Chapter 17
Ocean Governance and Integrated Ocean Management

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17.1 Introduction

Oceans are valuable natural resources providing numerous ecosystem services. Oceans have great importance not only from an economic perspective but also from a geographical and political perspective. However, oceans are becoming increasingly more vulnerable over time due to population growth and achievement of economic growth. By anthropogenic activities such as dumping untreated sewage and industrial wastewater, plastic, and other pollutants, oil spills, and climate change, ocean ecosystems and their biodiversity are rapidly changing and are under threat. As oceans are transboundary in nature, these issues need to be resolved at the country level as well as the regional and international levels. Furthermore, keeping in view the importance of oceans, the conservation and sustainable use of oceans has been included in the United Nations Sustainable Development Goals (SDGs).

SDG 14 states this goal as "conserve and sustainably use the oceans, seas and marine resources." The United Nations has specified the following targets under this goal:

1. Index of coastal eutrophication and floating plastic debris density.
2. Proportion of national exclusive economic zones managed using ecosystem-based approaches.
3. Average marine acidity (pH) measured at agreed suite of representative sampling stations.
4. Proportion of fish stocks within biologically sustainable levels.
5. Coverage of protected areas in relation to marine areas.

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6. Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported, and unregulated fishing.
7. Sustainable fisheries as a proportion of GDP.
8. Proportion of total research budget allocated to research in the field of marine technology.
9. Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries.
10. Number of countries making progress in ratifying, accepting, and implementing through legal, policy, and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea (Ritchie et al. 2018).

17.2 Contribution of Oceans

Oceans provide ecosystem services including provisioning, supporting, regulating, and cultural services, also covered in the previous chapters. Environmental and other economists have attempted to measure the value of these ecosystem services. In this section, we focus on the contribution of oceans in terms of GDP and major economic activities.

Three-fourths of earth's area is covered by the oceans; therefore, oceans have the largest and also complicated ecosystem. WWF (2015) reported that the estimated value of ocean assets around the world is about USD 24 trillion that entails an annual output of around USD 2.4 trillion. If the ocean economy is measured separately, this would have ranked seventh among the top 10 global economies (WWF 2015).

Ocean economy's share in GDP varies from country to country, ranging from 1% to 30%. However, there are some miscalculations or underestimation while calculating its share in GDP. Many do not consider the indirect role of oceans; they just calculate direct impact on GDP such as fisheries, aquaculture, and tourism only. There are many economies in this region where it plays a key role in their GDP such as India (4.10%), China (9.6%), Vietnam (18.80%), and Indonesia (14.85%) (Juneja et al. 2021).

Asia is surrounded by the Indian Ocean to the south, Pacific to the east, Arctic Ocean to the north, and Red and Black Sea to the southwest. 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." These countries are home to one-third of the world's population that rely extensively on marine resources for livelihood and food security. The Indian Ocean is projected to become a dominant global geopolitical and economic force in the twenty-first century. The contribution of Indian ocean nations to global GDP has significantly increased over the last four decades, from an average 6–7% in 1980 to 10% or USD 78 trillion in 2014 (Roy 2019).

The Arabian Sea covers a total area of about 3,862,000 square km and forms part of the principal sea route between Europe and India. Pakistan has a long coastline of 1050 km and the exclusive economic zone covering about 240,000 sq. km. It is bounded to the Horn of Africa, the Arabian Peninsula, Iran, Pakistan, and India. The Arabian Sea, with its strategic location vis-à-vis the Red Sea (including the Suez Canal) and the Persian Gulf, contains some of the world's busiest shipping lanes; and the chief routes originate in those two extensions. Persian Gulf shipping largely consists of tankers, some of immense capacity, that transit the Arabian Sea en route to destinations in East Asia, Europe, and North and South America. Besides that, it has an abundance of natural resources in the form of oil and gas along with seafood.

Therefore, it has become more challenging to enhance cooperation not only at the international level but also among local-level different administrative units within the country for the conservation and long-term use of riverbeds, deltas, seas, oceans, and other marine resources. Conservation and sustainability of these resources has also been given due attention in Sustainable Development Goals (SDGs).

Blue Economy Blue Economy is defined as the "sustainable use of ocean resources for economic growth, improved livelihood and jobs, and ocean ecosystem health" (World Bank, 2017). Thus, blue economy can potentially help nations to achieve SDGs.

