using certain resources (Gee et al., 2017; Mbatha, 2022). Developing a sense of ownership or stewardship for coastal areas is also inhibited when coastal communities are excluded from ocean governance processes (see Thomassin et al., 2010; Gall and Rodwell, 2016; Peer et al., 2022). And yet, most MSP initiatives fail to include Indigenous knowledge and rights, as previously highlighted by research on MPAs (Ban and Frid, 2018). However, there are several examples of MSP processes that have successfully integrated alternative knowledge systems into their development such as the Marine Plan Partnership (MaPP) in British Columbia, Canada, where the close collaboration between First Nations and the national government have brought cultural considerations to the fore of the planning process (Diggon et al., 2021). Future equitable and sustainable ocean use and protection urgently requires that this knowledge gap be addressed, as socio-cultural dynamics must be acknowledged, understood and integrated in ocean and coastal governance.

3 Materials and methods

In order to identify pathways to ILK integration in area-based ocean management we worked in tandem with a bottom-up (engaging with Indigenous and local coastal and marine resource users) and top-down (engaging with coastal governance authorities and practitioners) approach. Two objectives guided this work in order to answer the primary research question "How can ILK be integrated into area based ocean management like MSP"? The first objective was to identify the ILK currently existing in the Bay and the second was to identify pathways to integrate ILK into current and future coastal and ocean management approaches.

The research was divided into two phases with a bottom-up (engaging with Indigenous and local coastal and marine resource users) and top-down (engaging with coastal authorities) approach (see Figure 4 below). Phase One answered the first objective and employed arts-based participatory research (ABPR) with 24 ILK holders and culminated in a photographic Ocean Connections exhibition on 23 March, 2022 (see Strand et al., 2022a; Strand et al., 2022b). The exhibition demonstrated the importance of the individual perspective and interest-led personal views for understanding coastal and marine resource use and the implications this has for coastal research and sustainability considerations and transformations (see Figure 5).

Phase Two, highlighted in this paper, answered the second objective and included two parts. The first involved in-depth interviews and workshops with coastal governance authorities

and practitioners in order to identify current and future pathways to integrate ILK into their work. The second part involved a multi-stakeholder workshop which brought together ILK holders and coastal authorities and practitioners who engaged with the exhibition and then collaboratively identified pathways to integrate this knowledge into coastal and ocean management (see Figure 6). Both the exhibition and workshop functioned as platforms for storytelling, knowledge interaction and knowledge co-creation.

3.1 Semi-structured interviews and workshops with coastal governance authorities and practitioners

The lead author carried out nine semi-structured, in-depth interviews as well as five workshops with coastal authorities across all three levels of government (local, provincial and national) as well as implementers and practitioners working in the coastal management sector. Semi-structured, in-depth interviews involve posing open-ended questions to research participants on a particular topic in order to obtain an in-depth understanding of their experiences, perceptions and knowledge (Rosenthal, 2016). The aim of the interviews and workshops was to understand primary coastal and marine governance challenges and how they overcome these (pathways they use to work around these) as well as to identify current and future pathways to integrate ILK and knowledge holders into coastal management (see Supplementary Materials).
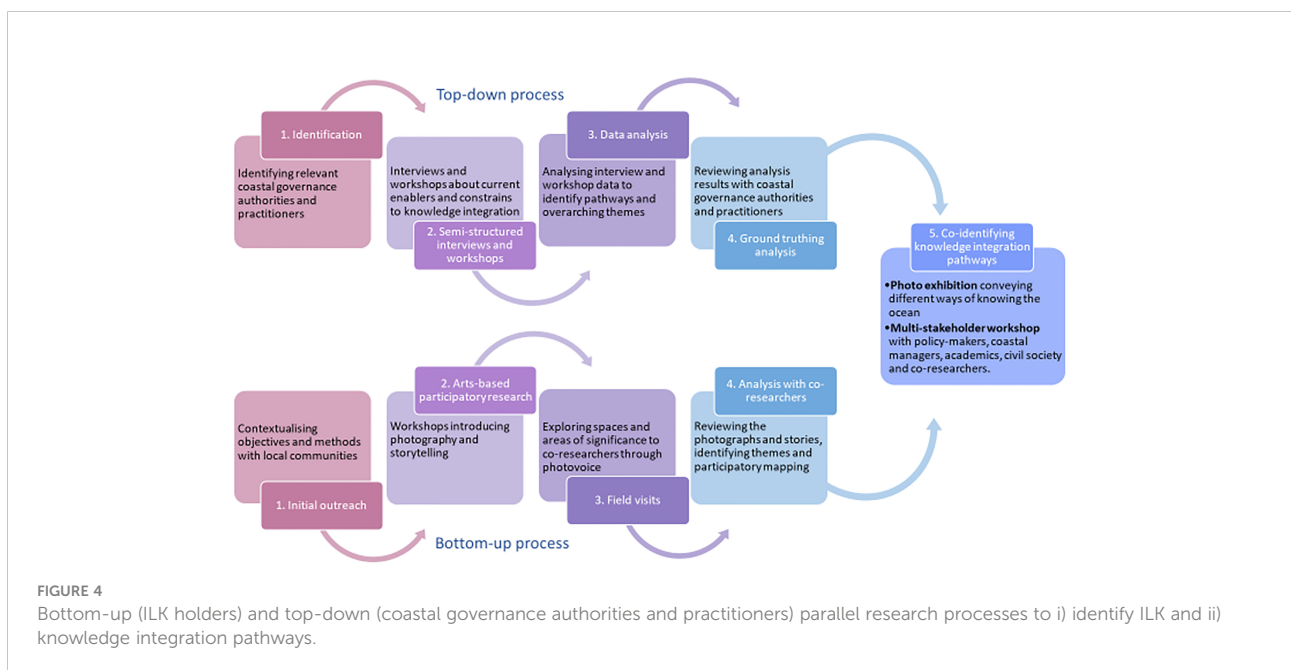

