Pakistan is located at the gateway of the Persian Gulf. It is close to Iran, Oman, India and the land-locked central Asian countries. Pakistan is thus provided a good opportunity to benefit from its geo-strategic position. However, the increasing pollution levels in the coastal regions and degradation of marine resources of the country are emerging as important environmental threats needing immediate action.

Chapter 6 Marine Resources – life underwater

Coastal States share many similar problems; have the same regional priorities and a need to understand the common global processes that effect their shores and environments. Amongst these are the control on marine pollution from land-based activities, loss of coastal habitat, protection of coral reefs, monitoring coastal health, and the ensuring availability of information and effective coastal management mechanisms.

Pressures

More than 70% of Pakistan's total marine resource production is derived from the highly productive coastal zone along Sindh province's 350-kilometer coastline. The economies of the local coastal and deltaic community in Sindh - with about 2.3 million people, the majority of whom are poor - are principally based on the fisheries industry and coastal agriculture. Generally a uniform upward trend or frequent annual change in production has been reported by statistical data given by Fisheries statisticians during the past decade however, fishing folk report low catches and loss/depletion of valuable fisheries. This is because fishery is adversely influenced by number of problems and constraints, with serious consequences for the income of fishers, the supply of fish to consumers and poverty in rural communities.

The marine and coastal resources are a primary source of nutrition for coastal communities as well. However, severe water shortage has affected the natural vegetation of the area, which is under environmental stress as a result of seawater intrusion. This is seen in reduced mangrove cover and breeding grounds for many commercially important species of fish and crustaceans. Fish stocks are declining and commercially important marine species are fast disappearing. After the decade of 1960s, the highest marine catch was experienced in 1993 however, ever since the catch is on the decline.

Trends in Marine Catch by Province (thousand metric tons)

Province	1960	1990	1993	1995	1998
Sindh	46	260	349	281	296
Balochistan	16	107	120	122	131
EEZ	-	2	31	2	7
Total	62	370	500	405	434

Source: http://www.iczm-sa.org/pakistan/costresource.htm (data beyond 1998 not available)

The coastal fishery resource of Pakistan comprises of highly diversified multi-species complexes. These are dominantly species with relative high growth, natural mortality and

turn over rate. A common feature of these resources is that they exhibit frequent maximum abundance in near shore shallow areas. Along the coast of Pakistan mullets, sardines, shads and anchovies are known to exhibit such frequent abundance at a depth range of 30m. This abundance of fish species including the shrimp encourages the concentration of fishing efforts and incursion of trawlers and large fishing vessels in shallow waters. This tendency may lead to over fishing, inappropriate exploitation patterns, post-harvest losses, conflicts between small and large scale, habitat degradation, information research inadequacy and institutional weakness/constrains. These issues are interconnected and have cross-reinforcing tendencies. Over the past 2 decades, Pakistan's coastal fisheries resources are constantly under constraints. However, there is no precise estimation of the extent this threat which directly impacts proper management planning efforts.

Excessive Fishing

High fish demand, due to increase in population; advances in technology: accelerated industrial fisheries development during the past few years and the issuance of fishing licenses without any knowledge of sustainable stock has led to excessive pressure on fishing resources. The increase in fishing efforts results in the decline of fish catches and lessened livelihood opportunities for fisher folk. These conditions force the fisher folk to restore to illegal fishing techniques that may be beneficial to individuals but cause irreparable loss to our fisheries.

The data published by Marine Fisheries Department suggests a marked decrease in number of trawlers from 1,926 to 1,604 in 1999 while large gill netters increased from 1,154 – 1,882 during the same period. Similarly the number of mechanized sailboats increased from 6,524 to 8,282.

Inappropriate Exploitation Patterns

The patterns of fishing in Pakistan's coastal water is very conservative, large number of fisher folk depend on less mechanized boats (due to economic costs associated), which usually operate in shallow waters. Technological advances, where explored, have been largely limited in scope due to higher costs associated with them as well as lack of awareness amongst fisher folk communities about the proclaimed benefits there from.

