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INVESTING IN COASTAL ECOSYSTEMS

STUDY ON GOVERNANCE AND VALUE CHAIN OF

Fisheries Resources

AT GWATAR BAY AND JIWANI, BALOCHISTAN

UNDP IUCN Food and Agriculture Organization of the United Nations UN environment Wetlands International Sweden Sverige Norad Udenrigsministeriet DANIDA Danmarks udviklingssamarbejde Royal Norwegian Embassy

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ABBREVIATIONS

AMP	Aquaculture Management Plan
BFD	Balochistan Fisheries Department
BMN	Balochistan Mahigir Network
BMPs	Best Management Practices
BPS	Basic Pay Scale
BPSD	Balochistan Partnership for Sustainable Development
CARD	Coastal Association for Research and Development
CBFM	Community Based Fisheries Management
CBO	Community Based Organisation
EKN	Embassy of the Kingdom of Netherlands
FAO	Food and Agriculture Organization of the United Nations
FMP	Fisheries Management Plan
GEF	Global Environment Facility
GDA	Gwadar Development Authority
HH	Household
HACCP	Hazard Analysis and Critical Control Point
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported and Unregulated Fishing
JEDS	Jiwani Educational Development Society
KM	Kilometer
MPA	Marine Protected Area
NR	Natural Resources
NGO	Non-Governmental Organisation
NTFP	Non-Timber Forest Product
PA	Protected Area
PPAF	Pakistan Poverty Alleviation Fund
PWP	Pakistan Wetlands Programme
PACCD	Pakistan Agriculture and Cold Chain Project
PFF	Pakistan Fisherfolk Forum
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
SoP	Survey of Pakistan
UNDP	United Nations Development Programme
WWF	World Wide Fund for Nature

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INTRODUCTION

The current report contains two studies which discuss the fisheries resources of the Gwatar Bay, a trans-boundary marine area sharing its waters with Pakistan and Iran. The first study, Governance of Fisheries Resources of Gwatar Bay, examines the shortcomings in the governance of the bay's fisheries resources, while the second study, Value Chain of Fisheries Resources of Gwatar Bay and Jiwani, looks at the weaknesses associated with the fisheries value chain. The studies are intended to support the conservation and sustainable use of shared natural resources (fisheries, mangroves, other marine species) in Gwatar Bay and aim at improving habitat management on both sides of Pakistan and Iran.

The small-scale fisheries supported by Gwatar Bay provide an important economic activity and livelihood support to the local fishermen. It is a source of income, employment and subsistence for them. From fish catch to boat building and net making, there are a number of activities that help generate income for the fishing communities. Keeping into account the prevailing conditions of these fisheries, it can be inferred that governance of the fisheries resources and maintenance of fish stocks, is still a growing challenge at Gwatar Bay and Jiwani. Losses during the fishing and post harvesting are one of the reasons that adversely affect fisheries resources and livelihoods of local communities.

In order to improve the governance and value chain of fisheries resources, studies provide practical solutions that will not only enhance income generation opportunities for local fishers but ensure sustainability of the fish stocks and maintain the quality of fish catch over a long period of time. This can also attract the international markets where fish catch could be exported to earn decent income for local fishers as well as boost our national economy. The report recommends new and innovative approaches to engage various stakeholders who can contribute in improvement of the fisheries resources and strengthen their value chain management.

PROFILE OF GWATAR BAY

Gwatar Bay is a trans-boundary inlet situated on the coast of Balochistan, Pakistan and the Sistan-Balochistan, Iran. Located at 25° 08' 00" N and 61° 38' 00" E, it covers a total area of around 1,000 km^2 (including the adjacent floodplain) and about 100 kilometers of the coast between the two countries. The bay is fed by larger seasonal rivers on both sides of the border i.e. the Dasht River in Pakistan and the Bahu-Kalat River in Iran. Despite being separated by a national border, the ecosystem of the bay functions as a single entity and is comprised of very rich interdependent habitats and marine species.

The area provides an important source of livelihoods for local communities, mainly Baloch ethnic groups who share the common culture and language on both sides of the border. A tradition of exchange and unreported trade between the people of the two countries in the area has been in practice for a long time. The population of the area is largely dependent on fishing as a main source of food and generation of income. Fishing is dominated by artisanal practices, mostly by using small speed boats imported from Iran and with traditional fishing gear being used to catch small fish species. The fisheries catch of Gwatar Bay has immense trade value for both Pakistan and Iran.

At present, Gwatar Bay is facing a variety of pressures such as over-fishing and over-harvesting of natural resources, water pollution, illegal trade and climate change among others. These threats are trans-national in nature and could be addressed jointly by the two countries for the wise use of coastal and marine natural resources and the effective management of ecosystem services.

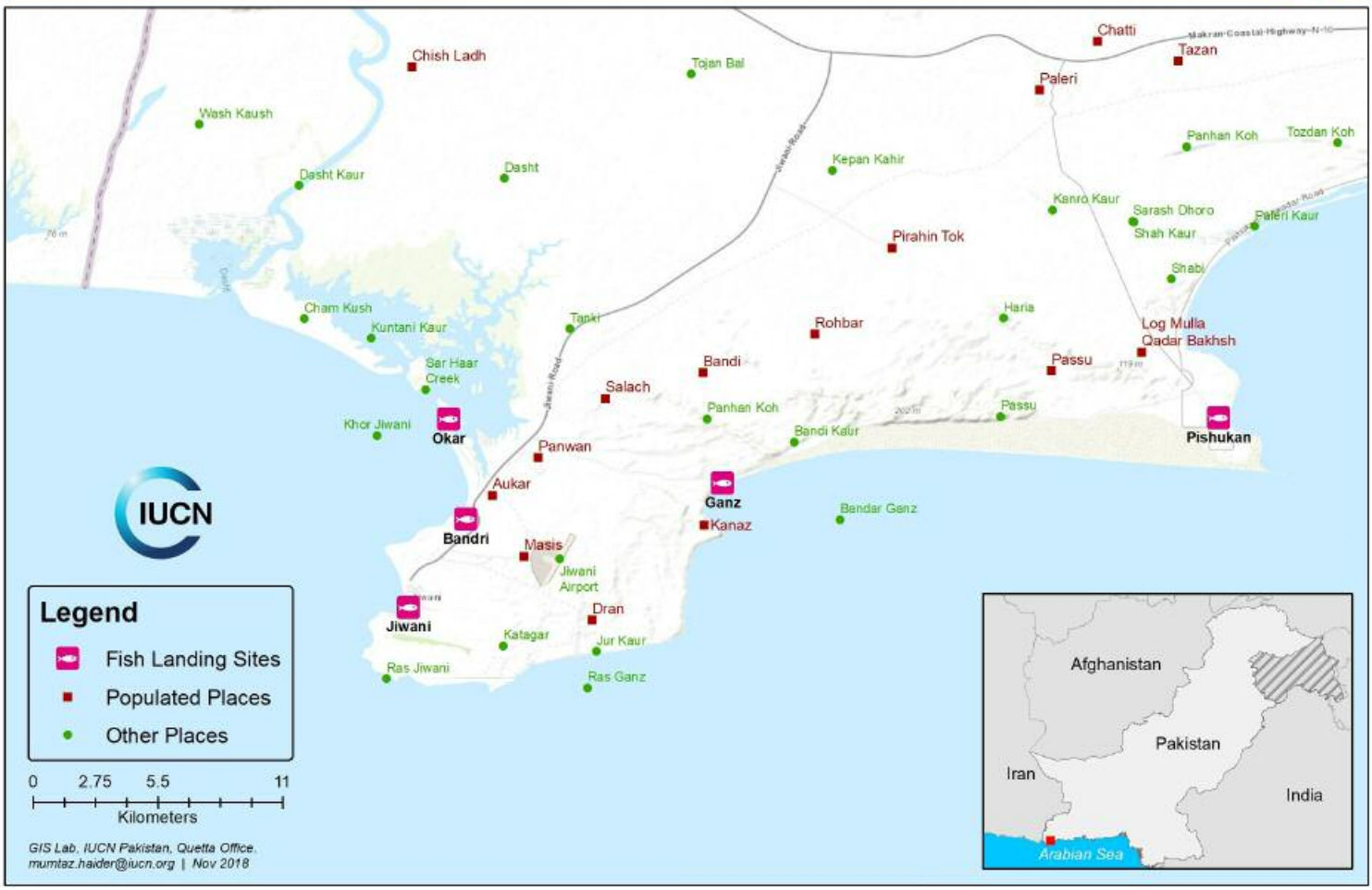
Gwatar Bay is a visually attractive site and has the potential for the development of tourism. The uniqueness and international importance of this area has led to the designation of two Ramsar sites, namely the Jiwani Coastal Wetland in Pakistan and the Gwatar Bay and Hur-e-Bahu in Iran.

The Jiwani Coastal Wetland supports the mangrove species *Avicennia marina* on its western side. The mangroves extend up to the border with Iran, and the wetland there has also been declared a Ramsar site. The Dasht River is the major source of freshwater which supports the mangrove forests. These forests provide an important breeding and spawning habitat and act as a nursery for juvenile fish and shrimp species

The eastern side of the wetland comprises of huge stretches of sandy beaches and supports a substantial number of endangered species. According to the Ramsar information sheet, turtle beaches extend for around 18 kilometres from Jiwani town to Ganz, and the width of the turtle beaches vary between 60-120 metres. Cliffs gradually rise in an eastward direction up to 30-40 metres and end abruptly to the east of Daran. The area receives very little rainfall annually and has almost arid climate.

STUDY ON GOVERNANCE OF FISHERIES RESOURCES OF GWATAR BAY

Map 1: Fish Landing Sites - Gwatar Bay



Visit to a Fish Processing Plant at Jiwani.

Summary

Gwatar Bay is located at Pak-Iranian border facing Persian Gulf. In Pakistan, the area lies at the extreme corner of Balochistan coast. Like other marine waters, it supports small-scale fisheries management and implementation of fisheries laws and practices differs considerably on both sides of the border. Fisheries policy and regulatory frameworks do not provide any mechanisms specific for Gwatar Bay or governance of any other small-scale fisheries in Pakistan. All fisheries resources are governed by generalized rules and regulations and no concept exists for individual fisheries management plans for small fisheries. An analysis of fish catch data revealed that the value of the fish has fallen despite an increase in fish catch, which is putting added pressure on fisheries resources and destroying the biodiversity of the Bay, with declining economic benefits to the community. The Balochistan Fisheries Department lacks the facilities and resources for managing marine fisheries resources efficiently. Political influence is also a contributory factor. The situation calls for a new approach for fisheries governance, and co-management could be the most viable option. However, the Fisheries Department is reluctant to share their authority. Similarly, the fishermen and communities are also not aware of the need for sustainable management. There is a need to create awareness and change mindset in order to create an enabling environment for co-management of marine resources. This may include training and institutional development of the Fisheries Department and relevant stakeholders. This will also require political will, and revisiting policy and regulatory frameworks for accommodating co-management and making resources available. It is also suggested that making bilateral arrangements across the border are also need of the time.

1. Methodology Adopted for the Study:

i. Consultations were held with local fishing communities, traders, officials of Fisheries Department and other stakeholders in the Gwatar Bay area. In this regard, meetings and Focus Group Discussions (FGDs) were conducted with different stakeholders to understand the issues related to governance in the target area and suggest any possible reforms in a right direction.

ii. Besides collecting first-hand information, the available published and unpublished information pertaining to fisheries governance in Gwatar Bay and along the Balochistan coast were collected and reviewed.

People met during the study

Mr. Akif, *Na Khuda* at Jiwani
Mr. Abdul Khalique, Fisheries Inspector, Balochistan Fisheries Department, Jiwani
Mr. Abdul Rahim, Assistant Director Environment, Gwadar Development Authority, Balochistan
Mr. Muhammad Noor, Former Director General, Balochistan Fisheries Department.
Mr. Muhammad Sadiq, Fisherman at Jiwani
Mr. Saeed Muhammad, *Na Khuda* Bandri Landing site
Mr. Saleem, *Na Khuda* from Jiwani
Mr. Rehmat Ali, Manager, Son of the Sea Processing Plant, Jiwani
Mr. Sanaullah, representative of Sunset Seafoods Processing Plant, Jiwani
Mr. Syed Zahoor Shah, Director, Balochistan Fisheries Department
Mr. Waheed Bux, Fish Trader at Ganz, Balochistan

2. Results and Discussion

2.1 Fisheries Governance - A Situation Analysis

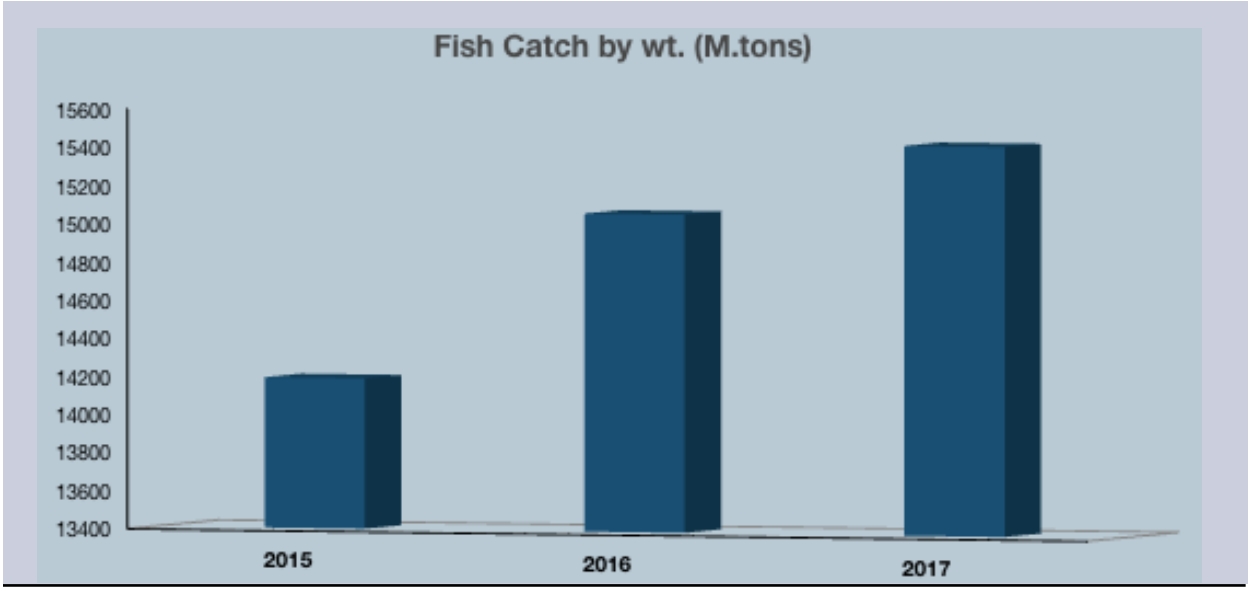
Fisheries are the main source of food and income generation for the communities on both sides of Pak-Iranian border. Fishing, previously dominated by artisanal practices such as the use of small boats and traditional fishing gear, is being transformed into commercial fisheries with the use of speed boats, modern gear and nets. It is reported that the tradition of exchange and trade between the two countries in the area has also been maintained.

As reported by local authorities and communities, the area is facing increasing pressures from habitat degradation, illegal and unreported fishing, sea pollution and climate change. The threats are transnational and need to be addressed jointly by the two countries in order to ensure the wise use and effective management of coastal resources.

