

Role of Tourism Stakeholders in Conservation of Coral reef ecosystems

BHASKAR SAILESH

Abstract: Coral reefs are diverse underwater invertebrate organisms which provide habitat to a number of other marine species. They are a significant revenue source for tourism businesses and for the local communities in reef bearing regions of the world. In the recent decades though, coral reef ecosystems have been under stress due to human induced climate change caused by the release of greenhouse gases. Tourism industry is one of the contributors of these greenhouse gases which makes it responsible for the conservation and preservation of coral reefs. With this in view, the aim of this study is to understand the involvement of tourism industry in conservation and restoration of coral reefs. The critically analyzed a number of secondary sources to achieve its objectives. The results indicate that tourism destinations which offer coral reefs as one of its attractions have associated with Non Governmental Organizations, Local communities, Tourists, researchers and other stakeholders to develop strategies, policies and practices aimed at conserving and preserving these coral reef ecosystems. To a great extent they have also been successful at creating a mutual benefit for all the stakeholders involved. In spite of these efforts to protect coral reef habitats, it is difficult to be optimistic about the health of reefs globally over the short term in the context of increasing human populations and economic growth.

Index terms: Coral Reefs, Reef Tourism, Reef Conservation, Marine Tourism, Climate Change

I. INTRODUCTION

Coral reefs are underwater marine ecosystems which are home to a diverse variety of marine organisms. They provide benefits that are vital to human societies and commercial industries like Fisheries, Pharmaceuticals, Building materials, Biochemical compounds, Food & Beverage and Tourism. During the last three decades, rapid increases in Greenhouse gas (GHG) concentration has led to Climate change which has severely impacted coral reef ecosystems globally (Guldberg et al., 2014).

According to United Nations World Tourism Organization's Davos Declaration (2007) tourism sector contributes on an average about 5% of the global Carbon dioxide (CO₂) emission in terms of radioactive forcing and about 4.6% of GHGs emissions related to Global Warming. Other sectors which support tourism also release variable amounts of greenhouse gases. For example, the agricultural activities, waste management and biomass all contribute to emission of Methane (CH₄) and Nitrous Oxides (N₂O) (IPCC, 2014).

Coral reefs are vital for survival of many tourism destinations such as Australia, Indonesia, Philippines, Pacific Islands, Caribbean region and the countries surrounding the Red sea. Coral reefs contribute around \$36 billion a year to the global economy. Of this \$36 billion, \$19 billion comes from Coral reef tourism activities such as Scuba diving, Snorkeling, Glass-

Prof Bhaskar Sailesh is currently working in the School of Hospitality and Tourism AIMS Institutes, Bangalore, Karnataka, India,
PH- +91 988651166.
E-mail: bhaskarsailesh3233@gmail.com

bottom boating and Wildlife watching on the reefs. The remaining \$17 billion is generated through "reef-adjacent" tourism which includes enjoying beautiful views, consuming local sea foods, paddle boating and other activities (Spalding et al, 2017).

Due to Climate change, coral reefs in many parts of the world are dying or dead. For example, in 2016 about 30% of the Coral reefs in the Great Barrier reef of Australia has dies after the record breaking marine heat-wave (Adipudi et al, 2017). Degrading coral reef ecosystems has affected tourism sector severely. Hence, stakeholders within and outside the tourism sector are putting efforts to conserve the remaining coral reefs. The aim of this study is to understand the involvement of tourism sector in conservation and preservation of Coral reef ecosystems.

II. SIGNIFICANCE OF CORAL REEFS FOR TOURISM

Tourism industry is one of the fastest growing industries which employs millions people globally. Coastal and Marine tourism represent a significant share of the industry and is a critical component of the growing, sustainable Blue Economy (Spalding et al, 2017). With an anticipated growth of 3.5% per year, coastal and marine tourism is projected to be the largest value-adding segment of the ocean economy by 2030 (Ransom & Mangi, 2010; Sarkis et al, 2013).

Coral reefs are critically important for the survival of tourism in several destinations. For example, Island destinations of Southeast Asia and Caribbean depend on tourism as their primary income source (Johnston et al, 2015). Globally, around 70 million trips are taken to experience reef based tourism and generate an average economic value of \$36 billion per year (Spalding et al, 2017). Coral reefs offer exciting activities such as snorkeling, diving, glass bottom boating, angling and fish watching tours. Other than these direct opportunities, coral reefs also are responsible for clear waters and fine white sand in the

reef bearing regions. These characteristics play an important role in tourists decision making (Onofri & Nunes, 2013).