FIGURE 4
Bottom-up (ILK holders) and top-down (coastal governance authorities and practitioners) parallel research processes to i) identify ILK and ii) knowledge integration pathways.

FIGURE 5
Co-researchers and coastal authorities engaging with the Ocean Connections photographic exhibition (Photograph by Mia Strand, March 2022).

FIGURE 6
Multi-stakeholder workshop (Photograph by Nina Rivers, March 2022).

3.2 Multi-stakeholder workshop with ILK holders and coastal governance authorities and practitioners

Following a year of engagements with ILKS holders and coastal governance authorities and practitioners in the form of ABPR, semi-structured interviews and workshops as outlined above, we designed and facilitated a multi-stakeholder workshop to co-identify and build consensus around ILK integration pathways. Although most participants were present at the exhibition opening on 23 March, which served as a space for cross-learning and engagements (see Strand et al., 2023b), most authorities were only able to attend one full day as they were based in other cities across the country, This pathways workshop therefore took the form of a one-day, multi-stakeholder workshop with 31 ILK holders and coastal governance authorities and practitioners on 24 March, 2022 through three sessions. In Session 1 participants were first invited to interact

with the photographic exhibition to help them connect to ILK in the Bay as well as to prepare them to identify ways to integrate this kind of knowledge into area-based ocean management. Participants were asked to think about what they experienced, felt and learned through the depictions of different coastal and ocean cultural practices and connections. In Session 2, participants were asked to identify current and future pathways to integrate ILK and knowledge holders into ocean governance in groups by considering current stakeholder platforms, what is and is not working with regards to stakeholder involvement in coastal management, what is missing in terms of knowledge needs and finally how ILK needs to be presented or packaged for it to be practically taken up by coastal authorities and policy makers.

In Session 3 we used a nominal group technique (Gallagher et al., 1993) to build consensus on policy recommendations to inform a co-authored policy brief (see Rivers et al. 2023) and inform future work for integrating ILK and knowledge holders into MSP. Participants were asked to identify ten recommendations: five areas of change (what is missing in terms of the kind of knowledge that informs current ocean and marine governance?) and five recommendations for how to integrate local knowledge and knowledge holders into MSP (see Supplementary Materials). These ten recommendations were analyzed and condensed into six broad recommendations (see Rivers et al. 2023) and feed into the below recommendations.

The interview data was qualitatively analyzed using content analysis where transcribed interviews were first organized into two broad categories: "current"and "future" pathways for knowledge integration. The data in these two categories were then coded inductively which allowed themes to emerge progressively. We originally identified 47 sub-categories or themes and then further coded these down into 17 higher level categories or broad themes (see Supplementary Material). The broad themes and subthemes were coded a second time (double-coded) by another researcher/co-author (MF) to ensure rigor and consistency of findings. In order to have a workable number of recommendations but still capture the diversity and complexity of the data these 17 themes were then collated under the six broad policy recommendations (Rivers et al., 2023) which were then further condensed and adapted into the five primary recommendations which are discussed below.