In the present study, we will focus on the Asian region for analysis. Most of the Asian region is covered by Asia and Pacific region. Many of them lie in developing and underdeveloped countries that are directly or indirectly linked with ocean economy. There are 13 least developing countries in this region out of 47 around the world. Names of these countries are Afghanistan, Bangladesh, Bhutan, Cambodia, Kiribati, Lao People's Democratic Republic, Myanmar, Nepal, Solomon Islands, Timor-Leste, Tuvalu, Vanuatu, and Yemen.

Asia-Pacific contains a large area of both land and coastline in the world. This region includes East Asia, South Asia, Southeast Asia, and Oceania. The area includes two oceans, the Indian Ocean (the third largest ocean) and the Pacific Ocean (the largest ocean), as well as several seas like Bay of Bengal and other water bodies. It possesses some of the most ecologically and economically important sea areas of the world which provide a rich array of services that directly and indirectly contribute to human survival and quality of life, supporting local coastal communities and their economies. The scope of Blue Economy is thus large in Asia as several states in this region have a significant share of marine economy in their gross domestic product (GDP).

There are some economic sectors that are dependent on oceans such as port and shipping, tourism, and fishing. The Asian region contributes a significant part in global trade. In terms of global trading volume (loaded and unloaded), Asia has the largest share as depicted from the figure below (Fig. 17.1).

Asian economies have witnessed a miraculous growth over the last decades. Most of the goods are manufactured in other countries while assembled somewhere else. Therefore, transportation of such good is heavily dependent on the shipping

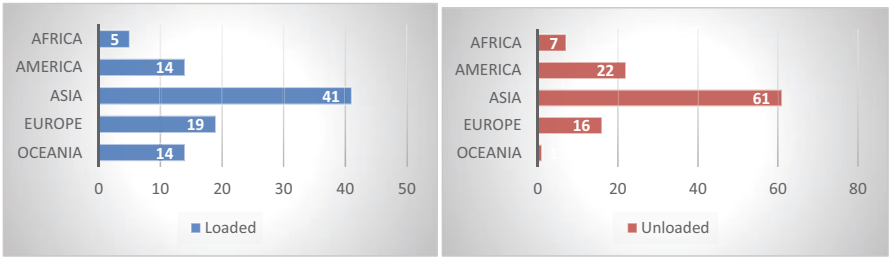

Fig. 17.1 International Maritime Trade by region in 2018 (% share in world tonnage). (Source: UNCTAD 2019)

industry. Interestingly, worldwide shipping industry is ruled by three Asian countries, namely, China, Korea, and Japan.

Asia excluding China captures 34% of fishing and aquaculture marked to the world. Since the last 20 years, its production has doubled. Asia's share (excluding China) in the global international trade market has reached up to 42% in 2019. In terms of volume of production, Asia's share has reached to 89% of global fish production (UNESCO 2017).

Tourism plays a key role in Asian economies. Southeast Asian economies are most dependent and have much contribution in their respective GDP through tourism. Indonesia, Malaysia, Thailand, Singapore, and the Philippines are among the leading countries in this sector. However, South Asian economies are far behind in this sector; now, India, Sri Lanka, and Pakistan are trying their best to attract tourist from across the globe as they are rich in natural spots along with historical places. In Asian economies, South Asian countries have just 13% share, while Eastern Asia-Pacific countries have 68% share in tourism.

17.3 Blue Economy and Challenges

Blue Economy is defined as the "sustainable use of ocean resources for economic growth, improved livelihood and jobs, and ocean ecosystem health" (World Bank 2017). It is used in a broader term, sometimes Blue Economy also mentioned as "marine economy," "coastal economy," or "ocean economy" in the literature (Mohanty et al. 2015).

To ensure sustainable use of ocean resources and provision of ecosystem services, oceans need to be protected from degradation. Oceans are facing some major threats and challenges including pollution (untreated sewage, industrial wastewater, plastic, and other waste material), oil spills, unsustainable fishing, climate change, reduction of mangroves, and many others.

One of the major threats faced by the ocean is plastic pollution which is increasing day by day and is expected to triple by 2050. Plastic pollution is affecting environment in two ways. Firstly, burning plastic increases carbon emissions, and

secondly, plastic pollution affects badly to biodiversity and other ocean habitants. Half of the plastic pollution is produced by the Asia-Pacific region which needs to be taken seriously. In this regard, all stakeholders at each level, domestic, national, and regional levels, should coordinate in policy design and then most importantly its implementation. Another issue is the usage of coastal land for industrial and commercial purposes. These industries are flowing their waste in terms of garbage and industrial water without any treatment. Many big and industrial cities are located nearby coastal areas. These cities especially in developing countries are pumping untreated effluent into the oceans. This has resulted in a staggering drop in marine life populations by 40% (Moeen 2019).

