

Institutionalizing Regulatory Framework for Coral Reef Governance in India: An Analysis of Prospective Alternatives

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ABSTRACT

Coral Reefs are one of the treasures of our planet. Establishing roughly 0.1% of the sea; they support an estimated of 25 % of all marine life. In spite of its massive significance, this beautiful ecosystem faces threats because of natural and human activities. If a similar circumstance is sustained, 90% of the world's reefs will be in jeopardy by 2030, resulting to cause inanition, destitution, and political upheaval all over the globe as the subsistence of a large number of individuals would evanesce. In this regard, examining the condition of Coral Reefs and the growing menace to them becomes crucial. This article aims to draw attention to the problem of the exploitation of corals, comprehend its significance and peruse policies of the government intended for its regulation. As the present legal framework for Coral Reefs in India hardly

exists other than its conservation through Marine Protected Areas.

Keywords Coral reefs, Protection, Legislations, Challenges, Marine protected areas.

INTRODUCTION

Coral Reefs are viewed as the “ Tropical Rainforests of the Sea ” and structure one of the most attractive and complex ecosystems. Constituting approximately 0.1% of the ocean, Coral Reefs are perhaps the most established biological system on the planet. They support large numbers of animals and plant species, accounting for a quarter of all marine species. These compound ecosystems incorporate hard and delicate corals, wiper, sharks, fishes, shellfish, ocean turtles, molluscs, and so forth (Coral Reefs Ecosystems 2022).

Coral Reefs are framed by coral polyps as they release layers of calcium carbonate. The coral polyps that assemble the reef persist by establishing a symbiotic relationship with microscopic algae, which supply them with macronutrients and micronutrients and give them their vivid color called zooxanthellae (Coral Reefs Ecosystems 2022).

Covering an overall area of around 2,375 sq km, the arrangement of Coral Reefs in India is confined

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to the Andaman and Nicobar Islands, Lakshadweep Islands, the Gulf of Mannar, and the Gulf of Kutch (Saroj, Gautam and Tehseen, Review of Coral Reefs of India: Distribution, Status, Research and Management 2016).

Coral Reefs are significant in keeping up the marine biodiversity and ecosystem since they uphold the lives of numerous marine species and are home to an assortment of plants and creatures. Further, thousands of individuals rely upon Coral Reefs for their subsistence and livelihood, making them of crucial importance to humans and the planet. The beautiful ecosystem is currently threatened by a combination of stressors, including climate change, overfishing, contamination, sedimentation, coastal development, and so forth (Foundation 2020). Initiatives have been taken both nationally and internationally, but unfortunately, the present legislative arrangements towards the assurance of coral reefs are frequently lacking (Foundation 2020). Therefore, India still has a long way to go.

Coral reefs: Valuable but Vulnerable

All over the world, Coral Reefs are apportioned in more than 100 countries and cover around 2,84,300 sq km (110,000 square miles); however, they establish only a tenth part of one per cent of the entire marine region (Coral Reefs: Tropical Corals, 2020).

Of all the Coral Reefs on the planet, more than 75% are presently vulnerable due to natural and anthropogenic menace. Climate change is one of the gravest threats to Coral Reefs. Additionally, there is strong worldwide unanimity that the earth is encountering global climate change, which is increasing at an alarming rate and is attributable to the excessive release of greenhouse gases by humans. As the global temperatures rise, Coral Reefs are at risk because of changing ocean circulation, rising acidification, rising sea-level, increased precipitation, higher frequency cyclones, and warming oceans (How does Climate Change affect Coral reefs?, 2020). These components modify the sensitive equalization which is a sine qua non for tropical Coral Reefs to operate, causing decolorizing and obliteration of Coral Reefs. In most cases, such harm is irreparable (Foundation 2020).

Across the globe, Coral Reefs are among the first and one of the most significant marine ecosystems to be severely impaired by climate change. The assessment of the (4th) Intergovernmental Panel on Climate Change (IPCC) states that “Coral Reefs are vulnerable to thermal stress and have a low adaptive capacity. It is perceived that there will be more frequent coral bleaching events and widespread mortality if the sea surface temperature comes to around 1–3°C except if there is thermal adaptation or acclimatization by Corals.”. The IPCC has additionally recorded the following changes which will adversely impact the Coral Reefs as increases in hurricanes and cyclonic storms; associated rises in UV concentrations; shifting in ocean currents; rise in sea-level; increasing concentration of CO₂ in seawater/ocean acidification; and rising sea surface temperatures (Ove Hoegh-Guldberg 2017).

