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Constraint analysis of major problems facing the marine fisheries sector in accordance with the national fisheries policy of Pakistan

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Pakistan is endowed with abundant fisheries resources that have significant economic potential. Capture fisheries contribute a comparatively vital role to the national economy. However, poverty, environmental degradation and political instability are major problems for the Pakistani people, and no effective steps have been taken to handle this socio-economically important sector efficiently in the past. Furthermore, the fisheries sector faced its own set of challenges, including the emergence of small-scale artisanal fisheries, the nonexistence of technologies, deficiency of institutional development, an absence of infrastructure, insufficient human resource skill, and a lack of responsiveness among fishing societies, all of which contributed to the sector's demise. The National Fisheries Policy (NFP) was formulated to address these problems in the fisheries sector. Potential efforts have been made by the Government of Pakistan to solve these constraints under various plans of objectives and strategy axes of the policy. Our findings indicate that despite these efforts, the fisheries sector does not show significant growth to achieve the policy goals. So, it is necessary to re-evaluate and re-orient this policy for further development of this sector. It is also essential to achieve the aim of Government of Pakistan Vision 2025 to become one of the 25th largest economies in the world.

[**Keywords**: Coastal and marine fisheries, Constraints, Fisheries sector, Management strategies, Pakistan]

Introduction

The Islamic Republic of Pakistan is located in South Asia between 23°42' and 36°55' north latitude and 60°45' and 75°20' east longitude[1]. In the extreme northeast, it shares borders with China, Afghanistan in the north and northwest, Iran in the west, and India in the east[2]. The 1,120 km long coastline reaches both the Arabian Sea and the Gulf of Oman that is Sindh to the east and Balochistan (Makran) to the west separating this coastline into two maritime fishing zones[1] (Fig. 1). Pakistan's overall marine zone covers more than 30 % of the country's geographical area. The area of the continental shelf is about 50,270 km^2 with the continental shelf area of Sindh and Balochistan approximately 35,740 km^2 and 14,530 km^2, in that order[1,3]. In 1976, Pakistan affirmed its 200 nautical miles (nm) Exclusive Economic Zone (EEZ)[2] which comprises approximately 240,000 km^2[(ref. 1)]. According to the 1995 fishing policy, the EEZ is divided into three zones, each for various sized vessels. Small-scale fishing is allowed in Zone 1 (coastline to 12 nm), which is supervised by the provincial administration. Medium-sized and large-sized vessels fish in zones 2 (12 to 35 nm) and zone 3 (35 to 200 nm), respectively. The federal government is responsible for both of these zones[4] (Fig. 1).

In Pakistan's economy, fishing and fishery is a major contributor and is pondered to be a source of food and livelihood for coastal communities[5]. The fisheries industry, on the other hand, provides barely 1 % and 0.33 % of the country's Gross Domestic Product (GDP) and gross national product (GNP), respectively. Furthermore, exporting fish and fish products generates more than 6 % of Pakistan's foreign exchange earnings (Table 1). During 2020 – 2021, total fish production (marine and inland) was estimated at 690,600 t. Marine output accounted for 465,200 t, whereas inland production accounted for 225,400 t (Fig. 2). Pakistan exported 136,370 t of fish and fish products during 2020 – 21 (Fig. 3). Pakistan's fish and fish products are mostly sold to China, Thailand, Malaysia, Sri Lanka, the Middle East, and Japan, among others and earned 303.606 million USD[6].

