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ABSTRACT

The Indian Ocean is vital to the economies, security and livelihoods of its littoral states. However, the economic and sustainable development issues in the rim are particularly challenging since the countries, with diverse political systems, development status and agendas, are home to one- third of the world's population that rely extensively on the marine resources for sustenance, thereby subjecting the ocean's resources to pressures from pollution, habitat degradation, and over-exploitation. Yet, if sustainable development goals are to be achieved and food security, livelihoods and economies based on marine resources assured, then, advancing blue economy through sustainable management and utilization of ocean's resources must be accorded high priority in the region. The paper explores the current governance framework of marine resource management in the Indian Ocean, delves into the challenges in blue economy development and recommends ways to advance blue economy governance in order to address pressures and ensure sustainable development in the region.

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INTRODUCTION

Oceans are the world's single largest ecosystem, covering nearly three-fourths of the earth's surface, thereby providing a massive arena for emerging complex and interconnected development issues such as climate change, livelihoods, commerce, and security.[1] According to estimates by the Global Ocean Commission, ocean resources contribute five percent of the world's GDP, secure the jobs of three billion people, and sustain the livelihoods of 350 million.[2]

Among the world's oceanic divisions, the Indian Ocean is the third largest, covering an area of more than 70 million sq km that includes extensive Exclusive Economic Zones (EEZ) of different countries and large "high seas"*.[3] The economic and sustainable development issues in the Indian Ocean rim are particularly challenging since the a majority of littorals are developing countries. These countries are home to one-third of the world's population that rely extensively on the marine resources for livelihood and food security. The sheer size of this population subjects the Indian Ocean's resources to pressures from pollution, habitat degradation, and over-exploitation.[4] As the population of the region is projected to increase significantly in the coming decades, its impact on food security and economy from marine resources would become more substantial.[5] Moreover, the region and its resources face multi-dimensional challenges from climate change impacts such as sea-level rise, ocean acidification, and extreme weather events—the latter, in turn, leading to changes in distribution of aquatic species, community structures due to migration, and decreased economic productivity.

* Institutionalised by the United Nations in the 1982 under the United Nations Convention on the Law of the Sea, UNCLOS, High Seas refers to "… all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State."

It is imperative, therefore, to increase cooperation towards conservation and sustainable use of the oceans, seas and marine resources as outlined in the goal 14 of the Sustainable Development Goals (SDG).# Serious efforts are needed to address the growing pressures on ocean resources, to ensure global food security, and secure livelihoods for future generations.[6] The concept of 'Blue Economy'—aimed at generating livelihoods and building resilience against climate change and its concomitant environment challenges—inspires the use of seas and oceans for sustainable development and inclusive growth.[7] In their Mauritius Declaration on Blue Economy of September 2015, the Indian Ocean Rim Association (IORA) recognised the need for urgent action towards improved governance structures to preserve the ocean's resources for future generations.[8]

This paper explores the current governance architecture for Blue Economy and its potential in the Indian Ocean region, particularly in the context of fisheries, environment protection and climate change impacts. It analyses the opportunities and gaps in existing legal and policy frameworks at the national, regional and international levels, and offers recommendations for the way ahead.

BLUE ECONOMY IN THE INDIAN OCEAN

The Indian Ocean is projected to become a dominant global geopolitical and economic force in the 21st century.[9] Indeed, the region's contribution to global GDP has significantly increased over the last century: from an average six to seven percent in 1980 to 10 percent or USD 78 trillion in 2014 (See Figure 1).[10] However, based on Gross

The Sustainable Development Goals (SDGs) were adopted at the United Nations Sustainable Development Summit in New York in September 2015.

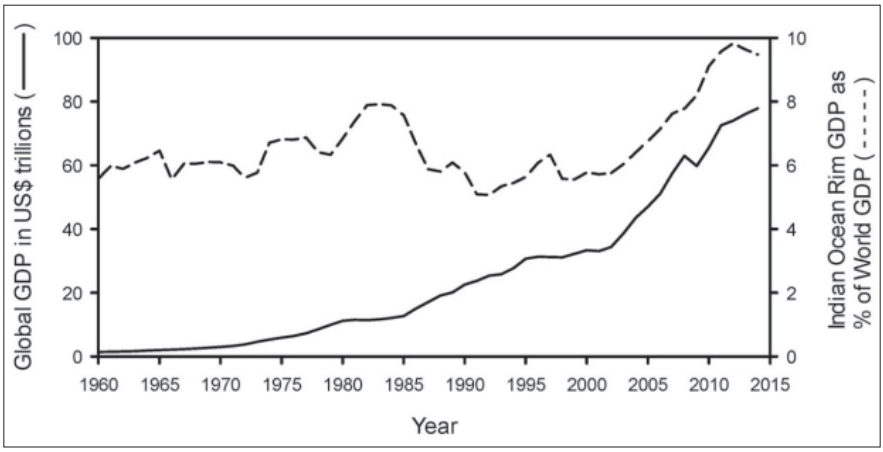


Figure 1: Global GDP (US$) since 1960 and the percent contribution of Indian Ocean nations.[11]

