# Sustaining our Seas: Economic Challenges and Opportunities in Pakistan's Fisheries

Ayesha Shafqat[1]*, Nadia Nazish[1,]*, Adnan Ihsan[2], Muhammad Abdur Rehman[1], Rabia Awan[1] and Mehwish Hadiat Ullah[1]

[1]Department of Zoology, University of Sialkot, Sialkot, Pakistan
[2]Department of Biology, Punjab College Kubay Chak, Sialkot, Pakistan
*Corresponding author: ayeshashafqatjanjua@gmail.com; nadia.nazish@uskt.edu.pk

## Abstract

Pakistan's economy is largely dependent on the fishing sector, thereby providing food security and employment to coastal communities in Sindh and Baluchistan, particularly. Despite its value, the industry faces major barriers to its development and sustainability. Overfishing has decreased fish populations, and marine biodiversity is at risk of environmental degradation, mainly from pollution and habitat loss. These concerns are made more intense by inappropriate fishing infrastructure and supplies, as well as lax management and non-enforcement of rules. This chapter evaluates the economic position of the country's fisheries, highlighting both its potential and drawbacks. To guarantee aquatic habitats for future generations, it illustrates the crucial requirement for sustainable fishing practices, such as improved handling of stock and ecosystem preservation. The investments in enhanced infrastructure, cold storage sites, and recent fishing equipment can also considerably raise yields while decreasing post-harvest losses. The fishing earnings will improve, and the allocation of resources will be more reasonable, if governance strengthens through a community-based administration and policy improvement. Moreover, upgrading Pakistan's access to international fish markets by complying with international fish practices; upholding quality control could contribute to exports and GDP growth. By overcoming these challenges, the nation's fisheries industry has the potential to be revived to ensure long-term financial viability and environmental sustainability.

Keywords: Fishing sector, Challenges and opportunities, Aquaculture practices, Marine resources, Food security, Export revenue, GDP

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## Introduction

Pakistan's economy has constantly relied notably on the fishing sector, particularly in coastal areas surrounding the Arabian Sea. The country's 1,050-kilometer coastline, which extends from the territories of Sindh to Balochistan, is a habitat for a range of marine species (Gill & Iqbal, 2021). Pakistan also has an exposure to major marine resources due to its broad Exclusive Economic Zone (EEZ), which covers more than 240,000 square kilometers in size. Furthermore, being a considerable employer, the fishing industry ensures food security and develops foreign exchange profits utilizing exports (Aijaz & Butt, 2021).

Pakistan's aquaculture industry employs between 400,000 and 500,000 professional fishermen, with thousands more actively involved in industries such as exports, packaging and seafood processing. The overall contribution of marine and commercial fishing to the national GDP is approximately 0.4% (Rashid et al., 2020). This is a mere percentage, but it serves as an important source of income for Pakistan's most economically disadvantaged populations. Although opportunities in China, Europe, and the United States, the nation's major exports are seafood particularly prawns. A map (Fig.1) showing the coast of Pakistan with key harbor stations marked as stars (Qayyum & Rehman, 2022).

Nevertheless, despite these efforts, Pakistan's fishing industry confronts many obstacles that impede its long-term viability and economic expansion. The industry's future survival is threatened by overfishing, ineffective administration of marine resources, degradation of the environment, antiquated fishing methods, and inadequate governance frameworks (Ullah et al., 2021). To resolve these issues, an integrated approach is required that takes into account not merely the financial needs of coastal cities but also the conservation of the ecosystem and the proper administration of marine resources (Islam et al., 2024).

### 1.1 The Economic Landscape of Pakistan's Fisheries

#### 1.1.1 Employment and Income Generation

For Pakistan's coastal and rural people, the fishing industry is a vital source of jobs. The industry is crucial to the livelihoods of traders, seafood processors, fishermen, and other supply chain participants. The bulk of jobs in the industry, especially around the coast, are held by small-scale, artisanal fishermen. These fishermen frequently lack access to contemporary technology and equipment that may increase their productivity and safety, and they rely on basic boats and gear (Bhuyan et al., 2022).The fishing industry supports many other businesses, such as export, packaging, transportation, and fish processing, in addition to providing direct jobs. Primarily in smaller coastal communities, women

are heavily involved in the processing and sale of seafood. Despite their contributions, women's involvement in the fishing industry is sometimes underappreciated, and they face several obstacles, such as poor working conditions, limited training options, and restricted credit availability (Kalhoro et al., 2024).

