eco

environment coastal & offshore

OCEAN SCIENCE | EXPLORATION | INNOVATION

UN Decade of Ocean Science for Sustainable Development

SPECIAL ISSUE IN PARTNERSHIP WITH IOC-UNESCO

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Chapter Five:
A Sustainably Harvested and Productive Ocean

Chapter Six:
An Accessible Ocean

Chapter Seven:
An Inspiring and Engaging Ocean

Mainstreaming Biodiversity into India's Coastal and Marine Fisheries

Dr. C. Thomson Jacob (Former Consultant in Biodiversity Policy, Centre for Biodiversity Policy and Law, National Biodiversity Authority) and Dr. Yugraj Singh Yadava (Director, Bay of Bengal Programme, Inter-Governmental Organisation)

The ocean makes up over 70 percent of the Earth's surface and 95 percent of the biosphere. Under the ocean's surface, there are more than 250,000 known species living in an array of oceanic and coastal habitats, providing enormous ecosystem services for the well-being and prosperity of humanity. The Convention on Biological Diversity[1] (CBD) is the only international instrument that comprehensively addresses biological diversity. It has three main objectives: the conservation of biological diversity; sustainable use of the components of biological diversity; and fair and equitable sharing of the benefits arising out of the utilization of genetic resources. India has ratified the CBD in 1994 and subsequently enacted India's national law on, Biological Diversity (BD) Act, 2002 for regulating bioprospecting of India's biological resources and associated traditional knowledge. The present study illustrates how India is implementing CBD's policy tools such as access and benefit-sharing and mainstreaming biodiversity into the marine fisheries sector.

Conservation of India's Coastal and Marine Biodiversity

India is a megadiverse country with more than 17,795 coastal and marine species, supporting around 6.75 percent of the global marine biodiversity. Its coastal and marine biodiversity includes over 200 diatom species, 90 dinoflagellates, 500 fungi, 1,042 corals, 14 seagrasses and 69 mangrove species. The faunal diversity includes 3,400 mollusks, 187 birds, 2,629 fishes, 37 reptiles and 24 marine mammals. India is conserving seven highly-threatened marine species under the species recovery plan, including dugong, whale shark, marine turtles, giant clams, sea cucumbers, horseshoe crabs and sea horses. There are 24 Marine Protected Areas (MPAs) in peninsular India and 106 in the island territories (Andaman & Nicobar Islands and Lakshadweep). India has two transboundary protected areas, namely the Gulf of Mannar Marine Biosphere Reserve and the Sundarbans National Park. India's Exclusive Economic Zone (EEZ) covers around 2.02 million square kilometers and the country has a coastline of 8,118 kilometers.

(For more information: please see https://www.cbd.int/idb/image/2012/celebrations/idb-2012-in-zsi-marine.pdf)

Fishery Resources in India

Fisheries are an important source of food, nutrition, employment and income in India. Fish, being an affordable and rich source of animal protein, is one of the healthiest options to mitigate hunger and malnutrition.

Today, the export of India's marine products stood at 13,92,559 metric tons and is valued at USD 6.73 billion, and nearly 16 million fishers and fish farmers are engaged in various livelihood activities. The marine fisheries wealth in the Indian EEZ is estimated at 5.431 million metric tons (Maximum Sustainable Yield) and nearly 09 million fishers are engaged in various livelihood activities. In 2019, the total marine fish catch from the mainland was estimated as 3.56 million tons. Deviating from the previous years, in 2019, the red toothed trigger-

fish (Odonus niger) topped the landings with an estimated catch of 0.274 million tons (7.7 percent of the total), followed by ribbon fish (0.219 million tons), non-penaeid prawns (0.195 million tons), penaeid prawns (0.180 million tons), lesser sardines (0.171 million tons), Indian mackerel (0.162 million tons), threadfin bream (0.153 million tons) and oil sardines (0.145 million tons). The other important oceanic resources comprise yellowfin tuna, skipjack tuna, billfishes, pelagic sharks, barracuda, dolphin fish and wahoo (Source: FRAD, CMFRI, 2020. Marine Fish Landings in India 2019. Technical Report. ICAR-Central Marine Fisheries Research Institute, Kochi).

