

WORKING PAPER

PRIAP

Dr. Kuperan^{n.2003}

Policy, Legal and Institutional Studies

SH
206
P272
P64
#4
c.2

Management of Fisheries, Coastal Resources and the Coastal Environment in Bangladesh: **Legal** and **Institutional** Perspectives

Ehsanul Habib

Policy Research and Impact Assessment Program



International Center for Living Aquatic
Resources Management

Library



1000019547



SH
206
P272
P67
#4
C-2

#410

PRIAP 2003

Working Paper No. 04

MANAGEMENT OF FISHERIES, COASTAL
RESOURCES AND THE COASTAL ENVIRONMENT
IN BANGLADESH: LEGAL AND
INSTITUTIONAL PERSPECTIVES

November 1999

Ehsanul Habib



MANAGEMENT OF FISHERIES, COASTAL RESOURCES AND THE COASTAL ENVIRONMENT IN BANGLADESH: LEGAL AND INSTITUTIONAL PERSPECTIVES

by Ehsanul Habib

1999

Printed in Manila

Published by the International Center for Living Aquatic Resources Management
MCPO Box 2631, 0718 Makati City, Metro Manila, Philippines.

Ehsanul, H. 1999. Management of fisheries, coastal resources and the coastal environment in Bangladesh: legal and institutional perspectives. PRIAP-ICLARM Work. Pap. Ser. 4.

Coordinator: Albert M. Salamanca
Copyeditor: Timothy R. Montes
Layout Artist: Florisa Norina Luna-Carada
Cover Designer: Miguel C. Migallos

This document has not been subjected to peer review or editing by ICLARM Publications Unit. The views presented in this paper are those of the authors and do not necessarily represent those of the Policy Research and Impact Assessment Program, ICLARM or Sida.

*This working paper is dedicated to the late
Dr. Mohiuddin Farooque, Founder and Secretary-General of the
Bangladesh Environmental Lawyers Association.*

Editor's Preface

This working paper, written by Atty. Ehsanul Habib of the Bangladesh Environmental Lawyers Association (BELA), is a profile analysis of the legal, institutional, and policy mechanisms of Bangladesh in its management of fisheries and coastal resources. This is one of the major outputs of the project entitled "Management of Fisheries, Coastal Resources and the Coastal Environment in Indonesia: Institutional, Legal and Policy Perspectives". The overall objective of this project is to look into the elements that are instrumental in formulating the rights and rules (laws, customs, traditions etc.) which provide the legal, institutional and policy framework for the implementation of locally-based (resources) management systems in marine and coastal areas. Other names for these systems include "co-management", "community based management", and "integrated coastal resources management". Special attention is given to fisheries and other types of aquatic resources as well as coastal environmental protection.

The existing laws defining the country's coastal fishery and regulating the exploitation of resources in it are flawed and prone to legal circumvention. The definition of Bangladesh fisheries water as laid down by the Marine Fisheries Ordinance of 1983 (MFO) has a lacuna in demarcating the area from an 18.29 m depth line to the limits of the territorial sea. This definition excludes the shallow areas between the coastline and the baseline measured from the 18.29 m depth where much of destructive fishing practices is also done. The Protection and Conservation of Fish Act of 1950, the parent act regulating fishing practices inland, may have questionable application to the area. Already, practices prohibited by this law like large-scale fishing using fixed engines and the use of the estuarine set bag nets is common in this area where the law's jurisdiction is questionable.

Conflict of jurisdiction and overlapping of functions of authority has led to a confusing situation regarding the appropriate departments to implement fishery regulations. For example, the Department of Fisheries (DoF) has authority to require fishing licenses under section 13 of the MFO in order to regulate fishing practices and to prevent overfishing. But the purpose of this ordinance is defeated by sections 17 and 18 of the MFO which exempts local fishing vessels from this requirement if they obtain registration or valid certificate under any other existing law. Incidentally, the Department of Shipping also requires registration of all vessels as proof of their seaworthiness, and this exempts most fishers from the DoF regulation. Registration based on vessel fitness alone and exemption from obtaining fishing licenses may lead to a situation where the number of vessels will exceed the tolerable limits of resource exploitation.

Equally confusing is the management of mangrove forests located within reserved forests. The Forest Department also issues fishing licenses inside the area, even allowing shrimp fry collection in disregard of the fact that mangroves act as nursery grounds for many aquatic organisms.

Of prime concern is the absence of regulations covering the use of estuarine set bagnets and the collection of fry from wild source, two practices that are highly destructive to fish stocks.

Large areas of the coastal region have been converted to shrimp farms, resulting in some social tension between rice and shrimp cultivators, not to mention the destruction of around 3,000 hectares of mangroves. There exists no zoning law for utilizing the coastal land for shrimp culture and, as such, there have been cases of adjacent agricultural lands being inundated by saline water. The Shrimp Estate Management Policy (SEMP) has a procedure for declaring *kbhas* (public) lands as shrimp estates to be distributed to interested fishers and traders. Administered by the Ministry of Land, SEMP is problematic because aquaculture is as much of a land issue as it is also a fishery issue, and the primary consideration in its implementation is the generation of economic revenue, not environmental soundness or social justice.

The institutional setup for sustainable use of coastal and fishery resources is existing, but the enforcement efforts by the different sectors are uncoordinated, competing, and sometimes even adversarial. The implementation of the Environment Conservation Act of 1995 leaves much to be desired inasmuch as industrial effluents, municipal wastes, oil spills, bilge, and sewage from ships continue to be dumped into the waterways. Stringent standards for the issuance of environmental clearances to industries near waters is provided by the aforesaid law, but the departments concerned lack adequate legal, technical, and logistical resources to efficiently implement it. Shipbreaking operations, for example, circumvent this requirement of an environmental clearance from the Department of Environment by operating under the guise of re-rolling mills. The Ports Authorities of Chittagong and Mongla, the two major ports of the country, cannot strictly enforce its mandate to minimize oil spills, sewage from ships, and transport of hazardous wastes.

There is therefore an urgent need to harmonize fishery and environmental laws in Bangladesh in order to efficiently implement its policy on sustainable exploitation and protection of its coastal resources. This policy should include the education and participation of the people in the management of their own resources.

At this juncture, the assistance provided by Dr. Mahfuzuddin Ahmed, the Program Leader of the Policy Research and Impact Assessment Program of ICLARM, in reviewing and commenting on the first draft is acknowledged. We would like also to express our gratitude to Sida for providing the funds to carry out this project.

Appreciation and gratitude is also extended to the late Dr. Mohiuddin Farooque, Founder and Secretary-General of BELA, for having laid the initial foundations of the working paper.

The views expressed in this working paper represent those of the author and do not necessarily reflect ICLARM or Sida.

Dr. Magnus Torell
Project Leader
Policy Research and Impact Assessment Program

Author's Preface

The study is intended to provide the basis for a profile on Bangladesh to be included in a regionwide study entitled Management of Fisheries, Coastal Resources and the Coastal Environment in Southeast Asia: Institutional, Legal and Policy Perspectives.

The objective of the study is to look into the regulatory regimes to manage the fisheries and the coastal environment in the country, especially the policies, laws and institutional mechanisms.

Geomorphologically, the coastal area of Bangladesh has unique features which are different from the other parts of the country. The country's coastal fishery and environment contribute largely to the revenue and employment of the people. Because of the unplanned, uncoordinated and indiscriminate exploitation and utilization of the country's coastal resource, the rich biodiversity of this environment has been affected.

The coastal environment has been experiencing a continuing saga of destruction due to unregulated conversion of the mangrove ecosystems into jumbo shrimp ponds. Although such mangrove forest was declared as Reserved Forest and managed accordingly by the Forest Act of 1927, public resources are managed by the state organs devoid of public participation and accountability.

Coastal resources possess certain identical features and they require clear legal arrangement which could cover all the conflicting regulations. The coastal area is situated between the inland and marine area, but there is no legislation that spells out the limits of the coastal region. The regulating provisions governing either the inland or marine coastal areas is complex and confusing. For example, it is prohibited in the Protection and Conservation of Fish Act of 1950 to operate fixed engines in inland rivers. If one visits any of the coastal rivers (estuaries), one would see the large-scale operation of such engines known for its destructiveness. One is likely to get confused which law regulates this type of gear in bodies of water managed as *jalmohals* especially when catch from such source is categorized under inland production.

Another important feature affecting the country's coastal area is the unplanned and unregulated expansion of shrimp culture. Undeniably, this fishery is earning a sizeable foreign exchange at the expense of environmental sustainability. The catching of shrimp fry from wild source along the coastal belt has been causing immense damage to other marine and estuarine species. This needs a regulatory approach which entails providing alternative sources of livelihood and employment for affected fisherfolk. Other issues like land use, culture methods, waste disposal, and payment of compensation to those affected are not legally defined. Rather, these are governed by *ad hoc* policies or circulars, the provisions of which are in conflict with each other.

The institution which deals with fish production and stock assessment should be the focal point in managing the resource. This institution should be able to strike the appropriate balance among other organs in ensuring maximum benefit to the fishers. However, the legal machinery is defective as regards allowing fishing operation in the coastal water. This may lead to a situation of exposing the resource to overexploitation and result in its depletion.

This study has attempted to analyze the jurisdiction of laws that would regulate various issues connected with fishery in Bangladesh. It has been discovered that the current fishing practice in the coastal waters is not in consonance with the existing legal norms. Whether or not the law was promulgated without taking into account the traditional practices of the people or without being aware of the impact of such practices, no effective alternative measures has yet been taken. The pollution status of water bodies caused by discharge of industrial waste of port areas from oil spills, bilge or ballast waters will be discussed in the context of the country's legal and regulatory regime. Policies adopted and the role of institutions involved have been analyzed with the view of working out a basis for a coordinated effort in addressing coastal issues and operationalizing policy guidelines.

As the resources are under the jurisdiction of various sectoral institutions and the management practice is devoid of public participation, incoordination and competition ensued which prevents sustainable growth and management of the coastal resource.

May I conclude by saying that whatever we do must be done in proper consultation with the people, by acknowledging their traditional norms and values and by clearly spelling out their rights, duties and interests as stakeholders of their own environment.

Ehsanul Habib
Coordinator
Bangladesh Environmental Lawyers Association
(BELA)
House 9, Road 8, Dhanmondi R/A
Dhaka 1205, Bangladesh

Contents

Dedication	iii
Editor's Preface	v
Author's Preface	vii
List of Figures	xiv
List of Tables	xiv
List of Boxes	xiv
List of Acronyms	xv
Abstract	1
1 Resources of Bangladesh	3
1.1 Water Resources	3
1.1.1 River	3
1.1.2 Floodplain	3
1.1.3 <i>Beels</i>	3
1.1.4 Estuaries	4
1.2 Fish as Resource	5
1.2.1 Protein Supply	6
1.2.2 Contribution to GDP	6
1.2.3 Foreign Exchange	6
1.2.4 Employment	6
1.2.5 Available Fish Species	6
1.2.6 Exotic Species	7
2 Fisheries in Law	9
2.1 Management Perspective	9
2.1.1 Public Fisheries	9
2.1.2 Private Fisheries	10
2.2 Biological Perspective	10
2.3 Legal Status of Coastal Fisheries	11
3 Management of Fisheries	15
3.1 Resource Potential of Inland Sector	15
3.1.1 Production Aspect	15
3.1.2 Area Covered	16
3.1.3 Inland Species	16
3.2 Evolution of Management Regime	16

3.2.1	Permanent Settlement Regulation	16
3.2.2	Since the Abolition of the <i>Zamindari</i> System	17
3.2.3	Revenue Oriented Leasing vs. Genuine Fishermen	17
3.2.4	New Fisheries Management Policy	18
3.2.5	Leasing of Open <i>Jalmohals</i> Abolished	19
3.3	Leasing of Closed <i>Jalmohals</i>	21
3.4	Management of Coastal Fishery	24
3.4.1	Resource Potential of Marine Sector	24
3.4.2	Principal Fishing Grounds	24
3.4.3	Available Stock	24
3.4.4	Species	25
3.4.5	Evolution of Management Regime	25
3.4.6	Jurisdiction of MFO (1983)	25
3.4.7	Registration of Fishing Crafts	26
3.4.8	Fishing License	26
3.4.9	Conditions of License	26
3.4.10	Administration	26
4	Prohibited Activities in Coastal Fishery	29
4.1	Activities Prohibited in Coastal Fishery	29
4.2	Prohibited Activities in Marine Waters	30
4.3	Marine Reserve	32
4.4	Conservation Zone	32
4.5	Control of Pollution	33
4.6	Closed Season	33
5	Legal and Non-legal Issues	35
5.1	Jurisdiction of Coastal Fishery	35
5.2	Fishing License	36
5.3	Fishing Gear	36
5.3.1	Set Bag Net	37
5.3.2	Pushnet Fishery	38
5.3.3	Other Fishing Gear	38
5.4	Number of Fishing Vessels vs. Resource Potential	38
6	Policy Covering Coastal Fisheries and Environment	41
6.1	National Fish Policy (NFP)	41
6.1.1	Salient Features of the NFP Relating to Coastal Fisheries and Environment	42
6.1.2	Conservation of Biological Marine Resource	42
6.1.3	Artisanal Fisheries Sector	43
6.2	National Water Policy (NWP)	43
6.2.1	Water Fishery and Wildlife	44
6.2.2	Water for Environment	44

6.3	National Environment Policy (NEP)	44
6.4	National Conservation Strategy	45
6.5	National Five Year Plan (1997-2002)	45
6.6	Salient Points of Policies Discussed Above	46
6.6.1	Shrimp Culture	46
6.6.2	Industrial Pollution	46
6.6.3	Number of Fishing Operations	46
6.6.4	Use of Gear	47
6.6.5	Fishing Communities	47
6.6.6	Embankment	47
6.6.7	Land Use	47
6.7	End Notes	47
7	Institutions	49
7.1	Ministry of Fisheries and Livestock (MoFL)	49
7.1.1	Department of Fisheries (DoF)	50
7.1.2	Bangladesh Fisheries Development Corporation (BFDC) ..	54
7.1.3	Fisheries Research Institute (FRI)	55
7.2	Ministry of Land (MoL)	55
7.3	Coast Guard	55
7.4	Institutional Issues	56
8	Coastal Fishing Communities	59
8.1	Non-mechanized Small-scale Fishing	59
8.2	Mechanized Fishing	59
8.3	Practice in Sharing Benefits	60
8.4	Significant Feature of ESBN Operation	61
8.5	Conflict Between Coastal and Industrial Trawling	61
8.6	Monitoring	61
8.7	Credit	62
8.8	Role of NGOs	62
9	Impacts and Expansion of the Coastal Shrimp Culture	63
9.1	Area Suitable For and Under Shrimp Cultivation	63
9.2	Shrimp-Farm Ownership Pattern	63
9.3	Impact of Shrimp Culture on Environment and Social Structure	64
9.3.1	Mangrove Destruction	64
9.3.2	Social Conflicts	65
9.3.3	Culture Methods	65
9.3.4	Pollution of Water Bodies	66
9.3.5	Impact of of Shrimp Fry Collection or Pushnet Fishery	66
9.4	Legal Situation	68
9.4.1	Shrimp Estate Management Policy (SEMP)	68
9.4.2	Development and Management of Shrimp Resource Committees	70

**Management of Fisheries, Coastal Resources and the Coastal Environment in Bangladesh:
Legal and Institutional Perspectives**

9.4.3	Land Management Manual	71
9.4.4	National Fish Policy	71
9.4.5	National Water Policy	72
9.4.6	National Environment Policy	72
9.4.7	Shrimp Culture (Tax) Act of 1992	72
9.5	Conflicting Issues	72
10	Management of Mangrove Fishery	77
10.1	Area of <i>Sunderbans</i>	77
10.2	Wildlife Habitat	77
10.3	Mammals	77
10.4	Birds	78
10.5	Reptiles and Amphibians	78
10.6	Fish and Crustaceans	78
10.7	Microorganisms	78
10.8	Estuaries of <i>Sunderbans</i>	78
10.9	Management of <i>Sunderbans</i> Fisheries	79
10.9.1	Evolution of Management Practice	79
10.10	Issues on the Management of <i>Sunderbans</i>	80
10.11	World Heritage Site	82
10.12	Ecologically Critical Area	82
10.13	Chakaria <i>Sunderbans</i>	82
10.13.1	Settlement of Mangrove Forest for Shrimp Cultivation	83
11	Environmental Issues in the Region of Bangladesh	85
11.1	Coastal Embankment Project (CEP)	85
11.1.1	Impact of CEP	86
11.1.2	Impact on Fishery	86
11.1.3	Changed Land Use	87
11.1.4	The Ministry of Water Resources	87
11.1.5	National Fish Policy of 1998	88
11.1.6	National Environmental Policy of 1992	88
11.1.7	Environment Conservation Act	89
11.2	Increased Salinity	90
11.2.1	Problem of Increased Salinity in the Coastal Area	90
11.3	Pollution of the Coastal Water Environment	90
11.3.1	Industrial Pollution	91
11.3.2	Legal Situation	93
11.4	Agrochemical	95
11.5	Domestic and Municipal Wastes	96
11.6	Oil Spills	97
11.6.1	Ballast and Bilge Waters	98
11.6.2	Discharge of Sewage from Ships	98
11.6.3	Legal and Institutional Setup	99
11.7	Shipbreaking Operations	100
11.7.1	Legal Issues	100

12	Recommendations	103
12.1	Legal Status of Coastal Fishery	103
12.2	Leasing of Open <i>Jalmohals</i> Abolished	103
12.3	Jurisdiction of Laws	104
12.4	Fishing License and Number of Vessels	104
12.5	Fishing Gear	105
12.6	Shrimp Culture	105
	12.6.1 Land Use	105
	12.6.2 Culture Methods	105
	12.6.3 Fry Catching from Wild Source	106
	12.6.4 Monitoring of Existing Policies	106
12.7	Coastal Embankment Project	106
12.8	Management of Mangrove Fishery	107
12.9	Industrial Pollution and Municipal Wastes	107
12.10	Oil Spill, Bilge Waters and Sewage from Ships	107
12.11	Shipbreaking Operations	108
12.12	Policy Implications	108
12.13	Institutional Issues	108
	References	109

List of Figures

Figure 1-1	Map of Bangladesh Showing the Limit of Salt Penetration in the Coastal Zone	4
Figure 1-2	Contribution of Inland and Marine Fisheries in Fish Production	6
Figure 2-1	Coastal Fishery Jurisdictions in Bangladesh	13
Figure 3-1	Depth Distribution and Area of Operations of Dominant Fishing Gear Used in the Coastal Waters of Bangladesh	25
Figure 9-1	Graphical Illustration of Penaeid Shrimp Life Cycle and Fishing Gear Used to Exploit them at Various Stages	67
Figure 9-2	Distribution of Shrimp Production by Gear and Weight	68
Figure 9-3	Distribution of Shrimp Production by Gear and Catch	68

List of Tables

Table 11-1	Sources of Industrial Wastes in the Eastern Region	91
Table 11-2	Sources of Industrial Wastes in the Western Region	92
Table 11-3	Sources of Industrial Wastes in the Central Region	93

List of Box

Box 8-1	Profit Sharing Scheme	61
---------	-----------------------------	----

List of Acronyms

ADC	Additional Deputy Commissioner
BCAS	Bangladesh Centre for Advanced Studies
BFDC	Bangladesh Fisheries Development Corporation
BFRI	Bangladesh Fisheries Research Institute
BFW	Bangladesh Fisheries Water
BWDB	Bangladesh Water Development Board
CEP	Coastal Embankment Project
DoE	Department of Environment
DoF	Department of Fisheries
EEZ	Exclusive Economic Zone
EMP	Environment Management Plan
EPWAPDA	East Pakistan Water and Power Development Authority
ESBN	Estuarine Set Bag Net
FAO	Food and Agriculture Organization
HYV	High Yielding Variety
IDPAA	Institute of Development Policy Analysis and Advocacy
LMM	Land Management Manual
MAF	Million-Acre Feet
MFO	Marine Fisheries Ordinance of 1983
MFR	Marine Fisheries Rules of 1983
MFSMU	Marine Fisheries Survey and Management Unit
MoEF	Ministry of Environment and Forest
MoFL	Ministry of Fisheries and Livestock
MoL	Ministry of Land
MPO	Master Plan Organization
MSBN	Marine Set Bag Net
MWR	Ministry of Water Resources
NCS	National Conservation Strategy
NEP	National Environment Policy
NFMP	New Fisheries Management Policy
NFP	National Fish Policy
NWP	National Water Policy
RCO	Revenue Circle Officer
RDC	Revenue Deputy Collector
RF	Reserved Forest
SEMP	Shrimp Estate Management Policy
Sida	Swedish International Development Agency
WARPO	Water Resources Planning Organization

Abstract

Habib, E. 1999. Management of fisheries, coastal resources and the coastal environment in Bangladesh: legal and institutional perspectives. PRIAP-ICLARM Work. Pap. Ser. 4.

This is a profile and analysis of the legal, institutional and policy mechanisms of Bangladesh in its management of fisheries and coastal resources.

The existing laws defining the coastal fishery and regulating the exploitation of resources are flawed and prone to circumvention. The legal definition of Bangladesh fisheries water excludes the coastal area below the 18.29 m depth and jurisdiction over shallow areas to regulate fishing activities is not clear. The abolition of the lease system of open *jalmohals* (fishery) has opened up coastal areas to indiscriminate exploitation. Conflict of jurisdiction of authority has led to a confusion regarding the implementation of regulations on licensing and registration of vessels as well as the prescribed fishing practices and gear. Of serious concern is the lack of regulation on the practice of fry catching from the wild and shrimp culture.

Likewise, institutional policies are not clear or are conflicting as regards the appropriate government departments or agencies to manage and regulate mangrove fishery in reserved forests, land conversion to shrimp estates, granting of fishing licenses, ship breaking operations, monitoring and prevention of water pollution caused by industries and municipal wastes, oil spills and sewage from ships.

There is an urgent need to harmonize fishery and environmental laws in Bangladesh in order to efficiently implement sustainable resource management policies.

Chapter 1

Resources of Bangladesh

1.1 WATER RESOURCES

One-third of the area of Bangladesh may be termed as wetlands covered by different kinds of water environment. This is regulated by a more complex regime and management practice. The tradition of living with water is a unique phenomenon governed by local knowledge and traditional practice reflecting the natural bond between the people and their environment. Bangladesh inherited a colonial legal system from the British which has been at odds with the spirit of the aforesaid tradition in shaping public attitudes. The following is a brief description of water resources in Bangladesh, the dominant source of fish and livelihood for many of its people.

1.1.1 *River*

Bangladesh is located in the delta of the world's major river systems (Figure 1-1). Rashid (1991) estimated that the total length of rivers, streams and canals together cover more than 24 000 km. In an average year, 870 million-acre feet (maf) of water flow into the country from India. About 953 maf water flow to the sea of which 914 maf are through the Ganges-Brahmaputra delta inside Bangladesh and 39 maf through the rivers of the Chittagong sub region.

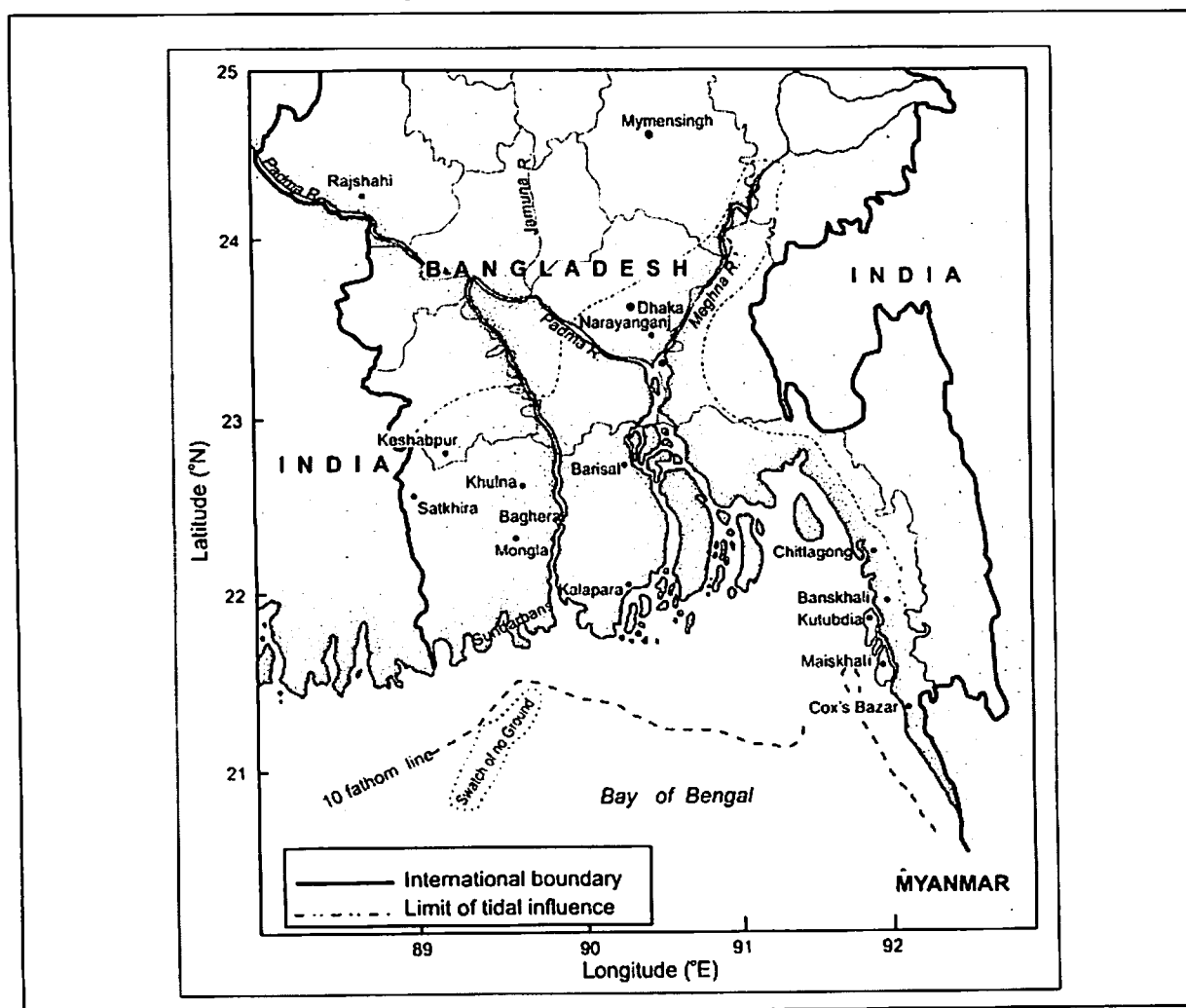
1.1.2 *Floodplain*

All these rivers and their tributaries and distributaries overflow their banks and flood extensive areas of the lowlying lands during the monsoon season from the month of May to October. According to the Master Plan Organization drafted in 1987, the total estimated area of floodplains was 6 300 723 ha in the past. As of end of June 1990, another 3.36 million ha of floodplain in addition to 814, 114 ha were protected from flooding (MPO 1990).

1.1.3 *Beels*

In a few parts of the country, lowlying areas inundated and submerged for a number of months, usually from June to September and become dry in the dry season, are termed as beels. In the Northeast region, the number of beels has been

Figure 1-1. Map of Bangladesh Showing the Limit of Salt Penetration in the Coastal Zone. (Source: Modified from Holmgren 1994 in Khan et al. 1997).



reported to be between 3 440 and 6 149. About 58% of the beel in the Northeast region are permanent and the remainder is seasonal. The total area occupied by this beel ecosystem is about 114 161 ha (Ali 1991).

1.1.4 Estuaries

All the major rivers meet the Bay of Bengal in the south of the country. Near the confluence of the sea and the rivers, freshwater and saltwater mixes producing brackishwater, and forming a distinct estuarine zone. A wide range of salinity gradients are encountered in the rivers up to a considerable distance upstream from the shoreline of the Bay of Bengal. The estuarine area covers an area of about 551 828 ha (Ali 1991).

Estuarine waters are shown in legal documents but are mostly applying institutional or utilization approach instead of environmental considerations. Such definitional approach to the treatment of these coastal resources has led to their degradation and deprivation. The ownership pattern as stated in the Bangladesh Constitution and management practice by sectoral institutions has created a chaotic condition of overlapping jurisdictions, haziness in the mandates of regulating institutions and failure in the application of laws. A river, instead of being described as a river, is labeled in several laws as canals (The Irrigation Water Rate Ordinance of 1983), channels (The Canals Act of 1864), inland navigable waterways (The Removal of Wrecks and Obstructions in Inland Navigable Water Ways Rules of 1973) and fishery (The Protection and Conservation of Fish Act of 1950). They are used by different institutions for purposes mentioned in sectoral laws and they concentrate on employing the river environment as a source of revenue by allowing various uses for it without considering the parameters needed to keep its status as river.

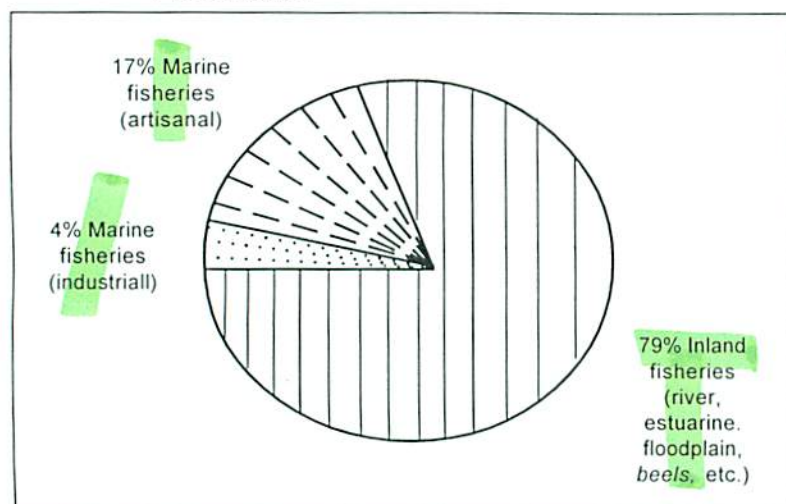
Ecologically, the different components of water environment are absolutely dependent or interconnected with each other in maintaining the richness in biodiversity and productivity.

