Ocean and Coastal Management

Shared visions for marine planning: Insights from Israel, South Africa and the United Kingdom

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Graphical Abstract

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The online symposium *Shared Visions for Marine Spatial Planning: Insights from Israel, South Africa and the United Kingdom* was held from 9-10 March 2021. Insights from this multi-disciplinary and international symposium included 1) current states of marine spatial planning (MSP) in the three countries, 2) how MSP can be a helpful tool to advance marine conservation, 3) the use and challenges of geospatial technologies for MSP, 4) how multidisciplinary, interdisciplinary and transdisciplinary efforts can help improve MSP processes and 5) recommendations for effective and collaborative MSP. Key reflections from the symposium included the need for MSP to be multi-, inter- and transdisciplinary in its stakeholder collaborations, aligned with in-country and area contexts.

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1. Introduction

Marine Spatial Planning[1] (MSP) has been adopted as a common process to achieve an integrated and ecosystem-based approach to manage the marine environment and uses therein, with rapid uptake globally (Kidd et al. 2020, Ehler 2020). With the inception of the UN Decade of Ocean Research and the pursuit of fulfilling the Sustainable Development Goals (SDGs), coastal states such as Israel, South Africa (SA) and the United Kingdom (UK) are now exploring best practices for the implementation of MSP[2]. As a result, an online symposium entitled "Shared Visions for Marine Spatial Planning: Insights from Israel, South Africa and the United Kingdom" was held on 9-10 March, 2021. Insights from this symposium included 1) current states of marine spatial planning (MSP) in the three countries, 2) how multidisciplinary, interdisciplinary and transdisciplinary efforts can help improve MSP processes, 3) how MSP can advance marine conservation, 4) the use and challenges of geospatial technologies for MSP and 5) recommendations for effective and collaborative MSP. We provide a synthesis of the main outcomes of this symposium by including country-specific examples and recommendations (the Symposium is available online[3]).

2. Current states of MSP in Israel, SA and UK

In 2015 Technion - Israel Institute of Technology developed Israel's first marine spatial plan in response to the need to manage its Exclusive Economic Zone (EEZ) due to newly confirmed gas reserves (Portman 2015). Simultaneously, an initial government-led MSP process was initiated and published a plan in May, 2020 involving two development stages: 1) multidisciplinary analysis of the existing conditions and 2) defining policy principles for required regulation, planning and management of the maritime environment. This effort has already changed policy approaches for allocation of activities within the country's territorial waters, most significantly changes to the regulatory body that approves such plans - the Committee for the Protection of the Coastal Environment[4] (Sas and Portman 2010).

MSP in South Africa had its inception in the 'National Environmental Management of the Oceans' (NEMO) white paper from 2014. Also in 2014, the Operation Phakisa "Unlocking the Ocean Economy" initiative was launched, aiming to unlock the economic potential of South Africa's oceans. As a result, a MSP act was fast tracked, while the NEMO white paper was not advanced. The MSP bill, finalized in 2017, outlines a framework that can enable a 'sustainable blue economy' whilst fostering socio-economic development (DEA 2018). In 2018 the MSP Act (MSP Act 2018) was gazetted and in April 2021 was signed into operation, providing mandatory requirements for the establishment of marine area plans (DEFF 2021). The Algoa Bay Project (ABP) in the Eastern Cape of South Africa is currently the first pilot site looking at the

[1] Ehler and Douvere (2009) denote MSP as "a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process". More current and critical definitions of MSP however acknowledge that MSP is, in fact, a political and social process informed by natural and social sciences where politics and power are inherent characteristics (Flannery et al. 2018; Ehler et al. 2019).

[2] Authors from Israel (Technion – Israel Institute of Technology) and the UK (University of Liverpool) were granted funding through the UK-Israel Inter-University Strategic Cooperation Programme (UIIUSCP) and then invited South Africa (Nelson Mandela University) to collaborate in order to engage with a global south country.

[3] https://portman.net.technion.ac.il/upcoming-conference-sustainable-governance-and-management-of-coasts-and-seas/

[4] This committee has been in existence since 2004.

legislative, biophysical and socio-economic practicalities to inform the country's first MSP (Dorrington et al. 2018). It is a civil society-led initiative funded by the Government's Department of Science and Innovation through the National Research Foundation.