Coral reefs perform many supporting roles which benefit tourism such as maintenance and building of islands, protection from wave erosion, and production of edible sea weeds and sea food. Coral reefs also create a beautiful pristine environment where a number of tourism businesses have sprung up. These businesses include beach resorts, seafood restaurants, animal watching tours, and water sports activities in non reef areas. Presence of tourists also attract local vendors who earn a livelihood by offering their own services and products. Without the presence of coral reefs, these business would not thrive. Coral reefs also act as barriers against storms and protect beach communities and tourists living in and around reef bearing regions (Musa & Dimmock, 2013). The image of coral reefs also play a significant role in marketing coastal destinations (Kittinger et al, 2015). Even the perception of being close to a reef attract several tourists (Russel et al, 2013; Kittnger et al, 2015)

III. Conservation of Coral reefs in the Tourism sector

1) Site level management

Conservation strategies at site level can play a critical role in preserving coral reef ecosystem and simultaneously support long term survival of coastal communities and tourism businesses (Cinner et al, 2012). Involvement of stakeholders can also provide opportunities to strengthen relationships and create shared goals aimed at reef conservation(Gleason et al, 2010). Stakeholders ranging from tourists to local communities to local business should be involved and educated on the importance of conservation and restoration of coral reefs. Site level managers, at times of severe stress such as bleaching events, can help reduce further damages by temporarily shutting down any activities that might aggravate the effects of environmental forces. They should also work with marine research groups to

understand the impacts of excessive tourism on coral habitats. Sustainable management of reef based recreational activities can go a long way in providing social and economic benefits as well as preserving the reef ecosystems. Reef managers should implement policies that prohibit tourists to feed marine organisms. Feeding organisms attract invasive species which can threaten coral reef ecosystems. For example, coral predators such as "Crown of thorns starfish" and "Drupella Snails" can cause severe damages to the coral reefs (Russel et al, 2013). Land use in reef bearing areas should be controlled and monitored to minimize transfer of sediments, nutrients and other pollutants into coral ecosystems (Jones et al, 2013).

2) Designating Marine Protected Areas

Certain vulnerable and threatened coral reef regions should be designated as Marine Protected Areas (MPAs). MPAs are defined geographic spaces which are managed through legal means to achieve long term conservation of nature with related ecosystem and cultural values (Dudley, 2008). Tourism can be restricted in these areas by limiting the number of tourists each day. Business operators can be educated about the significance of MPAs and stringent policies should be implemented aimed at preserving the natural state of the protected areas to the maximum extent possible. A good example of MPA is Ras Mohammed Marine park in the Red Sea which covers an area of 480Km². A study conducted by International Union of Conservation of Nature in 2007 concluded that a healthy rating of Coral reefs, Sea Grasses, Mangroves and Land features are a good indicator of past management actions taken by the park authorities. The creation of an MPA has kept the reef ecosystems in a stable and healthy condition in spite of growing mass tourism in the area (IUCN-UNDP, 2007).

3) Marine Conservation Agreements

In places where designation of MPAs are not effective due to legal issues, Non Governmental Organizations (NGOs) have

taken the lead role in Coral reef conservation and restoration activities. NGOs form Marine Conservation Agreements (MCAs) with various tourism stakeholders to achieve their objectives for long term success. Some examples of MCAs are lease agreements, licenses, management agreements, purchase and sale agreements, concessions, and contracts (Frey & Berkes, 2014). Efforts but by NGOs through MCAs have protected marine biodiversity by positioning NGOs as primary stakeholders with the government or local tourism boards and are responsible for solution oriented decision making.

There are several field projects managed by MCAs and NGOs throughout the world. For example, the "Chumbe Island Coral Park" in Tanzania and "Indonesia Marine Conservation Agreement" both of which showcases the relationship between profit oriented companies with local NGOs and local fishermen wherein they reach an agreement to protect coral reefs, fishing grounds and fishermen creating a win-win situation for all parties (McCrea et al, 2011; Bottema & Bush, 2012)

Some of the private organizations are investing directly to preserve the health of coral reefs as they have realized the benefits they can derive by sustaining these reef ecosystems. For example, the "Misool Eco Resort" in Indonesia has invested and worked for more than 10 years with local communities in creating and managing a no-take marine protected area in Raja Ampat, a fascinating biodiversity within West Papua region of Indonesia (Gjertsen & Niesten, 2010). Within this protected area, fish abundance and size has increased dramatically, with benefits for the coral reefs that surround the nearby islands.

Another example is in Key West, Florida- The Fury Watersports, which donates a portion of each snorkeling trip fare for coral restoration. By doing so they are helping to support the recovery of several endangered and threatened species of marine organisms within Florida Keys National Marine Sanctuary (Kemp et al, 2011).

