

**INDUSTRIAL GROWTH AND ENVIRONMENTAL DEGRADATION IN  
BANGLADESH: POST ECONOMIC REFORMS SCENARIO**

*Dissertation submitted to Jawaharlal Nehru University in partial fulfillment of the  
requirements for the award of the degree of*

**MASTER OF PHILOSOPHY**

**VIJAYA DIXIT**



**South Asian Studies Division  
Centre for South, Central, SouthEast Asian  
& South West Pacific Studies  
SCHOOL OF INTERNATIONAL STUDIES  
JAWAHARLAL NEHRU UNIVERSITY  
NEW DELHI – 110067, INDIA  
2007**



Date... 20/7/2007

### DECLARATION

I declare that the dissertation entitled "*Industrial Growth and Environmental Degradation in Bangladesh; Post Economic Reforms Scenario*" submitted by me in partial fulfillment of the requirements for the award of the degree of *Master of Philosophy* of this University is my own work and has not been previously submitted for any other degree of this or any other University.

Vijaya Dixit  
Vijaya Dixit

### CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

**Prof. P. Sahadevan**  
(Chairperson)

CHAIRPERSON  
Centre for South, Central, South East  
Asian and South West Pacific Studies  
School of International Studies  
Jawaharlal Nehru University  
New Delhi-110067

**Prof. Mahendra P. Lama**  
(Co-Supervisor)

SUPERVISOR  
Centre for South, Central, South East  
Asian and South West Pacific Studies  
School of International Studies  
Jawaharlal Nehru University  
New Delhi-110067

*Dedicated to:*

**AMMA & PITA,JI**

## *CONTENTS*

SL. NO.	NAME OF THE CHAPTER	PAGE NO.
	<i>Acknowledgement</i>	i
	<i>List of Tables</i>	ii-iii
	<i>List of Figures</i>	iv
	<i>Preface</i>	v-vi
<b>Chapter 1:</b>	<b>Introduction- Environmental Security A Theoretical Perspective</b>	<b>1-37</b>
	1.1 Introduction	1
	1.2 Environmental Security: Evolution of the Concept	1
	1.3 Environmental Degradation and Conflict	6
	1.4 Criticism of Environment-Conflict Thesis	11
	1.5 Linking Environment to Security: A Critical Overview	17
	1.6 Defining Environmental Security as Human Security	23
	1.7 Environment-Development Debate and Role of the Market	25
	1.8 Critique of the Market Mechanisms of Environmental Management	32
<b>Chapter 2:</b>	<b>Industrial Growth and Environmental Degradation: Linkages and Impacts</b>	<b>38-83</b>
	2.1 Industrialisation and Environmental Degradation: Linkages	38
	2.2 Industrial Growth, Environmental Degradation and Economic Reforms	40
	2.2.1 Pollution Havens Hypothesis	41
	2.2.2 Strictness of Environmental Regulations and Relocation of Industrial Units: Question of 'A Race to Bottom'	44
	2.2.3 Changing Dynamics of Industrial Growth and Environmental Degradation in Liberalising Economy	46
	2.3 Industrial Growth, Environmental Degradation and Social Variables	48
	2.4 Topographical Features and Natural Resource Endowments of Bangladesh	49
	2.4.1 Geographical Location	49
	2.4.2 Climate	49
	2.4.3 Land Types	50

2.4.4	Water Ecosystem	50
2.4.5	Coastal Ecosystem	50
2.4.6	Natural Resources and Biodiversity	50
2.4.7	Vulnerabilities Emanating from Geographical Setting and Topographical Features	51
2.5	Key Socio-economic Indicators	52
2.6	Structure of the Economy and Reform Measures	55
2.6.1	New Industrial Policy 1982	57
2.6.1.1	Investment Incentives and Licensing	57
2.6.1.2	Export Incentives	57
2.6.1.3	Import Liberalisation	58
2.6.1.4	Incentives for Foreign Investment	58
2.6.2	Reform Measures under Structural Adjustment Programmes	58
2.6.2.1	Fiscal Incentives	60
2.6.2.2	Exchange Rate Policy	60
2.6.2.3	Tariff Rationalisation	60
2.6.2.4	Export Incentives	61
2.6.2.5	Reforms in FDI Policy	62
2.6.3	Industrial Sector: Structure and Performance	63
2.6.3.1	Manufacturing Sector: Growth and Performance	65
2.6.3.2	Structural Changes in Manufacturing and Shift in the Export Basket of Bangladesh	68
2.6.4	Overall Growth of Industrial Sector	71
2.6.5	Contribution of Industrial Growth in Poverty Reduction and Employment Generation	73
2.7	Integration of Environmental Concerns in Industrial Policy	74
2.8	Industrial Growth and Environmental Deterioration in Bangladesh	75
2.8.1	Some Key Indicators of Industrial Pollution	76
2.8.1.1	CO <sub>2</sub> Emission	76
2.8.1.2	Organic Water Pollutants	78
2.8.1.3	Emissions from Industrial Units	79
2.8.1.4	Liquid Waste or Effluents	79
2.8.1.5	Deforestation	80
2.8.2	Industrialisation and Urban Pollution	82
<b>Chapter 3:</b>	<b>Socio-Economic Impacts of Environmental Degradation</b>	<b>84-115</b>
3.1	Introduction	84
3.2	Poverty and Environmental Degradation	84
3.2.1	Environmental Degradation and Poor Women	90
3.2.2	Environmental Degradation and Conflict	93
3.3	Industrial Pollution and its Socio-Economic Impacts	95
3.3.1	Polluting Industries in Residential Areas	102
3.3.2	Industrial Pollution and Resulting Health Hazards	104
3.3.3	Industrialisation, Urbanisation and Urban Pollution	107

<b>Chapter 4:</b>	<b>Environmental Governance in Bangladesh</b>	<b>116-161</b>
	4.1 Introduction	116
	4.2 Constitutional Base of Environmental Protection	117
	4.3 The Institutional Context for Environmental Management	118
	4.3.1 Environment Pollution Control Board	118
	4.3.2 National Environment Council	120
	4.3.3 Planning Commission	120
	4.3.4 Ministry of Environment and Forest (MoEF)	120
	4.3.5 Department of Environment (DoE)	121
	4.3.5.1 Environmental Clearance Process: Major Issues	122
	4.3.5.2 Environmental Impact Assessment	123
	4.3.5.3 Powers and Duties of the Director General of the DoE	126
	4.3.5.4 DoE: Some Key Weakness and Limitations	127
	4.3.5.5 Centralised Management: A Key Hurdle	128
	4.4 Environmental Policies	129
	4.4.1 National Environment Policy 1992	130
	4.4.2 Environmental Action Plan 1992	130
	4.4.3 National Environment Management Action Plan 1995	131
	4.5 Rules and Regulations Related to Environmental Management	133
	4.5.1 Environment Conservation Act 1995	133
	4.5.2 Environment Conservation Rules 1997	134
	4.5.3 Environment Court Act 2000	136
	4.6 Environment and National Planning in Bangladesh	137
	4.6.1 Fourth Five Year Plan (1990-1995)	138
	4.6.2 Fifth Five Year Plan (1997-2002)	139
	4.6.3 Achievements During Fourth Five Year Plan	142
	4.6.4 National Strategy for Poverty Reduction 2002	142
	4.7 Budget Allocation for Environmental Protection	143
	4.8 Role of NGOs and Civil Society in Environmental Protection	146
	4.9 Forest Management	150
	4.9.1 Forest Policy 1979	150
	4.9.2 The National Forestry Policy 1994	151
	4.9.3 Social Forestry in Bangladesh and Role of Multilateral Development Banks	154
	4.10 Importance of Informal Regulation or Community Pressure for Environmental Protection	157
	4.10.1 Development Projects, Environmental Policies and the Tribal People	158
	4.11 Environmental Policies: Major Constraints to Implementation	159
	4.11.1 The Problem of Governance	159
	4.11.2 Lack of Democratic Culture	160
<b>Chapter 5:</b>	<b>Conclusion</b>	<b>162-170</b>
	<b>References</b>	<b>171-180</b>

## **Acknowledgement**

*First of all, I am profoundly grateful to my Supervisor **Prof. M. P. Lama** under whose brilliant guidance and strict supervision I could finish my Dissertation within time. I express my sincere thanks to him for providing valuable suggestions and precious inputs which have enriched my understanding of the subject.*

*I am especially thankful to my dearest sister **Jaya** who has always been a source of joy and constant companion in my life. She always helped me with her jolly and cheerful nature whenever I was bored and tired during this lengthy work. Without her support and company it would have been difficult to devote my full time and energy to my research work single-mindedly. I would like to convey my regards to my brother **Deobrat** who has always boosted my confidence for higher aims in my career. I am also thankful to my friendly room partner **Gaithuan** who helped me a lot by maintaining a peaceful environment in room, necessary for serious studies. I would like to extend my deep thankfulness to my senior **Sitakanta Mishra** with whom I discussed and analysed various points. I got every help and suggestion from him at many crucial moments of correction and editing.*

*I owe my thanks to library staff at JNU, IDSA, South Asia Foundation Information and Documentation Centre and TERY library from where I collected authentic and relevant materials for my research work. I am grateful to all teachers and staff at South Asian Studies Division for their valuable advice and support.*

*Above all, I would like to extend my hearty respect and gratitude to my parents who have always been a source of inspiration and motivation during my work. Especially, I owe to my mother whose expectations have inspired me to work hard. And finely, all this could not have been possible without the blessings and grace of God.*

*Vijaya Dixit*  
**Vijaya Dixit**

## *List of Tables*

<b>Table No.</b>	<b>Name of the Table</b>	<b>Page No.</b>
Table 2.1	Trends in Human Development (Selected Indicators)	54
Table 2.2	Bangladesh and Other South Asian Countries: Selected Human Development and Deprivation Indicators	54
Table 2.3	Phased Removal of Quantitative Restrictions	61
Table 2.4	Growth of the Major Sectors in the Bangladesh Economy, 1972/73 to 1997/98 (Average Annual Growth Rate in Percentage, at 84/85 prices)	64
Table 2.5	Trends in Structural Transformation of Broad Sectoral Shares in GDP (Constant Prices at 1995-96, per cent)	65
Table 2.6	Share of Manufacturing to GDP (per cent, at constant prices: 1984/85)	66
Table 2.7	Bangladesh: Major Manufacturing Sectors (% Distribution of Output: at 1984/85 Prices)	67
Table 2.8	Bangladesh: Share in Exports by Commodity Groups (Percentage of total exports, some selected commodities)	69
Table 2.9	Export Basket of Bangladesh: Major Commodities (Composition and Growth Rate)	70
Table 2.10	Trends in Export by Traditional and Non-traditional Items	71
Table 2.11	Average Annual Growth of Industrial Sector According to Plan Period	72
Table 2.12	Selected South Asian Countries: Average Annual Growth Rate of the GDP, Industrial Sector and Manufacturing (Constant Prices, Base Year 1995)	72
Table 2.13	Carbon Dioxide Emissions Per capita (Metric Tons)	76
Table 2.14	Carbon Dioxide Emissions (Millions of Tons)	77
Table 2.15	Bangladesh: Sectoral Share to CO <sub>2</sub> Emissions (1990)	77



Table 2.16	The Extent and Sources of Organic Water Pollution in South Asia (1980-2001)	78
Table 2.17	Forest Cover in Key South Asian Countries (1990-2000)	81
Table 2.18	Population of Statistical Metropolitan Areas in Census Years	83
Table 3.1	Environmental Impacts of Human Activities	85
Table 3.2	Trends in Population Increase in Four Divisions in Bangladesh	94
Table 3.3	Estimated Waste Water Loads from Industries	97
Table 3.4	Concentration of Selected Parameters of Pollution in Industrial Liquid Wastes	98
Table 3.5	Water Quality Status of Major Rivers in Bangladesh (1996)	99
Table 3.6	Estimated Waste Water Flow and BOD Loads at Selected Industrial Areas	100
Table 3.7	Inland Water Fish Production in Bangladesh (1984-1994)	101
Table 3.8	Industrial Units in Five Municipal Wards in Dhaka	103
Table 3.9	Potential Reductions in Mortality and Morbidity and Economic Savings by Reducing Exposure to Environmental Health Risks	106
Table 3.10	Trends in Urban Population Growth Rate in Bangladesh	107
Table 3.11	Trends in Urban Population Growth in Bangladesh	109
Table 3.12	Trends in Increase in Number of Crimes in Bangladesh	110
Table 3.13	Air pollutants in Dhaka City (March 2001) as Compared to WHO Recommended Standard	112
Table 3.14	Water Quality in River and Canal System around Dhaka (2002-03)	113
Table 4.1	Allocation of Funds to DoE	143
Table 4.2	Physical Programme and Financial Outlay for the Development of Environment During Fifth Five-Year Plan (1997-2002) (in Million Taka)	144
Table 4.3	Expenditure in Forestry Sector in Bangladesh (1995-2002)	156

## *List of Figures*

<b>Figure No</b>	<b>Name of the Figure</b>	<b>Page No.</b>
Figure 1.A	Causal Links between Environmental Scarcity and Violence	9
Figure 2.A	Share of Employed Labour Force by Broad Sectors in Bangladesh	74
Figure 3.A	Environmental Links to Dimensions of Poverty	90
Figure 3.B	Women, Environment and Poverty	92
Figure 3.C	Environmental Degradation, Population Migration and Types of Conflicts	94
Figure 3.D	Regional Distribution of major Polluting Industries	96
Figure 3.E	Contributing Factors to Environmental Health Risks	105
Figure 4.A	Process of Getting Environmental Clearance from the DoE	123
Figure 4.B	Allocation of Environmental Budget	146

## *Preface*

Of late, environmental concerns have been accepted as a prime security threat. Both transnational and localised environmental problems such as greenhouse emissions, climate change, global warming, sea-level rise, deforestation, desertification, soil erosion, land degradation, pollution, loss of wetland and fisheries, etc. constitute a prime threat to *human security*. However, the term *environmental security* connotes different implications for peoples living in different parts of the world. While in the affluent North, *environmental threats* are largely post-industrial concerns broadly related to global trade, health concerns, aesthetic values and global environmental problems, whereas in the poor countries of South, environmental deterioration denotes livelihood crisis for millions.

In the wake of the ongoing economic reforms in the developing countries, the complexities of economic growth, environmental sustainability and long run socio-economic security and wellbeing have emerged as a key challenge for both policy-makers and the academia. This study seeks to explore some crucial issues of industrialisation, environmental sustainability, social harmony, and governance in the context of the economic reforms in Bangladesh.

The study comprehensively deals with industrial growth in Bangladesh in the perspective of both historical and reforms-triggered growth dynamics. As of now, industrial sector in Bangladesh is the fastest-growing sector of the economy, growing at a rate of more than seven per cent per annum. This rapid industrial growth has been a major contributing factor to the high growth rate of GDP over the past and current decade. However, it seems that the industrialisation-led growth strategy has caused irreversible damage to the environmental base of the country.

Bangladesh is grappling with various environmental problems caused by rapid industrialisation such as air and water pollution, soil degradation, loss of biodiversity, loss of forests, etc. The study extensively describes the negative environmental externalities of industrialisation. These environmental problems have, to some extent, tarnished the benefits of rapid economic growth.