It is observed that management and implementation of fisheries laws and practices differs considerably on both sides of the border. On Iran side, fishery rules and regulations are strictly implemented as reported by fishermen and the officials interviewed during the course of this study. However, the implementation on the Pakistan side has many issues which are sometimes beyond the capacity and authority of

Interview with a fish trader at Ganz, Jiwani.

Graph 1: Fish catch by weight at Jiwani (2015 to 2017).



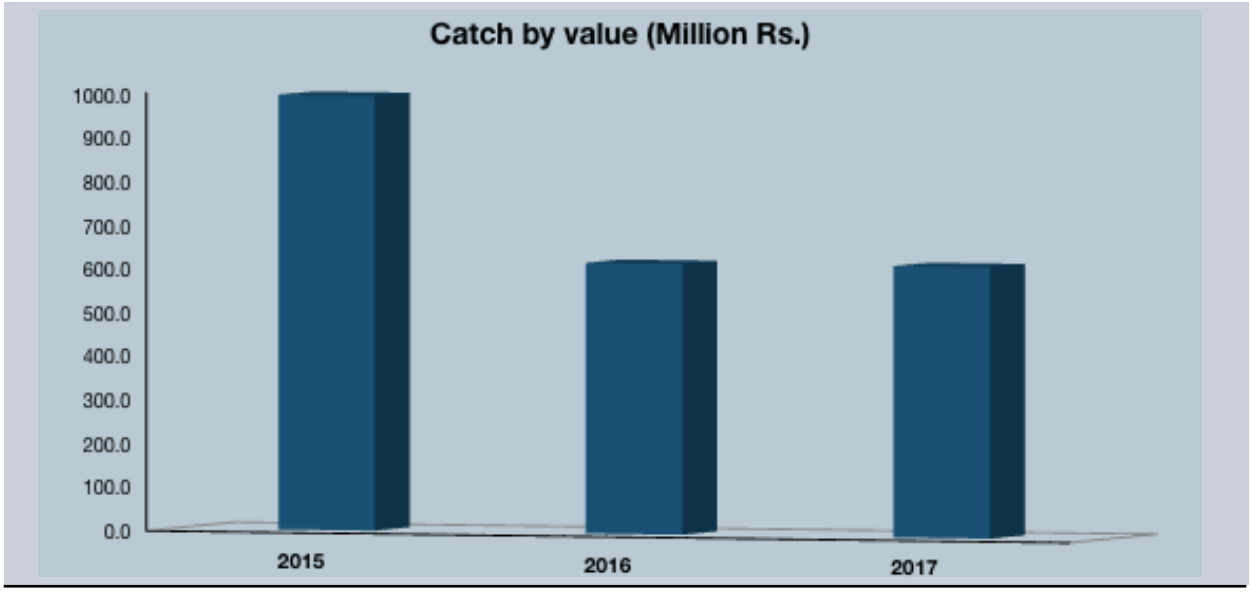
Source: Balochistan Fisheries Department

the implementing officials. This includes political interference and lack of political will to address these issues.

It is revealed that there are several landing sites on Gwatar Bay along Balochistan coast which include Jiwani, Ganz, Panwan and Bandri, in addition, to many other small sites at village levels. Except for Jiwani, fishing appears to be the only activity available to the inhabitants since there is little agriculture and no any industries. Only Jiwani town has some industry and businesses which provide employment opportunities. Moreover, the educational level of the majority of fishermen is low that they are not able to get good job opportunities or could engage in other occupations that require technical expertise or higher education.

A few fish processing plants have been setup in Jiwani in recent years, which directly receive fish from fishermen or it is supplied by middlemen. The fish processing plants at Jiwani either chill or freeze the fish catch and it is further dispatched to Karachi for final processing and packaging for export.

Graph 2: Fish catch by value at Jiwani (2015 to 2017).



Source: Balochistan Fisheries Department

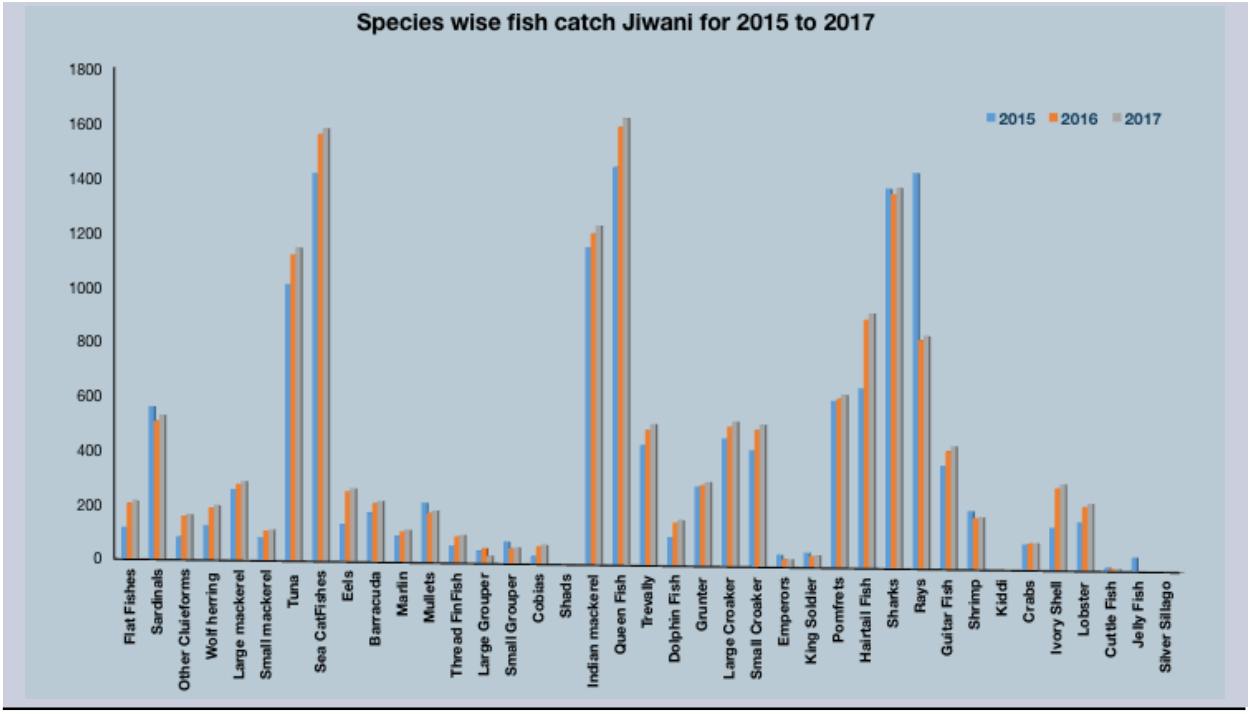
Despite the lack of accurate statistics, it is apparent that Balochistan's fisheries are now undergoing a period of pronounced and rapid change in response to a variety of pressures that are being generated both internally and externally; notably, increasing uncontrolled fishing activities have reduced the quality of catch and productivity in many areas. The little fisheries management efforts that have been made so far are only aimed to increase the price of catch and have failed to maximize the economic and social benefits from fishing. Further, the fragile resources have degraded in Balochistan coast and Gwatar Bay is no exception.

There is misconception among fishers who believe that more fishing efforts will help increase fish production. On the other hand, it has resulted in reduction of fish catch per boat or trip, thus creating further pressure on dwindling fish resources. It was revealed that though apparently, fish catch was seen to have increased with increase in fishing effort, but it was only due to additional low quality catch. This can be seen in charts 1, 2 and 3. Chart 3 clearly shows increasing quantities of medium to low value fish species except for tuna, mackerel, croakers, lobster and a few others. Such efforts can have an adverse impact on marine biodiversity leading to long term degradation of marine resources. The catch may include juveniles of commercial fish species including endangered and critically endangered marine fauna in by-catch.

According to the recent Stock *Assessment Survey of Pakistan's Marine Fisheries Resources* (FAO 2016), Pakistan's marine fisheries resources have declined by some 50-90 percent. The FAO document does not speak about the small fisheries such as those around Gwatar Bay. However, during the current study, fishermen indicated the decline in fish stocks and were very concerned about this trend.

2.1.1 Balochistan Fisheries Department (BFD)
The Balochistan Sea Fisheries Ordinance No. IX, 1971 and subsequent amendments empower the Balochistan Fisheries Department for fisheries management and governance in the provincial territorial waters and inland fisheries. The Gwatar Bay area fisheries is looked after by the Deputy Director (Marine Fisheries) working under the authority of Director Marine Fisheries at Pasni, and controls all the coastal area from Hub (district Lasbella) to Jiwani (district Gwadar). Field staff (table 1) is stationed at Jiwani Fisheries office headed by two Assistant Directors at Fisheries Department who are responsible for

Graph 3: Fish catch by species at Jiwani.



Source: Balochistan Fisheries Department

Table 1: Fisheries field staff stationed at Jiwani.

Sr.	Designation	BPS	# of posts
1.	Assistant Director Fisheries	17	2
2.	Marine Biologist	17	1
3.	Fisheries Officer	16	3
4.	Assistant Private Secretary	16	2
5.	Boat Engineer	15	2
6.	Skipper	15	3
7.	Charge-man	15	2
8.	Foreman	11	3
9.	Inspector	11	15
10.	Data Collector	9	2
11.	Asst. Inspector	9	11
12.	Crew	8	9
13.	Boat Operator	7	1
14.	Sea Medic	7	1
15.	Security Supervisor	7	1
16.	Mechanic	6	4
17.	Helper	2	4
18.	Security Guard	2	11
	Total		77

Source: Balochistan Fisheries Department

their respective jobs. There are 77 field staffs at Jiwani who are wholly responsible for Monitoring, Control and Surveillance (MCS) of the fisheries resources in Jiwani.

Fish catch data is collected and compiled by the Directorate of Marine Fisheries, Balochistan Fisheries Department. The data on fish catch from marine waters all along the Balochistan coast is divided into eight large coastal stations, namely Pasni, Gwadar, Surbander, Pishukan, Jiwani, Ormara, Gaddani and Damb. The data for smaller landing sites is not available separately and is merged with the data of the larger fishing stations. For example, the fish catch data of Jiwani covers Ganz, Panwan, Bandri and other smaller landing sites of the Gwatar Bay.

Overall fish catch has increased due to increased fishing efforts; however, the additional weight of fish comprises of low value and low quality catch, returning less economic benefits.

The analysis of fish catch (Graph 3), fishermen and vessel data (Tables 2 and 3) shows that the data collection process is very likely to have underestimated the actual fish harvest by anything up to 30 per cent, since data of small landing sites is not separately maintained and, there may be significant underreporting by processors and traders. The concerned fisheries department staff also does not appear to have the means and capacity to verify this data efficiently for many reasons including insufficient training, non-availability of equipment, vehicles and recurring funding constraints.

2.1.2 Fishermen and Trader Associations

Fishermen at Jiwani informed that there is an association of fishermen however they informed that it is not well organized and functional, and is unable to represent the fisher community. It was reported that the fishermen at Ganz are somehow organized and they do not allow other fishermen to catch fish in their territorial waters. Please remove from they try to other villages. It was revealed that fishermen at Ganz appear to be united on a one-point agenda that is not fishing for sardines and other such forage fish species, because they serve as food for large fishes. This is a fact that these fishermen do not allow fishermen coming from other areas to catch small fish and defend their fishing grounds.

According to local fishermen, due to lack of organization and unity, processors take advantage of it and offer them fixed rates regardless of the quality of fish. This appears to be one of the major reasons that fishermen do not improve the quality of catch. Table 2 shows a decreasing trend in the number of fishermen in the Gwatar Bay area over the last three years. This may be due to the decreasing economic returns to fishermen as indicated above.

Table 2: Fishermen population at Jiwani.

Year	Full time fishermen	Part time fishermen	Occasional fishermen	Total
2015	6190	670	300	7160
2016	4890	694	347	5931
2017	4915	719	369	6003

Source: Balochistan Fisheries Department

2.1.3 Others Stakeholders

There are a considerable number of people who are directly or indirectly engaged in ancillary industry such as middlemen, boat makers, engine mechanics, rickshaw/ cart drivers, ice suppliers and transporters. All these stakeholders are reaping the benefits of the fisheries, but seem least concerned about the degradation of fisheries resources.

2.1.4 Relationships among Stakeholders

The current fisheries management systems are highly influenced by political meddling in official matters. This is further subjugated by an authoritarian style of governance and do not provide for any inclusion and participation regimes that could lead to working relationship among various stakeholders. Under the current scenario, stakeholders are not coordinated and do not cooperate for a general cause despite the fact that they have clear perceptions about the issues prevailing in the fisheries sector.

Stakeholder relationship are complex and hard to explain; however graph 4, may provide some help in understanding this.

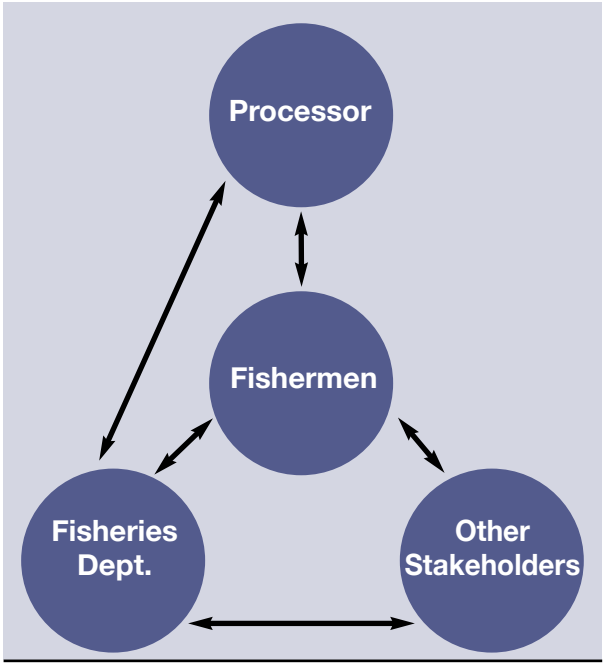
2.1.5 Regulatory Framework

Fisheries policy generally does not provide any regulatory framework that focuses governance of small scale fisheries. All fisheries resources are governed by generalized rules and regulations and there is no concept of individual fisheries management plans (FMP).

An important legislation relating to the fisheries in Balochistan is the Balochistan Sea Fisheries Ordinance No. IX, 1971. This law grants authority to control fishing craft, fishing licenses and processing of fish and fishery products in the territorial waters Pakistan along the coast of Balochistan. The Act has been amended several times and new regulations are enacted, most recently in 2010. A number of federal fisheries legislations cover regulation of fishing outside the 12 nautical miles (NM) of territorial waters, catching of turtles, a closed season for shrimp fishing, fish quality and inspection rules and environmental protection. The federal legislations include the Pakistan Fisheries Ordinance 1961, West Pakistan Fisheries Rules, 1965, Exclusive Fishing Zone (Regulation of Fishing) Act, 1975 (amended 1993), Pakistan Fish Inspection and Quality Control Act, 1997, and Pakistan Fish Inspection and Quality Control Rules, 1998.

The federal or provincial legislation neither specifically speak about Gwatar Bay fisheries governance, nor shed light on any other individual fishery. Gwatar Bay is governed by the generalized rules and regulations as explained above.

Graph 4: Stakeholder relationships.



2.1.6 Awareness about Policy and Regulatory Measures

During field meetings, most of fishermen were found to be unaware of the rules and regulations pertaining to fisheries governance and post-harvest quality assurance except for the allowed mesh sizes. The educational level among majority of the fishermen and their families is low as most of them have never had a chance to avail school or adult education. This is one of the major hurdles towards raising awareness among them.