Oil spillovers are another threat to the ocean. Such incidents are rare but still causing damage to the ecosystem and biodiversity in the oceans. To reduce the risk of oil spillover, there is a need of clean and renewable energy so that the risk of such incident could be minimized. In this regard, developed countries and other international agencies should step forward in technology transfer and manufacturing to such plants.

Another threat is unsustainable fishing in the Asia-Pacific Ocean which has caused the stock to dwindle over the time. In this region, as per UN reports, about 20% of fishing is done by unregulated, illegal, and unreported manners. This situation is even more worse in Indian, Northern Pacific, and Western Central Pacific Oceans where this percentage goes up to 30% (UNESCAP 2020).

Climate change is one of the major threats to the ocean life. Since the 1980s, 20–30% of human-induced carbon emissions are absorbed by the ocean. Therefore, small islands in Asia along the ocean are more vulnerable to these changes. Besides this, increased rainfall, glacier melting with more intensity, sea surface temperature, and warmer air are affecting seagrasses, mangroves, and other ocean habitants. Climate change causes the rise of sea level and to some extent intrusion of agricultural land into the sea. Due to climate change, rapid melting of glaciers and changing pattern and intensity of rainfall have resulted in frequent floods. Due to lack of water preserving capacity, floodwater run toward the sea, hence causing destruction of coastal areas.

Alongside the coastal area, mangrove trees and forests are of vital importance for sea ecosystem especially for fisheries and built-in barrier for various disastrous threats. It is a pool of biodiversity and provides habitat for a diverse community of organisms, ranging from bacteria, fungi, fish, shrimps, birds, and mammals. But with the passage of time, there is a decline in the area of mangroves. Global warming, arid conditions, prolong drought spells, inadequate supply of fresh water from rivers and other canals, industrial and thermal pollution, dumping of untreated effluents, overexploitation of mangroves for fuelwood/fodder, and population pressure are the main causes of degradation of Indus delta mangroves.

To achieve economic growth equally, small economies, especially underdeveloped ones, must be connected in the shipping industry as most of the world trade is done by oceans. In spite of this step, there is a need of greening the oceans to overcome the impact of pollution generated by these heavy cargo ships.

17.4 Integrated Ocean Management Policy

Since the last four decades, Blue Economy is increasing continuously to meet the needs of humankind in terms of food, transportation, energy, and tourism. At the same time, new industries are opening along with the expansion of existing ones. Therefore, new challenges and issues are emerging due to climate change, pollution, and environmental degradation. In this regard, there is a need of both short- and long-term policies to make the oceans more prosperous, healthy, and resilient against these unfavorable natural and anthropogenic shocks. All these benefits from the oceans and losses to the ocean's ecosystem are resulted from different industries. Therefore, there is a need of an integrated ocean management (IOM) policy. Keeping in view the importance of oceans, the need of an integrated management policy for oceans was observed many years ago (Underdal 1980). To discuss further details of IOM, we describe two approaches, namely, ecosystem-based management and integrated coastal zone management.

Ecosystem-based management (EBM) is defined as management of natural resources mainly by focusing on their health and productivity along with resilience of a specific ecosystem both at individual and at group level (Winther et al. 2020). It is a management approach which emphasizes the full range of interaction in the ecosystem including human. It has the following features: (a) emphasis on the protection of ecosystem, its structure, and functions; (b) recognition of linkages between target species and systems such as air, land, and sea; and (c) focused on individual ecosystem and account for human activities affecting it (Winther et al. 2020).

Integrated coastal zone management (ICZM) is the process of managing the coast and nearshore waters in an integrated and comprehensive manner with the goal of achieving conservation and sustainable use (Katona et al. 2017). Sometimes it is also named as integrated coastal management. The main purpose of this is to collect information, planning, decision making, management, and implementing with the help of all relevant stakeholders. Further, it also includes marine spatial planning and adaptive ocean management along with their features (Katona et al. 2017).

Coastal countries' jurisdiction is over 200 nautical miles, also called exclusive economic zone (Agardy et al. 2011). There are often multiple authorities to manage and oversee. Therefore, it is sometimes difficult for different agencies or departments to manage efficiently due to lack of coordination. Keeping in view all of this, it is a need of time to harmonize and coordinate among these different agencies for better and efficient management.