### 1.1.2 Contribution to Food Security

For the people of Pakistan, fisheries are a vital source of food since they offer high-quality protein and vital nutrients. In coastal regions, where seafood is a mainstay of the diet, fish consumption is especially high. However, as compared to other nations, Pakistan continues to consume comparatively little fish, mostly because fresh fish is hard to get by in interior regions and seafood is expensive in metropolitan markets (Mehak et al., 2023)By making fish more widely available and reasonably priced, sustainable aquaculture may increase fish output. Additionally, better storage and distribution of marine products can enhance food security (Khan & Abbas, 2023).

### 1.1.3 Exports and Foreign Exchange Earnings

With fish exports contributing to a considerable portion of the overall exports, Pakistan's fisheries sector is an important contributor to the foreign currency. Prawns and various fish products are the most prominent seafood exports, with primary buyers including the US, the Middle East, the EU and China (Raja et al., 2019). However, irrespective of its numerous marine resources, the country's stake in the global seafood industry remains small owing to unsatisfactory quality control, low investment in value addition and a restricted commitment to international standards (Aziz, 2023). In recent decades, the market for certified seafood has improved in highly valuable markets. Pakistan may improve its market appeal and increase the commercial value of its fish exports by achieving the guidelines of international certification systems (Gill & Iqbal, 2021).

## 1.2 Challenges Facing Pakistan's Fisheries Sector

### 1.2.1 Overfishing and Resource Depletion

Overfishing is one of the most significant problems related to Pakistan's fishing industry. The nation's aquatic resources have been overfished for centuries primarily because of insufficient directive implementation and insufficient sustainable management practices (Boyd, 2020).Overfishing is carried out through both commercial and artisanal fishers, who often harvest juvenile fish and reduce fish resources more rapidly than they recover from it. The available supply of important species including prawns and various fish species, which are essential for the national economy and generate export money, has significantly decreased as a result (Chan et al., 2019). Widely used detrimental techniques for fishing; such as trawling, and the usage of tiny mesh nets, which vigorously capture fish, particularly juveniles and non-target species, trigger the problem. These events affect the marine conditions that support fish populations while likewise decreasing them. Overfishing, which is neglected due to a lack of efficient administrative systems including monitoring and control mechanisms, threatens the fisheries industry's sustainable future at danger (Borgwardt, 2019).

### 1.2.2 Environmental Degradation and Pollution

Environmental degradation is a major concern for Pakistan's fishing industry. The agricultural and industrial contaminants have an enormous effect on coastal areas, especially in the provinces of Sindh and Baluchistan (Assefa et al., 2018). The water and aquatic life are negatively impacted by the harmful chemicals, toxic metals, and pollutants that are released into tributaries and the sea as runoff from industries and urban areas. The well-being and livelihoods of fishermen who rely completely on clean water for their catch are also at threat due to the contaminants entering rivers and coastal waterways, which also impact aquatic life (Craig & Helfrich 2009).The challenge becomes more extreme by the degradation of important coastal ecosystems like coral reefs and mangroves. Additionally, mangroves are crucial breeding and reproduction sites for an economically important species of prawns and fish. However, there are currently fewer resources available for marine species resulting from the eradication of huge sections of mangrove forests around Pakistan's coast for commercial, agricultural and urban development. The number of fish populations have disappeared as a result of the degradation of the marine ecosystems and the future sustainability of the fishing sector is seriously threatened (D'Abramo, 2018).

### 1.2.3 Lack of Modern Technology and Infrastructure

A key barrier to the rise in Pakistan's fishing industry is the lack of modern equipment and infrastructure (Giacomarra et al., 2021).Traditional boats make up the majority of Pakistan's fishing business, which primarily depends on old fishing techniques and outdated equipment. Modern navigation and fish-finding tools are frequently unavailable on these boats, resulting in decreased effectiveness of fishing operations and increasing the risk of overfishing in some regions (Risius et al., 2019). Additionally, due to poor storage and transportation networks post-harvest losses are elevated. As a result, nearly half of Pakistan's seafood exports are in raw or rarely processed condition which lowers the possibility of enhanced export revenue (Miles et al., 2015).

### 1.2.4 Weak Governance and Policy Implementation

Pakistan's fisheries authority is highlighted by insufficient execution of existing laws and weak administrative frameworks. Even though there are regulations and guidelines in place to protect marine ecosystems and manage aquaculture, they are successfully implemented because of a lack of executive will and institutional capability (Ong et al., 2021). However, the implementation of efficient management policies is hampered by the lack of cooperation among provincial and federal institutions, as well as by a scarcity of financing and resources (Menozzi et al., 2020).The management of fisheries is further compromised by political influence and corruption. Due to the cooperation of regional officials and the lack of accountability, illegal fishing events, such as poaching and the use of unauthorized fishing gear, frequently go unreported. In addition to causing to the exploitation of aquatic ecosystems, this lack of authority puts fishermen at a disadvantage, with those who observe the laws regularly being at a disadvantage (Del et al., 2018).