Socio-economic and geographical settings of a country bear particular significance for how variables of economy and environment interact and reinforce each other. The study deals with the socio-economic and topographical features of Bangladesh. It broadly analyses numerous negative social impacts of industrial pollution and related problems. Structural changes in the economy and industrialisation accompanied with massive urbanisation have caused immense pressure on the resource base and the social fabric of the country. This piece of research extensively explains the above phenomenon.

Grim governance scenario in Bangladesh puts further limits on the adaptive capabilities of the country to handle environmental challenges and resulting socio-economic dislocations. The research also focuses on the institutional setup and legal mechanisms to deal with the environmental problems, particularly, the implementation of the existing rules and regulations. Role of the NGOs, civil society and donor agencies in environmental management has also been discussed.

The very first chapter develops a conceptual framework based on environmental security debate and the role of market mechanisms for the sustainability of environment in the context of economic liberalisation and globalisation. Chapter 2 locates the industrial growth and the resultant environmental degradation in Bangladesh in a broader context of its liberalisation policies. The subsequent chapter puts into perspective the impacts of environmental degradation on the socio-economic profile of the country and the social security aspects. Chapter 4 deals with the legal-administrative aspects of the discourse where the competency of national laws and regulations are examined. Based on the analysis in these chapters, the study concludes that though environmental problems have definite repercussions on the socio-demographic profile of the country, the market-driven economic development has also brought better prospects to the poor millions. Bangladesh's environmental concerns are neither unique nor disastrous though worrisome. The study as a whole is analytical and both primary and secondary sources are extensively used.

# CHAPTER 1



# Introduction

## Environmental Security: A Theoretical Perspective

### 1.1 Introduction

The end of the Cold War witnessed sea-changes in the national security debate. Classical realist formulation which considers state as the main referent of security discourse has been questioned on several grounds. National security defined in the terms of territorial integrity has been felt inadequate to address the long array of non-traditional threats the present humanity is grappling with. It has been increasingly realised that secured borders alone are not the means to ensure security of the people. *Security* that is essentially considered as a “contested concept” (Buzan, 1983: 10) has been redefined to include non-traditional security threats such as rising poverty, population explosion, ethnic strife, spreads of infectious disease, environmental degradation, etc.

### 1.2 Environmental Security: Evolution of the Concept

Attempts to redefine security started in 1970s in the wake of the OPEC oil-crisis when economic issues entered the arena of the security debate. (Dabelko & Dabelko, 2000) The OPEC oil crisis and “limits to growth” (Meadows et. al., 1972) thesis stimulated concerns about how resource scarcity might jeopardise the economies of the industrially advanced countries and instigate conflicts. Buzan in his book *People State and Fear: The National Security Problem in International Relations* (1983) brought forth the crucial link between state security and individual security. While accepting that “the state also becomes a source of social threat against the individual”, he concluded that “the state is irreversible. There is no real option of going back, and security of individuals is inseparably entangled with that of the state”. (Buzan, 1983: 20-21) Buzan identified four types of threats that state can impose upon individual:

- i. those arising from domestic law-making and enforcement;
- ii. threats arising from direct political action by the state;
- iii. threats arising from struggle over control of state machinery; and

iv. threats arising from state's external security policies.

He argued that "while the state provides some security to the individual it can only do so by imposing threats" (Buzan, 1983: 25).

Environmental degradation has been a central theme in the reinterpretation of security during past few decades. Problems such as rapid population growth, rising energy consumption, global warming and climate change, soil erosion, cropland scarcity, deforestation, fresh water scarcity, degradation of coastal ecosystem, decline of fish stock, sea-level rise, etc. have caught attention of the policy-makers and the academia as well. During the 1960s, environmental issues for the first time attracted considerable political significance and began to influence political agenda at the local, regional and international level. Concern about environmental degradation was brought forth by a number of books and articles.

Rachel Carson's *Silent Spring* (1962) highlighted the harmful impact of pesticides on ecosystem. She asserted that nature could no longer be regarded simply as the source of raw materials to be endlessly exploited to fulfill human greed and to be transformed into commodities or consumer goods. "The environmental life-support system, upon which all life depended, was being degraded and altered by human actions, at stake was the future of humankind." (Carson, Rachel, 1962) Writers like Paul Ehrlich (1968), Garret Hardin (1978), Barry Commoner (1978), Donella Meadows (1972), and Lester Brown drew attention to the issues like exponential population growth, the tragedy of commons, the negative externalities of production technologies, the potential limits of industrial growth, and the complex global interdependence of the late twentieth century.

Garret Hardin in his popular essay *The Tragedy of Commons* illustrated how *rational self interest* of individuals ultimately leads to the devastation of common public resources. Giving an example of pasture-land, Hardin reached to the conclusion that "each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of commons.

Freedom in a commons brings ruin to all". (Hardin, 1968)<sup>1</sup> He suggested that the solution of this problem might be found in *mutually agreed upon mutual coercion*. Most of the authors during 1970s like Hardin, Ehrlick, Commoner, and Brown emphasised a *doomsday scenario* resulting from resource scarcity and resultant economic crisis.

Falk's *This Endangered Planet* was an early attempt to relate environment with security. He established relationship between resource scarcity and violence. He wrote: "under world conditions of insufficient resources to satisfy total demand, there is a natural tendency for those with less to a larger share. This tendency induces those with larger share to organize their defenses against those with less and to use their superiority to obtain still more." (Falk, 1971: 59)

Another early publication which identified the linkage between environment and security was Brown's *Redefining National Security*. Brown, especially, focused on the deterioration of the environment and identified four systems under severe stress- fisheries, grass- land, cropland and forests. He observed that "in a world that is not only ecologically interdependent but economically and politically interdependent as well, the concept of national security is no longer adequate .... Neither individual security nor national security can be sensibly considered in isolation. In effect, the traditional military concept of 'national security' is growing even less adequate." (Brown, 1977: 40-41) He asserted that military security was irrelevant to cope up the threat posed by environmental degradation. He observed that "national defense establishments are useless against these threats. Neither bloated military budgets nor highly sophisticated weapon systems can halt deforestation or solve the firewood crisis now affecting so many third world countries." (Brown, 1977: 37)

While the above mentioned authors mainly concentrated on the economic limitations posed by resource depletion, Ted R. Gurr analysed the political consequences of resource scarcity and ecological crisis. Gurr pointed out that "substantial and persisting increase in the scarcity of widely-sought resources in contemporary societies tend to

---

<sup>1</sup> Reprinted from *Science*, 162, 13 December, 1968 in John S. Dryzek and David Schlosberg (eds.) (2005), *Debating the Earth: The Environmental Politics Reader*, Second Edition, New York: Oxford University Press, pp. 25-36.



create greater material inequalities within and among societies, intensify internal and international conflict, and a shift from open towards more closed and authoritarian political institutions.” (Gurr, 1985: 51) He mainly examined three political consequences of resource scarcity: its impact on material inequalities, group conflict, and the viability of a democratic state. Gurr assumes that “scarcity-induced economic decline strongly disposes to increasing inequalities within societies, with groups below the median in wealth and income suffering proportionally more than those above it.” This situation intensifies the violent conflict among social groups, ultimately challenging the authority and legitimacy of democratic political institutions. In heightened scarcity-induced conflictual situations, democratic governments face increasing pressure from both advantaged powerful groups seeking to get a larger pie of resources and disadvantaged protesters and rebels committed to violent means and this situation ultimately results into total paralysis of the democratic institutions. (Gurr, 1985: 69)

In 1983, Ullman’s widely cited paper *Redefining Security* was another important contribution. He stated that “defining national security merely (or even primarily) in military terms conveys a profoundly false image of reality. That false image is doubly misleading and therefore doubly dangerous. First, it causes states to concentrate on military threats and to ignore other and perhaps even more harmful dangers.... And second, it contributes to a pervasive militarization of international relations that in long term can only increase global insecurity.” (Ullman, 1983: 129) In the paper he redefined national security threat in broader context:

“a threat to national security is an action or sequence of events that (1) threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or (2) threatens significantly to narrow the range of policy choices available to the government of a state or to private nongovernmental entities (persons, groups, corporations) within the state.” (Ullman, 1983: 133)

He mainly emphasised that Third World poverty would cause armed conflict and illegal migration. He suggested that environmental degradation was likely to make Third World governments more militarily confrontational in their relations with advanced industrialised nations. He argued that “the image of islands of affluence amidst a sea of

poverty is not an inaccurate one” and “the pressure engendered by population growth in the Third World is bound to degrade the quality of life and diminish the range of options available to government and persons in rich countries”. (Ullman, 1983: 143)

One of the most articulate and influential paper in this sequence was Jessica Tuchman Matthews’ *Redefining Security* (1989). Matthews observed that “environmental deterioration occasionally leads directly to the conflicts, however, its impact on nations’ security is felt in the downward pull on economic performance and, therefore, on political stability”. Generally, this underlying cause of turmoil is often ignored; and instead governments address the poverty and instability that are the results of environmental deterioration. (Matthews, 1989: 166) She argued for broadening the definition of security to include resources, environmental and demographic issues. Matthew’s paper emphasised the trans-boundary character of environmental problems. She claimed that resource scarcity coupled with rapid population growth would bring a bleak future of “human suffering and turmoil.” (Matthews, 1989)

Kaplan’s article “The Coming Anarchy” published in *Atlantic Monthly* drew wide attention due to its alarming and even grimmer picture of human future caused by environmental degradation. His prophetic declaration that “environment is the national security issue of twenty-first century” caused much sensation. (Kaplan, Robert 1994) He asserted that “the political and strategic impact of surging populations, spreading diseases, deforestation, soil erosion, water depletion or pollution, and possibly rising sea-level in critical overcrowded regions like Nile Delta and Bangladesh – developments that will prompt mass migrations and in turn incite group conflict – will be the core foreign policy challenge from which most other will ultimately emanate, arousing the public and uniting assorted interests left over from the Cold War.” (Kaplan Robert, 1994) He mainly argued that the developing counties won’t be able to face the problems caused by environmental degradation and are likely to threaten the interests of the wealthy North, especially the USA. He wrote:

“We are entering a bifurcated world. Part of globe is inhibited by Hegel’s and Fukuyama’s *Last Man*, healthy, well-fed, and pampered by technology. The other larger part is inhibited by Hobbes’ *First Man*, condemned to life that is

“poor, nasty, brutish and short.” Although both parts will be threatened by environmental stress, the Last Man will be able to master it, the First Man will not.” (Kaplan Robert, 1994)

Kaplan argued that much of the world is on the way to conflict ridden anarchy. He suggested that explosion of demographic and environmental forces had already shattered the weak part of the political and economic organisation. “*The Coming Anarchy* captured Washington’s attention with its dire vision of world beset with collapsing state authority.... Much of the Kaplan’s analysis centered on the role of environmental degradation in sparking the *coming anarchy*, and his article, therefore, marks a decided elevation of the environment and security debate”. (Levy, 1995: 35)

In this way, at the academic level, environmental security discourse emerged as a policy agenda primarily in the US. Most of the literature was contributed by the US scholars who were concerned about how environmental problems would affect US national security concerns. Though these scholars emphasised on broadening the concept of security to include environmental threats, threats were seen as emanating from the poor Third World countries, threatening mainly the interests of western world, specially that of the US. They argued for broadening the sources of threat to security, but the redefinition of security was in the context of nation-state.

### **1.3 Environmental Degradation and Conflict**

These efforts to redefine security in terms of environment have led to the attempts to establish relationship between environmental degradation and violent conflicts over scarce resources. This environment-conflict thesis holds that depletion of scarce resources would give rise to violent conflicts at the local, regional and international level.

One of the most comprehensive studies on this theme was conducted by the Project on Environment, Population, and Security at the University of Toronto led by Homer Dixon. He observed that developing countries are more likely to be severely affected by environmentally induced conflict as compared to the developed countries because “by definition, they do not have the financial, material, or intellectual resources of the developed world; furthermore, their social and political institutions tend to be

fragile and riven with discord.” (Homer Dixon, 1991: 88) He identified five types of scarcity-induced conflicts:

- i. disputes arising directly from local environmental degradation;
- ii. ethnic conflicts arising from population migration and deepened social cleavages due to environmental scarcity;
- iii. civil strife including insurgency, banditry and *coup d’ etat* caused by environmental scarcity;
- iv. inter-state war caused by environmental scarcity, for example, conflicts over water resources; and,
- v. North-South conflict over mitigation of, adaptation to, and compensation for global environmental problems like global warming, ozone depletion, threat to biodiversity, and decrease in fish stock. (Homer Dixon, 1999: 5)

However, the study group did not find any direct relation between environmental scarcities and violent conflicts among the states. Dixon identifies mainly three types of conflicts that may arise from environmental scarcity: simple scarcity conflicts, group identity conflicts, and insurgencies. (Homer Dixon, 1999:137)

Simple scarcity conflicts mean inter-state conflicts over fixed or shrinking pie of natural resources. He counts four resources that seem to likely to cause simple-scarcity conflicts among the states: agriculturally productive land, forests, river water and fish. His thesis holds that modern states generally do not fight over renewable resources because of two reasons. First, states cannot easily convert cropland, forests and fish captured from the neighbouring county into increased state power. Secondly, the countries which are highly dependent upon renewable resources tend to poor and poor countries have less capacity to wage war. As far as war over water is concerned, war over water sharing between the upstream and downstream country is possible only in the cases where:

- i. the downstream country is highly dependent upon the water for its wellbeing;
- ii. upstream county threatens to restrict the river flow;

- iii. there has been a history of antagonism between the two countries; and
- iv. the downstream country believes that it is militarily stronger than the upstream country.

Generally, it is highly improbable that all the conditions apply to a river basin. Moreover, historical and contemporary evidences show that the “violent conflict related to river water is almost always internal rather than international.” (Homer Dixon, 1999: 141)

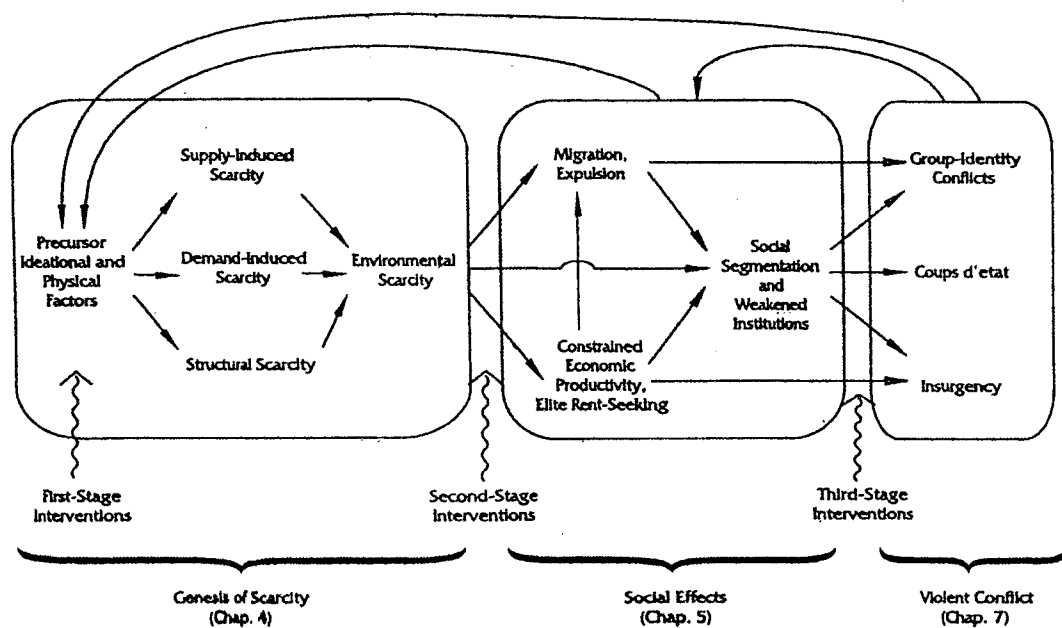
Group-identity conflicts are the conflicts which arise from the large scale movement of population caused by environmental degradation. As different cultural and ethnic groups are forced to live together under stressful circumstances, ethnic identities become assertive and ultimately it results into violent inter-group conflicts. Bangladeshi migration into northeastern region of India and resulting conflict in Assam is a typical example of such conflict. (Homer Dixon, 1999: 141)

Environmental scarcity can be a key inducing force for insurgency and related violence. It may be a key variable in aggravating the grievances of the deprived groups and would provide grounds for insurgency by perpetuating economic hardships and dislocation, increasing inter-group segmentation, and weakening the state institutions. However, Dixon argues that extent and degree of grievances caused by environmental scarcity depends on relative deprivation and this relative deprivation is largely influenced by local contextual factors. (Homer Dixon, 1999: 143-44) Guerrilla war in Peru led by Sendero Luminoso and New People’s Army insurgency in Philippines are examples of environmental scarcity, relative deprivation and violence.