Fisheries Conflicts

A downward spiral of coastal and marine resource degradation, livelihood loss, and worsening poverty are occurring in Sindh. At the same time, land use practices, such as the building of small dams and shrimp ponds, has interfered with water flow and hydrological processes. Conflicts between the farming and fishing communities in the area over the availability and use of freshwater further exacerbate the situation.

In Pakistan majority of fisher folk are extremely poor, earning their livelihood through catching fish or other marine animals on foot with small nets, hooks and traps. Catch including lobster, crab and small Goboids fish are caught from shallow water by individual fisher folk. Some communities have small boats with sails, catch sardine, anchovies etc. using gill nets and lines. Others have small power portable engines mounted on small boats usually gill netters and also use long lines in off shore waters. Trawlers which catch shrimp and other big size fish such as Jew fish etc. foreign trawlers equipped with modern fishing and fish processing plants.

There have been several instances of conflicts where small fisher folk are mostly asking the authorities to cease these joint foreign fishing ventures. Conflicts amongst fisher folk clans from Balochistan and Sindh, that is, conflicts for regional fishing rights have also been observed. In addition, conflicts between adjacent fishing countries like India and Middle Eastern countries are also debatable.

Habitat Degradation

This has been an acute problem along the coast towards Karachi and Korangi creek. The sewage discharge from Layri and Malir rivers is causing great loss to fish nursery ground and the mangrove forest. Industrial pollutants are also discharged in the sea, which are reported to produce high concentration of lead and iron in water and fishes. The degradation of coastal habitats, mangrove area and river Indus delta due to silting are significant factors. Even the low level of fresh water discharged in the sea and intrusion of sea water inside the Indus have negative impact on fish and mangrove production. The excessive operation of commercial fish trawling in the fishing grounds contributes to the degradation of bottom, disturbing sea grass and bottom marine communities. Influence of these effects causes the decline of coastal biodiversity and biomass. The oil spills with increase oil tankers traffic, spills caused by negligence and marine transport in the area give dangerous state on our fisheries. Recent examples of such oil spill (Tasman Spirit) in the Korangi area showed decline or no catch till the oil remained on the surface.

Pollution

Korangi Creek is the worst pollution affected section of Karachi coast, where the effluents from Korangi, Landhi, Karachi Export Processing Zone, Bin Qasim Industrial Area, and Pakistan Steel Mill are directly discharged into the sea. Rough estimates indicate 2,500 industrial units, which include 170 tanneries that are disposing off untreated organic and toxic wastes into the creek waters. In addition to these the waste and sewage from the metropolis of Karachi and smaller coastal settlements are also released into the coastal waters at this site. The consequent contamination of fisheries and other fauna poses health hazards to humans due to the consumption of polluted water and fish. Furthermore, three major coastal power plants located along the creeks also adversely impact the ecology of the area through entrainment, impingement and by discharge of heated effluents in huge quantities from their cooling systems. The thermal effluents with temperatures over and above the ambient seawater temperature range exert heat stress on the fish eggs. The low survival rates of larvae of fish and shrimp affect the fish and shrimp populations in the area. Recent data collected indicates the loss of fish resulting in low catches, aggregation of hardy tolerant species not of significant economic value and body deformation among the resident species (like mullets etc). Various species of fish, crabs, and shrimp have migrated due to pollution during the last 30 years. The bird population is also threatened through consumption of polluted fish. Owing to the scarcity of fish for their food, the populations of jackals and wolves in the region have been reduced. Eutrophication caused by organic pollution has changed the composition of the benthic communities at Korangi/ Phitti Creek system. The decline in the benthic fauna that serves as food for birds has severely decreased the bird population in the area. The oyster beds, which were very prominent earlier, have almost disappeared from the region. The windowpane oyster has become very rare and it is difficult to find them in the Korangi Creek area. Sea cucumber, sea urchin, lingula and some fish species have totally disappeared from this area. The mangrove trees in the region are under stress due to the non-availability of fresh water, scarcity of rain,