National Income, only three IOR countries—i.e., Australia, Singapore and United Arab Emirates—feature among the top 20 nations with highest per capita gross national income.[12] Owing to limited land resource base, many of the coastal and island IORCs are dependent on marine resources for economic opportunities.[13] Therefore, pursuing the goals of blue economy would be critical to the region's prosperity and development.

Blue Economy: Concepts and Definitions

'Blue Economy' (BE) conceptualises the oceans as "shared development spaces". It is defined by the World Bank as the "sustainable use of ocean resources for economic growth, improved livelihood and jobs, and ocean ecosystem health."[14] Often referred to as "marine economy", "coastal economy", or "ocean economy" in the literature,[15] the concept is at a nascent stage and is yet to be encapsulated in a comprehensive definition from an operational perspective.[16] While the basic tenets and goals of these paradigms may be similar, there are differences in approaches and treatment with reference to resource management, growth objectives, sustainability, and social equality. For instance, the

term "ocean economy" refers to the "decoupling of socio-economic development from environmental degradation". Therefore, in this regard, "efficiency and optimisation of natural marine resources within ecological limits becomes paramount."[17] An "ocean economy", meanwhile, could be understood through the knowledge of the following: (a) a sub-set of the economy; (b) dependent on ocean for inputs to invigorate its production process; (c) based on industry and also geographical locations; and (d) these industries/activities are located in coastal and non-coastal areas.[18] For its part, the concept of "costal economy" is larger than "ocean economy" and includes, concentration of activities on or around the coastal areas and sum of all activities relating to output, employment and wages in the coastal region. Therefore, Colgan (2004) has defined costal economy as "all economic activity in the coastal region, and is thus the sum of employment, wages, and output in the region. Some of the coastal economy is the ocean economy, but the coastal economy incorporates a broader set of economic activities."[19] Whereas, a marine economy is "horizontally integrated cluster industries which include sectors meant for a common market for the end products, using common technology or labour force skills, or require similar natural resources."[20] A sub-set of the coastal economy, the marine economy includes commercial seafood, marine transportation, coastal tourism and recreation, marine science and technology, marine-related construction and infrastructure. The Government of Australia, in its report titled, 'Marine Nation 2025: Marine Science to Support Australia's Blue Economy' defines "blue economy" as "one in which our ocean ecosystems bring economic and social benefits that are efficient, equitable and sustainable."[21]

While delimiting the concepts around and aims of BE, the Economist Intelligence Unit (2015) clarified that blue economy is synonymous to "greening of the ocean economy," with futuristic development implications by visualising certain patterns of production and

consumption of ocean resources.[22] From this perspective, blue economy is a shift from the old, "brown" business-as-usual development model where oceans are perceived as a means of free resource extraction and waste dumping. This paradigm does not consider the costs of the negative externalities to resource accounting, failing to take into cognisance the costs of environmental damage and ecological imbalance by consumption.[23] For its part, the European Commission (2012) has defined the concept of blue economy as "all economic activities related to the oceans, seas and coasts."[24]

The growing competition among the IOR countries over marine resources for their development highlights the need for enhanced regional cooperation that allows them to harness in a more sustainable manner. Adoption of a comprehensive definition of BE is the first step towards understanding and taking joint action to explore the existing potential of BE in the IOR region. So far, the concept of blue economy is still subject to multiple interpretations because of the coverage of activities, geographical locations and sectors.[25] From the available literature, an indicative list of sectors and the activities falling under "blue economy" is given in Table 1. While some studies classify different sectors of blue economy into "traditional" and "emerging" sectors, there is hardly any common position on this view.

Table 1: Taxonomy of Blue Economy Sectors and Activities

Fishing	Capture fishery, Aquaculture, seafood processing
Marine Biotechnology	Pharmaceuticals, chemicals, seaweed harvesting, seaweed products, marine derived bio-products
Minerals	Oil and gas, deep-sea mining (exploration of rare earth metals, hydrocarbon