4 Pathways to integrate Indigenous and local knowledge into area-based ocean management

Several pathways for integrating ILK and knowledge holders into area-based ocean management processes were co-identified with ILK holders and coastal authorities and practitioners. These pathways include: 1) contextual approaches to coastal and ocean management, 2) increased transparency and improved two-way

communication, 3) increased access to relevant and usable information, 4) reviewing and amending relevant MSP legislation towards a stronger connection between the MSP legislation and the Indigenous knowledge legislation, and 5) amending legislation pertaining to access to coastal and marine areas (see Table 1 for a summary of the findings below).

4.1 Contextual approaches to coastal and ocean management (no one-size-fits-all)

The development and implementation of (1) *marine area plans have to be context-specific* and cannot be generalized along

TABLE 1   Pathways to integrate ILK and knowledge holders into MSP.

Knowledge integration pathways	Definition
4.1 Contextual approaches to coastal and ocean management (no one-size-fits-all)	
1. Context-specific responses to coastal governance issues	Governance responses need to be tailored to specific contexts (E.g. historical, political, economic etc.)
2. Fine grain socio-cultural studies carried out	Socio-cultural studies done at local context level (fine-grained studies/data) that shed light on contextualised coastal governance challenges and opportunities
3. Management plans informed by meaningful stakeholder engagement	Management plans for MSP area plans or MPAs need to be informed by meaningful stakeholder engagement processes
4. Knowledge co-creation opportunities	Opportunities for coastal stakeholders to co-develop knowledge and management plans together (E.g. methods like participatory community mapping or local fisherfolk employed to monitor fish in local MPAs). Knowledge co-creation opportunities can lead to greater sense of ownership and stewardship of coast and ocean and can be a gateway into co-management
5. Local community members working in protected areas	Local community members working in protected areas - learning but also drawing on their local knowledge for management (i.e. graduate programs)
6. Dedicated local authorities who understand local coastal community needs	Local authorities or NGO workers living closely in the communities they work in-finger on pulse of dynamics and needs (Local officials as channels of information between national government and local communities)
7. Partnerships with local organisations/institutions	Government can reach out to local NGOs, research institutes or local conservancies who work on the ground on a daily-basis and are connected to local context to obtain knowledge and information (E.g. Cross-disciplinary collaborations, local conservancies, universities)
8. Institutional memory and knowledge	Deep institutional knowledge and memory needs to be documented and shared so it is not lost
9. ILK is spatialised	Even though difficult and problematic, spatialising ILK when possible so it is not lost or forgotten, but protected and encouraged
10. Designating cultural activity use zones	Designating cultural activity use zones through context-specific marine area plans
4.2 Increased transparency and two-way communication	
1. Government processes accommodating coastal communities	Government processes and initiatives that intentionally accommodate and include coastal communities in meaningful ocean resources management (E.g. meetings move around to accommodate different communities along the coast
2. Cultivating engagement based on empathy and compassion	Empathy and compassion should drive and underpin meaningful engagement (E.g. Coastal authorities who enjoy engaging with local communities and are willing to take the time to understand their point of view regarding resource use; NGO workers invested in building meaningful relationships with coastal communities)
3. Fostering trust and partnership building	Cultivating trust and building partnerships are primary pathways for integrating ILK
4. Clear and consistent communication	Communication that is clear and consistent can be a mechanism/pathway to enabling the integration of different knowledge forms (open communication between Indigenous communities and coastal authorities can result in more equitable use of coastal resources and spaces)
5. Face-to-face, focused meetings	Face-to-face, in person meetings with specific foci that produce targeted information, knowledge, action and feedback
6.Using existing engagement platforms/fora	Existing platforms that enable different stakeholders to come together and co-create knowledge, listen, engage and act together are useful pathways (E.g. stakeholder engagement meetings, MPA forums, workshops, radio programs, local business forum, ward council meetings, police forum meetings, ratepayers associations, Provincial and Municipal Coastal Committees,
	(Continued)