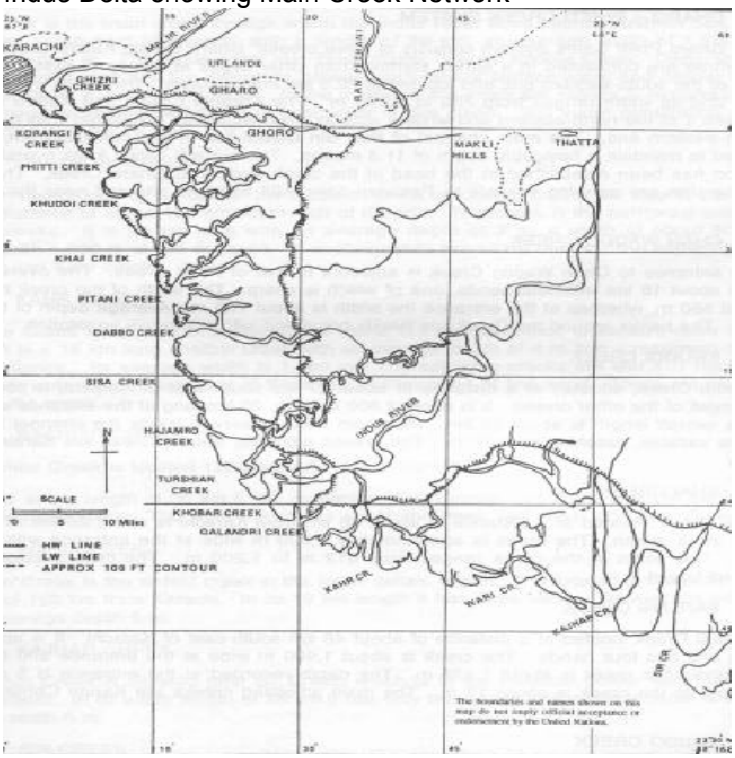
discharge of effluents directly into the creek, camel and buffalo grazing and cutting of mangroves for fuel. The increased exploitation pressure in the region has resulted in the extinction of *Rizophora mucronata* and *Aegicera corniculata* species from the region.

State

The coastline of Pakistan has large number of benthic alga and sea weed species along its length. Algae are an important component of marine ecosystems and are source of primary production. Sea weed are important great significance in the ecosystem, many animal feed on and also of commercial value.

The coastal areas of Pakistan near Karachi, Gadani, Sonmiani, Miani Hor, Phar, Aghor, Ras Malan, Ormara, Sokani, Rumna, Pasni, Chur, Ras Sughir, Sur Bunder, Gwader, Pishukan, Ganz and Jiwani display a variety of seaweed, which may be lying at the beaches during emergence from seawater either as drift or attached with the rocks or growing submerged in the water pools. 54 species belonging to 25 genera of blue green seaweeds, 110 species and 27 genera of grass-green seaweeds, 3 species and 1 genus of yellow-green seaweeds, 70 species and 27 genera of brown seaweeds and 112 species of 62 genera from red seaweeds; counting totally 349 species belonging to 142 genera of seaweeds have so far been collected along the coast of Pakistan. The most common and abundant use of seaweeds is as human food. The second biggest use is for extracting Phycocolloids which have wide commercial applications.

Indus Delta showing Main Creek Network



Source: http://www.iczm-sa.org/pakistan/pdf/iczmsp

The mangrove ecosystem along the coast of Pakistan is distributed along the Sindh coast including the mangroves along Indus delta and along the Balochistan coast. This system is dominated by a single species *Avicennia marina* which constitutes the major trees. *Ceriops tagal, Rhizophora mucronata, Aegicera corniculata, Bruguiera jugata,* and *Rhizophora mucronata* were known to occur along the coast are now no more seen.

