Evaluating the impact of marine protected areas on fisheries

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Abstract

The number of people is constantly increasing. However, natural resources are either declining or staying relatively stable. Fisheries resources are dwindling, much like all other natural resources, hence it is unrealistic to expect them to meet the demands of an expanding human population. In actuality, many of the world's fisheries have maintained a steady output in recent years. The state of the world's fisheries can be attributed to countless factors. Among them, two significant factors that impede the expansion of fisheries resources are environmental degradation and inadequate fisheries management. Many fisheries around the world have declined or even collapsed as a result of environmental contamination and ineffective resource management. Stocking fish in their early life stages is one method of fishery management that can help prevent extinction and encourage widespread production. This technique is used to ensure that coastal and marine regions continue to produce. Only after World War II did people realise how important it was for India's fishing industry to grow. Because of this, marine fisheries have been overfished in several Indian coastal regions over the years. The current study offers a thorough summary of the socioeconomic characteristics, living and working conditions, technological adaptation, employment and income trends of the fishing community, and the effects of marine protected area fisheries.

Keywords: Fishing, Marine fisheries, Socio-economic profiles

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Introduction

Fishing is one of the oldest human vocations and a significant global industry. One important source of animal protein that cannot be replaced is fish (Moretti and Tanaka, 2025). Nearly a tenth of the world's protein supply is thought to come from fish, either directly or indirectly (Ranjan and Bhagat, 2024). There is little delay between the labour and the results of fishing, which promptly gives food. When it comes to agricultural production, the results are seen after a while (Knežević *et al.,* 2018). The pursuit of fish is referred to as fishing (Kerfouf *et al.,* 2023). Hunting other aquatic species, such as different kinds of shellfish, squid, octopuses, turtles, frogs, and some edible marine invertebrates, is also referred to as fishing (Claudet *et al.,* 2006). The fishing industry is thought to be a significant source of revenue and jobs since it fosters the expansion of several related sectors (Bhardwaj and Ramesh, 2024). The coastal inhabitants of India have engaged in marine fishing for ages, and it is an essential component of their maritime culture. However, fishing operations have mostly stayed close to the coast, only stepping out into the open sea a few kilometres from the base upon distances that sailing craft could easily cover (Ranganathan, 2019). Fish and other aquatic species have long been caught and collected by mankind using their hands along the borders of lakes, rivers, and seas (Goti-Aralucea, 2019). The most basic type of fishing, which has been done by nomadic people since ancient times, is hand harvesting. Marine Protected Areas on Fisheries are display in figure 1.

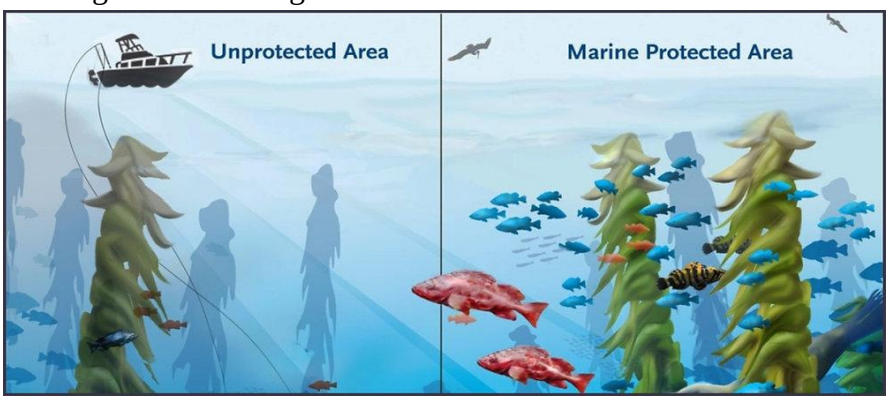

Figure 1: Marine protected areas on fisheries.

The development of planned fishing operations may have occurred as human family groups grew into tribe units (Pinto *et al.,* 2022). Man, then created a variety of fishing equipment (Fraser *et al.,* 2019). The spear, which is still in use in several regions of the world, seems to have been the first weapon to be utilized (Reddy and Qureshi, 2024). After that, there were some sort of crude, stationary traps constructed of twigs shaped like baskets that were intended to catch fish in motion and were appropriately baited (Claycomb *et al.,* 2013). In order to catch fish entering these buildings during high tide, more effective structures were created using stones or debris with a semi-circular form and the sea or estuary on one side (Tokur and Korkmaz, 2021). Man must have developed ways to move fish from the coast to the shallow coastal seas because there might not be any fish

shoals very near to the coast. This was most likely done with the help of floating logs or pieces of wood that were secured together (Mascia *et al.*, 2017). As a result, fishing crafts were created. Prior to the invention of wooden oars and the subsequent discovery of sails to harness wind power for propulsion, log systems may have been propelled by long sticks made of bamboo or another soft wood.

Marine Fisheries Development in India

Prior to independence, fisheries in India's maritime republics had grown significantly. They were primarily seen as a source of income, and with rare exceptions like the former Madras province, the government rarely supported the development of fisheries (Buxton *et al.*, 2004). Given the current conditions, the marine fishing community has developed a variety of fishing methods, constructed a wide range of crafts and equipment, and effectively implemented local preservation measures. By the time of independence, it can be said that the industry had achieved a high level of viability. The National Planning Commission (NPC) created a National Fisheries Policy on the eve of independence. The below figure 2 show the Definition of marine protected areas.