Dixon concluded that supply-induced, demand-induced and structural scarcities, singly or in interaction with other factors, intensify local and region scarcities of cropland, water, forests and fish stock which constrain agricultural productivity. Affected people, who tend to be already economically and ecologically marginalised, are forced to migrate to other rural lands or cities. This migration may often trigger group-identity conflicts in the receiving society. Local decrease in wealth can cause insurgencies and

rebellion. Migration, productivity loss and rent-seeking by elites increase social segmentation that deepens group-identity conflict. It also weakens the local and national institutions, which in turn, diminishes state control over ethnic rivalries and increases opportunities for insurgents/rebels challenging the state authority. The figure below presents Dixon’s core model of the links between environmental scarcity and various types of conflicts. ((Homer Dixon, 1999: 133)

**Figure 1.A**  
**Causal Links between Environmental Scarcity and Violence**



Source: Thomas F. Homer Dixon, 1999.

However, the study group found that “environmental scarcity by itself is neither a necessary nor sufficient cause: there are many conflicts around the world in which environmental scarcity plays little role; and when does it play a role, it always interacts with other contextual factors – be they physical or social – to generate violence.” (Homer Dixon, 1999: 7) The major thrust of the research group was on localised type of conflicts rather than environmentally-induced inter-state conflicts. It found that “environmental scarcities usually do not cause wars among countries but they can generate severe social stress within countries, helping to stimulate sub-national insurgencies, ethnic clashes, and urban unrest.” (Homer Dixon, 1999: 12)

Homer Dixon observed that demand-induced, supply-induced and structural scarcities interact and produce complex social and political relations that often tend to be conflictual. He mainly identified two types of social interactions – “resource capture” and “ecological marginalisation.” With decreasing resources, powerful groups in society try to capture key scarce resources with the help of legal and institutional apparatus of society causing severe structural stress for the poor. Ecological marginalisation is a situation in which poor sections of the society are forced to settle down in ecologically vulnerable areas. This situation creates a vicious circle of poverty and environmental degradation. This complex social interaction explains clearly why “world’s poorest people are thus increasingly clustered in two types of areas: remote and fragile rural areas and the edge of growing urban areas.” (Homer Dixon, 1999: 78)

Environmental scarcities and resulting social interaction may generate various types of conflicts. Homer Dixon has identified five social effects of environmental scarcity that may cause violent conflict, especially in developing countries:

- i. Constrained agricultural productivity, especially in ecologically marginal areas;
- ii. Constrained economic productivity, mainly affecting people who are highly dependent upon environmental resources and who are ecologically and economically marginal;
- iii. Migration of these affected people;
- iv. Greater segmentation of society along ethnic lines;
- v. Disruption of institutions, especially the state. (Homer Dixon, 1999: 80)

However, these social effects do not generate conflict in isolation. The study group concluded that “environmental scarcity often acts as a deep, underlying stressor of social system and it produces its effect by interacting with contextual factors unique to each society.” (Homer Dixon, 1999: 81) In this way environment-conflict thesis concludes that environmental stress linked to conflict indirectly but significantly. Adaptive capabilities of a society get strained due to environmental stress, creating “ingenuity gap” i.e. weakening a society’s inventive and technological ability to deal with

environmental scarcity, which simultaneously reinforces various forms of conflicts and instability. (Homer Dixon, 1999:107-109)

#### **1.4 Criticism of Environment-Conflict Thesis**

This scarcity-conflict thesis has been questioned on methodological, theoretical and empirical grounds. Environment-conflict thesis has also been criticised as the western propaganda, mainly formulated to shift the responsibility of environmental degradation from North to South. "The environment-conflict literature is almost entirely premised on the ethno-centric assumption that people in South will resort to violence in times of resource scarcity." (Barnet, 2001: 53) "By focusing on environmental matters in terms of security, attention is also diverted from "internal" matters of consumption and resource usage in the developed states where a small minority of the world's population consumes a disproportionate amount of world resources, and produces huge quantities of pollution and greenhouse gases. The "external" threats to this consumption are defined as the problem and focus is shifted to possible political disruptions from environmental refugees and migrations caused by external environmental disruptions and political turmoil." (Dalby, 1999: 161)

One of the strongest criticisms of the environment-conflict thesis is that there may be other compelling explanations of conflicts which are largely attributed to environmental causes. Critics have pointed out that political, ideological, structural, economic, and group identity variables can better explain these conflicts. (Matthew et al. 2003: 858) Secondly, interaction between environment and ecology is dynamic and multifaceted. Matthew argues that "it is remarkable and rare for societies to lose all adaptive capacity and collapse into diffuse, long-term violence or anarchy. Looking at the processes of adaptive experimentation and inter-systemic feedback tends overwhelmingly to reveal a series of adjustments to environmental stress, rather than sudden social collapse. What is coming in future may not be utopia, but is unlikely to be anarchy." (Matthew et al. 2003: 859) Critics argue that environmental stress only becomes an important explanatory variable when its level exceeds the adaptive capacity of a state, but



this situation rarely arises because societies always find way to deal with the situation. (Matthew et al. 2003: 864)

In order to better understand environment-conflict relationship some scholars have suggested to broaden the time-frame of environment-conflict research agenda instead of focusing on policy oriented, populist, alarmist and short-term rhetoric. They have suggested that many of the ensuing and important outcomes of human interaction with the natural world – ranging from collapse to migration, mitigation and adaptation – are most evident when viewed over longer time spans. Social effects of environmental degradation are not one way process. “It is entirely plausible that short timeframes may mislead, capturing only glimpses of diverse social effects and responses to them and often highlighting phenomena and trends that over a decade or more would cede prominence to other more analytically interesting phenomena or trends.” (Matthew et al. 2003: 866) For example, water scarcity may seem to give rise to conflict in wake of immediate problems and stress, but societies often learn to adjust and try to find solution in cooperation rather than conflict.

Scarcity-conflict research agenda has been mainly focused on the premise that once environmental stress reaches a ‘threshold point’, societies are bound to collapse in chaos and conflict. However, these research findings have not covered what lies beyond that ‘threshold point.’ Expanding the timeframe of the study would provide a greater understanding of adaptation in responding to environmental stress. A short-term study is likely to give impression that societies have limited choices and responses. But “adaptation is an ongoing and dynamic process and only a research project that focuses on a broad timescale can capture the action-response-reaction nature of this phenomenon.” (Matthew et al. 2003: 868) Even states with small resource base can deal with ecological stress with the help of institutional change and individual behaviour.

Matthew gives the example of Pakistan. A number of scholars predicted that Pakistan would collapse under severe environmental stress but it did not happen. The country was alleged to be a *failed state* under the burden of extensive forest logging, rapid population growth, poverty and influx of Afghan refugees. Nonetheless, Pakistan

could adapt to these pressures with the help of the international community and the network of NGOs as well as by the native efforts. The Global Environmental Change and Human Security Project (1999) found that Pakistan had evolved a number of mechanisms to face resource scarcity and livelihood concerns. These included, remittances from the diaspora, internal migration, adopting new crop patterns, and even the huge profits from the drug trade.

Matthew has emphasised that adaptive mechanisms of a society or a nation can better be understood and explained while analysing over a long period. “Restructuring an economy, building regional institutions and democratisation are the processes that take place over decades or generations, and their effects may not be immediately apparent.” (Matthew et al. 2003: 871) The same is true about efforts at individual level. In addition, some adaptive mechanisms may prove to be counter-productive, further aggravating tension in the short-term. For example, hydro-power projects may cause dislocations on massive scale and resultant local popular dissent, however in long-term, people understand the benefits of energy production and adjust with rehabilitation and new ways of livelihood.

Another major theoretical misunderstanding of scarcity-conflict thesis is that it assumes all types of conflicts to be socially disruptive. Conflict is a normal and important aspect of social development. Here again Matthew argues that “longer term studies might provide deeper understandings of the ways in which concerns about environmental stress and degradation are relevant not only to those concerned with international security, but also those worried about human rights, social justice, and sustainable development.” (Matthew et al. 2003: 868)

On empirical grounds also environment-conflict thesis has been criticised. Some key features of the world order make conflict over resources a premature or wrong prediction. Deudney has identified six features of world politics which make the prospects of resource-war highly improbable:

- i. First, robust character of the international trade, accompanied with flow of technology, has increased efficiency in resource use and resource substitution, which has diversified the resource base making war over resources a costly and short-sighted option.
- ii. Secondly, a large number of functioning international organisations and non-governmental-organisations have provided a channel for cooperation and conflict resolution.
- iii. Thirdly, highly developed institutions of the nation-state system like diplomacy, international treaties and alliances, regional groupings, etc have provided incentives for cooperation in utilisation of common resources rather than conflict.
- iv. Fourthly, the existence of nuclear weapons has made conflict among great powers almost impossible.
- v. Fifthly, proliferation of conventional weapons has made conflicts very costly.
- vi. Sixthly, after the end of the Cold War influence of the coalition of liberal constitutional democracies over world order has reduced the prospects of inter-state military rivalry and violent conflicts. (Deudney, 1999: 204)

As far as the conflict over natural resources is concerned, mainly conflicts over water and oil are supposed to be most probable. Sharing of common water resources has been a major cause of tensed relations between countries, for example, sharing of Ganga water between India and Bangladesh. However, instead of going for war, states have found solution in cooperation. Once multiple stake-holders get involved in joint development of common river basin, process of mutual cooperation becomes irreversible, given a wide-range of beneficiaries. The plausibility of using *water weapon* by closing off the flow of water to lower riparian countries is not supported by the recent developments in international relations. For example, in South Asia, irrespective of three wars fought between India and Pakistan, New Delhi never considered abrogating the Indus Water Treaty as a policy option.

Oil is hypothesised as one of the important natural resource which would cause conflict. Gulf War (1990-91) and the recent US invasion of Iraq to some extent support

this hypothesis. However, Gulf region is an exception in itself because the region contains two-third of the proven oil reserves in the world and most of the countries in the region are politically instable and militarily weak as compared to their neighbours. It is difficult to locate the other examples of such states. (Deudney, 1999: 208)

Neo-Malthusians fear that declining resource base and resulting economic stagnation would give way to authoritarian governments and internal turmoil. International consequences of these internal changes may be increased conflict and war. "In the Neo-Malthusian scenario, domestic political life is an intervening variable connecting environmentally induced economic stagnation with inter-state conflict." (Deudney, 1999: 211) Critics argue that "wealth formation is not so much a product of cheap natural resource availability as of capital formation via savings and more efficient ways of producing. The fact that so many resource-poor countries, like Japan are very wealthy, while many counties with more extensive resource endowments are poor, demonstrates that there is no clear and direct relationship between abundant resource availability and economic well being." (Deudney, 1999: 211)

Prospects of localised types of conflicts along ethnic lines due to resource scarcity and weakening of state structure, mainly emphasised by Homer Dixon and his study group, remains a viable probability. Conflicts in Philippines, Mexico, Peru, Sudan etc. are the examples of such conflict. The chronic Filipino insurgency in Philippines exhibits clear links between environmental degradation and conflict. Lower per capita availability of productive agricultural land in upland areas coupled with highly unequal land distribution has been a key cause of upland peasants' insurgency in Philippines. During 1970s and 1980s the New People's Army and National Democratic Front waged an insurgency against government in rural Philippines taking support from poor rural Filipinos. The situation in Philippines was so grim that three per cent of landowners controlled one-quarter of the country, while 60 per cent of rural families either could not survive on their tiny plots or had no land at all. To make the situation worse, deforestation and soil erosion added to the land scarcity. (UNEP, 1999: 17)

Chiapas in Mexico is another example of environmentally induced insurgency. Zapatista rebellion in Chiapas in early 1990 was largely a result of weakened Partido Revolucionario Institucional (PRI) regime, increasing woes of land-poor peasantry; decreasing ability of the government to co-opt these dissatisfied interests owing to economic reforms and grass-root mobilisation by Churches and leadership. (Dixon, 1999: 145-46) In Chiapas, historically, the wealthier social groups have had access to most of the agriculturally productive lands, while the indigenous people and Campesinos (spanish-speaking subsistence farmers) have had rights over the marginal less fertile lands. In Chiapas, deforestation was a crucial factor in aggravating the grievances of land-scarce people. Especially, deforestation in the Lacandon Rain Forest, which is situated in the eastern lowlands, was acute: between 1974 and 1986, it was reduced by 7.7 per cent annually. Soil erosion has also been severe in several parts of Chiapas owing to various natural and man-made factors such as heavy rainfall and winds, deforestation, unsustainable agricultural practices, etc.

In Chiapas over 6 per cent of the Lacandon Rain Forest was lost to soil erosion between 1974 and 1986; about 20 to 50 per cent of the highlands was affected by soil erosion; and up to 5 per cent of the major coffee producing region along the coast was severely degraded by water-logging. (UNEP, 1999: 19) Following a debt crisis in 1982, Mexico was forced to introduce economic liberalisation. Liberal economic policies eroded the PRI government's control over national assets, markets, subsidies and public control which weakened the government's structure to bribe and co-opt the challengers/rebels. As the government's co-optive mechanisms were weakened, groups hurt by economic reforms and scarcity found it easier to pose more vociferous and violent opposition. (Dixon, 1999: 145)

The rise of Peru's *Sendero Luminoso*, or "Shining Path", campaign in May 1980, that spanned over a decade and claimed tens of thousands of lives, is attributed to declined agricultural productivity and acute economic crisis in Peru's southern highlands, especially in Ayacucho area. Country's mountainous southern highlands are ecologically fragile area and are unsuitable for agriculture. Increasing population and decreasing agricultural productivity caused an economic crisis for people in highlands. The

population density in Ayacucho increased from 8.1 people per square kilometer to 12.1 in 1980. Simultaneously, cropland availability dropped below 0.2 hectares per capita. (Dixon, 1999: 151) Given the population density beyond sustainable limits and inherent fragility of the region, highlands experienced rapid degradation of cropland. As a result, per capita income declined sharply in the region.