TABLE 1 Continued

Knowledge integration pathways	Definition
	environmental education activities like beach clean-ups; oil spill contingency plan workshops, Whatsapp groups, Coastal Coordinating Committees; Integrated Development Program (IDP) cluster meetings and virtual platforms to communicate more widely with stakeholders)
7. Community leaders as gateway to ILK holders	Indigenous communities are often labelled as challenging to identify and contact but traditional community leaders such as chiefs and headmen are the first entry point to connect and engage with self-identifying Indigenous communities
8. Opportunities for stakeholders to network	Opportunities that allow different stakeholders to meet each other, make contact and start engaging on their own terms and broker new relationships (E.g. sponsored family or sports day to foster relationships in a relaxed environment)
9. Pressure from local communities to be included in ocean governance process	Pressure from local communities themselves demanding they be included in coastal and marine management processes
10. Authorities with strong stakeholder engagement skills	Coastal authorities who already have strong stakeholder engagement skills and understand the capacity (skills, time, funds etc.) required to engage stakeholders meaningfully are required to truly integrate ILK.
11. Stakeholder engagement training/skills for coastal authorities	Training for coastal authorities in stakeholder engagement skills and processes
4.3 Increase access to relevant and usable information	
1.Interactive and accessible databases	Creating interactive and accessible databases that include social and cultural data
2.Coastal and marine information to be tailored to specific audiences	Coastal and marine information to be tailored to specific language groups and audiences to be understandable and therefore empowering as opposed to alienating
3. Peer-to-peer learning and knowledge sharing	New knowledge and lessons better received from within communities than from outsiders coming in
4.Horizontal and vertical coordination and knowledge-sharing across government departments	Improved coordination across national to local government departments regarding coastal plans/management; departments relying on each other's strengths and knowledge and communicating (collaborations between different municipal departments E.g. architects and South African Heritage Resources Agency); local government collaborating with governmental agencies that work closely and meaningfully with communities E.g. Mandela Bay Development Agency
5. Reliable bridging actors	Local councillors that represent their constituents' needs fairly and relay important information clearly, consistently and correctly (from local communities to local government and vice versa)
4.4 Reviewing and amending relevant MSP legislation towards a stronger connection between MSP and Indigenous knowledge legislation	
1. Recognition of ILKS in MSP legislation	The inclusion of Indigenous and local knowledge must be legally mandated in (E.g. legislation that makes provision for traditional and cultural activities)
2.Consideration of ILKS and representation of ILK holders on National MSP Working Group	Consideration of ILKS and Representation from the National Indigenous Knowledge Systems Office (NIKSO) on the National Working Group on MSP
4.5 Amending legislation pertaining to access to coastal and marine areas	
1.Increased access to coastal and marine areas	Indigenous and local knowledge holders seek increased access to coastal areas in order to freely undertake cultural practices

the South African coastline (Weitz et al., 2018). Even though South Africa will have four marine area plans[2] (Western, Southern, Eastern and the Prince Edward Islands, see Figure 1 above) much socio-cultural, economic and historical diversity

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2   A marine spatial plan (s) is the entire MSP for a country or region whereas a marine area plan is the actual demarcated areas that are each allocated their own plan within the broader MSP.

among stakeholder groups is still found within each zone (DFFE, 2021). As such, Indigenous, traditional and local communities and knowledge holders will have varying and, at times, opposing priorities, interests and connections to the ocean and coast (see Masoga, 2017). Adequate resources (e.g. funds, time, capacity, skills and knowledge) are therefore required to develop marine area plans that can account for different contexts, cultural heritages and historical backdrops. Aligned with the South African National Framework for MSP (2017), the marine area

plans and their management plans therefore need to consider "Individual spatial allocations, such as priority areas, safety zones, seasonal closures, concession areas, areas designated for environmental or cultural purposes" (DEA, 2017).

In order to have context-specific marine area plans, more (2) fine-grained socio-cultural data are required in order to understand these dynamics and for this, more social scientists are needed. They also need to be (3) co-developed with Indigenous and local communities through inclusive and meaningful engagement processes[3] where all relevant stakeholders and their knowledge is understood and incorporated into area management plans where possible. For this to happen (4) *knowledge co-creation opportunities* like participatory community mapping approaches[4] need to be designed and planned for in order to develop relevant marine area plans. Stewardship approaches should also be encouraged in order to be more context-specific and to reach 'greater conservation success' (Peer et al., 2022).

For the immediate future we are forced to work within the ocean governance structures we have which include MPAs. Having (5) local *community members who work in protected areas* has the potential for them to have more influence and say over how these areas are managed. However, we also acknowledge that this influence may be tokenistic on the part of the conservation authority. (6) *Local authorities who are dedicated and sensitive to understanding community needs and desires* were also identified as a pathway of integrating ILK and management being better aligned to respective contexts. Governments in the Global South often lack the capacity to work closely on the ground so (7) *partnering with local organizations* who work closely with local coastal communities was another pathway identified. Closely related to this, deep (8) *institutional memory and knowledge* can be very valuable and this needs to be preserved and shared.