Mainstreaming Biodiversity

Mainstreaming biodiversity is the process of embedding biodiversity considerations into cross-sectoral and sector-specific plans such as agriculture, fisheries, forestry, mining, energy, tourism, transport and others. The concept of mainstreaming is advocated in the CBD and it is also specified in India's BD Act, 2002. The CBD's Strategic Plan for Biodiversity 2011-2020 and the Aichi Target 6, stipulates that all fish, invertebrate stocks, and aquatic plants are managed and harvested sustainably and legally, and by applying ecosystem-based approaches. In line with global targets, India has developed its national targets emphasizing conservation of marine zones, especially those of particular importance for species, biodiversity and ecosystem services. A policy analysis was carried out by the Centre for Biodiversity Policy and Law Programme (CEBPOL)[2] in collaboration with the Bay of Bengal Programme – Inter-Governmental Organisation (BOBP - IGO)[3] for mainstreaming biodiversity into the coastal and marine fisheries sector. Some of the approaches considered for analysis were (i) area-based management measures; (ii) disincentives for discarding by-catch; (iii) new and improved fishing gears and practices; (iv) co-management and (v) strengthening the implementation of the BD Act, 2002.

The recommendations that emerged from the study were integrated into India's National Policy on Marine Fisheries, 2017. These include fishing effort management; fleet size optimization; species-specific and area-specific management plans; conservation of Ecologically and Biologically Significant Areas and Vulnerable Marine Ecosystems; protection of iconic and endangered and threatened species; spatial (space) and temporal (time) measures for sustainable utilization of resources; creation of fish refugia; and providing legislative support for traditional fishers on tenure rights[4].

Access and Benefit-Sharing

Marine areas are rich in unique life systems for developing potential drug molecules for human therapeutics. India's marine biotechnology is an emerging sector that contributes immensely to the Blue Economy. Some of the marine species such as sponges, jellyfish and seaweeds are sources of potential health products, beneficial in treating life-threatening illnesses. The bio-polymers produced from these marine animals are used as antioxidants, antiviral, anticoagulant, anti-diabetic, anti-allergic, anti-hypertensive and anti-bacteria medicines. The bioactive compounds extracted from these marine animals are used for producing biodegradable plastics, food additives, medical polymers, wound dressing, bio-adhesives, biosensors, dental biomaterials, tissue regenerations and 3D tissue culture scaffolds.

Seaweed *Kappaphycus alvarezi* (Source: flickr, Credit J Martin Kansedo)

The potential of marine bio-resources derived pharmaceutical products is valued in multi-billion dollars. The Indian Patent Office reveals that marine organisms such as seaweeds, snails, corals, sponges and algae are extensively used for research purposes and claiming patents. India has around 700 species of marine algae found in both inter-tidal and deep-water regions, and nearly 60 species are commercially exploited.

Seaweeds are used for Producing Agar, Alginates and Carrageenan

The CBD recognizes the sovereign rights of nations over the biological resources found within their EEZs. For implementing the Access and Benefit-Sharing (ABS) principle, the Nagoya Protocol (NP) came into force in 2014. The Protocol guides countries on how to implement the Convention's third objective on ABS by providing legal certainty and transparency for providers and users of genetic resources.

The NP makes the bio-prospectors and the local community sign the Mutually-Agreed Terms (MAT). The MAT would be predicated on the prior informed consent of the providers of the resources and traditional knowledge, and the provider must be willing to give access to their resources and knowledge. The NP also specifies that the bio-prospector should comply with the domestic legislation or regulatory requirements of the provider country.