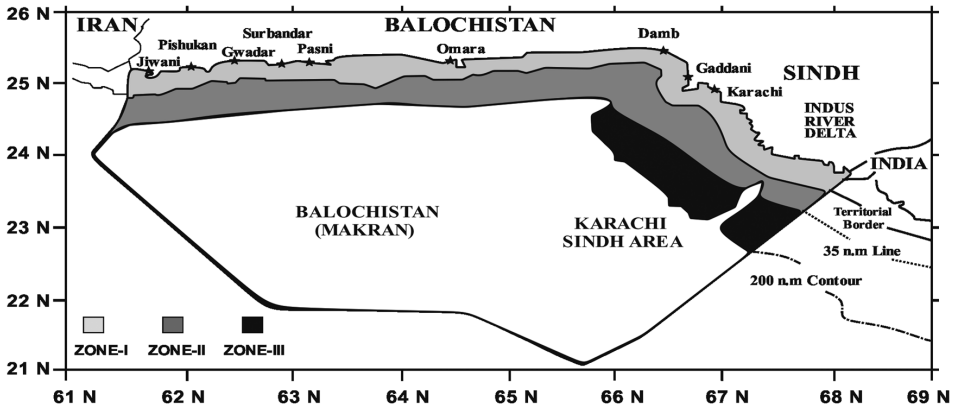

Fig. 1 — Exclusive Economic Zone of Pakistan with different fishing zone and major landing sites with stars

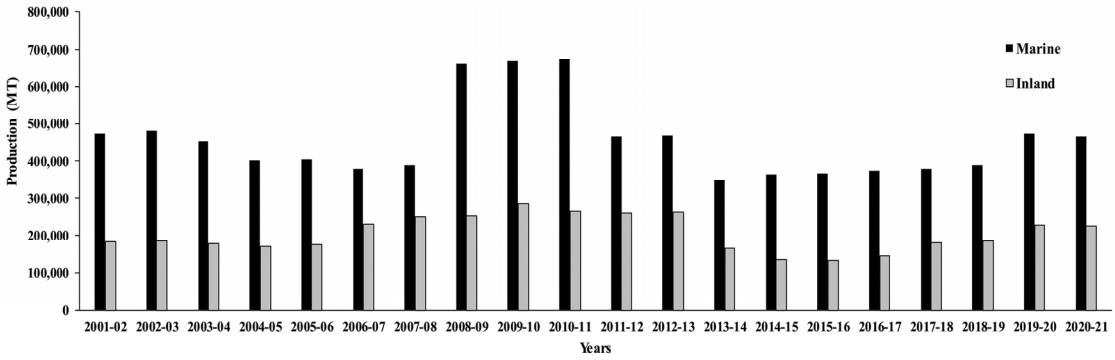

Fig. 2 — Marine and inland capture fisheries production, 2001 – 2021

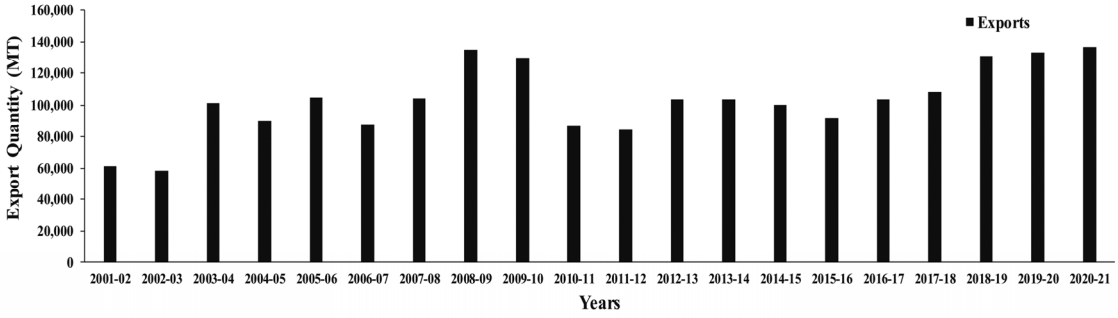

Fig. 3 — Total exports of fish and fish preparations, 2001 – 2021

The history of Pakistan has been blemished by natural calamities, repeated droughts, and continuing political rivalry with bordering countries especially India and Afghanistan[2]. Along with other problems *i.e.* food insecurity across the country, loss of biodiversity and environmental degradation[7], commercial fisheries also faced many technical and non-technical problems[8]. These problems include overexploited stocks below long-term potential levels, low productivity, high poverty levels among fishing communities, lack of feed, seed, land, and technology, post-harvest losses, low awareness of fish consumption, and insufficient volume of stakeholders[4]. Pakistan is the signatory to the Food and Agriculture Organization (FAO) of the United Nations, so, the state and federal governments must make policies for responsible fisheries activities and also to address these constraints in the country as per article 2.a of the Code of Conduct for Responsible Fisheries (CCRF). Thus, the objective of the current research work is to describe the major constraints which are addressed in Pakistan's NFP. This study also presents the possible solutions to these problems to gain potential economic and social benefits from the fisheries sector.