Similarly, floodplain is another description of a unique environment considered as a breeding ground for a number of local fish species which are disappearing quickly due to unplanned and indiscriminate structures constructed to protect the high-yielding varieties (HYV) of rice. The role of the floodplain, however, cannot be underestimated in terms of its contribution to soil fertility, pest control, restocking of fish, washing away of pollutants etc. But in fact the term floodplain does not have adequate legal shield for its protection and conservation. Beels are also defined in a few of the laws like a river, based on their use either for agricultural or fishing purposes. Ecologically, the different components of the water environment are absolutely dependent or interconnected with each other in maintaining biodiversity and productivity. However, injury inflicted to any of them will have negative implications on the system, a phenomenon not taken into consideration by the sectoral legal regime that eventually promoted a compartmentalized system of governance.

1.2 FISH AS RESOURCE

Fish plays a significant role in the economy, culture, tradition and food habits of the people of Bangladesh (Figure 1-2). Fish and fisheries have been an integral part of the Bengali life. The primary sources of production are inland capture fisheries (river, floodplain, *beels*, estuaries, *sunderbans*) and marine fisheries. Fish production has risen gradually from 8.47 *lakh* t in 1989-1990 to 13.73 *lakh* t (1 *lakh* = 100 000) in 1996-1997. The growth rate in fish production during the last seven years averaged at 6.5% which is lower than increase in demand proportionate to population growth. However, the present rate of fish production has gone up to 8%. Over the last decade the price of fish has increased by 2.5%. In the National Fifth Five-Year Plan, fish production is expected to be 20 *lakh* t by the year 2001-2002.

Figure 1-2. Contribution of Inland and Marine Fisheries in Fish Production.



1.2.1 Protein Supply

The basic meal of the Bengalis consists of rice and fish and about 60% of animal protein comes from fish alone. The current level of per capita daily fish consumption is about 25.6 g, which in the early 1960s was 33 g. In order to raise the level of consumption to about 34.43 g/capita/day at the end of the Plan period (2001-2002), the required production of fish will be 1 965 million tons (Ministry of Planning 1997).

1.2.2 Contribution to GDP

Fish industry contributes about 5% to the GDP and 16.7% to the agriculture sector. Growth in the fisheries sector is 6.6% per annum.

1.2.3 Foreign Exchange

With 8-10% contribution, it is also a third foreign exchange earner in the country.

1.2.4 Employment

This sector generates employment for 12% of the total working population in various forms of livelihood activities, e.g., fisherfolk, small traders, transporters, packers, and the like. About 1.2 million and 12 million people are engaged in this sector on a full time and part time basis, respectively.

1.2.5 Available Fish Species

A total of 260 species of freshwater fish belonging to 55 families have been reported in 1989 (Rahman 1989). About 56 species of palaemonid and penaeid prawns occur in fresh, estuarine and marine waters (Kibria 1983). In Bangladesh, all the 260 species of finfish are of importance from economic, social and nutritional point of view. The species of tortoises and turtles number about 25 (Fugler 1984). In the marine waters, the species of finfish recorded so far is 475 (GOB 1990) of which only 65 are commercially exploited (Hussain 1971).

1.2.6 Exotic Species

A total of 15 species of cultivable fish, besides several aquarium fish, have been introduced in Bangladesh beginning 1952 with the objectives of augmenting production and controlling insects and weeds. These introductions were not preceded by any study on their influence on, or their interaction with local fish populations. Several of the exotic species was found to have been competing with the local species for food to the detriment of the latter.

Chapter 2

Fisheries in Law

2.1 MANAGEMENT PERSPECTIVE

2.1.1 Public Fisheries

In 1950, the government of East Bengal decided to abolish the *zamindari* (feudal system)¹ and acquired the rent receiving rights of the *zaminders* (land lords). This was achieved through an enactment, the State Acquisition and Tenancy Act (SAT) of 1950 (East Bengal Act XXVIII of 1951). The promulgation of SAT Act had the effect of placing fisheries as non-retainable [Section 20 (2a)] under private ownership. Since state acquisition by the said Act, fisheries once owned by *zaminders* were transferred to the government together with the rent and its corresponding interest. It is interesting to note that the “fishery” which is not defined in the SAT within the domain of *zaminders* was acquired and recorded as land under water². Accordingly, the ownership of the fishery is now vested with the land holding agency and management.

In pursuance of the above clarification regarding identification and definition of fishery the Land Management Manual of 1990³ designated fisheries as *jalmohals* from the perspective of management of public fisheries. This Manual classified the public fisheries (*jalmohal*) into the following two groups.

Zaminders
↳ given to
↳ gov/state

jalmohals
is
↳ public fisheries

-
- ¹ *Zamindari* system-in 1793 the usufructory rights and titles over lands of the British government were vested with *Zaminders* (Landlords) under the Permanent Settlement Regulation on payment of fixed annual revenue.
 - ² Subsection 16 of Section 2 of the State Acquisition and Tenancy Act of 1950 defined land ... covered with water at any time of the year.
 - ³ Land Management Manual of 1990 is the basic compilation of legal documents adopted by the Ministry of Land for regulating settlement and connected issues regarding public lands. This Manual succeeded the government Estate Manual of 1958, which was formulated with the view to introduce administrative infrastructure, policies and guidelines to expedite activities relating to payment of compensation to intermediaries and performance of duties for establishing direct relationship with tenants. Since its promulgation, long period has elapsed and a number of separate legal instruments emerged due to the changed socio-legal circumstance. To fulfill the targets of the time, the Estate Manual of 1958 has been revised and called the Land Management Manual of 1990.

2.1.1.1 Open Water Fisheries

The open water fisheries has been defined as those fisheries which are not surrounded by the land and in which fishing continues throughout the year. Generally, rivers, canals and all flowing water bodies are regarded as open water fisheries.

2.1.1.2 Closed Water Fisheries

The closed water fisheries has been defined as those fisheries which are confined within specific boundaries. They are surrounded by land and in which fishes are caught in a specific time of the year to attain optimum growth. Generally, *haor*, *baor*, *beel*, *jheel*, *dighee*, lake, pond and ditches are known as closed water fisheries.

2.1.1.3 Marine Fisheries

The Marine Fisheries Ordinance of 1983 (Ordinance XXXV of 1983) stated that Bangladesh Fisheries Water (BFW)⁴ means the territorial waters and economic zone of Bangladesh as declared by the government under the Territorial Waters and Maritime Zones Act of 1974 and any other marine waters over which it has, or claims to have, jurisdiction under the law with respect to the management, conservation and development of the marine living resources (Section 2.a).

2.1.2 Private Fisheries

The Private Fisheries Protection Act of 1889 (Bengal Act II of 1889) has defined private fisheries as private waters (Section 2), which are the exclusive property of any person or in which any person has an exclusive right of fishery, and in which fish are not confined but have means of ingress or egress.

2.2 BIOLOGICAL PERSPECTIVE

*place of
entrance/
an entrance .*

a going out or issuing forth

The Protection and Conservation of Fish Act of 1950 (Bengal Act XVIII 1950) defined fishery as any water body, natural or artificial, open or closed, flowing or stagnant (such as river, *haor*, *baor*, *beel* floodplain, canal etc.) where activities for growing fish or for conservation, development, demonstration, breeding, exploitation or disposal of fish or of living organisms related to such activities are undertaken, but does not include an artificial aquarium of fish used as a decorative article, pond or tank (Section 2.1a).

⁴ Bangladesh fisheries water means the territorial waters and economic zone of Bangladesh as declared by the government under the Territorial Waters and Maritime Zones Act of 1974 and any other marine waters over which it has, or claims to have, jurisdiction under law with respect to the management, conservation and development of the marine living resource.

According to Section 2 (d) of the Marine Fisheries Ordinance of 1983, fishery means one or more stocks of fish that can be treated as a unit for the purposes of conservation and management.

The description of fisheries as enumerated above suggests two broad classifications, one depending on management issues and the other encompassing biological aspects. Designating fisheries as open, closed and marine is mainly for exercising jurisdiction over such area using the same as a source of revenue earning while definitions from a biological perspective have components for protection and conservation of fish and fishery. However, if the real situation in the management and conservation of fishery and fish is analyzed it would obviously compel one to pose the question: Which came first-the resource, institution, the law or policy?

2.3 LEGAL STATUS OF COASTAL FISHERIES

For the purpose of this study, apart from the classifications stated above, the legal status of coastal area or fisheries needs to be identified. The coastal area of Bangladesh is within the tropical zone between 21° and 23° north latitude. The coastal region covers an area of 36 000 km², which has a population of 20 million (United Nations 1987). The coastal morphology is characterized by a vast network of rivers, the enormous discharge of river water laden with sediments, a large number of islands between channels formed by tropical cyclones and their associated storm surges etc. On the basis of these geomorphological conditions, the coastal area is divided into three regions, namely eastern,⁵ central⁶ and western⁷ regions (Pramanik 1983). The existing legal documents do not clearly specify the jurisdiction of the coastal area though it is recognized on the basis of geomorphological characteristics. Similarly, it is hard to find the existence of coastal fisheries in terms of legal identification, although it possesses identical features. This difficulty also applies to finding regulatory issues in terms of having separate legal arrangements.

-
- ⁵ The eastern coastline extending from the mouth of Big *Feni* River to *Badar Mokam*, the southern tip of the main land, along Chittagong is regular and unbroken and is protected along the sea by mud flats and submerged sands. A continuous strip of sand runs from Cox's Bazar to *Badar Mokam* and forms a long sea beach of about 145 km. The smaller rivers of the eastern region (Karnaphuly, Sang, Matamuhuri and Naaf) also contribute to the active nature of the area. The region includes wetlands like Takara Sunderbans (mangrove forest), Teknaf Peninsula and the Naaf Estuary of international importance under the Ramsar Convention.
- ⁶ This region runs east from the Tetulia river to the Big *Feni* river estuary and includes the mouth of the combined Ganges-Brahmaputra-Meghna (GBM) rivers. As a result, the region is characterized by heavy sediment input, formation of chars (new lands) and bank erosion. Available maps for different periods suggest massive changes in the coastline of this region over the past 200 years due to sediments carried by the GBM system and the tidal actions. This region is most dynamic and most of the accretion and erosion occurs here. The coastline is highly broken and consists of series of islands (Hatiya, Manpura, Shahbazpur, Sandwip, Char Bata, Nijhum Dweep, etc.).
- ⁷ The western region covers the portion of the Bangladesh coastline westward from the Tetulia river to the international border located at Hariabhanga River. This is a stable region and is mostly covered with the *Sunderbans*, which is occupied by rivers, channels and other water courses. Accretion does not occur much in this region, being mostly concentrated at a few points. The sediments carried by the rivers of the region flow almost directly south to the Swatch of No Ground, which exerts a great influence on tidal characteristics, sediment movement and deposition and other hydrodynamic and morphological phenomena.

The regulatory norms of coastal area fishery have been located in different legal instruments. The rivers and closed water bodies within the coastal area, hence, come under the definition of either open or closed *jalmohals* and would be managed accordingly. The question arises at this point up on how the coastal water is treated either as open or closed *jalmohals*. Generally, according to international norms and practices the water on the landward side of the baseline⁸ are known as internal waters that fall within the state's sovereignty. In the case of Bangladesh, the baseline follows the course of the 10 fathom line (18.29 m isobath) depth contour except west of Cox's Bazar where there is a deep landward indentation at this isobath.

The National Conservation Strategy (NCS) of Bangladesh and the Coastal Environmental Management Plan for Bangladesh stated that the coast of Bangladesh is about 710 km long. On the other hand, the National Fish Policy of 1998, mentioned that the coastline is 410 km long. It may be assumed that the water regime outside the coastline towards the sea up to the baseline or territorial waters could be treated as coastal. If this is the guide in identifying coastal fishery then there exists a number of laws to regulate issues on management, conservation and development of fisheries landward and seaward of the baseline such as the Territorial Waters and Maritime Zones Act of 1974; the MFO; and the Coast Guard Act of 1994. However, none of them clearly spells out the limits or extent of coastal fishery. Among these laws, the most relevant and dominant in managing fishing is the Marine Fisheries Ordinance of 1983, which defined its territorial seas⁹ and economic zones and other marine waters over which it claims to have jurisdiction.

Another law, the Coast Guard Act of 1994 in Section 2(h) defined the "sea limits" as the territorial waters¹⁰ declared under the Territorial Waters and Maritime Zones Act of 1974). Section 2 (l) of Act of 1994 also defined the "marine area" as the territorial waters, contiguous zone, continental shelf, conservation zone and economic zone established under the Territorial Water and Maritime Zones Act. How far do the jurisdiction of laws which regulate issues on management, conservation and development of open and closed *jalmohals* extend up to the coastline (disputed) or the baseline? It is clear that issues beyond baseline is regulated by the MFO. But the framing and trend in implementation of the law suggests a different scenario from the perspective of the management of coastal fisheries, which perhaps increased the complexity in identifying this potential resource base. If one relies on the definition of BFW as enumerated in the MFO, it gives the impression that it would be applicable beyond the baseline towards the territorial sea. However, the Ordinance suggests that few of its provisions have applicability to fishing up to the baseline. Based on the definition of "sea limits" beyond land territory and internal waters measured

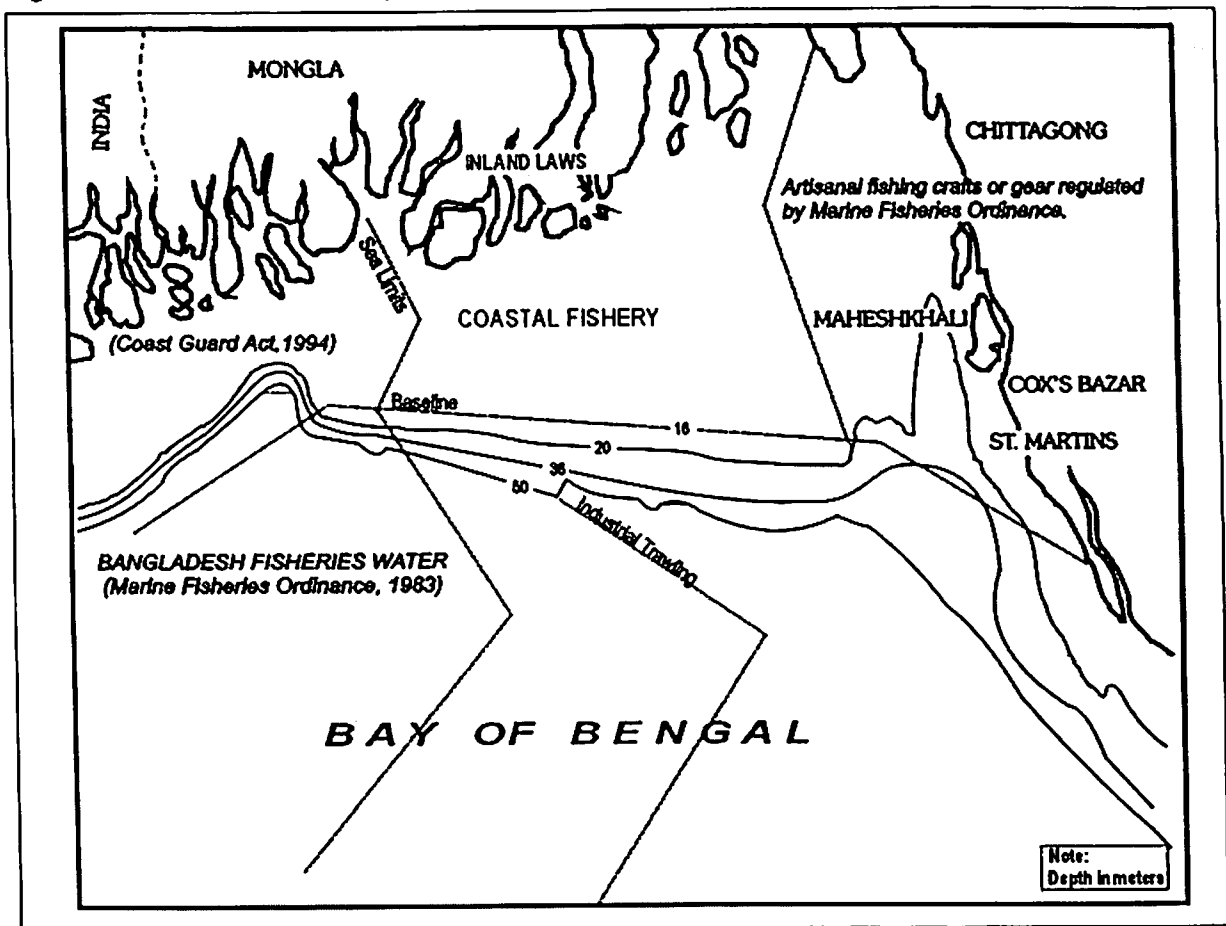
⁸ It is the line from which all maritime zones are measured in determining the extent of a coastal state's territorial sea and other maritime zones.

⁹ In the Proclamation No. LT-1/3/74 on April 1974, Bangladesh claimed a territorial sea of 12 nautical miles, measured from the baseline covering 221 nautical miles in length.

¹⁰ Section 3 of the Territorial Waters and Maritime Zones Act of 1974 declare the limits of the sea beyond the land territory and internal waters of Bangladesh.

from an 18.29 m depth line, it may be claimed that the water regime between the coastline and the baseline may form the coastal area or fishery. But the applicability of the MFO to this area may be extended beyond the baseline because, in this case, the baseline is measured from an 18 m depth while the Ordinance regulates fishing by traditional fishermen up to a 40 m depth. As our legal documents do not clearly state the jurisdiction or legal status of coastal areas, the same may be determined on the basis of traditional fishing practice particularly where they live, what types of gear are used, where they fish and how they are regulated by the legal framework.

Figure 2-1. Coastal Fishery Jurisdictions in Bangladesh.



Chapter 3

Management of Fisheries

The previous chapter showed that the government owned the fishery. Activities pertinent to their management, conservation and development are undertaken by line ministries or statutory agencies through various circulars, policies and laws. There are two types of management regimes, one for inland fisheries and the other, for marine fisheries. Both management regimes have provisions for regulating coastal fisheries. The rivers or estuaries in the coastal waters are leased out while marine laws regulate the operation of certain types of gear in the coastal waters near the shore. In the legal system, the types of inland fisheries are not spelled out. However, base on catch data, these types may include rivers, estuaries, *sunderbans* (mangrove forests), *beels* (seasonal or perennial low lying water bodies), *kaptai* lake, flood lands, ponds, *baors* and shrimp farms while the marine source consists of artisanal and industrial trawling. If the approach is based on legal jurisdiction, then it would seem that fishing operations landward of the baseline is governed by laws regulating marine fishing. The Marine Fisheries Ordinance of 1983 (MFO) has a twofold area of application—(1) up to baseline (18.29 m) and/or 40 m depth (artisanal) and (2) beyond the 40 m depth (industrial).

3.1 RESOURCE POTENTIAL OF INLAND SECTOR

3.1.1 Production Aspect

Inland water fish production comes from the following fishing environment: (a) flowing river and their tributaries both freshwater and estuarine environment; (b) seasonally inundated floodplain; (c) *beels*; (d) *baors*; (e) oxbow lakes; (f) freshwater ponds; and (g) brackish water ponds/farms in coastal polders. In the components mentioned in (a), (b) and (c), fish and prawn stocks move freely from one component to the other to complete their life cycles. During the monsoon season, these three components become interconnected and integrated into a single biological production system. In the open waters, fish stocks are self-breeding and self-sustaining. As opposed to the open inland waters, the habitats in the oxbow lakes and ponds are closed ecosystems providing rooms for increasing fish production through fish culture.

3.1.2 Area Covered

The total water environment covered by inland fishery is about 43.37 *lakh* ha out of which the open fishery including floodplain occupies an area of 40.47 *lakh* ha

INLAND FISHING ENVIRONMENT

- Flowing river and their tributaries (freshwater and estuarine)
- Floodplain
- *Beels*
- *Haors*
- Oxbow lakes
- Freshwater ponds
- Brackishwater ponds/farms in coastal polders

while the closed fishery including coastal shrimp farms stands at 2.90 *lakh* ha (Ministry of Fisheries and Livestock 1998).

3.1.3 *Inland Species*

In inland fishery, 260 local species, 12 exotics and 24 species of shrimps are available. Between 1996 and 1997, the production from the inland open and closed fisheries was about 10.79 *lakh* t. The statistics and estimated targets are mostly dependent on the production of the different water environments in the inland waters and not on the basis of stock assessment.

3.2 EVOLUTION OF MANAGEMENT REGIME

Prior to British rule in India, fishers used to enjoy customary rights to fish in rivers, *beels*, *haors* and *baors* either freely or by paying some tolls or handing over some portion of their catch to the estate holders or their agents. The British rulers allowed the traditions to govern the regime (Pokrant et al. 1996). As the government's revenue earning resource, its priority fell below agricultural land, forestry and minerals. The institutional development followed a similar pattern.

3.2.1 *Permanent Settlement Regulation*

In 1793, the Viceroy and Governor General of India introduced a new system of land rights settlement which came to be known as Permanent Settlement. Under the Permanent Settlement, Regulation I of 1793, influential people were granted permanent ownership of large tracts of lands which included not only vacant lands but also rivers and other waters as well as human settlement upon payment of fixed annual rent (Ali 1992). As a consequence of this settlement, large navigable rivers passed or flowed through the territories of several *zaminders* with segmentation of the river into several *jalmohals*. Again the large *zaminders* subdivided their territories under their respective *suzerainty* for administrative and management convenience. These territories are then settled by the lesser *zaminders* or *jotedars*. These lesser *zaminders*/*jotedars* became the direct subject of the larger *zaminders* and paid rents and royalties to the larger *zaminders*. The larger *zaminders* paid rents and royalties directly to the British Crown.

As a result, portions of the river falling within the territory of a large *zaminder* was further subdivided, each subdivision of the river coming under the control of lesser *zaminders* or *jotedars*. These divisions also gave rise to the leasing on contractual system. *Zamindars* or *jotedars* owning or controlling such segments of water leased their *jalmohals* to *ijaradars* (leaseholders). These *ijaradars* were mostly non-fishermen middlemen including local well-to-do farmers wielding influence and power. Thus, these *ijaradars*, rather than the large *zaminders*, exercised exclusive control over access to fishing and

labor. There was some direct leasing of *jalkar* to fisher *ijaradars*, but this appears to have been less important than the system of non-fisher *ijaradari* (Pokrant et al. 1996). The system of ownership and lease settlement of waters in the form of *jalmohals* continued in East Bengal, which fell into Pakistan after the partition of India in 1947.

3.2.2 *Since the Abolition of the Zamindari System*

On behalf of the provincial government of East Bengal, the Department of Revenue took over the ownership of all *jalmohals* and their management. The provincial Board of Revenue, attached to the Department of Revenue, was the principal body of the government to administer and manage all lands and waters in the province except waters inside the reserved forests (as in the Sunderbans Reserved Forest area). The authority of actual management of *jalmohals* was vested with the district collector-cum-district magistrate of districts in which the *jalmohals* were located. District collectors and district magistrates (now designated as Deputy Commissioners) were the chief representatives of the Crown in the district up to the time of the British Raj and, thereafter, of the national government. This system still continues in independent and sovereign Bangladesh.

The Department of Revenue of the then East Pakistan government and later in Bangladesh, the Ministry of Land Administration and Land Revenue (now designated as Ministry of Land) owned and managed all *jalmohals* through the Deputy Commissioners or Collectors of different districts. In each district, an Additional Deputy Commissioner (ADC) take charge of all land revenue administration under the overall charge of the Deputy Commissioner of the district. The ADC (Revenue) has under him the Revenue Deputy Collector (RDC) and Revenue Circle Officers (RCO) from the different revenue circles in the districts. In each district, a calendar of *jalmohals* was and is still maintained from which *jalmohals* due for fresh lease is auctioned.

3.2.3 *Revenue Oriented Leasing vs. Genuine Fishermen*

Between 1950 and about 1965 or so, anybody intending to lease could participate in the auction to bid for *jalmohal* lease. This resulted in the settlement of lease of all *jalmohals* with the old rich non-fishers and influential *ijaradars*. To help the poor fishing community, the Board of Revenue decided to give preference to the fishers' cooperative societies registered with the cooperative department in obtaining lease settlement of *jalmohals* during the late 1960s. This was with the provision that the societies would agree to pay the highest bid money offered at the auctions. This system continued until about 1974, when the government of the newly independent Bangladesh decided to restrict the auctioning of *jalmohals* to registered fishers' cooperative societies only. As a result of this new restriction, new fishers' cooperative societies mushroomed, particularly around more valuable *jalmohals*. These new societies also obtained registration from the cooperative department. The sole objective of all these fishers' cooperative societies, both new and old, was to secure lease of *jalmohals*. Most of these cooperatives were organized and formed at the behest of the traditional

non-fishing *ijaradars* of the past, who provided necessary financial and other support to their patronized societies. The reason for such patronization was to secure control of *jalmohals* by the traditional non-fishing leaseholders using the patronized cooperative societies as the front organization. The cooperative societies, upon securing the lease, would sublease the *jalmohals* over to their respective patrons or simply hand the *jalmohal* over to them.

This procedure continued up to 1980. Toward the end of 1980, the President of Bangladesh ordered the transfer of all *jalmohals* from the Ministry of Land Administration and Land Reforms (the new designation of the old Department of Revenue) to the Ministry of Fisheries and Livestock (MFL). The Ministry of Fisheries and Livestock continued, in the interim, the traditional system of *jalmohal* leasing through the Directorate of Fisheries. Simultaneously, the Ministry of Fisheries and Livestock was trying to develop new ways and procedures for replacing the revenue-oriented management of *jalmohals* with the management of the living aquatic resources on biological principles. But before this could be completed, the government in 1983 decided that the *jalmohals* should be transferred back to the Ministry of Land Administration and Land Reforms (now known as the Ministry of Land) and that Ministry would give 50% of the revenue earned to the *upazilas* (subdivisions).

In September 1991, the Ministry of Land ordered further changes in the method of leasing of *jalmohals*. Auctioning for lease of *jalmohals* was discontinued. In its place, a system of invitation of sealed tenders was instituted inviting offers for lease settlement. Any person offering bids had to offer a rent, which had to be 25% higher, or more than the preceding year's or preceding term's lease value. This provision of a minimum increased lease value of 25% or more replaced the earlier provision of an increase of lease value by 10% only.

Tenders were restricted to fishermen cooperatives societies only and the lease of the *jalmohal* had to be settled with the fishermen cooperative society with the highest tender. But if the highest is not at least 25% higher than the previous year's lease value, the offer is not to be accepted. In such cases, tenders had to be invited again and, this time, any individual or any organization is entitled to make offers for lease settlement.

3.2.4 *New Fisheries Management Policy*

Beginning 1986, in order to achieve two objectives — 1) diversion of maximum benefits arising from public fisheries to the actual fishers toiling on the water; and 2) development of implementation measures to ensure sustainability of the fisheries resource — the New Fisheries Management Policy (NFMP) was introduced on an experimental basis to cover ten *jalmohals*. Under the NFMP system, the leasing system was abolished and fishing rights were directly licensed to fishers. Subsequently, 257 *jalmohals* were brought under this system. To attain these goals, the MFL sought possession of selected *jalmohals* from the MoL on condition that the usual annual increase in rent is reimbursed. The actual fishers were provided access to such resources through a process of licensing. The license fee was determined on the basis of size, efficiency,

and the fishers needed to operate such gear. To ensure conservation of resource, fish aggregating devices were protected from fishing.

Genuine fisherfolk from villages on the shores of the *jalmohals* were selected, enlisted and granted renewable license to fish. The MFL also arranged institutional credits to the listed fishers so that they could free themselves from the clutches of the traditional moneylenders.

3.2.5 Leasing of Open Jalmohals Abolished

The system of leasing was also applicable open fisheries. But in 1995, the Chief Executive of the government while addressing a gathering organized to mark Fish Fortnight announced the abolition of the leasing of open *jalmohals*. In pursuance of the said declaration, the Ministry of Land (MoL) issued a notification on 04 September 1995 to materialize the objectives enshrined in the declaration.

The preamble of the notification states that “to protect the interests of poor fishermen and make the earning of their livelihood easier, the government decided to abolish the procedure of leasing rivers, canals and *jalmohals* which are categorized as open *jalmohals*.” It sounds definitely encouraging in providing free and uninterrupted access to fisheries by fishers in general. It does not restrict the access of non-fishers or occasional fisherfolk to these water bodies. However, from the fishers’ point of

view, the new policy is not of much help to the genuine fisherfolk; to some extent, it is detrimental to their interest. Acquisition of fishing rights without anything may tempt other people from other professions to fish in government-owned open *jalmohals*.

The preamble of the notification states that, “to protect the interests of poor fishermen and make the earning of their livelihood easier, the government decided to abolish the procedure of leasing rivers, canals and *jalmohals* which are categorized as open *jalmohals*.”

Jalmohals, which are transferred to the Ministry of Fisheries and Livestock (MFL) for the purpose of development and conservation of fisheries resources and creating fish sanctuaries and other development activities, remained outside the purview of this decision. The application of this decision may be considered in case of *jalmohals* that may be needed for the abovementioned development activities. The MFL shall formulate policies regarding the utilization of such *jalmohals* and the development of fisheries resources under

such development projects. It is clear from the above statements that open *jalmohals*, which were transferred to the MFL, would remain with the MFL, which is entrusted with the responsibility of formulating policies for utilization and development of *jalmohals*. This perhaps may act as a mode of accommodating the concept of community management of *jalmohals*.

On the eve of the Fish Fortnight '95, the government decided that no measures shall be taken which all adversely affect the rights of exploitation of poor fishers. This decision apparently establishes rights of poor fishermen in open *jalmohals* and also seems to be very much opposed to the policy of maximization of revenue from this sector as it confers fishing rights without demanding any consideration in return. Surprisingly, it shows no concern about the sustainable exploitation of the resource. It is silent on conservation issues.