(9) *Spatializing ILK*, especially knowledge and heritage that is intangible and dynamic, is problematic for several reasons (see Strand et al., 2023a). However, to ensure these knowledge systems inform how marine and coastal areas are managed, we need to work with the governance approaches we have which is currently MSP. One coastal manager drove the urgency of this point home when he stated that, "If it's not in a map or an Excel spreadsheet, it doesn't exist". One suggestion from workshop participants with regards to spatializing ILK is to (10) *designate cultural zones*[5] where ILK holders can practice and perform cultural and religious rituals and ceremonies. Some of these activities require the harvesting of certain plants and animals, the ritual slaughter of animals or the burning of fires, which are often prohibited in public or conservation areas, or the maintenance of certain structures, such as ancient fish traps. Nominating particular areas as National Heritage Sites through the South African Heritage Resources Agency is one avenue to do this through.

Additional resources (e.g. funds, research and learning, government and stakeholder capacity) should also be set aside to support coastal communities and ILKS holders to not only identify and protect their tangible and *intangible* (or living) cultural heritage, but to also enable it to expand and flourish for future generations. One way of making this feasible is by ensuring that cultural aspects of ocean governance are already included in the mandates of government agencies and relevant NGOs.

4.2 Increased transparency and improved two-way communication

Indigenous and local knowledge holders seek increased transparency and two-way communication between coastal authorities and themselves. Due to a long history of structural and individual racism and exclusion from decision-making processes and more recently within a climate of discontentment with government-led processes in the country, coastal communities, especially those on the margins, are often suspicious or indifferent to government processes (Peer et al., 2022). *With regard to transparency, stakeholder engagement processes that (1) intentionally accommodate coastal communities in a meaningful way, and are (2) based on empathy and compassion as well as (3) foster trust and partnership building* are vital pathways for integrating ILK and knowledge holders into ocean and coastal management. The results from the research processes described above were built on months of trust-building with co-researchers so they felt safe enough to share their ocean connection narratives as well as building a strong rapport with coastal authorities to share their working experiences. In terms of practically and feasibly increasing transparency and knowledge sharing, local and national

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3 By "meaningful" we mean engagement processes are not merely tokenistic but stakeholders have access to all relevant information, they understand it fully and have the capacity, agency and power to question, criticise and change processes they are not satisfied with.

4 Participatory community mapping involves collaborative partnerships between non-academic stakeholders (like local coastal community members) and researchers with the objective of involving impacted local communities in every aspect of the research process from the identification of a problem to the delivery of research findings (Leavy, 2017).

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5 The initiative to designate such a zone would require the services/ leadership of the Department Forestry, Fisheries and Environment (DFFE). Moreover, a consultative process that involves representatives from other state departments would be necessary to ensure consistency as far as spatial planning is concerned. With regard to legislative instruments, it would also require reconciling the Integrated Coastal Management Act (designation of special management areas) with the Marine Spatial Planning Act.

conservation and citizen science groups who host regular public meetings about current social and ecological challenges can contribute in this regard.

Direct lines of communication between coastal governance authorities and different user groups are required through (4) *clear and consistent communication and (5) in-person, face-to-face and focused meetings*. While virtual platforms are convenient for some stakeholders, they can be exclusionary for others and in-person meetings are often still the most appropriate for some stakeholder groups. Utilizing (6) *current engagement platforms and fora such as* functional and active coastal committees and accessing local communities through (7) *local and traditional community leaders. Providing (8) opportunities for stakeholders to network with each other through workshops and meetings also strengthens civil society movements and contributes toward (9) local communities to put pressure on government to be included in development processes that impact on them.*

We emphasize two-way communication because, in South Africa especially, 'communication' and 'stakeholder engagement' is often implemented as one-way "information sharing" or "consultation" that is merely a tick-box exercise and usually fails to take up stakeholder concerns and needs or deliver on anything tangible for certain coastal communities. This is in part due to the problematic and out-dated design of stakeholder engagement processes as well as due to powerful sectoral agendas and limited political will to incorporate stakeholder guidance. Standard engagement practices usually operate at an information-giving and consultation level. The kind of engagement we propose however should be more collaborative, where stakeholders are part of the knowledge creation and decision-making process and where communication is clear and consistent and supported by enough capacity, adequate resources (e.g. time, funding, skilled people) and a legal framework that calls for engagement to be meaningful. (10) *Coastal authorities with strong stakeholder engagement skills and (11) training for those who are lacking was also put forward as one of the pathways to integrating ILK.*

4.3 Increased access to relevant and usable information

One way of better integrating ILK holders into MSP is to ensure information is not only easily accessible but also relevant and usable. This knowledge sharing needs to be a two-way process where platforms are also created for people to share their own knowledge, thereby inverting the power dynamics around knowledge creation that assumes that only scientists and authorities hold legitimate knowledge (Peer et al., 2022). Stakeholders want access to relevant and current coastal and ocean management information but they also want to provide their own input and knowledge.