Further, human-caused or anthropogenic exercises are principal threats to the Coral Reefs. Gathering live coral for aquarium market, mining coral for building materials, destructive fishing methods using dynamite or cyanide, overfishing, contamination, unsustainable tourism, and mangrove destruction (which has an adverse effect on corals as mangroves' mud-binding capacity aids them in regulating the quantity of sediments reaching the sea bed and thus settling on corals) are certain ways by which Coral Reefs are being harmed by people consistently all around the world.

Coral reefs in India

India has a coastline of approximately 8,118 km (Ministry of Fisheries 2022). The total area covered by Coral Reefs in India is roughly 2,375 sq km. However, the major reef formation is confined to the Gulf of Kutch, the Gulf of Mannar, Lakshadweep Island, Andaman, and the Nicobar Islands (Saroj, Gautam and Tehseen, Review of Coral Reefs of India: Distribution, Status, Research and Management 2016). Further, reefs under all these regions are not the same, their type and structure shift from area to area.

Conditions of coral reefs in India

In India, the Andaman and Nicobar Islands have the

largest stretch of coral cover. They also have rich diversity, as 89% of India's Coral diversity is seen in these reefs (Bunga 2018). In 1998, the Indian Coral Reefs, principally the reefs of Gulf of Kutch and Lakshadweep were damaged because of the major Coral Reefs bleaching event. Fortunately, after a controlled and monitored period, the slow tourism development and lesser population pressure helped these Reefs to recuperate. Incidents of aquaculture, destructive fishing, industrial contamination, are continuing and are severe in the abovementioned reef areas which again makes their potential low for recovery and hence deserves special attention.

International legislations related to coral reefs

Either directly or indirectly, various international instruments protect Coral Reefs and promise to offer higher protection; however, the degree of protection is subject to the ratification and enforcement of these instruments. For example, so far as marine issues are concerned, the United Nations Convention on the Law of the Sea 1982 (UNCLOS) continues to be the governing instrument, but there are various other specialized conventions that enhance the protection for Coral Reefs. Some of the major legal regimes that principally provides for the protection of coastal and marine biodiversity with special focus on Coral Reefs are as follows.

United nations convention on the law of the sea 1982 (UNCLOS)

UNCLOS is the principal Convention that establishes the overall legal framework for all the activities on the ocean and seas and its resources (UNCLOS 1982). Every State under the Convention is granted " the right to establish the breadth of its territorial sea up to a limit not exceeding twelve nautical miles, measured from baselines determined in accordance with this Convention " (UNCLOS 1982). The Convention monitors the " waters on the landward side of the baseline of the territorial sea form part of the internal waters of the State " (UNCLOS 1982). In addition, Coastal States are given sovereign rights in an 'exclusive economic zone' up to 200 miles under Article 56 and 57 of the Convention (UNCLOS 1982). Since most Coral Reef developments are confined to

waters of less than 50 meters depth; this puts the wide diversity of Coral Reefs inside certain States' inland waters and sole jurisdiction. UNCLOS is considered one of the major treaties in the evolution of international environmental law as it provides a variety of conservation-oriented provisions. In particular, States are required to preserve their marine species, even in inland waters (UNCLOS 1982). The Preamble to the UNCLOS proclaims that one of the main purposes of the 1982 Convention is the " protection and preservation of the marine environment. " UNCLOS layouts " the first comprehensive statement of international law on the issue.....a movement towards regulation based upon a more holistic conception of the ocean as a resource that is exhaustible and finite, and ocean usage as a resource management question " (UNCLOS 1982). Even in the exclusive economic zones of coastal States, UNCLOS asseverates that " the coastal State shall determine the allowable catch of the living resources in its exclusive economic zone and shall also ensure through proper conservation and management measures that the maintenance of living resources in the exclusive economic zone is not endangered by overexploitation " (UNCLOS 1982).

UNCLOS provides for numerous unequivocal undertakings which consequently impact marine resources in domestic and international waters, viz., Coral Reefs. Part XII of the Convention establishes numerous international statutory provisions concerning the marine environment, including a robust system for implementing those provisions. Article 192 lays down the general obligation " to protect and preserve the marine environment. " Article 193 sets out the " sovereign right of States to exploit their natural resources ", but the same is subject to the " duty to protect and preserve the marine environment " (UNCLOS 1982). Article 194 and 196 states measures that are required to " prevent, reduce and control pollution of the marine environment " (UNCLOS 1982), and to secure that work is carried out in such a way that it " does not cause damage or hazards by pollution to other States and their environment " (UNCLOS, 1982).