The effectiveness of the license issued for fishing in *jalmohals* designated under the New Fisheries Policy is extinguished when this decision was announced. Licenses shall not be issued for the new term. The New Fisheries Management Policy was initiated in 1986 to achieve two objectives: 1) diversion of maximum benefits arising out of public *jalmohals* to the actual fishers toiling on the water and 2) development of implementation measures to ensure sustainability of the fisheries resource. Obviously, the NFMP failed miserably to achieve its objectives and for this reason, it was also cancelled. This clearly shows an unhealthy institutional approach as the NFMP was undertaken and implemented by the MFL in the *jalmohals* transferred from the MoL for the said purpose. Instead of the MFL implementing the NFMP, the MoL suspended the effectiveness of the NFMP.

On the eve of the Fish Fortnight '95, the government decided that no measures shall be taken which all adversely affect the rights of exploitation of poor fishers. This decision apparently establishes rights of poor fishermen in the open *jalmohals* and also seems to be very much opposed to the policy of maximization of revenue from this sector as it confers fishing rights without demanding any consideration in return.

A license is to be obtained from the office of the concerned Deputy Commissioner on payment of requisite fees for catching fish employing engine boat or trawler in the *jalmohals* classified as open. On the basis of the income and expenditure of a particular boat, the Deputy Commissioner fix the fees. This rate is evaluated every year and the license is renewable on the basis of this evaluation.

The notification mentioned above made open *jalmohals* accessible to all without any reference to management. Earlier, the leaseholder used to play that managerial role on the basis of his experience and skill, which to some extent was supportive of sustainability of the resource. Again, the leaseholders were usually granted fishing rights to genuine fisherfolks rather than non-fishers or occasional fisherfolk. There is every reason to believe that as long as the resource is open access, conservation will not be a concern among resource users.

3.3 LEASING OF CLOSED JALMOHAL

Leasing of open *jalmohals* has been abolished but the procedure is still being applied with the closed *jalmohals*. The government makes rules, policy, guidelines, circular, etc. for settlement and management of open and closed *jalmohals*. There are a number of such policies regulating the management of closed *jalmohals*. According to the provision of an amendment made in 1993 to the Local Government (Union *Parishad*) Ordinance of 1983, all closed *jalmohals* up to an area of 20 acres area shall be managed by the policy issued on 20 April 1994. The said policy envisaged that:

- ❖ A closed *jalmohal* valued at 30 000 taka (based on the value in 1400 B.S.) located within the territorial boundary of a union *parishad* shall be settled by the respective union *parishad*;
- ❖ While the lease value of a closed *jalmohal* exceeds the pecuniary limit of 30 000 taka (1 USD = 49.50 taka) then it shall be settled by the concerned Thana Nirbahi Officer (TNO);
- ❖ The union *parishad* shall be responsible for leasing out one or more closed *jalmohals* within its territorial boundary of 30 000 taka but if the value of such one or more closed *jalmohals* exceeds the pecuniary limit, then the *jalmohals* of 30 000 taka shall be leased out by the union *parishad* and the others shall be vested with the TNO;
- ❖ Closed *jalmohals* within the territorial jurisdiction of the city corporations and *paurashavas* shall be settled by the respective institution;
- ❖ Closed *jalmohals* spreading over more than one union *parishad* in one *thana* shall be leased out by the concerned TNO;
- ❖ The leasing of *jalmohals* shall be limited to fishermen, women and poor landless cooperative societies and the lease value shall be raised by 25% from the previous year's value and if the highest offer does not reach up to that level then arrangement have to be made to invite tenders afresh, and this time anybody shall be entitled to participate in making the offers; and
- ❖ The closed *jalmohals* shall be leased out for three years and in case of proposal for renewal through adoption of development projects by the lease holder, this period may be extended for another three years on raising the lease value by 10% for each subsequent year.

In 1997, the Ministry of Land (MoL)¹¹ issued a policy for management of closed *jalmohals* up to 20 acres. They were transferred to the Ministry of Youth and Sports (MoYS) to create opportunities for youth employment. The provisions regarding the management of such *jalmohals* as envisaged in the said policy are mentioned here:

¹¹ via memo no. bh:ma:sha-7-bibidh-47/97/605(995) dated 30 October 1997.

- ❖ Closed *jalmohals* once transferred to the Local Government Division (as stated above) shall gradually be transferred to the Ministry of Youth and Sports;
- ❖ *Jalmohals*, which had not yet been leased out by the Local Government shall immediately be transferred to the Ministry of Youth and Sports, and in case of leased out *jalmohals*, on expiry of the lease period on the last day of the Bengali year 1404, the use of all such *jalmohals* shall be transferred to the MoYS;
- ❖ If the lease period extends beyond the Bengali year 1404 then on completion of the lease period such *jalmohals* of 20 acres shall be transferred to the MoYS;
- ❖ Under this policy *jalmohals* shall not be leased out for any purpose other than promotion of opportunities for self-employment among the trained youth groups;
- ❖ To obtain settlement of such *jalmohals* trained youth and women youth groups must have formed a cooperative society and obtained registration;
- ❖ The leasing out shall be restricted among the registered cooperative societies of youth and women-youth;
- ❖ Certain category of *jalmohals* up to 20 acres shall remain outside the purview of this policy, such as: (a) *jalmohals* within the project area of model village or for providing shelter; (b) *jalmohals* within the vested and abandoned property; (c) *jalmohals* adjacent to the office of union land office, Assistant Commissioner (Land), TNO and the Deputy Commissioner; (d) *jalmohals* used by public in exercise of easement right; and (e) *jalmohals* owned by the city corporation within the respective territorial boundary;
- ❖ The lease value of such closed *jalmohals* shall be raised by 15% of the value of immediate preceding year's value;
- ❖ The settled *jalmohals* shall not be subleased;
- ❖ Initially and on experimental basis the *jalmohals* may be leased out for 3 to 5 years; and
- ❖ On deduction of expenses incurred to facilitate the auction of *jalmohals*, 1% of the rest of the lease value shall be deposited in favour of the MoL and the other amount shall be given to the Local Government Division.

On 12 October 1998, the MoYS issued a notification regarding the constitution of committees at district and *thana* level for settlement of closed *jalmohals* up to 20 acre among the registered youth and women youth cooperative societies. The convenor of the district committee shall be the Additional Deputy Commissioner (Revenue) and at the *thana* level, the Thana Nirbahi Officer shall act as such. The district committee shall be responsible for leasing out public *jalmohals* located within the territorial boundary of city corporations and the *thana* level committee shall deal with *jalmohals* within its territorial jurisdiction. It may be mentioned here that "city corporation" is a term denoted to the earlier municipal corporations through an amendment to the Local Government Laws (Amendment) Act of 1990 and there are at present four city corporations in the country while the other municipal areas are designated as "*paurashavas*" and accordingly managed

by the *Paurashava* Ordinance of 1977 although both institutions perform similar types of functions. However, use of the term “city corporation” in the policies of 1997 and 1998, respectively, issued by the MoL and MoYS may create confusion as to the location of closed *jalmohals*.

The management of closed *jalmohals* of above 20 acres shall remain vested with the MoL as per the policy bearing Memo No. bhum/7/bibidh/5/91/424(12) dated 19/9/91. The salient features of the said policy are hereby summarized:

- ❖ Management of *jalmohals* under the development projects of the Ministry of Fisheries and Livestock (MoFL) shall remain vested with MoFL and the management of *jalmohals* to be transferred in future to the MoFL under development project shall remain vested with the same;
- ❖ The MoFL shall be entitled to enter upon any open or closed water body for collection of information, data, extraction of fish, collection of environmental information to facilitate sectorwise research and data collection;
- ❖ Control of all *jalmohals* shall remain vested with the concerned Deputy Commissioner under the MoL other than *jalmohals* either under the existing development plan or to be included in such plan of the MoFL and the *jalmohals* up to 20 acres under the control of the MoYS and Local Government Division;
- ❖ Closed *jalmohals* of above 20 acres shall be leased out for a three-year period;
- ❖ The leasing of the closed *jalmohal* shall be restricted among the fishermen cooperative society giving the highest offer of lease money. But if such highest offer has not been at least 25% higher than the previous year’s lease value then the offer shall not be accepted. In such case, arrangements have to be made to invite tenders afresh for the second time and this time anybody, even an individual or an organization, shall be entitled to participate in making offers;
- ❖ Projects may be undertaken by the genuine fishermen cooperative society duly approved by the MoL, and in such case, such closed *jalmohals* may be leased out for three years and the lease value shall be raised by 25% from the previous year’s value. In the implementation of such project, the lease period may be extended from 4-10 years through open tenders or on the basis of discussion; and
- ❖ A tender committee consisting of the Deputy Commissioner of the district, Additional Deputy Commissioner (Revenue), District Fisheries Officer, District Cooperatives Officer, Revenue Deputy Collector shall facilitate the leasing of *jalmohals*. Such committees shall be presided over the DC as Chairman and in his absence by the ADC (Revenue).

However, it is apparent from the above discussion that closed *jalmohals* up to the 20 acres which were once transferred to the Local Government Division in 1994 have been transferred again by the MoL to the MoYS in 1997 for promotion of opportunities of self-employment by leasing them out in accordance with policy provisions among youth and women-youth registered cooperative societies. The management of *jalmohals* with an area of more than 20 acres shall remain vested with the MoL.

3.4 MANAGEMENT OF COASTAL FISHERY

As mentioned earlier, the MFO contains certain provisions for the management of fishing operations in addition to the BFW without clearly spelling out its landward jurisdiction. The very name of the Ordinance and explanation regarding BFW suggests that it is mainly applicable to industrial fishing in marine areas, but a close scrutiny of its provisions reveals that it can also be applied to fishing operations (i.e., gear, boat, etc.) conducted inside water areas of 40 m depth. However, the Ordinance is silent on the extent of its jurisdiction on internal waters. The reading of its provisions suggests that this would apply to fishing vessels and in determining the mesh size used by fishermen in the coastal waters up to 40 m depth line beyond the baseline (18.29 m depth).

3.4.1 Resource Potential of the Marine Sector

Over the last two decades, the share of marine fisheries in the total national landing rose from 10.6% in 1970 to about 22% in 1996. With the declaration of 200 nautical miles as Exclusive Economic Zone (EEZ) in 1974 according to the provisions set forth in the Territorial Waters and Maritime Zones Act of 1974 and subsequently demarcating the same area as BFW under the MFO, Bangladesh recognized the responsibility for exploitation and management of its living and nonliving resources within its 164 000 km² sea area. In 1996-1997, the contribution of marine resource in the total fish production was about 2.94 lakh t (1 lakh = 100 000).

3.4.2 Principal Fishing Grounds

The principal fishing grounds of the country are the south patches covering an area of 6 200 km² (below Cox's Bazar); the middle ground occupies an area of 4 600 km² (south of Patuakhali); and the swatch of no ground covers of 3 800 km² of seawater (south of Dubla) (Figure 3-1).

3.4.3 Available Stock of Marine Fish Species

A number of surveys have been conducted since 1958 in the marine waters of Bangladesh. Most of these surveys are exploratory in nature and oriented to studies of fishing feasibility. Some surveys, however, have been conducted to assess the standing stock of fisheries resources, particularly the demersal ones. The following stock assessment has been the recent one produced by the Marine Fisheries Wing under the Department of Fisheries in 1996.

- ❖ Demersal 185 000 t > 85 000 t (harvest at maximum sustainable yield level)
- ❖ Pelagic 60 000-120 000 t > nil
- ❖ Shrimps 4 000 t > 6 000 - 7 000 t (harvest at maximum sustainable yield level)

Historically, fishers in this country used to fish in nearshore areas with the help of non-motorized canoes. As a matter of fact, fishing in the marine waters was more of an artisanal rather than a commercial practice. The Bangladesh Fisheries Development Corporation (BFDC) first introduced the concept of motorization of traditional fishing crafts in 1966-1967 through a Food and Agriculture Organization (FAO)/Swedish International Development Agency (Sida) project under the Freedom From Hunger Campaign by fitting engines on traditional Cox's Bazar type boats. The BFDC

3.4.5 Evolution of Management Regime

As stated in the National Fish Policy of 1998, there are 475 species of fin fish and 36 species of shrimp and other commercially important species of turtle, crab and other aquatic species.

3.4.4 Species

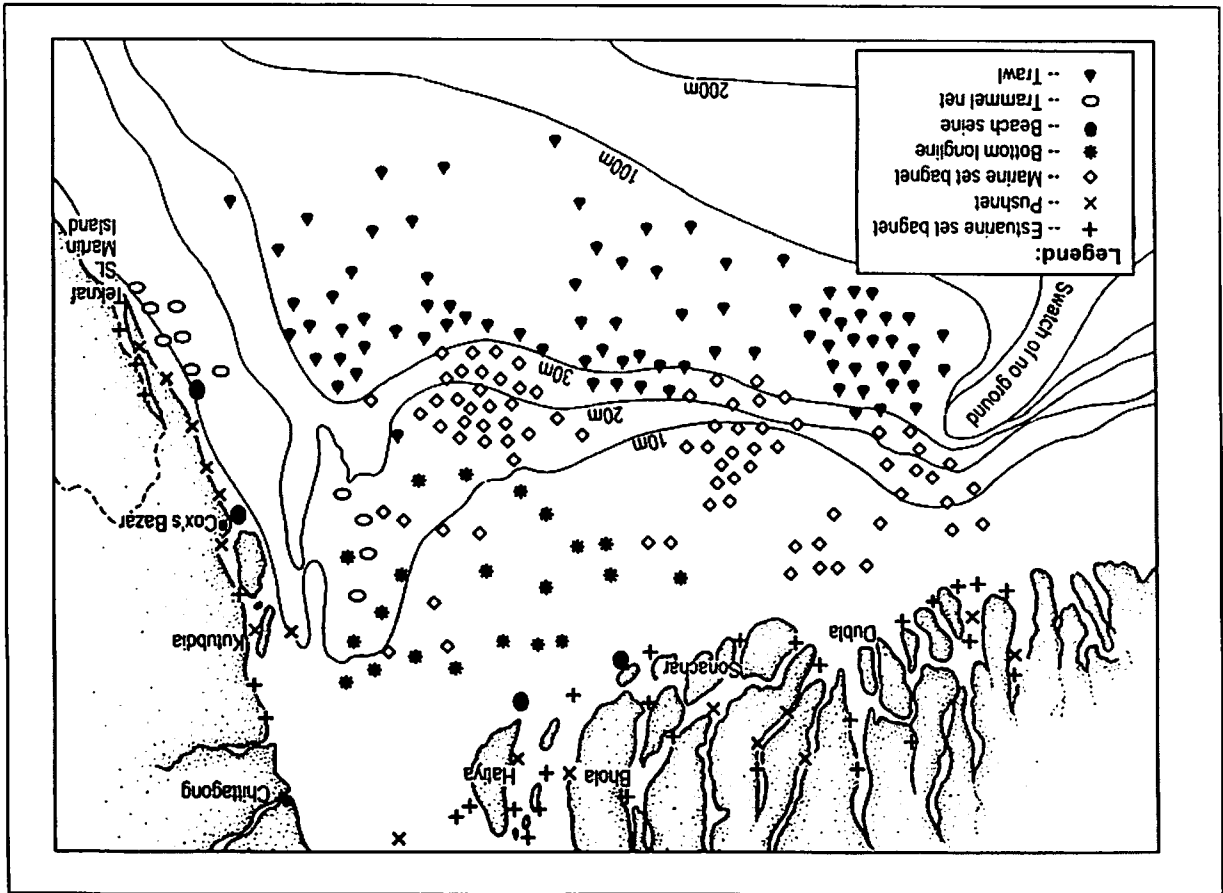


Figure 3-1. Depth Distribution and Area of Operations of Dominant Fishing Gear Used in the Coastal Waters of Bangladesh (Source: Khan et al. 1994 in Khan et al. 1997).

distributed 285 outboard engines of 6 hp and 12 hp to the poor fishers on hire purchase basis. Subsequently, these were replaced by inboard marine diesel engines of 15-33 hp. The boats are 12-14 m long. These boats operate eight months a year between the shoreline and the 40 m depth contour line. With the development of newer and sophisticated technology, the number of mechanized boats increased by at least 150%.

Moreover, BFDC pioneered the introduction of modern trawler in deepsea fishing. BFDC procured 10 trawlers from the then Soviet Union in 1972, and used them in fishing operations. This lucrative venture attracted the private sector to come forward and invest in deepsea fishing. The demand for shrimp by the international market acted as an added incentive to commence trawl fishing in the deep sea. This has drastically increased the number of trawlers. Towards the end of 1983, the effective number of trawlers in operation rose to 65, of which 47 were fish trawlers and 18 were double rig shrimp trawlers. Together with the increasing number of fishing crafts another major revolution in the sphere of new fishing technology took place through the replacement of cotton nets by nylon, a change which was adopted by both traditional and commercial fishers. The rapid change in fishing practice and the concomitant adoption of new technologies have prompted policymakers to evaluate the sustainability of fish stocks in recognition of these new developments. As a result, through a delayed motion, the MFO was promulgated enumerating provisions pertinent to the management, conservation and development of marine resource.

3.4.6 *Jurisdiction of MFO*

A reading of the MFO suggests that it would apply to the Bangladesh fisheries water (i.e., territorial water), economic zones measured from the base line at 18.29 m contour depth line and other water as declared by the government. The fishing operations using traditional motorized boats beyond the base line up to 40 m depth is also to some extent (license, gear, area) regulated by MFO.

3.4.7 *Registration of Fishing Crafts*

Under the provisions of the Bangladesh Merchant Shipping Ordinance of 1983, all seagoing fishing vessels are required to obtain a certificate of registration from the Mercantile Marine Office established under the Department of Shipping. This provision is also applicable to the locally made fishing crafts engaged in coastal fishing. The certificate of registry contains the details of the vessel and is to be used only for the lawful navigation of the craft.

3.4.8 *Fishing License*

Fishing licenses shall be issued to all marine fishing in Bangladesh fisheries waters and which will be obtained from the Marine Wing of the Department of Fisheries. According to Section 13 of the MFO, such license shall be valid only with respect to

the species of fish and the type of fishing gear or the method of fishing or the location specified in the license. The holder of any license shall keep detailed information of catches as well as sales in such form as may be prescribed (Section 14). Rule 6 of Marine Fisheries Rule of 1983 prescribed the carrying capacity wise fees to be paid by fishing vessels who are engaged in coastal or deepsea fishing. It restricted the application of this rule of making payment to obtain a license up to 31 December 1995. Is it practical to impose license fees on the basis of vessel carrying capacity? This question is relevant because in this system, it is the market factor which determines the species or gear to be used. Even with a very small carrying capacity, a vessel may still be able to make a high margin of profit in comparison to a huge capacity craft if the species, gear used or location are properly selected. In addition to the carrying capacity, the other factors also need to be accounted for while determining the license fees. Otherwise, the implementation of the law may face a setback if the socioeconomic condition of marginal poor fishermen are not considered, and which may lead to non-enforcement and deterioration of the fishing sector.

3.4.9 Conditions for License

Applications for license shall contain information regarding, among others, the species to be fished, method of fishing and types of gear to be used, area or areas to be fished and the amount of fish to be caught. The licensing authority, in addition, may attach a number of conditions to be followed by any license holder, such as the areas within which, and the period during which fishing is authorized, the species, size, sex, age and quantities of fish that may be caught or taken, the types, size and amount of fishing gear to be used by the fishing vessel, etc.

3.4.10 Administration

The coastal area-based marine fisheries office under the Department of Fisheries (DoF) is authorized to issue fishing licenses as per Section 4 of the MFO. This arm of the DoF is also responsible for the management, conservation, supervision and development of marine fisheries and implementation of its provisions. Section 31 of the MFO provides that for the purpose of enforcing this law, any authorized officer may stop and board any fishing vessel, conduct any examination concerning that vessel, its equipment, fishing gear, nets, fishing appliances, crew, or fish carried on board, and require any person to produce any license or other documents required under the MFO. By June 1998, 2 500 motorized traditional coastal boats obtained registration from this office while the Mercantile Marine Department issued registration to about 3 500 boats. But in practice, the number of boats actually engaged in fishing in the coastal waters up to 40 m depth is higher than those boats which have acquired legal franchises.

Chapter 4

Prohibited Activities in Coastal Fishery

There is no separate legislative structure to regulate coastal fishery issues in Bangladesh. As has been discussed in Chapter 2 on the jurisdictional conflict arising from the application of inland and marine laws, issues happening in the coastal region are regulated by both inland and marine laws. This chapter will enumerate the activities that are prohibited in the coastal region in relation to the aforementioned inland and marine laws. The territorial jurisdiction of the coastal water areas which are designated as rivers or channels comes within the category of open inland *jalmohals*, and therefore, activities in that water environment are regulated by the Protection and Conservation of Fish Act of 1950. On the other hand, marine laws regulate some matters connected with the operation of fishing gear and vessels in the coastal area beyond the jurisdiction of inland waters up to the baseline and/or 40 m depth from which the Bangladesh fisheries water (Section 2.a of MFO) has been measured.

4.1 ACTIVITIES PROHIBITED IN COASTAL WATERS (RIVERS, CHANNELS)

The following are the activities prohibited according to the provisions of the Protection and Conservation of Fish Act of 1950. The law mainly speaks on the prohibited methods of fishing, the fish species that cannot be caught during a particular season, mesh size of the fishing nets, prohibition regarding carrying, transporting, offering or exposing or possessing for sale of fishes below the prescribed size. The Department of Fisheries (DoF) enforces the law through its local administrative units having the territorial jurisdiction over the water bodies where violation takes place.

The Protection and Conservation of Fish Rules of 1985 enumerated the prohibited activities under the rule making power conferred by Section 3 of the Protection and Conservation of Fish Act of 1950 which runs as follows:

- ❖ Erection or use of fixed engines¹² (Rule 3);
- ❖ Construction of bunds, weirs, dams and embankments or any other structure whether temporary or permanent, in, on, across or over the rivers canals, *khals* or *beels* for any purpose other than irrigation, flood control or drainage (Rule 4);

¹² Fixed engine means any net, cage, trap or other contrivance for catching fish, fixed in the earth or made stationary in any other way (Section 2.3) in the rivers, canals, *khals* and *beels*.

- ❖ Destruction of or any attempt to destroy fish by explosives, gun, bow and arrow in inland waters or within coastal territorial waters (Rule 5);
- ❖ Destruction of, or any attempt to destroy fish by poisoning the water or the depletion of fisheries by pollution, by trade effluents or otherwise in inland waters (Rule 6);
- ❖ Catching or destruction of certain species of fish during specified period (Rule 7);
- ❖ Catching of carp fishes in specified water areas (Rule 8);
- ❖ Selling, offering or exposing for sale of certain fish species below specified size during a specified period (Rule 9);
- ❖ Operation of any kind of fishing net in violation of laws (Rule 12); and
- ❖ Fishing operation using nets having mesh size below the size¹³ prescribed by law (Rule 12).

In addition to the abovementioned rules, the government is also empowered to formulate rules for imposing prohibition regarding the following matters:

- ❖ Manufacturing, importing, marketing, carrying, transporting or possessing of such fishing nets, traps, gears and other contrivances as specified (Section 3.iv); and
- ❖ Any attempt to destroy fishes by drying or dewatering of any fishery (Section 3.g).

4.2 PROHIBITED ACTIVITIES IN MARINE WATERS

The MFO in its preamble stated that this ordinance would provide the basis for the management, conservation and development of marine fisheries in the Bangladesh Fisheries Water (Section 2). This definition of BFW gives the impression that MFO would be applicable to fishing activities in an area measured from the baseline (discussed in Chapter II) when in fact the jurisdiction of MFO begins from 18.29 m depth line leaving behind the vast water regime below 18 m depth towards inland waters. Though the definition of BFW signifies its jurisdiction in a limited way, certain activities of traditional fishermen below the 18 m depth towards inland waters are regulated by the MFO. This is indeed a confusing jurisdictional approach and in assuming jurisdiction over such coastal area, relevant provisions relating to activities prohibited under the MFO, Territorial Waters and Maritime Zones Act of 1974 and the Coast Guard Act of 1994 are summarized below:

¹³ Gill net not less than 4.5 cm.

- ❖ Catching of fish by local mechanized and non-mechanized fishing vessels in areas outside the zones declared for such purpose by the government (Section 3.2);
- ❖ Catching of fish without having any fishing license (Rule 17 Marine Fisheries Rules, 1983);
- ❖ Catching of fish by fishing vessels with an invalid fishing license (Section 13).
- ❖ Fishing operations in a manner so as to interfere with navigational aids or with shipping in the established shipping routes (Section 15);
- ❖ Fishing operations in violation of conditions imposed while issuing fishing license [Rule 7 Marine Fisheries Rules (MFR) of 1983];
- ❖ Fishing operations in violation of rules regarding conservation and management of fisheries (Rule 7.a);
- ❖ Catching of species and quantities of fish not mentioned in the fishing license (Rule 7.c);
- ❖ Use of fishing methods or gear as against the manner stated in the fishing license (Rule 7.c);
- ❖ Fishing operations by local fishing vessels without having registration or valid certificate of inspection (Section 17 and 18);
- ❖ Use or attempt to use any explosive, poison or other noxious substances for the purpose of killing, stunning, disabling or catching fish or in any other way rendering such fish easier to catch (Section 26.a);
- ❖ Carrying or keeping in possession or control of any explosive, poison, or other noxious substances with the intention of using such substances (Section 26.b);
- ❖ Use or attempt to use any prohibited methods of fishing as prescribed under any rule made under MFO (Section 26.c);
- ❖ Use or keeping in possession or on board of any fishing net that has a mesh size below the prescribed size under this ordinance (Section 27);
- ❖ Willful obstruction of authorized officer in the exercise of his or her lawful duty (Section 41);
- ❖ Willful or unlawful damage or destruction of any fishing vessels, stakes, gear or appliances (Section 42);
- ❖ Operation of fishing vessels without being marked in the prescribed manner;
- ❖ Destruction of any fish, fishing appliances, explosives, poison or other noxious substances or any other thing with intent to avoid seizure (Section 44);
- ❖ Carrying of fish in contravention of the carrying capacity determined by the appropriate authority (Rule 12 MFR);
- ❖ Catching of fish using trawl net below the 60 mm mesh size at the cod end (Rule 14.b MFR);

- ❖ Catching of fish using large mesh drift net below the 200 mm mesh size (Rule 14.c MFR);
- ❖ Catching of fish using small drift net below the 100 mm mesh size (Rule 14.d MFR);
- ❖ Catching of fish using set bag net (*behundi* net) below the 30 mm mesh size at the cod end (Rule, 14.e MFR);
- ❖ Fishing operation employing set bag net beyond the 40 m depth at its highest tide of marine water (Rule 15.1 MFR);
- ❖ Fishing operation using hooks and lines beyond the 40 m depth at its highest tide of marine water (Rule 15.2 MFR); and
- ❖ Fishing operation with drift net for catching *ilisha* and fishes beyond the 40 m depth at its highest tide of marine water (Rule 15.3 MFR).

4.3 MARINE RESERVE

In addition to the abovementioned list of prohibited activities, Section 28 of the MFO has a provision for declaring any area of Bangladesh fisheries waters as marine reserve to afford special protection to the aquatic flora and fauna, protect and preserve the natural breeding grounds and habitats of aquatic life, allow natural regeneration of aquatic life, promote scientific study and research, preserve and enhance the natural beauty of such areas. The following activities are prohibited in the marine reserve without obtaining permission from the appropriate authority:

- ❖ Fishing or attempts at fishing (Section 29.a);*
- ❖ Dredging, extraction of sand or gravel, discharge of waste, or any other polluting matter, or in any other way disturb, alter or destroy fish or natural breeding ground of fish (Section 29.b); and
- ❖ Construction or erection of any building or other structures on or over any land or waters within such reserve (Section 29.c).

4.4 CONSERVATION ZONE

The Territorial Waters and Maritime Zones Act of 1974 has a provision for declaring conservation zones in areas of the sea adjacent to the territorial waters for the purpose of maintaining the productivity of the living resources including measures to prevent their indiscriminate exploitation, depletion or destruction (Section 6).

4.5 CONTROL OF POLLUTION

Appropriate measures may be taken by the appropriate authority to control and prevent marine pollution and preserve the quality and ecological balance in the marine environment in the high seas adjacent to the territorial waters (Section 8, Territorial Waters and Maritime Zones Act of 1974). The Coast Guard is also responsible in undertaking necessary measures for prevention of pollution in the marine area (Coast Guard Act of 1994).

4.6 CLOSED SEASON

Rule 10 of the Territorial Waters and Maritime Zones Rules of 1974 provides for the declaration of closed season, during which fishing of all or any specified type shall be prohibited in the economic zone. There is no such provision in the MFO for declaring closed season from the point of sustenance of the coastal or marine resources. In 1995, the government issued an order prohibiting shrimp trawling from 15 January to 15 February of every year, considering that period as peak season for breeding. But the apex body of marine trawler owners association filed an objection against such prohibition with the High Court Division of the Supreme Court and was able to obtain an interim order against such closed season prohibition.

**PROHIBITIONS IN THE
MARINE RESERVE**

- Fishing or attempts at fishing.
- Dredging, extraction of sand or gravel, discharge of waste, or any other polluting matter, or in any other way disturb, alter or destroy fish or natural breeding ground of fish.
- Construction or erection of any building or other structures on or over any land or waters within such reserve.

Chapter 5

Legal and Non-legal Issues

There are a number of legal, non-legal and policy issues pertinent to the management, conservation and development of coastal fishery. But, these issues need to be considered in relation to sustainable growth and development of coastal resource so that maximum benefit to the poor fisherfolk is attained. Issues on resource management have occurred due to manifold reasons and the following discussion is an attempt to analyze a few of them in relation to existing regulatory regime.

