Achieving a Sustainable Ocean Economy

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Abstract

The fast growing ocean economy, driven by human needs for food, energy, transportation and recreation, has led to unprecedented pressures on the ocean. These pressures are further amplified by climate change, loss of biodiversity and pollution. Society's long-term prosperity and the healthy, productive and resilient ocean ecosystems it depends on is at risk. The need for better governance of human activities in the ocean space has been widely recognised for years, and is now underlined by the UN Sustainable Development Goal (SDG) 14 - "Life below water" - addressing marine issues and marine governance specifically.

Even so, many challenges relating to the implementation of existing governance frameworks exist. These range from knowledge and capacity shortages, to incomplete legislation and lack of enforcement, and poor coordination of international bodies as well as between different ministries and other government bodies at the national level with no overarching mandate or mechanism to harmonise them.

Here, we argue integrated ocean management (IOM) is a key approach for achieving a sustainable ocean economy. IOM is a holistic, ecosystem-based and knowledge-based approach that seeks to integrate and balance different ocean uses as well as ensure the sustainability and resilience of marine ecosystems.

We identify six aspects of successful IOM: harnessing knowledge, establishing partnerships between public and private sectors, strengthening stakeholder engagement and stewardship, improving capacity building, implementing regulatory frameworks, and encompassing climate change and other environmental changes in adaptive management systems.

Introduction

Opportunities and challenges to achieve sustainable development of our oceans and seas have reached the top of the international agenda through forums such as the UN Ocean conferences, the World Economic Forum, the Our Ocean conferences and the High Level Panel for a Sustainable Ocean Economy. The marine environment is also included in the UN Sustainable Development Goals.[112] Human needs for food, energy, transportation, recreation and other services from the oceans are rising, and as a result we experience a rapid growth in the ocean economy.[81] Existing ocean industries expand and new ones appear. Conflicts between short-term economic needs and long-term prosperity and healthy oceans are increasingly apparent, creating difficult dilemmas for governance. This condition is further complicated by compounding pressures such as climate change, pollution,

widespread loss of biodiversity, and ocean acidification. The need for better governance of human activities in the marine environment is therefore widely recognised.[111] There is an increasing need for a holistic, ecosystem-based and knowledge-based approach that addresses management challenges, ensuring the sustainability and resilience of marine ecosystems with tailor-made solutions to capture local conditions. Integrated ocean management (IOM) offers such an approach.

The core of IOM is that it considers multiple human uses and other pressures simultaneously and can contribute to reconciling competing interests, with the objective of ensuring the sustainability of societies and the marine ecosystems they depend on. It applies tools such as ecosystem-based management (EBM), marine spatial planning (MSP) and area-based management measures including marine protected areas (MPAs) in doing so.[53] The goal of IOM is to support a sustainable ocean economy, which involves long-term, sustainable use of ocean resources in ways that preserve the health and resilience of marine ecosystems while also improving livelihoods and creating jobs.

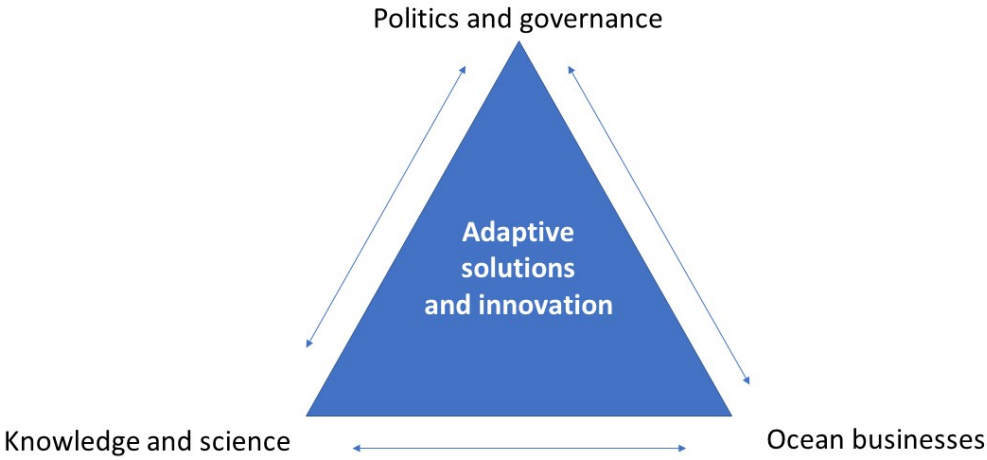

Figure 1: Integrated ocean management (IOM) is a knowledge-based and ecosystem-based approach with stakeholder involvement and adaptive solutions at its core.