Article 192 and 194 specifies duties which are binding on States, i.e., parties to the Convention. Prior to the Convention, not much was done concerning the

marine environment. The Convention's provisions with respect to the conservation of the marine environment reflect the status of the oceans along with its growing awareness.

Agenda 21, 1992

Agenda 21 is the course of action of the United Nations with respect to sustainable development and is a non-binding action plan. It is an outcome of the Earth Summit, i.e., United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1992 (Agenda 21, United Nations Conference on Environment and Development 1992). Chapter Seventeen of Agenda 21 "presents rights and duties of States and provides the international basis where upon to seek the protection and sustainable management of the marine and coastal environment and its resources" (Agenda 21, United Nations Conference on Environment and Development 1992).

In order to implement the recommendations on Coral Reefs and related ecosystems envisaged in Chapter Seventeen of Agenda 21 and other international conventions, in 1994, the International Coral Reef Initiative (ICRI) was constituted at the Small Island Developing States Conference (General 2011).

Chapter Fifteen of Agenda 21 aimed at enhancing "the protection of biological diversity and the sustainable use of biological resources, and also to support the Convention on Biological Diversity" (Agenda 21, United Nations Conference on Environment and Development 1992).

Chapter Fifteen states: "Despite mounting efforts over the past twenty years, the loss of the world's biological diversity, mainly from habitat destruction, over-harvesting, pollution and the inappropriate introduction of foreign plants and animals, has continued. Urgent and decisive action is needed to conserve and maintain genes, species, and ecosystems with a view to the sustainable management and use of biological resources" (Agenda 21, United Nations Conference on Environment and Development 1992). Chapter Fifteen is important for protecting and preserving Coral Reefs since they are home to an array of species of plants and animals, forming a significant connection in marine biodiversity.

Convention on biological diversity 1992

The Convention on Biological Diversity is an international treaty designed to promote the conservation of biological diversity, sustainable use of its components, and a fair and equitable sharing of the benefits of genetic resources (CBD 1992).

The CBD has been signed and ratified by many countries; India is also one of the parties to CBD and has passed the Biological Diversity Act, 2002 along with Rules towards its execution at the domestic level. The CBD adheres to the principle of "common but differentiated responsibility." This principle contends that "developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command" (CBD 1992). Hence, it's a need of an hour to have a balanced approach to conserve biodiversity.

Convention on international trade in endangered species (CITES) 1973

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) is a global agreement between governments to oversee or embargo international trade in species under threat (CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973). India was among the few countries to sign and ratify the Convention in 1973. Hitherto, one hundred and eighty-three countries have signed CITES, which provides some extent of protection to over 30,000 species of plant and 5,800 species of animal. CITES entered into force in 1975 and safeguarded those species itemized in the three Appendices to the Convention (CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973).

Appendices I, II, and III are subject to amendments if the species is within the party's dominion who are members to CITES. Trade of species threatened with extinction is forbidden in Appendix I of CITES. The trade-in species listed in Appendices II and III is permitted by CITES but depends on an authorization that permits nations to observe and even

restrict exports when needed (CITES, Convention on International Trade on Endangered Species of Wild Fauna and Flora 1973).

In 1985, all stony or reef-building corals were recorded in Appendix II by the countries members of CITES as a response to the consequences of the coral trade on reef ecosystems. Presently, blue corals, antler corals, and black corals are listed in Appendix II of CITES and need permission from the home country to be traded on the international market (CITES, Convention on International Trade on Endangered Species of Wild Fauna and Flora 1973). Nearly 230 kinds of Corals are listed on the CITES Species Database by their generic names (UNEP 2001).

Because of the existing difficulties, the implementation of the Convention to preserve Corals is not always successful. One of the challenges confronting is the difficulty in identification of Corals that are listed in the CITES Appendices.

A further issue is that CITES is helpful for managing the trade-in of separate coral species rather than the entire ecosystems, as it does not record numerous other reef varieties which are an inherent element of the coral reef ecosystem.

Nevertheless, with concrete implementation and sensitising the public regarding purchasing only appropriately reported coral species, CITES is a viable instrument to withstand the obliteration of Coral Reefs.

United Nations Framework Convention on Climate Change (UNFCCC) 1972

The UNFCCC is an international environmental treaty adopted on May 9, 1992. It has the overarching goal of “stabilising greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC 1992).