Besides fishermen, there is an association of processors who use their unity to take financial advantage of fishermen being disorganized and offer them fixed rates regardless of the quality of fish. This appears to be one of the major reasons that fishermen have no interest in improving the quality of catch.

Cold storage facility at Jiwani.

However, with consistent awareness raising campaigns and capacity building efforts, a greater change could be achieved.

During field meetings, most of fishermen were of the view that only the fisheries department could bring about sustainability in fisheries resources. In this regard, most fishermen gave the example of a ban on Top Shell which was only possible after strict enforcement by the Balochistan Fisheries Department; since then, nobody catches it. They also mentioned the example of the implementation of rules and regulations and strict compliance to them on the Iranian side of Gwatar Bay.

During discussions with fishermen at Bandri, the closest fish landing center to Iran, it was revealed that they were the happiest among all of the fishermen in the bay area. They did not complain of small size or decreasing catches, probably because they too benefit from the strict implementation of rules and conservation measures across the border.

2.2 Institutional, Policy and Regulatory Gaps

The current legislation, policy and regulatory framework are not adequate for management of a modern fishery and need to be reviewed to support progressive reforms of marine capture fisheries. For increased efficiency, the Fisheries Department needs to have clear goals and milestones, which are lacking due to gaps in policy and regulations. In addition, there is a need for institutional capacity building. The Fisheries Department needs capacity building of staff in fisheries management and development, in addition to provision of sufficient recurrent operational funds, and necessary base infrastructure and equipment. Other constraints, if any, need to be resolved as well.

The legal documents lack dynamism such as room for stakeholder participation in planning and fisheries management. The provincial or federal legislation does not specifically allow for co-management or adaptive management of resources, which are now considered essential to proper resource management of neither inshore waters, nor the precautionary and ecosystems approaches to fisheries management as

The current fisheries management systems are highly influenced by political meddling in official matters and are dominated by an authoritarian style of governance. They do not provide for any inclusion and participation regimes that could lead to working relationships among various stakeholders.

overarching principles which are enshrined in the FAO Code of Conduct for Responsible Fisheries. Additionally, post-harvest issues and coastal aquaculture are not properly covered.

Pakistan, like many other coastal countries, is bound by a series of international agreements and treaties, including the Rio Convention on the Environment and its subsequent protocols and sub-treaties, the FAO Code of Conduct for Responsible Fisheries, the Convention on Biological Diversity, the FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IUU Fishing), and agreements under the auspices of the Indian Ocean Tuna Commission. The obligations placed upon Balochistan by these and other international treaties are not adequately addressed in the current legislation or through active fisheries management.

Given the weak control measures, the marine fishery is in a de facto open access situation. With low entry costs, anyone can start fishing in inshore waters, and this is reflected in the increasing numbers of boats recorded by the Fisheries Department (Table 3). There are no formal accesses rights established, though traditionally fishermen have been fishing in the coastal areas which are near to them. Even this limited traditional restricted access is becoming strained now, as fishermen poach in neighbouring waters for instance illegal fishing boats from the larger ports like Karachi and Iran fish along the shallow coastal areas. Open access fisheries are undesirable and lead to overfishing and ultimately the decline and collapse of fish stocks, that results in subsequent loss of economic rents, as this can be seen in many other parts of the world. The present status and growing challenges to inshore marine fisheries in Balochistan call for early implementation of appropriate policy measures to gradually shift the focus from harvesting high volumes of fish in a de facto open access resource situation, to a more holistic approach based on a long-term goal that helps maximizes net economic, social and environment benefits from sustainable fish production.

Management planning for individual fisheries is necessary for improving performance of fisheries resources. Individual Management Plans for small scale fisheries should be emphasized as they mostly cover small fisher folk and protect their rights. In this regard, establishment of “fish refugia” in Miani Hor (Sonmiani Bay) under a MFF-supported small grant project may be regarded as a small step towards co-management of sustainable fisheries. Formally or informally, the community is also involved in managing these refugia through Coastal association for research and development (CARD), a local NGO.

Better Monitoring Control and Surveillance is needed to reduce the illegal and destructive methods being used; to achieve this desired goal, the capacity of the implementers needs to be built. A multifaceted approach and support (capacity building, funds and facilities) is missing for implementation of rules that involve patrolling at sea as well as compliance at landing and processing units.

Existing infrastructure (harbours, jetties, etc.) require improvement or repair, and investments in new infrastructure can play significant role, particularly at those sites which are facilitated with beach landings, including the small landing sites. In this regard, floating jetties and covered areas may be considered as an economical and feasible option.

It may be noted that officials of Fisheries Department are not well aware about the mechanism and benefits of co-management of fisheries resources. This can be detrimental for any future efforts or development scheme for co-

Table 3: Fishing vessels at Jiwani for the year 2015, 2016 and 2017.

Year	Mechanized boat (fitted with in-board engine)	Motorized boat (fitted with out-board engine)	Life boat (fitted with in-board engine)	Total
2015	203	503	-	706
2016	249	375	-	624
2017	297	399	-	696

Source: Balochistan Fisheries Department

management if initiated without capacity building in this regard.

Gwatar Bay is a shared resource between Pakistan and Iran; however, no formal cooperation among Iran and Pakistan exists for resource conservation and its use.

2.3 Conclusion and Recommendation

The present status of Gwatar Bay's fisheries, as presented in charts 1 to 3, calls for a better implementation of appropriate reforms through consultative and analytical processes that could lead to improved awareness, efficient legal and policy frameworks, stronger institutions, active stakeholder participation, and effective fisheries management systems. Any reform process must gradually shift the policy, institutional and management focus from harvesting high volumes of fish in a de facto open access resource situation, to a more holistic approach based on a long-term goal of maximizing net economic, social and environmental benefits. The outcome of not reforming current management systems may be seen in continued resource depletion, poor net returns, reduced food security, and a growing poverty trap for marginalized stakeholders. Fisheries governance model for Gwatar Bay needs to be developed that should be characterized by more productive fish stocks, effective fisheries management, and improved ownership of resources. This will require strong policy and robust legal, regulatory and management systems around a more holistic approach, supported by appropriate economic and financial incentives, and above all, stronger access and rights for resource users.

The management strategies could include co-management, adaptive learning and management, implementation of Best Management Practices (BMPs) in fishing, establishment of local Marine Protected Areas (MPA), research, training and capacity building, and infrastructure development supported with policy and regulatory reforms. Development of sustainable aquaculture should also be part of the change.

2.3.1 Co-management of Fisheries Resources

To address the current situation of the fisheries governance, a shift in fisheries management approaches is required, from the current practices and management to a more structured approach of co-management with the users of the resources. Under the current circumstances, and to avoid large scale failures, it is suggested that co-management should be initiated at some smaller station, for example Ganz, which already has some sort of such arrangement, or at Bandri which is closer to the Iranian border and could reap better results from co-management as it will also benefit from the strict compliance of rules and regulations in Iranian waters. Piloting at a small scale will provide greater chances of success.

Moreover, inclusion and participation should be the essential part of any co-management efforts. All the stakeholders including the Fisheries Department, fishermen, traders, suppliers among others need to be taken on board through a formal coordination body. A local NGO could be encouraged to take the lead and an environmental NGO such as IUCN or WWF-Pakistan could facilitate this process. An Advisory Body could also be formed to oversee and supervise the process. The Advisory Body may include the local administration, educationists, community elders, religious leaders, businessmen and journalists. Well thought out participatory action plans and sustainable resource-use strategies may help achieve goals in a shorter period. This pilot should be adaptive in nature and be used to encourage adaptive research and learning and subsequent adjustments in governance of the bay and elsewhere.

2.3.2 Policy and Regulatory Reforms

In order ensure that co-management works smoothly, a revision of marine fisheries policy, legislation and supporting regulatory frameworks should be done through participatory processes. Further, both the policy and the underlying legislation and regulations need to be revisited and revised to reflect co-management with subsequent rules that carry detailed support and a clear mandate for piloting and extending its scope to a larger area.

Institutional development and capacity building of fisheries staff is essential for achieving good governance goals in Gwatar Bay as this will set an example for further expansion. Similarly, training and skill development of other stakeholders is also required.

2.3.3 Bilateral Arrangement between Pakistan and Iran

With common resources it would be useful to have some sort of resource sharing and management agreements with Iran, possibly through comprehensive management plans for the shared stocks. IUCN could play a pivotal role in facilitating any bilateral arrangements through the foreign offices of both countries.

2.3.4 Local MPAs

Large Marine Protected Areas (MPAs) spreading over hundreds or thousands of square miles, particularly fully protected "no-take" zones, may be biologically more important, but considering the local socio-cultural, economic, and political processes in Balochistan, a network of small MPAs is a more effective and socially attainable strategy than establishing large MPAs. It is suggested to pay more attention to economic factors and social sustainability issues when establishing MPAs, rather than concentrating on their intrinsic biological and ecological value alone.

Stakeholder-driven small MPAs can also act as precautionary tools to prevent overexploitation and habitat degradation. These may be established in Gwatar Bay as either no-take zones or selectively harvestable on rotational basis. The impact of the Sonmiani Bay fish refugia need to be studied and lessons learnt should be incorporated in the future MPAs. Moreover, traditional ecological knowledge should also be utilized along with scientific research in identifying hotspots such as nursery grounds or spawning aggregation sites of fish. These small MPAs could play a great role in community education, as can be seen in the case of numerous fish sanctuaries (Katas) in inland fisheries in Bangladesh, as observed by the author during his visit to study community based fisheries management (CBFM) in 2007.

Initiating small scale pilot-based MPAs will likely to be helpful in changing mindset. Once a pilot is successfully implemented, it can be up-scaled to other marine areas.

2.3.5 Training and Capacity Building

Training and capacity building is considered one of the priority areas for successful participatory management. Institutional development and capacity building of fisheries staff is essential for achieving good governance goals in Gwatar Bay

as this will set an example for further expansion. Similarly, training and skill development of fisher communities in sustainable fishing and reduction in post-harvest losses on-board and at landing will be required to add value to the existing catch for additional economic benefits. Training and capacity building of other stakeholders also need to be addressed accordingly. Community organization and development is another missing area to be taken into account in for results-oriented co-management in the long run.

2.3.6 Soft-corner for Co-management among Authorities

During the meetings, officials of Fisheries Department were found to be unwilling to implement co-management of fisheries resources and expressed their concerns about its success. One of the reasons could be the fear of losing the authority of the department over the resources. In this regard, it is suggested that exposure trips of senior officials of Fisheries Department to such initiatives in foreign countries may be helpful in developing a soft corner towards inclusion and participation among the concerned authorities. It is also expected that initiating small scale piloting will be helpful in changing mind set of the relevant department.

2.3.7 Infrastructure Development

There is a lack of appropriate infrastructure and facilities that could reduce post-harvest losses and add value to fish catch. There is a need for construction of jetties (floating or fixed) and other supporting infrastructure and allied facilities such as shelters for removing fish from nets, supply of electricity, clean water and flake ice. Such facilities are equally needed on all large or small landing sites. On the other hand, there is also a need for raising awareness among fishermen in maintaining the cold chain all along the fish catch cycle for added economic returns.

Considering the local socio-cultural, economic, and political situation in Balochistan, a network of small MPAs is a highly effective and socially attainable strategy than establishing large MPAs. It is suggested that more attention should be paid to economic factors and social sustainability issues when establishing MPAs. Concentrating only on their intrinsic, biological and ecological values is not sufficient.

2.3.8 Funding

Sufficient funds will be required to implement co-management in the Gwatar Bay. Funds will be required for capacity building, infrastructure development and Monitoring, Control and Surveillance (MCS). Therefore, it is necessary to have funds arranged before any such task is started.

2.3.9 School Awareness

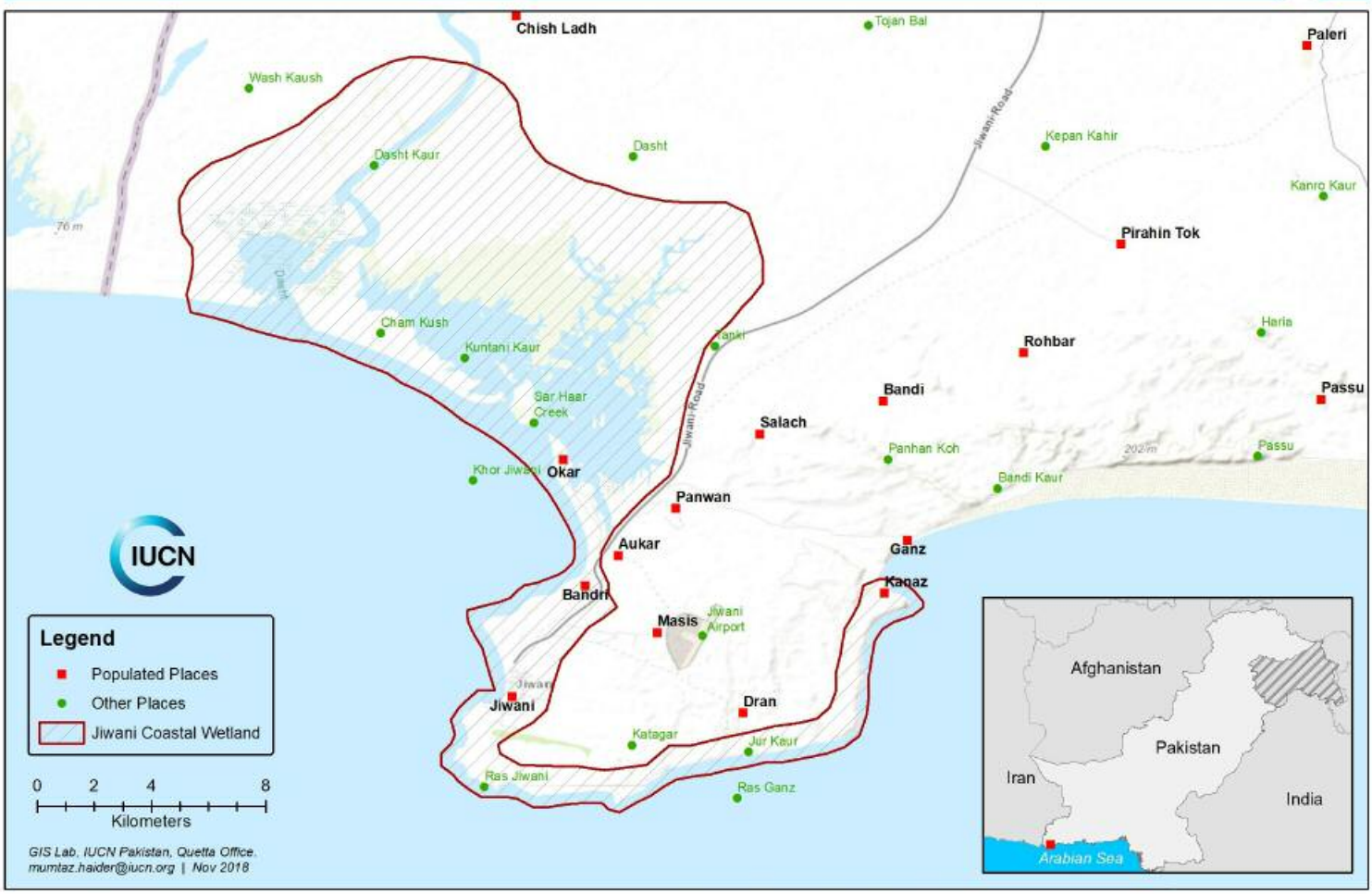
For long-term success of co-management in Gwatar Bay it is important to work with schools and launch an awareness campaign on sustainable fisheries management among school children who are future custodians of the resources

2.3.10 Aquaculture Development

Experience shows that it has been hard for the coastal inhabitants to engage in other income generating activities due to various limitations and hardships (e.g. low level of education and historic linkages with fishing). As such, sustainable aquaculture development will help in providing an alternate and additional income source that they are familiar with. In this regard, an Aquaculture Management Plan (AMP) may be developed to avert the implications of aquaculture on the natural habitat and vice versa.