The global framework for ocean governance, the centrepiece of which is the United Nations Convention on the Law of the Sea (UNCLOS)[120], has evolved significantly over the last decades, responding to technological developments, increasing demands for natural resources and a growing use of ocean space for human activities.[56] Implementation agreements have been negotiated for deep seabed minerals[116] and for fisheries[117], and governance bodies and legal instruments are in place for a number of other specific oceans issues such as shipping and pollution. The legal framework, however, remains incomplete with regards to the protection of marine biodiversity and

does not consider the effects of climate change. Implementation is hindered by inadequate knowledge and capacity shortages, incomplete legislation and enforcement failures, and lack of political will to prioritise the actions needed to implement the international agreements. Ocean management currently often occur in silos, sector by sector, and poor coordination between different ministries and other government bodies with no overarching mandate or mechanism to harmonise them is also a challenge. With increasing use and pressures we now also need mechanisms to account for cumulative effects of economic development and environmental change. Supplementing sector-based management of the oceans with collaboration on integrated management between the various interests in ocean use is crucial.

In 2015, the UN General Assembly adopted 17 Sustainable Development Goals (SDGs), as part of the 2030 Agenda. Several of the interlinked SDGs are essential in relation to oceans and seas and contain specific targets and timetables for achieving them. Goal number 14 - “Life below water” - addresses marine issues specifically. This goal provides opportunities to facilitate concrete actions for ocean sustainability and to foster greater integration in ocean governance.

Here, we identify six main aspects of successful IOM: harnessing knowledge, establishing partnerships between public and private sectors, strengthening stakeholder engagement and stewardship, improving capacity building, implementing regulatory frameworks, and developing adaptive solutions. In the following we discuss these in turn, indicating how we can move forward in using IOM to build a resilient and sustainable ocean economy.

Harnessing Knowledge

In some regions, there are large knowledge gaps on the abundance and interactions of marine living resources, consequences of existing and future human activities, opportunities in the digital and technological revolutions, and the consequences of climate change, loss of biodiversity, and marine litter on marine ecosystems.[55,72] The coming United Nations Decade for Ocean Sciences for Sustainable Development (2021-2030)[113] is an opportunity to address such fundamental knowledge gaps and should be utilised as a platform for building the science we need for the future we want.

The 2017 Global Ocean Science Report demonstrates clearly that many countries lack fundamental scientific capacity to support their efforts at ocean governance.[47] In these cases, scientific capacity is needed to assemble the information required for management of marine ecosystems and economic activities, and to underpin the establishment and implementation of regulatory measures. Tools to develop, strengthen and coordinate the management of human activity in marine ecosystems include increased science and monitoring efforts, sharing of knowledge, and transfer of technology

and digital infrastructure, especially in the least developed countries and small island developing states (SIDS).[47] Obviously, the goal of ecosystem-based management is impossible to achieve if data on the ecosystems and the societies depending upon them are lacking or not available. Relevant and accessible data and clearly defined goals for management, coupled with research and science plans, are important to advance and achieve IOM.

To address this, we recommend strengthening the global ocean knowledge system – including social science – building on the UN Regular Process and the International Oceanographic Commission (IOC), as well as ongoing efforts at the regional level. Strengthening the role of IOC would build on already existing structures to enhance the attention given to marine science and help generate the resources needed for development of scientific knowledge, scientific capacity building worldwide and effective frameworks for knowledge transfer to decision makers and other key societal actors. A process and platform for its development could be the United Nations Decade for Ocean Sciences as a framework to be hosted within the International Oceanographic Commission. Another important initiative in this regard would be the World Ocean Assessments, following up on the 2015 and 2020 editions which can be supportive of regional and national ocean governance.

