

## ***The Bastion: Interview with Dr. Vardhan Patankar***

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***The Bastion (TB):*** What kind of research is being conducted by non-governmental and governmental actors in Andaman and Nicobar (A&N) to improve knowledge surrounding the reefs, as well as their conservation? Are there any limitations to conducting research on coral reefs in India, or any areas requiring more focused research?

***Vardhan Patankar (VP):*** Various NGO's and Government organizations are involved in reef research. India is part of the Global Coral Reef Monitoring Network (GCRMN), Global Coral Reef Alliance (GCRA), and International Coral Reef Initiative (ICRI). To increase awareness regarding the importance of reefs, the ICRI has declared the year 1998, 2008 and 2018 as the International Year of the Reef, which was celebrated in Kadmat Island in 1998 and 2008 and in Bangaram Island in 2018, where representative researchers presented their work from the reef systems from the A & N islands.

The reefs research in the A & N Islands began with the study by Rink (1847) on the description of reef structure and deep-sea corals of the Nicobar Islands based on collection of coral species, coral reef conservation research is still in its infancy and there are only a handful of studies that are published in mainstream research. Most studies in the A & N islands are restricted to the determination of the status of coral reefs and taxonomic documentation of different species. There are a total 36 published major documents/papers from the A & N islands, which have looked at diversity and distribution, reef associates, threats, impacts of climate change, disturbances, social aspects and ecosystem services etc. Of these, diversity and distribution, studies on associated species and impacts of disturbances are the dominant themes, whereas remote sensing, climate change, social aspects of coral reefs and studies on ecosystem services derived from coral reefs are limited.

The current species count for corals in India is at 478 species. However, in the last twenty years, several records of coral species added by scientists at the Zoological Survey of India (ZSI) were found to be plagiarized from the book 'Corals of the World' by Veron and Sanford-Smith and other published work. This has raised questions regarding the credibility of existing coral research in India, along with obscurities in the baselines on which future studies will be based. There is a pressing need for rigorous taxonomic validation of coral species by experts in coral taxonomy through collaborated national and international efforts.

Along with taxonomy, the current research focus is on corals and fishes, although other benthic invertebrates play crucial roles in the ecosystem as well, including nutrient recycling, water quality regulation and herbivory. Limited information exists on community ecology and

population densities of corals and reef-associated species in relation to abundance, resilience potential, social aspects of reef resource use and stakeholders' perception about the reefs and how they can be engaged in management and conservation decisions.

A & N islands are affected by SW & NE monsoon as a result researchers gets 6 months to conduct meaningful research. While there are eager individuals/institutes who are interested in long-term monitoring of the reefs, procuring timely permits from the Andaman and Nicobar Forest Department to conduct reef research is a herculean task. In addition, there are many areas that are outside marine protected areas and where healthy corals are known to thrive such as north Andaman, middle Andaman and Nicobar group of islands. These areas have received limited attention from the research community due to difficulty in access and harsh field conditions.

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**TB:** Across our research, we have noticed repeated references to the impact of Ocean Acidification on coral reefs in A&N, as well as instances of coral bleaching. How well have the impacts of these phenomena been measured and recognised in A&N's coral reef ecosystems?

**VP:** Climate change is threatening the reefs, with worrying fact that climate conditions are occurring at a much faster rate than in the past and are potentially beyond the capacity of reefs to adapt and recover. This is happening due to rapid development projects across the coastline and due to anthropogenic modification, physical and chemical constituents of seawater has changed, which has resulted in the emergence of new coral diseases as well as a decline in calcification caused by ocean acidification due to increased CO<sub>2</sub>.

In the Andaman and Nicobar Islands, a range of natural catastrophes including cyclones, surges, underwater earthquakes, tsunami, El Niño Southern Oscillation (ENSO) event have caused extensive bleaching. In the past decade there have been series of bleaching events starting from 1998, 2002, 2010 and 2016, which has severely hampered the health of coral reefs. Though impacts of these bleaching have been recorded at few sites, a long-term coral reef monitoring by selecting plots across the gradient of reef resilience for repeated monitoring and recovery tracking is severely lacking in the A & N Islands. Most pre-bleaching 1998 reports indicate that scleractinian corals dominated the benthic substrate at most sites, reaching estimates of 70–90% coral cover (Sankaran, personal communication 2006). However, the status of Indian reefs has been poorly documented and there are only a few quantitative studies prior to the 1998 bleaching about the status of reefs. As a result, comparative status studies that include pre- and post-disturbance scenarios, or that document reef status over time were not possible. Conservation organisations including the Nature Conservancy and the IUCN Working Group on Climate Change and Coral Reefs have recommended incorporation of the reef resilience

framework, which includes all aspects of reefs which are known to confer resilience of the reefs into local management in crucial areas. Periodic data on simple reef parameters can go a long way in understanding the changes in reef communities, the reasons for the change and potential ways to better manage these systems.