With the passage of time, its importance has been accepted not only globally but also at the regional, national, and domestic levels. Even then, there are many challenges regarding policy framework, implementation, new laws, capacity deficiency in knowledge, and lack of coordination among different departments and ministries and between their mandates as well. The main purpose of integrated ocean management is to protect oceans (here ocean includes both marine and coastal areas) for

sustainable development and long-term usage and make it healthier and more resilient against the unhealthy activities such as pollution and environmental changes. In this regard, IOM aims to bring all the stakeholders from international to domestic, from government to civil society, all those who are directly or indirectly linked with the ocean economy.

The World Ocean Assessment in its first report under the UN General Assembly to examine the status of the marine environment concludes as (United Nations 2015):

> The sustainable use of the ocean cannot be achieved unless the management of all sectors of human activities affecting the ocean is coherent. Human impacts on the sea are no longer minor in relation to the overall scale of the ocean. A coherent overall approach is needed. This requires considerations of the effects on ecosystems of each of the many pressures, what is being done in other sectors and the way that they interact.

The UN General Assembly in 1999 passed a resolution on oceans and law of the sea to address the issues and challenges; again, in 2018, the General Assembly passed a resolution whose preamble states that.

> [T]he problems of ocean space are closely interrelated and need to be considered as a whole through an integrated, interdisciplinary and intersectoral approach, and reaffirming the need to improve cooperation and coordination at the national, regional and global levels, in accordance with the Convention, to support and supplement the efforts of each State in promoting the implementation and observance of the Convention and the integrated management and sustainable development of the oceans and seas.. .

Further, the UN adopted Sustainable Development Goals as part of Agenda 2030. Many of these goals are relevant to the ocean, but specifically Goal 14 is related to life below water. It addresses marine issues specifically.

17.5 Ocean Governance

17.5.1 Ingredients of Successful Ocean Governance

Today, in the era of modern and complex world, there is more need of better coordination among different sectors and departments for improved ocean governance (Klinger et al. 2018). In most of the countries, especially in underdeveloped countries, legal and institutional mechanisms are divided among different agencies or departments both at national and domestic or at local level. That makes economic development along with other issues such as environmental and marine ecosystem difficult to manage. This needs to be resolved, and this can be done only by political will. In general, governance is defined by the UNDP as "the exercise of economic, political and administrative authority to manage a country's affairs at all levels. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences" (UNDP 1997). Rotberg (2004) perceives governance as "the term used to describe the tension-filled interaction between citizens and their

rulers and various means by which governments can either help or hinder their constituents' ability to achieve satisfaction and material prosperity." Keeping all this in view, some aspects of better ocean governance are described below in detail.

All over the world, issues and problems vary across the country and region. Besides these issues and challenges, some ingredients must be followed: (a) a detailed examination of all relevant agencies, their structure, powers, and obligations either they have overlapping or shortcomings in their responsibilities; (b) an assessment of the present condition, variability, and expected future trends in climate and ecosystem with the help of all available data using modern scientific techniques (also maintain a data center to observe these changes and trend continuously); (c) an examination of information regarding human activities and interest along with their conflicts; and (d) include all relevant stakeholders in this exercise on a regular basis.

As discussed above, the main aspects of a successful ocean management now need some detail.

A legal structure for IOM can provide a baseline for better ocean management for sectoral and long-term economic growth. In this regard, there is a need of new law and also provisions in the existing laws at the domestic and international levels just to harmonize the polices and for better coordination among different stakeholders. The European Union in 2008 formulated their marine policy at the continent level, and on the other side, at the state level, USA state Massachusetts introduced new laws for ocean in 2008. Besides legal regime, there is also a need of check and balance on illicit activities, capacity constraints, and gap between reality and legal framework.

Another issue is the deficiency of scientific data and its usage for better ocean management. Many countries are facing this problem as they do not have enough data for implementing and then monitoring the international governance framework (UNESCO 2017). Availability of new technologies has increased the government's capability to oversee what is happening in the oceans. For example, Global Fishing Watch offers tracking of fishing activities in the ocean. National level cooperation helps to pool up resources for better management and monitoring.