Establishing Partnerships between Public and Private Sectors

With a growing ocean economy and increasing use of ocean space for human activities, it becomes more difficult to maintain productive and healthy oceans. Currently, investments, infrastructure and businesses are developed within various ocean industries with differing standards of governance, with different definitions of and visions for sustainability. In practice, enduring sustainability can only be achieved if best practices are applied in both the public and the private sectors and where productive partnerships between the two are established. IOM is an approach that brings together relevant actors from government, business, academia, and civil society, from the entire spectrum of human activities - including petroleum, fishing, aquaculture, shipping, tourism, mining, renewable energy, and recreation - to collaborate towards a sustainable future of our marine environment. Good governance and partnerships can bring long-term solutions that advance the economy, societies and the environment.

In the context of IOM, it is particularly important to engage ocean businesses at the global, national and local level. There are different ways of organizing this, and in recent years ocean businesses have repeatedly joined forces for sustainability. One example is the UN Global Compact Action Platform for Sustainable Ocean Business, which has developed principles and guidelines for sustainable ocean

businesses that several of the largest ocean-related businesses globally have signed onto.[114]

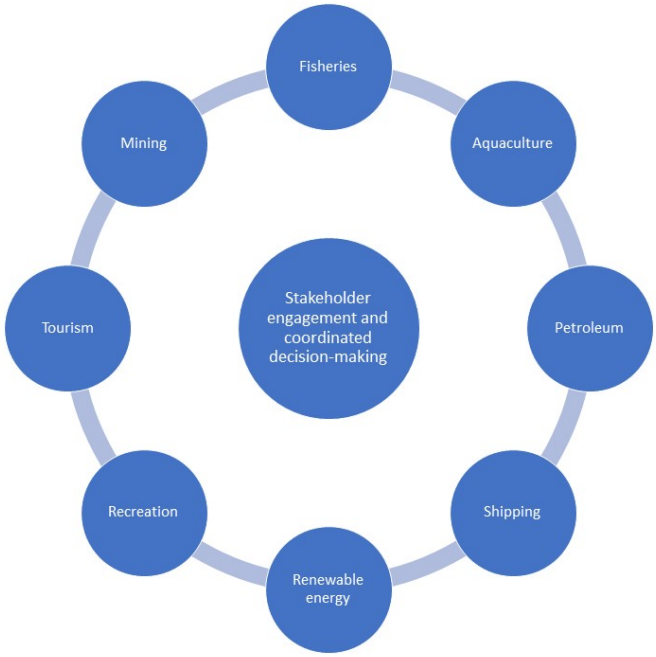

Figure 2: Stakeholder engagement and coordinated decision-making, particularly with ocean businesses, is one central aspect of successful IOM.

We suggest advancing and clarifying the responsibilities of the private sector through the development of "Ocean Principles" for a sustainable ocean economy, modelled after the Carbon Principles. The UN Global Compact Action Platform for Sustainable Ocean Business could serve as a starting-point and inspiring model. A further development would be to give credits to private companies that are able to develop transparent and traceable supply chains demonstrating sustainability and contributing to the implementation of the 2030 Agenda for Sustainable Development. By doing so we could strengthen the businesses' commitments to further develop technological solutions, and thereby empowering consumers in order to change the markets.

Strengthening Stakeholder Engagement

To achieve sustainability, the insight, engagement and stewardship of local stakeholders are critical. National strategies for strengthening ocean management will not work without implementation of sustainable projects at local levels of governance. One could argue that the contract made by the world community through agreeing on the SDGs will fail if we are unsuccessful in engaging local communities and implementing a large number of sustainable projects worldwide. Active community participation and inclusion of local knowledge is very important.[35] Planning at the local level –

especially in developing countries – requires approaches tailored to the diverse environmental, socio-economic contexts and governance systems in these regions.