The Protocol facilitates a flow back of monetary and non-monetary benefits/incentives to the community for stewarding the local ecosystem and biodiversity. It also provides monetary benefits such as an access fee, upfront payment, milestone payment, royalties, licensing fee, research funding, joint venture, and joint ownership of relevant intellectual property rights. Further non-monetary benefits include sharing research results, collaboration, participation in product development, transfer of technology, capacity building, training and contribution to the local economy.

India is one of the leading countries in implementing the international regime on ABS and India's BD Act 2002 regulates access to biological resources for scientific research, commercial utilization, bio-survey and bio-utilization.

ABS and Export of Seaweed – A Case Study

The seaweed *Kappaphycus alvarezi* is cultivated in the southern coastal districts of Tamil Nadu by a self-help group (SHG) of women, and it was exported to countries such as Malaysia, the Philippines and Indonesia. Red seaweed has high demand in the international market and is used for making more than 250 food and non-food products. To comply with the BD Act, 2002, the seaweed exporters have approached the National Biodiversity Authority (NBA) to seek approval for accessing the seaweed and transferring the bio-resources to a third party (foreign buyer).

The NBA has approved the export of the seaweed and fixed five percent royalty, while signing the Material Transfer Agreements with the exporters. After the export, an amount of 4.35 million rupees was deposited by the exporters for sharing the benefit with the fishing community from where the seaweed/bio-resource was accessed. To evolve the modalities for benefit sharing, an expert committee was constituted by the Tamil Nadu State Biodiversity Board, Government of Tamil Nadu and the committee has recommended conservation measures and socio-economic developmental activities for the coastal communities. These include provision of drinking water facilities to the fishing community, sheltered areas for drying seaweed, solar lights, green belt by planting native tree species, restoration of degraded water bodies, providing seeds for cultivating native seaweeds, introduction of indigenous fish varieties in the inland water bodies, developing medicinal plant nursery, promoting alternative livelihoods for the women SHGs, and installing a carrageenan unit for extracting carrageenan and capacity building[4].

India's efforts in implementing the CBD's policy tools and mainstreaming biodiversity into the marine fisheries sector are now yielding results and the benefits of harvesting marine resources are being shared by a larger section of the society.

Further Reading

1. The Convention on Biological Diversity (CBD) entered into force on 29 December 1993 and 196 countries are party to this Convention (Source: https://www.cbd.int/convention/).
2. CEBPOL is a bilateral technical collaborative programme between India and Norway: http://nbaindia. org/cebpol/.
3. The Bay of Bengal Programme – Inter-Governmental Organisation (BOBP-IGO is a unique regional fisheries body, specifically mandated to assist the member-countries in increasing the livelihood opportunities and improving the quality of life of the small-scale/artisanal fisher folk in the Bay of Bengal region: https://www.bobpigo.org/pages/view/services
4. CEBPOL, NBA, 2018. Mainstreaming biodiversity into coastal and marine fisheries sector. Published by the Centre for Biodiversity Policy and Law, National Biodiversity Authority, 52pp.
5. Report of the Expert Committee to Evolve Modalities for benefit Sharing from the Royalty amount received from the Exporters of Seaweed, Southern Coastal Districts of Tamil Nadu, Published by the Tamil Nadu Biodiversity Board, January 2021

Have You Been Missing Out On Ocean Science?

ECO Magazine is a leading international trade publication reporting from the frontlines of ocean science, innovation, and exploration.
Through high-quality, original reporting direct from the experts, we help raise international awareness of critical topics surrounding the oceans, coasts, and sustainable blue economy. Our worldwide coverage uniquely positions ECO Magazine as an essential and informative resource connecting the global ocean science community.

Subscribe to ECO at **ecoMagazine.com**

Some of this year's upcoming topics

Coasts & Estuaries
Wave, Tide & Current Profilers

Rising Seas
In partnership with NOAA and The Ocean Foundation

Fisheries & Aquaculture
Environmental Monitoring Sensors

Ocean Exploration
Ocean Robots & Integrated Sensors

Marine Pollution
Special Partnership Announcement Soon