Sustainable Fisheries in Goa: Best Practices for Effective Management

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Abstract:
In India, the fisheries sector provides roughly 220 billion, or 1.40 percent and 4.50 percent of the national GDP and agricultural GDP respectively. According to Food and Agriculture Organization (FAO) report "The State of World Fisheries and Aquaculture 2018" apparent per capita fish consumption in India lies between a ranges of 5 to 10 Kg. Over 5 million fishermen and fish growers are employed and earn a living in the field. Goa, located on the western coast of India, is blessed with an abundance of marine resources. Fishing has been a traditional occupation in Goa, and seafood is an integral part of the local cuisine. However, the rapid increase in population, tourism, and demand for seafood has put immense force on the marine resources leading to overfishing and depletion of fish stocks. The problems faced by the fisheries sector in Goa are multi-faceted. One of the major challenges is the lack of effective management and regulation of fishing activities. The absence of proper monitoring and control measures has led to the overexploitation of marine resources. This highlights the need for education and capacity-building programs for fishermen to promote sustainable fishing practices. The challenges faced by the fisheries sector in Goa require a multi-faceted approach that involves effective management, regulation, and community participation. Adopting sustainable fishing practices, fishery conservation and management measures, and using technology for monitoring fishing activities can ensure the long-term viability of marine resources.

Keywords: Effective management, fishery conservation, Goa coast, marine resources.

Introduction:

Over the previous five decades, India's marine fisheries sector has experienced spectacular expansion, both numerically and qualitatively. During the early 1950s, subsistence fisheries generated around 0.5 million tonnes per year (Pankaj, 2014). The entire yearly output is currently at 2.7 million tonnes. This increase in marine fish output may be attributed to creative and efficient fishing tactics, fisheries-friendly government regulations, post-harvest infra-structure and well-developed harvest, and growing need for marine fish products in both the international and domestic markets (Rajan & Pillai, 2020). India is presently among the world's top 10 fish producing countries, accounting for more than 3% (6 million tonnes) of worldwide fish output from both marine and estuarine species. In India, the fisheries sector provides roughly Rs.220 billion, or 1.40 percent and 4.50 percentof the national GDP and agricultural GDP, respectively. Over 5 million fishermen and fish growers are employed and earn a living in the field (Meynen, 1989). The country's marine fisheries industry accounts for around half of total fish output and is a substantial contributor to foreign exchange revenues through export. The increased demand for seafood ultimately increased fishing efforts which expanded coverage of fishing area, and holding capacity of fishing vessels, and increased fisheries catching hours (Albala, 2015). Multi-day fishing by the mechanised sector and improved fishing operations by the motorised sector increased fishing effort. The advent of multiday fishing in the 1990s increased the output to 2.7, but production has stayed nearly constant since then. The convergent exploitation location of production at different level suggests that there is very limited room for additional growth (Sonak et al., 2006). As a result, to maintain resource sustainability through suitable subvention agreements, there is serious need have envisioned in the FAO

Code of Conduct for Responsible Fisheries (Thomson & Gray, 2009).

Goa, located on the western coast of India, is blessed with an abundance of marine resources. Fishing has been a traditional occupation in Goa, and seafood is an integral part of the local cuisine. However, the rapid increase in population, tourism, and demand for seafood has put immense force on the leading to overfishing, marine resources, and depletion of fish stocks (Newman, 1984).
Overfishing has far-reaching implications that affect not just fishermen's livelihoods but also the marine ecology (Bavinck, 2011a). Unsustainable fishing practices such as bottom trawling, use of dynamite, and illegal fishing methods destroy coral reefs, damage the seabed, and harm non-target species. This not only affects the biodiversity of marine resources but also poses a threat to food security, as seafood is major source of amino acids for millions of people. Therefore, it is crucial to ensure sustainable fisheries management in Goa to preserve marine resources and maintain a balance between economic, social, and environmental factors (Paul, 2005), as shown in Figure 1.