### 1.2.5 Limited Access to Global Markets

In addition to safety and hygiene standards being disregarded, Pakistan has been reluctant to get into revenue-generating foreign markets, while having a large coastline and substantial aquatic resources. With over half of the captured fish either sold in markets or eliminated, shipping seafood to highly demanded regions including Europe, Japan and the Middle East is still restricted (Føre et al., 2018).

## 1.3 Opportunities for Growth and Sustainability

### 1.3.1 Sustainable Fishing Practices

The number of fish can potentially be brought back and the sector's sustainability over time might be ensured by adapting to sustainable fishing methods, such as the use of selected fishing gear with seasonal fishing requirements (Hossain et al., 2022). The federal government could promote and encourage fishermen to implement methods that reduce accidental capturing and preserve breeding grounds, furthermore conserving essential ecosystems such as coral reefs and mangroves (Kim et al., 2019).

### 1.3.2 Investment in Modernization

Transforming the country's fishing business and framework provides the potential to considerably boost profitability and effectiveness (Raja et al., 2019). Using a network of refrigeration facilities, fish processing services and fishing equipment would be possible to minimize post-harvest losses while improving the nutritional value of seafood for both local and foreign consumers. Expanding output would also be facilitated by funding development and research projects to strengthen aquaculture, particularly in inland areas (Lall et al., 2022).

### 1.3.3 Boosting Exports and Improving Standards

Pakistan requires improvements to the safety and quality standards of its fish exports to enable access to foreign markets. Pakistan may gain access to the premium sectors of Asia, Europe and the United States by investing in certification systems, upgrading supply-chain management, and implementing quality assurance laws. The key to this change will be working simultaneously with the business sectors to develop processing sites that meet international standards Fig.2 shows the performance of marine fisheries over the past two decades. It is noteworthy that marine fisheries production has increased in the last two years but export ratio still has a vast difference (Hunter et al., 2017).

### 1.3.4 Community-Based Management and Capacity Building

Collaboration projects facilitate local fishermen that can enhance the conservation of aquatic ecosystems. Community-oriented methods may result in more efficient regulation, reasonable benefit distribution and livelihood preservation by supplying all fishermen with a share in the sustainable management of fisheries (Roheim et al., 2018). Fishermen might benefit from additional support by integrating new technology and optimal procedures through instructional courses and capacity-building projects (Sheng & Wang 2021).

### 1.3.5 Harnessing Aquaculture

Pakistan could improve fish yield by performing aquaculture despite increasing taxation of wild fish equipment, which is a considerable opportunity overall (Mohsin et al., 2015). Aquaculture on the coastline and inside might sustain natural fisheries and offer fishermen a different source of revenue during annual restrictions. New commercial opportunities might be developed by promoting funding for sustainable aquaculture, especially in highly demanded species like prawns and tilapia (Faran & Ejaz, 2022).

## 1.4 Future Opportunities for Pakistan's Fisheries Sector

Although the most adverse challenges that Pakistan's fishing industry must overcome, there are still many encouraging prospects for long-term growth and economic progress in the future (Syed & Safdar, 2021). Pakistan may preserve its position in the international seafood industry and build up its local economy by taking benefit of these opportunities. Access to global markets, growth of processed seafood businesses, the establishment of marine protected areas, aquaculture development, and technological advancements are the main areas of possible examination in this new division (Tagar et al., 2021).

### 1.4.1 Aquaculture Expansion: A Sustainable Solution for the Future

A long-term strategy for the future; the cultivation of seafood and other aquatic organisms represents a considerable potential for Pakistan's fish sector. Aquaculture could serve as an environmentally sustainable alternative to native fish, which are under rising strain caused by oppression and habitat destruction (Noman et al., 2022). It can not only supply the increasing requirement for fish in Pakistan as well as globally, but it also has the prospective to generate stable employment along with ensuring the nation's food security (Kaczan & Patil, 2020). The decreasing availability of native fish stocks and growing consumer demand for seafood are two of the main reasons why aquaculture has transformed into an increasing trend globally. The Indus River and its tributaries which include freshwater and marine supplies provide optimal conditions for fish farming in Pakistan (Van et al., 2020). The nation's broad coastline and deep-water reservoirs, which serve as a barrier against overfishing, help to improve fish yield. On account of this adaptability, diverse regions in Pakistan have the liberation to employ aquaculture techniques to facilitate their specific ecosystems. Because of these vital conditions for the saltwater ecosystem; prawn farming in coastal regions has been considered as a high-demand business (Velichkova et al., 2024).