The family penaeidae contains the greatest number of commercially important species of shrimps in Pakistan as well as worldwide. The fishery is carried out in shallow waters from October to March, while in July, August and September, shrimps are caught in creeks and backwaters. Most of the catches are frozen for export to the USA and European markets. On the other hand, lobster fisheries are only of moderate importance in Pakistan. Similary, crabs are not exploited in Pakistan at present because of low demand. Some species, however, have a high nutritional value and seem to be abundant enough to have a potential commercial value.

The coastal wetlands of Pakistan specially the Indus delta are important in respect of the diversity of birds. The huge flocks of migratory waders, egrets, herons, gulls and terns, cormorants, flamingoes are amongst the most spectacular phenomena of the coast. Following species of birds are recorded from the coast of Pakistan. The land forms are remarkably uniform and the region consists of a network of small and larger tidal creeks/channels. The arid coastline of Makran in Balochistan stretches from the Iranian border at the mouth of river Dasht and runs eastward for about 670 km towards the Hub River. The coastal zone of Makran includes rocky headlands, bays, lagoons and wide alluvial plains. Although, much of the coastline resembles a barren desert, there are spectacular landscapes at localities of Jiwani, Gawadar and Ormara.

Net Primary Productivity along the Sind Coast

Locality	Net Primary Productivity (mg C/m-3 / Hour)	Net Primary Productivity (g C/m-2/Day)	Net Primary Productivity (g C/m-2/year)
Gizri Creek	7.667 (2-13.5)	0.077	28.105
Malir river estuary	9.818 (5-15.5)	0.098	35.77
Korangi Creek	3 (1-4)	0.030	10.950
Gharo Creek	36 (2-111)	0.360	131.40
Isaro Creek	43.063 (5-175)	0.431	157.315
Open sea east coast (Seaview and Clifton)	8.063 (1.5-14.5)	0.081	29.565

Source: http://www.iczm-sa.org/pakistan/costresource.htm

Pollution on the coast of Pakistan has not yet reached any critical levels but is heading that way. It is rather high near the Karachi area, particularly around the Karachi harbor, where virtually every type of pollution is found, the most important being oil from ships and oil terminals as well as the oil spill from Tasman Spirit. The industrial and domestic wastes are yet another adding source of marine pollution levels. The greatest threat to our marine ecosystem and its resources is posed by oil pollution. Oil and its degradation products reach the costal waters of Pakistan mostly from the Persian Gulf region.

Very little study on chemical accumulation and its harmful effects has been done in Pakistan but a survey shows that plankton in the Arabian Sea has a DDT concentration of 0.05 to 3.21ppm which shows an alarming trend of pollution. The mangroves are vitally important for self repairing coastal barriers against tidal surges, the shrimp and fin fish nursery beds, and for most of the Pakistan's commercially important fishing industry. The destruction of previous mangrove forest cover by development, urbanization, pollution and cutting may lead to a great imbalance in the natural flow of our coastal ecosystem.

Impact

Combination of all the factors described above, including mismanagement of marine resources and lack of enforcement of environmental laws, has initiated a process lead to an unsustainable situation. In addition, the communities of migratory fishermen residing on the islands are very poor and their only source of livelihood is subsistence fishing. They heavily depend on the mangroves for their fuel and fodder requirements. Hence the fisheries and the mangroves of the area are heavily over-exploited. Diversification of the livelihood base of the local communities will be required for the rehabilitation of the ecosystem.

The local population is large but their socio-economic condition is poor which leads to their over exploiting the local natural resources. Secondly a very large number of fishing crafts and trawlers operate in these waters. Hence excessive fishing is also a challenge that will have to be addressed. There are several industries located along this section of the coast including a thermal power plant, a large alkali plant and several small industrial units. All of these discharge their effluents into the creek.