One step toward this is to (1) *create an interactive and accessible database that includes social and cultural data.* At

present, South Africa has the National Oceans and Coastal Information Management System (OCIMS) Marine Spatial Planning (MSP) Support Viewer Decision Support Tool (DeST) as well as the Western Indian Ocean (WIO) Symphony tool[6] and the Marine Spatial Atlas for the Western Indian Ocean (MASPWIO) portal which all provide consolidated data sources that can inform MSP and the development of Marine Area Plans (MAPs) in South Africa and the broader region (Somalia to South Africa). The host of OCIMS, the Department of Forestry, Fisheries and Environment (DFFE), needs to integrate qualitative, socio-cultural data into the tool as currently it is largely built on quantitative, ecological data layers, rendering the socio-cultural aspects of MSP invisible. In order to make this more feasible, data sharing agreements between tertiary institutions, NGOS and different levels of government, especially local municipalities, can contribute toward both a more fine-grained and broader knowledge base. The language used to describe different data layers is also overly technical and fails to provide adequate interpretation of the data and the implications for different stakeholders within the MSP process. These databases also need to be made more accessible to stakeholders with no access to computers or with limited data or internet access through, for example, adapting the tool to a user-friendly or data-free phone application. In addition, more effort needs to be put into creating awareness around these tools as not many stakeholders are aware of their existence. The current increased focus on making OCIMS more user-friendly and society-relevant should therefore ensure that these efforts are complemented with existing qualitative socio-cultural data, and that the tool is tested with coastal communities to increase direct feedback, awareness and potential uptake.

(2) Coastal and marine management data and information needs to be tailored to specific audiences. ILK holders seek information that is presented in different languages and with informative visuals. Coastal communities cannot contribute their knowledge if they do not firstly properly understand the process they are being asked to contribute towards and have the means to consume and communicate information in their own language. Although English may be the *lingua franca* in many WIO region countries, there is often a diversity of languages in representative countries (e.g. South Africa has eleven official languages (DAC, 2020)). Many individuals are also more visual learners, so clear and succinct infographics should be used when possible. Furthermore, and linked to the first recommendation, any coastal information, (e.g. present and future legislation, data reports, documents sent out for review or comment) should be translated in a number of primary languages and presented clearly, avoiding technical language that alienates and further excludes stakeholders from ocean governance processes. Competent knowledge brokers and science communicators, skilled at tailoring and packaging information for

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6   At the time of writing this policy brief the MSP DeST was not active and the WIO Symphony Tool was still being developed.

particular audiences, can be employed to this end. (3) *Peer-to-peer learning and knowledge sharing is also a powerful tool put forward by co-researchers in order to make information more palatable and accessible.*

Furthermore, some coastal and marine stakeholders feel alienated from current communication and signage at coasts and estuaries and want people-friendly communication strategies that are non-aggressive or exclusionary. South Africa has a tragic history of denying access to people of color to certain areas along the coast which was often communicated through aggressive and violent language. Current signage continues using exclusionary language, dominated by the use of English. A recommendation is therefore that signage not only be in multiple languages across provinces but is also co-developed with different user groups in order for language to be more affirming, for example, signage at a marine protected areas should aim to inform and engage (explaining the ecological diversity and activities that are allowed to take place within its boundaries) as opposed to exclude and alienate people (emphasizing all the prohibited activities).

(4) Horizontal and vertical coordination and knowledge-sharing across government departments and levels was also put forward as important for knowledge integration. Better integration of ILK holders requires improved coastal governance and this in turn requires increased coordination between different government departments involved in coastal management. Lack of coordination between departments results in confusion around government processes such as MSP, hinders the inclusion of stakeholders in the planning process, causes a lack of resolution on prior discussions as well as implementation on decisions that are made. Although coordination structures are in place such as the National Inter Ministerial Coordinating Committee for ocean governance established by the Department of Forestry, Fisheries and Environment Oceans and Coasts Branch, provincial coastal committees and the MSP National Working Group, coordination between these bodies is not always optimal, resulting in provincial or local level officials lacking the information they need to make informed decisions. Allocating adequate budget and communication officers for increased coordination could help in this regard. (5) *Reliable bridging actors like* local councilors that represent their constituents' needs fairly and relay important information clearly, consistently and correctly can either be powerful enablers or constraining factors.