UNFCCC receives all the scientific views on the present status of information on climate change and its potential environmental and socio-economic impacts through the Intergovernmental Panel on Cli-

mate Change (IPCC) which is a scientific body. The research of IPCC includes assessing the impacts of climate change on Coral Reefs. Also, the result shows that the Coral Reefs are at a greater risk because of climate change since there is a rise in the temperature of seawater, a rise in sea level, changes in rainfall patterns, as well as changes in storm patterns, water currents, and increased sedimentation are all adversely affecting Coral Reef ecosystems.

To deal with the abovementioned risk, members of the UNFCCC developed National Communication, which gathers greenhouse gas inventory data that give an outline of national circumstances appertaining to climate change (UNFCCC 1992). It contains details on all affected ecosystems; activities in progress to alleviate effects and to analyze vulnerability and adaptation; activities related to research and systematic observation; and education, training, and public awareness.

To provide information on Coral Reefs, as appropriate, this National Communication can be used as a means by the parties. Also, parties to the Convention, in order to sustainably manage Coral Reefs may also develop policies, projects, and activities as a component of National Adaptation Programs of Action and other strategies, using outcomes of appraisals of research by the IPCC and other significant institutions on the impacts of climate change on Coral Reefs.

Convention concerning the protection of the world cultural and natural heritage 1972

The Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) was adopted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1972, effective from 1975, providing an alternative avenue in order to protect Coral Reefs (Convention Concerning the Protection of the World Cultural and Natural Heritage 1972). The Convention seeks to strengthen assistance amongst States “to protect heritage across the globe that is of such outstanding universal value that its conservation is important for current and future generations” (Convention Concerning the Protection of the World Cultural and Natural Heritage 1972).

On the World Heritage List are 167 natural properties (UNESCO 2021), and 11 of those sites comprise Coral Reefs (UNESCO 2019). The designation as a World Heritage Site provides identification and even succour that can aid in conserving that nation's heritage for the coming generations.

Indian legal framework for regulation of coral reefs

In India, the Coral Reefs fall within the preview of the Department of Forests and Wildlife (DFW), which is accountable for screening, managing, and conserving these delicate ecosystems (Saxena 2015). From developing a constructive action program to administer the reef resources to providing guidance for the sound management of Coral Reefs, the DFW has been entrusted with responsibilities by the Ministry of Environment and Forests and Climate Change (MoEF and CC) which is the nodal ministry. Further, the administration of Coral Reef ecosystems has also been affirmed in India's National Conservation Strategy and Environment Action Plan (UNDP 1997).

In 1986, the National Committee on Wetlands, Mangroves, and Coral Reefs were established to exhort the Government on essential issues about the protection and supervision of these delicate ecosystems. Based on the National Committee's recommendations, four Coral Reef regions in the state viz., Lakshadweep Islands, Gulf of Mannar, Gulf of Kachchh, Andaman and the Nicobar Islands were reported for management. Further, to prepare the Management Action Plans (MAPs), the State level Steering Committees have been constituted for each one of these Coral Reef regions. Also, monetary aid has been conferred to the State Agencies/UTs for the execution of their corresponding MAPs.

India's existing efforts to manage the Coral Reefs stretch from formation of a system of protected areas to the facilitation, and implementation of international covenants which have an impact on Coral Reefs.

Creation and management of protected areas for conservation of Coral Reefs

In India, specific legislation for Coral Reefs is still

non-existent. In the country, few laws protect Coral Reef areas, such as the Wildlife Protection Act (WPA), 1972, Environment (Protection) Act 1986, and the Coastal Regulation Zone (CRZ) Notification, 1991. The other legislations in India that have significance on Coral Reefs areas are the Indian Forest Act, 1927, the Forest Conservation Act 1980, and the Indian Fisheries Act.

The Wildlife (Protection) Act 1972 ensures the protection of protected areas and specific species, including marine species. Since July 2001, all the Scleractinia Corals, Antipatharians, Tubipora Musica, Millepora species and Gorgonians have been incorporated in the Schedule-I of the Wildlife (Protection) Act. However, no specified legal provision exists for Coral Reefs areas under the Wildlife Protection Act; rather only Reefs falling under the jurisdiction of protected areas are prohibited by exploitation (Saroj, Gautam, and Tehseen, Review of Coral Reefs of India: Distribution, Status, Research and Management, 2016).