Marine Renewable Energy	Offshore wind energy production, wave energy production, tidal energy production
Marine manufacturing	Boat manufacturing, sail making, net manufacturing, boat and ship repair, marine instrumentation, aquaculture technology, water construction, marine industrial engineering
Shipping, Port & Maritime Logistics	Ship building and repairing, ship owners and operators, shipping agents and brokers, ship management, liner and port agents, port companies, ship suppliers, container shipping services, stevedores, roll-on roll-off operators, custom clearance, freight forwarders, safety and training
Marine Tourism & Leisure	Sea angling from boats, sea angling from the shore, sailing at sea, boating at sea, water skiing, jet skiing, surfing, sail boarding, sea kayaking, scuba diving, swimming in the sea, bird watching in coastal areas, whale/dolphin watching, visiting coastal natural reserves, trips to the beach, seaside and islands
Marine Construction	Marine construction and engineering
Marine Commerce	Marine financial services, marine legal services, marine insurance, ship finance & related services, charterers, media & publishing
Marine ICT	Marine engineering consultancy, meteorological consultancy, environmental consultancy, hydro-survey consultancy, project management consultancy, ICT solutions, geo-informatics services, yacht design, submarine telecom
Education and research	Education and training, R&D

Source: RIS, 2015

Blue Economy potentials in the Indian Ocean

The idea of 'blue economy' was first articulated by Gunter Pauli in 2010 and later discussed at the United Nations Conference on Sustainable Development, Rio + 20 in 2012. BE has since emerged as an influential concept in the Indian Ocean region and is a powerful and contested discourse among the member states of the leading regional governance organisation, the Indian Ocean Rim Association's (IORA).[26] Since its conceptualisation, a number of IORA states have been strongly advocating for increased cooperation and improved governance of BE.[27] Bangladesh, for one, has been at the forefront of regional attempts to promote BE; in 2014 it became the first country to host a major conference focused on proposing a Bay of Bengal partnership for Blue Economy.[28] This was followed by an IORA-organised conference, 'Enhancing BE for Sustainable Development', in 2015. Such efforts led to an increased focus on sustainable development in the Indian Ocean region and the emergence of the IORA Declaration on Enhancing Blue Economy Cooperation for Sustainability.[29] Subsequently, BE gained importance in India's strategic and development vision. Prime Minister Narendra Modi has stated it as a tool for India's development, emphasising on the protection of shared marine spaces for 'Security and Growth for All in the Region.'[30] For his part, former president of the Republic of Seychelles, James Alix Michel, championed the concept from the perspective of small island developing states (SIDS) in his 2016 book, *Rethinking the Oceans: Towards the Blue Economy*.

It is becoming increasingly evident that the concept of BE—straddling principles of marine-led economic growth, protection of marine environment, and enhanced maritime security in all national and regional manifestations—would have profound implications on regional foreign policy in the coming decades. Therefore, the concept holds particular relevance to the Indian Ocean since the region is defined by "maritime regionalism", in pursuit of similar geopolitical

goals.[31] With nearly half the world's population projected to be residing in the Indian Ocean Rim (IOR) countries by 2050, the region is making a geopolitical shift from its identity as the 'Ocean of the South' to the 'Ocean of the Centre', and further to the 'Ocean of the Future' as its core position in terms of global trade, industry, labour, environment and security is likely to shape the 21st-century world.[32] Doyle (2016) claims, "The IOR is of high economic, strategic and environmental significance. Half of the world's trade already traverses through this region. In addition, the Rim possesses a variety of natural resources, both marine and terrestrial, which are vital for the well-being of its inhabitants, trade and environmental stability. The scope for the development of such resources – including food, livelihoods, tourism, minerals resources, bio-prospecting, the mining of seabed resources and 'blue energy' – is being realized especially by coastal and island developing states who are at the forefront of 'Blue Economy advocacy.'"[33]

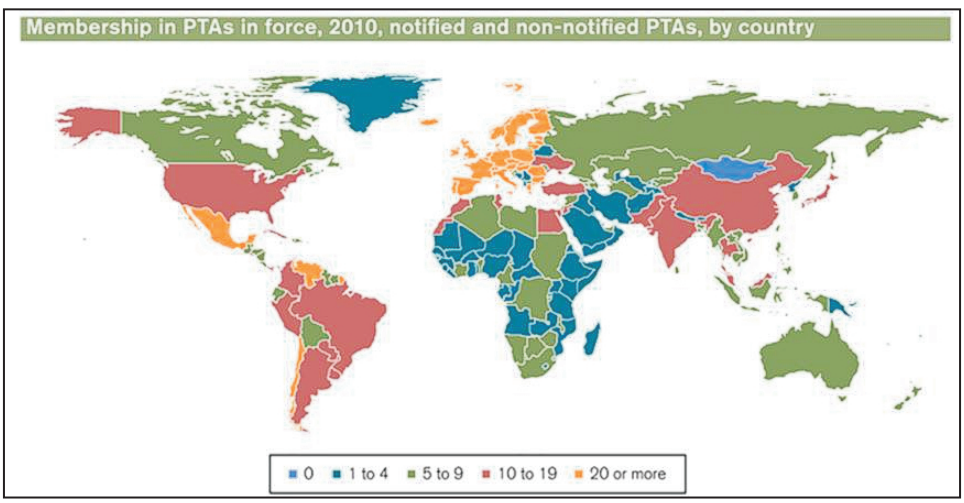
Table 2: National Estimates of Blue Economy