In 1980, per capita income in the Peruvian highlands was 82 per cent of the 1972 level; in 1980 people in southern highlands had less than 70 per cent of the FAO daily calorie intake. Drought in 1983 made the situation worse and production of the staple crop of potatoes fell by 40 to 50 per cent. Although the government adopted sweeping land reforms in 1970s, it did not benefit the people in highlands as the government was reluctant to touch large agricultural enterprises which contributed much of the country's export earnings. The situation caused a sense of relative deprivation among peasants in the region who supported the insurgency. Young university radicals in Ayacucho forged an alliance with the region's peasantry. And the movement which started as a social protest movement quickly turned into a terrorist movement. (UNEP, 1999: 21)

However, implications of such intra-state conflicts for international peace and security may not be very great unless and until great powers are involved in the region with some crucial strategic or economic interests.

### **1.5 Linking Environment to Security: A Critical Overview**

The term *environmental security* has been widely criticised for the theoretical inconsistency of the term itself. The term environmental security faces less opposition when explained narrowly to connote the situations where environmental degradation might spark off armed conflict among states. A broader inference of the concept, which acknowledges the ways in which environmental degradation directly threatens the human well being even without the immediate prospects of armed conflict, has invoked much criticism. (Soroos, 1994: 319)

Several points have been raised against linking environment to security. First of all, it is argued that the term security will lose theoretical and conceptual clarity if it is

used to include broader threats other than military invasion; secondly, environmental threats have nothing in common with military threats; thirdly, if dealt as a security concern, environmental threats may reinforce and perpetuate nationalistic sentiments and nation-state system which may ultimately lead to armed conflict; fourthly, putting environment in security agenda may enhance the coercive powers of the state and give way to undemocratic tendencies; fifthly, if environmental threats are treated as security issues, it may impair international cooperative approach needed to solve global environmental problems; sixthly, security as a value is biased towards maintaining status quo whereas environmental problems require new approaches and strategies; seventhly, using the emotive powers of *security* to attract wider attention for environment may prove counter-productive.

Deudney has criticised the idea of linking environment with security mainly on three grounds. First, it is analytically flawed to link environment to security because traditionally national security has focused on threats and vulnerabilities that are totally different from those resulting from environmental degradation. Second, by using the term security proponents of environmental security have tried to use the “emotive power” of nationalism in order to divert the attention and resources to environmental threats but this may prove counterproductive and may undermine globalist political sensibility needed for environmental cooperation. Third, environmental degradation is not likely to cause inter-state war as emphasised by many scholars. (Deudney, 1992)

Deudney raises the point that widening the scope of national security to encompass environmental threats can be useful analytically and conceptually only if both- security from violence and security from environmental threats – have something in common. However, these two are totally different in terms of the types, sources and degree of their intensity and also the type of organisations involved in their management. Given the wide differences between the two, linking them by redefinition may cause a conceptual muddle rather than a paradigm shift. If all the problems that limit range of choices and opportunities and threaten human wellbeing are considered as threats to national security, the term security would lose its conceptual and analytical integrity. “If

all large scale evils become threats to security, the result will be dedefinition rather than redefinition of security.” (Deudney, 1999: 194)

Critics argue that the use of the term *security*, which has traditionally been conceived and practiced around the territorial nation-state system, is flawed for being stereo-typed, thus inadequate, for addressing environmental issues. Therefore, security policies are necessarily staus-quoist and any change from present equations is perceived as a compromise to security. According to Lother Brock, with this staus-quoist connotation of security “the term ‘environmental security’ would become a contradiction in itself because, ecological thinking is dynamic and global, whereas security thinking is static and particularistic. The one stresses adaptation, the other enforcement and control.” (Brock, 1991: 418) Traditionally, the concept of security has been formulated on the idea of “us” against “them” i.e. security is a zero-sum game. But threats posed by environmental hazards do often emanate from domestic policies and practices and are trans-boundary in nature. Military threats are overt therefore, easily identifiable whereas environmental threats are often diffused and global in their implications. Owing to their very nature, environmental threats demand a cooperative approach rather than conflict-relation. (Dalby, 1994: 34)

Rethinking security in ecological terms, demands redefinition of the concept of security as a political concept and policy discourse. In addition, redefinition of security questions the very centrality of nation-state as the main referent of security and gives second thoughts to the sanctity of national borders. “But many writers who have attempted to enlarge the concept of security are still caught largely in the ambit of realist considerations of the national security of single states, and consequently their discourse operates to perpetuate existing political arrangements”. (Dalby, 1994: 26) Brock argues that defining environmental degradation as a threat to the security may provide legitimacy to the use of force when environmental threat are perceived as threatening the economic and ecological interests of the state. “In this way, defining ecological interests in terms of security needs could contribute more to the militarization of eco-politics than to a demilitarization of traditional security thinking”. (Brock, 1991: 419) Existing security apparatus i.e. military establishment in itself poses a major threat to



environmental security in many ways. “Ironically some of the worst localized environmental disasters that need to be cleaned up are those produced by military industrial complex’s search for technological superiority”. (Dalby, 1994: 30)

Deudney has argued that linking environmental issues to national security is a mistake; one that reproduces outdated habits of mind and one that leads away from dealing adequately with the environmental challenges already facing the planet. He argues that security is a term that comes from the history of military occupations. A comparison between environmental threats and military threats reveals that there is little in common between the two in terms of both sources of threats and their solutions. Military threats and environmental threats are quite different in the terms of *type* of threat, the *source* of threat, degree of *intentionality*, and the types of *organizations* involved. (Deudney, 1999: 192-94)

Military threats are focused and very clearly identifiable whereas environmental threats are diffuse. Moreover, in many cases a single country or alliance can not be held responsible for environment hazards, for example, pollution or overexploitation of global commons. Environmental threats may emanate from activities of a particular group or state but the impact of such activities is felt globally, for example, CFC emissions and the resultant global warming. In addition, environmental threats are interconnected and cannot be so easily compartmentalised.

Levy has argued against linking environment to security on albeit different grounds. He holds that “for any environmental threat to be a security threat, there must be some demonstrable connection to some vital national interest. But threats caused by environmental degradation are connected to other fields of public policy”. For example, “in the case of ozone depletion, the connection is to public health and human lives; in the case of environmental refugees, the connection is to humanitarian concerns, migration and regional stability; and so on”. He argues these issues are connected to some sort of national interest and demand certain remedial measures but the appropriate level and form of remedy is dictated by the interests affected, not by putting these problems into security rubric. Putting these issues on security agenda will create a problem of “double

counting”. (Levy, 1995: 43) Levy concludes that “the assertion that many environmental problems constitute security risk is correct and is of very little importance”. (Levy, 1995: 60)

Some environmentalists have tried to use the rhetoric of environmental security as motivational strategy to divert policy attention towards environmental amelioration. Deudney has warned against this strategy because perceiving environment as security problem may affect environmental problem in a negative way. He argues that national security claim is politically mobilising force because it has been connected to state institutions, national identities and wars, whereas environmental threats are not necessarily associated with any of these potent forces. National security is invariably linked to the institution of state sovereignty but responding to global environmental problems often runs against the normal practice of state sovereignty. The term security has been closely linked to nationalist and militarist understanding of state, which can hamper the spirit of international cooperation needed to meet the global environmental challenges like global warming and sea level rise. Deudney argues that:

“A central thesis of environmental political thought is that coping with global problems and new forms of ecological interdependence requires replacing or supplementing national or other forms of group identity ... framing environmental problems as threat to national security risks undercutting the globalist and common fate understanding of the situation and the sense of world community that are necessary to solve many environmental problems ....if environmental concerns are wrapped in national flags, the “whole earth” sensibility at the core of environmental awareness will be smothered”. (Deudney, 1999: 200)

Levy has also criticised the environmental security on the same grounds. He argues that “environment as a security issue is far too blunt an instrument to generate appropriate policy responses.” Moreover, efforts to garner more support by putting environmental problems on the agenda of *high politics* may be “a recipe for wrong environmental policy also” because public opinion may not be always serious about environmental threats. (Levy, 1995: 45)

Diss  
338.095492  
D6429 In  
  
TH14244



TH-14244

Taking environment as security threat without reconsidering the position of the nation-state implies the strengthening and expanding of state capacities. "In many developing countries, states are simultaneously weak and oppressive and political identities are rarely national. In this context, framing environmental problems as national security threats could provide a mandate for coercion." (Deudney, 1999: 197) In many of third world countries, where political boundaries of nation-state do not coincide with ethnic identities, states tend to be fragile, non-democratic and oppressive. In such a situation environmental security may be used as a tool to discriminate against a particular ethnic group for the benefit of state elite. "Because almost all human activities affect the environment in some way or another, assigning states the task of environmental security could provide the foundation for an eco-totalitarianism." (Deudney, 1999: 197)

Moreover, environmental scarcities or degradation do not necessarily lead to the type of conflict as conceived by security analysts in its traditional formulation. The main assumption of environmental security debate is that environmental problems challenge both population and states in a new way that makes traditional notion and practice of security irrelevant. For example, global warming and sea-level rise are two most debated threats which some states are likely to face in the near future. However, critics argue that though these environmental hazards do harm national interests, putting them on security agenda does not necessarily provides the best policy option to deal with. (Levy, 1995: 61-62)

Though traditionally natural resources have been linked to security but the referent object of security is the state. Environment or environmental problems were never thought as security problem in their own domain. Environmental threats know no boundary. Many crucial environmental threats are global or trans-boundary in nature. The main source and solutions of environmental degradation are generally found beyond the domain of traditional national security system. The trans-boundary character of most of the environmental problems makes it difficult to put them in state-centered security paradigm. So, linking environment to traditional security thinking poses an analytical as well as empirical problem. If scope of security is to be enlarged, so should be the fundamental assumptions of the security concept. (Dalby, 1999: 176)

## 1.6 Defining Environmental Security as Human Security

In this way, meaning of environmental security must be reconsidered beyond its state-centric formulation to be analytically useful; notwithstanding, it raises certain analytical and conceptual questions. The advent of globalisation and increased economic interdependence has, to some extent, compromised state's capacity to control its affairs within its tight jurisdiction. In a world order characterised by *complex interdependence* threats to security are diverse, multi-dimensional, and located at various levels of social organisation. Though state remains the prime object and provider of security, globalisation demands *democratisation of security issues*.

Authors like Eric K. Stern have argued for a *comprehensive security* approach in order to situate environmental threats into security policy. Stern asserts that "Blind allegiance to the nation-state system and inability to contemplate shifts of sovereignty "upward" or "downward" needlessly limit the range of institutionalized or ad hoc security strategies, which may be brought to bear in averting or coping with military and non-military threats to individual and collective well-being." (Stern, 1999: 145) Questioning the state's monopolisation of political legitimacy and violence, *Human Development Report 1994* raised a fundamental question: *whose security?* It raised the question of *human life and dignity*, irrespective of national borders and introduced a new concept of security: *human security*. The report clearly stated:

"The concept of security has far too long has been interpreted narrowly; as security of territory from external aggression, or as protection of national interests in foreign policy or as global security from the threat of a nuclear holocaust. It has been related more to the nation-state than to people ... forgotten were legitimate concerns of ordinary people who sought security in their daily lives. For many of them security symbolized protection from the threat of disease, hunger, unemployment, crime, social conflict, political repression and environmental hazards." (*Human Development Report 1994*: 22)

The report emphasised on a "people-centered" security paradigm which is rather concerned with "how people live and breathe in a society, how freely they exercise their many choices, how much access they have to market and social opportunities – and whether they live in conflict or peace". (*Human Development Report 1994*: 23)

Some scholars have argued for defining environmental issues in terms of human security. According to Simon Dalby “if a broader understanding of security is invoked, one that has populations as its referent rather than states, then obviously environmental degradation is an immediate security threat to numerous people, uprooting their way of life if not directly threatening them with starvation.” (Dalby, 1994: 37) Thinking in terms of human security shifts the scale of analysis away from nations to the local level. It focuses on the immediate vulnerability of most of the world’s population, as opposed to hypothetical threats to nation-states. This approach perceives environmental security not as a problem for legitimacy and survival of modern institutions, but as a problem for which modern institutions are responsible. (Barnet, 2001: 127) Jon Barnet has defined environmental security as “the process of peacefully reducing human vulnerability to human induced environmental degradation by addressing the root cause of environmental degradation and human insecurity”. (Barnet, 2001: 129)

The concept of “human security” offers a perspective that allows us to move beyond conventional security thinking, appreciate both the local and global dimensions of many insecurities experienced by real individuals and groups, and identify useful ways of linking security and development policies. Human security provides an integrative framework to ensure that development policies do not undermine the security and cause new forms of insecurities. (OECD, 2000: 54)

While industrialisation is a preferred form of development, downside environmental impacts of industrialisation pose a key challenge to human security. Various forms of pollution, deforestation, soil degradation, chemical hazards, toxic wastes, etc. and resulting socio-economic dislocations cause numerous insecurities. Therefore, from a human security perspective, development should lead to the conditions in which individuals and communities have fair and reasonable access to the things they require to exist and flourish; in which disputes are resolved fairly; and in which the environment is protected from the destructive human behaviour and interactive negative impacts of development paradigm such as unfair distribution of wealth and power,

weakening of social safety net, segmentation of society and new forms of conflict, etc are avoided. (OECD, 2000: 55)

Despite these methodological and theoretical flaws, environmental security debate has played a major role in putting environmental issues on the international agenda. Though the debate still continues whether environmental degradation is a national security threat or not, the fact remains that depletion of resource base and environmental pollution have emerged as global challenge. The key question is how to handle these challenges in a liberal political and economic framework.

### **1.7 Environment-Development Debate and Role of the Market**

Particularly after the end of the Cold War, sway of market based economic reforms and triumph of liberal democracy, what Fukuyama termed as the *End of History*, (Fukuyama, 1992) have raised some very fundamental questions about the role and limits of the state. The prime question, affecting millions of people in the developing world, is how to maintain sustainable development in a neo-liberal economic framework and how to maximise environmental security when economic activities of the state threaten the same. Since environmental degradation is a byproduct of the development process it can not be seen in isolation from broader political, economic and social context.

The *Brundtland Commission Report* (1987) played a major role in directing attention towards many interdependencies between economic and environmental policies. The report called for integrating environmental policy with economic, trade, energy, and agricultural policies in order to prevent environmental damage. The report argued for more effective use of economic instruments to promote clean production. The report stated:

“Pollution is a form of waste, and a symptom of inefficiency in industrial production. When industries recognize pollution as a cost, they are sometimes motivated to make investment in improved products and processes to increase efficiencies and hence to reduce the pollution and waste they generate, particularly when there are economic incentives to do so” (*Brundtland Commission Report*, 1987: 220).

The report raised some basic question as to who pays the environmental costs of economic activity: whether it is externalised i.e. transferred to society in the form of threats to human health, property and ecosystem or internalised i.e. paid by industrial enterprises. The commission raised some other relevant issues of environmental costs of economic activities such as how to measure environmental externalities; and how these environmental costs are to be included in national accounting system.