Finally, the issue in this regard is the involvement of all stakeholders from common persons to international community. Planning at the domestic level requires inclusion of all groups related to oceans. These are common persons, businesses, local agencies, and domestic and national governments. Participation of all these actors is the most effective approach in ocean management. Even with compilation of resource from all these stakeholders, resource constraints are still there especially in developing countries and small islands. Keeping this in view, there is a need of international cooperation among different agencies and countries. There are different actors or sectors that are directly or indirectly involved in ocean economy that are fisheries, recreation, tourism, aquaculture, mining, renewable energy, petroleum, and shipping.

17.5.2 Future Policy for Ocean Governance

For sustainable use of oceans, there is a need of effective governance with cooperation not only at the international level but also among local-level different administrative units within the country aiming at conservation and long-term use of riverbeds, deltas, seas, oceans, and other marine resources. Conservation and sustainability of these resources has also been given due attention in Sustainable Development Goals (SDGs).

There are more than 100 agreements at the regional level for ocean governance. The scope of these agreements is related to biodiversity, fisheries, pollution, and climate change. Some agreements cover some sections of biodiversity, fisheries, pollution and climate change, while others include all sections (Mahon et al. 2015). Many of these agreements are still in papers. However, some agreements are fully implemented while others are partially implemented. In a governance perspective, many agreements are overlapping in their jurisdictions and mandates. Therefore, according to Mahon et al. (2015), there is a need of "one ocean one policy" for better and effective governance. Mahon et al. (2015) called this approach as a global to regional issue-based network. At the regional level, all agreements should be in line with each other. Conflicts and overlapping in jurisdiction and mandate of these agreements must be removed. This can be achieved through better coordination and linkages among different regional stakeholders.

17.6 Conclusion and Way Forward

Keeping in view large interests in the ocean, there is a need of transformative actions to make ocean life better and sustainable. As discussed above, the UN adopted SDGs for Agenda 2030 that also include ocean named as "life below water.". Johansen (2020) estimated that there is a need of $174 billion on annual basis to achieve this goal, and most of these funds should be spent to avoid marine and coastal pollution. Oceans are transboundary, therefore, the flow of polluted water and plastic move from one country to the other. Thus, these problems call for mutual agreement and cooperation among countries in the Asian region.

Climate change is one of the major threats to the ocean life. Since the 1980s, 20–30% of human-induced carbon emissions are absorbed by the ocean. Therefore, small islands in Asia along the Asia-Pacific and Indian Oceans are more vulnerable to these changes. Besides this, increased rainfall, glacier melting with more intensity, sea surface temperature, and warmer air are affecting seagrasses, mangroves, and other ocean habitants.

Another threat to the ocean is plastic pollution which is increasing day by day and is expected to triple by 2050. It has double affects, one carbon emission and second it affects badly to biodiversity and other ocean habitants. In Asia, half of the plastic pollution is produced by the Asia-Pacific region alone, which depicts the

gravity of the situation, and therefore, it must be taken seriously. In this regard, all stakeholders at each level, domestic, national, and regional levels, should coordinate in policy design and then most importantly its implementation.

To achieve economic growth equally, small economies, especially underdeveloped ones, must be connected in the shipping industry as most of the world trade is done by oceans. In spite of this step, there is a need of greening the oceans to overcome the impact of pollution generated by these heavy cargo ships.

Another threat is unsustainable fishing in the Asia-Pacific Ocean which has caused the stock to dwindle over the time. In this region, as per UN reports, about 20% of fishing is done by unregulated, illegal, and unreported manners. This situation is even more worse in Indian, Northern Pacific, and Western Central Pacific Oceans where this percentage goes up to 30%.

Oil spillovers are another threat to the ocean. Although such incidents are rare but still causing damage to the ecosystem and biodiversity in the oceans. To reduce the risk of oil spillover, there is a need of clean and renewable energy so that the risk of such incident could be minimized. In this regard, developed countries and other international agencies should step forward in technology transfer and manufacturing to such plants.

Currently, there are many organizations that are involved in ocean governance at different levels that make it difficult to make a unified approach for ocean protection. These are performing their duties at different layers such as international and domestic. These include the International Maritime Organization, which exclusively deals with oceans, and the Food and Agriculture Organization (FAO), which basically deals with food by partly dealing with the sea. Other international organizations deal with oceans at the regional level such as the Oslo-Paris convention that deals with Northeast Atlantic Ocean. Some other nongovernment organizations are also working; besides these, most of the countries have their own institutions for ocean governance. All that need is the establishment of single body or commission to regulate at each level of governance including the national, regional, and international levels just to have a unified policy for better ocean governance to protect this asset for future generations.

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