In India, for the conservation of Reefs, Protected Areas are one of the principal measures. At present, India has 25 marine protected areas and there are three Marine Biosphere Reserves: The Environment (Protection) Act of 1986 is a piece of legislation that covers the preservation and governance of the environment, as well as other related issues.

Under the Environment (Protection) Act 1986, the Coastal Regulation Zone Notification 1991, was notified under the to protect Indian coasts from degradation. It governs shoreward operating activities, which affect coastal environments. It prohibits activities like dredging and submarine explosions near Coral structures. All Coral Reefs under this notification is covered by the CRZ1 category.

Role of marine protected areas in the management of coral reefs

Marine Protected Areas (MPAs) are essential for managing and protecting the marine environment. IUCN defines MPAs as " areas of the ocean set aside for long-term conservation aims – are the only mainstream conservation-focused, area-based measure to

increase the quality and extent of ocean protection ” (IUCN 2017)

For perpetuating climate change resilience and revamping ecological and social resilience, it is vital to establish MPA networks. Coastal habitats which are protected by MPAs such as Coral Reefs, Mangroves, and Wetlands, reduce human vulnerability against climate change and also yield the natural infrastructure (e.g. storm protection) on which individuals rely.

Although MPAs are not the complete solution for the protection and management of the Reefs, they can ameliorate resilience and provide endangered species to proliferate and recover in a safe zone (Gibbens 2018).

MPAs, if managed appropriately, can improve fish populations in adjacent regions, whilst ascertaining that the populace depending on them for sustenance and livelihood can flourish (UNEP 2018). Also, for the native population, conservation initiatives could facilitate new opportunities for employment (Recipe for Saving Coral Reefs: Add More Fish 2015). In such a manner, MPAs are beneficial for both coastal communities and marine wildlife.

Presently, only 27% of the Coral Reefs are covered by the world’s MPAs (Recipe for Saving Coral Reefs: Add More Fish 2015), and there are considerable disparities in their efficacy. There is a lack of clarity in Internationally recognized criteria on what constitutes an MPA and it is only on individual countries on which they seek to implement conservation measures. There is a significant discrepancy in their measure of protection, in fact, only 3.6% of designated MPAs have been effectively implemented, and only 2% are adequately protected (Enric Sala 2018). Though the number of MPAs is growing, it is critical that they are managed effectively.

In India, MPA includes national marine sanctuaries, state conservation areas, protected areas, eco-sensitive zones, National parks and sanctuaries. To protect and conserve Coral Reefs, MPAs refer to a current patchwork of local, state, and national efforts

Many factors are affecting the MPAs in India,

which are largely beyond local management. Though there is a CRZ Notification and protected areas have been established, the laws are very vague and there seems to be a problem in their implementation. The Wildlife Protection Act does not include Corals outside the jurisdiction of MPAs. Therefore, it is challenging to move against the perpetrators outside the premises of a National park. Hence, there is a need for well-managed MPAs for the preservation and conservation of Coral Reefs.

CONCLUSION

Coastal Zones have the world’s richest biodiversity areas, and Coral Reefs form a prominent part of it. Coral reefs are the most antiquated and dynamic ecosystems present on the earth. They do not just give a haven to a heap of marine life yet additionally assume a key part in shielding the coastline from disintegration. They are storehouses of immense biological wealth and provide a vast array of services (environmental and economic) to thousands of individuals worldwide.

In India, there are four recognized Coral Reef territories with major reef types. The Reefs are under severe threat from sundry human-induced and natural factors. In the country there are a few legal statutes that have been actuated with regard to the regulation of Coral Reefs. Existing conservation and management efforts, on the other hand, are limited to the creation of a network of protected areas, strategy, enactment, and assistance to multilateral environmental agreements that make reference to the reef system. The current conservation model is based on piecemeal enactments and strategies that serve to protect only a subset of coral reefs, either directly or indirectly.

Despite legislation, the deterioration of Coral Reefs region is persistent. Therefore, to preserve, conserve, and manage the Coral Reefs of India, a separate legal status is the need of the hour in order to control and impede disruptive acts. Also, India is a signatory of international treaties like UNCLOS, CITES, and CBD; the national legislation should be revised according to these treaties as an international obligation and for better conservation. In addition, well-managed MPAs can play a pivotal role as they

safeguard and upgrade scientific, cultural, commercial, recreational and conservation values. Within MPAs, specific regions may prohibit all fishing, collecting and mining, making them “highly protected” or “no-take zone” which would benefit Coral Reefs.

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