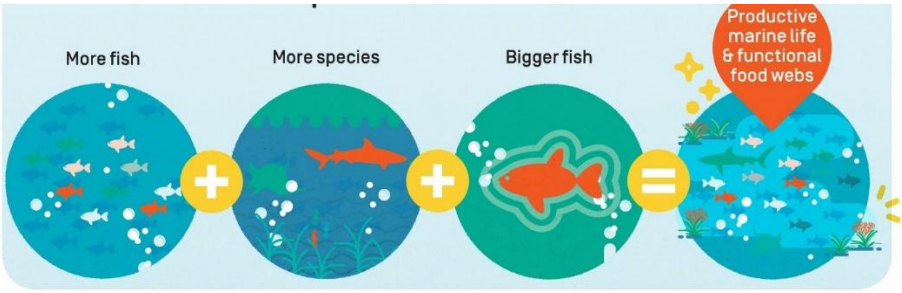

Figure 2: Definition of marine protected areas.

In this regard, an expert committee was established, and the Commission concluded that the majority of fishermen were in debt to middlemen and merchants, and that the condition of living for coastal residents of India was comparable to that of impoverished farmers (Rees *et al.*, 2021). The Commission concluded that the best way to guarantee the seamless transition of the shoreline would be through community development. In the second half of the 1980s, India's marine fishing industry grew steadily, but in the 1990s, marine landings stagnated. A technical network that connected mechanised boats to fishing harbours, cold storage facilities, ice-making facilities, fish processing facilities, refrigerated rail and road transportation, quality control, and inspection services was necessary for the growth of the fishing industry. Millions of fishermen's socioeconomic circumstances are improved and our marine resources are fully utilised when contemporary, scientific methods are applied for landing, preservation, and distribution (Ahmadia *et al.*, 2015). In the context of fisheries, technological change can refer to the use of new techniques and tools in any one or a combination of fish-catching, handling, conserving, processing, and distribution-related activities. New techniques may be used in fish production to improve the quality of fishing gear, the organisation of the

production process, and the abilities of the fishermen. Devices for underwater television, sonar, and radar are being offered to identify fish shoal sites. But the most important of all these innovations has been the mechanisation of fishing vessels (Pelletier *et al.*, 2008). The motorisation of current fishing vessels and the introduction of new mechanised vessels were the primary focus of the marine fisheries sector during the first three Five Year Plan periods and the subsequent three Annual Plans. Investigating the possibility of installing appropriate engines in the current boat was the first step in the mechanisation drive. However, it quickly evolved into a project to build boats with unique designs. Year after year, the boats' size and engine capacity increased. Mechanisation combined with trawler technology resulted in a dramatic rise in fishing productivity. The western world's growing need for seafood led to a boom in trawlers.

Theoretical Background

According to traditional economic theories, when capital, technology, and other resources are used effectively, economic growth will inevitably occur in any society. The expansion of production possibilities brought about by higher economic resource availability and productivity is known as economic growth. The production potential curve moves outward as the economy grows. The production possibilities curve is effectively pushed outward by the availability of new capital. This indicates that the productivity of the resources that are available tends to grow with increased money. The cornerstone to economic advancement, according to traditional economists, is capital accumulation. They place a strong emphasis on greater savings.

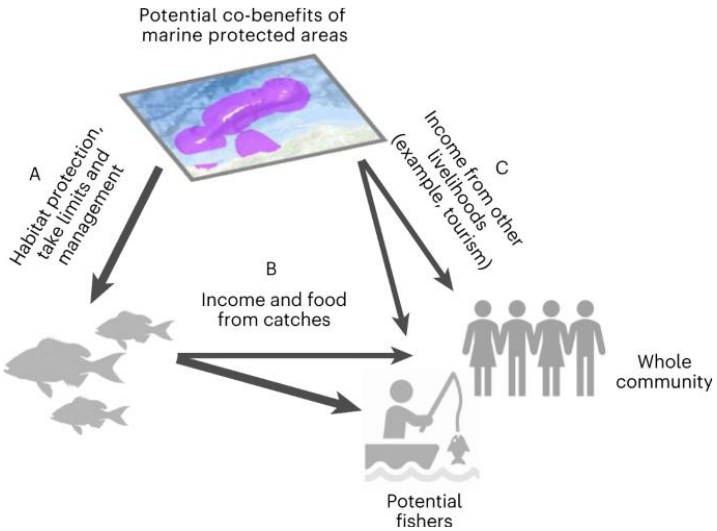

Figure 3: Benefits of fisheries.

As new machines that can perform more jobs more accurately and quickly are introduced, the quality of capital likewise improves. Technological developments are necessary to improve the quality of capital, and these developments are what allow economic progress. Making greater use of the available fishing resources without jeopardising their renewability is the ultimate goal of marine fishery management. The economic viability of

the maritime fishing villages may be severely strained in the near future due to the overexploitation of fishery resources, whether by traditional or mechanised crafts. Despite the fact that our nation's overall level of fishery resource exploitation is far below optimal, there is a great deal of concentration in specific regions and with regard to particular types, which reflects the shortcomings of the current fishery management policy and its application. Natural resources in less developed nations (LDCs) are either underutilised or misused. Furthermore, appropriate exploitation of resources is necessary for economic progress; their mere existence is insufficient. The current analysis takes into account efforts to modernise the fishing industry while making the best use of the marine resources that are now available while staying within the highest sustainable limit. Both primary and secondary data were employed in the investigation. The required primary data was gathered through a well-planned interview schedule. Analysing the issues and potential benefits of marine protected areas for fisheries is the primary goal of this study in figure 3.

Conclusion

The expansion of production possibilities brought about by higher economic resource availability and productivity is known as economic growth. The production possibilities curve is effectively pushed outward by the availability of new capital. This indicates that the productivity of the available resources tends to rise with the added capital. In addition to providing an essential source of income for over four million people, the fishing industry plays a significant part in the Indian economy by contributing to the GDP of the nation. At different points in time, academics and scholars carried out a variety of studies on the economics of marine fisheries. Analysing the significance of marine protected areas is the main goal of this study.

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