STUDY ON VALUE CHAIN OF FISHERIES RESOURCES OF GWATAR BAY, JIWANI

Map 2: Jiwani Coastal Wetland



Post harvest fish handling practices.

Summary:

Gwatar Bay is recognized as a Ramsar wetland site of high ecological importance. It is a trans-boundary site located near the Pakistan-Iran border in district Gwadar. The main source of employment and livelihood for local residents is fisheries of the Bay; however, huge losses are incurred during fishing and at the post-harvest phase. At Gwatar Bay, Jiwani four fish processing plants and ten fish retailers are located at one end of the value chain, with their raw material being obtained directly from three prominent fish landing sites or directly from the sea. The main objective of this study was to assess the fisheries value chain in Gwatar Bay, including basic data on current fishing practices and catches. The study focused on the prevailing conditions of fish storage and transportation by boat owners and fish-processing operations. Prominent villages situated within a three kilometer buffer zone of the Jiwani Coastal Wetland were identified for gathering primary data. Questionnaire development, secondary data collection and desk review were undertaken. Meetings were held with stakeholders in fisheries management and cold chain development, including government departments, local fish purchasers, transporters, fish processing owners, NGOs and CBOs representatives. The assessment identified significant weaknesses in the fisheries value chain from capture to handling and processing, with extremely low standards for maintaining hygiene throughout handling and processing of fish catch. Besides the lack of infrastructure, cold storage facilities, equipment/tools and awareness regarding sustainable and quality fish catch, illegal and over fishing, pollution and drastic decrease in fish stocks have created a challenging situation for the fisheries industry. Thus, study suggests improvement in the social, economic and environmental factors which influence the fisheries value chain. Post-harvest losses could be decreased by 10 to 25 per cent by addressing the issue of cold chain management. Improving fish handling techniques and standards through simple, adaptable means will have far reaching benefits to the livelihoods of local fishermen. Improved handling and storage of catch at sea, better and proper sanitary conditions at landing sites and better transport to processing units will enable expansion to international markets. Joint efforts by stakeholders can help improve the current scenario of the fisheries value chain at Gwatar Bay where the Balochistan Fisheries Department needs to play a key role in implementing the practical solutions. This could lead to a better business environment for existing and future players in the fishing industry.

1. Scope and Methodology

Prominent villages located within a three kilometer buffer zone of Jiwani Coastal Wetland were selected for gathering the primary data.

The below listed fish landing sites/ villages are located on the eastern side of Jiwani Coastal Wetland and are mainly dependent on fishing. The mangrove forest having marsh land are uninhabited by the local communities. The current village and sample size is given in Table 4.

Primary data was gathered to know about the basic demographics of landing sites or villages located near the Jiwani Coastal Wetland and record the contribution of fisheries and natural resources towards livelihood of local fishers. Meetings were conducted with various stakeholders involved in fisheries resource management and cold chain development in the fisheries sector, such as government departments, local fish purchasers, transporters, fish processing owners, NGOs and CBOs representatives.

Following data collection approaches were used that included;

I. Consultations with Stakeholders

Consultations were held with fisher folk communities, local CBOs/ NGOs, traders, financiers, trade companies, and officials of Fisheries Department at Gwadar including Gwatar Bay, Jiwani. In this regard, meetings and FDGs held with officials of government departments and other stakeholders.

A number of NGOs and CBOs representatives were consulted to get information regarding their role in the management and development of the fisheries value chain. The following departments and organisations were contacted:

1. Fish processing companies and fish retailers at Jiwani and Ganz
2. Jiwani Wetland Conservation Society
3. Municipal Committee, Jiwani
4. WWF-Pakistan's Wetlands Information Centre at Jiwani
5. Jiwani Educational and Development Society

Consultative meetings were conducted with officers from government departments, especially the Balochistan Fisheries Department, and other organizations to gather their perspectives regarding the fisheries resource status and value chain management. Apart from having an open-ended discussion with the officers, interviews were conducted with fish processing unit personnel and fishermen to determine existing pressures and threats to the fisheries resources. Gaps in value chain development and value chain practices such as cold chain development, transport, safe handling and storage were also discussed with the help of structured questions. The names of those interviewed are listed below in Table 5.

II. Questionnaire

Primary data was collected using structured and semi-structured questionnaires and through planned field surveys. One-on-one interviews with the help of structured questionnaires and FGDs were conducted with the residents of communities/ villages and local fishermen.

Table 4: Selected villages and their sample size.

S #	Fish landing sites	Village name	Total number of HHs
1	Landing site 1	Dirr Nokabad	18
2		Panwan	300
3		Owkar	200
4		Bandri	200
5	Landing site 2	Shayabad	200
6		Jiwani	4,500
7	Landing site 3	Daran	2
8		Ganz	400

Source: Socio-economic Survey, January 2011

Table 5: Government officials, fish processors and fishermen who were interviewed.

SNo.	Names	Designation	Department / Organization
1	Mr. Shakeel Ahmed	Ex-Assistant Director	Marine Fisheries Department, Jiwani
2	Mr. Abdul Khaliq	Inspector	Provincial Fisheries Department, Jiwani
3	Mr. Sohail Ahmed	Inspector	Fisheries Department, Jiwani
4	Mr. Sanaullah Baloch	Owner	Sunset Fish processing factory Jiwani
5	Mr. Nehmat Ullah	Manager	Son of Sea (Gaba) fish factory, Jiwani
6	Mr. Wahid Bakhsh	Owner	Zabad Fish Retailer Ganz Village
7	Mr. Akib Baloch	Skipper	Jiwani Fishermen Organization

Structured questionnaires were also used for collection information from fishermen at each of the three prominent landing sites. A questionnaire was designed and developed in consultation with IUCN Pakistan and was used to determine the existing potential of fisheries resources, value chain gaps, safe fish handling practices and possible best practices for value chain development in the fisheries sector. A Rapid Assessment was conducted and a questionnaire was developed to obtain information regarding sustainable fishery value chain development for Gwatar Bay. To determine the value chain status and socio-economic conditions of selected landing sites, data was gathered from fishermen living in selected villages through individual interviews and FGDs. Initially, general information about the fish value chain such as boats, types of fishing, boat size and fish processing units was collected through FDGs. Fishermen were asked to define value or a general criteria for segregating of fish catch into excellent, good and spoiled fish and share the number of boats and types of fishes they catch.

The questionnaire was divided into two parts i.e. the first part focused on the fish catch and value chain, while the second one highlighted fishers' dependency on natural resource. A structured questionnaire was designed to collect quantitative and qualitative data. Field observations by team members were further supported through the gathering data on fish type, fishing operation, boat size and fish preservation practices.

III. Desk Review

This included review of published and unpublished material/reports pertaining to the fisheries sector and Gwatar Bay, particularly the literature related to fisheries governance, co-management, post-harvest catch management and value addition.

IV. Secondary Data

Most of studies previously conducted on fisheries resources, statistics and the fisheries value chain were referred. The following studies and reports have been consulted for the value chain development of Gwatar Bay, Jiwani:

1. Economic Survey of Pakistan 2009-2010 (Government of Pakistan).
2. Gwadar Integrated Development Vision, 2007 (Government of Balochistan, Pakistan and IUCN).
3. Reducing the Exposure of Coastal Communities to Disaster Risk in Pakistan Mangrove Planting in Jiwani, Gwadar DDstrict by Shaista Hussain, Programme Officer, Crisis Prevention and Recovery Unit, UNDP Pakistan.
4. Rapid Rural Appraisal Tehsil Jiwani, May 2004 (WWF-Pakistan).
5. Balochistan Fisheries Development Study: Options for Balochistan Coastal Fisheries and Aquaculture by Competitiveness Support Funds, 2008.
6. Fisheries Statistic of Balochistan Fisheries Department, 2015, 2016 and 2017.
7. Summary report on Pakistan Agriculture and Cold Chain Development Project by Winrock International, 2015.

2. Results and Discussion

The main objective of this study was to assess the fisheries value chain in Gwatar Bay that included basic data on current fishing practices and catches (such as fishing methods being

used, level of fishing effort, species being caught and size of catch) and give recommendations for improvement in the value of the catch.

In nutshell, the study is focused on how boat owners, fish transporters and fish-processing units operate. For this purpose, an assessment of the prevailing conditions was undertaken, and practical solutions were given to address the issues identified so far that pertained to the development of the fisheries value chain.

2.1 Main Fish Landing Sites/Villages/Settlements: Physical and Socio-economic Profile

Jiwani Coastal Wetland is located on the delta of the Dasht River in Gwadar district. It spreads over 4,600 hectares of land and for being an important nesting ground for Green Turtles (*Chelonia mydas*), it was declared a Ramsar site on 10 May 2001. The mangrove forests with only Avicennia *marina* species are present over 433 hectares within the wetland. These forests are an important breeding and spawning ground for shrimp and other fish species. Despite its immense ecological importance, the area has not been assigned protected status by the government. The climate of Jiwani coast is arid with very little annual rainfall. The coast of Jiwani comprises of sandy and rocky beaches, marshy swamps and cliffs. The Dasht River, the largest river of Balochistan, sustains the mangrove forests of Jiwani.

Table 6: Elevation and coordinates of selected fishing villages.

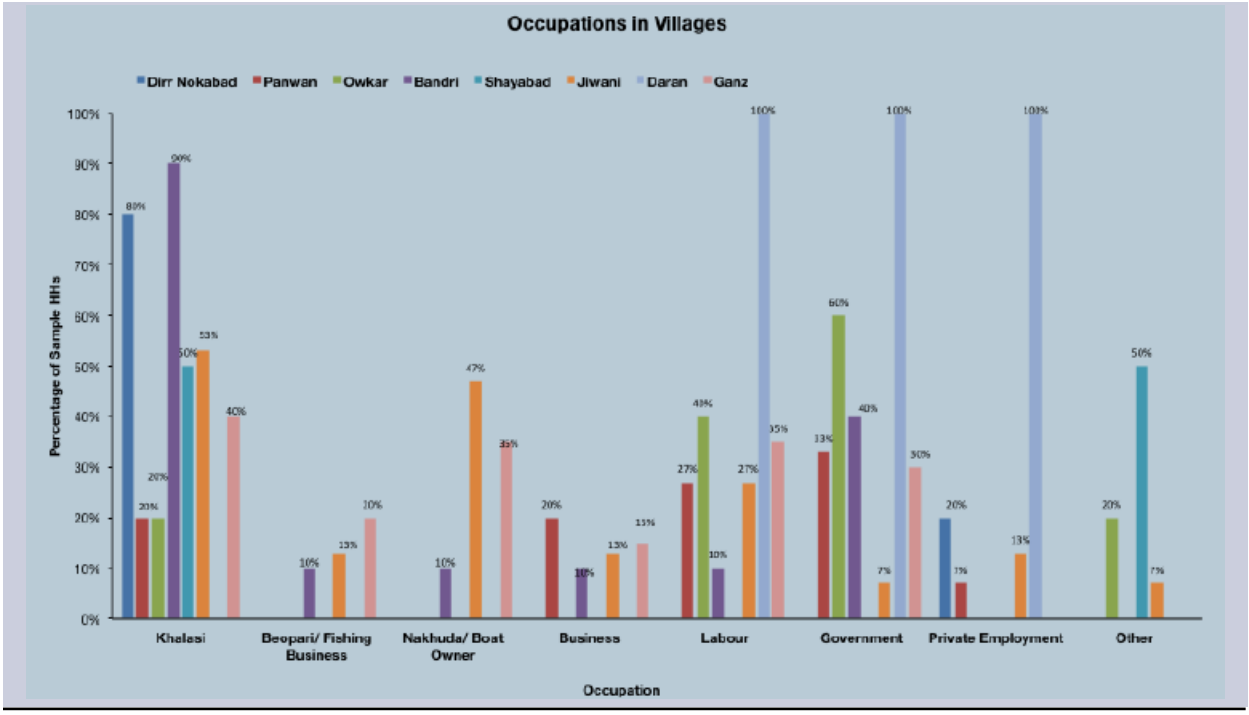
Village	Elevation (Meters)	Northing	Easting
Dirr Nokabad	10	25° 08' 43.3"	61° 48' 03.1"
Panwan	31	25° 06' 10.3"	61° 47' 59.3"
Owkar	2	25° 05' 30.0"	61° 46' 31.8"
Bandri	1	25° 05' 07.7"	61° 46' 09.9"
Shayabad	43	25° 04' 01.8"	61° 45' 42.7"
Jiwani	1	25° 02' 45.3"	61° 44' 26.0"
Daran	17	25° 02' 36.2"	61° 49' 14.3"
Ganz	17	25° 05' 46.6"	61° 52' 09.2"

Source: Balochistan Fisheries Department

A number of villages including Dirr Nokabad, Panwan, Owkar, Bandri, Shayabad, Jiwani, Daran and Ganz are situated on or near the east side of Jiwani Coastal Wetland. There are three prominent fish landing sites in Jiwani. Fishing is the main occupation of the residents dwelling in its vicinity. Moreover, women hardly contribute to the household income and all income and expenditure is managed by male family members. The coordinates and elevation (from sea level) of the surveyed villages are given in Table 6.

Fish lying in crates without ice at the fish processing unit.

Graph 5: Variation of occupations in selected villages.



Source: Socio-economic Survey, January 2011

It was noted that apart from fishing as main occupation, other livelihood sources included labour (skilled and unskilled), border trade with Iran and government jobs. Majority of the fishermen worked as fish labourers, known as "*Khalasi*" in the local language.

According to the data gathered from area, different percentages of sampled HHs are engaged in different occupations. The highest percentage of "Khalasis" i.e 90% is recorded in Bandri followed by 80% in Shayabad, while the lowest, at 20%, was found in Panwan.

2.2 Fishing Activity and Fish Catch at Gwatar Bay

Local fishers mostly fish for 10 months a year as 2 months during the summer season are rough / unsuitable for fishing in sea. The type of fish caught from the Bay depends on the fishing gear used by fishermen. The price offered for fish species by middleman increases with the size of the fish such as that of *Bangra*. On average, fish of a small size (e.g. Indian mackerel, sardine, etc) is sold for Rs. 100 per kg, while a large size (e.g. Spanish mackerel, large croaker, etc) will fetch around Rs.130 per kg. However, fishermen reported that 'Bangra" fish rates are higher in Pishukan and Gwadar as compared to Jiwani.

Fishermen handling fish catch at the beach along Jiwani coast.

White Pomphret is amongst the most expensive fish which is caught by only a few fishermen. Lobsters and various types of shrimp are also caught there depending on the season. According to the Balochistan Fisheries Department, fishing is banned for two months i.e. June and July due to the fish breeding season, but local fishermen observed that the ban is not complied in true spirit. The major fish, lobsters and shrimp types and their quantities along with their respective price are given in a table below. It also mentions the amount of the average fish catch per month.

Table 7: Fish, Shrimp and Lobster and their catch per boat. Source: BFD 2017.