Economic Uses, Impacts & Social Benefits Of Coastal Areas In Pakistan

S.No.	Sector of Coastal Economy	Main Usage	Main Impacts	Social benefits of clean coastal environment
1	Fisheries: 1) Coastal & Marine Fisheries; 2) Brackish water Fisheries 3) Aqua-culture	Main-stay of Coastal Economy; Commercial Fishing for Fish, Shrimp, Lobsters, Crabs, etc.; Artesian Fisheries; Mari-culture not exploited so far.	Over fishing, Disposal of wastes generate Organic Pollution, Eutrophication in Coastal areas	Provide the main economic activity to coastal population; Provide Subsistence, sustenance and support to coastal communities for food, living and jobs; Produce Fish Catch worth over Rs 6 billion /year; Fetch Foreign Exchange of over Rs 2 Billion / year
2	Forestry: 1) Coastal vegetation 2) Coastal Mangrove Forests	Increase and sustain productivity of coastal waters; Provide Nursery, feeding and breeding grounds to a variety of fish, shell fish; Provide Fire wood, fuel wood, Fodder and food products to coastal communities; Provide Coastal Defence; Reduce Soil erosion; Clean air and water pollution.	Stop soil erosion; Clean air and water; Increase productivity; Provide roosting for birds, refuge for wild life & fisheries Provide food products and fire wood for coastal communities	Provide sustenance and support to coastal communities for food and shelter; Help maintaining a good level of bio-diversity and niches for coastal fauna and flora; Support maintaining fisheries production at a certain level despite increase in fishing pressures; Provide Clean coastal environment for coastal communities
3	Coastal Agriculture	Provide food, fodder and sustenance for coastal communities	Produce organic wastes, Residues of un-utilised fertilisers, insecticides & pesticides lead to coastal pollution	Provide food and sustenance to coastal communities and their cattle; Provide some additional economic activity for the coastal population.
4	Ports and Harbours, Shipping	Provide sites for land-sea	Dredging and maintenance dredging	Strengthen Economy through promoting

S.No.	Sector of Coastal Economy	Main Usage	Main Impacts	Social benefits of clean coastal environment
		communication; Enhance trade through export, import of required commodities; Provide landing facilities for fish catch and shell - fish , etc.	causes pollution problems; Shipping, navigation by mechanised crafts produce oily wastes and accidental oil spills leads to oil pollution; organic wastes, leaching of organotin compounds from anti-fouling paints and of heavy metals in to the coastal environment.	Trade activities under bulk Exports & Imports; Promote hygienic conditions at the fish landing jetties, harbours; Promote speedy marketing of fish and fisheries products
5	Communications Coastal Roads, water ways (rivers & creeks	Ensure speedy transportation of required commodities between cities and to the ports / harbours; Enhance trade of required commodities; Provide speedy access to modern facilities between the rural and urban centres	Environmental impacts include disturbance to wild life, coastal fauna and flora, impact on cultural heritage and local traditions	Promote development, strengthen economy and enhance socio-economy of the adjacent areas
6	Coastal Tourism	At present it is insignificant but has the potential to develop as an industry	Disturb the coastal fauna, flora, and wild life. Also negatively impact the local culture and traditions. Social and moral values change.	Promote development, improve coastal economy, improve living standards and promote development of infrastructure.
7	Energy Sector (Coastal Power Plants)	Provide basic needs for modern day living, essential for development, Promote Economy	Promote Air Pollution and acid rains. Negative Impacts include Entrapment, Entrainment and Thermal shock to microscopic plants and animals as well as larger fish, etc.; Leaching of heavy metals and the Release of Anti-fouling chemicals including Chlorine to coastal waters leads to pollution	Provide Essential Energy / Power requirement for the urban and industrial development and serves as backbone of economic development.