All of these businesses understand their dependence on coral reefs and are making direct investments to preserve these natural assets. It's a win-win for the tourism economy and nature.

4) Reducing land based impacts

Land based impacts arising from tourism can also degrade coral reefs (Munang et al, 2013; Schumacher et al, 2018). Reviewing tourism infrastructure in coastal regions is an important strategy to safeguard coral reef ecosystems. Controlled land based practices are important for the management of tourism site and watershed areas to ensure minimal transport of sediments and other pollutants (Schumacher et al, 2018). Coral reef managers can also engage directly with watershed users, tourism businesses and tourists by supporting specific strategies that are aimed at preserving the health of coral reefs. Care should be taken to ensure all tourism related infrastructure should be constructed using environment friendly materials only. Policies aimed at controlled land use should be implemented.

5) Agricultural Practices

Coral reef managers can raise awareness campaigns about the impacts of excess sediments entering watercourses and affecting the reef ecosystems. Tourists can involve themselves in certain activities to reduce erosion in both agricultural and urban settings such as organic farming and re-vegetation. Fertilizers can enter watercourses and degrade coastal water quality thereby destroying coral habitats (Kroon et al, 2014). Coral reef managers and other stakeholders such as rural tourism businesses, estate managers, farmers and landlords to understand the implications of using herbicides and pesticides which are harmful to both land and marine environment. Instead, Organic farming should be encouraged. Tourists should demand for food products made from organic materials.

6) Community engagement

Local communities and reef users like fishermen, tourism operators, and tourists are important beneficiaries of efforts to reduce stresses on coral reefs, and can be valuable partners in efforts to influence watershed management decisions (Kittinger et al, 2013). Coral reef managers can increase the constituency for improved land watershed management through outreach and education programs targeting reef stakeholders. Monitoring programs or participatory management activities such as catchment cleanup days or 'adopt-a-reef' programs that involve tourists and local community members are a great way to create a sense of stewardship (Frey & Berkes, 2014). Reef stakeholders are usually also watershed inhabitants, so helping local people understand the links between their actions on land and outcomes for reefs can be a powerful way of reducing local land-based sources of pollution (Cinner, 2016).

CONCLUSION

Coral reefs are at times referred to as the rainforests of the sea. As with rainforests, the significance of coral reef ecosystems lies not in the diversity of the corals themselves, but rather the millions of species that live primarily or exclusively in association with them. Currently there are about 835 species of reef-building corals spread throughout our planet. In the last few decades, coral reefs, with their millions of species, have changed profoundly because of the impacts arising due to human activities, and will continue to do so if steps are not taken to ensure long term sustainability of these coral reefs.. Habitat degradation, together with habitat fragmentation, may lead to the establishment of genetically isolated clusters of inbreeding corals which may be unhealthy to the entire ecosystem. Increases in average sea temperatures by as little as 1°C, a likely result of global climate change, can cause coral "bleaching", changes in symbiont communities, and coral death. The activities of tourists, tourism businesses and local communities living near the reefs increase both fishing pressure and nutrient inputs. In general, these processes favor more

rapidly growing competitors, often fleshy seaweeds, and may also result in explosions of predator populations.

Unfortunately, modern human civilization and coral reefs make poor companions. Most activities of tourists and local communities such as fishing, water sport activities, accommodation, burning of fossil fuels for transport, consumption of Inorganic food and beverage and use of toxic chemicals in farms and hospitality operations either damage corals directly or damage them indirectly by adversely modifying interactions with their competitors, predators, pathogens, and symbionts.

In several destinations conservation strategies are already in place and are showing positive results. NGOs, MCAs, tourism boards, environmental organizations and local community members are joining hands as they are realizing the benefits they can derive from these reefs if they are allowed to sustain for long term. Although rigorous efforts to protect reef habitats may slow their ongoing decline, it is difficult to be optimistic about the health of reefs globally over the short term in the context of increasing human populations and economic growth.

A detailed, targeted knowledge of reef conservation and restoration strategies presents an opportunity for the travel and tourism industry to lead both in the private and public sector and also institutionalizing the value of nature into business practices and corporate sustainability investments. With the changing nature of tourism industry and realization of the importance of Coral reefs, stakeholders can make more informed decisions about the conservation and management of coral reef and become potential partners in the conservation movement.