### 1.4.2 Aquaculture as a Driver of Food Security

In a state like Pakistan, where several organizations are disturbed about protein deficiencies, aquaculture delivers a sustainable supply of food. Omega-3 fatty acids, low-fat protein and essential micronutrients are all obtained by consuming fish (Teh & Sumaila, 2013). Pakistan may strengthen its food security by developing aquaculture while providing its people with affordable seafood. This may also aid in minimizing malnutrition; particularly in coastal and rural settings where there is limited access to an extensive range of meals (Alam & Azam, 2023).

### 1.4.3 Economic Benefits of Aquaculture

Additionally, aquaculture provides a considerable opportunity to earn revenue, particularly for agricultural and coastal regions where there are limited economic alternatives (Wanja et al., 2020). In contrast to other distinct agricultures, fish farming requires a relatively low initial funding, making it obtainable for small-scale farmers. As the global market for seafood increases, aquaculture can help decrease unemployment in coastal regions and improve export earnings. (Tacon et al., 2022).

Highly demanded species; prawns and tilapia which satisfy significant domestic and global market demand, may be developed in Pakistan's aquaculture industry with guidance and suitable investment (Sakhuja, 2015). Though, to decrease the ecological effects of fish farming alternative aquaculture methods must be employed. Following standard procedures and research studies may facilitate in reducing problems like habitat destruction, disease outbreaks and contamination of waterways (Babar & Masood, 2024).

### 1.4.4 Access to Global Markets: Strengthening Pakistan's Export Potential

As the global need for fish products continues to develop, Pakistan must take advantage of this prospect to place itself as a better participant in the worldwide market. At present, Pakistan's export ratio small division of international trade, mainly due to obstacles associated to quality, certification, and devotion to safety standards (Muhammad et al., 2021). However, the county's substantial potential to develop fish export and gain profit utilizing this beneficial resource. Due to increased seafood demand, imports have more developed than exports, resulting in a large trade shortage. To maintain a strong financial growth, Pakistan requires increasing private investment (Khan & Khan, 2021).

### 1.4.5 Addressing Certification and Food Safety Standards

Pakistan is required to strictly following regulatory standards to gain access to cost-effective international markets, particularly in regions like the United States and the European Union. Fish products are required to be certified by global organizations like; the Aquaculture Stewardship Council and the Marine Stewardship Council (Humayun & Zafar, 2014). These certifications demonstrate the sustainable source and high ecological and community standards of fish products. Certification processes directly employ fisheries and fish farmers and involve them to deal with socioeconomic challenges to attain an established outcome of the fisheries sector recognized by the certification standards (Bari, 2017).

### 1.4.5 Expanding Market Access through Trade Agreements

Pakistan should consider the latest trade agreements and emerging alliances to develop its access to the global market. The Middle and Southeast are major traders of seafood, contributing a substantial export market for Pakistan. Establishing diplomatic and commercial relations with these geographical regions can unlock access for Pakistan's seafood industry, mainly for highly demanded fish products; shrimp and prawns (Shamsuzzaman et al., 2017).

### 1.4.6 Marine Protected Areas (MPAs): A Path to Sustainable Fisheries

Marine Protected Areas propose a supportive tool for preserving biodiversity, replenishing fish stocks, and ensuring the long-term sustainability of marine ecosystems. The establishment of Marine Protected Areas on Pakistan's coastlines can facilitate recovery the harm caused by the overfishing, environmental pollution as well as habitat destruction. By adapting such resource management strategies, Marine Protected Areas can help both the environment and the livelihoods of regional fish communities (Jattak et al., 2023).

### 1.4.7 Better governance makes marine protected areas more effective

Since seas are complicated ecological systems that maintain intricate social and economic systems, increasing the usefulness of marine protected areas can be resource demanding. Frequently challenging circumstances include; a lack of awareness, political willingness and funds investment (Subasinghe et al., 2009). Furthermore, marine protected areas are accepted as an emergency expense instead of being viewed as future investments with considerable social and environmental benefits. In support of marine protected areas to be completely effective they require strong governance to affect human behavior and lessen the effects on the ecosystem. This practice should be comprehensive, and foster an understanding of stewardship that illustrates the socioeconomic and environmental advantages for communities (Verdegem et al., 2023).