5.1 JURISDICTION OF COASTAL FISHERY

As has been discussed in Chapter 2 regarding the legal status of coastal fishery, it is apparent that beyond the jurisdiction of inland laws in the coastal area, the MFO regulates certain fishery-related activities of coastal fisherfolks, such as the issuance of fishing licenses, gear regulation and area for fishing, etc. Although the MFO speaks about regulation of the fishing practices of coastal fishermen, the preamble of the MFO states that this law is made for management, development and conservation of marine fisheries in BFW. The wording regarding the territorial jurisdiction of BFW as it appears in section 2(a) of the MFO suggests that the provisions of the MFO is also applicable to fishing activities undertaken in the BFW. But the point of reference for the BFW is measured from the baseline earmarked at 18.29 m depth line in the coastal water. On analyzing the areas for operating gears by coastal fishermen it has been found that they are authorized¹⁴ to go up to 40 m depth line for fishing purposes. Therefore, beyond 18.29 m and up to 40 m towards the sea the fishing activities are more or less regulated depending on the definition of BFW by the MFO. It is vague which law will have jurisdiction over the coastal waters below 18.29 m depth line from the coastline near the inland water. It is difficult to answer relying on the definition of BFW unless it has been expressly declared through the issuance of a notification¹⁵.

¹⁴ Rule 15, Area for fishing, MFR.

¹⁵ As stated in the definition of BFW the MFO shall have jurisdiction over other marine waters as declared by the government) claiming territorial jurisdiction over the stated area of coastal water by the government.

5.2 FISHING LICENSE

Section 8 of the MFO provides that fishing licenses shall be issued to grant marine fishing rights in the BFW. Section 17 and 18 of the MFO exempted local fishing vessels¹⁶ from obtaining fishing license if they are registered or required to hold valid certificate of inspection under any other law in force for the time being. Rule 12 of MFR mentioned that no fishing vessel shall be issued a license which has a carrying capacity of less than 150 t. Conversely, Rule 17 of the Marine Fisheries Rules (1983) requires that all fishing vessels shall have a license for fishing in the BFW. Rule 6 of MFR, which was announced in 1993, prescribed the carrying capacity wise fees to be paid by the fishing vessels in order to obtain a fishing license. Its application has been restricted to non-mechanized local fishing vessels up to December 1995. Interpreting these provisions may lead to confusion as to which types of fishing activities require a fishing license or not. As per the provisions of Sections 17 and 18, if a local fishing vessel is registered under any law, then it is not required to obtain a fishing license, but if its carrying capacity exceeds 150 t, then it becomes mandatory to obtain a fishing license¹⁷. However, relying on Rule 17, it may also be argued that fishing vessels which travels into the BFW requires fishing licenses and the others which are engaged in fishing in nearshore coastal waters or below the BFW are not obligated to obtain fishing licenses. Rule 6 of MFR, amended in 1993, prescribed the fees on the basis of vessel carrying capacity to be paid by fishing vessels when obtaining a fishing license.

5.3 FISHING GEAR

Rule 14 of the MFR specified the mesh size of different types of nets which the fishing vessels may use. The rule mentioned about five types of nets, namely, shrimp trawl net (boom), fish trawl net, large mesh drift net and small mesh drift net and set bag net. In practice, there are a few more types of nets which do not fall within the purview of this rule, though one or two of such types have been found severely destructive to the resource.

5.3.1 Set Bag Net

Anon once reported that 28% of the artisanal fish production comes from the set bag nets (*behundi jal*)¹⁸ and of this, 73% has been reported to be from the estuarine set bag net (ESBN) fishery, while the rest is from the seasonal marine set bag net operation.

¹⁶ Local fishing vessel means any fishing vessel: (i) wholly owned by one or more persons who are citizens of Bangladesh; (ii) wholly owned by any company, society or other association of persons established under the law of Bangladesh of which at least 51 per cent of the shares are held by citizens of Bangladesh and includes any fishing vessels registered in Bangladesh and operating under Bangladesh flag under joint venture or any other approved arrangement; and (iii) wholly owned by the government or by a statutory corporation established under a law of Bangladesh.

¹⁷ Rule 12, MFR.

¹⁸ *Behundi* or set bag net is a fixed bag net with a rectangular mouth. The net traps from its mouth and ends in a bag 25-30 m from the mouth. The mesh size decreases continually from the mouth to the bag; the bag is of fine mesh 4-13 mm. The catch consists mainly of shrimp, bombay duck, small anchovies and immature hairtails.

The ESNB fishery covers a vast coastal area. It embraces almost all the brackishwater bodies, channels, tributaries and also the open sea waters in some areas, where there is a heavy outflow of freshwater from rivers and extend up to a 10 m depth in the coastal water. The Marine Fisheries Survey and Management Unit (MFSMU)¹⁹ prepared a report in December 1996 which stated that the operation of such a gear is generally done in areas which are the habitats of small shallow water species or shrimp and are the nursery grounds of marine species of shrimp and fish. All aquatic species of marine and freshwater origin which visit the brackishwater area for nursery and breeding purposes are seriously overfished (growth overfishing). Moreover, catching of fishes at the juvenile stage also prevents them from participating in the spawning process. 13 000 nets are being used by around 55 000 ESNB operators and more than 300 000 are dependent on such operators. This MFSMU report concluded by saying that the operation of ESNB below the 10 m depth and in specified areas during specified seasons has to be prohibited.

The Rules 14 and 15 of MFR fixed the mesh size of the set bag net (*behundi*) at the cod end at 30 mm and the area for fishing up to 40 m depth of marine water. This regulation of mesh size in respect of ESNB has hardly been enforced as it is evident that this gear targeted the juveniles and that increased mesh size virtually results in no catch (Hansen and Mustafa 1992). Does the mesh size prescribed for set bag net also includes the ESNB or only for marine set bag net? This confusion arises from the demarcation of areas for operation of set bag nets as mentioned in Rule 15²⁰. It has been reported in a number of surveys that the ESNB is operated within the 10 m depth line from the coastline while the marine set bag net (MSBN), as alleged, is operated up to the 25 m depth line. So it needs to be spelled out clearly which gear is to be regulated by what provision. It seems that the regulation for mesh size and demarcation of fishing areas in Rules 14 and 15 have targeted mainly the set bag net used for fishing in the BFW as measured from the 18.29 m depth line since the rule has not mentioned anything about its landward limit. To minimize damage to the ecosystem, the jurisdiction should be extended as in the Protection and Conservation of Fish Act of 1950. In this Act, the coastal water is designed as comprising a vast network of channels, tributaries and rivers below the 10 m depth and falls within the category of open *jalmohals* management system. There are specific provisions that provide sanction to the law enforcing agency (i.e., Department of Fisheries [DoF]) for regulating the indiscriminate use of ESNB and its mesh size.

5.3.2 Pushnet Fishery

Details on this fishery have been discussed in a separate chapter on impacts of shrimp culture.

¹⁹ This is a permanent set up of the Department of Fisheries (DoF) for doing survey work on resource monitoring and management.

²⁰ Area for fishing with the set bag net is earmarked up to 40 m depth of marine water.

5.3.3 *Other Fishing Gear*

Rules 14 and 15 of MFR mentioned about five types of nets, namely, shrimp trawl net (boom), fish trawl net, large mesh drift net, small mesh drift net and set bag net and areas where such nets are to be used. In the report prepared for integrated management and development of the fish exploitation process in the coastal area by the MFSMU, fishing gear considered traditional are ESBN, beach seine, fry catching net and trammel net. On the other hand, the semi-traditional gear are large mesh drift net, small mesh drift net, marine set bag net and long hook lines. The traditional types are generally operated in the shallow area of the coastal waters while the semi-traditional types are predominant in the deeper portion of the marine waters. A careful reading of Rules 14 and 15 would reveal that they are mostly applicable to deepwater coastal fishing in terms of nets and area specification. The question may be raised regarding the operation of fishing nets (ESBN, beach seine, fry catching net and trammel net) and which law regulates the area or mesh size of such gear. These fishing nets are mostly operated in shallow waters and the nature of operation and the structural framework suggests that such gear are not made for use in the deep water up to the 40 m depth line. The fact is that Rules 14 and 15 has not specifically mentioned these types of gear and the area specification. In such circumstances, either the Protection or Conservation of Fish Act of 1950 is to be applied or necessary amendments have to be made in the MFO to clarify these issues.

5.4 NUMBER OF FISHING VESSELS VS. RESOURCE POTENTIAL

According to Section 19 of the MFO, the Director²¹ may refuse to issue a fishing license, suspend, cancel or refuse to renew any license if it is necessary for proper management, conservation and development of any particular fishery, to protect the interest of the marine fishery industry, or if the vessels acted in contravention of the conditions imposed by the fishing license. This authority has been vested in the Director to limit the size of the fishing fleet for the sustainable use of the resource.

But a close analysis of two of the sections of the MFO reveals a loophole that may hinder the objective of Section 19. Sections 17 and 18 of the MFO states that a fishing license need not be required with respect to local fishing vessels that have been registered or hold a valid certificate of inspection.

²¹ The Director shall be responsible for the management, conservation, supervision and development of marine fisheries and implementation of the objectives of the MFO and for issuance of fishing licenses (Sections 5 and 8).

Section 13 of the Bangladesh Merchant Shipping Ordinance (BMSO) (1983) also requires all sea-going Bangladesh ships²² exceeding 15 t be registered. Section 2(16) has defined a fishing vessel as a vessel of whatever size and by whatever means propelled exclusively engaged in sea fishing for profit. The Mercantile Marine Department of the Department of Shipping is authorized to issue registration certificates to sea-going Bangladesh ships exceeding a carrying capacity of 15 t. The BMSO does not specifically impose any liability for obtaining registration for fishing vessels as defined in section 2(16), although this may come under the definition of Bangladesh ship which require registration for going into the sea to fish. Based on the provisions of Section 13 and the definition of a Bangladesh ship, it may be assumed that fishing vessels which are engaged in sea fishing exceeding 15 t are required to obtain registration.

One can, hence, conclude that local fishing vessels that have obtained registration from MMD are not required anymore to take any fishing license from the DoF. Sections 17 and 18 of the MFO undermine the objectives enshrined in Section 19 of the MFO. It is the Office of the Director, the marine wing of the DoF, which is responsible for the management, conservation, supervision and development of marine resource and for issuance of fishing licenses depending on the standing stocks and the maximum annual harvestable stock.

Under the cover of this legal exemption, the number of motorized traditional fishing vessels operating within the 40 m depth line has increased alarmingly²³. It is a situation which might lead to the overexploitation of the resource. The provision of section 19 of the MFO has been vitiated by Sections 17 and 18 as the discretion in ascertaining the stock and maximum harvestable stock may not lie with the MMD. MMD as a government agency is mainly responsible in ensuring safe navigation and preventing shipping accidents, not in regulating fishing activities. It is the marine wing of the DoF which has the authority and legal responsibility to ensure sustainable fishing yield. In the near future, due to such legal flaw, the number of fishing vessels might exceed the stock limit resulting in irreversible destruction of the country's fishing resource.

²² "Bangladesh ship" means a ship belonging to a statutory corporation, a ship acquired and owned by a foreign national or company and leased out to the government or a citizen of Bangladesh or a Bangladeshi company under such an agreement that the ownership of the ship shall be transferred after a specified period of time to the government or such citizen or company in accordance with the terms of the agreement or a ship owned wholly by persons each of whom is: (a) a citizen of Bangladesh; or (b) a company which fulfills the following conditions, namely: (i) the principal place of business of the company is in Bangladesh; (ii) shares representing more than fifty percent of the share capital of the company or shares carrying more than fifty percent of the total voting power are held by citizens of Bangladesh; (iii) the majority of the directors of the company are citizens of Bangladesh; and (iv) either the Chairman or the Managing Director of the Board of Directors of the company is a citizen of Bangladesh.

²³ During the period from 1974/75 to 1981/82, the number of mechanized fishing vessels increased by 150 % and up to this period from 1985 it increased by 225 %.

Chapter 6

Policies Covering Coastal Fisheries and Environment

Policies are enumeration of guidelines for translating the objectives of the government's commitment to attain socioeconomic justice for the people. Policies are general principles by which a government is guided in its management of public affairs, or the legislator in its measure. This term, as applied to a law, ordinance, or rule of law, denotes its general purpose or tendency considered as directed to the welfare or prosperity of the state or community (Black 1998). It provides a context within which more detailed decisions about organization, resource allocation, procedures, etc. are made.

6.1 NATIONAL FISH POLICY (NFP)

In 1998, the Ministry of Fisheries and Livestock introduced the National Fish Policy (NFP). Its objectives were: (1) to develop and increase production of fish resource; (2) to alleviate poverty by creating opportunities for self-employment and for improving the socioeconomic condition of fisherfolks; (3) to meet the demand for animal protein; (4) to earn economic revenue and foreign exchange through export of fish and fish products; and (5) to maintain ecological balance, conserve biodiversity and develop public health.

The objectives set forth seem exhaustive, but there is a need to harmonize these with other sectoral policies as prioritization of policy provisions often depends upon striking a balance between the issue of economic revenue and other criteria.

Prior to reviewing the relevant provisions on coastal fishery in the NFP, a short description of policy guidelines on other fishery regime is in order. NFP may be classified into six components based on the different fishing environments:

- ❖ Conservation, management and exploitation guidelines for inland open water fishery (Item 5.0);
- ❖ Fish culture and management guidelines for inland closed water fishery (Item 6.0);
- ❖ Guidelines for coastal shrimp and fish culture (Item 7.0);

- ❖ Guidelines for conservation, management and exploitation for marine fisheries resources (Item 8.0); and
- ❖ Additional guidelines relating to fish resources (Item 9.0).

6.1.1 *Salient Features of the NFP Relating to Coastal Fisheries and Environment*

- ❖ The policy encourages integrated culture of fish and shrimp in flooded and slightly saline paddy fields.
- ❖ To maintain and protect the environment in the coastal region and to take the necessary steps to integrate fish and shrimp cultures in the paddy fields.
- ❖ Prohibition of mangrove destruction for shrimp and fish culture.
- ❖ Shrimp farm owners are compelled to plant trees to maintain environmental balance.
- ❖ The establishment of postharvest facilities are encouraged in order to prevent shrimp wastage.
- ❖ The NFP underscores the need to encourage the establishment of hatcheries by the private sector.
- ❖ Shrimp culture area in the coastal region are delineated.
- ❖ The use of chemical fertilizers is prevented due to its deleterious impact on environment.
- ❖ Environment-friendly fish and shrimp culture shall be followed.
- ❖ Activities having negative impact on fisheries resource or related to fish culture shall be regulated.
- ❖ Enforcement of laws shall be strengthened to prevent the disposal of untreated industrial waste into water bodies.
- ❖ Natural water bodies and marine biodiversity shall be protected.
- ❖ Prohibition on fishing shall be imposed on trawlers in coastal marine areas below the 40 m depth line.

6.1.2 *Conservation of Biological Marine Resource*

Earlier survey reports have revealed that the current exploitation trend of marine fish species and shrimp has reached close to its maximum yield. To conserve the marine resources, steps shall be taken to limit exploitation and the number of mechanized fishing vessels. The number of trawlers shall be regulated and fixed in relation to the available stock of fish resource (Article 8.2.1).

Regulation shall be imposed on the use of the set bag net (*behundi*) which is responsible for the destruction of juvenile shrimps and other fish species (Article 8.2.2).

Estuaries, rivers and canals get highly populated with shrimp fry through larval migration. To protect the shrimp population, catching of certain species of shrimp (*bagda, chaka, harina*) from the breeding ground shall be prohibited (Article 8.2.3).

6.1.3 Artisanal Fisheries Sector

The right to catch fish in the coastal area shall be reserved for the artisanal fisherfolk. On the basis of the research results of resource surveys, areas where small and commercial fishing can occur should be delineated and fixed by necessary laws.

Special attention shall be given to the development of socioeconomic conditions of the fisherfolk. In order to achieve this end, the following programs shall be undertaken (Article 8.3.4):

- ❖ Insurance projects for boats, engine, gear, fish, property and life of fishermen shall be instituted;
- ❖ Each boat shall be equipped with life-saving materials and radio;
- ❖ Necessary measures shall be taken to prevent piracy;
- ❖ Members of fisherfolks' organizations shall be trained in the use of newer and more advanced technology for catching, conserving, distributing and processing of fish and steps shall be taken to assist them in enhancing professional capability and family income;
- ❖ Supervisory credit system shall replace the current collateral system of credit; and
- ❖ More landing and processing facilities in coastal areas shall be constructed to ensure preservation of fish and fair price to the catch of poor fishers.

In addition to the NFP, there are a number of other policies which contain guidelines regarding the conservation and management of the coastal environment.

6.2 NATIONAL WATER POLICY (NWP)

The National Water Policy adopted in 1999 underscores the need to utilize the underground and surface water resources in an integrated manner. The Policy covers issues connected with management of catchment areas, their rights and distribution, the involvement of government and nongovernment sector in promoting public health, fisheries, navigation, agriculture, industry and environment. The water policy places particular

emphasis on the involvement of the people for better management of water resource in order to achieve economic development, gender equality and promote environmental awareness. Relevant portions of the National Water Policy are mentioned below:

6.2.1 Water, Fishery and Wildlife

- ❖ Due consideration shall be given to fishery and wildlife while making plans for the utilization of water resource in different areas;
- ❖ Necessary steps shall be initiated for minimizing the environmental damages caused by rivers and their water flow;
- ❖ Implementation of drainage project shall avoid the public wetlands and *beels* are considered as primary habitats for waterfowl and other animals;
- ❖ Conservation of *baor, beel, haor* and borrow pits located on the sides of roads shall be undertaken for fish production and development and maintenance of connection with rivers throughout the year;
- ❖ The water development plan shall not interfere with movement of fish and water-regulating structures must provide sound migration and breeding routes of fish; and
- ❖ Aquaculture in low saline water shall be limited within specified areas as declared by the government.

6.2.2 Water for Environment

- a. To maintain environmental balance in estuaries sufficient flow through riparian channels needs to be ensured; and
- b. Necessary steps need to be taken in removing existing unapproved structures from rivers or any water flow as well as prevention of activities which interfere with water flow and which cause environmental problems.

6.3 NATIONAL ENVIRONMENT POLICY (NEP)

The Policy underscores the need for the development of fisheries resources which will have no adverse impact on the environment, especially on the mangrove ecosystem. The guidelines envisaged in the National Environmental Policy of 1992 are as follows:

- a. to ensure appropriate environment for the conservation and development of fisheries and livestock (Article 3.8.1);
- b. to prevent activities which disturb the wetlands/natural habitats of fish and encourage rehabilitation (Article 3.8.2);

- c. to ensure that development activities in fisheries and livestock do not create any adverse impact on mangrove forests and other ecosystems (Article 3.8.3); and
- d. to evaluate existing projects on water resources development, flood control and irrigation to determine their adverse impact on fisheries and adopt measures for alternative fish culture to improve environmental conditions (Article 3.8.4).

6.4 NATIONAL CONSERVATION STRATEGY (NCS)

Striking a balance between conflicting and competing needs for the present, conserving life support systems and preserving the renewable and nonrenewable resources for future generations demand sound analysis and commitment. Keeping in view this ideology, the government in 1991 prepared a National Conservation Strategy (NCS), which has been awaiting final approval. The following are relevant provisions in the NCS:

- ❖ The *Sunderbans* are to be managed in an integrated manner;
- ❖ In the context of Bangladesh, a well-defined land use and water use policy particularly in the brackish water zone is yet to emerge;
- ❖ Preservation of mangrove forests which provide nursery, food and shelter to shrimp and other estuarine living resources;
- ❖ Allocation of government-owned coastal land with most suitable physical environment for shrimp culture and provision of technological support to farmers for intensive aquaculture. It will be made obligatory for shrimp farmers to grow mangrove forests around the farm where such forest does not exist;
- ❖ Establishment of shrimp hatcheries for production of juveniles and discouraging the wasteful method of trapping floating eggs and juveniles in open waters; and
- ❖ Importation of appropriate and environmentally sound technology.

6.5 NATIONAL FIFTH FIVE YEAR PLAN (1997-2002)

The Plan has targeted the following to be achieved within the next five years:

- ❖ Increased fish production and nutrition value;
- ❖ More employment opportunities in fish and fish-related industry;
- ❖ Development of the socioeconomic condition of fisherfolk, fish farmers and other fish sector employees;
- ❖ More revenue earnings through export of shrimp, fish and fish products;

- ❖ Development of public health, aquatic environment and fishery management regime;
- ❖ Development of fish harvesting, landing and marketing systems; and
- ❖ Improvement of research, management and training on fishery-related activities.

6.6 SALIENT POINTS OF POLICIES DISCUSSED ABOVE

6.6.1 *Shrimp Culture*

The NFP recognizes the necessity of formulating guidelines for coastal shrimp and fish culture. It emphasizes an integrated culture of fish and shrimp in paddy fields. Some commendable points include a moratorium on cutting of mangroves for shrimp culture, compulsory measures for planting trees on boundary areas of shrimp farms, adopting scientific arrangement to prevent wastage of shrimp fry during transportation and collection, demarcating areas for shrimp culture and limiting the use of chemical fertilizers in shrimp culture.

The National Water Policy limits aquaculture operations in the low saline water area as designated by the government.

The National Environment Policy suggests taking steps for preventing adverse impact on the mangrove ecosystem while undertaking development activities in fisheries.

6.6.2 *Industrial Pollution*

To check the increasing problem caused by industrial pollution, the NFP underscores the need for stringent enforcement of laws to regulate the disposal of untreated industrial wastes into water bodies.

The National Environment Policy is a guide for the adoption of corrective measures by polluting industries.

6.6.3 *Number of Fishing Operations*

To conserve the resource in the marine and coastal areas, decision shall be taken to limit its exploitation and the number of mechanized fishing vessels plying the waters as stated in the NFP.

6.6.4 Use of Gear

Regulation shall be imposed to regulate indiscriminate operation of set bag net (*behundi*) responsible for destruction of juvenile shrimp and other fish species as proposed in the NFP.

6.6.5 Fishing Communities

The NFP addresses issues connected with the development of socioeconomic conditions of coastal fisherfolk, such as insurance projects for boats, engines, gear, life-saving materials, training for using improved technology aimed at conserving the resource and granting of supervisory loans instead of collateral system of credit.

6.6.6 Embankment Projects

The NFP emphasizes the protection of natural water bodies while the National Water Policy has taken a step further by advising that water development plan must not interfere with movement of fish, and water-regulating structures must have facilities to provide sound migration and breeding pathways of fish. Moreover, the National Environment Policy is in favor of evaluating existing projects on water resources development, flood control and irrigation to determine their adverse impact on fisheries.

6.6.7 Land Use

The National Conservation Strategy for Bangladesh expresses the need to formulate a well-defined land use policy and the National Environment Policy encourages land use systems in consonance with various ecosystems.

6.7 END NOTES

According to Article 8(2) of the Constitution of Bangladesh, policies are not judicially enforceable, but shall give direction to the State in law making. Perhaps, that may be a good reason for incorporating all good items in the policies as one cannot go to the court of law for enforcement of policy provisions. However, in one case²⁴ the court observed that while dealing with public resource through any statutory body, and in the absence of any rules or laws made by such body, the government must follow certain fixed standards, principles, guidelines applicable to all persons.

²⁴ Sharping Matshajibi Samabaya Samity Limited vs. Bangladesh and others, 1987 BLD, AD, p. 106.

Through this avenue, attempts were taken by nongovernmental groups to pursue the objectives enshrined in a number of sectoral policies. It may be seen from the enumeration of policy provisions above that they are mostly of recent introduction but in most sectors the legal provisions are existent but not in the fashion as stated in such policies. Therefore, to update legal norms and to make policy provisions compatible with each other, the existent laws need to be amended or new ones need to be enacted to keep pace with policy developments. The environmental regulatory regime of environment in the country often suffers from such lack of activism.

“Therefore, to update legal norms and to make policy provisions compatible with each other, the existent laws need to be amended or new ones need to be enacted to keep pace with policy developments.

The environmental regulatory regime of environment in the country often suffers from such lack of activism.”

Chapter 7

Institutions

There are several institutions involve in the management and development of fisheries in Bangladesh. The roles and responsibilities of these institutions are described below. The primary and principal organizations and institutions responsible for regulation, management and development of fish production from inland, coastal and marine sources are the Department of Fisheries (DoF), Bangladesh Fisheries Development Corporation (BFDC) and Bangladesh Fisheries Research Institute (BFRI).

7.1 MINISTRY OF FISHERIES AND LIVESTOCK (MOFL)

The Ministry of Fisheries and Livestock (MoFL) was created in 1985 when the Fisheries Division and Livestock Division were carved out of the Ministry of Agriculture. A Minister appointed through the political process heads MoFL. A Secretary, a senior civil servant, assists the Minister. A Joint Secretary, a Deputy Secretary, three sections and a small planning cell are responsible for the following:

- ❖ Preparation of schemes and coordination of national policies in relation to fisheries;
- ❖ Prevention and control of fish diseases;
- ❖ Control, management and development of government fisheries which are under the development scheme of this Ministry and such other fisheries which will be included in the future;
- ❖ Conservation of fish and other population of aquatic organisms of economic importance;
- ❖ All matters relating to marine fisheries like permission, licensing and monitoring of operations of fishing vessels, including factory ships;
- ❖ Fishing and fisheries beyond territorial waters (including deepsea fishing), fish harbor, fish quality testing, laboratories and other ancillary organizations; and
- ❖ Utilization of coastal land for brackish water shrimp culture.

The Ministry is primarily a policymaking agency. The implementation and execution of policies is in the hands of the agencies mentioned below.

7.1.1 *Department of Fisheries (DoF)*

7.1.1.a Evolution of the Department

The Department of Fisheries (DoF) was established in 1908 under the Province of Bengal. This department merged with the Department of Agriculture in 1910. Subsequent to such merger, the DoF went through several bureaucratic transformations in its history. The DoF was entrusted with the task of implementing the Indian Fisheries Act of 1897. Because of the non-availability of necessary institutional support, the DoF was abolished in 1923 and was again revived in 1942 with the original task of augmenting fish production.

In 1947, the office was renamed as the Directorate of Fisheries and the headquarters was shifted from Calcutta to Comilla, located on the southeast of the capital city. In the initial years of such transfer, the Directorate mainly looked after fish marketing and fishers' welfare. It prepared the Protection and Conservation of Fish Act (1950). It hired some ponds and managed small-scale nursery activities to grow fry and fingerlings of major carps for distribution among private fish farmers. The Directorate was split into the Research and Extension wing in 1954 and then its headquarter was shifted to Dhaka, the capital city.

In 1971, the Directorate was renamed as the "Department of Fisheries" (Ahmed and Hossain 1995).

7.1.1.b Responsibilities of the DoF

The institution was not created by any specific law stipulating its substantive powers and functions. It transformed itself through the years by gradual development. The DoF expanded its activities, and in the process the following responsibilities have emerged:

- ❖ Advise the government regarding extended management of the inland and marine fisheries resources and other aquatic animals of economic significance;
- ❖ Advise the government regarding the environmental conservation and development and protection of water bodies;
- ❖ Assist the line Ministry in formulating policies regarding the management and development of fisheries resources and other fish-related matters;
- ❖ Conduct survey and stock assessment of the existing fisheries resources;
- ❖ Identify the present status and productivity of marine water bodies and monitor the fish catch of the trawler fleet;

- ❖ Take steps for the management and conservation of inland and marine fisheries resources;
- ❖ Formulate fisheries-related acts and ensure the enforcement of the acts, ordinances and regulations;
- ❖ Formulate and implement development projects for fish culture, fisheries resources management, fish processing and utilization, and other fisheries development related activities;
- ❖ Monitor, evaluate, analyze and coordinate fisheries development related activities. Coordinate fisheries-related inter-organizational activities with other institutions and bodies engaged in this sector like the Fisheries Research Institute, Bangladesh Fisheries Development Corporation, Bangladesh Agricultural Research Council, Rural Development Board, Bangladesh Water Development Board, Export Promotion Bureau, Department of Environment, Krishi Bank, etc.;
- ❖ Disseminate improved fish cultivation techniques;
- ❖ Run fish seed multiplication farms and fish hatcheries as demonstration as well as to supply high-quality indigenous and exotic fish fry and fingerlings to the fish farmers. Impart to farmers through training in these demonstration farms;
- ❖ Demonstrate and extend improved and appropriate technology for shrimp culture through shrimp farms and shrimp hatcheries;
- ❖ Arrange institutional credit for fish farmers, shrimp cultivators, fisherfolk and fish traders;
- ❖ Carry out fisheries extension service and transfer of technology on fish farming, fish harvesting, fish preservation and fisheries management;
- ❖ Arrange in-service training for the officers, staff and field level extension workers of the DoF;
- ❖ Arrange training for the extension workers of various private organizations, landless peasants, unemployed youth, fish farmers, fisherfolk, etc.;
- ❖ Enforce quality control measures and issue health certificates for exportable fish and fish products;
- ❖ Arrange for the Thana Fishery Officers to participate in Fisheries-related development and extension activities at the Thana level. At the same time implement acts, ordinances;
- ❖ Carry out programs for the socioeconomic development of the fisherfolk community;
- ❖ Liaise with fisheries-related regional and international organizations; and
- ❖ Coordinate investment in the various sectors of the fisheries industry like trawling, fish processing, etc.

7.1.1.c Present structure of the DoF

The DoF is headed by the Director General who is supported by two Directors—one for marine fisheries and one for inland fisheries. The Director of marine fisheries is to take care of all functions related to marine survey, enforcement of laws and licensing, etc. The Director of inland fisheries, with headquarters located inland, is responsible for administration and finance, training, fish culture and extension activities and management of field offices.

The field level setup consists of Deputy Directors in charge of six Divisions presently designated as divisional fishery officer, District Fishery Officers in charge of 64 districts and 456 Thana Fishery Officers (TFO). TFOs are supposed to render extension service and at the same time are responsible for the implementation of all rules, acts, ordinances, etc. There are three Principal Scientific Officers (PSO) equivalent to a director.