Country	**Size of Blue Economy**			**Indicative Employment**	
	Year	**Output** *(US$ Billion)*	**% of GDP**	**Year**	**No.**
Australia	2004	17.00	3.6	-	-
Canada	2004	15.98	1.5	2006	1,71,365
France	2006	16.69	1.4	2009	4,59,358
New Zealand	2006	2.14	2.0	-	-
United Kingdom	2008	84.27	4.2	2006	5,48,674
United States	2009	138.0	1.2	2010	2,770,000
China	2010	239.09	4.0	2010	9,253,000
Ireland	2007	1.9	1.0	2007	17,000

Compiled by RIS from various sources[34] (Note: Data on the size of blue economy in select countries. Since the conception and methodology differs across the sources, these numbers are indicative.)

The Indian Ocean region have been providing a unique ecosystem and connectivity routes to the resources for centuries now. The growth of technology and capabilities have expanded the opportunities further. A sustained—and *sustainable*—growth of blue economy in the Indian Ocean region would therefore require concerted efforts by governments, private sector and broader community, including the scientific ones. In terms of domestic consumption and trade, there has been a significant rise in the number of preferential trade agreements in the past two decades (World Trade Organisation, 2011). Yet, the Indian Ocean countries lag behind the rest of the world, especially compared to the United States and Europe that have many more agreements in place (See Map 1).[35] In the absence of a non-regional approach to a sustainable economic growth, recent improvements and efforts being pursued by IOR countries towards global integration and increased productivity would be undermined.

Map 1: Membership in preferential trade agreements as at 2010 (reproduced with permission World Trade Organisation, 2011).



Source: Llewellyn, English and Barnwell, 2016.

An increased policy focus of Indian Ocean littoral states towards BE would draw attention to the economic potential of the shared marine resources and their capacity to contribute to larger development

imperatives such as poverty reduction, food security and enhanced economic opportunities. However, this realisation should be accompanied by an awareness to derive economic development from the marine resources while ensuring conservation and sustainable management of the marine ecosystem. In this context, an increased political and economic attention to sustainable management of marine resources is imperative to foster better governance and security for its vast resources. Steinberg observed that the sea is now being understood as a "resource-rich but fragile space requiring rational management for sustainable development."[36] It is critical, therefore, to explore existing law and policy frameworks, particularly for food security and sustainable management, to realise the gaps, and propose solutions for better governance in the region.

FISHERIES MANAGEMENT IN THE REGION

Fisheries have sustained human population for millennia and a healthy aquaculture is a critical component of global protein supply.[37] However, the Indian Ocean's aquaculture is mired in governance challenges that need urgent fixing. While IOR countries have their respective laws, regulations and policies that govern fisheries management and their jurisdiction, they are largely ineffective in mitigating illegal, unreported and unregulated (IUU) fishing.[38] Non-compliance with domestic regulations and licences leads to the denial of economic benefits from their rightful owners, thereby exacerbating domestic conflicts. The challenges negatively impact government income, social distribution of benefits, accuracy in reporting, and effective monitoring to ensure sustainable fishing.[39] Indeed, the current status and architecture of fisheries management may affect the capacity of fisheries to satisfy the burgeoning protein demand of the world population.

The IOR is home to both, commercial fishing and subsistence activities. While commercial fishing is largely operated by foreign fishing

vessels from Europe and Asia in distant waters focused on tuna and similar species, fishing in the region remain mostly at the subsistence level, involving coastal communities accessing the resources for their local livelihood.[40] The global yields from capture fisheries have stabilised in recent years due to greater attention towards aquaculture. Yet, it remains a challenge to maintain a sustainable fish stock. India Ocean tuna, for example, is a major contributor, constituting a quarter of global supply. However, the bulk of tuna harvests is monopolised by foreign vessels, impeding the growth of local fisheries. As external parties continue fishing in the Indian Ocean waters, it becomes more necessary to find solutions that go beyond regional jurisdictions.[41]

Most of the IOR littorals are developing countries. As such, their lack of capacity, skills and access to cost-effective technologies makes it difficult to overcome the barriers to sustainable management of aquatic resources. Addressing these challenges would boost the BE of this region, while leading the fisheries sector to flourish sustainably, attract investments, and ensure food security. The demand for ethical fish capture has risen significantly in recent years, demanding the need for fish suppliers to document the source of their fish.[42] Recording this chain of custody data would require innovative and cost-effective tools. While significant disparity exists within the member states in terms of sustainable management of the marine species and BE goals, a regional approach would cultivate bigger—and less volatile—growth opportunities in the region. However, this would require evidence-based policy supported by nuanced data.