There are mainly three theoretical perspectives about environment-development discourse: neo-Malthusians, economic optimists and distributionists. (Dixon, 1999: 28) Neo-Malthusians claim that finite natural resources put strict limits on consumption and over consumption will result in poverty and social breakdown. Neo-classical economists or economic optimists are of the opinion that “the appropriate balance between environmental protection and economic development can be best achieved through market mechanisms- by means of market based incentives and the privatisation of environmental assets.” (Kinrade, 1995: 86) Distributionists argue that environmental deterioration is primarily an issue of maldistribution of resources and wealth. Poverty and inequality, they say, are causes, not consequences, of high population growth rates and practices that deplete resources. (Dixon, 1999: 28)

In the context of the proposed study, the question of role of the market in environmental degradation as well as environmental protection needs special mention. Generally, environmentalists blame markets for environmental degradation. Environmentalists base their criticism of markets on few assumptions. First of all, introducing markets without appropriate environmental policy in place may deteriorate the environmental base. For example, rapid expansion of shrimp farming in several countries of Asia, primarily in Bangladesh, India, Thailand, Philippines, and Indonesia has caused harmful environmental externalities. Shrimp farming without ecological considerations has caused acute environmental problems such as contamination of the water supply, drop in water table, intrusion of salted water, and immense damage to mangrove forests. Secondly, free trade and investment may prove disastrous for environment and human health if the regulatory framework is weak and there is proper mechanism to ensure compliance with environmental standards by multinationals. Bhopal

Gas Tragedy in India and Magurchhara gas exploration fire in Bangladesh are examples of weak regulatory system to deal with industrial accidents in multinational companies. Thirdly, introducing markets in *public commons* may cause livelihood crisis for the poor. For example, privatisation of water or forests will bring suffering for the poor rural communities who are unable to afford prices for privatised commodities.

Economic optimists or free market environmentalists argue that one obvious cause of pollution is that the polluter has not to pay for the social costs inflicted by environmental degradation. Though environmentalists tend to blame markets for environmental degradation, “environmentalists are typically dealing with the situation where markets do not exist as when pollutants are dumped into lakes, rivers, and oceans, and into the sky above, and the polluter does not have to buy permits to do so- and therefore must be specially created. In fact, whereas environmentalists often disdain markets, prescriptions such as regulatory imposition of ‘polluter pay taxes’, under which the polluter is taxed for pollution that he causes, amount to nothing more than demands to create the missing markets” (Bhagwati, 2004: 137).

The same school of thought also maintains that with the innovation in technology and growth in income pollution intensive activities decrease naturally. “In fact, as development occurs economies typically shift from primary production, which is often pollution intensive, to manufactures, which are often less so, and then to traded services which are currently even less pollution-intensive. This natural evolution could itself then reduce the pollution intensity of income as development proceeds”. (Bhagwati, 2004: 144) A World Bank study showed a continuous relationship between national per capita income and the strictness of environmental regulations. The study based on data from environmental agencies in Brazil, China, Finland, India, Indonesia, Korea, Mexico, Netherlands, Philippines, Sri Lanka, Taiwan, Thailand, and US revealed that pollution intensity falls by ninety per cent as per capita income rises from \$500 to \$20,000. (*Greening Industry New Roles for Communities, Markets, and Governments*, World Bank, 2000: 13)



Economic optimists further argue that “pollution is an inevitable by product of living. It is of concern only when someone uses something and fails to take the costs resulting from that into account. Normally, this is due to the absence of a feedback mechanism to sheet home to producers and the consumers the full costs of their decisions”. (Moran, 1995: 73) In addition, plant managers do not pollute because they enjoy fouling the air and water but because they are trying to minimise their costs, so they will tolerate emissions up to the point where the penalty for more pollution becomes greater than the cost of controlling it. (*Greening Industry New Roles for Communities, Markets, and Governments*, World Bank, 2000: 3)

However the question is how self interest can be harnessed to produce environmental goods that people demand. According to the economic optimists, markets fail to take into account the full environmental costs and benefits of economic activity because environmental assets and services (many of which are public goods) have not been properly valued. Environmental assets are taken as free of cost or have been chronically undervalued. (Eckersley, 1995: 13) Lack of appropriate property rights is the main cause of the ‘tragedy of the commons’. Free market environmentalists assume that “environmental externalities are attributed to the absence of markets and property rights in relation to the environment; if property rights over the environment are well defined, then the problem can be addressed through voluntary transactions among those causing environmental degradation and those suffering such degradation.” (Anderson and Leal, 1991)<sup>2</sup>

It is but obvious that firms would dump wastes and effluents into nearby river if they have not to pay for social costs inflicted in the form of diseases and loss of biodiversity. This cost should be reflected in the price of product instead of being externalised in the form of pollution and diseases. “The way to getting the incentives

---

<sup>2</sup> As cited in Eckersley, Robyn “Markets, the State and the Environment: An Overview” in Robyn Eckersley (ed.) (1996) *Markets, the State and the Environment: Towards Integration*, London: Macmillan Press Ltd.

right through free market environmentalism is to establish property rights that are well defined, enforced and transferable". (Anderson and Leal, 2005: 223)<sup>3</sup>

In addition, free market environmentalists assume that market/trade distorting subsidies intensify the over-exploitation of resources. For example, if government provides cheap electricity or fertilizers and pesticides at low cost, people would obviously misuse or overuse that. The World Bank observed that "eliminating subsidies for energy and raw materials, and breaking up protected monopolies that produce them, change the prices of these goods. Because industry relies heavily on such inputs, changes in their prices also exert significant effects on industrial pollution". (*Greening Industry New Roles for Communities, Markets, and Governments*, World Bank, 2000: 110) Thus, as prices go high with the removal of subsidies, industrial units use these resources economically in order to minimise their costs of production.

The World Bank also suggested that materials-intensive industries also produce a lot of wastes. Thus, as subsidies for raw materials are scrapped out and prices of these inputs go high, industries shift their production towards processes and technologies that use fewer materials and pollute less. (*Greening Industry New Roles for Communities, Markets, and Governments*, World Bank, 2000: 110) Environmental costs are, therefore, result of *incomplete or missing markets* not a byproduct of market itself. To address this problem of environmental externalities free market environmentalists have suggested polluter pay taxes. These taxes are supposed to be an effective instrument to enable the environmental factors of production to be internalised by the market so that prices reflect the full costs of production. (Stavins and Whitehead, 2005: 230)

As for as regulatory framework for pollution control is concerned, economic optimists do put a premium on market based instruments rather than government led command and control system of uniform regulations for all types of firms. They have raised the debate of bureaucratic regulation vis-à-vis market regulation i.e. question of *coercion vis-à-vis option*. They argue that in command and control system "there is no or

---

<sup>3</sup> Reprinted From Robert N. Stavins (ed.) (2005), *Economics of the Environment: Selected Readings*, New York, W.W. Norton & Company, Fifth Edition.

little financial incentive to do better than the law requires or to develop an experiment with new technology and equipment that might lead to even greater improvements in performance. The net result is a drag on productivity and complaints about regulatory inefficiency.” (Stavins and Whitehead, 2005: 230) So, in a system of state regulations firms comply with environmental laws only to avoid penalty and the motive of gaining personal profits or competitive edge by better environmental performance does not work at all. Moreover, administrative machinery of the state often proves to be inadequate to ensure strict adherence to these regulations. Some critics also argue that “state responses to environmental problems have been post-facto rather than anticipatory. So, such responses have turned out to be far more expensive, politically troublesome and inefficient than they might have been”. (Moran, 1995: 74)

Market based instruments offer extra flexibility to industrial enterprises to choose their own least cost solutions for pollution control. “Properly designed and implemented market mechanisms- regulations that encourage appropriate environmental behaviour through proper price signals rather than through explicit instructions- provide incentives for businesses and individuals to act in ways that further not only their own financial goals but also environmental aims such as reducing waste, cleaning up the air or reducing water pollution. In most cases, market mechanisms take overall goals of some sort- say, the total reduction of emissions of a specific pollutant- and leave the choice of how to accomplish this up to individuals or companies concerned”. (Stavins and Whitehead, 2005: 229)

On the other hand, tight environmental regulations by government force all types of industries to adopt same pollution control strategies and instruments irrespective of abatement cost for each of them. Environmental optimists firmly believe that various market mechanisms such as polluter pay taxes, putting appropriate property rights on environmental assets, tradable permits, reducing market barriers, scrapping off trade distorting government subsidies, providing public information, and consumer demand for environment friendly products may, to a large extent, correct environmental imbalance. (Stavins and Whitehead, 2005: 229)

Under polluter pay taxes the polluter is charged for per unit of emission. So, firms would reduce pollution up to the point when cost of doing this equals what they would otherwise pay in taxes. Polluter pays principle has been mainly endorsed by the EU and OECD countries. If taxes for pollution are imposed on polluters they will think about multiple ways of reducing pollution level according to their own cost-benefit calculations and consumers will not have to pay for the pollution in the form of social costs. Tradable permits provide a more flexible system of pollution control under which policy makers set a target of pollution level for industries in a particular area or region, then total amount of permissible emissions is allocated among firms through permits. The firms whose emission level is below the set limit, can sell their surplus permits to other firms. Firms with high emission level can buy permits to avoid penalties. (Stavins 2001: 3-4)

Economic optimists have a firm conviction that economic reforms are the proper way to deal with industrial pollution. They assume that “at the national level, economic reforms can reduce pollution level. Greater openness to international trade can provide better access to clean technology while cutting subsidies for raw materials can encourage firms to reduce waste. In addition, state-owned enterprises are often heavy polluters, so privatization can contribute to cleaner production.” (*Greening Industry: New Roles for Communities, Markets, and Governments*, World Bank, 2000: 3) Below cost resources encourage misuse. “Cleaner production generally results from economic reforms-reducing barriers to international trade, privatizing state industries, developing new stock markets, eliminating subsidies for energy and raw materials, and deregulating domestic industries.” (*Greening Industry: New Roles for Communities, Markets, and Governments*, World Bank, 2000: 107)

Rather than strict regulations knowledge dissemination, public awareness and community participation at local level can play a greater role in addressing downside environmental impacts of economic reforms. People can raise their voices against adverse impacts of industrial pollution only when they are well informed about adverse impacts of industrial pollution. Income and availability of employment opportunities for local people is also a key determinant of their ability to protest. Indigenous people can be the best managers of environmental assets owing to their traditional knowledge and

experience of local eco-system. Chipko movement in Garhwal district in India, which started in 1973, is an example of popular movement for the protection of community rights and natural resources. The movement was totally indigenous in its origin and encompassed broader ecological concerns such as collective protection and management of forests, and the diffusion of renewable energy technologies. (Guha, 1997: 4)

Use of information technology to spread awareness about sources and impacts of environmental degradation among people may prove an effective tool to curb pollution. One example of such consciousness is growing consumer demands for environment friendly products. For example, there is an increasing demand for bio-degradable paper-bags in place of polythene bags even in poor developing countries. Firms have also started taking into account this public consciousness as shown in advertisement of large a number of products. For example, Tata International uses 'ECO-MARK' on its leather products. Tata has also acquired ISO 14001 certification in 2002.<sup>4</sup> "Growing consumer demand for environment-friendly products and services indicated that the short term cost incurred by firms in improving environmental performance could bring longer term competitive advantages, new investment opportunities and significant commercial rewards" (*Greening Industry: New Roles for Communities, Markets, and Governments*, World Bank, 2000: 17)

One prime question in this regard is what value is given to environmental assets by a society or community. If some society puts infinite value on environmental assets and zero value on economic development or income generation, only then, development activities or trade can be blamed for environmental degradation. So, the concern should be raising the relative valuation of environment as compared to income, and in a democratic society, only citizens of the country can decide how much value they do give to their natural resources. (Bhagwati, 2004: 142)

### **1.8 Critique of the Market Mechanisms of Environmental Management**

These market based mechanisms have been widely criticised and opposed by both environmentalists and academia on ethical, political and practical grounds. First of all,

---

<sup>4</sup> Available at: <http://www.tatainternational.com/abt-env-measure.html>

putting property rights for all natural assets is not practically possible. For example, air and water can not be divided into pieces and therefore, can not be assigned to transferable property rights. A significant proportion of environment's value, such as its aesthetic value, value of biodiversity, its value to future generations and its value for ecologically displaced people can not be measured accurately and therefore, can not be included in evaluation process. Environmental values and assets are a part of complex, interlinked ecological and social system, so, can not be priced objectively. "Full scale privatization of commons is not possible. After all many environmental assets are public goods which, by definition, are not amenable to being captured, commodified, and bought and sold." (Eckersley, 1995: 16)

In addition, one very crucial question is that if natural assets like wilderness and water are privatised what will happen to local communities who have been traditionally dependent on natural resources for their livelihood. Poor people can not afford to the privatised natural resources which have been the very source of their living. So, commercialisation of natural assets would cause social tension which may ultimately escalate into violent conflict. The key question is who controls the resources. It is not a remote possibility in the developing countries that the state would favour wealthy entrepreneurial class at the cost of poor people. Controversies over Special Economic Zones (SEZ) in many of the South Asian countries clearly reflect this phenomenon. Nandigram in West Bengal State of India is an example of people's struggle against land acquisition for establishing SEZs.

Market based mechanisms for environmental management can be effective only when people are well informed and empowered enough to assert their rights. If people are poor their first priority would be employment not environment. Employment concerns would compel local people to welcome hazardous activities into their backyard. Even economic liberals accept that "economic development may be best antidote to such problems in long run but in the meantime poor communities may suffer from excessive pollution" (*Greening Industry: New Roles for Communities, Markets, and Governments* World Bank, 2000: 75) In short term, economic reforms can worsen local conditions in certain cases. For example, vicious circle of the use of hybrid cotton seeds, debt and

farmer's suicide in Andhra Pradesh in India shows the irony of free trade and globalisation. Their native seeds have been displaced by genetically engineered seeds which cannot be saved for the next year and need to be purchased every year. These seeds are also vulnerable to pest attacks, which raises the expenditure on pesticides. Industrial monocultures have proved to be brutal for women and small farmers, primary food providers working with bio-diversity. (Shiva, 2005: 481-82)

Instruments such as green taxes<sup>5</sup> and transferable permits<sup>6</sup> have been criticised by environmentalists on normative grounds also. "The problem with green taxes or pollution charges ... is that they seem to say, 'It is okay to pollute, provided you pay', when the proper message is instead, 'It is wrong to pollute, even if you can afford to pay'". (Goodin, 2005: 245) Free market environmentalism has been widely criticised for considering only economic values and total neglect of environmental values. Tradable permits or trade in pollution control may provide an easier and efficient way to meet the obligations of pollution control, but it simultaneously, undermines the moral responsibility or obligation for pollution control. (Goodin, 2005: 245)

Environment has an ethical value also along with a commercial one and environment cannot be considered just as a factor of production. According to Michael J. Sandal, "turning pollution into a commodity to be bought and sold removes the moral stigma that is properly associated with it, if a company or a country is fined for spewing excessive pollutants into the air, the community conveys its judgment that the polluter has done something wrong. A fee, on the other hand, makes pollution just another cost of doing business, like wages, benefit and rent". (Sandal, 1997) In this way, economic instruments to pollution control, particularly, tradable permits and pollution taxes go against communitarian environmental ethos.

---

<sup>5</sup> Note: Green tax is a fee or tax on the amount of pollution that a firm or enterprise generates. Therefore it is imperative for a firm to reduce pollution to the level where its marginal abatement cost is equal to the tax rate.