7.1.1.d Marine wing (Department of Fisheries)

The MFO has entrusted the director the responsibility for the management, conservation, supervision and development of marine fisheries and the implementation of the objectives set out in the MFO (Section 5). The responsibilities under the MFO has briefly been discussed in Chapters 2 and 3. Considering its implication on coastal fishery, and on the basis of territorial application, the functions enumerated in the MFO and the rules made thereunder have been summarized below:

- ❖ The director shall be responsible for issuing fishing licenses in respect of all marine fishing in the Bangladesh fisheries waters (Section 8);
- ❖ The director shall specify the species of fish to be caught, the type of fishing gear to be used, the method of fishing and location for catching fish (Section 13);
- ❖ The director shall ask the holder of any license to provide detailed information of catches and the sale as prescribed in the form (Section 14);
- ❖ The director has the responsibility of keeping the shipping routes free from fishing vessels (Section 15);
- ❖ The director may attach all or any of the following terms and conditions to any license:
 - (a) the areas within which, and the period during which, fishing is authorized;
 - (b) the species, size, sex, age and quantities of fish that may be caught or taken;

- (c) the methods by which fish may be caught or taken;
 - (d) the types, size and amount of fishing gear that may be used by the fishing vessels; and
 - (e) statistics relating to the catch to be provided.
- ❖ The director may refuse to issue a fishing license to local fishing vessels and may also cancel, suspend or refuse to renew the license for the purpose of proper management, conservation and development of fishery to suit the best interest of the marine fishery (Section 19);
 - ❖ The director shall take steps to:
 - (a) prevent the use of or attempts at using any explosive, poison or other noxious substances for the purpose of killing, stunning, disabling or catching fish; and
 - (b) prevent the use or attempts to use any prohibited methods of fishing as prescribed or of fishing gear prohibited under any rule (Section 26).
 - ❖ The director shall prevent the use of nets which has a mesh size below the size prescribed by any rule or this Ordinance (Section 27);
 - ❖ The director shall take necessary measures to prevent:
 - (a) fishing or attempt to fish in marine reserves;
 - (b) dredging, extraction of sand gravel, discharging or deposition of waste or polluting matter and destruction of natural breeding grounds in marine reserves; and
 - (c) construction or erection of any building or other structure on or over any land or waters in the marine reserve (Section 29).
 - ❖ The director shall order and supervise the sale of any fish or other article of a perishable nature seized and the proceeds are dealt in accordance with the provisions of this Ordinance (Section 38);
 - ❖ The director shall be responsible in enforcing laws and rules regarding the conservation and management of fisheries (Rule 7, MFR);
 - ❖ The director shall initiate necessary measures in keeping the trawler fleet outside of the coastal area as mentioned in the rule made under this ordinance (Rule 15, MFR);
 - ❖ The director shall ensure that all fishing vessels shall have license for fishing, possess valid required certificates, display nationality sign through vessel flag and suitable marking (Rule 17, MFR); and
 - ❖ The director shall be responsible for the issuance of identity card (not transferable) to every person engaged in fishing (Rule 17, MFR).

7.1.2 *Bangladesh Fisheries Development Corporation (BFDC)*

BFDC was established in 1964 in order to promote the fishing industry in Bangladesh and for certain other matters connected therewith. After independence, the BFDC received its permanent legislative structure under the Bangladesh Fisheries Development Corporation Act of 1973. BFDC is entrusted with the authority to acquire, hold or dispose of fishing boats, fish carriers, road and river transports and all equipment and accessories necessary in connection with the development of fishing industries. The general direction and administration of the corporation and its affairs shall be vested in a board, which shall have full authority in exercising all powers and performing all acts and things the corporation is entitled to. The board, in discharging its functions, shall act on commercial considerations and shall be subject to the supervision and control of the government and shall also be guided by such general or specific instructions as may, from time to time, be given to it by the government. According to Section 6 of the BFDC Act 1973, the corporation shall take such measures as it thinks fit for the development of fisheries and fishing industries in Bangladesh. To carry out the purposes of this Act, the BFDC shall have power to:

- ❖ Take measures for the development of fisheries and fishing industry;
- ❖ Establish the fishing industry;
- ❖ Establish units for capturing fish and promoting a better organization for the exploitation of fish wealth;
- ❖ Acquire, hold or dispose of fishing boats, fish carriers, road and river transports and all equipment and accessories necessary in connection with the development of fishing industry;
- ❖ Establish units for preserving, processing, distributing and marketing of fish-products;
- ❖ Advance loans to fishing industries and to the fisherfolks' cooperative societies;
- ❖ Encourage establishment of fisherfolks' cooperative societies;
- ❖ Undertake surveys and investigation of the fish resources;
- ❖ Establish institutes or make arrangements for the training and research in the methods of catching, processing, transport, preservation and marketing of fish;
- ❖ Set up organizations for export of fish and fish products; and
- ❖ Acquire, hold and dispose of such other properties as required for carrying out all or any of the above-mentioned purposes.

The BFDC was the major contributor to the development, modernization and industrialization of coastal and marine fisheries. Over the years, however, its activities have been reduced. It operates approximately in five landing centers in the coastal

districts with facilities for berthing, bunkering, ice, water and preservation for landing of fish catch by traditional local motorized and non-motorized fleet.

7.1.3 Fisheries Research Institute (FRI)

FRI has been established through the adoption of the Fisheries Research Institute Ordinance of 1984 to carry out and coordinate fisheries research and to assist in the development of more efficient and economical methods for fish production, management, processing and marketing in Bangladesh. Section 6 of the FRI Ordinance spelled out the functions of the institute as follows:

- ❖ To carry out and coordinate fisheries research in Bangladesh;
- ❖ To assist in the development of more efficient and economical methods for fish production, management, processing and marketing; and
- ❖ To do such other acts or things as may be considered necessary for carrying out the purposes of this ordinance.

The Fisheries Research Institute (FRI) was established in 1984 as an autonomous body under the administrative control of the MoEF.

7.2 MINISTRY OF LAND (MoL)

The ownership of the *jalmohals* whether open or closed within the territorial limit of inland waters shall be vested with the Ministry of Land (Article 223, Land Management Manual of 1990). According to Article 186 of the Land Management Manual (LMM), the management of around 10 108 *jalmohals* is vested with the MoL. The nature of the two types of *jalmohals*, the evolution of their management regime and the management procedure has been discussed in detail in Chapter 3 of this study.

7.3 COAST GUARD

The coast guard has been constituted under the Coast Guard Act of 1994 to protect the national water territory and to prevent illegal fishing and environmental pollution in marine areas.

In June of 1998, the Coast Guard acquired a number of vessels for patrolling the coastal area. Matters like environmental pollution have been incorporated in the law, although the focus of the Coast Guard may be limited to checking smuggling or preventing intrusion of foreign fishing vessels.

7.4 INSTITUTIONAL ISSUES

There is no particular institution to look after the matters occurring in the coastal region. It is the DoF, with its two wings, which takes charge of the issues.

- 7.4.1 The DoF is responsible for the conservation and protection of fish and fishery in the country as mandated by the Protection and Conservation of Fish Act of 1950 and the MFO. However, it seems that the institution is not clear about its mandates. For example, the issues of industrial pollution, construction of coastal embankment, issuance of fishing license from the Mercantile Marine Department under the Department of Shipping, use of unsustainable gear can be cited where the DoF did very little in clarifying its jurisdiction and in explaining to the stakeholders its role and mandates under different governing legal instruments.
- 7.4.2 Monitoring and awareness are both important from the perspective of ensuring compliance with legal requirements. In the context of Bangladesh, most of the fishermen are poor and uneducated, and it is absurd to expect people in the lower classes to read law and abide by its provisions, particularly with respect to obtaining fishing licenses, using appropriate gear and methods to fish. In interviews with inhabitants of a fishing village, the respondents believed that the fish is an endless resource so that they see no problem in using efficient gear like ESNB to harness maximum output. An awareness campaign would help in making the people understand the re-stocking pattern of fish, the necessity of obtaining license to keep the number of fishing vessels up to the sustainable yield level and issues connected with the use of destructive gear. However, it is frustrating to note that the fishermen even do not understand the distinction between the fishing license which specify the areas, period, species and methods to be used for catching fish and the registration certificate which ensures the fitness of the vessels engaged in fishing operations. The marine wing of the DoF is empowered by the MFO to implement provisions relating to the conservation, development and management of resources lying within the coastal and marine waters but substantial measures still have to emerge from this wing to generate compliance with rules and regulations from fisherfolks.
- 7.4.3 Under the provisions of the Bangladesh Merchant Shipping Ordinance of 1983, vessels that fish in the coastal region up to a substantial depth towards the sea are required to obtain registration certificates as a proof of the vessel's fitness in making such voyage. According to Sections 17 and 18 of the MFO local fishing vessels that possess a valid registration certificate are not required anymore to obtain a fishing license from the marine wing of the DoF. It is, however, the latter which has the information about the resource potential and maximum harvest limits

through the Marine Fisheries Survey and Management Unit.²⁵ Is there any effective legal understanding in maintaining the relationship between the two institutions regarding the issuance of registration certificates? If yes, is there any regulating provision in the Bangladesh Merchant Shipping Ordinance of 1983 for limiting the number of vessels? When a prospective applicant files the document seeking registration of a fishing vessel, what would be the legal plea for turning down the petition? Such issues need to be resolved. Otherwise, under the existing legal arrangement the number of fishing vessels may exceed the manageable number, thereby exposing the resource to overfishing and fast depletion of fishery stocks.

- 7.4.4 The FRI is tasked to carry out and coordinate fisheries research in Bangladesh. Two brackishwater and marine fisheries research stations were established to undertake fisheries research, respectively, for the purpose of generating basic scientific information for feedback to the stock assessment program and to enable management and development of the two fisheries. But due to inadequacy of scientific staff and lack of training of personnel in these fields, the research programs have greatly suffered. Instead of exploring the options through utilization of the strength of these two stations, a Marine Fisheries Survey and Management Unit (MFSMU) started functioning as a permanent set up of the DoF for doing survey work on resource monitoring and management. This, obviously, undermines the role of the FRI in generating research information for determining policy goals. The overlap also reveals the lack of coordination among different institutions under the same policymaking body. What causes the failure in reconciling and streamlining the functions and roles of the different government agencies? Is it the reluctance of the policymaking body or the failure of the respective institutions in proving their credibility or the effort by any particular organ to increase revenue as proof of its credibility?
- 7.4.5 The unclear DoF mandate that does not adequately define the tasks and the demarcation of areas of responsibility in relation to those of sister agencies such as BFDC and FRI has resulted in the overlapping and conflict of programs. These are manifestations of lack of coordination and unhealthy competition. The regulatory situation postulates that, as the marine wing, the DoF is required by the MFO to manage the coastal and marine fishery resource and therefore, the duty to conduct research also falls within the domain of the DoF. This situation is obviously causing the underdevelopment of other institutions.
- 7.4.6 The MFO or the Protection and Conservation of Fish Act of 1950 have provisions for regulating the use of gear, including the catching of fry at specified periods and places. However, the enforcement mechanism is absent to address the socioeconomic issues connected with the use of

²⁵ Permanent set up of the DoF for doing survey work on resource monitoring and management.

ESBN or shrimp fry catching fishery. Institutions responsible for enforcement of laws are constrained by lack of adequate knowledge of socio-legal issues which, in most cases, results in the breaching of legal norms. For example, it may be said that ESBN operators have traditionally been using such net for generations. If it needs to be regulated, what appropriate type of awareness, alternative, rehabilitative or legal measures need to be initiated? This would require involvement of people from different fields of disciplines to be placed under one umbrella organization that would help in clarifying the socioeconomic situation and design programs or laws addressing social, technical and legal issues in connection with fishery.

- 7.4.7 The marine wing of the DoF is incapable of understanding the jurisdiction of the MFO. As stated in the preamble, this law would apply to the management, conservation and development of marine fisheries in BFW measured from the depth line of 18.29 m, but it seems from the activities of the institution that it exercises jurisdiction over the coastal area below that depth line. In exercising jurisdiction over such area in accordance with MFO, the marine wing may be challenged by anybody on the territorial applicability of MFO. This can become a cause for legal battle where the marine wing may not get a strong legal ground unless declared so by the government (Section 2.a).
- 7.4.8 The data on fish catch statistics is not always dependable and may even be misleading.
- 7.4.9 At the field level, the fisheries staff is thickly and more or less uniformly posted to almost all the *thanas* and districts, instead of being spread out to areas where the potential fisheries production may be increased.
- 7.4.10 The present structure is also incomplete in the sense that many key functions are either absent on the organogram or, if they appear on it, are not being followed. For example, although there is normally a "Research, Training, Project Planning, Evaluation and Statistics Unit," none of the tasks expressed in its title seem to be actually carried out. There is also a Fisheries Extension Section, but the absence of an organized extension system and the lack of appropriate training for district and *thana* fisheries officers constrain and hamper field operations.
- 7.4.11 There is a lack of delegation of power and decisionmaking is overly centralized. This may be caused by unclear, inconsistent job descriptions and authorizations and also by the higher level staff unnecessarily interfering with the work of their subordinates and the subordinates not defending their responsibilities.
- 7.4.12 Duties of each post are not clearly defined, and the supervisory posts for subordinates are indicated through the sectoral guidelines under different laws as functions or powers of an institution.

Chapter 8

Coastal Fishing Communities

The centuries-old tradition of fishing in Bangladesh has been under pressure since the mid-1960s and is now in danger of breaking down. In the past, the fisherfolk could control this occupation by themselves but now their old way of life has been affected by the modern fishing techniques, changing socioeconomic circumstances and other environmental factors. These traditional fisherfolks mainly fish in coastal waters up to a depth of 40 m. Through experience, they evolved boat designs and gear. Within the fishing communities there are two groups—one which operates and owns small sized non-mechanized boats and the other group operates mechanized boats (commonly known as trawlers) up to 40 m depth of the coastal waters.

8.1 NON-MECHANIZED SMALL-SCALE FISHING

This type of fishing is confined to a certain depth. Prior to 1995, before the leasing of open *jalmohals* was abolished, fishers were required to pay taxes, depending on the gear or boat size, to the leaseholder for access to rivers and estuaries. After its abolition, access is now open to all without payment of any tax, even to the government. Various types of fishing continue, such as off-season, contractual and subsistence fishing. The sharing of benefit from the catch of the fishing varies in the different regions of the coastal area.

8.2 MECHANIZED FISHING

"The centuries-old tradition of fishing in Bangladesh has been under pressure since the mid-1960s and is now in danger of breaking down."

In 1966-1967, with the motorization of the traditional fishing crafts (12-14 m long), coastal fishing drastically changed. With the development of a newer and sophisticated technology, the number of mechanized boats increased by at least 150%. This fishing practice is capital-intensive and ordinary fishers who cannot afford it act as hired laborer to the person who owns boats and gear. These boats operate eight months a year between the shoreline and the 40 m depth contour line.

With the commencement of the fishing season, the company²⁶ enters into an informal contract with one of the *Majhi*²⁷ who acts as the leader of the voyage and also hires fishers. Depending on the size of the boat, the number of crew varies from 15 to 20 persons. The company does not give them wages on regular basis. These fishers are recruited and paid through profit sharing. To cover incidental costs necessary for operating the boats, the company provides adequate capital. Prior to the commencement of a voyage, the company also pays each staff a certain amount of money to cover the expenses of the family left behind. Each voyage lasts for 8 to 10 days depending on the availability of fish. After the harvest, the fishers take the total catch to designated landing sites and during such interval, they often visit their families. In an interview with a group of fishers in one of the coastal fishing villages, it was learned that during one fishing season of six months the income of each staff of the boat may range from 15 000 to 50 000 taka (US\$300 to 1 000) and sometimes even more than that.

8.3 PRACTICE IN SHARING BENEFITS

With the increasing commercialization of the fishing industry, the practice in sharing the benefits of the catch has also been restructured. The most common practice today is for a boat and gear owner to pay an agreed percentage of the value of each catch after covering the operating costs such as fuel, ice and food. The sharing arrangement varies from one area to another, on the type of fishery practice and between periods in a fishing season.

The system is changing in favor of labor, probably because of mechanization. Mechanized boats need more net capacity than non-mechanized ones. The former can also cover a much wider area. Both these factors augment the demand for labor. The Mechanized Boat Owners Association has been trying to develop a definite guideline on profit sharing. The members of the association generally follow the practice of sharing profit into two parts—one for the boat owner and the other for the fishers. The fuel and incidental costs of the voyage is deducted from the total amount. The advance paid by the boat owner, if any, is also deducted proportionately from the share of the fishers. The rest of the amount is divided among the fishermen as remuneration for their contribution to the expedition.

This calculation is based on the practice of sharing benefits followed by the members of the Mechanized Boat Owners Association.

²⁶ The fishing boat and gear are owned by an individual popularly known as 'company', a very common feature throughout the whole coast of Bangladesh.

²⁷ A person who has knowledge about the fishing ground, understands the weather and water environment that supports the availability of fish.

Box 8-1. Profit Sharing Scheme.

For a six-month season and five fishers are engaged in fishing. Each of the crew received 6 000 taka in advance from the company. For example, at the end of the season at 300 000 taka worth of fish has been sold.

Cost (40 000) incurred at the beginning of the voyage is deducted:

$$300\ 000 - 40\ 000 = 260\ 000$$

The rest of the amount is divided into two shares—one for the boat owner and the other for the fishers:

$$260\ 000 / 2 = 130\ 000$$

Advance paid by the Company is deducted from the fishermen's share:

$$130\ 000 - 30\ 000 = 100\ 000$$

If five persons including the *Majhi* fish, then the amount would be divided into seven shares. Five shares will go to the fishers and two shares will go to the *Majhi* for his expertise.

**8.4 SIGNIFICANT FEATURE OF
ESBN OPERATION**

Estuarine set bag net (ESBN) operation in the eastern region of the coastal area has a significant feature. In talks with local fishermen, it was revealed that individuals may possess rights to underwater locations where ESBN may be set. Such right may also be leased to others. It is really surprising to note that although the river is a public property, the right of possession for operating ESBN is even transferable from one's heir to another person if payment is made. The fishers interviewed further added that such transfer of rights to persons other than family members hardly takes

place. When they were asked how they were able to possess these rights they replied that they inherited these from their predecessors.

8.5 CONFLICT BETWEEN ARTISANAL FISHERS AND INDUSTRIAL TRAWLERS

Based on the statement made by the fishers, several conflicts were mentioned:

- ❖ Trawlers destroy the nets placed by the artisanal fishers;
- ❖ Trawlers are responsible for the destruction of their fishing grounds; and
- ❖ Trawlers are intruding/invading the areas where artisanal fishers generally fish.

8.6 MONITORING

The fishers complained that sometimes the Bangladesh Navy stops boats and looks into their papers. A frustrating scenario was revealed regarding the requirement of fishing license or registration. The fishers do not even understand the difference between a fishing license and a registration. They said that they were never educated on the requirement of obtaining a fishing license nor were they informed of its purpose.

8.7 CREDIT

Although several schemes have been launched to provide credit to the poorest, it is generally observed that the benefits hardly reach them. With limited scope for institutional credit the poor turn to non-institutional credit suppliers. Most of these money lenders charge exorbitant rates of interest. By and large, small-scale fisherfolk lead a life at the subsistence level. Because their economic base relies mainly on physical labor, their living conditions can be improved only if they get credit at low interest rate. The system of credit plays a significant role in determining the real success or failure of a program for the poor. The National Fish Policy underscored the need to introduce a supervisory system of loan to replace the collateral-based credit system.

8.8 ROLE OF NGOs

There are a number of nongovernment organizations working with fishing groups. Their activities focus on group mobilization and credit provision. They also carry out programs on awareness building on environmental conservation and alternative source of livelihood during off-season.

Chapter 9

Impacts and Expansion of the Coastal Shrimp Culture

The traditional shrimp culture in Bangladesh is quite old, but from the early seventies when demand and price of shrimp in the world market became very high, coastal shrimp culture started to expand very rapidly in the mangrove and poldered areas (Mahmood 1986). In the 1980s, intensification of shrimp culture began in coastal areas. Now, the three modern types of shrimp culture *viz a viz* extensive, semi-intensive and intensive methods are being practiced in the coastal areas of Bangladesh. The major species cultured are *Penaeus monodon* and *Marcobrachium rosenbergii*.

The shrimp industry contributes around 86% to the total foreign exchange earnings.

9.1 AREA SUITABLE FOR AND UNDER SHRIMP CULTIVATION

It is estimated that out of the 3.6 million ha of coastal areas, about 2.5 million ha of brackishwater areas are suitable for shrimp culture, of which about 0.25 million ha have been projected as very good areas for coastal aquaculture. According to the National Fish Policy (1998), around 1.40 lakh ha (1 lakh = 100,000) is under shrimp cultivation in the coastal region but in practice the area stands at 1.46 lakh ha according to Nijera Kori, a national NGO working with landless people in coastal districts on land rights. A fishery development plan prepared for Bangladesh by the United Nations Development Program (UNDP)/Food and Agriculture Organization (FAO) in 1985 reported that a total of 129 530 ha of coastal areas would come under shrimp and fish aquaculture within the next 20 years. However, the present rate of expansion of shrimp farm has already exceeded the target fixed by UNDP/FAO. The culture ponds are clustered mainly in two coastal regions—western and eastern—accounting for 70% and 30%, respectively, of the total distribution.

9.2 SHRIMP FARM OWNERSHIP PATTERN

The shrimp-farm (*gher*) ownership pattern is complex. In general, the *gher* pattern may belong to the following categories with some minor variations:

- ❖ Small landowners, but rarely medium landowners, organize themselves into groups for shrimp farming. They contribute land and money and do the farming jointly. This category is not as popular as other patterns.

- ❖ Large landowners usually contribute their own land and lease neighboring plots, usually for one year. Lessors get only the rentals and no share of the produce. Lessors may or may not have the right to grow rice during the monsoon season, depending on the contractual arrangement or on the will of the lessor.
- ❖ Absentee landowners, including outsiders providing capital, usually set up shrimp *ghers*. This takes most of the land from small and medium landowners having plots in the vicinity of the absentee owner's own land. They usually ally themselves with neighboring medium landowners by taking their land and giving them a share in the farm operations and income.
- ❖ There is another type of land holding system for shrimp cultivation. *Khas* (public) lands identified as suitable for shrimp cultivation are leased out to fisherfolk/fish business entrepreneurs/fish processors. This process of land settlement is done by a policy for management of shrimp estates²⁸ introduced on 30 March 1992. Prior to the declaration of any *khas* land as shrimp estate, it must get the approval of the National Shrimp Estate Management Committee headed by the Minister of the Ministry of Land. This procedure is a little lengthy and complicated, but to some extent, it has the advantage of creating accountability and equitable distribution of land.

9.3 IMPACT OF SHRIMP CULTURE ON ENVIRONMENT AND SOCIAL STRUCTURE

The impact of shrimp culture varies in the three coastal regions in terms of the socio-environment criteria. In the eastern region, the practice of state-owned mangrove forests has expanded. Conversely, in the western region a large portion of land owned by local farmers has been utilized for shrimp culture either with or without voluntary arrangement.

9.3.1 Mangrove Destruction

The total disappearance of 2 944.0 ha of Chokoria mangroves in the northern region is an example of how shrimp cultivation has caused unprecedented harm to the unique mangrove ecosystem of the country. Bangladesh has lost more than 50% of the mangroves in the Chokoria area by leasing out the mangrove marshes for shrimp culture since 1977. What remains of the Chokoria mangroves today is only the name. A few columns of the unique mangroves are what remains on the banks of the Moheshkhali channel and other rivers. They stand there only to deceive the tourists and new arrivals, if they do not venture out to see what lies beyond the dikes.

The process of conversion commenced in 1976 when declared reserved forests (Section 3 of the Forest Act 1927) were opened by the government to develop shrimp farming. The Ministry of Fisheries and Livestock leased out mangrove forests to individuals by making plots of 4.0 and 12.0 ha.

²⁸ Land/div.-8/shrimp/227/91/217).

Although the Forest Act of 1927 had stringent provisions for maintaining ecological balance in the reserved forest by stipulating that no fresh clearing for cultivation or for any other purpose shall be made in such land except in accordance with such rules as may be made by the government (Section 5), it was important to note that such is a callous event of forest killing sanctioned by the government as authorized through Section 5 of the Forest Act. Is there a way to hold the government responsible for such an act to a property owned by the State on behalf of the people (Article 13, Constitution of Bangladesh)?

9.3.2 Social Conflicts

In coastal areas, brackishwater is necessary for shrimp cultivation. If not properly separated from neighboring fields, this can pollute adjacent paddy fields and degrade the soils, making them in some cases unfit for crop production and igniting conflicts between shrimp and rice cultivators.

In the western region, there have been instances of inundation of a neighbor's land with saline water adjacent to a shrimp pond when the poor farmer did not voluntarily agree to offer his land for shrimp cultivation. Such inundation makes the neighbor's land unfit for agricultural use and this gives the farm owner a better chance of negotiating for their use for an indefinite period.

In some villages situated in the western region, it has been observed that the number of dying trees, fruit-bearing or not, has increased within 10 years at the start of shrimp culture. This also had a negative impact on supply of fuelwood as vegetation growth has been decreasing.

Shrimp culture has altered the practice of rotational crop cultivation in many areas. With reduction of pasture land, the number of cattle heads has also drastically gone down leading to a deficiency in the supply of milk, dung for fuel and poultry.

9.3.3 Culture Methods

Along with artificial feed, semi-intensive/intensive shrimp culture farms are now using fish meal, trash fish, crustaceans and mollusks (i.e., snails, mussels, etc.). As a result, fresh and brackishwater snails and mussels may face the risk of extinction.

With the intensification of shrimp culture practice, the requirement of water has increased. About 30-40% of pond water is exchanged per day for intensive culture, mainly to remove waste metabolites. Direct discharge of waste water into surrounding water bodies pollute the environment.

The acreage of shrimp farm has been increasing in an unplanned manner, instead of limiting its area by developing sustainable culture methods that might result in

higher production. In 1983-1984, the area under shrimp cultivation was 52 000 ha but in 1988-1989 it had more than doubled to 108 000 ha. The present figure is about 156 000 ha.

9.3.4 *Pollution of Water Bodies*

The semi-intensive shrimp farms are clustered around Bakkhali river and Moheshkhali area in the eastern region. Signs of degradation are already apparent in the changing characteristics of water bodies near the shrimp farms as well as disease outbreaks and mass mortality of shrimps. Following this disaster, a study by the International Center for Diarrheal Disease and Research in Bangladesh showed very high bacterial counts in the said river, in the intake canals and the infected ponds (Ahmed 1995). The direct discharge of untreated shrimp pond effluent to the river might be one of the major causes of such pollution.

The use of chemicals as feed additives, disinfectants, pesticides, algicide, molluscides, chemotherapeutant, lime and fertilizers have most likely contributed to environmental changes in the area. In an interview for a write-up entitled "BANGLADESH: The Desert in the Delta", a fisher living near the natural source of fish in the eastern region commented: "If the pesticides and chemicals stop all around us, the quantity of fish will automatically increase."

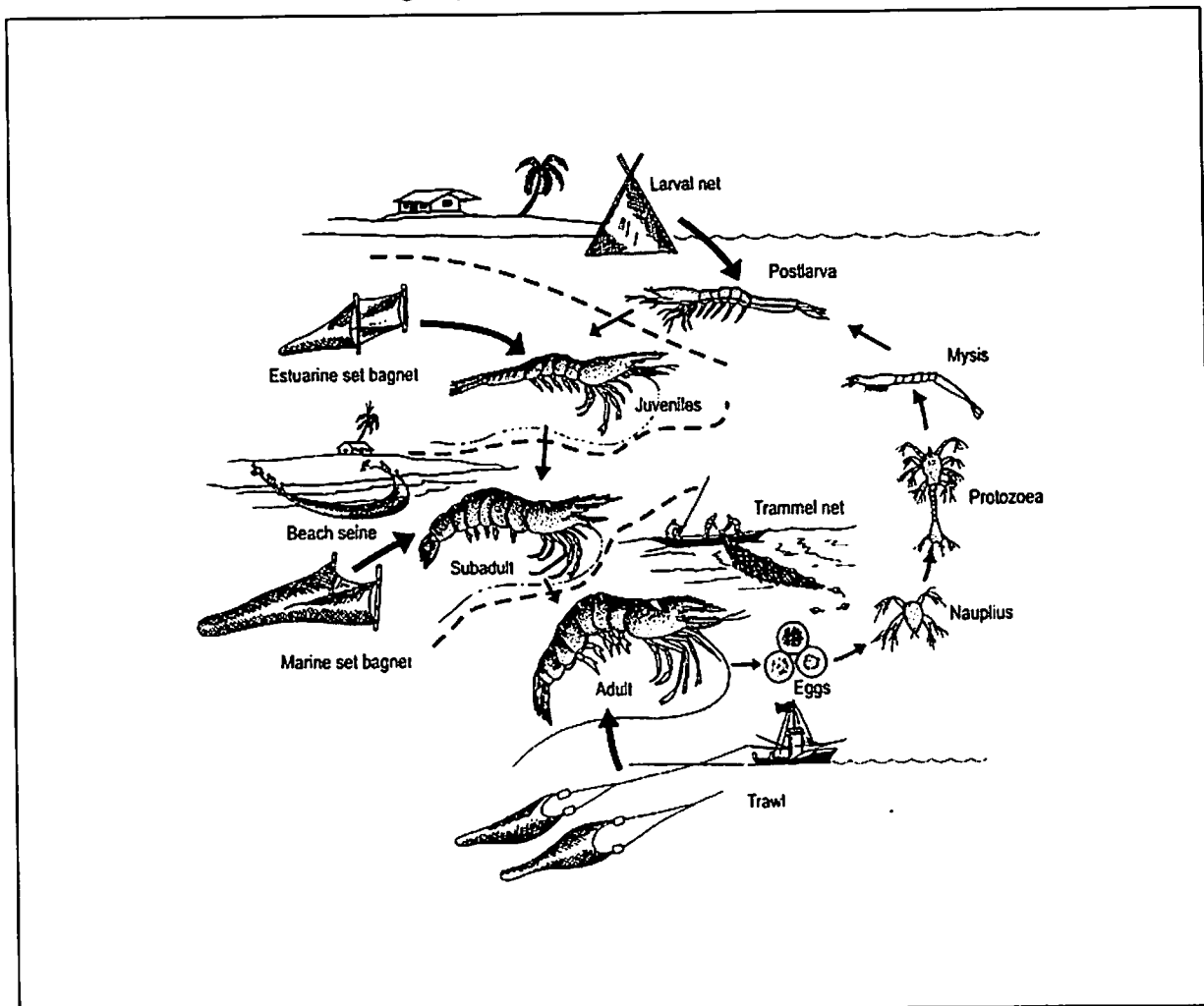
9.3.5 *Impact of Shrimp Fry Collection or Pushnet Fishery*

The survey report of the Marine Fishery Survey and Management Unit reveals that in each year more than 2 000 million tiger shrimp fry are collected from wild sources to supply the shrimp industry. This method of shrimp fry collection has been destroying 2 000 000 million other species of shrimp fry, fish and zooplankton. Fry catchers, after separating the fry of tiger shrimp, throw away other species on the banks of water bodies. If these fry are allowed to go back to their breeding ground, then the production would have increased thereby adding more revenue. More than 200 000 people are engaged in shrimp fry catching, employing 190 000 fishing nets throughout the country (Figure 9-1).