EXISTING BLUE ECONOMY GOVERNANCE FRAMEWORKS AND APPROACHES

National Level

Most of the IORA member states have designed their respective national policies and laws that separately address the issues pertaining to

sustainable management of species relied upon for food, environment conservation (including land and marine), and climate change. Their implementation, however, is varied. For instance, South Africa's Constitution expressly provides for the right to access natural resources and an environment conducive to human health that addresses sustainable development and ecological integrity; environmental conservation, therefore, has a centralised focus.[43] The country has enacted many policies and laws such as National Environmental Act 1998, Integrated Coastal Management Act 2008, Disaster Management Act, Biodiversity Act 2004, and Environment Conservation Act 1989, aimed at addressing sustainable development challenges, intergenerational equity and right to favourable environment.[44] Moreover, fisheries have a separate dedicated regulation—the Marine Living Resources Act 1998, covering spatial planning, licence permits for commercial fishing, and sustainable use of marine resources. Despite this, there is still a dearth of concerted actions that directly respond to ensuring food security or addressing climate change.[45]

Mozambique, meanwhile, has introduced relevant laws such as the Forestry and Wildlife Law, Fisheries Law and Local Organs Law, Environment Law 1997, and the National Adaption Programme of Action, 2007 that focuses on integrated and sustainable management of the marine environment and actions to mitigate climate change.[46] However, a weak governance framework has resulted in the exploitation of the country's natural environment, along with poor implementation and fragile oversight mechanisms.[47] Most of the IORA member states, especially the Small Island Developing States (SIDS), provide a similar picture. Therefore, while there is an awareness of the risks associated with climate change and environment degradation on the sustainability of the limited resources of marine habitats, the lack of capacity and poor governance act as bottlenecks to implementation.

Regional Level

Although the Indian Ocean littorals have historically lacked a strong regional framework focused on food security, sustainable growth and climate action, there have been some relevant initiatives for a region-wide approach largely through the Indian Ocean Rim Association. Established in 1997, IORA aims to achieve "sustained growth and balanced development of the region and of the member states, and to create common ground for regional co-operation."[48] Its relevant programmes such as the Fisheries Support Unit (FSU) work to balance the growth of the fishing sector in the face of illegal fishing and depletion of stocks, as well as to limit marine pollution. Therefore, IORA is best suited to provide a framework for action related to climate change and food security.

The 2013 Perth Communique of IORA is committed to "peaceful, productive and sustainable use of the ocean and its resources" and supports sustainable marine resource management while combatting illegal fishing through capacity building.[49] Since a number of nations are now focused on the blue economy agenda, capacity-building programmes and workshops for its advancement have gained momentum.[50] There has been significant development recently with the adoption of the Jakarta Concord that reaffirmed commitment to fisheries management through "science-based approaches, promoting sustainable practices, building capacity, addressing crimes in the fisheries sector and strengthening the FSU."

Besides the efforts led by IORA, the large marine ecosystems (LMEs) initiatives in the region have also made significant contribution towards the conservation of marine environment in the regional level. The African LMEs have been working in partnerships through commissions, programmes and policies for protection against climate change risks.

The Bay of Bengal LME initiative is aimed at improving fisheries management and governance frameworks for enhancing adaptation and resilience of the marine ecosystem.[51]

Furthermore, the existing regional institutions in the Indian Ocean, have established partnerships to coordinate research and management activities in the region. For instance, the South West Indian Ocean Fisheries Project (SWIOFP) and the UNEP WIO-Lab Project have collaborated to create the 'Western Indian Ocean Sustainable Ecosystem Alliance' (WIOSEA), allowing for integrated approaches to oceans governance across large scales.[52]

While there have been some notable initiatives in recent times, however, regional efforts in the Indian Ocean have largely remained disjointed, lacking a unified law and policy framework. For instance, while the Indian Ocean Commission (IOC) has developed a Regional Climate Action Plan 2016–2020, its implementation has been scarce due to its principal focus on regional economic development. Regional agreements such as the African Convention on the Conservation of Nature and Natural Resources (ACCNNR), and the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, as well as the Association for South East Asian Nations (ASEAN), have been active in the area of ecosystem conservation and climate change. However, they can only play a tangential role in facilitating regional coherence in the Indian Ocean region as their scope extends beyond the region.[53]