S.	Local Name of Fish Species	English Name	Fishing Months	Average Fish Catch (kg / month / boat)	Price (Rs.) Offered by Middleman (per kg)	Sale Price (Rs.) for the Middleman (per kg)
1.	Bangra	Indian mackerel	Whole year	366	100 130	120 150
2.	Bam / Kalu	Eel fish	August to March	871	(>4kg) 500 (<4kg) 200	650 400
3.	Chindi	Ribbon fish	August to April	1,767	250	270
4.	Chodi (big)	Mullet	March to April		280	295
5.	Chodi (Small)		March to April		70	85
6.	Gallo	Cat fish	December to June		90	100
7.	Dohtar	Grunt	September to April	300	270	280
8.	Gaka		December	750	20	30
9.	Gold Fish	Barracuda	August to March		300	320
10.	Gor / Surmai	Spanish mackerel	November to March	1,106	300 to 400	320 - 420
11.	Khagga	Cat fish	November to March	7,265	small 52 big 100	small 60-75 big 110
12.	Kher	Large croaker	June to August	333	400	500
13.	Mas	Cuttle fish	December	100	200	120
14.	Mushka	Croaker	December to March	735	250	260
15.	Sufaid Paplet	White pomphret	August to December	184	1500	1600
16.	Kali Paplet / Paplet	Black pomphret	August to June	281	300 - 250	450 - 300
17.	Pashant		January to March	525	105	150
18.	Sarum	Leather jack	June to July	393	220	250
19.	Shark	Hammarhead shark	June to August	1 -2 pieces per season	250	300
20.	Choti sole	Sole	August to October & March to April	1,461	200	250
21.	Bari sole		August to October & March to April		600	620
22.	Gole sole		August to October & March to April	1,817	50 - 100	65 - 150
23.	Sufaid sole		August to October	3,750	400	500
	Shrimp and Lobster					
1.	Jaira	Shrimp (white, large)	December to January	1,263	600	700
2.	Patas	Shrimp (medium)	August to October	231	500	600
3.	Kiddi	Shrimp (small)	August to November		450	500
4.	Kekat / Keeka	Lobster	Whole year	194	(<300g) 550 (>300g) 1050 (>300 alive) 2500	3000

Source: Balochistan Fisheries Department 2017.

Within Jiwani city there are four fish processing plants and about ten (fish retail centres). The plants process fresh fish directly received from local fishermen or imported from Iran. All units process fish through blast freezing and have ammonia freezing plants with flake ice facilities. Processing plants and fish retail units are owned by locals, with the exception of one, which is owned by a person residing in Karachi. The majority of staff at these fish processing units comprise of non-locals such as Bengalis and Gilgities, who reside at the processing units.

Traditionally, the most of the fish catch was dried or salted; but over the last few years this practice has been abandoned and now almost all the catch is frozen or iced. The processing stations for fish, prawns and lobsters are used for a only gutting, grading, freezing, heading, defining, packing and storage. They freeze and package the produce, after which it is ready for trans-shipment to Gwadar and Karachi for onward export to countries abroad. Chilled or fresh fish is transported directly to Karachi for further processing or auction at the Karachi Fish Harbour. Currently, no fish processing plant has obtained EU or Hazard Analysis and Critical Control Point (HACCP) certification. However, several plants are now making an effort to obtain such certification. It was found that most fish processing plants are not following any standard procedures and are likely to be shut down if a proper and genuine health and safety inspection is conducted by relevant department or agencies.

The majority of local fishermen and related fisheries experts shared that, fish production has decreased from 50 to 80 per cent over the last five years. This has badly affected income generation capacity of local fishers. A. This decrease in fish catch is said to be primarily caused by illegal fishing practices, which include:

- Use of illegal fishing gear such as plastic nets by local fishermen and poachers from Sindh
- Fishing during breeding season and catch of fish juveniles.

A drastic increase in the number of fishermen and fishing boats is also one of the main causes of decrease in fish catch. Locals also informed that a variety of illegal fishing gear is used by huge trawlers, however, the concerned government agencies do not take any measures to stop them. Apart from catching fingerlings, these trawlers also damage the nets placed in the sea by local fishermen, causing them additional loss. Furthermore, oil smuggled from Iran is also transferred from one boat to other and the improper handlings results in leaking into the sea which affects water quality and poses a serious threat to marine life.

2.3 Fishing Methods and Practices

The majority of fishermen in Jiwani i.e. around 98% use fibreglass speed boats with an outboard speed engine imported from Iran. All fibreglass speed boats are temporarily registered with the Balochistan Fisheries Department. These speed boats are of various sizes ranging from 16 feet to the maximum length of 25 feet. It was reported by fishers that fiber glass gets damaged over time due to rough weather conditions, strong wave action and mostly by striking pebbles or boulders while tied up at the beach. However, registration of damaged or broken boats is not maintained. Only a few fishermen (around 2 per cent) use hand-made wooden fishing boats which are non-mechanized.

Study found that fishing boats did not have proper facilities such as modern cold storage system, flakers, echo sounders and other fish finders, including modern navigation technology. It was observed that only a few boats had insulated boxes with crushed ice for storage of some fish species like Ribbon fish and Pomfret. Moreover, it was noted that some boats had fish crates for storage purposes.

Usually, boats undertake fishing trips lasting from a few hours to about one day, depending upon the boat or type of fish which is being caught. Generally, fishermen use plastic nets for fishing which sometimes catch fish of smaller sizes as well. The list given below mentions main type of fishing nets and lines used by local fishermen:

- Gill nets of various mesh sizes, 2” to 20” used by small scale fishermen in territorial waters of Gwatar Bay.
- Cast net is used to catch bait for long-lines and human consumption.
- Long-lines is used for bottom-dwelling and pelagic fish species and seasonal fishing.

- Hand lines from boat are used for Spanish mackerel, tuna, marlines and jack fish.
- Hand lines from shore are usually used by young fishermen for local consumption.
- Bottom trawls are banned in Balochistan however, their operational activities became evident when some fishermen were arrested boarding trawlers from Sind province.
- Troll lines (*Barram*) - In Ganz , fishermen use live bait (*Sardinella sp.*) on hand lines. The bait is caught using a cast net and is kept alive in a wicker basket (locally called *Jall),* towed alongside the boat. When schools of jack or Spanish mackerel are sighted, the bait fish is hooked on a single hook (of size 6) and is cast out amongst the target fish. Several hand lines are used per boat and only one hook per line.
- Mangrove ecosystem fishing is carried out in the mangrove creeks of Gwatar Bay, and beach nets are used when tidal water recedes in creek areas.

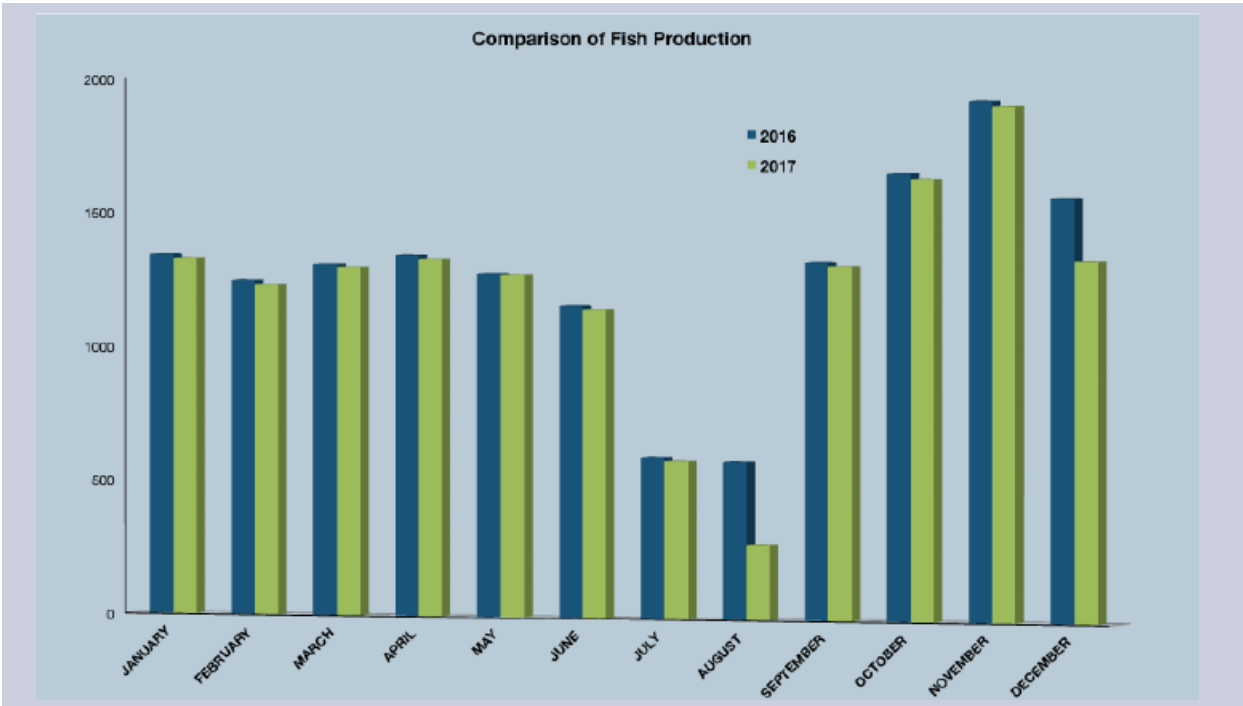
Most of the fishing boats serve different purposes and use gill nets for Indian mackerel, long lines for demersal fish and hand lines for other species, according to the season and prevailing

Fishermen preserving ice in a large icebox.

sea conditions. The statistics from the Fisheries Department, Jiwani indicate that total fish production for the year 2016 to 2017 has been fairly constant. Graph 6 mentions the fish production for each month of both the years.

Fish catch includes various fish species including shrimp, crabs, lobsters and jellyfish. Table 8 shows various types of fish caught during 2016 and 2017.

Graph 6: Comparison of fish production for the year 2016 and 2017.



Source: Balochistan Fisheries Department

Table 8: Types and quantities (in metric tons) of fish caught during 2016 and 2017.

S. No.	Commercial Fish Types	2017	2016
1	Flat fish	214.241	206.321
2	Sardine	528.321	508.032
3	Other clupeiformes	165.536	161.221
4	Wolf herring	200.251	193.305
5	Large mackerel	290.235	279.714
6	Small mackerel	114.415	110.584
7	Tuna	1147.684	1123.381
8	Sea cat fish	1585.354	1565.852
9	Eels	267.568	258.502
10	Barracuda	223.654	215.405
11	Marlin	118.546	114.105
12	Mullets	191.524	181.642
13	Thread fin fish	103.215	98.921
14	Large grouper	28.147	55.203
15	Small grouper	60.324	56.521
16	Gobies	70.145	66.351
17	Sead	0.000	0.000
18	Indian mackerel	1242.365	1212.847
19	Queen fish	1637.250	1605.257
20	Travelly	519.148	496.436
21	Dolphin fish	167.481	158.855
22	Grunter	309.002	298.301
23	Large croaker	529.315	513.514
24	Small croaker	521.369	501.725
25	Emperor	29.999	29.976
26	King soldier	45.150	43.221
27	Pomphret	633.215	619.552
28	Hairtail fish	933.741	910.614
29	Sharks	1393.236	1370.952
30	Rays	852.210	838.270
31	Guitar fish	451.214	433.544
32	Shrimp	192.213	190.152
33	Kiddi	0.000	0.000
34	Crabs	100.215	99.214
35	Lovery shell	317.008	302.006
36	Lobster	247.165	236.162
37	Cuttle fish	10.654	10.215
38	Jelly fish	0.000	0.000
39	Silver sillago	0.000	0.000
	Total	**15441.110**	**15065.873**

Source: Balochistan Fisheries Department

Almost all fish catch from processors or landing stations is transported to Karachi for onward export. Mostly tuna species (eight species of tuna are recorded) are illegally exported to Iran where they are used in the fish canning industry.

Sometimes local fish buyers import shark species from Iran and transport them to Karachi harbour for export. A few of the processors have direct agreements with fishermen, so they buy fish from middlemen at the landing sites. This makes the catch more vulnerable to damage due to the prolonged time period and exposure to higher temperatures.

To prevent damage to the fish, it is imperative for fishermen to use ice and insulated boxes on boats fishing during day-time. It is also advised to small and medium sized boats to box their fish and upgrade their boats to avoid contamination. In addition, ice must be used liberally all along the cold chain so that quality of the fish is maintained

2.4 Value Chain of Fisheries Resources at Gwatar Bay

The fishing grounds of Gwatar Bay are home to rich marine life with a diversity of species of commercial value. Species like sharks, rays, large croakers and shrimp are found on a regular basis and sometime these are exported to Iran and vice versa. It is reported that fish rates are high in Iran, especially for tuna.

As a primary hub of Gwatar Bay, Jiwani's fisheries production and imports present immense potential for capturing international and domestic markets and can play an important role in alleviating poverty and providing food security in a long run. The fisheries products of Gwatar bay have a high value in terms of local consumption in Makran region particularly Jiwani, Gwadar and Turbat. It is found that fish consumption by locals is high as compared to the status of national fish consumption, which is one of the lowest in the world e.g. 1.6 kg per person per year.

There are a number of factors contributing towards a hostile environment for the development of fisheries value chain which include lack of fisheries infrastructure,

unorganized private sector and weak implementation of government policies at all levels.

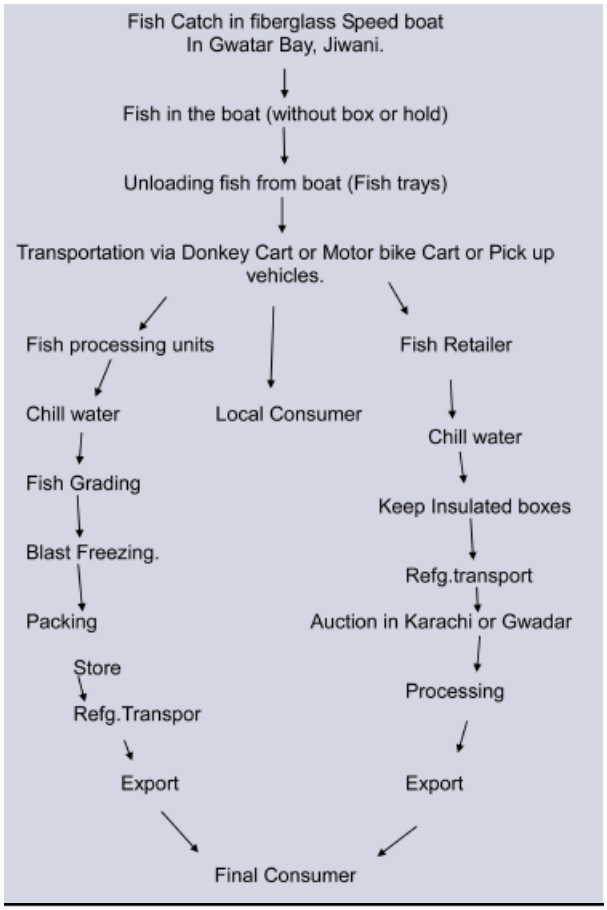
However, Fishing remains the main source of livelihood for families in Gwatar Bay. The fishermen's income is significantly undermined as they suffer huge losses during post-harvest supply chain processes.

The charts given describe the steps in the fisheries value chain at Gwatar Bay.