Table 1 — Fisheries share in GDP, Fisheries GDP and percentage growth in Fisheries GDP

Year	Fisheries share in agricultural GDP[a]	Fisheries GDP (value in current million US $)[b]	% Growth in fisheries GDP[c]
2006-07	0.53	408.66	-0.75
2007-08	0.55	448.45	9.74
2008-09	0.56	523.03	16.63
2009-10	0.56	635.23	21.45
2010-11	0.45	539.69	-6.54
2011-12	0.45	600.56	1.15
2012-13	0.44	691.19	15.09
2013-14	0.43	762.03	10.24
2014-15	0.44	866.69	13.73
2015-16	0.43	990.71	14.31
2016-17	0.41	806.04	-.0002
2017-18	0.40	836.94	3.69
2018-19	0.39	864.69	3.21
2019-20	0.40	980.83	11.84
2020-21	0.39	1011.18	3.00

Source: a & b = National Bureau of Statistics and c = Calculated from "*b*" values

Materials and Methods

The present study was performed to evaluate the major constraints, which are described in NFP, faced by the commercial marine fisheries sector in Pakistan. This study was based on the primary as well as secondary data. The primary data was acquired from government officials, researchers/academicians, fishermen, seafood exporters/processors, fisheries cooperative societies, fish boat owners, fish auctioneers/transporters and fishermen associations/ union leaders. Primary information was gathered by one-to-one interview method through a pre-tested questionnaire particularly intended to achieve the goals of this study. Secondary information was gathered through the broad review of already available research and opinion articles, scientific reports, pieces of communication and newspaper essays.

The preference given by various respondents on different restrictions encountered by commercial marine fisheries in Pakistan was ranked using Garrett's ranking approach. According to this technique, respondents were requested to rank all of the limitations and their factors, and the results of this ranking were then transformed into score values using the formula:

$$\text{Percentage position} = 100(R_{ij} - 0.5) / N_j$$

Where, R_{ij} = Rank given for the i^{th} variable by j^{th} respondents, and N_j = Number of variables ranked by j^{th} respondents.

By bringing up the table of Garrett, the percentage position of each rank so acquired was converted into scores. Individual respondent's scores were put together and divided by the total number of respondents who supplied scores for each issue and element, and ranks were assigned based on the mean score. These mean scores for all the major problems and their factors were arranged in a descending order and the most essential issue was ranked first, while the least significant problem was ranked the last.

Results and Discussion

The constraints faced by the commercial marine fisheries in Pakistan and their major factors were identified and asked to rank them to their preference. Based on the response of the various respondents, the Garrett score was estimated to know the severity of these constraints. A total of 11 constraints were identified and the results so obtained are represented in Table 2.

Legislative shortcomings

Fisheries law refers to state and federal legislation concerning the protection of endangered fish species and their habitats. However, it is also concerned with regulating commercial and sport fishing activities *i.e.* fishing permits, licenses, the dates of fishing season and the catch limits. Although, for the fishery management in Pakistan, many laws and regulations are in place (Table 3), but still legislative shortcomings ranked first with an average Garrett score of 88.00 (Table 2). For instance, there was a substantial drop in stocks of economically important fish species because of the implication of banned fishing apparatuses, ineffectual laws and rules and a

Table 2 — Constraint analysis of major problems facing commercial marine fisheries in Pakistan