International Law and Framework

Various global international agreements provide a common platform for law and policy developments in the Indian Ocean region. Majority of Indian Ocean States have ratified the key international environmental treaties and framework for oceans governance that create obligations to

protect and preserve the marine environment. These include the United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD), Convention on Migratory Species (CMS), Convention on International Trade in Endangered Species (CITES), United Nations Convention on the Law of the Sea (UNCLOS), and the Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. However, there is a lack of specificity on guidelines in achieving the goals set out by these agreements.[54]

The UNEP Regional Seas Programme covering 18 regions of the world and the South Asian Seas Programme that includes India, Bangladesh, Sri Lanka, Pakistan and the Maldives as members, focuses on Integrated Coastal Zone Management, environmental effects and climate change issues.[55] However, their lack of focus on fisheries and their limitations in acting beyond the boundaries of member states pose implementation challenges across the entire Indian Ocean. Among the initiatives towards fisheries, the Food and Agriculture Organization (FAO) plays the most prominent role in standard setting, dissemination of data, and development of best-practice guidelines.[56]

Unlike the Pacific Island region, where collaboration through regional bodies is common, the Indian Ocean region demonstrates that while there are a number of global laws, projects and programs in operation, "they rarely involve all relevant countries or address fisheries and food security on a whole-of-region basis."[57]

CHALLENGES TO DEVELOPMENT OF BLUE ECONOMY GOVERNANCE IN THE INDIAN OCEAN

The Indian Ocean states are connected to each other by historical ties, most commonly unified through the seas. However, their diversity in terms of population, country size, natural resources and cultural

heritage makes effective regional cooperation difficult. While there has been some development following the establishment of IORA, Chellaney argues that the region is still "far away from becoming a community of common values."[58]

The governance arrangements of the Indian Ocean have several gaps that hinder the implementation of blue growth in the region. Moreover, a complex regulatory landscape that involves divergent sovereign laws, regional arrangements as well as international laws contributes to additional challenges. While most of the Indian Ocean countries have formulated their own fisheries regulations, they lack proper standards, guidelines and enforcement mechanisms owing to limited data and capacity constraints.[59]

The IORCs are faced with the common pressing challenges of increasing urbanisation, industrialisation and migration, resulting in over-exploitation of natural marine resources. The populations of these countries are projected to experience dramatic growth by 2050; by then, they will collectively host nearly half of the world's people. Such explosion will be fuelled by the rapid geopolitical and geo-economic rise of Africa. This will only heighten the challenges further.[60] Countries like Seychelles, for instance, are already undergoing rapid urbanisation that is adding stress to the limited land and coastal resources. Therefore, it is imperative to close the existent gaps in weak governance, lack of effective policies and enforcement measures, and larger security dilemmas such as illegal fishing, to cultivate sustainable development practices and blue growth in the region. In this context, it is critical to ensure appropriate environmental management of marine ecosystem, supported by effective law and policy.

Food security, including that of seafoods, is a global challenge that is already at risk due to climate change. The Indian Ocean region is rich in

seafood resources and is one of the major areas of global fishing. Over 800 million people in the region rely on seafood for their protein needs.[61] As the agriculture sector in many of the Asian and African agrarian economies are likely to suffer from the impacts of climate change, it is expected that their reliance on seafood would increase. At the same time, fisheries are already being severely affected by marine pollution and illegal fishing, thus destabilising ecosystems and negatively affecting the population of various marine species. Climate change is likely to exacerbate the negative impacts and lead to further degradation of marine species.[62] Climate change impact like erosion and inundation could cause loss of coastal habitats such as mangroves, thereby affecting the reproduction of species.[63] Acidification and rise in sea temperature destroys the coral reefs that are critical to various sea species.[64] The impact of climate change would not only be catastrophic for the marine species alone, but also for the communities that depend on them, while increasing their additional socioeconomic and environmental pressures. For the economies to address significant future food security concerns and avert economic distress, it is crucial to keep fisheries and marine environment management as top priority. However, the ability to react to the increasing impact of climate change on the marine ecosystem would vary according to human and natural geography, capacity and current as well as projected degradation.