Incorporation of traditional and local knowledge can ensure community participation in the development of appropriate strategies for IOM. Participatory approaches have proven to be effective at the local level for all phases of establishing and operating ocean governance.[5] We experience, however, that implementation remains constrained. It is important to scale up and reorient local actions to larger scale activities and governance regimes at national and regional level, and appropriate ecological scales, but this is highly context-specific and therefore difficult. It also requires time, resources and political will that sometimes are absent.

There are a number of different approaches to local stakeholder engagement, and which to choose is highly context-dependent. It is important to design well-managed engagement processes that consider the cultural, scientific, societal, economic and political context while actively seeking robust stakeholder participation. Regardless, we emphasise that engagement of relevant user groups is a central component of successful IOM. An example of this approach is seen in the formal intergovernmental partnership Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) including the six countries Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste.[5] We therefore suggest government support for the active involvement of local and traditional communities in all stages of the planning and development of IOM at the local level.

Improving Capacity Building

Capacity building enhances scientific and regulatory proficiency as well as institutional and collaborative capabilities. It is widely recognised that this is critical to strengthen ocean governance. In many cases, the ability to implement existing rights and obligations following from international agreements are hampered by inadequate science, weak regulatory frameworks, and the lacking enforcement of those frameworks. The importance of building resilient and effective institutions capable of performing these tasks can hardly be overstated. Ocean literacy and education addressing oceans uses and management are also critical.[16]

In this regard, it is imperative to address challenges such as climate change, biodiversity loss, and pollution. As demonstrated, the scientific capacity needed to implement the management principles embodied in international governance frameworks are severely lacking in many countries.[47] Capacity building, primarily building on but also amplifying the provisions of existing regional and

intergovernmental organizations and institutions, therefore needs to remain at the top of the international agenda.

At the national level, it is essential that government agencies involved in ocean management are properly institutionalised, and have the skills, knowledge, resources and authority to address challenges relating to the oceans and communities depending on them in a long-term, integrated manner. Here, collaboration and coordination among stakeholders is essential. New technologies combined with transparency create new opportunities for monitoring and policing of inappropriate behaviour at sea, bringing practical and inexpensive solutions for transfer of know-how such as the Global Fishing Watch.[32] Additionally, the ocean science enterprise is advancing technologies that allow us to collect scientific data with less cost and higher efficiency than ever before. One example is complex adaptive systems which recently have emerged as new tools to help identify key indicators and thus refine IOM. In order to effectively advance capacity, this must be done with transparency, tailored to context, and with appropriate data standards and metadata in place. In this respect, regional cooperation can be an effective vehicle for strengthening the role of science and providing advice for management, as demonstrated by for example ICES in the North Atlantic or WIOMSA in the Western Indian Ocean.

Implementing Regulatory Frameworks

Failure to implement existing international instruments is perhaps the most important weakness of ocean governance systems. The global ocean governance framework is supplemented by many regional instruments, often combined with sufficient national legislation. However, implementation of the existing legal framework is often inadequate and ineffective, and important legal gaps with regard to the conservation and sustainable use of marine biological diversity beyond national jurisdiction remain. In some cases, only immediate needs are prioritised in the allocation of resources to implement and give effect to laws and regulations. Also, there is a need for local and sub-national action plans and direct leadership in order to achieve successful implementation of IOM. Furthermore, important work is underway to address these shortcomings at the global and regional levels of governance, including efforts to strengthen the implementation of regulations from Regional Fisheries Management Organisations (RFMO), negotiations on Biodiversity Beyond National Jurisdiction (BBNJ), and the development of a seabed mining code by the International Seabed Authority (ISA).

A leading principle should be the effective implementation of international agreements in domestic legislation and practices, including for activities in the high seas. In practice, we suggest that

regulations for managing human activities in the high seas should be coherent and compatible with – and at least as strict as – those that apply in areas under national jurisdiction. Development of a strong legally-binding instrument for BBNJ as well as ratification of the key international instruments for ocean governance and coordinated implementation of their provision, including UNCLOS and related instruments, is a precondition for this. Further, we suggest that regulatory frameworks for areas beyond national jurisdiction as well as those in areas under national jurisdiction need to reflect the connected nature of different legal zones and effectively implemented, building on the best available science.