REFERENCES

1. Adipudi, S., Beernink, E., Lakey, A., & Zarzuela, K. (2017). Impacts of Climate Change: Coral Reef Biodiversity.

2. Bottema, M. J., & Bush, S. R. (2012). The durability of private sector-led marine conservation: A case study of two entrepreneurial marine protected areas in Indonesia. *Ocean & coastal management*, 61, 38-48.
3. Cinner, J. E., Huchery, C., MacNeil, M. A., Graham, N. A., McClanahan, T. R., Maina, J & Allison, E. H. (2016). Bright spots among the world's coral reefs. *Nature*, 535(7612), 416.
4. C.R.C. Sheppard (Ed.), *Coral Reefs of the United Kingdom Overseas Territories*, Springer, Netherlands, Dordrecht (2013), pp. 201-211
5. Dudley, N. (ed.) 2008 *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN
6. Frey, J., & Berkes, F. (2014). Can partnerships and community-based conservation reverse the decline of coral reef social-ecological systems?. *International Journal of the Commons*, 8(1).
7. Gjertsen, H., & Niesten, E. (2010). Incentive-based approaches in marine conservation: Applications for sea turtles. *Conservation and Society*, 8(1), 5.
8. Gleason, M., McCreary, S., Miller-Henson, M., Ugoretz, J., Fox, E., Merrifield, M., ... & Hoffman, K. (2010). Science-based and stakeholder-driven marine protected area network planning: a successful case study from north central California. *Ocean & Coastal Management*, 53(2), 52-68.
9. G. Musa, K. Dimmock *Scuba Diving Tourism* Routledge, Abington, UK (2013), p. 212
10. Jones, P. J. S., Qiu, W., & De Santo, E. M. (2013). Governing marine protected areas: social-ecological resilience through institutional diversity. *Marine Policy*, 41, 5-13.
11. J.N. Kittinger, L.T. Teneva, H. Koike, K.A. Stamoulis, D.S. Kittinger, K.L.L. Oleson, E. Conklin, M.Gomes, B. Wilcox, A.M. Friedlander *From reef to table: social and ecological factors affecting coral reef fisheries, artisanal seafood supply chains, and seafood security* (2015), p. e0123856
12. K.P. Ransom, S.C. Mangi *Valuing recreational benefits of coral reefs: the Case of Mombasa Marine National Park and Reserve, Kenya Environ. Manag.*, 45 (1) (2010), pp. 145-154

13. Kittinger, J. N. (2013). Participatory fishing community assessments to support coral reef fisheries comanagement. *Pacific Science*, 67(3), 361-381.
14. Kemp, D. W., Oakley, C. A., Thornhill, D. J., Newcomb, L. A., Schmidt, G. W., & Fitt, W. K. (2011). Catastrophic mortality on inshore coral reefs of the Florida Keys due to severe low-temperature stress. *Global Change Biology*, 17(11), 3468-3477.
15. Kroon, F. J., Schaffelke, B., & Bartley, R. (2014). Informing policy to protect coastal coral reefs: Insight from a global review of reducing agricultural pollution to coastal ecosystems. *Marine pollution bulletin*, 85(1), 33-41.
16. L. Onofri, P.A.L.D. Nunes Beach 'lovers' and 'greens': a worldwide empirical analysis of coastal tourism *Ecol. Econ.*, 88 (0) (2013), pp. 49-56
17. McCrea-Strub, A., Zeller, D., Sumaila, U. R., Nelson, J., Balmford, A., & Pauly, D. (2011). Understanding the cost of establishing marine protected areas. *Marine Policy*, 35(1), 1-9.
18. Munang, R., Thiaw, I., Alverson, K., Mumba, M., Liu, J., & Rivington, M. (2013). Climate change and Ecosystem-based Adaptation: a new pragmatic approach to buffering climate change impacts. *Current Opinion in Environmental Sustainability*, 5(1), 67-71.
19. N. Beharry-Borg, R. Scarpa Valuing quality changes in Caribbean coastal waters for heterogeneous beach visitors *Ecol. Econ.*, 69 (5) (2010), pp. 1124-1139
20. R. Russell, A.D. Guerry, P. Balvanera, R.K. Gould, X. Basurto, K.M.A. Chan, S. Klain, J. Levine, J. Tam Humans and nature: how knowing and experiencing nature affect well-being *Annu. Rev. Environ. Resour.*, 38 (1) (2013), pp. 473-502
21. R.J. Johnston, J. Rolfe, R.S. Rosenberger, R. Brouwer (Eds.), *Benefit Transfer of Environmental and Resource Values: A Guide for Researchers and Practitioners*, Springer, Netherlands, Dordrecht (2015), pp. 465-485
22. Schumacher, B., Vargas-Ángel, B., & Heron, S. F. (2018). Identifying coral reef resilience potential in Tutuila, American Samoa based on NOAA coral reef monitoring data.
23. S. Sarkis, P.H. van Beukering, E. McKenzie, L. Brander, S. Hess, T. Bervoets, L.-v. der Putten, M. Roelfsema Total economic value of Bermuda's Coral Reefs: a summary

★★★