S.No.	Sector of Coastal Economy	Main Usage	Main Impacts	Social benefits of clean coastal environment
8	Coastal Industries: (Chemicals, metals, Tanneries, Oil Refineries, etc.)	Provide products for business, trade and exports; Provide business opportunities, jobs and economic development	Disturb coastal ecosystems and wild life,; Improper management of solid waste and industrial wastes leads to severe pollution of coastal environment, public health risks and depletion of coastal resources.	Promote industrial development, job opportunities, business and trade including exports / imports; Proper treatment and disposal of sewage and industrial wastes help maintain clean environment.
9	Coastal Minerals Industries 1) Extraction of Minerals 2) Sea Salt (Coastal Salt Pan Industry)	Promote use of coastal lands for economic development,	Extraction of beach sand and minerals disturb local hydrologic regime; Production sea salt from polluted waters leads to public health risks	Promote coastal development and encourage use of local resources for coastal communities
10	Construction Material (Extraction of Coastal Sand & Gravel)	Promote use of coastal materials for economic development,	Extraction of gravel disturbs local hydrologic regime and weaken coastal protection works and coastal defence.	Promote coastal development and encourage use of local resources for coastal communities
11	Boat Building / Ship Building	Promote Transportation through sea and water-ways; Essential for Trade and Fishing activities	Disposal of waste products leads to pollution; Mechanised boats and ships promote oil pollution	Promote shipping and exports; Promote fishing industry and local / foreign trade; Provide job opportunities; Help maintain traditional boat building skills.
12	Ship Breaking Industry	Provide scrap steel and other scrap metals for foundries; and scrap wooden products, etc., for a variety of re-use for local industry	The waste products and waste / un-used fuels, oily products, anti-fouling paints, and heavy metal leaching leads to heavy metal and oil pollution	Promote coastal area development, infra-structure; Promote development of foundries and allied industries; Provide job opportunities to local people.
13	Coastal Urban Developments: 1) Coastal urban	Provide developed sites for residential use and setting up	Disturb coastal ecosystems and wild life,;	Provide residential areas with modern day living facilities;

S.No.	Sector of Coastal Economy	Main Usage	Main Impacts	Social benefits of clean coastal environment
	Development and Housing 2) Beaches and Coastal Recreation 3) Disposal of Sewage and Solid waste management	industrial usage; Provide recreation and business opportunities; Provide safe drinking water, sanitation and clean environment	Increase pressures on coastal resource use; Improper management promotes poor sanitation, pollution of coastal environment, public health risks and depletion of coastal resources	Promote industrial development, job opportunities, business and trade including exports /imports; Help maintain good sanitation, safe drinking water supply, proper treatment and disposal of sewage and industrial wastes and proper solid waste management.
14	Oil & Gas Exploration	Provide good business prospects in Oil & Gas sector and its development for the benefit of coastal population from indigenous coastal resources.	Disturb coastal ecosystems and wild life; Improper management of exploratory activities and improper management & disposal of waste products leads to pollution of coastal environment and negatively affects coastal fauna & flora.	Disturb coastal ecosystems and wild life,; Improper management of wastes produced leads to damage coastal fauna, flora and negative impacts
15	Coastal Defence / Storm Protection: 1) Natural Coastal Defence (Coastal vegetation & Mangrove forests) 2) Man made Defence i) Coastal protection works ii) Flood Control	Provide protection to coastal area and coastal resources from Storms, cyclones; Act as buffers and provide protection to coastal areas from flooding after heavy rains and land run-off	Man made protection works obstruct natural flow of water and hinder water exchange; The man made structures limit and disturb the progression and natural growth and spread of coastal communities and disturb natural ecological balance.	Provide protection to coastal structures, ports and harbours, coastal out-falls from the ravages of storms, cyclones and thus protect life and property; Natural coastal defence also promote sustenance of coastal living resources and provide food, fodder, fuel / fore wood to the sustain coastal communities.
16	Water Drainage: 1) Saline Agriculture 2) Storm water Drainage for Urban & Land Run-Off	1) Efficient Agriculture Drainage to the sea helps in fighting water logging and soil salinity problems in coastal and upland	Agriculture drain waters cause coastal pollution by residues of pesticides, insecticides and fertilisers;	Efficient Agriculture Drainage rehabilitate agriculture lands under water logging salinity and thus help increasing agriculture production;

S.No.	Sector of Coastal Economy	Main Usage	Main Impacts	Social benefits of clean coastal environment
		agriculture areas. 2) Provide natural and man made drainage facility to coastal areas; Help maintaining good sanitation in the coastal areas / towns / cities.	Land-run-off brings a variety of pollutants from land based industries urban developments and human settlements	Improved Sanitation through efficient Storm water Drainage; Mitigate flooding of low lying lands and help maintaining clean environmental conditions in coastal areas for coastal communities.