In general, there are significant weaknesses in the fisheries value chain from capture to handling and processing. According to the 2008 report titled "Balochistan Fisheries Development Study" by the Competitiveness Support Fund describes that the Balochistan fisheries have extremely low standards of hygiene for fish handling and processing. High value fish are placed on dirty floors during auction and fish catch is handled with shovels and spades in the vicinity of donkey carts and trucks. Moreover proper fish cleaning and handling facilities are not available.

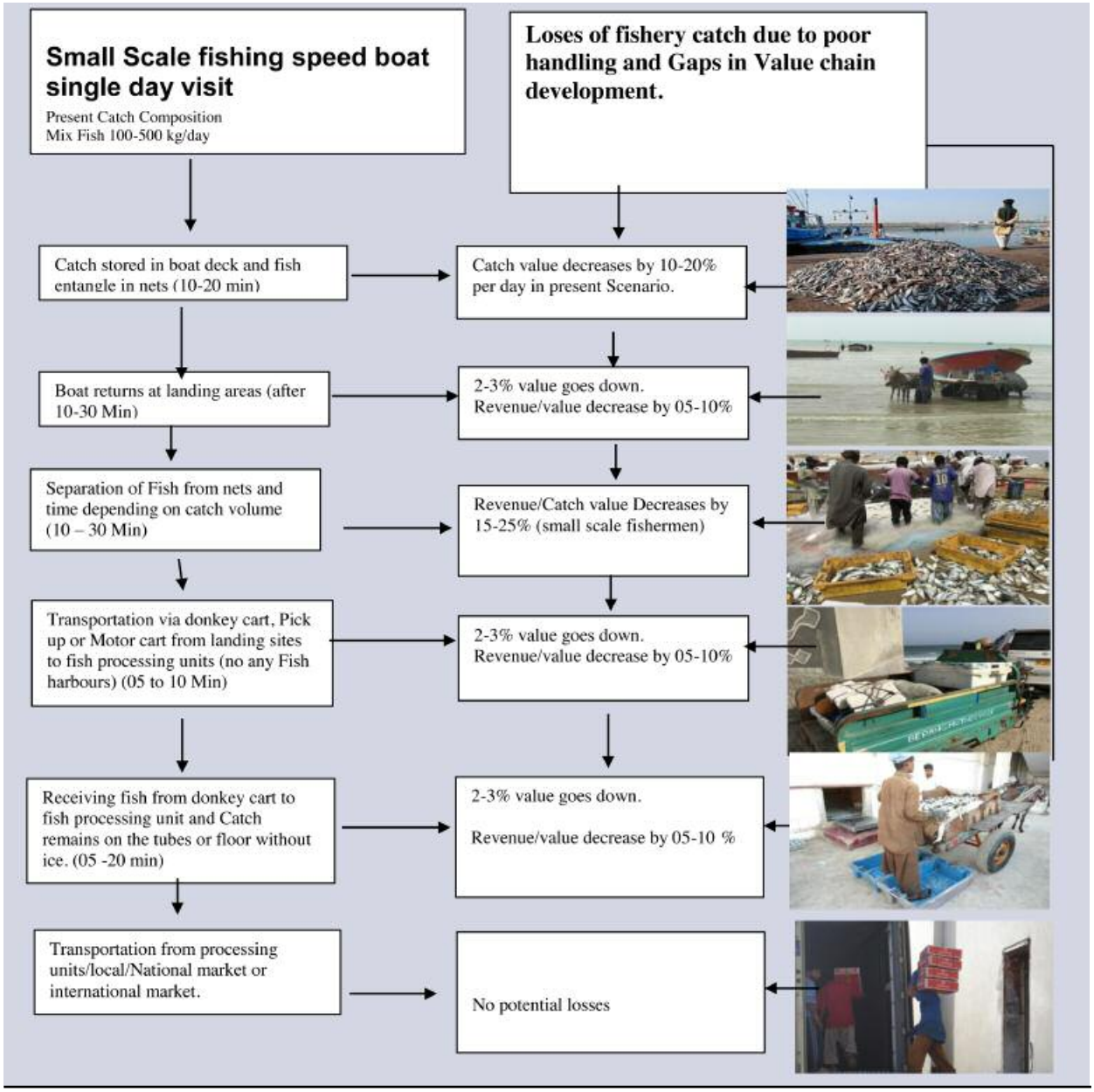
The production or supply of fish is more or less similar to that of any other agricultural product in

Fishery Value Chain Practice in Gwatar Bay, Jiwani



Fishermen cutting and cleaning the fish for packing.

Evaluation of Fishery Value Chain and post-harvest losses during fish handling at Gwatar Bay, Jiwani



the country, where the landlord provides land and the peasant grows commodities. The produce is then sold to the market through commission agents, to wholesalers and then to retailers and finally to consumers. The income after deducting the cost of direct inputs is shared by the landlord and the peasant.

Within Gwatar Bay the wholesale or bulk transaction of fish is done through direct rates fixed by a third person or "*bepari*" and there is no auction mechanism. The fixed rates are normally low as compared to the Pishukan and Gwadar stations. Fish processors complain that they have to bear the extra cost for transportation from Jiwani to Karachi or Gwadar.

Fishermen are initially supposed to approach the boat owner, who provides a boat on a 50:50 partnership basis, excluding expenses such as fuel and rent. After obtaining a boat, the fishermen approach a Mole Holder, who gives a loan to the fishermen to meet their operating expenses while at sea such as meals, ice and salt. After fishing at sea, fishermen bring their catch to the auction hall, where authorized agents sell their fish and charge commissions.

The owner of a fishing vessel is usually not the fisherman or the boat's captain, known locally as "*Na Khuda*". The owner and the fish catcher generally operate on a profit sharing basis, where the two parties equally share the proceeds from the fishing activity after accounting for direct expenses. Such direct expenses may either be claimed by the owner, such as fuel, repair and maintenance, and insurance, or by the fisherman, e.g. ice, salts, meals etc. The arrangement usually does not provide for the wages of the crew and helpers.

Since the fishing activity requires a team effort, and the boat remains at sea for several days, the *Na Khuda* may take a crew with him, which normally consists of his family members. If family members are not available, he may hire a crew and pay them from his own share of the earnings.

After the targeted amount of fish has been caught, the fishermen bring their goods or catch to the landing sites (any of three prominent landing sites), where commission agents who usually provide fishing nets, engines and boats await the arrival of the catch. Only authorized commission agents are allowed to transport fish to processing units. The fishermen are not allowed to sell the products directly to either middle-men or end consumers i.e. wholesalers, retailers, consumers, fish processors or exporters.

The commission agent arranges the pick-up or motor cart and fish tub for transportation of fish catch from landing site to the processing unit or fish retailers' site. Purchasers assess the value of the commodity; the rates are already fixed in consultation with fish processing unit committees. Out of the sale proceeds, the fishermen pay 20 per cent of the gross value of fish sold as commission to the third party. This amount directly goes to the commission agent as he invests in each boat. Therefore, the fish passes from the catcher via the commission agent to the processor or exporter.

2.4.1 Availability of Raw Material – Fish Catch

Gwatar Bay has rich fish stocks of commercial significance in close proximity to the shore; the bays and mangrove forests in the delta, along with other natural factors, are ideal for the growth of marine life in general and fisheries of commercial importance in particular. Import of fish from Iran is also the best source of fish raw material and Gwatar Bay receives a large amount

Donkey cart awaits approaching boat for loading fish catch at Jiwani.

Catch from the bare ground is being loaded onto a vehicle by manual shoveling at Jiwani.

of raw fish from Iran; it sometimes exports fish to Iran as well. The total fish catch lands at three stations, while the rest of the catch lands at small landing points all along the coast, from where it is transported by land to Jiwani. Fish catch, mainly tuna, is unofficially exported to Iran depending upon the price offered to local fishers. The road network between landing points are non-existent and transportation by sea consumes a lot of time, therefore the fishermen are at the mercy of local fish traders and have to sell their products at throwaway prices. Recently, due to the development of Gwadar Port, the National Highway Authority is making some link roads which will help fishermen to transport their catch to Karachi in less time while maintaining fish quality. Other sources of fish raw material are Karachi and Gwadar from where fishermen get their catch and sell it to Jiwani for export to Iran.

2.4.2 Fish Catch Handling Practices

Generally, fishermen use small fiberglass boats without any electronic gadgets, handling or freezing facilities, hence the catch remains on the floor of the boat. Once the fish is caught, there is no handling equipment or proper means of transportation to the processing units or to the local market.

As the fish arrives at the coast, it is handled in unhygienic conditions, from unloading at the landing sites till it reaches the processing factories. Sometimes, the catch lands around midnight and remains stacked at the landing site for 4 -5 hours until, fish retailers' or factories begins processing/packing activities. Moreover, there is no arrangement for washing and proper handling or cold storage facilities for the catch at landing sites. According to our estimates, about 80 per cent of the catch can be chilled when it arrives at the fish retailer or processing factories.

It is revealed that dead fish provides an ideal condition for growth of bacteria. Chemical breakdown due to oxidative and enzymatic reactions leads to a bad odor and rancidity. Physical factors such as bruising, tearing and cutting enhance the bacteriological or chemical processes which spoil the fish. It is reported that reducing temperature through placement of ice can prevent the growth of many bacteria. The ice lowers the temperature, and keeps the fish fresh

for many days and drains the bacteria from the surface of its body.

2.4.3 Fish Processing Units

There are four fish processing units and about ten fish retailer points in Jiwani. Fish is a perishable item hence it needs immediate preservation, from the time it is caught to the time it reaches the consumer. In order to increase the shelf life and maintain the quality of fish, timely preservation is a must. In the fisheries sector, preservation of fish quality means freezing the natural product immediately after catching it.

Crushed blocks of ice are used for preservation purpose. Crushed ice has pointed edges that add to handling abuses and are a safety hazard. There are four ice plants in Jiwani which produce about 300-600 blocks of ice per day. Each block weighs around 30 kg. The blocks are crushed by crushers or iron bars and then is used on the boats or in the supply chain until the catch reaches the final consumer. All fish processing units have their own flake ice units for their own use.

After the fish processing units receive fish catch directly from the fishing boats, a Quality Check is conducted, where catch is evaluated for parameters such as size of the catch, skin damage among other things. Then floor workers (under training or unskilled labor) sort the fish by weight. In case of shrimps which are for export orders, another step is involved before pre-cooling, i.e. removing of the shells. However, the processing units have no proper system of sorting and grading. The table below shows the different grades of fish depending on condition of the fish.

The processors do not receive top quality fish at their factories, and therefore, after processing the product which leaves the factory is consequently not of a high quality.

Table 9: Fish grades in processing units provided by Fish Processing Association at Jiwani.

Fish Grades in processing units	AA	A	AH	HH	GAND
Status/condition	Extra fresh	Rigger condition	Depressed, redness on skin	No eye, injured and colorless	Degraded fish that goes to fish meals

Stacked Fish Crates.

Fish is being handled through plastic trays.

The next step involves pre-cooling, where the sorted catch is stored in separate tubs of ice, which helps to reduce the temperature of the catch and is essential for ensuring the freshness and quality of the fish or shrimp before the next step of storing it in the freezer. The following two methods of freezing are mainly used in the fisheries sector.

I) Individual Quick Freezing (IQF)
The Individual Quick Freezing technique, commonly known as “IQF”, is very cost effective and widely used method of freezing worldwide. The IQF process takes only 3 to 8 minutes (depending upon the process and the product) to decrease product temperature to –40°C, thus increasing its shelf life by 6 to 8 months. IQF is the recommended form of freezing and several countries, including those in the EU, are now planning to make IQF a pre-requisite for imports. IQF is conducted in processing units in Pakistan, but in a very limited capacity.

2) Blast Freezing
Blast freezing is a basic form of processing and is mostly used in developing countries, including Pakistan. Blast freezing takes about 8 to 10 hours to freeze the product. Blast frozen fish costs less then compared to IQ frozen fish. The customers of blast frozen fish products are often pre-processors in their own country, who after some value addition finally pass the fish to the IQF process, adding more value and then reselling it in their own country at a higher profit. In Jiwani, most of freezing units use plastic fish trays, except one factory namely Son of Sea (Gaba), which uses aluminum trays that are considered a good conductor for cold and need minimal energy for freezing. The quality of fish is comparatively better from this particular unit compared to other processing units.

2.4.4 Packing of Fish

In Gwatar Bay every factory has its own branding and packaging material. Packaging is an important factor in preserving fish quality. Products have to be packed in food grading, convenient, attractive, cost-effective and market-oriented packs with brand names printed on them. The packing requirements may vary from product to product but most of the fish processing units pack their fish products in 10 kg

size packing as their main buyers import fish products. While, ray fish product is packed in about 30 kg bags. As a standard practice of factory, water is introduced into the packaging before storage in the deep freezer that helps prevent cold burn. Recently, it has been observed that fish processing units are now focusing their attention towards canning, vacuum and shrink wrapping. One of the medium sized units has also started exporting ready-to-eat crab meat in 10 packs.

Still, there is a great need for modern and value added fish processing units that can yield products such as breaded buttered shrimps, fish fingers, fish cakes, fish paste, fish sauce, and other such products. Three major categories of export oriented fish processing activities in Pakistan are freezing, canning and fish meal production, which have already been started; however, in Gwatar Bay, only freezing of whole fish is being carried out with simple packing. After packaging, fish products are kept in cold storage at a temperature of –20°C prior to shipment in refrigerated containers.

2.5 Balochistan Fisheries Department as a Key Organization for Fisheries Value Chain Development

The Balochistan Fisheries Department plays a key role in the management of fishing activities. It mainly issues and renews boat licenses and provides support to stranded boats. The fee at which a boat license is initially issued and periodically renewed is the same and it depends on the size of boat. Upon purchase of a boat it is mandatory to get it registered. A license for one year is issued to the boat owner, and is renewed on annual basis. License issuing and renewal fees are given in Table 10.

Table 10: Boat license fee corresponding to boat size.

Boat Size (Feet)	Fee (Rs./Year)
<20	100
21 – 35	200
36 – 55 (in boat and out boat engine)	1,000
>55	1,500

Source: Balochistan Fisheries Department

Workers sorting the fish at a fish processing unit at Jiwani.

Frozen products packed in 10 kg boxes.

Table 11: Fishermen's categories and numbers in 2016 and 2017.

Categories	Number	
	2016	2017
Full time fisherman	4915	4890
Part time fisherman	719	694
Occasional fisherman	369	347
Total	**6003**	**5931**

Source: Balochistan Fisheries Department

Another major responsibility of the department is to prevent illegal fishing activity. According to the Fisheries Department, illegal fishing is the major cause the decline in fish production, though efforts have been taking to decrease it. Trawlers are not allowed up to 12 nautical miles but they mostly operate beyond the jurisdiction of the Fisheries Department. For improving fishery value chain development, the Balochistan Fisheries Department has introduced some tools such as insulated fish boxes, fish crates, trays and gloves for fishermen that help upgrade fish catch and minimize post-harvest losses.

The Balochistan Fisheries Department has one patrol boat that is 27 feet long with 2 engines of 150 horse power each and operates around Gwatar Bay to prevent and control illegal fishing activities. Staff of about 7 to 10 people including, boat driver and inspector are assigned to carry out regular patrols. In addition, the department has shot guns containing rubber bullets. The trawlers, however, are around 60 to 70 feet in length and carry weapons. The Fisheries Department's patrol boat is therefore unable to take on or prevent huge trawlers from operating.

Another serious problem affecting sea habitat, marine life and fish production is leakage of smuggled oil, which is beyond the control of Fisheries Department, hence it does not take any action against it.