Major constraint	Avg. Garret score	Rank	Factors	Avg. Garret score	Rank
Legislative Shortcomings	88.00	1	Ineffective legislation from government	83.00	1
			No inter-departmental co-ordination	77.80	2
			No monitoring and surveillance support	76.20	3
Inadequacy in the Research and Development Sector	85.60	2	Inadequate funding	80.73	1
			Insufficient institutions	78.13	4
			No support from technical research programs	78.53	3
			Little relevance of research with practical aspects	80.60	2
Over-Exploitation of Resources	80.93	3	IUU fishing	83.53	2
			Absence of monitoring and surveillance support	76.33	3
			Legislative shortcomings	84.07	1
			No Quota-system	74.07	4
Weak Inter-agency Coordination	80.67	4	Coordination among national authorities missing	78.80	2
			No attention from Govt. in providing coordination	78.07	3
			No Public Private partnerships	81.13	1
Inadequate Human Resources and Skills	79.67	5	Insufficient govt. institution and support	80.33	2
			Inadequate staff in fisheries institutions	77.07	4
			Lack of proper strategies within fishing and fish farming communities	79.40	3
			No Fisheries Extension Services	81.20	1
Inadequate Institutions	79.07	6	Internal conflicts linked to institutional malfunctioning	76.80	3
			Lack of fisheries management schemes managed and organized by communities	78.20	2
			No interest from Reforming Provincial or District authorities	82.00	1
Lack of Infrastructure	78.80	7	Lack of govt. interest	80.67	1
			Inadequate funding	79.27	2
			Little attention from harbor authorities	78.07	3
Inadequacy in Fisheries Statistical Data	77.27	8	Insufficient research vessels	80.47	1
			Less attention from Provincial and federal governments	79.13	4
			Insufficient support from Federal Bureau of Statistics	78.87	5
			Inadequate funding	80.13	3
			IUU fishing	80.40	2
Use of Destructive Fishing Methods	76.87	9	IUU fishing	82.87	1
			No legal penalties	76.33	5
			Legislative shortcomings	81.40	2
			Absence of monitoring and surveillance support	80.07	3
			Non prevalence of modern technologies	78.33	4
Increase in Pollution and Environmental Degradation	76.33	10	Lack of Govt. interest	81.40	1
			No environmental impact assessment	79.53	2
			Improper linkage among environmental protection agencies	79.53	2
			Inefficiency of Marine Pollution Control Board (MPCB)	77.53	4
Post-Harvest Losses	72.80	11	Non prevalence of modern technologies	87	1
			Legislative shortcomings	78	2
			No monitoring and surveillance support	73	3

Table 3 — Implications of fisheries with different acts, ordinances and rules

Major acts, ordinances, rules related to coastal and marine fisheries	Main objectives/features/prohibitions
Fisheries Act, 1897	• Currently operates as a provincial law • Forbids the use of explosives for the purpose of fishing • Prohibits the use of poison to catch or destroy fish • Gives the provincial government the discretion to regulate fishing by making rules to govern the construction of weirs and the use of fishing equipment • Prohibit fishing in any area for a period of up to two years • Allow the police or a provincial government officer to arrest without a warrant person suspected of committing an offence under this act

(*Contd.*)

Table 3 — Implications of fisheries with different acts, ordinances and rules (*Contd*.)

Major acts, ordinances, rules related to coastal and marine fisheries	Main objectives/features/prohibitions
West Pakistan Fisheries Ordinance, 1961 West Pakistan Fisheries Rules, 1965	• Appointment of fisheries inspector • Empower the director of fisheries to lease out any water • Nets, fixed engines, traps, etc. shall not be employed without a permit or license • Restrict the catch of fish in a closed season • Prohibits the use of explosion and poison to catch or destroy fish
Exclusive Fisheries Zone (Regulation of Fishing) Act, 1975 Exclusive Fisheries Zone (Regulation of Fishing) Rules, 1976	• Regulate fishing in Pakistan's "exclusive fishery zone" • Prohibits fishing with the aid of explosives, poison, lime and other toxic substances • Federal government has the power to ban all fishing or the fishing of certain species for any period • Federal government may make rules to determine the types of nets, size of the mesh, the size and quantity of fish that may be caught or processed at any time
Pakistan Fish Inspection and Quality Control Act 1997	• Regulate the quality of fish exports • Establish an inspection committee • Allow fishery officers to inspect fish processing plants, issue certificates of quality, and detain sub-standard fish and fish products • Make rules to govern the registration of fish processing plants; the inspection of fish; quality standards; the handling, processing, packaging, storage and marketing of fish and fishery products; and the disposal of substandard fish and fishery products

lack of observing and investigation support amenities. As a result, current fisheries law must be revised and amended as necessary to enable the execution of the current fisheries policy and plan.