The survey report further stated that analysis of catch data shows that out of 13 000 metric t of penaeid shrimp production in terms of weight ESBN collection accounts for 55.87%, trawl fishery 29.70%, MSBN (marine set bag net) 14.30%, beach seine 0.09% and push net or *pona jal* 0.04% (Figures 9-2 and 9-3). However, if the data is examined in terms of catch, it shows that ESBN accounts for only 3.40%, trawl fishery 1.00% and the *pona* net 94.60%. This data clearly shows the destructiveness of the *pona* net.

The abovementioned report also stated that as the penaeid shrimp belongs to the same stock at all depths, the overfishing of the species at any stage of their life cycle must have a negative impact on the whole resource. This fishery prevents juvenile

Figure 9-1. Graphical Illustration of Penaeid Shrimp Life Cycle and Fishing Gear Used to Exploit them at Various Stages (Source: Khan and Latiff 1995 in Khan et al. 1997).



shrimps from entering the shallow coastal water so they can grow to complete their life cycle (Figure 9-1). Various analysis of catch record showed that while collecting one tiger shrimp fry, about 99 other species of shrimps and zooplankton are caught and increase the probability of their mortality.

There are debates on replacing *pona* (fry catching) net with alternatives that would reduce the indiscriminate destruction of shrimp juveniles and other fish species. Is there any legal provision that regulates the *pona* fishery? The answer is no. The fisherfolk catch shrimp fry from the shallow nursery areas in the estuarine waters. Both in the eastern and western regions of the coastal area, the predominant gear used for fry collection is the push net, a synthetic monofilament net material made of high density polyethylene with knotless webbing of about 2 mm mesh size.

Figure 9-2. Distribution of Shrimp Production by Gear and Weight.

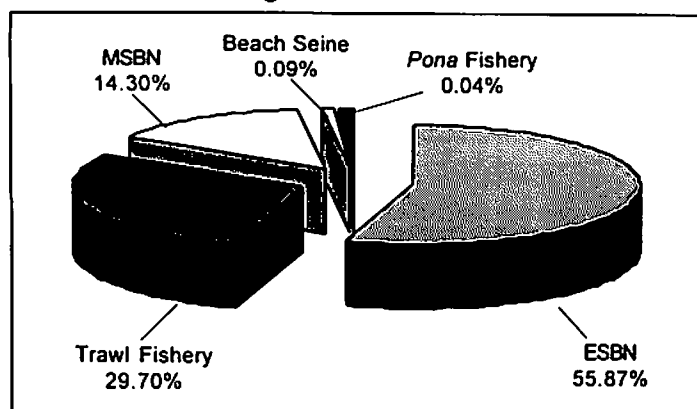
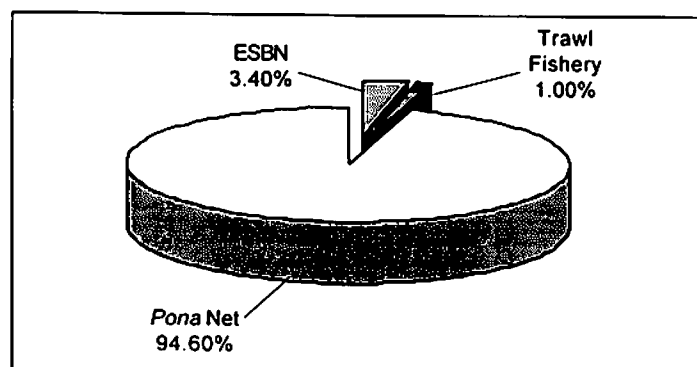


Figure 9-3. Distribution of Shrimp Production by Gear and Catch.



The fry collectors are not required to pay any tax for the collection of fry from wild source except in the mangrove area located on the western side. The Protection and Conservation of Fish Act of 1950 has provisions for regulating the use of fishing gear. It has also provisions specifying areas, gear types, mesh size and fishing periods. The areas where this fishery practice has been going on also come within the purview of the inland fishery, and thus may be regulated accordingly. The National Fish Policy (1998) also underscores the need to prevent damage to other fish species while catching shrimp fry.

9.4 LEGAL SITUATION

There exists as such no law or legal instrument in favor of or against brackishwater shrimp/fish aquaculture in the coastal areas of Bangladesh. There is even no existing zoning plan for coastal areas. Decisions regarding aquaculture is based on the availability of suitable land having ancillary facilities like proximity to

water sources, transport facilities and the consent of the landowner for privately owned land.

9.4.1 Shrimp Estate Management Policy (SEMP)

There is a Shrimp Estate Management Policy (SEMP) introduced by the Ministry of Land in 1992 which talks about the procedure for declaration of *khas* lands as shrimp estates. After such declaration, *khas* lands were to be distributed among the interested fishers/fish traders/processors for shrimp cultivation. This policy created committees, one at the national level, and the other at the district level.

9.4.1.1 Functions of committees

The national committee which is headed by the Minister of Land is supposed to determine the national policy regarding management of shrimp estates, undertake necessary measures for expansion of shrimp cultivation and increase production, to work out interministerial coordination, and to make recommendations for the formulation of laws regulating shrimp cultivation and allocation of land. At the district level, the committee is headed by the Deputy

Commissioner (DC) of the concerned district and its scope of authority is limited to the identification of new lands suitable for shrimp cultivation and recommend their approval and distributions to the national committee. The district committee meets once in every two months and whenever necessary and the national committee meets once in every six months. The following are the salient features of this policy:

9.4.1.2 Shrimp estate (Article 3)

- ❖ Areas presently under shrimp cultivation shall be declared as shrimp estates. The effect of this declaration is applicable in case of *khas* lands already under shrimp cultivation, although this has not been stated specifically in this policy.
- ❖ On receiving recommendation to designate any area as shrimp estate or identification of such area either by the MoEF or the MoFL or any other organization/board established by the government, the MoL may declare such area as shrimp estate.
- ❖ This policy has the effect of converting the *khas* lands zoned for agricultural use to areas for shrimp cultivation if located in an area declared as shrimp estate.

9.4.1.3 Conditions for obtaining settlement of *khas* lands (Article 4)

- ❖ Application for obtaining lease must be made by fishers/fish traders/processors.
- ❖ Persons and institutions having technical or managerial skill shall be given priority in getting settlement.
- ❖ Applicant shall have financial ability to develop the shrimp estate.
- ❖ Persons having experience of shrimp culture shall be given priority.
- ❖ Rent for each acre is 1 500 taka (US\$30) which will be raised by 5% each year.

9.4.1.4 Conditions to be fulfilled by the leaseholder (Article 5)

- ❖ Cultivation of shrimp must be continued in each year.
- ❖ Settled land shall not be used for any purpose other than shrimp cultivation.
- ❖ Adequate payment must be made to the farmer/marginal farmer whose land has been added to the settled land by the leaseholder.

- ❖ In the context of past events regarding unlawful land grabbing by influential people, the leaseholders are required to execute a letter of commitment while entering into contractual arrangement with such farmer for using his land. In such case, the affected person may prefer an application with the DC and he, on hearing, shall settle the matter within 15 days. To protect the interest of the affected group, the DC may even cancel the lease given for shrimp culture.

9.4.1.5 Conditions to be fulfilled in making settlement in shrimp estates (Article 6)

- ❖ License to be obtained on payment of requisite fees from the government even if any one wishes to do shrimp culture on land owned by private individuals. The DC shall be empowered to take any lawful action including cancellation of license issued for shrimp cultivation on hearing of any complaint filed by an individual whose land is used for cultivation.
- ❖ To avoid the long process at Land Record and Survey Department, such estate may be identified on an emergency basis by the local survey officer, in case of adding of new land to the shrimp estate in the coast.

9.4.1.6 Scope of application of SEMP

It is evident from the above discussion that *khas* lands, unless declared as shrimp estate by the national committee, shall not be used or settled for shrimp cultivation. In addition to the provision for declaration and settlement of *khas* land for shrimp cultivation, there are a number of provisions for providing remedy to affected private land owners, and this is perhaps one of the main reasons for the increased social tension in the western region.

9.4.2 *Development and Management of Shrimp Resource Committees*

In 1998, the Cabinet Division of the government of Bangladesh through a notification restructured the committees at the divisional, district and *thana* levels calling the same as “development and management of shrimp resource” committees. This notification also reformulated the functions of each committee and abolished the district shrimp estate committee formed by the SEMP. The functions of the committees related to conservation of environment and protection of poor people’s rights are enumerated below:

- ❖ Protection of rights of marginal farmers, prevention of coastal erosion, protection of embankment, environmental conservation, control of salinity in shrimp farms, supply and drainage of water to and from shrimp farms and support in developing infrastructure.

- ❖ Protection of interests of the neighboring landowners of shrimp farms.
- ❖ Development of guidelines for collection of shrimp fry in a sustainable manner.

The abovementioned functions are to be performed by the divisional, district and *thana* level committees. This notification does not say anything about the culture methods to be employed and the monitoring of activities regarding shrimp cultivation. The notification even does not state anything about the procedure for protecting the interest of neighboring landowners, maintaining environmental standards, resolving conflicts between rice growers and shrimp cultivators in the southwest, and how these issues are to be resolved involving such multidisciplinary committee. There are as such no guidelines regarding the fulfillment of the objectives set forth in this notification.

9.4.3 Land Management Manual

There is another legal document called the Land Management Manual (LMM) of 1990 that regulates the management and settlement of *khas* land. The LMM gives authority to the concerned district administration to provide settlement of *khas* land. The *khas* land declared as shrimp estate under the SEMP shall also be settled by the district administration in compliance with the provisions laid down in the SEMP. Chapter IV, from Articles 41-72 of the LMM, spells out the jurisdiction of the district administration in settling *khas* agricultural land wherein it is stated that settlement of *khas* land, shall be made with landless families under different terms and conditions based on the legal status of such *khas* land.

9.4.4 National Fish Policy

The Policy of 1998 states that to maintain the ecological balance in the coastal area, shrimp and rice cultivation have to be integrated while the shrimp estate management policy issued by the MoL stated that an area declared as shrimp estate must be used only for shrimp cultivation and not for any other purpose.

Improved intensive type of shrimp cultivation is to be encouraged. In designated areas, the semi-intensive type is to be promoted in a controlled and environment-friendly manner. However, neither the shrimp estate management policy nor the notification which restructured the committees and their functions mentions anything about the sustainable culture methods to be used.

The areas for shrimp cultivation to be demarcated in the coastal area is relevant to the provision of declaring shrimp estates under the SEMP.

9.4.5 *National Water Policy*

Brackish aquaculture shall be limited in areas designated by the government.

9.4.6 *National Environment Policy*

This ensures that development activities in fisheries do not create any adverse impact on mangrove forests and other ecosystems.

9.4.7 *Shrimp Culture (Tax) Act of 1992*

Shrimp farmers dig unauthorized cuts or breaches in the BWDB embankments to install sluice gates for controlled flooding of their shrimp farms inside the polders. The rice farmers complain that such intake of water disrupts rice growing in lands adjacent to the shrimp farms. Under the Embankment and Drainage Act of 1953, such "cuts" in BWDB embankments are illegal. Subsequently, the government introduced a new act through which the breaching of embankments has been allowed. In the Shrimp Culture (Tax) Act of 1992, shrimp farm owners are allowed to construct sluice gates as per approved design and plan of BWDB. The cost of the sluice gates is to be paid in advance to BWDB. The actual construction is done directly by BWDB or by the shrimp farm owner under the supervision of BWDB.

9.5 CONFLICTING ISSUES

This section discusses whether the shrimp estate management policy, the scope of activities for committees formulated by the Notification of 1998, and the National Fish Policy adequately address all the issues connected with shrimp cultivation.

- ❖ It seems that committees composed of officials from different statutory agencies shall enforce these policies. The SEMP has a provision for holding meetings of national committees every six months and district committees every two months. The Notification of 1998, however, does not have any such provision for monitoring the activities connected with shrimp culture. The reading of the provision of the Notification signifies that they are mere policy guidelines. Concrete steps for the materialization of such objectives are lacking.
- ❖ Another issue worth considering is to determine which organ of the committees shall be responsible for the enforcement of the SEMP, Notification of 1998 and National Fish Policy. The functions and structure of authority in the committees can be exercised mainly by the district administration when the subject matter of shrimp culture is centered on land issues and the district administration assumes sole authority over these concerns. However, shrimp is an aquaculture product and considered as fish in different government

documents. The Department of Fisheries (DoF) is, therefore, also responsible in carrying out programs in the light of the National Fish Policy of 1998, especially that it has a shrimp cell to disseminate information on improved techniques of shrimp cultivation and production.

If the provisions of the National Fish Policy relating to shrimp culture are analyzed, then it becomes clear that certain types of conflicts are the result of the present trend of shrimp culture, a problem which has been addressed in the said policy. Earlier, shrimp farm owners were required to obtain license from the DoF, but through the Notification of 1998 this provision has been abolished. Although shrimp is legally defined as fish (Section 2.1) in the Protection and Conservation of Fish Act of 1950, the DoF has very little role in the power and committee structure provided by the Notification of 1998. This Notification of 1998 assigns specific responsibilities to different committees composed of different sectoral officials who have different agenda in accordance with the mandates of each organization's functional mechanism. This may result in a situation where everybody's responsibility is nobody's duty.

- ❖ The Notification of 1998 abolished the committee formed at district level under the SEMP in 1992 and provided a set of new functions to be performed by it. However, the list of functions for the district committees do not provide for a mechanism for hearing an appeal by any person aggrieved. It is not clear if the provision of filing an application to the DC under the SEMP shall remain valid or if it has been nullified by the Notification of 1998.
- ❖ In the coastal region, one unique phenomenon is land accretion. A survey by Pramanik in 1983 shows that within a period of seven years the average rate of land reclamation was 35.6 km² (United Nations 1987). According to the provisions of the LMM, the newly-emerged land falls under the jurisdiction of the particular district administration. And in most cases such riverine lands are settled by landless people from different parts of the country where they construct dwellings and initiate agricultural activities.

There are provisions in the LMM for different types of settlement, which may be either permanent or temporary. In some cases of settlements made in favor of landless families for temporary occupation, the district administration, even after a considerable period has elapsed, often refuse to renew such arrangement and try to settle the land in favor of shrimp growers. In one such event, the district administration, being empowered by the LMM, tried to settle *khas* land to shrimp growers, depriving the landless families of their estate even though such land had not been officially declared as a shrimp estate based on the procedure laid down in the SEMP. The district administration at first complied with the LMM by allowing a certain portion of *khas* land to be settled with landless families. After a lapse of several years of settlement, the district administration sent a notice of evacuation to the landless people and adversely settled the same with a shrimp-growing farm in violation of the provisions of the SEMP and LMM. One of the NGOs (Nijera Kori) working with the local people initiated legal proceedings against

such unlawful action of the district administration with support from the Bangladesh Environmental Lawyers Association (BELA). The main plea of the petition²⁹ was that unless that land had been declared as a shrimp estate it must be settled in accordance with LMM providing settlement to landless families. The High Court Division of the Supreme Court of Bangladesh stayed the unlawful displacement of the landless.

- ❖ The SEMP has the effect of converting the settlements of *khas* land for agricultural purposes to settlements made for shrimp cultivation if located in the area declared as shrimp estate. This provision in many instances has caused displacement of small landowners within the shrimp estate. The weak government control on shrimp culture has resulted in sudden inundations of adjacent lands with saline water resulting in the non-viability of such lands for agricultural use, deterioration of fodder for livestock, lack of open space for growing trees and ultimately, force eviction of farmers from their land. Profit-oriented shrimp growers tend to employ unlawful means to raise the acreage value of their land and absorb the lands of marginal farmers. As per this policy provision, a small farmer may obtain settlement of land for agricultural use but upon declaration of that land as shrimp estate suitable for shrimp farming, he may not have the skill or the money to develop the land for that purpose even if he wishes to do so. On many occasions, unlawful displacement has occurred when such lands fall within the domain of shrimp estates and declared for exclusive shrimp cultivation alone.
- ❖ Article 4 of the Notification of 1998 abolished the requirement of obtaining license under the SEMP (Article 6.b) for shrimp cultivation. The provision of obtaining license under SEMP (Article 6.b) has also a provision for cancellation of license upon a complaint by any aggrieved poor farmer if he sustains any damage due to the actions of shrimp cultivators. It is surprising to note that such abolition is an avenue for complaint and appeal which could accommodate and provide remedy to affected persons. The delegation of management of the whole spectrum of shrimp culture to the different committees may create a situation where the grievances of the poor may remain unheard or the disposal of their cases may depend on the whimsical will of such committees.
- ❖ The National Fish Policy specifically mentioned the need for the integration of shrimp and paddy cultures to maintain environmental balance while the SEMP prohibits the cultivation of crops other than shrimp in the *khas* land settled for shrimp culture within the declared shrimp estate.
- ❖ The National Fish Policy also compels shrimp farm owners to plant trees between open spaces of farms and prohibits the use of chemical fertilizers because of their deleterious impact on the environment. But the regulating norms the SEMP and the Notification of 1998 do not provide any guidelines for the culture method of shrimp farming and the preservation of the environment.

²⁹ Writ Petition No. 1162/1998.

The harmonization of the different fishery policies is urgently needed. The Notification of 1998 gives the impression that all policy issues should not pose any obstacle to the expansion of shrimp culture. The other policies (National Fish Policy, National Water Policy and National Environment Policy) should not be treated as mere guidelines to be contravened but rather as instruments for bringing in necessary changes in the regulatory norms to achieve sustainable development and protect the welfare of the people.

“The other policies (National Fish Policy, National Water Policy and National Environment Policy) should not be treated as mere guidelines to be contravened but rather as instruments for bringing in necessary changes in the regulatory norms to achieve sustainable development and protect the welfare of the people.”

Chapter 10

Management of Mangrove Fishery

Bangladesh has one of the largest mangrove ecosystems in the world. In Bangladesh, the mangroves are locally known as *Sunderbans* or *Peraban*. The mangrove forests are classified into dense, low-density, grassy and bare areas. The water areas of mangroves are classified into deep, turbid, shallow and swampy/humid areas. In the western part of the coastal region, the single largest compact mangrove ecosystem is intercepted by the flushing of a number of upstream rivers and tidal influence of the Bay of Bengal.

10.1 AREA OF *SUNDERBANS*

The *Sunderbans* area extends over 0.57 million ha in three districts of the coastal region, namely, Khulna, Bagerhat and Satkhira. It is the largest single block of mangrove forests in the world. Out of a land area of 401 600 ha, 395 500 ha is occupied by forests and 6 100 ha is scrub jungle, grassland or bare ground. Rivers, channels and other water-courses occupy about 0.17 million ha. Topographically, the *Sunderbans* is a deltaic swamp.

10.2 WILDLIFE HABITAT

The *Sunderbans* is a unique wildlife habitat. The forest and the numerous waterways which flow through it support a wide range of mammals, birds, amphibians, reptiles and crustaceans. Certain animal species in the *Sunderbans*, including the Royal Bengal Tiger and the estuarine crocodile, are recognized globally as endangered species.

10.3 MAMMALS

Thirty-two species of mammals are known to inhabit the *Sunderbans* (Salter 1984). However, no less than four major species—the Javan rhinoceros, wild buffalo, swamp deer and hog deer—have become extinct since the beginning of this century. The larger terrestrial mammals which have found their homes in the *Sunderbans* include the spotted deer, barking deer, wild boar, tiger, Rhesus macaque, smooth Indian otter, the flying fox, wild cat and the Gangetic dolphin.

10.4 BIRDS

One hundred and eighty-six species of birds have so far been recorded, but the list is not yet complete (Salter 1984). These species include kingfishers, whitebellied sea-eagle, gray headed fish eagle, Pallas's fish eagle, herons, egrets, storks, sandpipers, whimbrels, curlews, gulls and terns, woodpeckers, barbets, shrikes, drongos, mynas, minivets, babblers and many others.

10.5 REPTILES AND AMPHIBIANS

About 35 species of reptiles and 8 species of frogs and toads have been recorded in the *Sunderbans* (Salter 1984). Due to overexploitation in the past, the mugger or marsh crocodile is now extinct. Recorded species in this group include the marine turtle, the Olive Green Ridley, loggerhead, hawksbill, estuarine terrapin, freshwater turtles, black mud turtles and 18 species of snakes including the king cobra in the coastal waters.

10.6 FISH AND CRUSTACEANS

There are reported to be over 120 species of fish commonly caught by fishers in the *Sunderbans*. The nutrient-rich waters of the *Sunderbans* also yield a considerable harvest of shrimps, prawns and lobsters, which together with fish, provide a livelihood for several thousands of fishermen. The total water area of the *Sunderbans* is about 6 651 ha which produced around 6 951 t of fish in 1995 (Bangladesh Bureau of Statistics 1997).

10.7 MICROORGANISMS

The primary productivity of the mangrove forests is shown in the accumulation of biomass (wood, roots, leaves, etc.). Leaves, which are continually being shed by plants, undergo decomposition and result in particulate organic matter (POM) and dissolved organic matter (DOM) that enter the estuarine ecosystem. The POM, which consists of small particles, is consumed by larval and juvenile organisms that use the mangrove habitat as a nursery and feeding grounds. The algae, plankton, benthos and other micro fauna are essential features of the mangrove ecosystem and they determine, to a large extent, the variety, quality and quantity of fish and crustaceans.

10.8 ESTUARIES OF SUNDERBANS

The numerous rivers and streams which pass through the *Sunderbans* in a north-south direction are tributaries of the Ganges. These rivers partially combine to form the five main estuaries that provide the major points of ingress for saline intrusion. The five main

estuaries from west to east are: (a) Raimongal-Harinbhanga estuary; (b) Malancha estuary; (c) Kunga estuary formed by the Sibsa and Passur rivers³⁰; (d) Bangra estuary formed by Sela gang; and (e) the Baleshwar estuary formed by the combined flow of the Bhola and Baleshwar rivers.

10.9 MANAGEMENT OF SUNDERBANS FISHERIES

10.9.1 Evolution of Management Practice

Up to 1947, Bangladesh, India and Pakistan had the same legislative history on the management and administration of forests in this subcontinent. Prior to 1865, most of the States of India having significant forests had their own rules for management. The rules had no legislative enactment of the government of India or the British government. However, for the first time, in 1865, the Forest Act was enacted. This was succeeded by the Indian Forest Act of 1878 which was revised in 1927. The Act is the present regulating law.

By 1864, the conservation of forests in Bengal began with the appointment of conservator of forests. The first notification reserving forests came in 14 December 1864. In 1868-1869, proposals were made for the conservation of *Sunderbans* forest but the matter was not considered at that moment. Since 1876, a huge portion of forest area was gazetted as government Reserved Forest and the Bengal Forest Department was then constituted with, among others, the *Sunderbans* division (Farooque 1997a).

Since the partition of India in 1947, the Forest Department (FD) as part of the government of Pakistan and after independence in 1971, as part of the Bangladesh government has been preparing and executing management and working plans³¹. The ownership of forests was placed under the FD with the abolition of *zamindari* (feudal) system as introduced by the State Acquisition and Tenancy Act (1950).

Ali (1991) stated that the Forest Department (FD) took control over fishers and fishing crafts entering the waters within the forest area effective 17 November 1931. This control was exercised through the collection of taxes, tolls and rent from fishers and fishing boats entering the reserved forest area. In 1943, the Forest Department introduced two additional conditions for fishing purposes: 1) every permit should clearly specify the exact stretch of water in which a fishing permit holder would be allowed to operate; and 2) the permit should be surrendered to the Forest Station from where the relevant permit was issued. According to the Divisional Forest Officer, Khulna, who is in-charge of the *Sunderbans* Reserved Forests, the fishers at present are required to pay the defined charges to gain access to fishing in the reserved forest area in rivers, creeks, canals and the open Bay of Bengal adjacent to it.

³⁰ Ocean-going vessels run to and from Mongla Port through the Passur River.

³¹ The forest is managed on the basis of a working plan, prepared for a period of 10 years which lays down rules for working on the forests such as areas to be felled, plantation to be raised and other silvicultural prescriptions.

The *Sunderbans* have been under some form of management since 1875 and most of the forests were declared reserved forests in 1879. Early management commenced with the enforcement of minimum girth limits for the exploitation of four major species of mangrove trees only with a view to restricting overcutting.

With the declaration of *Sunderbans* forest as reserved forest (RF) and through the gradual development of laws regarding management of RF, it is the Forest Act of 1927 which is currently in force. Chapter II of the 1927 Act governs the regime of RF. For constituting any land as RF, the following requirements must be met:

- ❖ It must be the property of the government;
- ❖ Over it, the government has proprietary rights; or
- ❖ To the whole or any part of the forest produce of which the government is entitled (Section 3).

As has been mentioned in Section 3 of the Act 1927, to designate a RF the land must either be:

- ❖ Forest land;
- ❖ Wasteland; or
- ❖ Any land suitable for afforestation.

Fishing rights in the RF is regulated by the Act of 1927. Accordingly the FD, responsible for management of RF, issued licenses for catching fish and shrimp fry in the water areas which comprises around 28.82% of the total area. The management of fishery in this region is mainly focused on maximizing revenue, a system which lacks proper institutional development in order to exploit the resource in a sustainable manner. The Conservator of Forests in charge of *Sunderbans* Division looks after the management of this rich environment. There is no separate body composed of people having fishery background to oversee the management of the resource which is vulnerable to over-extraction. Since the resource underneath the water is not unlimited, this requires a fishing management based not only on re-stocking pattern and maximum sustainable yield but also in terms of its role as a nursery ground for a number of marine species.

10.10 ISSUES ON THE MANAGEMENT OF *SUNDERBANS*

- 10.10.1 The emphasis of the National Forestry Policy of 1994 is on the sustained management of forest, water and fish of the *Sunderbans* RF. This, however, requires a modification in the structure of FD to accommodate the management of fisheries inside the reserve forests. It intends to have a setup of professionals from the fishery sector who can fine-tune the steps in issuing licenses. The catching of shrimp fry inside the RF would not have been

allowed on the understanding that shrimp fry that use the RF waters as grazing areas belong to the same stock and if allowed to go back would be able to spawn further. Just to boost the economic revenue, such destructive practice of harvesting shrimp fry could be initiated in the absence of defined obligatory guidelines.

- 10.10.2 Although the *Sunderbans* RF fishery contributes around 1.17% in the production of inland capture fishery, the laws which regulate issues regarding the gear to be employed, season and species for catching, type and size of fish that cannot be caught and areas that are considered as spawning grounds in the inland area shall not be applicable to fishing in the RF. The mere requirement is for one to obtain a license from the FD, thereafter, one is free to use whatever method in maximizing one's catch. It has been reported in the media that the fishers in the RF use some kind of powder which increases the tidal flow in the water channels that compel fish to float when the water starts receding, thereby making them very easy to catch.
- 10.10.3 As stated in Section 3 of the Forest Act of 1927, on designating an RF, the land must either be a forestland or wasteland, or any land suitable for afforestation. But, if one relies on such wording of the law and compare it with the geophysical characteristics of the *Sunderbans*, one will be surprised to note that about 28.82% of the area under RF is underwater, an area which sustains a good stock of various species of fish. What regulates fishery in the area are circulars issued on *ad hoc* basis, from time to time, and not on the basis of sustainable management of the resource. One study (Chantasari 1994) claimed that more than 10 000 tons of finfish, shrimp and crabs were harvested from the *Sunderbans* in the year 1993 whereas the Statistical Yearbook of Bangladesh (1997) reported that in the 1994-1995 fish production was 6 951 t from an area of 6 651 ha. It seems that the statistics that are available are conflicting or do not reflect the actual situation regarding the fishing area, stock and production. Hence, there is a need to revise the existing institutional structure for better resource management.
- 10.10.4 The FD issues licenses for collection of shrimp fry from the *Sunderbans* RF and under such arrangement nearly 110 000 shrimp fry fishermen collected about 334 million shrimp fry (Chantasari 1994). The fry collector carefully sorts out from the mixed catch a particular species of high demand in the market and the rest of the zooplanktons including fry of other economically important shrimps and finfishes are mercilessly discarded. The provision in the Act of 1927 provides adequate safeguard to terrestrial forest resources in the RF while the fishes and other aquatic resources are exposed to indiscriminate harvesting.
- 10.10.5 How many people can catch fish in the water bodies within the RF? Reports show that capture fishery operations employ more than 200 000 people (Mahmood 1986). However, it is not sure whether the figure is compatible

with the 6 651-ha water area in terms of stocking or re-stocking pattern of fisheries.

- 10.10.6 Seagoing vessels pass through the Passur river for a distance of about 100 km through the *Sunderbans* to and from Mongla Port. Oil spills from these vessels are a potential threat to the *Sunderbans* ecosystem and could cause immense damage, especially to aquatic fauna and bird population. Oil from a heavy spill could be carried by tides to the forest floor causing damage to the soil.

10.11 WORLD HERITAGE SITE

One-fourth of the total *Sunderbans* RF area has been declared a World Heritage Site to provide better protection. Initially, areas already declared as wildlife sanctuaries³² will be brought under the aegis of the World Heritage Site project. The areas covered could then be subsequently increased. UNESCO initiated the process for making the declaration. The declaration has the effect of regulating all activities connected with extraction of any resource in the area.