4.4 Reviewing and amending relevant MSP legislation towards a stronger connection between MSP and Indigenous knowledge legislation

4.4.1 Recognition of ILK in MSP legislation

It is not surprising that the MSP Act does not specify that ILK must contribute to the MSP system or inform management decisions, especially as the applicable ILK legislation, the

Protection, Promotion, Development and Management of Indigenous Knowledge Act, 6 of 2019, was only assented to in August 2019 (IK Act),[7] four months after the MSP Act was passed.[8] Moreover, the Indigenous Knowledge Act is not yet in force.[9] Nevertheless, the Indigenous Knowledge Act provides a legal framework for the protection, promotion, development and management of Indigenous knowledge, and establishes the National Indigenous Knowledge Systems Office (NIKSO).[10]

The functions of NIKSO include, amongst other things, the implementation of the Indigenous Knowledge Act;[11] facilitating the redress of rights and benefits to Indigenous communities which have previously been deprived of such rights and benefits;[12] facilitating and coordinating the development of Indigenous knowledge;[13] and carrying out any functions that are consistent with the objects of the Indigenous Knowledge Act.[14] These key functions exercised by NIKSO, makes it the most suitable body to provide relevant ILK to the Knowledge and Information System established in terms of the MSP Act.[15] This would ensure that in the development of marine area plans, knowledge that "has been developed within an indigenous community and has been assimilated into the cultural and social identity of that community…",[16] and registered in terms of the Indigenous Knowledge Act,[17] will be taken into consideration.

Ocean governance legislation needs to also move beyond narrow conceptualizations of cultural heritage (e.g. the over-emphasis of shipwrecks as the primary example of marine heritage) and understand Indigenous and local knowledge as intangible, living and dynamic (Boswell, 2021). The relevant shift in the governance mechanisms, especially the MSP Act, would require political will in addition to amendments to the legislative framework. Certainly, the MSP Act requires that MSP knowledge and information systems include information relating to the matters prescribed by the

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7   Published in GN 1082 *GG* 42647 of 19 August 2019.

8   The MSPA was assented to on 29 April 2019.

9   The IK Act will come into force after proclamation by the President of the Republic. See section 34 IK Act.

10   Section 4 IK Act.

11   Section 5(a) IK Act.

12   Section 5(c) IK Act.

13   Section 5(d) IK Act.

14   Section 5(n) IK Act.

15   See section 7 MSPA.

16   See definition of "indigenous knowledge" in section 1 IK Act. In terms of the latter, such knowledge includes— (a) knowledge of a functional nature; (b) knowledge of natural resources; and (c) indigenous cultural expressions.

17   Section 19 IK Act concerned with the registration of indigenous knowledge.

Minister. This gives the Minister a basis to emphasize substantive consideration of ILKS input in the MSP process.

4.4.2 Consideration of ILKS and representation of ILK holders on National MSP Working Group

ILKS are not specifically recognised in the MSP Act. However, the founding principles and criteria for MSP require the promotion of collaboration, and responsible use of the ocean through consultation and cooperation as well as adaptive management that considers the evolution of knowledge.[18] With that in mind, when the Indigenous Knowledge Act comes into force, it will be consistent with the objectives and criteria for MSP in South Africa that the NIKSO be specifically represented in all consultations leading to the development of marine area plans. The recommendation here is that, short of amending the MSP Act, regulations should be made in terms of the MSP Act,[19] that would require consultation with NIKSO. This is entirely feasible because the wording of section 8 of the MSPA that deals with consultation does not infer that the list of relevant stakeholders contained therein is exhaustive. Moreover, specific inclusion would ensure that ILKS are not overlooked.

Another regulatory recommendation that would foster participation of ILK stakeholders in the development of MSP is the inclusion of a representative from NIKSO into the make-up of the National Working Group (NWG) on MSP.[20] Specific representation from NIKSO could foster the principle of "promotion of equity between and transformation of sectors" in MSP,[21] while also protecting and managing the rights of Indigenous knowledge communities and holders. The enactment of the recommended regulatory addition is also within the competence of the Minister of Environmental Affairs in terms of the MSP Act, as it would foster effective implementation of MSP.[22]

4.5 Amending legislation pertaining to access to coastal and marine areas

A primary challenge raised by ILKS holders is a continued lack of access to coastal and marine areas which has its roots in South Africa's apartheid history of prohibiting people of color from these areas (Strand et al., 2022a). Legislation therefore needs to enable equitable and sustainable livelihoods.