Inadequacy in the research and development sector

With the rapid increase of population and exhaustion of fisheries resources because of overfishing, loss of fish growing land to agriculture and siltation, etc., it becomes essential to build up an institutional set-up for fisheries research[9]. Recently, modern fisheries research is focused to improve the understanding and connection between independent and dependent variables which explain behavioural and ecological patterns[11]. Similarly, research in fisheries is directly associated with the policy development processes[10]. Although several research organizations, institutes and universities in Pakistan put fisheries-related topics on their agendas, it is still seen as the second most significant limitation affecting Pakistan's commercial marine fisheries, with a Garrett score of 85.60 (Table 2). This may be because there is inadequate funding from the government, little relevance to research with practical aspects, lack of support from technical research programs and insufficient institutions with average Garrett score of 80.73, 80.60, 78.53 and 78.13 respectively (Table 2). Hence, provision to advance feature and relevance of the study and develop and support technical research programs are needed for the development of commercial fisheries in the country.

Over-exploitation of fisheries resources

The problem of over-exploitation of marine resources is a worldwide one. It occurs when the maximum amount of fish that may be collected from the sea has been reached. The advancement of skilled fishing technology, which is becoming available to even small fishing operators, is providing the fish with very little time to escape the fishing gear and reproduce in the water. Biological over-exploitation of available fishery stocks results in the ruin or severe lessening of particular fisheries[12]. Based on published MFD data, individual efforts were also made the different researchers to evaluate the stock status of commercially significant fishery resources in Pakistani marine waters (Table 4). However, it remains the third major constraint faced by commercial marine fisheries in Pakistan with average score of 80.93 (Table 2). The outcomes of constraint analysis reveal that legislative shortcomings, Illegal, Unreported and Unregulated (IUU) fishing, lack of monitoring and surveillance support, and no quota system, with an average score of 84.07, 83.53, 76.33 and 74.07 correspondingly (Table 2) are the major factors of this problem. The results of a recently completed stock assessment survey by the FAO and published articles by various researchers indicate that almost all of Pakistan's fishery resources are significantly to severely overfished. Therefore, it is the need of the hour to promote sustainable management of marine aquatic resources and to control the over-exploitation of commercially significant fisheries resources.

Table 4 — Exploitation status of commercially important fisheries resources from Pakistani marine waters

Species/ Group	Models used	Package name	Exploitation state	Reference
1. Ladypees (*Sillago sihama*)	Non-equilibrium SPMs	CEDA, ASPIC	CL	Panhwar *et al*.[23]
2. Spiny Lobster Fishery	Non-equilibrium SPMs	CEDA	CL	Panhwar *et al*.[24]
3. Hilsa shad (*Tenualosa ilisha*)	Non-equilibrium SPMs	CEDA	CL	Panhwar & Liu[25]
4. Kelee shad (*Hilsa kelee*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Panhwar *et al*.[26]
5. Silver Pomfret (*Pampus argenteus*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Siyal *et al*.[27]
6. Bombay Duck (*Harpodon nehereus*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Kalhoro *et al*.[28]
7. Talang queenfish (*Scomberoides commersonnianus*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Panhwar *et al*.[29]
8. Barramundi (*Lates calcarifer*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Memon *et al*.[30]
9. Lesser tiger toothed croaker (*Otolithes cuvieri*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Memon *et al*.[31]
10. King Soldier Bream (*Argyrops spinifer*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Memon *et al*.[32]
11. Greater lizardfish (*Saurida tumbil*)	Non-equilibrium SPMs	CEDA, ASPIC	CL	Kalhoro *et al*.[33]
12. Indian Squid (*Uroteuthis duvaucelii*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Soomro *et al*.[34]
13. Kiddi shrimp (*Parapenaeopsis stylifera*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Mohsin *et al*.[5]
14. Black Pomfret (*Parastromateus niger*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Memon *et al*.[35]
15. Randall's threadfin bream (*Nemipterus randalli*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Kalhoro *et al*.[36]
16. Indian oil sardine (*Sardinella longiceps*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Baset *et al*.[37]
17. Portunus spp. (Family *Portunidae*)	Non-equilibrium SPMs	CEDA, ASPIC	OE	Kalhoro *et al*.[38]