Regarding safe fish handling and value chain development, the Fisheries Department does not have a particular wing to control or monitor activities within Gwatar Bay. Furthermore, there is no improvement programme for fish storage and handling practices on the boats, either at landing stations or during transportation. A total of 297 mechanised and 399 motorised boats have been reported to operate in Jiwani during the year 2017.

Table 12: Fishing crafts for the year 2015, 2016 and 2017 at Jiwani Coast.

Boat Type	Years/Numbers of boats		
	2015	2016	2017
Mechanised boat fitted with inboard engine	203	249	297
	503	375	399
Motorised boat fitted with outboard engine	Nil	Nil	Nil
	Nil	Nil	Nil
Total	**706**	**624**	**696**

Source: Balochistan Fisheries Department Statistics, 2017

In general, the Fisheries Department has an acute scarcity of resources, including equipment and facilities such as telephones, computers, vehicles, photocopier and other necessary supplies; however, there is some activity in cold chain development under IFPAD project and they have introduced insulated boxes, fish crates, fish baskets, gloves and life jackets for fishermen to improve the handling of fish and minimizing post-harvest losses. The effectiveness of work done by the staff could be improved through coordination, communication and training.

2.6 Policies, Legislative Acts and Business Enabling Environment

At Gwatar Bay, there is no significant policy for value chain development. Balochistan Fisheries laws, apart from the Shrimp Policy, do not cover aquaculture. Areas that are not addressed include pollution, introduction of new species, use of antibiotics, pesticides and other drugs in feeds, residue levels in harvested products, harvesting of wild post larvae or brood stock, registration of farmers and fish farms, organic waste management, protection of navigation, quarantine/fish health, notification of diseases, and quality of feed. The community based management of natural resources in the coastal zone is another desirable activity which is not covered in the fisheries legislation.

The fisheries laws of Balochistan relating to capturing of fisheries resources need to be properly reviewed, revised and amended to include Fisheries Management Plans for each of the discrete stocks being exploited (such as lobsters, shrimp, demersal fish, tuna, mackerel and endangered fish species such as sharks, rays and other marine bycatch including turtles, dolphins and whales).

Fiberglass fishing boat imported from Iran at Gwatar Bay.

2.6.1 Policy, Acts, Ordinances, Rules and Regulations

The main relevant policy, rules and legislative acts are mentioned here.

i) Sustainable Fisheries Policy for Pakistani Seawater is in progress, yet there is no fishery policy implemented in the fisheries sector and there is an urgent need to finalize the policy for sustainable growth and utilization of marine resources.

ii) Agriculture Produce (Grading and Marketing) Act, 1937 (Federal Govt.). This act provides authority and control for the grading and marketing of agricultural produce. Dry fish, shellfish and fishmeal are graded under the provision of this act.

iii) Food and Agriculture Department (No. IV/(5)/17-SOA-VII-F and A/58) (Federal Govt.) Rules for the Protection of Fish in the Waters of Shikarpur District (Preceded by a Provisional Order, 1957).

iv) The Pakistan Fisheries Ordinance (Federal Govt.) 1961.

v) West Pakistan Fisheries Rules, 1965 (Federal Govt.)

vi) Exclusive Fishing Zone (Regulation of Fishing) Act, 1975, amended in 1993 (Federal Govt.). This extends to the whole of Pakistan and to waters within the exclusive fishery zone of Pakistan beyond the territorial waters. It regulates the management of fishing in the EEZ of the country. The provisions of the law are in accordance with the provisions provided for in the Law of the Sea Convention, and cover licensing and management of fishing operations in the EEZ of the country. Fishing crafts are subject to navigational regulation. Prohibition of illegal, dynamite and poisoning fishing practices. Closed seasons and prohibited areas.

vii) Pakistan Fish Inspection and Quality Control Act, 1997. This law deals with the registration of fish processing plants and fish exporters, and constitutions and functions of the inspection committee. The function of the committee includes inspection of fish processing plants, fish exporters, and handling of fish and fishery products. It also defines powers, duties and functions of fishery officers and assign penalties for contravention by processors and exporters.

viii) Pakistan Fish Inspection and Quality Control Rules, 1998. This law provides a detailed description of conditions required for registration of processing plants for export, ice factories, fish handling on board fishing vessels, landing places, and fish processing establishments. It also provides provisions for registration of testing laboratories for seafood products, and notification of approved cleaning materials.

ix) Pakistan Environmental Protection Ordinance No. XXVII. This law deals with protection, conservation and improvement of the environment for the prevention and control of pollution, including biodiversity, ecosystems, effluent, hazardous substance emission and water pollution. It also has a provision to make rules for implementing the provisions of international environmental agreements.

In addition to the laws and regulations, Pakistan has entered into a large number of international agreements. Many of these require Pakistan to follow international norms and agreements on pollution, sustainable use of natural resources, the precautionary approach to fisheries, monitoring of fisheries activities and control of IUU fishing among others.

2.6.2 Credit Mechanism

There is no formal credit mechanism in Gwatar Bay. It is available to large investors, such as individuals wishing to establish processing plants, and it is subject to the usual banking rules and preconditions, but there is no mechanism for loans for small fishermen and fish retailers. Usually, commission agents provide loans to small scale fishermen on a long term basis, and these loans are repaid from the revenue these fishermen earn, often over their life time.

Furthermore, there is no direct incentive for fishermen on boats including fuel and gear and they do not usually have formal lenders. As a result, many fishermen are in the debt of middlemen and money lenders. The system is seen as iniquitous because the middlemen providing the loan get an annual return on investment (ROI) of 147%. Developing commercial fishery activities would be very difficult without financing options; loans are mainly required for leasing and operating boats. Since no formal lender tends to enter into a loan agreement with the fishermen, as it is considered as a risky business, there seems, in the short term at least, to have no alternative to the middlemen as financiers of the artisanal fleet.

2.6.3 Landing Sites Clusters

In Gwatar Bay, all of five main fishing grounds extend all along the coast and most of small fiberglass fishing vessels tend to be concentrated around three suitable landing places/ sites. Much of the coastal area is physically hostile to human habitation and settlement, and consequently is very sparsely populated. The landing sites can be divided into 3 clusters such as the western cluster, near the Iranian border centered on Gwatar Bay is Bandari covering Okar and Panwan; the central cluster, including Jiwani and Shahabad; and the Eastern Cluster which includes Bandeg, Rubbar and Ganz.

2.6.4 Responsibility for Provision of Infrastructure

At Gwatar Bay, the primary responsibility for provision of infrastructure provision is held by the Balochistan Coastal Development Authority (for the area between the water and 30 miles inland) and the Balochistan Fisheries Department. The Balochistan Coastal Development Authority has attempted to develop a harbor on the west bay of Jiwani, but only large bricks are placed in the water and the harbor plan has not been completed. The BFD also completed some infrastructure for aquaculture purpose in the deltaic region of Gwatar Bay, but plans for aquaculture have not been implemented yet. The district government also developed some shades for fishermen along the beach which provide shelter to fishermen for repairing their nets and boats.

2.6.5 Gwadar Port Authority

Located strategically about 400 kilometers from the choke point of the Straits of Hormuz, Gwadar Port is adjacent to the entrance of the Persian Gulf and about 120 kilometres away from Gwatar Bay, which is the main route for international shipping. Gwadar is under development as a mega port for the future, and multiple projects are underway as part of the China Pakistan Economic Corridor (CPEC). Direct shipping of fresh fish out of Gwadar by air transport offers an opportunity to fish exporters and a few shipments on trial basis have also been attempted from Gwadar Port to international markets by Chinese authorities. The fish quality from the day boat gill net fleet (sometimes using hand lines and long lines) is relatively good and if the fishermen are encouraged to use ice in boats while at sea then it would become even better. This fish could reach a lucrative market in the Gulf States as Gwadar is only an hour and twenty minutes away (by plane) from these markets. In this scenario, Gwadar would be a cargo port instead of a fishing port, with containers of fish passing through it. This would reduce freight costs for frozen fish, which is currently being taken by road at a cost of PKR 120,000 for a 40ft container carrying 25 tons of fish to Karachi. This would be a major benefit of Gwadar Port to the fishing industry. Already, the remote and neglected fishing villages of Gwadar have been linked to Karachi and the rest of the country through the Makran Coastal Highway (MCH) which was constructed in 2004. The MCH has provided access and greater mobility to communities along the coast and has also made it possible to expand and develop port business by increasing the volume of transit trade and cargo handling.

2.6.6 Support Infrastructure for Aquaculture

Fish stocks are declining worldwide, yet the market for fish is ever expanding. The declining wild stocks of fish are being supplemented by aqua farming of different species of fish for consumption. It is expected that aqua cultured fish will account for 41% of the world's fish production by the year 2020. This is a strong indicator of the importance of mari-culture and aquaculture.

This option is therefore available to the investors to consider moving up the value chain into aqua

farming. This will bring to an investor an advantage of a continuous and assured source of direct raw material for the processing of final products and a hedge against declining fish stocks in the wild.

Currently, there is no commercial aquaculture development at all throughout Gwatar Bay, or along the rest of the Balochistan coast, but there is potential to adopt practices from Iran, which have a good model of shrimp farming, at the Iranian border. Coastal aquaculture of other species has not been undertaken so far. There are many other species that could possibly be farmed or cultured at Gwatar Bay that is thus a potential source of income to local manufacturers of fish products since it is ideal for aqua culture development. Overall, the sea is nutrient rich with relatively unpolluted waters which make it potentially suitable for further developments in this area.

2.6.7 Gender

Fishing is 100 per cent male oriented sector. It is not a norm in local coastal societies for women to fish. During field visits to four processing plants within Gwatar Bay, only a few woman were found working at fish processing factories, namely at the Son of Sea (Gaba) and Sunset fish factories. They were working in the fish grading, and are all from Karachi.

2.6.8 Staff Education and Training

There is lack of trained staff in the fisheries sector of Balochistan. Literacy level and educational attainment remains low, especially in Gwadar district, where the literacy rate is mere 25.47 per cent against the national average of 43.92 percent. A dismal female literacy rate of 6.38 percent in rural areas of the district indicates the virtual exclusion of women from education. There is only one degree college and one technical training centre for boys in the district. There are currently no effective fisheries training courses being carried out in Balochistan, with the exception of a few courses conducted at Punjab Fisheries Department for the newly hired Assistant Directors of the Balochistan Fisheries Department.

Training courses (such as recent prawn farming trainings) are organized on an ad-hoc basis or as a response to offers from overseas institutions and research bodies. No structured training programmes exist on a long term basis. Fisheries officers in Balochistan have inadequate training or skills, though they are supposed to be well-versed in modern concepts of engine maintenance, quality control and monitoring of fish spoilage. It is essential to provide required training to the staff of fisheries' department and develop their skills in the sector. It was observed that there was no training centre, though there are plans for one to be built in Gwadar.

2.6.9 Labour Market

In Gwatar Bay, most of the laborers engaged in the fisheries sector come from other areas and belong to diverse backgrounds such as, Bangalis and Gilgitis. They are specially trained for processing, grading and packing in the fisheries industry. The country profile prepared by FAO recognizes fisheries as a contributor to Pakistan's economy and a significant source of foreign exchange. Throughout the country, the fisheries sector provides employment opportunities to about 1.5 million people. According to the 2008 report, *Balochistan Fisheries Development Study* by the Competitiveness Support Fund, it is reported that around 85% of Gwadar's employment depends either directly or indirectly on fisheries.

In general, there is no structured local labor in the fisheries sector in Gwatar area. Fishermen do not have social rights and are not considered as "laborer" under national labor laws. In this regard, local fishermen have raised their voice in provincial parliament and also have protested against this discrimination. If fishermen are included under national labor laws, then they can avail old age benefits and other facilities at the time of their retirement.

2.6.10 Market Linkage/Channels for Promotion of Fishery Products

Currently, illegal exports and imports of fishery products are done between Iran and Pakistan without any legal market linkages. Fish that is exported from Pakistan to Iran is unpacked again for value addition processes and the final product is then sold at greater margins.

If a new investor has to enter into this market, so he should first to establish his brand identity with

foreign buyers in retail and chain outlets as well as in middle to high end specialty restaurants offering sea food as part of their menus. Another factor in target markets is marketing and distribution channels which need to be established. A cost-effective option would be to get support from local marketing and distribution networks or to work directly on a one-on-one basis with the end buyer. A marketing and distribution set up in the target markets abroad allows for timely implementation of marketing interventions, obtaining relevant market feedback and generating meaningful market information, and can ensure swift distribution to retail and chain stores or restaurants.

In view of the development of Gwadar Port, the direct marketing can be done through the CPEC platform. A few successful demonstrations of direct export from Gwadar have also been carried out. This model of direct export from Gwadar may help fishermen and processors to get more benefit from fishery products. It is anticipated that limited quantities will be produced for local consumption and sell of the bulk of the production will be to foreign buyers.

2.6.11 Value Addition Processes and Product Development

It was observed that fisheries products at Gwatar Bay lack value addition. nt. Product development and diversification is limited to freezing and export of different fish species. There are a number of key processes in value addition and it is up to the investor to choose how best to convert processed and frozen fish to value-added ready–to-eat products e.g. smoked fish, which can be sold in markets worldwide. Product development also brings with it the additional flexibility to absorb unforeseeable losses that may be faced for some products but could be offset by others, allowing the investor to continue to grow and tap into new markets.

2.6.12 Comparison of Fisheries Situation between Pakistan and Iran

A comparison of the fisheries situation in Pakistan and Iran is given in the table below.

Table 13: Comparison of fisheries situation between Pakistan and Iranian sides of Gwatar Bay.

S. No.	Gwatar Bay- Fishery on Pakistan side	Gwatar Bay - Fishery on Iranian side
1.	Illegal fishing is practiced by trawl, wire and encircles netting in Pakistani waters.	No illegal fishing is practiced in Iranian waters.
2.	Weak monitoring and patrolling by concerned authorities.	Strong monitoring and patrolling is done by Iranian coast guards and fisheries department.
3.	It lacks strict ban on seasonal fishing and fishermen fish during spawning season.	Seasonal fishing is observed in true spirit and ban in is strictly implemented in June and July.
4.	It lacks fuel subsidiary and micro-credit to fishermen.	Fuel subsidiary and micro-finance is provided to all fishermen.
5.	Fishermen mostly fish in Iranian waters as good catch is reported there.	Fishermen do not fish in Pakistani waters.
6.	Fish catch is landed in motor cart and pick up by vehicle transport to the processing units.	Fish catch is landed in refrigerated containers at landing sites/harbor.
7.	It lacks fish landing jetties and harbors.	Fish landing sites and jetties are available on every site.
8.	No quality assurance and quality control checks in the supply chain by concerned authorities.	Quality assurance, quality control, monitoring and maintenance are in place at each step of fish supply chain.

2.7 Strengths, Weaknesses, Opportunities and Threats – SWOT Analysis of Fisheries Value Chain at Gwatar Bay

Table 14: SWOT analysis of fisheries value chain at Gwatar Bay.