10.12 ECOLOGICALLY CRITICAL AREA

As per the provisions of Section 5 of the Environment Conservation Act of 1995, the government may, by notification in the official Gazette, declare any area as an ecologically critical area if the government is satisfied that due to degradation, the ecosystem of such area has reached a critical threshold or is threatened to reach a critical state. The Ministry of Environment and Forest (MoEF) through a Gazette notification dated 19 April 1999 declared 762 304 ha area of the *Sunderbans* RF as an ecologically critical area. The notification has the effect of prohibiting activities like: (a) extraction of natural forest or trees; (b) killing of wild animals and all forms of hunting; (c) catching or collection of oyster, tortoise or coral; (d) all activities connected with destruction or creation of habitats for animals and plants; (e) all activities that may alter/destroy the natural state of water and land; (f) establishment of industry or establishment that causes soil, water, air and noise pollution; and (g) all activities injurious to the fish and other aquatic creatures.

10.13 CHAKARIA SUNDERBANS

Chakaria *Sunderbans* is another mangrove tract in the eastern part of the coastal area. It has an area of 8 540 ha and the mangrove forests formerly covered an area of over 8 000 ha. In this forest, there is a large number of low-lying islands that are mostly submerged

³² Article 23 of the Wild Life Preservation Order (1973) spelled out provisions for declaring the wildlife sanctuary and activities that are permitted and prohibited in such area.

at high tide, and the water remains brackish throughout the year. This forest was declared as RF in 1903 to provide protection to human settlements following damage caused by a cyclone in 1882. Management practices involve restricted exploitation based on minimum diameter limits of trees of different species and limited grazing.

10.13.1 Settlement of Mangrove Forest for Shrimp Cultivation

In the mangrove areas in the Chakaria Upazila (presently *thana*), some areas within the reserved forest were made available by the government for development of shrimp farming in 1976. In the first phase in 1977, an area of 2 250.9 ha was allowed to be converted to shrimp farms. In 1982, another 894 ha of the reserved forest was given to the fishery Department to implement an Asian Development Bank (ADB)-funded project for the development of shrimp farming.

Thus, altogether, 2 944.0 ha of mangrove forestland have been converted to shrimp farms. Of the 2 250.94 ha in which shrimp farming was allowed in 1977-1978, 2 023.5 ha (5 000 acres) were transferred to the Ministry of Fisheries and Livestock. The Ministry thereafter leased this land in plots of 150 acres (60.7 ha) and 100 acres (40.4 ha) for shrimp farming, keeping 250 acres for the DoF to set up a demonstration unit. In 1985, the leases were cancelled and the entire area has been taken over by the MoFL. These lands have now been divided into plots of 10 and 30 acres (4.0 and 12.0 ha, respectively) and are allocated to a larger number of shrimp farmers.

Chapter 11

Environmental Issues in the Coastal Region of Bangladesh

Aside from the issues discussed earlier regarding the fishery, shrimp culture and mangrove ecosystem, there are a few more issues relating to the management, development and conservation of coastal resources in Bangladesh. The issues to be discussed in this chapter may gradually be of possible concern and which would need some form of check and balance in terms of regulatory intervention to maintain the pristine condition of the coastal region.

11.1 COASTAL EMBANKMENT PROJECT (CEP)

Hundreds of water resource development projects have been implemented in Bangladesh since the 1960s. Practically, the entire country has been converted into a series of polders with earthen embankments.

The coastal area of Bangladesh is subjected to regular or periodic incursions of saline water from the Bay of Bengal resulting in serious damage to crops and land fertility. Construction of small dikes or embankments around individual land plots separated by numerous tidal creeks and inlets had been practiced since the 17th century by the *Zaminders* or landlords (who served as principal revenue agents of the government) to limit saline-water overflow. With the abolition of the *zamindari* system in 1947, the construction of embankments by local efforts practically ceased and the condition of the existing embankments deteriorated for lack of proper maintenance (Uddin and Islam 1982).

The need to protect the coastal areas was recognized by the government and reconstruction and development of embankments was started in 1961. In 1967, the CEP was undertaken to provide flood control works by constructing new embankments or repairing and strengthening existing embankments along coastlines, banks of rivers and tidal estuaries. The Dutch term "polder" has been adopted to designate these reclaimed bodies of land in the coastal areas. Sluices are provided to remove accumulated rainfall from within the polders by gravity flow during periods when the tide level is below the elevation of the water inside the dikes. Automatic flap gates are installed at the outfall of the drainage vents to prevent flow into the polder during high tide (EPWAPDA 1968; Haq 1982).

Beginning in the early 1960s, the former East Pakistan Water and Power Development Authority (EPWAPDA) started the construction of embankments with standardized planning in the coastal region below the salinity line of 1 000 micromhos. About 4 800 km of embankment has been constructed to cover about 1 336 000 ha of coastal lands (Matin 1985).

11.1.1 Impact of CEP

Realization of the potential benefits from the project has been limited. Siltation of rivers and channels leading to drainage congestion, hindrances to navigation owing to the closure of channels, lack of fresh water for irrigation inside the polder and frequent breaching of embankments for irrigation or shrimp farming are problems that need to be solved to obtain the full benefits from CEP. The adverse environmental impacts of CEP are enhanced river siltation, reduction of natural fishing grounds, reduction of siltation in low-lying areas and interference with fresh water flooding during the monsoon season. In summary, some of the major problems of CEP are (Bangladesh Water Development Board 1984):

- ❖ The polders suffer from lack of irrigation facilities;
- ❖ There are problems of drainage congestion due to siltation in drainage channels;
- ❖ Siltation of many surrounding rivers has raised the riverbeds, making the river sluices inoperative;
- ❖ Salinity of soil as well as of river water restricts agricultural activities;
- ❖ The introduction of shrimp farming is in conflict with agricultural practice;
- ❖ The majority of the structures lack proper maintenance and are damaged as a result; and
- ❖ Salinity-resistant high yielding variety (HYV) of rice have not been developed.

11.1.2 Impact on Fishery

Prior to the construction of coastal embankments, low-lying areas that remained under tidal water in each tidal cycle provided nursery grounds for various marine and estuarine fish and shrimp. Coastal embankments now prevent flooding in those inter-tidal areas. This obviously has deprived fish and shrimp juveniles their natural nursery and grazing grounds. But the extent to which the removal of nursery grounds has impacted on the natural fish populations has yet to be quantified.

Coastal embankments and associated regulatory structures have also resulted in an overall reduction of the habitats of fish and shrimp residing in flowing rivers and canals. River and *khal* siltation has also wiped out the capture fishery. For example, with the completion of the dam under the Muhuri Flood Control and Irrigation

Project across the Feni River in 1985, the *hilsha* fishery, worth about 10 million taka, upstream of the dam has been eliminated. Coastal embankments also brought to an end the traditional *gher* fish culture.

11.1.3 Changed Land Use

The primary objective for construction of CEP had been to protect agriculture from tidal inundation and promote salinity resistant HYVs in the poldered areas. At a later phase, due to the failure of the CEP in achieving its targeted objectives in terms of agricultural production, it lifted its ban on use of lands inside the polders for shrimp culture rather than providing technical support to the activity because of the shrimp industry's alleged economic superiority (Adnan 1993). Such change in the CEP project policy gave rise to many conflicts relating to land, many of which have been discussed in the chapter on impacts and expansion of coastal shrimp culture. Worse is the fact that, the change in the environment has resulted in water management practices which have resulted in changed land use patterns. This consequently brought in inequitable distribution of benefits and increased social tensions.

11.1.4 The Ministry of Water Resources

The Ministry of Water Resources is the controlling Ministry of the Bangladesh Water Development Board and the Water Resources Planning Organization. The Ministry is responsible for, among others, all matters relating to irrigation, flood control, flood control works, causes of floods and damage caused by floods to irrigation projects, embankments, land reclamation and estuary control and antisalinity measures. The Ministry is mainly the policymaking body while the subordinate offices and organizations are responsible for implementation of such policy.

11.1.4.1 Bangladesh Water Development Board (BWDB)

BWDB succeeded EPWAPDA after the independence of Bangladesh in 1971 and restructured the BWDB through promulgation of the Bangladesh Water and Power Development Board Order in 1972. To implement this Order, a Board called BWDB was constituted to prepare a comprehensive plan for the control of flood, and the development and utilization of water resources of Bangladesh (Sections 3 and 9). The BWDB has control over the flow of water in all rivers and channels (Section 14.a) which empowers the institution to frame a scheme or schemes for all or any of the following matters (Section 9):

- a. Construction of dams, barrages, reservoirs and other original works of irrigation, embankment and drainage, bulk water supply to communities and recreational uses of water resources; and
- b. Prevention of salinity, water congestion and promotion of land reclamation.

To achieve the objective set out in clause (b), the BWDB undertook CEP by acquiring the lands owned by private individuals for boosting up the agricultural production. The land utilized for construction of CEP had been acquired by a law called Acquisition and Requisition of Immovable Property Ordinance of 1982 (an updated version of a number of earlier laws) under the direct supervision of the concerned district administration.

In earlier periods when the construction of CEP began, the impact of such water regulating mechanism was not contemplated or assessed. Environmental impact assessment prior to implementation of such project has been a recent phenomenon, a concept relatively new for a country like Bangladesh where more land is needed to grow more food. In such pretext, the government established a Water Resources Planning Organization (WARPO) through the Water Resources Planning Act in 1992 and its functions include the formulation of a master plan for development of water resources in an environment friendly manner. Although a late comer, the National Water Policy of 1999 also underscored the need for formulating a master plan for utilizing the water resources in a sustainable manner. The National Water Policy has a few more provisions enumerated below, which require consideration while planning water-related projects:

- Section 4.2.i Assessment of social and environmental impacts of all development projects shall be compulsory;
- Section 4.2.r Formulation and implementation of projects to reclaim land from sea and river shall be undertaken;
- Section 4.9.e Water resource development plan shall in no way restrict the movement of fish. Moreover, the regulating systems must have adequate facility to promote fish migration and breeding; and
- Section 4.12.c Increased flow in the channels shall be ensured to maintain ecological balance in the estuaries.

11.1.5 National Fish Policy of 1998

- Section 7.3 Arrangement to be made to maintain ecological balance while constructing embankments and polders and in the future provide adequate facilities to produce appropriate crops like rice and shrimp in poldered areas.

11.1.6 National Environment Policy of 1992

- Section 3.5.1 Ensure environmentally sound utilization of all water resources;
- Section 3.5.4 Ensure mitigatory measures of adverse environmental impact of completed water resources development and flood control projects;

- Section 3.5.7 Conduct environmental impact assessment before undertaking projects for water resources development and management; and
- Section 3.8.4 Evaluate existing projects on water resources development, flood control, and irrigation as well as to determine their adverse impact on fisheries and adopt measures for alternative fish culture upon improvement of environmental conditions.

11.1.7 Environment Conservation Act

Section 12 of the Act of 1995 and the corresponding rule of 1997 made it obligatory to perform environmental impact assessment prior to undertaking any project related to water resources. The rule has categorized water resource development project as a red plan and stringent procedures are to be observed in conducting environmental impact assessment. In its implementing rules and regulations, the Department of Environment under the MoEF has been working out the detailed guidelines to be followed while conducting environmental impact assessment in connection with water resource development projects.

The law, which empowers the implementation of water resources development projects, does not have any mandatory provisions to address the environmental impact of these projects. In a few instances, because of the conditions imposed by the grant-making authority, the BWDB conducted an environmental impact assessment but did not make it as an institutional requirement before undertaking any water resources development projects.

There are a number of institutions created by statutory provisions involved in implementing programs connected with water resources under the Water Resources Ministry. Each institution is assigned with specific responsibilities but the vagueness of the legal position in determining the authority over the water resource may hamper the growth of or act as a bar in developing effective coordination with other institutions. For example, in accordance with the provisions of Bangladesh Water and Power Development Board Order of 1972, the BWDB has control over the flow of rivers and channels (Section 14) and is empowered by Section 9 to frame an implementation scheme accordingly. As the sole authority over the flow of water lies with the BWDB, why don't they act according to the master plan which was formulated by the WARPO as provided in the Water Resources Planning Act? In one such event, while undertaking a mega project (Flood Action Plan) in the wake of consecutive floods of 1987 and 1988, the Ministry created a temporary body called Flood Plan Coordination Organization (FPCO) to provide support directly to the Ministry in the planning, project preparation, monitoring and evaluation of functions concerning all FAP activities, preempting the BWDB in its responsibility of planning, designing, executing, maintaining and performing other related activities in connection with water resources management and flood control. In such circumstances, BELA filed a suit in the High Court Division of the Supreme Court of Bangladesh in 1994 (Writ Petition No. 998 of 1994) challenging violations of law due to the undertaking of the FAP. The petition claimed that the authority of the FPCO in undertaking the work

connected with water resource is in contravention of the legal provisions, as the FPCO had not given the appropriate legal sanction for legitimate functioning and performance of its duties and for ensuring accountability.

11.2 INCREASED SALINITY

Changes in tide and freshwater flows result in the fluctuation of the salinity limit. This has been noticed in the coastal area, especially in the southwestern region.

11.2.1 *Problem of Increased Salinity in the Coastal Area*

Salinity intrusion over the coastal area, through the rivers and estuaries is primarily a function of seawater entry due to tide and upland freshwater flow which pushes it back. Changes in tide and freshwater flow result in the advance and retreat of the salinity level. During the wet season, local rainfall associated with flood flows from the upland regions keeps the salinity level lower near the coastline; with the cessation of the rains and consequent reduction of river flows, salinity starts increasing and intruding into the uplands from the beginning of November. Studies on salinity movement and changes in its intensity reveal that the salinity in the coastal area, especially in the southwestern region, has increased significantly in the dry season in recent years, following the reduction of the Ganges flow due to withdrawals in the upstream region (Nishat and Chowdhury 1987).

Bangladesh, particularly the southwestern region of coastal area, is faced with a deadly environmental stalemate with India on the issue of augmentation of the dry-season flow of the river, which is not enough to satisfy the needs of both countries. It is shocking to note that the deadlock in resolving the Ganges issue resulted in salinity intrusion and desertification that may need hundreds of years to repair.

Bangladesh and India entered into a treaty in December 1996 for equitable sharing of the Ganges water. This treaty is perhaps the most important environmental agreement signed by Bangladesh, if its immediate implications are considered. The treaty may not be an end in itself, as no treaty dealing with shared natural resources is a one-shot deal, but it has changed the status quo and provides for a basic mandatory framework under which the parties can continue negotiating as the need arises. And this structure is crucial wherever "equity" is the governing principle.

11.3 POLLUTION OF THE COASTAL WATER ENVIRONMENT

The coastal water ecosystem of Bangladesh is threatened by different types of pollutants dumped directly in waters or washed down through the large number of rivers and tributaries which crisscross the entire country before emptying into the Bay of Bengal.

11.3.1 Industrial Pollution

There are about 425 major, 1 175 moderate and 2 200 minor polluting industries in Bangladesh. In 1994, the Department of Environment (DoE) prepared a list of polluting industries and in some areas they ranked them as major, moderate and minor polluters. The number of such industries stands at 1 176. Most of the polluting industries do not have any treatment plant and the few existing treatment facilities are non-functional and ineffective in removing pollutants. These polluting industries are mostly clustered around urban centers near water bodies and the effluents ultimately flow through the river network into the coastal water and the Bay of Bengal.

11.3.1.1 Industrial effluent from eastern region (Chittagong)

Table 11-1. Sources of Industrial Wastes in the Eastern Region.

Types of Industry/Institution	Number
Tannery	38
Textile	60
Jute and Carpets	25
Iron, steel, glass and engineering	57
Pharmaceutical	27
Fish processing	20
Aluminum	15
Chemical and paints	21
Vegetable oil	20
Rubber, plastic, foam, resin	15
Pesticide	9
Paper and pulp	6
Fertilizer	3
Cement	5
Refinery	4
Water purifying	5
Tobacco	1
Rice mill	4
Bone factory	2
Flower mill	7
Iron foundry	3
Salt producing	4
Bakery	4
Wood processing	12
City corporations	6
Miscellaneous	17
TOTAL	390

Recently, the DoE carried out a survey to identify polluting industries in this region and the investigation revealed the existence of around 390 units (Table 11-1) spreading over eight industrial zones which were causing pollution of the Karnaphuly estuary and adjacent water bodies.

These industries discharge their untreated wastes directly into the Karnafuly river and its estuary. These effluents are huge and contain both degradable and persistent organic and inorganic wastes and toxic metallic compounds and chemicals. The pollutant loads have been alarming for their adverse effects on aquatic life and aquatic ecosystems. Mercury comes from the chemical complex and the Karnafuly Paper mills, lead from the oil refinery, chromium from tanneries, cadmium from dyeing, printing and paint industries, and arsenic compounds from the urea fertilizer factory which have ruined the *hilsa* stock in the Bay of Bengal, near the Sonadia Island of Cox's Bazar (Syed Iqbal Ali, pers.

comm.). *Hilsa* migration into nearby rivers has been blocked or possibly eliminated.

11.3.1.2 Industrial Effluent from the western region (Khulna)

In the western region, most of the industries are clustered around the Khulna district where the situation is not any better than that in the east. The industrial plants are located in three industrial zones and the DoE identified 268 industrial units (Table 11-2) as polluters with different ranking attached to each.

Table 11-2. Sources of Industrial Wastes in the Western Region.

Types of Industry/Institution	Severe	Moderate	Less
Newsprint/hardboard	3	x	X
Tannery	2	x	x
Powerhouse	1	x	x
Match factory	2	x	x
Textile	1	6	x
Tobacco	1	3	1
Sugar	3	X	1
Chemical	1	7	1
Fish processing	x	38	x
Cold storage	x	3	x
Jute mills	x	16	x
Oil companies	x	3	x
Salt manufacturing	x	3	x
Rubber	x	1	x
Battery	x	1	x
Agrochemical	x	5	x
Rice mill	x	x	13
Saw mill	x	x	23
Automobile	x	x	10
Engineering works	x	x	53
Metal works	x	x	10
Iron foundry	x	x	3
City corporations	12	x	x
TOTAL	35	121	112

These factories discharge untreated effluent into the local rivers, thus, causing deterioration of water quality and depletion of fishery.

11.3.1.3 Industrial effluent from the central region (Barisal)

Most of the sources of industrial wastes in the central region are of moderate character (Table 11-3). Thus, compared to other regions, the central region has the least sources of industrial wastes.

Table 11-3. Sources of Industrial Wastes in the Central Region.

Types of Industry/Institution	Severe	Moderate	Less
Chemical	1	3	X
Fish processing	X	1	x
Tobacco	x	3	x
Food products	x	2	x
Jute	x	1	x
Textile	x	x	1
Ice plant	x	x	10
City corporations	6	x	x
TOTAL	7	10	11

11.3.2 Legal Situation

The first law enacted for the regulation of industrial wastes is the Factories Act of 1965 implemented by the Chief Inspector of Factories and Establishments under the Ministry of Industries. The Act provides that effective arrangement shall be made in every factory for the disposal of wastes and effluent and the government may make rules prescribing the arrangements for safe disposal of industrial wastes (Section 13). At the time the law was made, the problem of industrial pollution was not an issue of concern or consideration as the period was only the beginning of the process. However, the very wording of the said section signifies that the lawmaker had contemplated such an issue and reserved adequate space for the details of the procedural matters to tackle such problems. The prevailing scenario reaffirms that as the law was not strictly enforced at the initial stage of expansion of industries it became really hard to implement the same in its true spirit at a later phase.

There is another law which came in 1950 called the Protection and Conservation of Fish Act which prohibits the poisoning of water or depletion of fisheries by pollution by trade effluents or otherwise (Section 3.iii.c). This law is implemented by the DoF. If one scrutinizes the category of legal action prosecuted by the DoF, one would find that most of the issues are connected with the use of prohibited gears, catching of undersized fish, catching of certain species during closed season and not one provision on pollution by individual effluents. Moreover, this task may not be possible for DoF to perform in the present context as it deals with environmental resources in a compartmentalized manner and sectoral laws are more concerned with earning revenues. The National Fish Policy emphasized strict enforcement of laws to prevent discharge of untreated waste into the water bodies.

Taking into consideration the impacts of pollution and the necessity of preventing unplanned development efforts, the government in 1977 introduced a law entitled Environment Pollution Control Ordinance. Through this Ordinance, all water pollution control projects were turned over to the Department of Environmental Pollution Control and placed under the Department of Public Health in the Ministry

of Local government, Rural Development and Cooperatives (MLGRDC). In 1986, the Department of Environmental Pollution Control identified 903 industries as polluters and the MLGRDC vested on the Ministry of Industries the responsibility of ensuring that the industries with no environmental pollution control/protection system will adopt measures to control pollution over a period of three years. But more was needed to be done in order to achieve the objective of combating the adverse effects of pollution caused by the industries/factories. During this period, there was a change in the management practice when a new ministry called the Ministry of Environment and Forest was created in 1989. The Department of Environment and the Forest Department, which were formerly under the Ministry of Agriculture, were placed under this Ministry.

After a lapse of about eight years of the non-implementation of the above decisions, the environmental NGO BELA filed a lawsuit³³ in 1994 in the High Court demanding implementation of the said notification. The Court has been pleased to issue notice against the MoEF and Ministry of Industries for the alleged failure in implementing their own decisions. The petition is pending for further hearing. Meanwhile, the DoE updated the list of polluting industries the number of which has increased to 1 176, although the procedural matters for incorporating the additional numbers of the said notification has yet to be initiated.

The Environment Policy of 1992 underscored the need to adopt corrective measures by polluting industries, in phases, to undertake environmental impact assessment for all industries both in the public and private sectors, and to close down existing industries producing materials that cause environmental pollution.

To strengthen the basis of the law in preventing pollution and conservation of the environment, the MoEF adopted a new law called the Environment Conservation Act in 1995 replacing the Ordinance of 1977. Under the rule making power of this Act, the DoE formulated the Environment Conservation Rules in 1997 describing the environmental quality standards, the procedure in preparing the environmental impact assessment, the procedure to be followed by industries of different categories for obtaining environmental clearance from the DoE, (Section 12)³⁴ the standard for discharging or disposing of waste, and the list of industries or projects that fall within the four categories, namely green, orange-a, orange-b and red. The environment-friendly industry or project categorized under the green list has an easier method for obtaining environmental clearance than the industries or projects that fall under orange-b or red categories.

³³ WP 891/1994.

³⁴ Section 12 of the Environment Conservation Act of 1995 provides that no industrial unit or project shall be established or adopted without obtaining environmental clearance in the manner prescribed by the rules of 1997 which categorized the industries into four groups, namely, green, orange-a, orange-b and red, depending on the nature of waste and its impact on the environment.

However, the DoE is facing difficulties in implementing this law. Prior to the introduction of the Environment Conservation Act, the law did not have any provision requiring industries to obtain environmental clearance. There is also a lack of adequate coordination among different statutory organs that might help in the dissemination of the legal requirement for obtaining environmental clearance prior to setting up of any industry. In addition, the DoE lacks capability of enforcing provisions of this law against polluters as in most cases the services of the DoE remains limited to issuing toothless cautionary notices.

Incorporated in the recently adopted National Water Policy is a small chapter on water rights and distribution which stresses the need to maintain the purity of water sources and development by industries of their own pollution control measures. The bone of contention about water rights, however, lies with who is going to fix the boundary of such rights and how this is going to be done. The question may even be asked whether the industries have the right to pollute the water owned by the public whose life and livelihood depend on it.

11.4 AGROCHEMICAL USE

The uncontrolled use of pesticides may cause irreparable damage to the environment. The disastrous effects of large amounts of pesticides on fish, benevolent insects, birds, other animals and the soil are well established. Since 1977, the use of agrochemical substances, both fertilizers and pesticides, has increased by about 400%. Between 1985 and 1990, the use of pesticides doubled from 3 036 t to 6 948 t. It has been estimated that at present about 1 800 t/year of pesticides and fertilizer residues are added to the coastal waters through freshwater runoff (Mahmood et al. 1994). Agrochemical residues come in contact with water bodies every monsoon (May through September) as most of the agricultural lands are low lying. The contaminated water finds its way into ponds, streams, and rivers and is finally discharged into the coasts and the Bay of Bengal. In Bangladesh, no systematic study has been carried out to assess the concentration of agrochemical residues in the coastal waters and their effect on the environment.

The Agricultural Pesticides Ordinance of 1971 as amended by the Agricultural Pesticides (Amendment) Act of 1980 and the Agricultural Pesticides (Amendment) Ordinance of 1983 to regulate the import, formulation, distribution and use of pesticides for all agricultural and commercial purposes to protect the vegetation, human or animal health. This law has a detailed procedure on obtaining pesticide registration, licensing, manufacturing, formulating, repacking, selling, inspecting and testing of pesticides by any purchaser from an appointed government analyst.

As per Section 12 of the Agricultural Pesticides Ordinance, a Pesticide Advisory Technical Committee was constituted to advice the government on technical matters arising from the administration of this Ordinance. This Committee is presided over by the Minister of Agriculture. Under the Pesticide Rules of 1985, the Director of the Plant Protection Wing of the Department of Agricultural Extension is the registering authority

for the importation, manufacture, formulation, sale and re-packing of pesticides. The registration authority is required by law to send the application for registration, together with a sample of the pesticide, to the laboratory for test or analysis. On receipt of the result of such test or analysis, the same shall be forwarded to the Pesticide Technical Advisory Committee which shall conduct such biological tests under field condition as required under section 5 to examine, *inter alia*, that the pesticide is not generally detrimental to vegetation, human or animal health even when applied as directed. On receipt of such report, the registration authority may register that brand of pesticide. This law has a provision for the cancellation of a registration on the grounds, among others, of its hazardous impact on vegetation, human or animal health (Section 7).

Some brands of pesticides are dubbed as the “Dirty Dozen” due to hazardous effects. These are widely distributed and used in the country but they are prohibited in the countries of origin. Certain environmental groups, namely BELA, Institute of Development Policy Analysis and Advocacy (IDPAA) of PROSHIKA and Coalition of Environmental NGOs of Bangladesh, are jointly advocating for a ban on the import and use of these pesticides. This endeavor is also a form of protest against the dumping of certain pesticides (e.g., Dirty Dozen) by the developed countries on the developing countries. It may be mentioned here that only four of the Dirty Dozen are banned for agricultural use in Bangladesh. But the efficacy of such ban is questionable as they are widely available in the local markets aside from the fact that four other chemicals in the Dirty Dozen are allowed to be used.

The National Conservation Strategy of Bangladesh, National Environment Policy of 1992 and National Water Policy of 1999 emphasized the strict implementation of the provisions of the Agricultural Pesticides Ordinance of 1971 which prohibits import and use of pesticides discarded in countries of origin. But the implementing wing (Directorate of Agricultural Extension) finds itself handicapped by logistical and financial difficulties so that it is not effective in educating the farmers about the appropriate dosage and the types of pesticides to be used for controlling certain types of pests. This has resulted in pesticide abuse and consequently degradation of the aquatic habitat.

11.5 DOMESTIC AND MUNICIPAL WASTES

The townships and human settlements in the coastal areas of Bangladesh do not have any domestic waste treatment facilities. Effluents either directly or indirectly find their way untreated into the rivers and ultimately to the Bay of Bengal, adding to the load of waste drained from all the upstream districts. The two most populous and developed coastal cities of Chittagong and Khulna districts have poor sanitary conditions due to a lack of sanitation facilities or the improper functioning of existing facilities. A common practice is to dump excreta in drains and canals that go to nearby rivers. The rivers in the coastal area also directly receive raw excreta daily from a vast number of people living along the area. Furthermore, every day a considerable amount of market wastes from the districts find their way into the rivers and hence, to the Bay of Bengal. The major channels which carry domestic and industrial wastes reverse their flows at high tide and spread into

the coastal city areas causing pathogenic microbial pollution and serious health hazards during the rainy season.

The legal and institutional setup for the management of domestic and municipal wastes lies in the local government laws. In case of divisional urban area of any district as mandated by the city corporation laws, the district urban area under such divisions the Paurashava (Municipality) Ordinance of 1977 regulate the removal, collection and disposal of domestic and municipal wastes within their respective territorial boundaries. Until recently, the government has already declared four city corporations. Two of these areas fall within the coastal area.

City Corporation laws give the responsibility for removal, collection and disposal of refuse to each corporation. Such laws have provisions requiring city corporations to make adequate arrangement in order to have a systematic collection of waste from various sources like households, market places, etc. But a perusal of the laws in an effort to find the existence of any rule regarding the final disposal of these collected wastes reveals an environmentally unsound practice by these corporations of dumping waste material to fill up low lying areas. A praiseworthy step has been initiated in a number of municipalities of transforming these wastes into wealth by making and selling them as organic fertilizers. In one divisional city area, an NGO called PRODIPON has been successfully implementing a solid waste management project in collaboration with the concerned city corporation in one of the coastal districts. Dissemination of knowledge may lead to a wider replication of this project and may result in waste recycling and less damage to the aquatic environment.

Another legal setup available is called the Water Supply and Sewerage Authority for the management of the sewerage system (Section 17.2.b of the Water Supply and Sewerage Authority Act, 1996).

As shown above, the laws and institutions are there but most of the people are deprived of the benefits of such facilities mainly due to financial difficulties and lack of institutional initiatives in harnessing adequate revenue for running such programs independent of the national budget.

11.6 OIL SPILLS

Generally, more than 50% of the oil pollution in the marine environment comes from urban and river runoffs. Localized oil pollution is reported to be heavy in the vicinity of the two port areas of the country, namely Chittagong and Mongla. There have also been persistent reports of oil slicks in the territorial waters of the country and the upper Bay of Bengal. There is, however, as yet no monitoring system in place to document these occurrences systematically (UNEP 1987). In 1995-1996, around 1 652 vessels were handled in these two ports (Bangladesh Bureau of Statistics 1997). From this figure, the Chittagong port handled around 1 286 vessels and the rest was handled by the Mongla port. The navigational route to the Chittagong port made it as the prime marine

ports, hence, the number of vessels that come here is considerably higher. Consequently, this port is prone to more environmental damage.

Chronic spillage of oil into the sea occur during oil transfer and bunkering operations. There are possibilities of chronic oil discharge from the oil refinery at Chittagong and also oil-water emulsion from the repairing and manufacturing industries situated near the coastal areas. Crude oil and its derivatives are among the worst pollutants that enter the Chittagong coastal area from crude oil transport operations in and around Chittagong port.