While fisheries regulation and law at the national level have existed for centuries, there is a lack of coherent regional arrangement in the Indian Ocean[65] that either covers all the IORCs or ensures protection of various species. Moreover, lack of governance mechanism, poor data and resources suggests that there are very few institutions, finance and technical resources available to deal with the challenges. There is no single overarching organisation that covers all IORC in its membership. For instance, the Southern Indian Ocean Fisheries Agreement (SIOFA) involves only eight countries and further opportunities for membership

is restricted considering the organisation's limitation in covering only the high seas of the southern Indian Ocean. Similar is the case with the Indian Ocean Tuna Commission (IOTC) and the Southern Indian Ocean Fisheries Commission (SIOFC).[66] Although the IOTC has a broader reach, it is only limited to addressing Tuna-like species, thereby leaving various others unprotected in different geographical areas.[67] Therefore, a major shortcoming with these regional fisheries management organisations (RFMOs) is their sectoral approach to ocean management with limited focus on particular types of marine species. Moreover, an overarching focus of regional treaties towards the southern Indian Ocean ignores the regulatory concerns associated with non-highly migratory, shared and straddling fisheries resources in the high seas in the northern region of the Indian Ocean. Countries like Bangladesh and Myanmar that are not part of these treaties continue to fish in relevant areas.[68] In the absence of a regional framework, research, monitoring and enforcement measures continue to be dispersed and lack a concrete integrated knowledge of the Indian Ocean ecosystem that could foster effective governance mechanisms.

A major reason for the lack of progress in fisheries and environmental management in the region is the lack of research, barring a small body of biological and physical scientific data.[69] It is imperative to pursue research directed at improving the technical knowledge of the seabed, sea column as well as the behaviours of those whose livelihoods are dependent on the health of the ocean. There is also a lack of research that focuses on the complex architecture of governance required to construct a regional BE.

Compounding the problems is weak coordination on the present governance arrangements overseeing Indian Ocean-wide monitoring and enforcement of sustainable development and blue growth agendas such as fisheries management. While the regional arrangements such as

IOTC and SIOFA are well-equipped to combat IIU fishing, insufficient coordination at national, regional and international level is jeopardising effective multilateral and comprehensive governance instruments for the Indian Ocean.[70] Tools and enforcement mechanisms could be employed for sustainable fishing. These should include monitoring, control and surveillance (MCS) systems that cover surveillance, monitoring, inspections, observations, apprehension, reporting, trial and punishment, and satellite-based vessel monitoring systems (VMS) to monitor real time vessels fishing on high seas.[71] While the mechanisms for enforcement and technological solutions are available, the problem lies with inconsistent and sporadic application of these tools, lack of capacity for implementation, a lack of clarity over which actor has enforcement rights, and absence of a structured cooperation. The presence of large numbers of actors with different levels of capabilities, normative outlooks and strategic attitudes makes it difficult for a country to assume position as key player in blue growth in the Indian Ocean. These have been witnessed in case of catch and trade documentation and joint inspection schemes.[72] Therefore, in order to achieve the blue economy objectives of reducing non-sustainable fishing and to fulfil goals for a broader sustainable development in the Indian Ocean, key is the more efficient use of existing monitoring and enforcement measures, along with the commitment of state and non-state actors to sustainable development and its oceanic dimensions.

TOWARDS A SUSTAINABLE GOVERNANCE FRAMEWORK FOR THE INDIAN OCEAN BLUE ECONOMY

The stakeholders in the Indian Ocean BE seek three things: a) secure and sustainable economic growth; b) increased policy certainty; and c) greater social licence to operate. To ensure economic growth in the region and attain food security, manage fisheries and restrict

environmental degradation, and to strengthen resilience to climate change risks, this paper makes the following recommendations.

Improvement in governance framework

Integration of scientific management and enforcement in the Indian Ocean would require a new framework agreement to be negotiated, that could play a prominent and legally embedded role in the field of sustainable oceans governance. Since IORA is committed towards the objective of "strengthening the blue economy," the framework could be formulated under the auspices of IORA. Moreover, IORA is the only regional forum bringing together most countries on the Indian Ocean rim through an annual foreign ministers' meeting. However, for IORA to live up to the commitment would require it to significantly boost its resources and dedicated leadership by key countries such as India, Australia and South Africa. The envisaged inclusive multilateral framework agreement should introduce a system of governance that provides an overarching framework for subregional and sectoral approaches covering marine areas, allocation of fishing rights, combating pollution, climate change mitigation, and other systemic issues. This would aid in reducing the regulatory burden created by multiple treaties and governance programmes in different overlapping areas.

At present, the management and conservation of fish stocks in IORCs are governed by the UNCLOS and United Nations Fish Stocks Agreement, as nearly all countries in the region are members of at least either of the two. However, achieving a balance between commitments at a global scale and at the level of individual ecosystems for sustainable management of fisheries would require regional-level cooperation and enforcement mechanisms. Therefore, the existing governance frameworks of Fisheries Support Units of regional organisations such as