<sup>6</sup> Note: Under tradable or transferable permits an overall level of pollution is fixed for a particular region which is allotted among various firms in the form of permits. Firms, which keep their emission level below permissible level, can sell their surplus permits to other firms.

As far as the implementation of the markets instruments in developing countries is concerned, there are several limitations to the implementation of these instruments. Among the developing countries dependence on natural resources is quite high. Therefore, the market-based policies may threaten the subsistence livelihood of people and produce unequal wealth concentration in the hands of few. Some other limitations to market mechanisms are limited funding, weak institutional capacity and lower capacity for environmentally-related research and development. (*The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges*, UNEP, 2004: 53)

Despite these constraints several developing countries such as Indonesia, China, Brazil, Philippines etc. have introduced market based environmental policies. In China, pollution charges, which have often been lower than the marginal abatement costs, could not produce any perceptible behavioural changes. (Stavins, 2001: 9) For example, the World Bank estimates that SO<sub>2</sub> emission charges in Zhengzhou would have to be increased more than fiftyfold to equalise marginal abatement costs and marginal social damages. (Wheeler *et al.*, 2000).<sup>7</sup> Philippines has successfully introduced environmental fees for wastewater discharge from industrial sources in 1997 (World Bank 1997b). Though the program was implemented in only one area of the country, Laguna Lake, BOD discharges from the affected plants witnessed a drop of 88 per cent between 1997 and 1999. (Wheeler *et al.*, 2000).

Among the developing countries the success of the market instruments depends on various factors such as understanding and defining the problem, realistic assessment of the institutional and economic capabilities, identifying most suitable policy options, establishing a process of stakeholder involvement from grassroot level, and handling political challenges. While implementing a market-based policy option, overlooking the needs of the poor may give rise to popular discontent. Therefore, consideration should be given to how market mechanisms can be applied to existing situations in order to protect

---

<sup>7</sup> As cited in Stavins, Robert N. (2001), *Experience with Market Based Environmental Policy Instruments*, Washington, D.C.: Resources for the Future, p. 9.



the environment more efficiently while also alleviating poverty. (*The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges*, UNEP, 2004: 80)

At the international level the trade in *right to pollute* can provide an easy way for the developed countries to escape their obligations to reduce emissions in their own country. For example, if instead of fixed level of emissions for each country, trade in emissions is allowed, rather than reducing its own huge greenhouse emissions, US can easily pay to poor countries for transferring/selling its share of emissions and can invest in pollution control in some other country. It can also buy permits from countries whose emission level is already below the set standards. Market environmentalists argue that it does not matter whether emission is reduced in US or China if overall emissions are reduced. If cost of reducing CFCs emissions in China is cheaper than what Washington will spend on reducing emissions by same level in US itself, it is judicious to for both China and US to enter into trade in pollution permits. (Shavell, 1997)<sup>8</sup>

Though in objective terms it does not matter whether pollution is being reduced in which part of the world – North or South, it does make a strong political and moral sense. First of all, the developed countries should not be allowed to “buy their way out of global obligations”. Moreover, trade in pollution emissions can hamper the cooperative approach and sense of shared responsibility required for resolving global environmental problems. (Sandal, 1997) Under the umbrella of trade in pollution control developed countries, that are responsible for a major chunk of global emissions, can easily escape their responsibility to reduce emission level in their own country.

Against this conceptual background, the proposed study would analyse the issue of industrial growth vis-à-vis environmental degradation in Bangladesh in a broader economic, social, and political context. This debate is particularly important for the developing countries in the aftermath of economic liberalisation and globalisation. Openness to international trade and economy may influence the environment-base of a country in both positive and negative ways: positively, in terms of growing income,

---

<sup>8</sup> *New York Times*, December 17, 1997. As quoted in “It’s Immoral to Buy the Right to Pollute” in Robert N. Stavins (ed.) (2005), *Economics of the Environment: Selected Readings*, New York, W. W. Norton & Company, Fifth Edition.

employment and improved quality of life and negatively, in terms of overexploitation of resources, deteriorating environment base and generating conflicts.

In a least developed country (LDC)<sup>9</sup> like Bangladesh which has been fraught with high population growth rate, limited resource base, natural disasters, relatively low industrialisation, poor governance and non-democratic tendencies, sustainable development largely depends on how environmental concerns are integrated into economic policies. (Ahmed, 1999: 45) In Bangladesh, growth of the industrial sector is a prerequisite to attain a steady growth rate. However, the question is how to minimise environmental costs of industrialisation and to transform industrialisation-led growth strategy into a pro-poor growth trend.

---

<sup>9</sup> Note: LDCs are classified as low-income countries that have been suffering from long-term handicaps to growth, low human development and severe structural weaknesses. In its latest review of the list of LDCs in 2006, the ECOSOC has used three criteria for determining a LDC: per capita gross national income, human assets index and economic vulnerability index. The criterion for the inclusion in the list of LDCs was calculated at \$ 745 for a three year average gross national income (GNI) per capita; the human assets index (HAI) value was 58.

## **CHAPTER 2**

---

---

## **Industrial Growth and Environmental Degradation: Linkages and Impacts**

This chapter is broadly divided into four sections. The first section theoretically deals with linkages between industrialisation and environmental degradation in the context of economic liberalisation; the second section provides a general overview of the topographical features and key socio-economic indicators of Bangladesh; the third section is about the profile of the industrial sector in Bangladesh, and the fourth section gives an overview of industrialisation-related major environmental problems.

### **2.1 Industrialisation and Environmental Degradation: Linkages-**

During the last three decades, many poor countries have experienced rapid economic growth after adopting liberal economic policies. (Mani and Wheeler, 1997: 1) But this development has not been without downside environmental costs. Environmental challenges arise both from the lack of development and from the unintended consequences of some forms of economic growth. The World Commission on Environment and Development played a crucial role in putting economic development in the context of environment. The report noted that:

“Industry and its products have an impact upon natural resource base of civilization through entire cycle of raw materials exploration and extraction, transformation into products, energy consumption, waste generation, and the use and disposal of products by consumers. These impacts may be positive, enhancing the quality of a resource or extending its uses. Or they may be negative, as a result of process and product pollution and of depletion or degradation of resources”. (*Our Common Future*, World Commission on Environment and Development, 1987: 208)

Most of the developing countries have adopted an industrialisation-led growth strategy, while paying scant attention on the environmental repercussions of such development policies. Negative environmental externalities of industrial growth have often been overlooked. Unplanned industrialisation may result in several negative byproducts ranging from several types of pollution to loss of habitat and major shifts in life pattern for millions. Pollution is an inevitable product of industrialisation. Untreated

effluents and emissions from industrial units cause severe water pollution, air pollution and soil contamination having serious repercussions for human health and ecosystem. Loss of forest cover and biodiversity, extinction of various aquatic species owing to water pollution, and overall change in the geological features of earth resulting from global warming and sea-level rise, are some other negative consequences of rapid industrialisation.

There are several factors that contribute to the negative impacts of industrialisation on environment. These include: the scale of the economic activity, the sectoral composition of the industry, the geographical distribution of the production, use of energy, raw materials and pollution intensity of production process, and the effectiveness of policy in regulating industrial activity. (*Asian Environment Outlook 2001*, ADB, 2001: 20) Technological efficiency in energy and raw material use also bears particular significance for lowering industrial pollution intensity. Especially, among the developing countries there are several loopholes which contribute to the pollution-intensity of industrialisation such as the lack of waste treatment plants, lack of environment management system, lack of technological efficiency for waste recycling and treatment, lack of proper drainage system, inadequate solid waste management system, overlooking the air and water pollution, lack of adequate safety measures for workers, lack of market incentives for pollution abatement, etc.

In addition to immediate impacts on human health in terms of morbidity and mortality from industrial pollution, industrial growth may cause long term socio-economic dislocations such as rural-urban push, migration across countries, changes in traditional livelihood practices resulting from shifts in subsistence economy, and transformation of social structure resulting from the changes in production and consumption patterns.

However, environmental degradation can dampen or reverse the process of industrialisation also. This is particularly true about agriculture-based industries. Some major indicators of environmental degradation worldwide are as follows.

- Nearly two million hectares of land worldwide (twenty three per cent of all cropland, pasture, forest, and woodland) have been degraded since the 1950s. About thirty nine per cent of these lands are lightly degraded, forty six per cent moderately degraded and sixteen per cent so severely degraded and this is too costly and difficult to reverse the situation. (*World Development Report 2003:2-3*)
- One-fifth of all tropical forests have been cleared since 1960. According to Food and Agricultural Organization of United Nations, deforestation has been mainly concentrated in the developing countries, who have lost nearly 200 million hectares of forests between 1980 and 1995. (*World Development Report 2003:2-3*)
- About 58 per cent of world's coral reefs and 34 per cent of all fish species are at risk from human activities. Seventy per cent of the world's commercial fisheries are fully exploited or overexploited and experiencing declining yields. (*World Development Report 2003: 2-3*)
- One-third of terrestrial biodiversity, accounting 1.4 per cent of the earth's surface, is in vulnerable "hot spots" and threatened with complete loss in the event of natural disasters or further human encroachment. Some statistics suggest that 20 per cent of all endangered species are threatened by species introduced by human activity, alien to local ecosystem. (*World Development Report 2003: 2-3*)

These downside environmental costs of economic development are manifestations of a non-sustainable growth pattern. The World Bank observed that "unless the transformation of society and the management of environment are addressed integrally along with economic growth, growth itself will be jeopardized over the long term." (*World Development Report 2003: 25*) This issue of environment-development nexus is particularly important in the context of rapidly liberalising low income countries where most of the resource-poor people are dependent upon natural resources for their immediate livelihood.

## **2.2 Industrial Growth, Environmental Degradation and Economic Reforms**

A central question in this debate has been how to put environment-development debate in the context of economic liberalisation and globalisation. There are several other questions

including - what are the economic, social, political and cultural linkages and impacts between the two variables; how to relate economic reforms to environmental deterioration, environmental consciousness, and greening of the environment, particularly in the context of poor countries like Bangladesh?

Generally, economic liberalisation implies greater integration with the world economy and resulting greater movement of people and goods across the world. Increased production and consumption means greater energy consumption, increasing stress on resource base, and rising emissions and waste generation. “The global outlook of chains of production and consumption, with economic relationship stretching over great distances and material resources and intermediary goods flowing through the world economy, increase the time and space between the origins of environmental neglect and actual environmental consequences and deterioration in specific localities.” (Mol, 2003: 71) In an increasingly interdependent world economy, an environmentally sound growth pattern is required to integrate the local populace to the mainstream of economic development. One major concern related to economic reforms among the developing countries is about the impact of structural adjustment policies on the environmental base and the livelihood pattern of the poor. Rapid industrialisation coupled with FDI flows may cause severe stress on environment, especially, in the countries where environmental regulations are weak and are not properly implemented.

### **2.2.1 Pollution Havens Hypothesis**

Some scholars have argued that stringent environmental rules in developed countries would promote relocation of heavily polluting industries in peripheral countries where weak environmental regulations imply less abatement costs and resulting less costs of production. It is argued that under the conditions of free trade, poor countries would turn out to be *pollution havens*. One basic question is “what will happen with dirty industries and industrial pollution patterns when, in an increasingly globalized capitalist world, industrialized countries tighten their environmental regimes, production sites become less dependent on specific geographical locations, and developing countries are eager to attract foreign industrial investment.” (Mol, 2003: 158)

This *pollution havens* hypothesis has strongly been criticised by economic optimists and multilateral development institutions like the World Bank. They argue that multinationals are greener than domestically owned businesses in developing countries because they have high-level of technical skills, good information about abatement alternatives, internationally competitive management, and better access to capital. (World Bank, 2000: 116). In a study conducted for the World Bank, Mani and Wheeler concluded that “‘pollution havens’ effects have not had major significance” and “any tendency towards formation of a ‘pollution haven’ is self-limiting because economic growth brings countervailing pressure to bear on polluters through increased regulation. In practice, ‘pollution havens’ have been as transient as ‘low wage havens’.” (Mani and Wheeler, 1997: 28)

Mani and Wheeler studied the production pattern, import/export ratio of five most pollution intensive industries: Iron and Steel, Non-Ferrous Metals, Industrial Chemicals, Pulp and Paper and Non-Metallic Mineral Products in OECD countries, Latin America and developing Asia (South Asia, Newly Industrialised Economies, and Developing East Asia) for the period 1960-1995. They found that pollution intensive industries are intensive in other factors of production, particularly, bulk raw materials, energy and land. Their study on Japanese economy showed that five dirtiest industries witnessed a strong downward trend in production during the period 1963-1993. As a proportion of clean sector production, dirty sector output dropped from nearly seventy per cent in 1963 to about 30 per cent in the mid-1990s. As a proportion of total manufacturing production, dirty sector output dropped from about 25 per cent in the early 1960s to about 15 per cent in the mid-1990s.

Mani and Wheeler explained this phenomenon partly by price changes for factors in which dirty industries were highly intensive: land, energy and bulk raw materials, tightened environmental regulation and mainly, by rising per capita income. These five dirty industries witnessed low income elasticity i.e. as income increased demand for dirty sector products decreased in the same proportion. One major finding of this study was that while the production of dirty sector industries in Japan was decreasing, since 1976



the country witnessed a rapid increase in the consumption/production and import/export ratio for these dirty sector products. This coincided with rapid growth of strict environmental regulations and sharp increase in industrial pollution control investments. For example, major cities like Tokyo, Osaka, and Kyoto enacted some pollution control measures by the mid-1950s. From 1967-1970 regulations related to industrial air and water emissions were formulated and implemented. Moreover Japanese environmental agency was set up in 1971. One possible conclusion can be drawn that stricter environmental regulation reduced the comparative advantage in pollution intensive products. This led to the shift of dirty industries to Japan's trading partners. (Mani and Wheeler, 1997: 8-15)

Mani and Wheeler also conducted a study for Western Europe and North America. In all the three regions: Japan, North America and Western Europe, share of pollution-intensive industries had declined significantly. In two of the regions – Japan and North America – this decline had been accompanied by net displacement of polluting production to trading partners i.e. consumption/production and import/export ratio for the dirty sector products increased simultaneously. While for Western Europe import/export ratio for pollution intensive products almost remained constant. In all the three regions, this decline could be attributed to the low income elasticity for pollution-intensive products and stricter environmental regulations. (Mani and Wheeler, 1997: 19)

On the other hand, developing Asia and Latin America witnessed a steady upward trend in pollution-intensive production share, in contrast to the trends in Japan, Western Europe and North America. Mani and Wheeler concluded that during the 1960s, rapid growth in dirty sector production in these regions coincided with relatively weak environmental regulation and low and steady energy prices world wide. Due to low income elasticity, demand for pollution-intensive basic products fell in OECD countries and grew at least as rapidly as domestic production in the poorer nations of Asia and Latin America. The oil-crisis of mid-1970s, coupled with weaker environmental regulations and low energy prices in Asia and Latin America, shifted the comparative advantage in favour of the pollution intensive industries in these developing countries. Therefore, the position of Latin America and Asia shifted from the net importers of

pollution intensive goods and import/export ratio for dirty sector products witnessed a sharp declining trend.