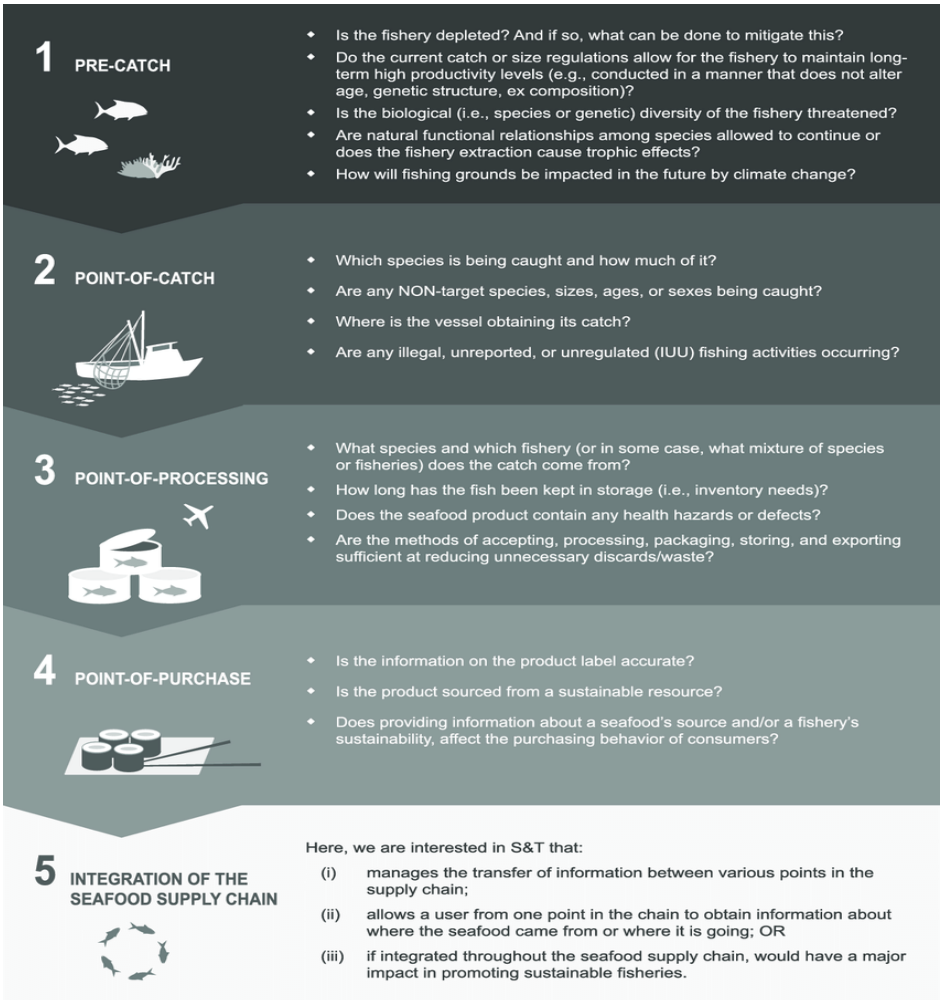

Figure 1: Some instances of fisheries operational questions divided into five different categories relating to differential places throughout the seafood supply chain (Gorospe et al., 2016).

Significant problems confronted by Fisheries in Goa:

The problems confronted by the fisheries sector in Goa are multi-faceted. One of the major challenges is the lack of effective management and regulation of fishing activities (Ansari et al., 2006). The absence of proper monitoring and control measures has led to the overexploitation of marine resources (Bavinck, 2011b). Additionally, the use of disastrous fishing practices such as bottom trawling, which involves dragging a heavy net along the seabed, has caused irreparable damage to the marine ecosystem (Amarasinghe & Bavinck, 2011).

Another challenge is fishermen's lack of awareness and education regarding sustainable fishing practices. Many fishermen use traditional fishing practises and are unmindful of the impact their operations have on the marine ecosystem (Wiber & Milley, 2007). This highlights the need for education and capacity-building programs for fishermen to promote sustainable fishing practices.

Best Practices for Effective Fisheries Management:

Effective fisheries management is essential for the sustainable utilization of marine resources. Here are some best practices for sustainable fisheries management in Goa:

1. Sustainable Fishing Techniques

Sustainable fishing techniques such as hook and line fishing, gill netting, and trap fishing are less destructive to the marine ecosystem as compared to bottom trawling (Jentoft et al., 2009). These techniques target specific species and reduce the bycatch of non-target species. Furthermore, the use of selective fishing equipment such as escape panels and sorting grids can help to limit bycatch of non-target and juvenile species (Fisheries, 2011).