The legislative framework for MSP in the UK was formed by the 2009 Marine and Coastal Access Act, with more specific legislation for Scotland in the 2010 Marine (Scotland) Act. The 'UK Marine Policy Statement' sets out broad MSP terms and objectives throughout the UK which generally aligns with the European Union MSP process. MSP in the UK takes place independently in the four nations of England, Scotland, Wales and Northern Ireland. In England, marine plans are divided between inshore and offshore waters (covering internal and territorial waters and the EEZ respectively). England has 11 marine plan areas and as of June 2021, all outstanding marine plans were adopted[5]. Scotland has a two-tier system: a high level strategic national plan (2015) and 11 regional inshore plan areas at various stages of development. In Wales (2019) and Northern Ireland (draft 2018), a single plan covers the area for both inshore and offshore waters.

3. Multidisciplinary, interdisciplinary and transdisciplinary stakeholder collaborations in MSP

By design, MSP is a public process and requires multidisciplinary[6], interdisciplinary[7] and transdisciplinary[8] approaches. These lead to better integration of efforts between use sectors as well as public buy-in by (Ansorg et al. 2020).

In Israel, MSP development has included consultation with various sectors such as shipping and trade, fisheries, gas exploration, heritage bodies and national parks. In order to integrate different interests and viewpoints into the MSP, a co-working steering committee was created to formulate policy and long-term strategies as well as coordinate processes with shared objectives. For example, through extensive research with different stakeholder groups on alternative protection scenarios and ecosystem service valuations, multi-sectoral perspectives can inform the zoning and planning of new Marine Protected Areas (MPAs) (Portman et al. 2016).

In South Africa, the lead authority for the development of MSP is the Department of Forestry, Fisheries and the Environment (DFFE)[9] that engages with sectors from heritage, transport, mining, tourism and defense. Engagements with stakeholders will be led by the Marine Spatial Planning National Working Group (MSP NWG). However, government capacity to carry out equitable stakeholder processes needs to be leveled up for this process to be effective and just. Cooperation across sectors and disciplines have proven fruitful, such as in the ABP where Nelson Mandela University is investigating how best to facilitate cooperation between different disciplines and sectors towards the first multi-sectoral, ecosystem-based MSP in the country (Dorrington et al. 2018).

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[5] In the UK, a marine plan sets out how the MSP will be implemented in context-specific areas, or marine plan areas (MMO 2013).

[6] "Multidisciplinarity draws on knowledge from different disciplines but stays within the boundaries of those fields"(Choi and Pak 2006).

[7] "Interdisciplinarity analyzes, synthesizes and harmonizes links between disciplines into a coordinated and coherent whole" (Choi and Pak 2006).

[8] "Transdisciplinarity claims to provide holistic schemes that subordinate disciplines and look at the dynamics of whole systems" (Alvargonza´lez 2011). One of the defining features of transdisciplinarity is that it engages different sectoral stakeholders outside of academia.

[9] This Department has undergone several name changes in recent years (from DEA to DEFF to DFFE)

In the UK, MSP is required by law[10] to engage with a variety of stakeholders to understand their specific values. The marine planning authority in England, the Secretary of State for the Environment, is mandated to plan, implement, monitor and report through the Marine Management Organization (MMO). As a result, the MMO has integrated stakeholder engagement in every step of the MSP process.

4. Advancing marine conservation through MSP

MSP can advance marine conservation by prioritizing specific areas in need of biodiversity conservation, sustaining ecosystem services and identifying cumulative pressures on areas critical to socio-economic development or biophysical preservation (Foley et al. 2010). MSP can also offer different planning scenarios and assist in finding sustainable approaches to area-based ocean management (Portman 2015).