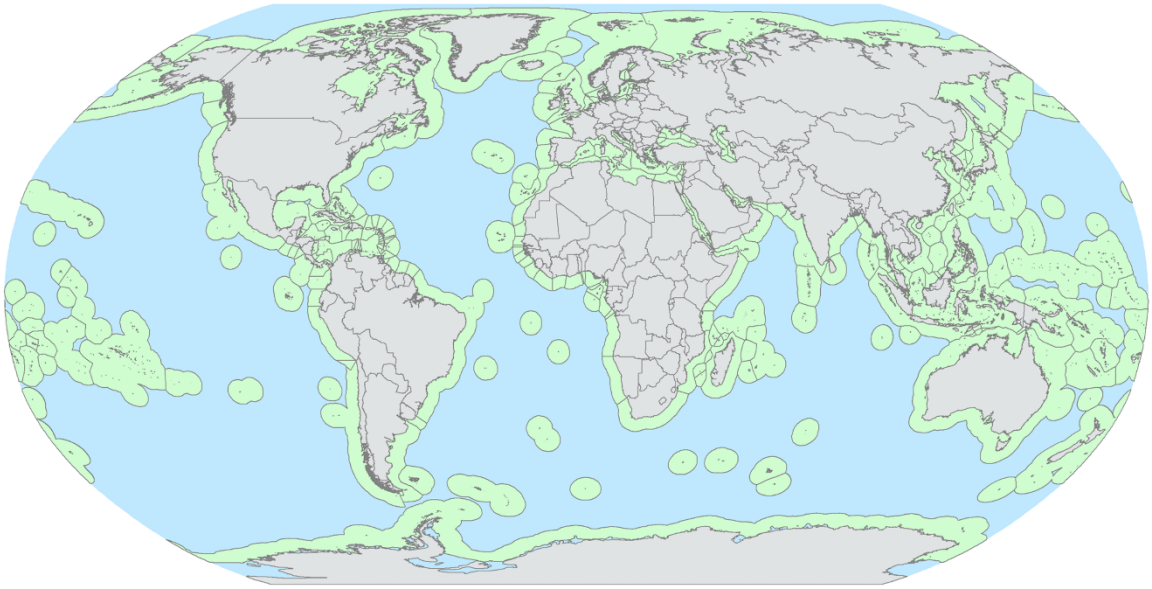

Figure 3: International ocean governance is based on coastal state jurisdiction over their 200 nautical mile exclusive economic zones (EEZ), highlighted in green on this map. Areas beyond national jurisdiction (ABNJ), commonly called "the high seas", comprise 64 % of the ocean's surface and nearly 95 % of its volume. Source: White and Costello 2014.

Developing Adaptive Solutions

Marine ecosystems are by nature more dynamic than the relatively static land areas. There are also strong variations in physical, chemical and biological characteristics with depth, very unlike land. Thus, ocean governance needs to reflect the highly dynamic characteristics of the ocean. It is further important to address land-ocean interactions when developing integrated management of coastal regions.

Today, the dynamic nature of the ocean is amplified by climate change which in our view is the most serious of all pressures currently facing the oceans. Many regions already suffer from the effects of climate change, especially in developing countries and small island states where coastal communities

and even whole countries are threatened. These challenges are further amplified through a governance system that does not view the system holistically. Climate projections suggest that forward-looking, adaptive solutions where risk is explicitly considered will become an even more important element of IOM.

Climate change is manifesting itself in tropical and temperate as well as polar marine environments. Sea level rise, ocean warming and deoxygenation, ocean acidification, changing storm intensities and tracks and melting sea ice as well as migrating species are examples of consequences of climate change already representing major challenges to ocean management. Current climate projections give strong evidence that societies must prepare for an even more challenging situation in the future.[84,94] In this respect, IOM represents an important tool for addressing multiple uses while at the same time also considering the impacts of climate change and improving resilience of marine systems.