The government must protect the environment for the benefit of present and future generations through reasonable measures that include the enactment of legal instruments.[23] The relevant measures must "secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".[24] Accordingly, the newly Draft White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity (2022) acknowledges "the significance of equity and sustainable use of wild resources and the need to guide transformation to achieve equity".[25] However, key outcomes still emphasize "strengthened" conservation and protected areas,[26] which usually translates into stricter laws that may have the result of denying access to certain areas by the local communities. Nevertheless, emphasis on conservation in existing legal instruments does not necessarily have to translate to exclusion, where explicit reference to and amendments include ILKS be made, where implementation is closely monitored, and a holistic approach to the applicable instruments is considered.

The relevant instrument that requires such a holistic approach is the Marine Spatial Planning Act, 16 of 2018 (MSPA). Indeed, the relevance of the MSP Act is rooted in its primacy over all other instruments as far as marine spatial planning is concerned.[27] Therefore, instruments that have had, amongst other things, the effect of denying or limiting access of Indigenous communities to coastal areas and resources, may be revised in order to establish consistency with the criteria for MSP that requires "the promotion of equity between and transformation of sectors".[28] Certainly, the MSP Act recognizes the changing character of the marine environment and aims to develop, and implement a shared marine spatial planning system that can be accessed by all sectors and users of the ocean.[29] Some work has already been done that provides recommendations that may be brought to applicable environmental instruments that would bring these instruments in line with the MSP Act and approved marine area plans (see Metuge, 2021). Nevertheless, further review of other environmental instruments must be done to ensure that they achieve the government's constitutional mandate to ensure the protection of the environment in a sustainable manner.[30] As far as ILKS are

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18 See section 5(c) and (e) MSPA.

19 See section 13(c) MSPA.

20 The makeup of the NWG does include a representative from the department of science and technology that hosts NIKSO.

21 See section 5(1)(g) MSPA.

22 See section 13(e) MSPA.

23 See section 24(b) of the Constitution, 1996.

24 See section 24(b)(iii) of the Constitution, 1996.

25 See Draft White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity at 5.

26 6.

27 Section 4 MSPA.

28 Section 5(g) MSPA.

29 See section 2(a) MSPA.

30 See s 24 of the Constitution, 1996.

concerned, the relevant reviews will require specific incorporation of ILKS into the MSP process.

5 Conclusion

Coastal and marine resources are found within complex social-ecological systems that are culturally, economically, historically and politically embedded. Therefore, ocean governance and management approaches have to firstly acknowledge and adopt SES approaches and secondly, integrate alternative and diverse knowledge systems that are contextualized in order to be inclusive, relevant, adaptive and sustainable. This research offers practical and achievable pathways that include adopting contextual approaches to coastal and ocean management and increasing transparency and two-way communication between coastal users and authorities, through considered and careful co-design processes as undertaken in this study that ultimately are written into policy and stakeholder engagement procedural processes. Additional pathways include increasing access to relevant and useable information for coastal stakeholders (through accessible and useful knowledge exchange platforms), reviewing and amending relevant ocean governance legislation towards policy coherence (for example marine spatial planning legislation and Indigenous knowledge legislation) as well as amending legislation pertaining to access to and use of coastal and marine areas. Coastal and marine communities in Algoa Bay want to be meaningfully included in how their coastal resources and ocean is managed. The pathways presented above are not only locally identified but were identified collaboratively between resource users and local authorities, making the process even more unique in that it was a merging of bottom-up and top-down coastal governance processes. By highlighting knowledge integration pathways, these can contribute towards improved understanding of complex SES and therefore more impactful sustainable management of coastal and marine resources.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors upon request, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Research Ethics Committee (Human), Nelson Mandela University. Written and verbal informed consent to

participate in this study and contribute to this article was provided by the participants.

Author contributions

This article was conceptualised by NR with significant contributions from MS and BS. Research was conducted by NR with the supervision of BS. MS, DM, CLN and AL contributed towards facilitating the multi-stakeholder workshop. NR and MF carried out data analysis. DM contributed the legal dimensions of the article. MF, CLN and AB helped towards editing and formatting the article. All authors contributed to the article and approved the submitted version.

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Conflict of interest

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmars.2022.1084674/full#supplementary-material

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