An Ecosystem Based Approach (EBA) is recommended as the most appropriate framework underpinning the development of MSP, where the health of marine environments are recognized as the foundation for preserving the system (Friedrich et al. 2020). To support EBA MSP, there is a need to envision and forecast the effects of management decisions on spatial and temporal outcomes under different scenarios, and to identify trade-offs between socio-economic and environmental goals (Foley et al. 2010). In South Africa, for example, system dynamics models are being developed to simulate temporal trends and sustainable outputs in selected marine uses, and to identify areas for management considerations in sectors to achieve a balance in social-ecological planning goals (Lombard et al. 2019b, Vermeulen et. al submitted).

MSP can also support other area-based management tools, such as MPAs, that may lack statutory power. In Israel for example, the co-development of a MPA management plan (2012) set a goal to protect 20% of Israel's territorial waters. However, since the plan held no statutory power, additional complementary processes were adopted through MSP, by allocating 9% territorial waters as no-take zones. Results from the process showed that no-take zones had substantial conservation benefits for vulnerable marine ecosystems as opposed to 'paper parks' which lack authority and regulation (Portman et al. 2016).

Ocean accounting is an important complementary tool in MSP to make strategic decisions affecting the ecological integrity of the ocean. The Blue Paper on National Accounting for the Ocean and Ocean Economy identifies that ocean accounting places an economic value on marine and coastal ecosystems and their services using metrics based on their impacts on "(1) real income and its distribution (and therefore social inclusivity), (2) ocean production (and economic metrics) and (3) changes in ocean wealth, including ecosystems" (Fenichel et al. 2020). Changes in ocean wealth are an important indicator of sustainability and can identify knowledge gaps for evidence-based ocean policy cycles and conservation plans linked to MSP.

5. Geospatial technologies as one of the tools to advance MSP

The oceans cover 71% of the Earth's surface, yet to date, only 20% of the seafloor has been measured by echo-sounders[11] (UNESCO 2020). Within the last two decades, a realization that the ocean environment represents a 'last frontier' and initiatives to better understand the structural layout of the earth's seafloor are being promoted at both an international (e.g., GEBCO Seabed 2030) and national (e.g. Operation

[10] In the Marine and Coastal Access Act it states that 'interested persons' should be involved in the plan making process. Interested persons means - 'any person appearing to the marine plan authority to be likely to be interested in, or affected by, policies proposed to be included in a marine plan, and members of the general public' (MCAA 2009)

[11] Sonar used to determine the depth of water by transmitting acoustic waves.

Phakisa) level[12]. Fourth Industrial Revolution advances in ocean monitoring and research technologies have greatly increased access to, resolutions and volumes of ocean data, in many cases within spatial realms (OECD 2016).

Technologies available to map the seafloor have vastly improved over recent years, and for MSP applications, sonar methods and geophysical mapping have been coupled with sampling or seafloor imaging campaigns that contribute to substrate maps. Specific geological and habitat boundaries are constructed using both supervised and unsupervised classification methods. Submersibles such as Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs) are increasingly being applied as effective and efficient mapping tools (Sowers et al. 2020). It is anticipated that these maps can be used to model biological communities and produce benthic habitat maps for use in marine management. In South Africa scholars are both mapping the seafloor and developing algorithms that use machine learning to model benthic habitats

These geospatial technologies can also be used to map human activity to better understand the marine area and threats. The Blue Belt Programme in the UK, for example, has used a combination of satellite technologies and AIS to improve maritime domain awareness by assessing fleet distribution at different times of the year, creating 'heat maps' of shipping activity, bunkering and transshipments. This helps marine planners to determine where measures need to be put in place (e.g. Areas to be avoided).

Understanding the ocean and the natural processes occurring at the seafloor from a marine geological perspective is not without its limitations, primarily due to technological challenges in operating in this environment (Weatherall et al. 2015). For example, the technology used to map, observe, and understand land topography cannot penetrate more than tens of meters in ocean waters. Satellite measurements of ocean surface height provide a general view of the deep ocean floor through altimetry-derived predicted seafloor depths, but only to a limited extent (Cutter et al. 2003, McAdoo et al. 2004). Seafloor mapping remains an intensive and expensive task and has left most of our planet virtually unmapped.