Strengths	Weaknesses
1. Gwatar Bay has a coastline which borders the most productive sea in the world. 2. There is a sufficient supply and demand for fish products worldwide although countrywide demand (8 per cent) is very low due to weak cold chain management. However, international demand is 95 per cent. 3. Gwatar Bay is home to more than 500 species of fish and nearly 200 of them are of commercial value. 4. The quality of fish from Gwatar Bay is very good as compared to national standards. 5. There are no customs or cultural differences between the industry in Pakistan and Iran as the Baloch ethnic groups on both sides are living together in harmony. 6. Labor at Gwatar Bay fish processing industry is quite experienced and skillful. 7. There is potential for technology transfer from Iran, where the fishing industry is up-to-date such as new technology like freezing plants and onboard insulated storage is available, and transportation systems and fishermen training centres are established in neighboring villages/cities. 8. China under CPEC is planning to utilize Gwadar Port for fish exports hence fisheries resources can be sent abroad via the port.	1. There is a lack of education, training and international market awareness among labor.. 2. Poor health and nutrition issues contribute to low productivity of labor. 3. There are problems by Customs for direct export of fish along Balochistan coast and there is no export due to Customs clearance issues in Iran. 4. Smuggling, poaching and use of illegal gear in some areas. 5. Most of the fish processing units and retailers' shops in Jiwani are not up to modern standards. Most of these units are either not operating or in very poor condition, and the products produced in these units are not in accordance with the requirements of importing countries, particularly European one. 6. There is no implementation of certification standards for food safety at processing units, e.g. HACCP. Most products are sent to Karachi or the Sindh coast. 7. High operational costs because of expensive transportation charges (diesel is very expensive) and high cost of electricity. 8. Dependence on a few fish species for export purpose e.g. Ribbon fish, Sardine, Pomphret, large croakers, Top shell and Indian mackerel with very little value addition. 9. Most fish markets lack cold storage facilities andhave poor hygiene conditions and inadequate communication links. 10. Post-harvest losses are high due to poor handling of fish catch on board, low standards of storage capacity in boats, improper transportation and lack of landing sites. 11. Community members have very little experience of fish handling, post-harvest loss and transportation.

Opportunities	Threats
1. Strengthening infrastructure facilities supply and dissemination of technical knowhow for improvement fish value chain. 2. Exploring new markets for fish export such as. Iran, China, Dubai and Malaysia. 3. If local trawlers or wire netters (i.e. from Sindh) are banned, it will create more opportunities for local fishermen. 4. Sustainable use and export of fisheries resources in Gwatar Bay through international certification i.e. MSC (Marine Stewardship Council). Spanish mackerel, Tuna, Crab and Ivory shell, have potential for achieving this certification. 5. The Federal or Provincial Governments may provide expertise and technical assistance to seafood establishments to improve their processing conditions in line with various EU directives (the European Union countries are major importers of seafood products from Pakistan). 6. The Federal Government can provide assistance for direct export from Gwatar Bay via Gwadar Port or through a direct trans-border agreement with Iran; and it can strengthen the capacity of the Balochistan Fisheries Department for quality control. 7. Direct export from Gwatar Bay, through Gwadar Port will help curtail post-harvest losses and will reduce burden on transportation losses/freight rates. 8. Establishment to improve processing conditions and product quality for exporting seafood to China, Iran and European Union.. 9. Pakistan is an exporter of raw material / semi processed fish/seafood. Value addition of seafood can boost foreign exchange.	1. Marine habitat and marine life is being adversely affected due to coastal/marine pollution, over-exploitation of resources, illegal fishing, and illegal poaching of fishery resources. . 2. In order to meet the increasing fish demand, shrimp and various types of fish species are being caught with small mesh size nets, which are said to be very dangerous for marine life and marine/coastal ecosystem. 3. Iran is creating a tough competition for our industry because of better quality products and lower costs. 4. Some small mesh size nets have been banned but are illegally being used by Sindh-based fishermen at Gwatar Bay. Length of fishing nets must be as per approved international standards. 5. Catering to future demand, Iran has successfully entered the shrimp farming sector thereby affecting our exports. 6. Illegal fishing by local trawlers is also a huge threat to the marine ecosystem.

3. Recommendations

The following recommendations and suggestions are crucial to the development of the Gwatar Bay fisheries value chain.

1. The marine resources of Gwatar Bay should be harvested in a sustainable manner as per FAO Precautionary Principle and the Ecosystem Approach to Fisheries Management that ensures resources can be used for the benefit of present and future generations.
2. Establish a practical, legal and regulatory framework for the fisheries sector that is properly linked with other sectors. It will help to grow in a sustainable manner with minimum administrative and management costs being incurred on it. Further, the legislative base should be strengthened and management plans should be formulated for important stocks of marine fisheries and aquaculture.
3. While, acknowledging realities regarding funding and equipment, attempt should be made to establish and implement systems for enforcement of regulations, and monitoring, control and surveillance (MCS),

possibly through co-ordination with other law enforcement or monitoring agencies and community bodies. In addition, efforts should be made to combat, prevent and eliminate illegal, unregulated and unreported (IUU) fishing and the fishing vessels involved in such operating in Pakistani and Iranian waters should be immediately confiscated.

4. GDA and the BCDA should be supported in provision of appropriate infrastructure (harbors, jetties, roads) for fisheries all along the coast of Gwatar Bay, especially at the three prominent landing sites.
5. Institutional capacity should be enhanced so that the Balochistan Government and its various bodies can assist and guide the development of the fisheries sector. While issuing licenses and permits for fishing (and aquaculture activities), liaise, discuss and make joint decisions with all fisheries stakeholders within Pakistan and with the Iranian Government. Liaise and negotiate with those involved in activities that have an impact on fisheries (BCDA and GDA in particular) but including all other interested bodies. For example, exploring the possibilities of offshore Tuna fishing, exploiting under-utilized or unused species, exploring the markets for mari-culture and aqua culture and making trade agreements with Iran for legal trade.
6. A formal fisheries education programme should be established to increase skills throughout the Fisheries Department and the industry, as well as among fishermen. It should be initiated with establishment of a Fisheries Training and Research Centre in Gwatar Bay that help impart basic knowledge. For example, local fishermen are taught to sort fish catch by species and prepare a simple layout of their fish holds that help to identify its location.
7. With the objective of supporting commercial fisheries, a business enabling climate may be created that can lead to invest in both the capture and processing sectors. The fisheries policies should be formulated and management plans are developed so that fisheries development projects are smoothly implemented. Further, access to enterprises may be created in the fisheries sector for capacity building, fish quality management, export regulations and advice on business and investment planning and management issues on a cost-recovery basis. Furthermore there is a need to control and improve the security situation so that potential and existing investors do not feel threatened in conducting their day-to-day activities.
8. At present, boats are being constructed in an unorganized manner, mostly manually, using tools and techniques that are as old as two hundred years. Therefore, there is a need to establish an organized boat-making industry so that quality boats can be built. Fiberglass can be considered as an alternate source of material as use of wood in boat-making is causing deforestation. This intervention can lead the local boat builders/fish hold a designer to introduce a better quality fiberglass in wooden boats for fish holds so that they last longer (5 years than the traditional ones (1year). Fishermen and boat owners can benefit from higher prices for fresh catch stored in fish holds.
9. There is a need to use fiberglass boats as recommended by SMEDA, and for the development of ancillary industries such as manufacturing of nets, hooks, floats, ropes etc. If boats are equipped with such facilities, it is expected that the fisheries sector can double its post-harvest stocks, thereby increasing the export potential of this sector.
10. There is a need to mainstream new fishing methods among the fishermen (who sometimes oppose adopting new techniques) and to modernize their fleet. Fishermen make nets manually but these are of inferior quality. The basic raw material is synthetic fiber that is made locally as well as is imported. Net manufacturing should be undertaken by the organized sector.
11. Empower local communities and fishermen's associations to participate, in collaboration with the Fisheries Department, in the regulation of access to resources, and clarify user rights and obligations so that they can directly benefit

from these resources.

12 The Balochistan Fisheries Department or private sector should provide cold storage facilities on shore as well as at the auction halls, which can minimize the loss of fish catch and would help to preserve the quality of fish.

13. The existing donkey or motor cart body is designed for multi-tasking and most of the donkey carts are used in activities other than transporting fish. Therefore, proposed removable fiberglass cart body is a better option and would also save fish from direct exposure to the sun. The design is flexible for a large cart and there is sufficient space. The quality of fish can thus be improved during transportation, but most cart owners are reluctant to fully change their cart into permanent fiberglass. It was observed that the existing cart body contributes to issues such as loss of fish quality during transportation from the boat to processing units. Most of the carts were observed to have rusted nails that protrude when worn out. In addition, direct exposure to the sun during the transportation, falling of fish during long distances, and limited space for storage and over loading of fish further deteriorates it quality.

14. Provision of modern cutting, scaling, gutting, and salting tools such as knives, food grade cutting boards and buckets for washing, are necessary for fish cutters in Gwadar town that will help to improve handling and quality of fish for end users. In addition, proper attire such as aprons, caps, gum boots and gloves for fish cutters should be provided to fishermen to ensure their safety. Provision of waste bins and other tools is also required to collect fish waste and keep the value chain healthy.

15. Fish preservation should be improved on fleets destined for foreign countries so that value of the catch is enhanced. Although there is no single answer as to which form of chilling serves the best purpose to handle the post catch, in general, the flake ice is an easier, more uniform and simple distribution of ice around fish in the box or container and produces very little or no mechanical damage to fish. It also chills the fish more quickly than other types of ice. Aluminum panned trays are more efficient to quickly freeze the fish in the freezing tunnel and can eliminate heat in less time as compared to the trays in use. They also don't tend to rust quickly in sea water and can easily be reused after washing.

16. There is a growing awareness that the HACCP system is a cost-effective food safety assurance system which can be implemented in all sections of the sea food industry, from production, processing, manufacturing, distribution and retention to the point of consumption. In general, it is now recognized as an essential tool in the food industry for the control of food contamination and prevention of food borne diseases.

17. Research should be promoted in fishery development sector, particularly for small-scale fisheries. Develop and implement a joint and coordinated research programme of fisheries science in research institutions at the provincial level (linked to other national institutions). This should include all aspects of fisheries such as biology, ecology, technology, traditional knowledge, environmental science, economics, and social and nutritional science, in order to use knowledge as a basis for setting management and development objectives, including reference points and fisheries performance criteria.

18. Promote post-harvest activities and trade, so as to add value to the existing catch. Investment in modern processing and value adding plants should be encouraged so as to get the most from the catch.

19. Coordinate, collect, analyze and disseminate data and information related to fishery activities, thereby promoting an improvement in fish quality, export and local marketing.

20. Seek international collaboration for development and improvement of the fisheries value chain at Gwatar Bay.

4. Conclusion

Gwatar Bay is an internationally significant site which harbours diverse fish species and presents a marvellous view of sea. Jiwani which is located at the eastern end of Gwatar Bay is connected with Gwadar through Makran Coastal Highway that further leads to Karachi. Jiwani has an old domestic airport which was constructed by the British during the Second World War and is currently being used by the Pakistan Navy for the operations. The area around the bay includes an important mangrove forest extending across the international border, and is an important habitat for a wide variety of wildlife, especially the endangered Olive ridley and green turtles. Due to its ecological significance, Jiwani Coastal Wetland is a designated Ramsar Site.

The population of the area largely depends upon fishing and for export of fish there are a number of freezing plants located in Jiwani. Government departments are the key stakeholders involved in fisheries resource management and value chain development. In May 2018, IUCN Pakistan, under its Mangroves for the Future (MFF) programme, conducted a rapid assessment to identify the most pressing needs of the communities engaged in fish handling and processing in Gwadar. It was found that low quality or lack of fish and fish-based products affect local demand and undermine their potential for international trade in fisheries. According to the assessment, there were significant weaknesses in the fisheries value chain at Gwatar Bay that ranged from capture to handling and processing with extremely low hygiene standards.

There are a number of factors contributing to deterioration of fish quality throughout the supply chain – from catching to processing of the fish. These include improper handling of fish on boats (fish catch is placed on boat decks with direct exposure to the sun), absence of required jetties or harbor for transferring fish from boat to fish processing factories or retailers, provision of proper transportation (fishermen rely on inexpensive donkey carts or motor bike carts for transportation), manual handling of catch with shovels and spades.

Furthermore, the wooden carts used for loading fish are badly damaged with protruding and rusted nails, sharp or broken wooden edges and

dirty jute lining. Exposure to high ambient temperatures and direct sun during loading and unloading activities further deteriorates the quality of the catch. As a result about 10-20 per cent of fish catch is discarded and used as fish meal.

It was also found that the processing units operate in unsanitary conditions; fish is usually placed on dirty fish trays and while weighing, high value fish is heaped on dirty floor. Proper fish cleaning and handling facilities at fish processing units or fish retailer units do not exist. In this scenario, the exporters are not able to obtain fresh fish catch from such a poorly handled market.

Besides lack of infrastructure, cold storage facilities, appropriate equipment and tools, the other threats that include illegal fishing and over fishing, pollution and a decrease in fish stocks have created a challenging situation for stakeholders in the fisheries industry. A business enabling environment, especially for fishermen, remains bleak in the absence of policies and legislation. Thus, there is an acute need to address the social, economic and environmental factors that influence the fisheries value chain.

It is suggested that improved handling and storage of catch at sea, better sanitary conditions for handling the catch at landing sites, and better transport to processing units will enable future growth and expansion into international markets, such as direct export from Pakistan to Iran and China. This will foster a better business environment for existing and future players in the fishing industry.

There is also a need to introduce and implement international standards such as the HACCP for maintaining the quality and shelf life of fishery products. The inherent potential in the sector will remain largely untapped unless quality and production related losses are eliminated and an enabling environment for businesses is promoted. Joint stakeholder efforts with a key role of Balochistan Fisheries Department could improve the current scenario of the fisheries value chain at Gwatar Bay.

With emergence of Gwadar Port as an international port under CPEC, the area will be the focus of foreign markets, and it is high time not only to improve the existing conditions of the fisheries value chain, but also to explore value added and ready–to-eat fish products to cope with the future demands of the sea food industry. Complying with international standards and the development of mari-culture and aquaculture for farming fish and shrimp is yet another important factor to be taken into account. The model currently in use by Iran could be adopted in Pakistan for shrimp farming.

Overall, the fisheries value chain of Gwatar Bay is crucial as it supports hundreds of jobs, ensures food security and helps in revenue generation for the country through sea food exports; it is therefore up to the Government and related stakeholders to tap into the bounty of this rich site and improve the socio-economic conditions of the local fishermen.

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Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

About Mangroves for the Future

Mangroves for the Future (MFF) is a unique partner-led initiative to promote investment in coastal ecosystem conservation for sustainable development. Co-chaired by IUCN and UNDP, MFF provides a platform for collaboration among the many different agencies, sectors and countries which are addressing challenges to coastal ecosystem and livelihood issues. The goal is to promote an integrated ocean-wide approach to coastal management and to building the resilience of ecosystem-dependent coastal communities.

MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami. It initially focused on the countries that were worst affected by the tsunami – India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand. More recently it has expanded to include Bangladesh, Cambodia, Myanmar, Pakistan and Viet Nam.

Mangroves are the flagship of the initiative, but MFF is inclusive of all types of coastal ecosystem, such as coral reefs, estuaries, lagoons, sandy beaches, sea grasses and wetlands.

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MFF addresses priorities for long-term sustainable coastal ecosystem management which include, among others: climate change adaptation and mitigation, disaster risk reduction, promotion of ecosystem health, development of sustainable livelihoods, and active engagement of the private sector in developing sustainable business practices. The emphasis is on generating knowledge, empowering local communities and advocating for policy solutions that will support best practice in integrated coastal management.

Moving forward, MFF will increasingly focus on building resilience of ecosystem-dependent coastal communities by promoting nature based solutions and by showcasing the climate change adaptation and mitigation benefits that can be achieved with healthy mangrove forests and other types of coastal vegetation.

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