2. Fishery Conservation and Management Measures

Fishery conservation and management measures such as closed seasons, size limits, and gear restrictions can help to regulate fishing activities and prevent overfishing (Bavinck et al., 2013). Closed seasons or fishing bans during the breeding season of certain species can allow stocks to replenish and ensure their long-term sustainability. Similarly, size limits can ensure that only mature fish are caught, allowing juveniles to grow and reproduce. Gear restrictions, such as banning destructive fishing methods, can help to reduce the impact of fishing activities on the marine ecosystem (Somayaji & Coelho, 2017) and as shown in Figure 2.

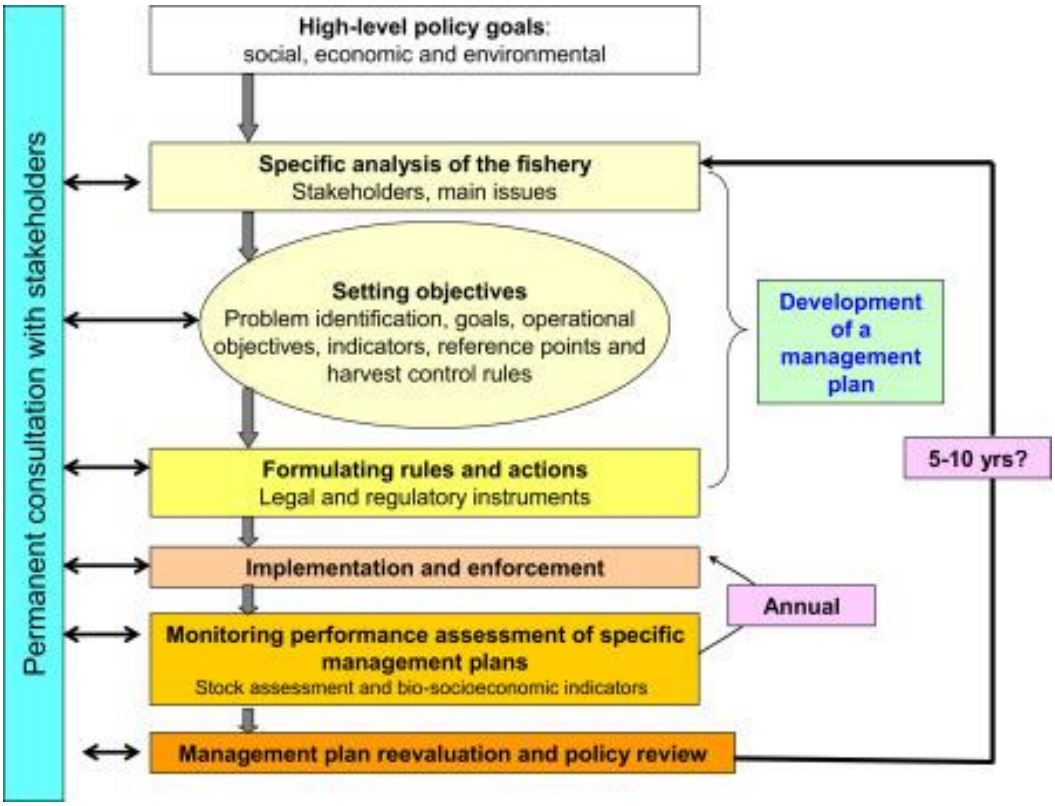

Figure 2: The essential stages in putting the Ecosystem Approach to Fisheries into action (McLachlan & Defeo, 2018).

3. The Role of Authorities and Non-Governmental Organisations in Sustainable Fisheries

The government and NGOs play a crucial role in promoting sustainable fisheries in Goa. The government can implement policies and regulations to promote sustainable fishing

practices and ensure effective management of marine resources (Amarasinghe, 1989). NGOs can play a vital role in educating fishermen and raising awareness about sustainable fishing practices. Additionally, NGOs can provide technical assistance and support to fishermen to adopt sustainable fishing practices and help them access markets for sustainable seafood products (*Fishes and Fisheries: Conservation and Sustainable Development - Google Books*, n.d.), as depicted in figure 3.