### 1.4.8 Community-Based Resource Management

Community engagement is a vital component of this advance system. Community engagement is critical to make sure that individual rights of people in the sustainable utilization of marine resources can be rewarded with the aim of awareness and practices based on combined traditional and modern culture recognized in management plans of marine protected areas (Little et al., 2016).

The establishment of MPAs in coastal areas like the Indus Delta, as well as the Makran coast, can protect vital marine ecosystems while supporting sustainable fishing practices. As a result of collaborating with neighboring communities and government organizations along with environmentalists; Pakistan can extend a system of MPAs that maintain marine ecosystems and sustain the livelihoods of several fish communities (Henriksson et al., 2021).

### 1.4.9 Technological Advancements: Modernizing Pakistan's Fishing Industry

Technological gradation offers a considerable prospect to renew Pakistan's fisheries, transforming it into a more proficient, commercial, and sustainable industry. The employment of advanced tools and infrastructure can lessen post-harvest losses, improve product quality, and improve the competitiveness of the country's seafood in international markets (Fiorella et al., 2021).

### 1.4.10 Upgrading the Fishing Fleet

A large proportion of Pakistan's fishing fleet is composed of wooden boats that are exempt from recent technology. These fleets use outdated materials and traditional techniques, which are considered unproductive and lead to overfishing and damage marine ecosystems (Aijaz & Butt, 2021).The traditional fishing fleets will possibly be advanced with modern technologies like GPS and ultrasonic systems to increase yield and minimize the ecological effects of fish operations. Navigation and protection can be improved using GPS technology particularly in adverse weather conditions. Pakistan can develop the sustainability and effectiveness of the fish sector by investing in modern technologies and fishing boats (Kalhoro et al., 2024).

### 1.4.11 Improving Post-Harvest Technology

Post-harvest technology is important in maintaining fish quality and safety. Post-harvest technology helps to ensure fish products are accessible at the required marketplace. Although traditional methods result in loss and not fulfilling the consumer demand, they utilize locally available materials (Froehlich et al., 2018). Fully constructed and organized infrastructure including landing areas and market services, are essential for producers to manage and sell stored fish and fish products professionally and in order and to fulfill food quality standards and hence lessen the post-harvest loss (Rashid et al., 2020). Pakistan can strengthen its international exchange revenue and get a better fraction of the global seafood market by making investments in manufacturing and packaging facilities. Value-added techniques and products are also more suitable for export purposes as they have an extensive shelf life (Gill & Iqbal, 2021).

### 1.4.12 The Benefits of Value Addition

Value addition is important in improving product quality; on average value addition requires improved end-product quality including enhanced hygiene, management and processing practices as well as fish packaging and labeling procedures (Napier et al., 2020). A few practices were considered essential in value addition these include; the availability of funds necessary for the equipment, and to help access to technological advancement and infrastructure; affordable equipment allows reach by more producers, fish handling practices and product certification and certification schemes planned for farmers to improve market access. By working more on post-harvest technology and infrastructure, Pakistan can increase the shelf life of seafood and guarantee to facilitate fish reach consumers in the most favorable conditions (Khan& Abbas, 2023).

### 1.4.13 Job Creation in Coastal Areas

New career opportunities can be created by the development of the fish industries, mainly for young people who reside in coastal regions. Individuals for sanitation, freezing, and packaging seafood are recruited by processing centers (Ragasa et al., 2022). This can provide fishing households with a stable job that can help lessen unemployment in coastal regions. A healthy ocean maintains jobs, sustains financial growth, regulates the environmental conditions, and promotes the welfare of coastal communities (Tacon, 2020). In particular, coastal communities in developing regions are significantly dependent on marine resources for their food requirements as well as their livelihood. Involving such communities in sustainable management, conservation, and supervision of fish habitats can provide a demanded income shortly, while building socio-economic flexibility over time (Naylor et al., 2021).

### Conclusion

The fishing industry in Pakistan is at a turning point. The industry holds potential for the development of the whole nation associated with its abundant marine resources and scope for substantial economic growth. However, this sector may continue to decline if the drawbacks of overfishing and environmental effects are not addressed immediately. Pakistan can revive its fisheries sector by guaranteeing its long-term sustainability by adopting sustainable fishing practices, upgrading the business, increasing its accessibility to international markets and strengthening governance. The way forward demands some collaborative efforts by the fishermen and the corporate sector with a preference; for striking the right equilibrium between the preservation of the environment and economic growth. Investing funds into Pakistan's fisheries is not merely about making a profit; it's also about protecting the health of aquaculture species and the lives of coastal communities for later generations. The long-term development of Pakistan's fishing industry depends on the sustainable management of its marine resources.

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