Note: OE: Over-exploited, CL = Current Level

Weak inter-agency coordination

The wide perception of inter-agency coordination is based on at least six types of different activities and arrangements: collaboration, coordination, mergers, integration, networks, and partnerships. A project worth 2.0 billion Pakistani rupees was set to encourage investment through public-private partnerships, strengthen the governing system, endorse coastal aquaculture & farm fisheries of cold water fisheries including trout fisheries in hilly regions, and also to advances the marketing and processing of fish and fish products. The project was assigned to a private sector-led Fisheries Development Board (FDB), which was established under the Companies Ordinance in 2007. Today, FDB is contributing significantly to the creation of an enabling environment in collaboration with the Government. It has also made considerable efforts to promote joint ventures between foreign and local investors in the fisheries. Nevertheless, it was ranked 4th major constraint faced by commercial marine fisheries in Pakistan with an average score of 80.67 (Table 2). It was observed that lack of public-private partnerships with an average score of 81.13, lack of coordination among national authorities with an average score of 78.80 and lack of attention from Govt. in providing coordination with an average score of 78.07, are major factors of this problem (Table 2). However, these issues can be resolved by founding durable shared corporations to fascinate private investment in fisheries and post-harvest activities and supporting across-the-board employment necessities in fishing societies.

Inadequate human resources and skills

Human resource planning anticipates the future personnel needs for fisheries management. It has become a significant and challenging task for fisheries

managers with the rapid changes in market situations, competitive environment, the need of farmers, and technological improvement[13]. However, inadequate human resources and skills are found in Pakistan and are considered the 5th major constraint facing commercial marine fisheries in the country with an average score of 79.67 (Table 2). The results of constraint analysis demonstrate the following major factors responsible for this problem. Firstly, the lack of extension services in the fisheries sector; secondly, insufficient governmental support and institutions; thirdly, lack of proper strategies within fishing and fish farming populations; and finally, inadequate staff in fisheries institutions. Hence, it is recommended to provide more fisheries training programs with proper training facilities, and also advance extension services for the fisheries sector. Table 2 also shows the average score and rank of various factors of inadequate human resources and skills in fisheries sector.

Inadequate institutions

The institution is an idea with many definitions and explanations. However, it is a fundamental notion in the fisheries management discussions because managing systems work through institutions[14]. Provincial/Area Fisheries Departments in Pakistan, excluding Punjab and to a lesser degree Balochistan, are poorly structured, particularly at the district level. The research conducted in various faculties of Sindh universities is not commercially applicable. Therefore, the inadequate institution was observed as the 6th major constraint facing commercial marine fisheries in Pakistan with an average score of 79.07 (Table 2). This was due to the following factors; firstly, no attention has been paid to this sector from reforming provincial or district authorities; secondly, lack of fisheries management schemes managed and organized by communities; and finally, internal conflicts linked to institutional malfunctioning. This situation could be improved by: a) strengthening current fisheries institutions through pointing out their clearer roles and assigning tasks, b) reforming/ reorganizing provincial/area and district authorities and already present institutions to make them further approachable to fisheries management needs, and c) assisting the formation of producers' organizations. Table 2 shows the average score and rank of various factors of inadequate institutions in the fisheries sector.