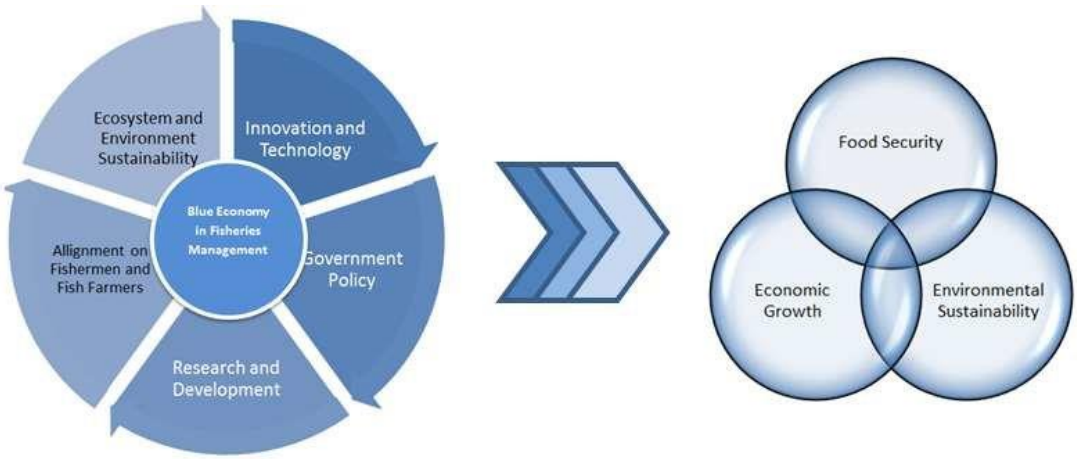

Figure 3: Model of blue economy integration in sustainable fisheries management (Sari & Muslimah, 2020).

4. Sustainable Seafood Certification and Labelling

Sustainable seafood certification and labelling can provide consumers with information about the sustainability of the seafood products they consume (French et al., 2014). Certification programs such as the Aquaculture Stewardship Council (ASC) and Marine Stewardship Council (MSC) certify seafood products that meet certain sustainability criteria. Labelling sustainable seafood products can help promote sustainable fishing practices and increase consumer demand for sustainable seafood (*Fishery Management - Rekha R. Gaonkar - Google Books*, n.d.).

5. Success Stories in Sustainable Fisheries in Goa

Several success stories demonstrate the effectiveness of sustainable fisheries management in Goa (M Bavinck, 2006). One such example is the community-driven conservation efforts in the village of Morjim. The village community, with the support of NGOs, implemented a community-based conservation program that involved the establishment of a marine protected area and the adoption of sustainable fishing practices. This initiative has resulted in the recovery of fish stocks and the regeneration of coral reefs, providing a source of livelihood for fishermen and preserving the marine ecosystem (Jentoft & Bavinck, 2014).

Another success story is the use of technology for monitoring fishing activities. The government of Goa has implemented a satellite-based vessel monitoring system that tracks the movement of fishing boats and monitors fishing activities in real time. This has helped to prevent illegal fishing activities and ensure the sustainable utilization of marine resources (Srinath & Pillai, 2006).

Conclusion:

Sustainable fisheries management is crucial for the preservation of marine resources and the livelihoods of fishermen (Bavinck, 2003). The challenges faced by the fisheries sector in Goa require a multi-faceted approach that involves effective management, regulation, and community participation. Adopting sustainable fishing practices, fishery conservation and management measures, and using technology for monitoring fishing activities can ensure the long-term viability of marine resources. The government and NGOs have a vital role to play in promoting sustainable fisheries in Goa

through policy interventions, education, and capacity-building programs. Sustainable seafood certification and labelling can also help to promote sustainable fishing practices and increase consumer demand for sustainable seafood. By adopting these best practices, we can ensure the sustainability of the fisheries sector and preserve the marine ecosystem for future generations.

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