With increasing uses and pressures on marine ecosystems, concerns for the cumulative impact on these ecosystems has grown. UNCLOS recognises this concern on a general basis, and global environmental concerns such as climate change are addressed in separate instruments as the United Nations Framework Convention on Climate Change (UNFCCC). Cumulative impacts need to be an integrated part of IOM.

On this basis, we suggest IOM as an approach to capture the dynamic nature of marine ecosystems as well as the connectivity and differences between land and ocean in an integrated and adaptive manner.[33] Further, we suggest that ocean governance considers expected future changes in the ocean environment by using the best available scientific knowledge on climate change. A static approach, for example in establishing marine protected areas, may due to climate change over time loose its efficiency in preserving the ecosystem values it originally were established to look after.

Conclusions

We argue the need for integrated ocean management and identify several central components of successful IOM. Achieving a healthy, productive and resilient ocean requires a holistic perspective on ocean use and management, and effective implementation of relevant national and international measures. Given current levels of pressures on our oceans, few human activities can be viewed in isolation. Most activities have impacts that need to be accounted for and seen in relation to other activities and concerns in order to fully capitalise on the economic potential of the ocean in a sustainable way. The need for an integrated, ecosystem-based, knowledge-based approach to ocean governance is more pressing than ever.

The status of marine ecosystems and their properties and characteristics vary considerably. IOM enables an understanding of the totality of ocean uses and pressures and provide guidance for prioritisation among these various uses. Governance solutions need to be tailored for the characteristics and problems of the different marine regions – one size does not fit all. Context is essential.

Governments need to ensure in partnership with ocean industries that they do not degrade the environment they and others depend on. It is critical that short-sighted solutions with negative environmental impacts are replaced with long-term solutions. To this end, important knowledge often exists but is not used in decision-making due to the lack of efficient science-policy interfaces. Also, effective ocean governance must consider advancements in technology, impacts of climate change, and the dynamic nature of the oceans and seas, as well as the interactions and synergies between land, oceans and people.

Furthermore, the need for enhanced regional collaboration is evident. Ecosystems and economic activities often occur in several jurisdictions and across national boundaries. Also, activities in the marine realm can have widespread impacts. In the case of such transboundary situations, regional cooperation in for example fisheries management or in the prevention of marine pollution is necessary to address the problems at an appropriate geographical scale. At the local level, connectivity among people and institutions plays a vital role in ensuring sustainable ocean governance.

Finally, climate change represents a challenge vastly larger than anything we have faced before. The ocean is intimately connected to climate and visa versa. The perhaps most important issue in the future is therefore our ability to efficiently take action on climate change. Questions of adaptation and risk management loom large in this respect and are critical dimensions of all options for action discussed in this paper.

In order to use IOM as a tool for achieving a sustainable ocean economy, we recommend the following:

- Strengthen the global ocean knowledge system by developing and disseminating new data as well as better utilising existing knowledge. Further, building on established structures such as the IOC and using the UN Decade of Ocean Science for Sustainable Development as a vehicle for developing international cooperation in marine science and related sciences further.
- Encourage ocean-related businesses at local, regional, national and international levels to cooperate in developing principles and guidelines for sustainable conduct.

- Build government support for the active involvement of local communities in all stages of planning and the development of IOM.
- Identify and use the best and most relevant principles, practices and procedures from regional efforts at IOM for the development of integrated management in other regions.
- Ensure that regulatory frameworks for areas beyond national jurisdiction as well as those in areas under national jurisdiction are effectively implemented, building on the best available science. Rules for managing human activities in the high seas should be compatible with and at least as strict as those that apply in areas under national jurisdiction.
- Secure IOM to capture the connectivity and differences between land and ocean, society and ecology in an integrated and adaptive manner. Further, we suggest that ocean governance considers the expected future changes in both the ocean environment and human interactions with the ocean by using the best available scientific knowledge on climate change and other environmental changes.

Figure 4, illustrating these six recommendations, will be inserted here.

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