As a result, these regions experienced a rapid decline in import of pollution-intensive products. However, by mid 1980s, in these two regions i.e. Asia and Latin America the share of dirty sector production stopped increasing and import/export ratio stopped decreasing. This phenomenon could be explained by three factors. Firstly, with rising income, income elasticity of demand for dirty sector products declined. Secondly, both Asia and Latin America witnessed stricter environmental regulations during this period. And thirdly, oil prices stabilised in world market and developing countries started reducing energy subsidies as well, this situation negatively impacted upon the comparative advantage, developing countries were enjoying.

Though this analysis initially seems supportive of 'pollution havens' hypotheses, this phenomenon actually did not materialise due to several reasons. Firstly, consumption/production ratios for dirty sector products in developing world remained balanced i.e. most of the dirty sector story were rather a domestic trend. Secondly, a significant part of the increase in dirty-sector production share in the developing world was due to a highly income elastic demand for basic industrial products and with continued income growth this income elasticity declined gradually. And thirdly, some portions of the international adjustment had probably been due to oil shocks and persistence of energy subsidies in many developing countries. (Mani and Wheeler, 1997: 28)

### **2.2.2 Strictness of Environmental Regulations and Relocation of Industrial Units: Question of 'A Race to Bottom'**

Another important concern about environment, in the wake of economic liberalisation, is related to environmental regulations. In high income countries, high environmental standard imply higher costs of pollution abatement on polluting enterprises. Therefore, shareholders would relocate firms to low-income countries where intensive demand for jobs and income makes the issue of environmental regulations almost non-existent. This increasing capital outflow may force governments in high income countries to lower

environmental standards. (Dasgupta et al., 2002: 159) Furthermore, as developing countries face stiff competition for attracting FDI flows, they would lower their environmental standards or keep it low in order to attract the major chunk of global FDI flows. This would cause 'a race to bottom' i.e. a competition for keeping low environmental standards.

However the question is whether environmental regulations are the only determinant of relocation of industries or other factors of production play rather a dominant role. Economic optimists suggest that as compared to other factors considered for business in a country, pollution control costs are not major determinants as firms take into account factors such as labour and raw material costs, transparency in regulations, issues of governance, etc. More important factors include distance to market, infrastructure quality and cost. (Mody and Wheeler: 1992)<sup>1</sup> Moreover, most of the OECD-based multinationals keep nearly uniform environmental standard in their national and international plants in order to realise economies in engineering standards for design, equipment purchases and maintenance; to reduce potential liability from regulatory action; and to maintain their reputation in local and international market. (Dowell, Hart and Yeung, 2000)<sup>2</sup> "Indeed foreign-owned plants in developing countries are precisely the ones that, according to theory, would be most attracted by low standards, tend to be less polluting than indigenous plant in the same industry. Most multinational companies adopt near-uniform standards globally, often well above government set standards." (World Bank, 2000: 25)

They argue that with the increase in income, demand for environmental quality increases and institutional capability to formulate and implement environmental regulation enhances as well. There are several reasons to support this thesis. First, once societies achieve affluence, investment in environmental protection gets wider attention as they must have already completed basic investment in social sector such as health and education. Secondly, high-income societies have better technological efficiency and

---

<sup>1</sup> As cited in: Dasgupta, Susmita et al. (2002) "Confronting the Environmental Kuznets Curve", *Journal of Economic perspective*, 16 (1): 147-168.

<sup>2</sup> As cited in: Dasgupta, Susmita et al. (2002) "Confronting the Environmental Kuznets Curve", *Journal of Economic perspective*, 16 (1): 147-168.

financial resources for monitoring and enforcement of environmental regulations. Thirdly, higher income empowers local communities to enforce higher environmental standards. (Hartman, Huq and Wheeler, 1997) Wheeler has given two arguments in the support of why “race to bottom” is not going to happen. He argues that “first, communities in developing countries are neither passive agents not focused exclusively on material gain. Empowered with good information about the benefits and costs of environmental protection, they will act to protect their own interests. As their income and education levels improve, they will control pollution more strictly. Second, consumers and investors assign significant value to environmental performance, and, if they are well informed, their market decisions will provide powerful incentives to reduce pollution.”

### **2.2.3 Changing Dynamics of Industrial Growth and Environmental Degradation in Liberalising Economy**

Relationship between industrialisation and environmental degradation may vary significantly in a liberalised economy as compared to in a closed one. Free flow of capital, labour, and information influences the production pattern in a decisive way. For example, as economies liberalise, export-led growth strategy implies the focus on industries and products which have good export potential, irrespective of the fact whether production pattern is environmentally sustainable or not. Shrimp aquaculture in Bangladesh is an example of such growth strategy. Commercial shrimp farming, which started with \$20.6 million SDR from the World Bank in 1985, has emerged both as key export item and one of the most environmentally unsustainable practices. Export of shrimp from Bangladesh, which was worth only \$ 2.9 million in 1972-73, accounting for 1 per cent of country's total export, increased to \$ 33 million in 1980 and to \$90.0 million in 1985. Exports of shrimp further increased from \$ 90.8 million in 1986 to \$ 197.6 million in 1994 and to \$ 260.4 million in 1998. But environmental externalities caused by shrimp farming such as destruction of mangrove ecosystem, increased salinity leading to decrease in soil fertility, increasing deforestation, damage to traditional economic practices, loss of common property rights and irreparable damage to flora and fauna have given way to complex socio-economic stress. (Bhattacharya et al, 1999: 9, 13)

Moreover, export-led growth strategy brings structural changes in the economy. This structural change in economy may have several repercussions for environment. For example, decreasing share of agriculture to GDP and increasing share of services and industries is an underlying factor for rural-urban push and resultant pressure on environmental resources.

Some scholars argue that integration with global economy can be an effective tool for environmental improvement. Use of consumer power, multilateralism, and cross-country statistical evidences on environment i.e. sharing of information through IT are some of the benefits of globalisation that can be utilised for environmental protection. (Frankel, 2005: 364) With increasing global trade, consumers can exercise their purchasing power (consumer sovereignty) for environment-friendly goods from any part of the world. For example, it is possible only through free trade that American consumers could reject the Mexican tuna, caught by methods which kill dolphins. Moreover, compulsory leveling provides an effective tool in the hands of consumers.

Cross-border environmental issues such as CFC emissions, global warming and sea-level rise, etc. cannot be solved by an individual country within its tight sovereign jurisdiction. Such issues require international cooperation regulated and shaped by multilateral rules and international institutions. "Increasingly, people living in one country want to protect the air, water, forests, and animals not just in their *own* countries, but also in *other* countries as well. To do so international cooperation is required. National sovereignty is the obstacle to such efforts, not the ally. Multilateral institutions are a potential ally, not the obstacle." (Frankel, 2005: 362) For example, reduction in CFC emissions is such an issue where only cooperative approach and a sense of shared responsibility can work because increase in these emissions produces the same unit of global warming irrespective of the fact which country contributes to these emissions. Moreover, given the close interdependence, countries can learn from each-others' experiences.

But these benefits of globalisation can be translated into better environmental performance only with the help of effective governance and technological efficiency. If

we analyse the above discussion in the context of developing countries, various loopholes and discrepancies can be figured out. For example, under the conditions of free trade coupled with strict environmental barriers to imports in developed countries, developing countries can suffer both ways: as exporters as well as importers. As exporters, they may have to prove that their products do not contain any environmentally unsustainable input or process which needs a costly and burdensome system of certification and segregation. As importers, they are unable to restrict the entry of such imports because of technological inefficiency.

Good governance and political stability are important factors for integrating ecology and economics in policy decision-making. In order to protect the vulnerable groups from the adverse impacts of industrialisation, enhancing local participation in decision making is required. Properly functioning democratic institutions can be helpful in mitigating the adverse impacts of environmental degradation if people are given a chance in decision-making at the local level. Community participation in environmental management is the key to address local environmental problems.

### **2.3 Industrial Growth, Environmental Degradation and Social Variables**

The debate of industrialisation or economic development vis-à-vis environmental degradation is also related to complex social variables such as poverty, inequality, income, population growth, education, status of women etc. For example, rapid population growth, which inflicts considerable impact upon both environment and development, is mostly determined by social and cultural norms and status of women in the society. Environmental degradation coupled with uneven development may cause social tension and conflict. (*Our Common Future*, World Commission on Environment and Development, 1987: 38) If industrial growth is to be sustainable it should not limit people's choices, instead it should widen the range of livelihood choices available for them, especially for the poor. If growth is to be sustainable it requires that overall impact of development is taken into account. For example, a hydropower project is not only a way of producing more electricity, its impact upon local environment and livelihood of local people is also to be there on the balance sheet. Downward social costs of

development projects should be taken into account. There is a direct link between poverty and environmental degradation. A sustainable pattern of development should address the problem of environmental degradation in a pro-poor approach.

Against this conceptual debate the following section deals with the topographical features and key socio-economic indicators of Bangladesh. The purpose of this section is to put environmental problems in a broader geographical and socio-economic context. Impacts of environmental problems are relative to each society as environmental problems create stress only in interaction with socio-economic variables. So, policy responses to address these problems require a proper understanding of the particular context.

## **2.4 Topographical Features and Natural Resource Endowments of Bangladesh**

**2.4.1 Geographical Location:** Bangladesh is situated in the north eastern part of South Asia between 20°34' and 26°38' north latitude and 88°01' and 92°41' east longitude. The country shares borders with India in the west, the north and the north-east; it borders upon Myanmar in the south-east; and it is surrounded by Bay of Bengal on the south. The total area of the country is 1,47,570 sq. k.m. (*Statistical Yearbook of Bangladesh 2000*, BBS, 2002:XIX) The major parts of Bangladesh are deltaic in origin and are highly vulnerable to sea-level rise. Nearly fifty per cent of the country has an elevation of less than ten metres above the sea level. Only in the southeastern part of the country the altitude exceeds 300 metres. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 6)

**2.4.2 Climate:** Bangladesh is endowed with a sub-tropical monsoon climate and there are mainly three meteorological seasons: winter, summer and monsoon. During winter temperature ranges from a minimum of 7.22-12.77°C to a maximum of 23.88-31.11°C while during summers maximum temperature is generally 36.66°C, however, some times it goes up to 40°C at certain places. The monsoon, which starts in July and stays till October, contributes 80 per cent of the total rainfall of the country. The average annual rainfall varies from 1429 to 4338 millimetres. (*Statistical Yearbook of Bangladesh 2000*, BBS, 2002: XX)

**2.4.3 Land Types:** Bangladesh has three broad types of landscapes: floodplains, terraces and hills. Floodplains consist of 80 per cent of the total area of the country; the terraces occupy about eight per cent of the area and remaining 12 per cent is hilly area.

**2.4.4 Water Ecosystem:** Bangladesh is endowed with a network of rivers. Three river systems: Ganga, Brahmaputra, Meghna and their large number of tributaries provide the country a rich water ecosystem. The very fact all three rivers originate outside the country, makes Bangladesh highly vulnerable to intervention and diversion of rivers by her neighbours. Total length of rivers is 22155 kms i.e. around 7 per cent of the total territory. (*Statistical Yearbook of Bangladesh 2000*, BBS, 2002: 9) The wetlands of the Bangladesh (haors, baors and beels and parts of the floodplain that remain inundated for parts of the year) cover about 16000 sq. kms or 11 per cent of the total area. Wetlands in Bangladesh are of great ecological and economic value. Besides being a habitat of very rich flora and fauna, the wetlands help in the storage of floodwater, provide a rich source of inland fisheries and facilitate water transport. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 14)

**2.4.5 Coastal Ecosystem:** Bangladesh has a coastline of about 710 kms, measured along the shores of the Bay of Bengal between India (on the west) and Myanmar (on the southeastern tip). The coastal districts cover some 23 per cent of the country's territory and account for 27 per cent of the total population. Mangrove forests or Sundarvans in the coastal areas are unique natural resources of Bangladesh. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 17)

**2.4.6 Natural Resources and Biodiversity:** Bangladesh is gifted with rich fisheries sub sector which contributes to about 10 per cent of the total agricultural production. As of 1998-99, gross value addition of fisheries to total agricultural production was 25,452 million taka whereas total value addition of agriculture to GDP stood at 238,529 million taka or 31.55 per cent. (*Statistical Yearbook of Bangladesh 2000*, BBS, 2002: 101). Bangladesh has a unique patch of forest cover. Under the Department of Forest, there are main three types of forests in three separate zones. These are: tropical evergreen or semi-



evergreen hill forests in southeastern Chittagong, Chittagong Hill Tracts and northeastern Sylhet district, deciduous forests in central Bangladesh, and tidal mangrove forests in south-western Khulna district and southern coastal belt. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 19)

Bangladesh is enriched with world's single largest mangrove forest, the Sundarbans, extending across the Indian state of West Bengal. Bangladesh owns nearly two-third of the Sundarbans which accounts for 45 per cent of the country's total productive forest area. According to an ESCAP survey, 500,000 or 600,000 people depend directly on the Sundarbans for their livelihood. Sundarban is a unique reservoir of bio-diversity. It is the home of 32 species of mammals, 226 species of birds, 35 species of reptiles and 8 species of amphibians. It is also the last remaining natural habitat of Royal Bengal Tiger. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 101)

#### **2.4.7 Vulnerabilities Emanating from Geographical Setting and Topographical Features**

Geographical location, topographical features and, natural resource endowments have, to a large extent, shaped the unique culture, tradition, livelihood pattern, and economy of the country. However, at the same time, owing to its geographical features, Bangladesh suffers from a range of environmental problems such as drought, flood, and other natural hazards. Bangladesh has 57 trans-boundary rivers, of which 54 are shared with India and 3 with Myanmar. Bangladesh is highly vulnerable to water-withdrawal and river diversion by neighbouring countries. Climate change and sea-level rise are potential threats to the country. According to the *Regional Study on the Greenhouse Effects and Its Impacts on the Region* (1992) by the SAARC, one metre rise in sea-level by the middle of the next century is expected to inundate about 5.608 million acres of the existing coastal land which is about 15.8 per cent of the total area of Bangladesh. The area comprising of 65 per cent of greater Khulna, 99 per cent of Barisal, 100 per cent of Patuakhali, 44 per cent of Noakhali and 12 per cent of Faridpur will be inundated. (SAARC, 1992: 53)

## 2.5 Key Socio-economic Indicators

Bangladesh is a land-scarce country with large population. According to the 2001 census, total population of Bangladesh is 129.25 million and Bangladesh is the eighth most populous country of the world. The total area of the country is 147.570 square kilometers. Population density is about 900 persons per square kilometer, one of the highest in the world. (*Population Census 2001*, Government of Bangladesh) Bangladesh is mainly an agrarian country; nearly 68.8 per cent of the labour force is employed in agriculture. (*Statistical Yearbook of Bangladesh 2001*, BBS, 2003: XXII) Although Bangladesh is mainly an agrarian country, a large number of industries based on indigenous and imported raw materials have been established. Jute and cotton textile, paper and newsprint, sugar, cement, chemicals, fertilizers, and tanneries are some of the important industries of the country. (*Statistical Yearbook of Bangladesh 2001*, BBS, 2003: XXIII)

The low-income country is characterised by persistently high level of poverty, low per capita income, proneness to natural hazards especially floods, glaring and increasing socio-economic inequality particularly in the wake of economic liberalisation, low human development, gender disparity, widespread unemployment, and extremely narrow export basket. (Q.K. Ahmed, 2001)

According to the estimates made by Bangladesh Bureau of Statistics, using Household Expenditure Survey data for 1995/96, 48 per cent of population is absolutely poor and 25 per cent is extremely poor (in terms of inadequate access to food less than 2122 Kcal and 1805 Kcal per person a day respectively). (Q.K Ahmed, 1998: 7) According to the Human Development Report 2006, 36 per cent of the population lives below \$1 earning a day, 82.8 per cent of population lives below \$2 a day, and 49.8 per cent people live below the national poverty line. (Human Development Report 2006, UNDP) Thus, nearly half of the population of Bangladesh lives below the poverty line. However, there has been a decline of 9 per cent in percentage of people living below the poverty line over the past decade. In 1990, 59 per cent of the population lived under poverty line. (Human Development Report 2006, UNDP) Household Income and

Expenditure Survey (HIES) 2005 of the BBS also shows a downward trend in income poverty. According to survey, the incidence of poverty at the national level declined from 48.9 per cent in 2000 to 40 per cent in 2005. During 2000-2005, poverty declined by 1.8 percentage points whereas the rate of poverty reduction in the previous decade was 1 percentage point. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 169)

Bangladesh has achieved a steady economic annual growth rate of 4-5 per cent during the past decade. At the same time annual population growth rate, which was 2.5 per cent during 1980s, came down to 1.8 per cent during 1990-2001. As a result, annual per capita GDP growth rate has increased from 1.6 per cent in 1980s to 3.7 per cent in 2004, though it is still below the regional average of 5.4 per cent. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 1)

At the start of the 1990s, there was a general pessimism about the future prospects of Bangladesh. "Slow economic growth, high population growth rate, limited progress on social indicators, and acute vulnerability to natural disasters, provoked descriptions of Bangladesh as a 'landscape of disaster.'" (*Human Development Report*, 2005: 46) However, Bangladesh has recorded a better growth rate, accompanied with impressive improvement in the social sector.