Source: Ministry of Environment and National Institute of Oceanography

Response

The Government of Pakistan has acknowledged the need for Integrated Coastal Zone Management (ICZM) and has made an international political commitment to develop and implement an ICZM programme. The country's National Conservation Strategy (NCS) outlines policies and measures for the development of coastal and marine resources that are in essence components of the ICZM approach. Agenda 21 of the United Nations Conference on Environment and Development (UNCED) recognised the special importance of the oceans and coastal zones in relation to sustainable development. Pakistan as a participant in the Conference has made a commitment to support Agenda 21.

In recent years there has been a marked increase in coastal development activities as more people migrate to coastal areas and more displaced people take up fishing to survive. Considering the rapid expansion of Karachi, it is likely that without rational management and sustainable use of coastal and marine resources large parts of the Karachi coast will suffer irreversible damage. Realising this, the Coastal Environmental Management Plan for Pakistan was prepared by UN-ESCAP Bangkok, in cooperation with the Environment and Urban Affairs Division, GoP and the National Institute of Oceanography (NIO), in 1990. This Management Plan, however, has not been implemented so far. These concerns had also prompted the Ministry of Science and Technology, Government of Pakistan , to organise an ICZM workshop (October 1994), with an aim to assist in drafting guidelines for the development of an integrated coastal zone management process. The workshop identified ICZM as the most imperative and immediate need for Pakistan.

Efforts to assess Biodiversity in the coastal area of Pakistan are many reported from individual assessments on a particular group in a niche. However, the state of knowledge is often unsatisfactory for proper evaluation. The absence of reliable information and consequently sound assessments can create serious consequences to understand the biodiversity, its trends and changes. Similarly, non availability of adequate literature, type specimens and less linkage with develop world are primary factors which has provided skewed knowledge. Check lists of flora, fauna and other biotic component are complementary tools of Biodiversity and Pakistan has recently embarked upon compiling hand maintaining updates lists.

Another factor which is extremely difficult relates with assessment of ecological diversity, assessing biodiversity at ecological level is easy to monitor the on going changes and the ecosystem degenerating caused by human population to exploit the commercial species at the maximum level that may result over fishing and depletion of fisheries and eventually resulting socioeconomic hazards. At present some of species shrimp and prawn are under enormous fishing pressure because of increasing demand. In addition species like amphioxus, lingual and oyster bed are lost from our coastal area because unfavourable environmental conditions.

Pakistan as a maritime nation can prosper if it makes use of the oceans successfully and wisely to enhance commerce and maritime security, and keeps open, the sea-lanes of communications for commercial purposes. For this, a stronger and firmer commitment and more comprehensive means have been stressed time and again by various stakeholders including the government.

Input to Medium Term Development Framework

In August 2004, the Marine Fisheries Department at the Wetland Centre, Karachi, and World Wide Fund for Nature, Pakistan, jointly hosted a workshop. The purpose of the event was to identify factors contributing to the country's failure in achieving the required growth of fisheries. The experts discussed various aspects of the issue at the consultative workshop on 5-year pan for fisheries sector. Stakeholders in fisheries sector, experts from the federal

and provincial Departments of Marine Fisheries, National Institute of Oceanography, Balochistan Coastal Development Authority, as well as academicians and representatives from various NGOs, community-based organisations and academicians participated and provided input.

The scarcity of scientific studies and the non-availability of data about marine fisheries, lack of human resource development, illegal and harmful practices in fishing, and absence of micro-finance facility were major obstacles in the required growth of fisheries have been identified as key areas to address in the 5-year plan. The future marine fisheries policy is therefore envisaged to be based on research and community participation in the planning process.

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