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**TB:** Are current government laws (for e.g.: Wildlife Protection Act of 1972, Environment (Protection) Act of 1986, The Fisheries Act of A&N Islands) effective for the conservation and protection of coral reefs in A&N? If not, how could they be strengthened to meet their objectives given heightened development in the region?

**VP:** In India management of the coral reef ecosystem is the responsibility of the Ministry of Environment and Forests and Climate change (MoEFCC). They are liable to monitor, manage and develop an action plan to conserve coral reefs by collaborating with research institutes and NGO's involved in reef research. As per the 2001 notification, all corals and gorgonians are protected under the Schedule I of the Indian Wildlife Protection Act (1972) and offenders are subject to the highest penalties by the WPA. All coral reef areas are also legally protected under the coastal regulation zone notification, 1991, which offers legal protection to all coral reefs under the CRZ-1 category. A special category CRZ 4 has been prepared for the Islands of Andaman, Nicobar and Lakshadweep. As per the CRZ norms, use of corals and sand from beaches and coastal waters is prohibited. In addition, dredging, blast fishing, underwater blasting in and around coral formations is prohibited.

While these regulations are in place, they are not helping in the conservation of the reefs due to inadequate implementation of the law. Many reef areas are part of Marine Protected Areas, and corals are protected by the Indian legislation. However, there is a lack of basic knowledge on the natural history of corals among state Forest Department staff, the primary custodian for protecting coral reefs in India. Capacity building programs, better management of existing Marine Protected Areas, coupled with training in coral reef monitoring techniques, adequate funding from the Central Government and long-term monitoring of reef systems, is the need of the hour. Addressing other problems which are indirectly linked to improving the health of the reefs e.g., poverty, poor governance, a lack of political will or insufficient engagement of local communities are necessities. On-ground execution at multiple scales of radical management at international and regional levels is the only solution to preventing coral reefs from being wiped out completely in the near future.

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**TB:** With the Sagarmala project and general Central push towards developing the blue economy, oceanic environments are set to undergo discernible environmental shifts. This is evident in

recent amendments to the CRZ, as of this year, which privileges development. While this is undesirable, arguments are also often made in support of the economic and employment benefits of such projects. How can we find balance the protection and conservation of fragile marine ecosystems, and a general need for economic development in India?

**VP:** As you have rightly pointed out that oceanic environments are likely to undergo discernible and irreversible environmental shifts. Corals are listed under Schedule 1 under the Wildlife Protection Act (1972), which means that have the highest level of legal protection as per the law. While destruction of coral, coral reefs and their surroundings is classified as a prohibited activity there is no clarity on exactly how and in what circumstances this constitutes an offence punishable by law, since many of the permissible activities themselves that are mentioned in Sagarmala project and CRZ notification can lead to coral reef destruction both directly and indirectly. In addition, there is no process of dealing with such violations of the prohibited activities.

In particular, tightening the law framework in case of violations, education and awareness program to sensitize people about the importance of conservation of marine habitats exploring offshore resources while protecting inshore and reef fisheries, understanding of fishing community perspectiv, enforcing patrolling and dealing with all illegal fishing can go a long way in ensuring balance between conservation and development. Reef tourism is a gradually growing industry in India and nearly 10,000 thousand SCUBA divers visit the Indian reefs for recreational purposes. Although poorly managed tourism has shown to affect reefs due to anchor damage, breakage of corals, pollution, etc., if properly managed and trained, tourists can help in collecting meaningful data by implementing strong citizen-science-based projects for coral reef monitoring.

Conserving marine biodiversity and managing our marine environment is a must, after all, it's not about the marine life or biodiversity or development, but it's about food and job security of thousands of people of India who are dependent on marine habitat directly or indirectly. If we don't take timely actions against Sagarmala project and CRZ 2018 notification, then besides degradation of marine habitats, in the long run, there will irreversible impacts on the economy of India.

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