Indian Ocean Tuna Commission (IOTC), Southern Indian Ocean Fisheries Agreement (SIOFA), Southwest Indian Ocean Fisheries Commission (SWIOFC) and IORA should be strengthened. This needs to include the increase in number of marine species such as sharks, well-defined regulation of membership and additional specificity on duties of the different state actors.[73] Since IOTC members have embarked on modernising their framework, they have an opportunity to formulate best practises while learning from the challenges that other similar organisations have faced. Lessons can be drawn from regional fisheries management organisations (RFMOs) such as the Western and Central Pacific Fisheries Commission and the Inter-American Tropical Tuna Commission that governs all species in the marine ecosystem such as tuna, sharks, seabirds, and turtles affected by fishing. However, transformation would require renegotiation by organisations such as the IOTC and SIOFA, that would be able to develop binding policies for the member countries. In order to maintain equitability and effectiveness, the negotiations must incorporate developing country assistance.[74]

Extensive, effective collaboration

Another essential feature for the success of governance framework and to ensure effective outcomes is through involvement of relevant stakeholders, including the business sector and local communities. While governments are the custodians of laws, regulations and treaties, fishing is performed by the companies and local fisherfolk. While the academia and the business sector's insights are already covered under the IORA's "tripartite structure," the voices of the private sector and local communities must be included in revised treaties, measures or policies. One step could be to offer the relevant non-state stakeholder groups an observer status in new and existing discussion forums. This would encourage their active contributions in shaping policy

development, capacity-building, and implementation. The IOTC is a case in point. Moreover, this should include the scientific community, as envisioned sustainable environmental practices must be scientifically supported. Scientific explanation is essential in order to create support among private actors, convince stakeholders that improving sustainable fish stocks is in their own interest, and minimise losses for companies and fishermen.[75]

Strengthening monitoring and enforcement mechanisms

Comprehensive and effective monitoring, control and surveillance (MCS) systems are imperative for the goals of reducing non-sustainable fishing practices and achieving broader sustainable development in the Indian Ocean. An efficient use of monitoring and enforcement mechanisms would improve the commitment of state and non-state actors to BE and its oceanic dimensions. Data concerning the Indian Ocean and its scientific scrutiny are usually limited and poorly shared. Integrated systems to identify and deter non-compliance through independent verification and auditing, additional data collection, improved data sharing, scientific analyses concerning fishing activities and environmental impacts in the region, and the inducement of compliance by vessels are needed to monitor and adaptively improve cooperation and governance across the Indian Ocean.[76] However, achieving this would require setting uniform standards for the collection and reporting of fishery-dependent data. The Niue Treaty Subsidiary Agreement for the South Pacific Region provides a lesson on how to pool limited resources, capacity and assets for sharing fisheries data and intelligence while strengthening the ability to identify and enforce fisheries laws.[77] More scientific understanding through data collection can improve economic efficiency and enforcement systems, thereby enhancing capacity to cope with changing marine ecosystem.[78]

Adoption of Marine-specific policies

The importance of the oceans to nations are often reflected in the respective marine policies of the littoral countries under a broader policy and regulatory framework. While oceans and the differences to terrestrial systems are well-recognised, less attention is paid to specific marine related issues such as food security, fisheries regulation, pollution and climate change thereby confusing the policy settings that may be applied. Therefore, it would be beneficial in the long term to formulate marine policies separately under a sub-head in the broader governance framework. This would enable a focus on "marine" resources in particular, while integrating different facets of marine policy where appropriate. A clearer framework to operate would provide greater certainty to industry, thereby reducing the compliance burden and costs for government, regulators and the industries.

CONCLUSION

There are a number of bilateral and multilateral agreements that today bind the Indian Ocean littoral countries. However, not only are these mechanisms limited in focus, they have also failed to include all relevant stakeholders in the fray. The IORA, for example, with 21 member states and a number of global defence and economic powers, is the most comprehensive arrangement that embraces the entire region under one forum. Yet, the current architecture lacks coherent governance instruments, and this could inhibit sustainable blue development in the Indian Ocean, even as they attempt to address issues such as food security, ecosystem management and biodiversity conservation. The diversity of the countries of the region in terms of geography, politics, economy and culture[79] have so far hindered the development of regional institutions, cohesions and translation of blue development goals into reality.[80] Achieving the blue economy goals would require extensive

cooperation between the community of coastal states and a range of other stakeholders that include the private sector, non-governmental organisations, scientific and local communities. It would be valuable to learn lessons, compliance mechanisms and legislative models from other regional bodies such as the Pacific and Caribbean communities. Adapting best practices to the Indian Ocean context would fill the current gap of a strong foundation of regionalism upon which new approaches to fisheries, climate change and food security could be developed.

Chellaney warns, "[t]here is a danger that interstate conflict in the IOR in the coming years could be driven by competition not so much over political influence as over scarce resources." Therefore, addressing regional stability and multiple stressors on resources due to climate change impacts and environmental degradation would urgently require a unified, holistic, multi-scalar and integrated regional response to ensure sustainable management of marine resources. ORF

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