Lack of infrastructure

The development of infrastructure of commercial marine fisheries and improved fishing capacity of fishers has made it possible to produce and obtain the fresh fish all over the year. In order to achieve this purpose, the improvements in the infrastructure have encouraged the traders to advance the marine fish supply chain system[15]. The unavailability of proper infrastructure has been proven a main constraint (*i.e.* 7th with an average score of 78.80) to the development of the fisheries in Pakistan (Table 2). Hence, it is recommended to develop better handling and preservation facilities for all the aquatic products by the creation of auction and market centers at major fishing harbors; by the construction of more landing facilities along the coast and by improving the existing harbour facilities. The major factors responsible for this problem along with their average Garrett scores are highlighted in Table 2.

Inadequacies in fisheries statistical data

The phrase "fisheries data" is a common means of referring to data that may be of employ in the management of a fishery as well as for scientific, cultural, recreational and commercial purposes. Fisheries data are crucial to strategic planning activities in coastal communities that depend upon fisheries. However, the official fisheries data of catches from small-scale artisanal fisheries is either absent or underestimated[17] and as a result underestimated in the context of their socio-economic importance[16,18,19].

Pakistan is gifted with an "immense wealth" of marine resources[20], nevertheless, there is no comprehensive data gathering arrangements, which ranked 8th major constraint with an average score of 77.27 (Table 2), has been established to update management. Moreover, various factors *viz*. insufficient research vessels, IUU fishing, in adequate funding and attention from the government, and insufficient support from the Federal Bureau of Statistics, are responsible for inadequacies in fisheries statistical data (Table 2). As a result, it is necessary to improve the consistency of fisheries statistical data across the country by implementing wide-ranging and coordinated data gathering and evaluating systems across provinces, synchronized by Fisheries Departments at the provincial/area level, and reporting to the Pakistani Federal Bureau of Statistics (FBS).

Use of destructive fishing methods

The phrase "destructive fishing" has frequently been employed for a wide array of accomplishments, from conventional overfishing to absolute destruction of the aquatic stock and the environment with considerable and ultimate influences. The employment of destructive fishing rehearses in the wrong environment must be banned or firmly regulated[21]. In 2011, a plan for the improvement of fish holding on local fishing boats was approved by the Federal Government, in order to achieve Productive Outcomes (POs) following POs of NFP. As per the economic survey of Pakistan 2015 – 2016, it is aimed that the traditional fishing fleet will be modernized by providing high-power engines, navigational and other communicational equipment. It is also necessary to promote light fishing and squid jigging to ensure sustainable exploitation and usage of undiscovered marine resources. There is also a need to introduce tuna long-line fishing and also trap fishing for various shellfish and finfish as an alternative to traditional methods. Table 2 reveals the severity of the use of destructive fishing methods and various factors responsible for this major problem facing commercial marine fisheries in Pakistan.

Increase in pollution and environmental degradation

World Health Organization defines coastal pollution as "the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects such as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities"[22]. Pakistan is facing numerous environmental issues (Table 5) and these are the major contributors to public health risks, contamination, pollution, and decline in capture fisheries production in coastal areas. To achieve the fruitful results according to POs of NFP, the Marine Pollution Control Board (MPCB) had addressed the matter of protecting the marine life and ecosystem, but nothing has been achieved so far and it is still a major problem for commercial marine fisheries in Pakistan (Table 2). It may be due to the various facts: firstly, the government takes no interest to resolve these environmental issues; secondly, there is no prevailing environmental impact assessment existed; thirdly, improper linkages among environmental protection agencies; and finally, the inefficiency of MPCB (Table 2). So, a uniform strategy is required for cantonment boards, KWSB, KPT, Pakistan Navy, Defense Housing Authority (DHA) and the City government to control such devastating situation. To control contaminations through aquatic pollution, there is a need for strong coordination among all the stake-holder and Environment Protection Agencies over environmental management regulations.