Dyeing and painting of vessels also contributed to the waste dumped in the port area.

Damaged flexible hoses are not maintained regularly. Oil discharges due to dripping from hoses, overfilled slumps and deteriorating packing in flanges all contribute to chronic oil pollution in the harbor. There is also the risk of leaking pipelines.

Transport of refined petroleum product results in oil spillage during oil transfer from tankers to receiving stations at port areas.

There is also the constant danger of severe accidental oil spills from ships. A huge oil spill caused by an accident involving a Panamanian ship in August of 1994 in the Mongla port area was reported to have continued for a long time causing severe damage to the *Sunderbans*.

11.6.1 Ballast and Bilge Waters

Ballast and bilge waters from oil tankers and other ships anchored in ports should only be emptied in special port installations where the oil can be separated and recycled. This is obligatory in many countries, but Chittagong and Mongla do not have such facilities. The ships directly discharge these waste oil-water mixtures into the coastal waters of Bangladesh.

11.6.2 Discharge of Sewage from Ships

Discharge of sewage from a large number of ships in the limited area of ports can create problems. Infectious diseases may spread as a result of marine pollution caused by this sewage. Cargo sweepings like rotten food grains, cement dust, fertilizer, torn bags, mats and broken dunnage are invariably dumped into the coastal waters in ports.

11.6.3 Legal and Institutional Setup

A very old law regulates the manner in which oil or water mixed with oil are to be discharged in port areas (Section 6.1.ee of the Ports Act of 1908). This law also prohibited the throwing or casting of ballast or rubbish in port areas without lawful excuse (Section 21.1). However, an interview with an official of the Chittagong Port Authority provides the impression that the issue of environmental pollution or conservation was never seriously considered by the port authorities who think that tides will wash away the pollutants from the port areas. This clearly signifies that the authority does not understand the long-term effect of such pollution and the measures to prevent it.

During the 1970s, the government announced two ordinances, namely the Chittagong and Mongla Port Authority Ordinances of 1976. Both these Ordinances have a detailed procedure for the establishment of separate port authorities. It described the port limits and the functions and powers connected with port operations. Both the ordinances had no provisions for controlling pollution of the port areas by vessels. Subsequently, through an amendment, section 41A was inserted to impose penalty for causing pollution. The section provides that any person who throws or allows to fall into water, shore, bank or land within the limits of the port or any goods, ballast, ashes or any other thing causing pollution of the water or environment shall be punishable with a fine up to one *lakh* taka (US\$2 000).

The exclusive jurisdiction of the port authority over the port area has resulted in confusion regarding the application of other laws like the Environment Conservation Act of 1995 and the Protection and Conservation of Fish Act of 1950 which have also provisions to mitigate environmental pollution. In one case, a ship registered as MV Pavlina in Panama was carrying 195 t of fuel oil and 35 t of diesel when it sank near the Mongla port due to fire in August of 1994. The water used to extinguish the fire drained into the hatch and insincere attempts at pumping out the water caused the sinking of the ship. Thus, the oil pollution spread swiftly causing severe damage to the adjacent area, particularly the *Sunderbans* which was covered with dark oil slick. The DoE, which observed the crisis, was barred from interfering into the matter due to the exclusive sectoral approach that limits its jurisdiction. It was estimated that the oil spill caused a loss of taka one crore (US\$200 000).

The laws provide for penalties to anyone who throws any ballast or any foul matter into the water within the port area but whether or not the port authorities have adequate arrangement to facilitate the safe disposal of various types of waste is another matter. It is obligatory in developed nations to have waste receiving stations in ports, but no such such facilities exist in Bangladesh.

In connection with the defective vessels that are responsible for causing more pollution, one of the officials of the port authority commented that the feeder vessels which come to the port are mostly registered in China, Russia or Panama. Requirements

to obtain registration of ships from their countries of origin are rather flexible. Further, the old and mechanically-faulty ships are allowed in the port despite the pollution they are causing. These flag states (China, Russia and Panama) appear to have a lax fitness requirement.

Poor law enforcement record is not a reason for ignoring the legal requirements. Rather, regular inspection should be done on ships which arrive in the port of jurisdiction. Minor repair work of engines may be done without requiring any permit. In case of major repair work however, the vessels are required to go to designated dry docks, although the trend suggests that nobody bothers about such requirement.

11.7 SHIPBREAKING OPERATIONS

Shipbreaking operations have been started on an industrial scale in Bangladesh in recent years. Old seagoing vessels and oil tankers collected from abroad are dismantled on the seashore near the two major port areas. Nearly 50 shipbreaking units have started functioning. The bottom sludge of residual heavy oil in the oil chambers of the tankers and other lubricants and engine oils from condemned tankers/ships constitute a considerable amount of oil spilled during washing and dismantling operations. This discharge of waste heavy oil has been the cause of severe pollution of sea water and destruction of the amenities of the nearby sea beaches. Local fishing groups pointed out that the fish availability from areas close to such operations have been reduced alarmingly.

Not only is there oil pollution from shipbreaking. In addition, huge amounts of refuse iron scraps are thrown away haphazardly into the seashore area. Iron particles produced during cutting operations are also strewn about. Degradation or corrosion products of these scrap iron materials pollute the seawater in the area concerned.

11.7.1 *Legal Issues*

There is no law which regulates shipbreaking, an industry which mainly supplies recycled material for building local ships and iron foundries or re-rolling mills to produce iron rods for use in the construction of buildings. The entrepreneurs buy land adjacent to the river bank where such operation is to be undertaken. Then they acquire lease of the bank from the concerned district administration for pulling the wrecked ships and construct boundaries on the banks straight into the river. According to section 12 of the Environment Conservation Act of 1995, this operation requires an environmental clearance from the DoE following the methods prescribed in rule 7 of the Environment Conservation Rule of 1997. This industry falls within the Orange-B group (Schedule 1, item 66 of Orange-B) and is required to submit the following to obtain an environmental clearance:

- ❖ Initial Environmental Examination report, layout plan showing location of effluent treatment plan with process flow chart;
- ❖ Environmental Management Plan (EMP) stating, among others, the effectiveness of the effluent treatment plan;
- ❖ No objection certificate from the local authority; and
- ❖ Mitigation plan for reducing the hazards caused in case of emergencies.

In the case of the shipbreaking industry, it is obligatory under rule 7 to first obtain a clearance of the site where it would be located (Rule 7.4).

Subrule 8 of Rule 7 states that only upon approval of the location site from the Department of Environment can the entrepreneur proceed to develop the land and construct infrastructures. These documents are to be submitted to the divisional office of the DoE. However, an analysis of the legal status of such an environmentally hazardous business revealed a number of flaws. The entrepreneurs do not conduct their business under a separate registration for shipbreaking. They operate under the disguise of a re-rolling mill which is registered and operated far away from the place used for shipbreaking.

Shipbreaking is an industry regulated by a different legal arrangement. Because of this, it is hard to find the presence of a legal entity registered as a shipbreaking company. The trade has been in existence on the pretext that scraps from discarded ships in the developed countries are providing an enormous amount of raw material for the shipbuilding and re-rolling industries in Bangladesh, thereby circumventing the legal requirement of obtaining an environmental clearance.

Chapter 12

Recommendations

An integrated management of all the resources in the coastal ecosystem should be introduced to ensure sustainable growth which is beneficial from the perspective of economic development, environmental conservation and the well-being of the local people.

The recommendations listed below are based on the discussions in the preceding chapters.

12.1 LEGAL STATUS OF COASTAL FISHERY

As discussed in Chapter 2, it becomes clear that there is no specific legislation which clearly spells out the status of coastal fishery, although it possesses identical geomorphological features and regulatory issues. Because of the legal complexity in defining the coastal fishery, it is not clear what law is to be applied in managing fishing operations in the coastal area. According to the catch record reported in the Statistical Yearbook of Bangladesh (1997) the production from estuaries and *Sunderbans* has been included in the inland fishery production system. But the activities in such fisheries are mostly regulated by the law which governs the issues in the Bangladesh fisheries waters (BFW) (Section 2.a of MFO) as measured from 18.29 m depth towards the Bay of Bengal.

12.2 LEASING OF OPEN *JALMOHALS* ABOLISHED

Chapter 3 attempted to analyze the possible legal and non-legal effects of the abolition of the procedure for leasing open water *jalmohals*. The estuaries within the coastal region designated as either rivers or flowing water bodies in the legal document (definition of open *jalmohals* as it appears in article 118 of the Land Management Manual) comes within the purview of open *jalmohals*. Because of the abolition of the leasing of the resource, it is now open to everybody and nobody. Considering the role of coastal water bodies in providing nursery grounds for a number of marine and inland species measures need to be initiated to ensure conservation and sustainable extraction of fish resource.

12.3 JURISDICTION OF LAWS

There are no specific legal provisions which regulate coastal fishing operations. The situation seems quite identical with the vague status of coastal fishery. According to legal instruments, the definition of rivers encompasses the estuaries located in the southern part. In addition, the catch from this area is also classified as inland production. Depending on which statement may be used, the Protection and Conservation of Fish Act of 1950 (the parent act regulating issues like gear, areas, species and time for the inland fishery) may be applied to such area but it must be expressly declared through Gazette notification. As discussed in Chapter 4 regarding territorial jurisdiction of the MFO, the definition of BFW as laid down in Section 2.a excludes the coastal water below the depth line of 18.29 m from which the BFW is measured. This may act as an obstacle in applying the provisions of the Ordinance and the Protection and Conservation of Fish Act of 1950 over areas shallower than the depth. As has already been observed in field surveys in one of the coastal rivers, numerous ESN are used although this is expressly prohibited by the Protection and Conservation of Fish Act. One reason for non-application of the 1950 Act may be that the catch from such water bodies is mostly marine species and it may be presumed that the MFO shall have jurisdiction over such issues. The jurisdiction of different laws over the coastal area need to be clarified to avoid this kind of confusion.

12.4 FISHING LICENSE AND NUMBER OF VESSELS

A fishing license is a document which specifies the species of fish to be caught and the type of fishing gear or the method of fishing or the location for catching of fish (Section 13 of MFO). The requirement of a fishing license is more or less related with the management and conservation of resource by ensuring a sustainable production system. Section 8 of the MFO provides that fishing licenses shall be required in all marine fishing in the BFW. However, Sections 17 and 18 of the MFO exempts local fishing vessels from obtaining a fishing license if they obtain registration or valid certificate of inspection under any other existing law. True enough, another law, the Merchant Shipping Ordinance of 1983 (Section 13), requires registration of all seagoing vessels as proof of their seaworthiness. If the provisions of the MFO and the Merchant Shipping Ordinance of 1983 are taken together according to the rules of statutory construction, it signifies that there is no need to obtain a fishing license under the MFO if a local fishing vessel has already obtained registration for seaworthiness. But registration of a vessel is different from obtaining a license to ensure selective fishing. This legal exemption has to be removed if the legislative intent is sustainability of fishery resources. The Department of Fisheries, not the Department of Shipping, is the institution which should issue this license because it has the knowledge on fish stocks, the methods to be used in specified locations and the annual harvestable stock, and the capability to determine the number of vessels allowed to fish. Registration based on vessel fitness alone may result in a situation where the number of vessels will exceed the carrying capacity of marine ecosystems.

12.5 FISHING GEAR

Rule 14 of the Marine Fisheries Rules prescribes the mesh size of different types of nets to be used by the fishing vessels. The rule mentions about five types of nets, namely, shrimp trawl net (boom), fish trawl net, large mesh drift net, small mesh drift net and set bag net. Also, specified are areas where such nets are to be used for fishing operations. In practice there are few more types of nets which do not fall within the purview of this rule although one or two of such types have been found to be severely destructive from the perspective of sustainable management of the coastal fishery resource (as discussed in Chapter 4). It seems that the gear listed in the MFO are used mainly in relatively deep coastal waters. For example, the marine set bag net is used up to the 25 m depth line, while ESNB is used within the 10 m depth line, embracing almost all the brackishwater bodies, channels and tributaries. The ESNB has been found to be severely destructive as it also captures juvenile shrimps and fish that graze in shallow waters. In one survey report, the MFSMV recommended the prohibition of the use of ESNB in specified areas during specified season below a 10 m depth. The MFO specified the mesh size for set bag net but failed to consider ESNB. Regulatory laws should clearly spell out what types of gear are to be regulated by which legislation.

12.6 SHRIMP CULTURE

Detailed discussion on the issues surrounding shrimp culture is provided in Chapter 9.

12.6.1 Land Use

Changes in the land use pattern brought about by the establishment of shrimp estates have resulted in social tension and unequal distribution of benefits from the resources. Based on land topography, tidal inundation, water salinity, soil quality and other environmental factors, a land utilization policy should be urgently formulated with the active participation of local people. This should take into consideration social and economic equity as well as resource sustainability. Meanwhile, until the formulation of this land utilization policy, the guidelines enumerated in the SEMP for declaring shrimp estates and using public (*kebas*) land for shrimp culture must be strictly followed.

12.6.2 Culture Methods

To date, there is no specific rule on culture methods to be employed. The National Fish Policy of 1998 proposed a number of methods like integrated culture of rice and shrimp, improved intensive type and, in designated areas, semi-intensive type of shrimp farming. This gives the impression that the culture mode would depend

not only on availability of saline water but also on the socioeconomic and cultural aspects of the land/pond owners. The semi-intensive type of shrimp culture has been practiced in most of the areas and the NFP also recommends such method in designated areas.

12.6.3 Fry Catching from Wild Sources

The survey report of the MFSMU reveals that in each year more than 2 000 million tiger shrimp fry are collected from wild sources to supply the shrimp ponds and such method destroyed other species of shrimp fry, fish and zooplankton. Fry catchers, after separating the fry of tiger shrimp, throw away the other species on the banks of water bodies. The survey report further stated that analysis of catch data shows that in terms of weight the fry catching effort accounts for 0.04% but if the data is examined by counting the catch then it goes up to 94.6%. This data clearly shows the destructiveness of such fishery practice. This requires urgent measures like hatchery technology development, education of fry collectors about the negative impact of their practice, and applying alternative methods and technology that will assist in economically rehabilitating these fry collectors.

12.6.4 Monitoring of Existing Policies

There are a number of committees formed under different policies or notifications tasked to look after issues connected with shrimp culture at the district and local levels. The functions of these committees are not assigned to any specific organ for implementation. Such policies assign specific responsibility to different committees composed of different sectoral officials who have separate programs to perform and agenda to fulfill in accordance with the mandates of each organization. This may result in a situation where everybody's responsibility is nobody's duty.

12.7 COASTAL EMBANKMENT PROJECT

The National Environment Policy of 1992 encourages a reevaluation of existing projects on water resources development, flood control, and irrigation to determine their adverse impact on fisheries and to adopt measures for alternative fish culture. The institutions, i.e., the BWDB, the DoF and DoE, have regulatory powers authorizing them to undertake the aforesaid programs with the involvement and participation of the affected people. The adoption of such large-scale programs would involve huge financial outlay, so it is advisable to initiate pilot projects on a small-scale which, if they succeed, may be replicated.

12.8 MANAGEMENT OF MANGROVE FISHERY

The fisheries in the mangrove forests are managed by the Forest Department (FD) under the MoEF as per the provisions enunciated in the Forest Act of 1927. The FD issues separate circulars for regulating fishing practices in the water bodies located within the mangrove forests declared as reserved forests (RF). Chapter 10 discussed the issuance of licenses by FD for catching fish in these water bodies. In most cases, this is not backed by reliable assessment of fish stock and even the issuance of permits for catching shrimp fry in such water bodies indicates the failure of FD to understand the life cycle pattern of fish in mangrove areas. The FD should have a body of professionals with fishery background to formulate policies in collaboration with the DoF to study fish stock assessment and sustainable extraction of fish and other resources in RF.

12.9 INDUSTRIAL POLLUTION AND MUNICIPAL WASTES

The sources causing such pollution are already identified but urgent actions are not taken yet to minimize pollution. Polluting industries have been discharging untreated wastes into public water bodies without being fined. The institutions are there with adequate legal shield to launch the battle against polluters. The Environment Conservation Act of 1995 needs to be revised so that it can retrospectively take effect against existing polluting industries and this should be done without immediate delay. The DoE should also launch an extensive awareness program to educate the people on the necessity of obtaining environmental clearance (Section 12, Environment Conservation Act of 1995) for projects or industries. The entrepreneurs should know the environmental requirements of the DoE.

As regards the disposal of municipal wastes, the relevant laws may be amended to accommodate the concept of people's participation in managing municipal wastes. When the garbage is placed into the bins fixed by the municipal authority, it becomes the property of the municipality which may then prevent individuals from carrying out recycling or organic fertilizer projects utilizing these wastes.

12.10 OIL SPILL, BILGE WATERS AND SEWAGE FROM SHIPS

The two major port authorities (Chittagong and Mongla) are responsible for the management and conservation of the port areas as empowered by the Ports Act of 1908. But these authorities lack adequate legal and technical facilities in managing environmental issues. Furthermore, most people seem a bit reluctant to admit the fact that pollutants in the port area are washed down to the Bay of Bengal. This attitude needs to be changed to mitigate water pollution from oil spills, bilge and sewage disposed by ships. To make the antipollution programs effective, port authorities should undertake an awareness campaign to change the practices or attitudes of the people, especially the tradition of non-compliance with legal environmental requirements.

12.11 SHIPBREAKING OPERATIONS

There is as such no legal instrument that regulates the shipbreaking operations which have been taking place on river banks for a quite considerable period. The Environment Conservation Act of 1995 has provision for obtaining environmental clearance to conduct such a hazardous operation but the enforcement of this law is questionable. Many entrepreneurs involved in shipbreaking do not classify their operations as such, but under the guise of re-rolling mills, thereby avoiding stringent rules of clearance by the DoE. Bangladesh is also a signatory to the Basel Convention on the Transboundary Movement of Hazardous Waste and the transportation of discarded ships for such purpose is also regulated by the said Convention. As signatory, Bangladesh should promulgate laws banning the entry of such ships in pursuance of the Convention.

12.12 POLICY IMPLICATIONS

Policies discussed in the foregoing chapters have so far addressed most of the pressing environmental issues. However, for effective implementation of the policy provisions, there must be an action plan incorporating guidelines to effect sectoral cooperation and amendment or formulation of laws. Rules or by-laws, if needed, must be devised to strengthen institutional capability in undertaking programs compatible with sustainable development. According to the Constitution of Bangladesh, case law supports the proposition that, in the absence of specific laws for dealing with any resource, it is the policy provisions that may be enforced although policies are not judicially enforceable.

12.13 INSTITUTIONAL ISSUES

In the context of Bangladesh, the environmental resources are held by different sectoral statutory institutions as trust on behalf of the public (Article 13, Constitution of Bangladesh, 1972). This sectoral arrangement and management of the public properties devoid of public input or accountability has promoted sector-based compartmentalization of environmental regulations. This arrangement has resulted in an uncoordinated, competing and often adversarial approach which is unfriendly to sustainable management of resources and ecological governance. The action plan under the National Environment Policy identified the actors with specific roles to be performed for ensuring sustainable development but the concrete mechanism by which this may be achieved still has to be worked out. No less than the constitutional spirit demands that the resources have to be managed in consultation with and reflecting the needs of the public to ensure accountability. This is undoubtedly the ideal institutional approach.

References

- Adnan, S. 1993. Shrimp culture projects in coastal polders of Bangladesh: policy issues about socioeconomic and environmental consequences. Unpublished.
- Ahmed, A.T.A. 1995. Impact of shrimp culture on the coastal environment of Bangladesh, p. 77-84. *In* N. Mahmood (ed.) Proceedings of the workshop on coastal aquaculture and environmental management, April 1995. Institute of Marine Science, University of Chittagong and Marine Fisheries Academy, Fish Harbor, Chittagong.
- Ahmed, N. and M. M. Hossain. 1995. Legal regulatory and institutional framework for fisheries and fishing community development and management. *In* Proceedings of the National Workshop on Fisheries Resources Development and Management in Bangladesh. Ministry of Fisheries and Livestock in collaboration with BOBP/FAO and ODA, 29 October - 1 November 1995, Dhaka, Bangladesh.
- Ali, M.Y. 1991. Towards sustainable development of the fisheries resources of Bangladesh. In IUCN, National Conservation Strategy of Bangladesh. International Union for Conservation of Nature and Natural resources, The World Conservation Union. 96 p.
- Ali, M.Y. 1992. Report on leaseholder studies under the Third Fisheries Project. Bangladesh Centre for Advanced Studies (BCAS), Dhaka. 40 p.
- Ali, M.Y. 1997. Fish, water and people: reflections on inland openwater fisheries resources of Bangladesh. Bangladesh Centre for Advanced Studies and the University Press Limited, Dhaka.
- Bangladesh Bureau of Statistics. 1997. Statistical yearbook of Bangladesh. Ministry of Planning, Dhaka.
- Bangladesh Water Development Board (BWDB). 1984. Draft report on reconnaissance survey of South-West delta of Bangladesh. Office of the Executive Engineer Delta Development Cell, BWDB. May 1984.
- Black, H.C. 1990. Black's law dictionary. St. Paul, Western Publishing Company. 1657 p.
- Chantarsari, S. 1994. Integrated resource development of the Sunderbans reserved forest. Fourth draft report on Fisheries Resources Management for the Sunderbans Reserved Forest. BGD/84/056:171 p. Bay of Bengal Programme, Madras, India.
- Das, N.G. and M.M. Alam. 1995. Shrimp fry fishing along the coast of Cox's Bazar-Teknaf and its possible effect on fishery resource, p. 46-51. *In* N. Mahmood (ed.) Proceedings of the workshop on coastal aquaculture and environmental management, April 1995. Institute of Marine Science, University of Chittagong and Marine Fisheries Academy, Fish Harbor, Chittagong.

**Management of Fisheries, Coastal Resources and the Coastal Environment in Bangladesh:
Legal and Institutional Perspectives**

- Department of Fisheries. 1996. Integrated management and development of exploitation process of fish resource in the coastal area of Bangladesh, December 1996. Marine Fisheries Survey and Management Unit, Department of Fisheries, Bangladesh.
- Department of Environment Pollution Control (DEPC). 1985. Report on industrial pollution and polluting industries in Bangladesh. 210 p.
- East Pakistan Water and Power Development Authority (EPWAPDA). 1968. Coastal embankment project: engineering and economic evaluation. A report prepared by Leedshill - De-Leuw Engineers, December 1968.
- Ehsanul, H. 1998. Legal aspects of shrimp cultivation. In Workshop Proceeding on Environmental Consequences of Export Oriented Shrimp Culture in Bangladesh: Reforms and Changes, October 1998. Center for Policy Dialogue, Dhaka.
- Farooque, M. 1997a. Law and custom on forests in Bangladesh: issues and remedies. Bangladesh Environmental Lawyers Association, Dhaka. 9 p.
- Farooque, M. 1997b. Regulatory regime on inland fisheries in Bangladesh: issues and remedies. Bangladesh Environmental Lawyers Association, Dhaka.
- Fugler, C.M. 1984. The commercially exploited chelonia of Bangladesh: taxonomy, ecology, reproductive biology and ontogeny. *Fish Info. Bull.* 2(1). 52 p.
- GOB. 1990. The Fourth Five Year Plan 1990-95. Planning Commission, Ministry of Planning, Government of Bangladesh, Dhaka.
- Hansen, U.J. and Mustafa, M.G. 1992. Survey to study the design, behaviour and performance of the set bag net operated in the estuaries of Bangladesh. Danish Institute for Fisheries Technology & Aquaculture, FAO and Bay of Bengal Programme, Madras, India. 28 p.
- Haq, S. 1982. Delta development of Bangladesh. *In* ILRI. Polders of the World. International Institute for Land Reclamation and Improvement, Wageningen.
- Holmgren, S. 1994. An environmental assessment of the Bay of Bengal Programme, Madras. BOBP/REP/67: 256p.
- Hussain, M.M. 1971. The commercial fishes of the Bay of Bengal. UNDP Project Publication No. I. East Pakistan Fisheries Development Corporation, Chittagong.
- Islam, S., M.G. Khan, S. A. Quayum, M.N.U. Dasa and Z. A. Chowdhury. 1993 The estuarine set bagnet fishery. *In* Studies of interactive marine fisheries of Bangladesh. BOBP/WP/89. 19-50 p. Bay of Bengal Programme, Madras, India.
- Khan, G. 1994. Present status and future plan for sustainable marine resources development, p. 30-36. *In* Proceedings of a workshop on sustainable development of marine fisheries resources in Bangladesh, 29 August 1994, Cox's Bazar.
- Khan, M.G. and M.A. Latif. 1995. Potentials, constraints and strategies for conservation and management of open brackishwater and marine fishery resources. Paper presented at the National Seminar on Fisheries Resources Development and Management organized by MoFL, Bangladesh, with FAO and ODA, 29 October to 31 November 1995. Dhaka, Bangladesh. 19 p.

- Khan, M.G., M. Alamgir, and M.N. Sada. 1997. The coastal fisheries of Bangladesh, p.26-37. *In* G. Silvestre and D. Pauly (eds.) Status and management of tropical coastal fisheries in Asia. ICLARM Conf. Proc. 53, 208 p.
- Khan, M.G., M.S. Islam, M.G. Mustafa, M.N.U. Sada and Z.A. Chowdhury. 1994. Biosocioeconomic assessment of the effect of the estuarine set bagnet on the marine fisheries of Bangladesh. BOBP/WP/94. 28 p. Bay of Bengal Program, Madras, India.
- Kibria, G. 1983. Shrimp fishery and shrimp farming in Bangladesh (in Bengali). Khulna, Bangladesh.
- Mahmood, N. 1986. On fishery significance of the mangroves of Bangladesh, p. 26-32. *In* N. Mahmood (ed.) Proceedings of the workshop on coastal aquaculture and environmental management, April 1995. Institute of Marine Science, University of Chittagong and Marine Fisheries Academy, Fish Harbor, Chittagong.
- Mahmood, N., S.R. Chowdhury and S.Q. Saikat. 1994. Indiscriminate expansion of coastal aquaculture in Bangladesh, genesis of conflicts : some suggestions, p. 1697-1706. *In* P.G. Well and P. J. Ricketts. Coastal zone Canada '94. Cooperation in the coastal zone: Conference Proceedings, Sept. 20-23, 1994. Halifax, Nova Scotia, Canada.
- Matin, M.A. 1985. Hydrology of mangrove forest of Bangladesh (engineering aspect). Paper presented at the ESCAP/SACEP Symposium on the Environmental Management of Mangrove, Coral and Island Ecosystem, 21-25 August 1985, Dhaka, Bangladesh.
- Ministry of Fisheries and Livestock 1998. National fish policy. Ministry of Fisheries and Livestock, Dhaka.
- Ministry of Planning 1997. The national fifth five year plan 1997-2002. Planning Commission, Dhaka.
- MPO (Master Plan Organisation). 1987. Fisheries and flood control, drainage irrigation development. Technical Report No. 17. March 1987.
- MPO 1990. National water plan (phase II). Draft final report.
- Nijera Kori. 1990. Bangladesh: the desert in the delta. Delta Development Project of the Netherlands Embassy, Dhaka.
- Nishat, A., and S.K. Chowdhury. 1987. Water quality: problems and needs for integrated control in Bangladesh, p. 349-362. *In* Ali, M.Y. et al. (eds.) Water Resources Policy for Asia. Rotterdam, Balkema.
- Paul, S.C., Md. G. Mustafa, Z.A. Chowdhury, Md. G. Khan. 1993. Shrimp seed collection. *In* Studies of Interactive marine fisheries of Bangladesh. BOBP/WP/89, 3-17 p. Bay of Bengal Programme, Madras, India.
- Pokrant, R.J., P. Reeves and J. McGuire. 1996. Riparian rights and the organization of work and market relations among the inland fishers of Colonial Bengal, c. 1793-1950. Unpublished manuscript. School of Social Sciences and Asian Languages, Curtin University of Technology, Perth, Australia. 54 p.
- Pramanik, M.A.H. 1983. Remote sensing applications to coastal morphological investigations in Bangladesh, Jahangirnagar University, Savar, Dhaka, 227 p. Ph.D. dissertation.
- Rahman, A.K.A. 1989. Freshwater fishes of Bangladesh. Zoological Society of Bangladesh, Department of Zoology, Dhaka University, Dhaka. 364 p.

**Management of Fisheries, Coastal Resources and the Coastal Environment in Bangladesh:
Legal and Institutional Perspectives**

- Rashid, H. 1991. Geography of Bangladesh. Second revised edition. University Press Limited, Dhaka.
- Salter, R.E., 1984. Integrated development of the Sunderbans, Bangladesh: status and utilization of Wildlife. FAO/BGD. TCP/BGD/2309 (MF), No. W/R0034.
- Tsai, C. and Y.M. Ali. 1997. Openwater fisheries of Bangladesh. Bangladesh Centre for Advanced Studies and the University Press Limited, Dhaka.
- Uddin, Md. Mohsin and S. Islam. 1982. Polder development in Bangladesh: past and present development. *In* ILRI. Polders of the World. International Institute for Land Reclamation and Improvement, Wageningen.
- United Nations. 1987. Coastal environmental plan for Bangladesh. 2, Final Report. Economic and Social Commission for Asia and the Pacific, Bangkok.

Published working papers:

PRIAP-ICLARM Working Paper Series 1

Management of Fisheries, Coastal Resources and Coastal Environment in Thailand: Institutional, Legal and Policy Perspectives

Ayut Nissapa, Awaé Masae, Vichot Jungrungrot, and Somsak Boromthanarat

PRIAP-ICLARM Working Paper Series 2

Coastal and Marine Resources in Indonesia: Legal and Institutional Aspects

Tommy Purwaka and Sunoto

PRIAP-ICLARM Working Paper Series 3

Management of Fisheries, Coastal Resources and the Coastal Environment in Cambodia: Institutional, Legal and Policy Perspectives

Cambodia Working Group

Forthcoming paper:

PRIAP-ICLARM Working Paper Series 5

Management of Fisheries, Coastal Resources and the Coastal Environment in the Philippines: Policy, Legal and Institutional Framework

Antonio G.M. La Viña