6. Recommendations for effective and collaborative MSP

Following expert presentations and subsequent discussions, breakout sessions culminated in the formulation of several recommendations to be considered when working towards a shared vision of MSP across countries, sectors and disciplines. Support from the current literature is provided where relevant. We recommend:

1. **Closing the science-to-policy gap through adaptive management:** As ocean resource use, ecosystem services availability, social-ecological systems and scientific research programs are constantly changing, the development of dynamic and adaptive ocean management policies is required to respond to these changes (Winther et al. 2020, Maxwell et al. 2015, Portman 2016).
2. **Interdisciplinary and transdisciplinary approaches**: MSP is by definition interdisciplinary and should therefore be based on interdisciplinary collaborations and engage stakeholders and professionals through transdisciplinary collaborative processes from the beginning (Lombard et al 2019a, Grip and Blomqvist 2021).

[12] Without a level of certainty on habitat types it can be difficult to write prescriptive policies within a marine plan or assign areas to a particular activity if they are dependent on a specific habitat type.

3. **Data sharing policies, dialogue, transparency and deliberate collaboration** among scientists and broader stakeholder groups need to be established to share data as a response to lack of data access and communication. This is also applied to technology use and development (Milanés Batista et al. 2020, Verutes et al. 2017).
4. **Early and consistent stakeholder participation** through empowered involvement in MSP development and ongoing commitment from convening authorities is required. This is vital to the success of MSP and involves clear communication aimed at creating a participatory management framework (Flannery et al. 2018, Bakker et al. 2019, Morf et al. 2019).
5. **Accommodation of different languages and education levels** is required for MSP to be fair and equitable. MSP stakeholder engagement processes need to be accessible in all the languages of a given impacted or impacting community and for new concepts, goals and risks to be clearly communicated and discussed through objective knowledge brokers (Gorris 2019).
6. **A diversity of incentive** should include state and non-state funding (economic); the establishment of collaborative platforms (participatory); penalties for non-compliance; improved stakeholder relations; increased political will; and effective legal enforcements (Ratsimbazafy et al. 2019, Bakker et al. 2019).
7. **Conflict resolution processes** should be components of MSP processes to help resolve sectoral conflict. Objective conflict resolution experts can guide deliberations to be constructive (Twichell et al. 2018, Morf et al. 2019).
8. **Political will** is required to build momentum and direct adequate resources and capacity towards effective MSP, especially during stakeholder engagement processes (Johnson, et al. 2020, Flannery et al. 2019).
9. **Top-down and bottom up approaches** are required to address both vertical and horizontal institutional and disciplinary barriers. For example, **strong leadership** is often required for successful MSP processes to help guide holistic long-term visions, whilst **participatory mapping**, when used correctly, can be a democratic tool for stakeholders to meaningfully inform MSP (Gaymer et al. 2014, Bakker et al. 2019).
10. **Partnerships with the private sector** towards resource collaboration is beneficial (Johnson et al. 2020, Österblom et al. 2020).
11. **Capacity building** of management authorities and stakeholders, as well as social learning processes, need to be planned for in MSP processes (Gerhardinger et al. 2019, Ansong et al. 2019).

Figure 1 provides a visual artist’s interpretation of what a shared MSP vision might encompass (drawn during the symposium plenary session).

Figure 1: Artist’s interpretation of shared MSP visions (illustration by Efrat Goldberg).

7. Conclusion

Coastal nations can learn from one another regarding best practices for the development and implementation of MSP. However, to facilitate an adaptive, country-specific MSP process, the acknowledgement of contextual realities and integration of all local stakeholders is required. MSP provides a framework to manage the marine and coastal space, and also offers tools to advance marine conservation by applying ecosystem-based management, identifying priority areas for conservation, using accepted and novel ocean accounting frameworks and supporting management interventions that may lack statutory power.

The importance of transdisciplinarity and the early and consistent inclusion of all stakeholders impacted by and impacting on MSP is essential not only for the sustainability and adaptive ability of MSP but also to ensure a truly democratic process. An enabling environment characterized by political will, collaborative learning and investment in capacity building to enable stakeholders and implementers to engage equally and fairly were factors highlighted across all three country contexts. It is acknowledged that no country has all the enabling factors in place for the effective and just implementation of MSP but every effort should be made to work towards these if MSP is to effectively manage how we use and conserve the ocean now and in the coming decades.

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