Post-harvest losses

Fish is also exceedingly perishable and spoils more quickly than almost any other meal. Because of

Table 5 — Pollution/Environmental degradation in coastal areas of Pakistan

Pollution/Environmental degradation	Description
Industrial Effluents	• Industrial effluents from six industrial complexes of Karachi are discharged in two seasonal rivers *i.e.* Liyari River and Malir River • Chemical, metallurgical, oil refineries, petrochemical, tanneries, pharmaceutical, glass and textile industries are the major source of industrial effluents across the Sindh coastline • Industries in Hub Industrial Trading Estate (HITE) are a major source of industrial effluents across Balochistan coastline[39]
Power Plants	Power plants of K-electric discharge a large amount of heated water (3° - 6°C ΔT) and number of pollutants[40]
Domestic waste and sewerage	According to the Karachi Water and Sewerage Board, approximately 472 million gallons of sewerage dumped into Arabian sea daily[41]
Oil and oil residue	Oil tankers pass through the Arabian Sea are a chronic source of oil pollution including de-ballasting, tanker traffic, bilge cleaning and accidental oil spills[42]
Persistent urban wastes	Organo-chlorine compounds i.e. pesticides, insecticides, PCBs and plastic waste materials are amongst prominent persistent urban wastes[42]
Radioactive wastes	Karachi nuclear power plant (KANUPP) is the major source of radioactive wastes in terms of volume and quantity[42]
Wastes from the fisheries industry	Relatively minor role is played by the wastes from the fisheries industry
Ship Braking Industry	Ship breaking industry at Gaddani is the biggest source of heavy metal pollution in the area[42]
Destruction of mangroves	Reduction in the flow of the Indus River exerts more pressure on alternative resources such as mangroves which leads to their destruction[43]

microbial growth, chemical alterations and intracellular enzyme breakdown, this rotting renders fish unsuitable for consumption and may pose a health concern. Thus, post-harvest handling, processing, preservation, packing, storage, and transportation of fish require special attention to preserve the quality and nutritional properties of the fish while avoiding waste and losses. However, due to poor handling practices and a lack of preservation facilities, post-harvest loss (the 11th major constraint facing commercial marine fisheries in Pakistan, with an average score of 72.80) is one of the most important factors resulting in the underprivileged quality of raw material for processing and consumption in Pakistan. Approximately, 70 % of collected seafood is predicted to be damaged or decomposed before reaching consumers or processing facilities. The various factors which are responsible for this problem with their average Garrett scores and ranks are highlighted in Table 2. In 2016, MFD approached the administration of Gwadar and Karachi Fish Harbours to renovate the harbor facilities as per requisite hygienic standards to reduce post-harvest losses.

Conclusion

The NFP of Pakistan was developed to boost fisheries in the country which have been neglected in the past. The objectives of NFP are to ensure the significant contribution of this subdivision of agriculture to financial growth, food security and poverty alleviation. Different POs and Strategy Axis (SAs) were set up to address various constraints facing this sector in Pakistan. Various steps such as technological improvement, infrastructure enhancement, research development, legislation revision, destructive fishing methods prevention, etc. were taken by the federal government along with provincial governments and international coordination for the successful implication of these POs and SAs. Nevertheless, these all efforts, unfortunately, seem to be vague. Because, the contribution of fisheries towards GDP (approximately 1 %) is still very low and the majority of fishing communities are still poor and facing food insecurity. Consequently, non-compliance with legislation is increasing which in turn leads to the increase in illegal fishing practices that degrade the fisheries' resources. The Pakistan Vision 2025 aims that Pakistan will become among the largest global economies by achieving the vision's goals *viz*. increase the per capita income from 1,299 USD (2013) to 4,200 USD (2025), increase the exports up to 150 billion USD, bringing down poverty from 49 % population to 20 % and reduce food insecure population from 60 to 30 %. Therefore, this is the right time for re-evaluation and re-orientation of NFP to kick start this sector again and to ensure its potential contribution to achieving these goals.

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Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

MN started the project, obtained and analyzed the data. YTM planned and supervised the study. UN compiled the results. MM and AMM assisted in the writing of the article.

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