The average life expectancy at birth has improved from 45.2 years during 1970-75 to 62.6 years during 2000-05, infant mortality rate has come down from 145 (per 1000 live births) in 1970 to 46 in 2003, under-five mortality rate has reduced to 69 in 2003 from 239 in 1970. (*Human Development Report 2005*, UNDP) Though Bangladesh has achieved considerable success on social development front, it is still lagging behind the other South Asian countries in many human development indicators. (Tables 2.1 & 2.2)

**Table – 2.1**  
**Trends in Human Development (Selected Indicators)**

<b>Selected Indicator</b>	<b>Years</b>	<b>Trends</b>
Life expectancy at birth (years)	1970-75	45.2
	2000-05	62.6
Infant mortality rate (per 1000 live births)	1970	145
	2003	46
Under five mortality rate (per 1000 live births)	1970	239
	2003	69
Adult literacy rate (% of 15+ populations)	1981	24
	2003	58.9
Children under weight (% of under five age)	1975	84
	1995-2003	48
Population with sustained access to an improved water source (% of population)	1990	71
	2002	75

*Source: Human Development Report, 2005, UNDP.*

**Table 2.2**  
**Bangladesh and Other South Asian Countries:**  
**Selected Human Development and Deprivation Indicators**

<b>Countries</b>	<b>Life expectancy at birth (Year)</b>	<b>Adult literacy rate (%)</b>	<b>Combined gross enrolment ratio for primary, secondary and tertiary sectors (%)</b>	<b>GDP per capita (\$US,PPP)</b>	<b>Population without sustained access to improved water source (2002) (%)</b>
Nepal	61.6	48.6	61	1420	16

Pakistan	63.0	48.7	35	2,097	10
Bhutan	62.9	47.0	..	1,969	38
India	63.3	61.0	60	2,892	14
Maldives	66.6	92.2	76	..	16
Sri Lanka	74.0	90.4	69	3,778	22
Bangladesh	63.3	41.1	53	1,770	25

Source: *Human Development Report 2005*, UNDP.

Acute poverty and human deprivation coupled with high socio-economic inequality have worsened the situation in Bangladesh. As of 2000, the poorest 10 per cent of the population had access to 3.9 per cent of national income whereas the richest 10 per cent owned 26.7 per cent of the national income or consumption. The bottom 20 per cent secured only 9 per cent while the top 20 commanded 41.3 per cent of the national income or consumption. In 2000, the Gini index for Bangladesh was 31.8, indicating high inequality in the society.<sup>3</sup> (*Human Development Report 2006*, UNDP)

## 2.6 Structure of the Economy and Reform Measures

In the pre-liberation Bangladesh, the government had adopted import substituting policy with thrust on private sector under a highly protective system. “The pattern of industrialization that followed was characterized by overcapitalization, widespread underutilization of capacity but very high private profits, the benefits of which accrued to a select group of non-Bengali entrepreneurs.” (Quazi Sahabuddin et al. 2004: 51) After liberation, the government adopted an import substituting industrialisation policy accompanied with massive nationalisation drive. Jute textiles, cotton textiles, sugar industry, banking, insurance and the jute export were completely nationalised. A policy

<sup>3</sup> Note: It is an index to measure inequality. A value of 0 represents perfect equality while a value of 100 shows perfect inequality.

of fixed exchange rate, high tariff and non-tariff barriers and extensive quantitative restrictions on imports was adopted. But “the main limitation of this autarkic development strategy, however, was that it created a distorted incentive structure resulting in allocative and productive inefficiency; it also gave rise to anti-export bias and discouraged growth of exports.” (Bakht, 2001: 87)

However, soon the government realised the need of encouraging private sector. As a result, in July 1974, investment ceiling for the private sector was raised from Tk. 25 lakh to Tk. 3 crore and the period of moratorium on nationalisation was extended from 10 to 15 years. In December 1975, the private investment ceiling was further raised to Tk 10 crore. In addition, a large number of policy changes were carried out. The Industrial Policy 1977 reduced the number of industries reserved for public sector to 8 industrial sub-sectors from 18. A large number of fiscal incentives were also initiated. For example, tax holiday for less developed areas was extended from 7 to 9 years; import duty on capital machinery was reduced from 20 per cent to 2.5 per cent for priority development areas, to 5 per cent for development areas, and to 15 per cent for developed areas; and the Investment Corporation of Bangladesh was revived. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 230) In mid-1979 Bangladesh, adopted a flexible exchange rate policy fixing the value of Taka to a basket of currencies of her major trading partners and nominal exchange rate was allowed to adjust with fluctuations in the currencies of major trading partners. (Bakht, 2001: 90)

In this way, “a number of policy changes were made during 1975-82. These included further raising of the private investment ceiling, and its eventual removal in 1978, amendment of the constitution to allow denationalisation, with actual denationalisation of a number of public enterprises, making investment funds available through development finance institutions, reopening of the stock market, and reducing the number of industries reserved for the public sector. At the same time, the investment sanctioning procedure was relaxed to a certain extent. On the trade policy front, a major shift was a move to a managed floating exchange rate system and the introduction of a number of export promotion measures.” (Rahman and Bakht, 1997: 79)

## **2.6.1 New Industrial Policy 1982**

A major shift in this regard was the New Industrialization Policy of 1982 which gave further push to reform measures initiated during the earlier policy regime. The NIP restricted the role of the public sector to only six major industrial sub-sectors: arms and ammunition and allied defence equipment, atomic energy, air transport, generation and distribution of electricity (excluding rural electrification by Palli Bidyut Samiti), telecommunication, and mechanised forest extraction. It also issued a concurrent list of 13 categories of industries wherein both public and private investment were allowed. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 230) A number of incentive measures were announced under the NIP with an objective to encourage private sector. These included:

**2.6.1.1 Investment Incentives and Licensing:** In order to encourage increased investment, the number of industrial sub-sectors freed from requiring any sanctions for new investments was increased from 19 to 47. These industries were not required to get sanctions for new investment provided the capital goods imports for these sectors were financed through Wage Earners Scheme<sup>4</sup>, the Export License Scheme (XPL), suppliers credits or non-repatriable direct foreign investments. With an objective of simplification of procedures, an Investment Assistance Unit was set up to provide a 'one stop' service to handle all licensing requirements of private investors. In addition, the authority to sanction investments in smaller projects was decentralised to regional offices. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 230)

**2.6.1.2 Export Incentives:** Under the policy, measures were adopted to avoid the overvaluation of Taka in order to promote exports. Furthermore, Export Promotion License (XPL)<sup>5</sup> was extended; a national Import Duty Drawback Scheme for exporters

---

<sup>4</sup>Note – Under this scheme, entrepreneurs earning foreign exchange abroad were allowed to import particular category of goods directly i.e. they were not required to get import licenses.

<sup>5</sup> Note – It was a system to provide incentives to exports under which certain exporters were given specified portions of their exports earnings as Import Entitlement Certificates (IECs). Exporters could utilise IECs to import particular categories of goods or they could sell an IEC to other exporters at a premium to import such goods.

was introduced; and liberal export credits at concessional interest rates were given. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 231)

**2.6.1.3 Import Liberalisation:** Under the policy, the WES/XPL market, in which remittances and IECs could be exchanged, was extended significantly and more goods, particularly, industrial raw materials were made eligible for import under the WES. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 230)

**2.6.1.4 Incentives for Foreign Investment:** The NIP envisaged a growing role for foreign private investments. Under the policy a National Committee for Industrial Development was constituted for sanctioning all foreign investments. (*Third Five Year Plan 1985-1990*, Government of Bangladesh: 231)

A major step in liberalising imports was the introduction of Negative and Restricted list during 1985-86. Prior to this a yearly Import Policy Order was used to list importable items. Items on the Negative list were not allowed to be imported while items under Restricted list were allowed to be imported under certain conditions. All other items not counted in the lists were allowed to be imported. (Bakht, 2001: 90) A Revised Industrial Policy, declared in 1986, aimed at further strengthening and expanding of the privatisation and liberalisation measures initiated earlier. (Rahman and Bakht, 1997: 79) The revised industrial policy stated for the first time that no export industry would be bound or disadvantaged by any restrictions on imports. Since 1987 export industries have been allowed to import any banned or restricted raw materials required by them for the purpose of specific export orders with permission of the Chief Controller of Import & Export. (Bakht, 2001: 97)

## **2.6.2 Reform Measures under Structural Adjustment Programmes**

During the 1980s, pace of industrialisation in Bangladesh was influenced by donor conditionalities, as outlined by the World Bank and the International Monetary Fund. In 1987, Bangladesh adopted structural adjustment programme as outlined by the IMF. The core policies under structural adjustment programmes were cutback in public sector expenditure, reduction of anti-export bias in tax structure, tariff rationalisation and



overall trade liberalisation, bringing flexibility in the exchange and interest rates, privatisation, price decontrol and desubsidisation. Thus, “the overarching goal of the reform measures under SAPs in Bangladesh was to stimulate the country's growth performance through creation of a market-based economic management structure reflecting the comparative advantages of the country”. (Bhattacharya et al, 1999: 6)

During 1988 and 1989, more reform measures were adopted. Public sector enterprises were placed at par with the private sector units in matters of finance, infrastructure facilities, and duty rebates; sanctioning rules for foreign private investment were further relaxed; the provision of tax holidays was extended to 1990; and a Board of Investment was created. (Rahman and Bakht, 1997: 80)

With the political change in 1990, a democratic government came into power. A new industrial policy was declared in July 1991. Industrial sector reforms during 1990s mainly included the following measures: (i) gradual reduction of reserved lists and opening of almost all sectors for foreign direct investment; (ii) deletion of the provision of moratorium for nationalisation, thus guaranteeing the security of private investment from government control and ownership; (iii) shift from bureaucratic control to investment friendly measures; (iv) increased incentives for export-oriented industries in the form of liberalisation of imports of raw materials and machines and accessories, cash incentives, bonded warehouse facility, interest subsidy; (v) reactivating EPZ and development of its facilities since 1986 and permitting private EPZ with the same facilities as provided in government EPZ; (vi) reactivating capital market and developing it through continuous liberalisation measures along with stricter supervision for efficient functioning; (vii) clear-cut classification of industries into large, medium and small industries in 1999; and (viii) increasing and improving infrastructural facilities and institutional support for investment. (Quazi Sahabuddin et al, 2004: 53)

Some of the major reform measures in industrial sector adopted in Bangladesh after initiation of structural adjustment programmes are as follows:

**2.6.2.1 Fiscal Incentives:** Under the reform measures, export industries were given a large number of fiscal incentives such as tax holidays and income tax rebates. Under the Industrial Policy 1991, a proportional income tax rebate of 30 to 100 per cent on export earnings was allowed. Industries in the EPZs were given income tax exemption for 10 years and proportional income tax rebate between 30 per cent 100 per cent on export earning after this period. These industries were also given tax exemption on: (a) the salaries of foreign executives and technicians for three years; (b) interest on foreign loans; (c) royalties, technical know-how and technical assistance fees; and, (d) profits on account of transfer of shares by foreign companies. Hundred per cent export-oriented industries located outside EPZs were also extended the facility of duty free import of capital machinery, (the facility which was available to EPZ units only). (Bakht, 2001: 100)

**2.6.2.2 Exchange Rate Policy:** With an objective to enhance export competitiveness, the government moved towards a market-oriented exchange rate policy. Bangladesh shifted from a fixed exchange rate regime to a managed floating exchange rate in 1979 under which the nominal exchange rate was allowed to adjust with fluctuations in the currencies of major trading partners. Since then Taka has been depreciated in small amounts to make exports competitive. In 1993, the government announced to move gradually towards current account convertibility. Finally in 1996-97 the Bangladesh government made Taka fully convertible for international current account transitions. Some other measures in this regard included permission to exporters to retain a part of their foreign exchange earnings, increased foreign exchange entitlements for businesses, withdrawal of restrictions on non-residents' portfolio investment, etc. (Rashid and Rahman, 1998: 56)

**2.6.2.3 Tariff Rationalisation:** Under reforms there has been a declining trend in average tariffs as well as in number of tariff slabs. Prior to 1986 there were 24 tariff slabs, which were not based on distinct principles for assigning different rates to different products. The duty rates varied widely, not only among different industries, but also between products within the same industry. (Bakht, 2001: 93) In a bid to rationalise tariff structure, the number of tariff bands has been reduced to five (0 per cent, 5 per cent, 10 per cent, 15 per cent and 37.5 per cent) in 1999/00 from 18 in 1990/91. Maximum tariff

rate was reduced from a level of 350 per cent in 1991-92 to 50 per cent in 1995-96 and was further brought down to 42.5 per cent in 1997-98. (Bakht, 2001: 94)

There has been a gradual reduction in quantitative restrictions with regard to reduction in the use of banned and restricted items. The table below (Table 2.3) shows this trend.

**Table 2.3**  
**Phased Removal of Quantitative Restrictions**

Fiscal Year	Trade Reasons			Non-trade Reasons	Total No. of Commodities
	No. of Banned Commodities	No. of Restricted Commodities	No. of Partly Banned and Partly Restricted Commodities	No. of Banned Commodities	
1989/90	135	66	52	62	315
1990/91	93	47	39	60	239
1995/97	5	6	12	92	115

Source: Ministry of Commerce, Government of Bangladesh<sup>6</sup>

**2.6.2.4 Export Incentives:** In accordance with export-led growth strategy, several export incentives such as export performance license, duty drawback system, special bonded warehouse scheme, tax concession, etc were introduced. The provision of refund on duties and taxes on imports of inputs for selected export industries has been in place since early 1970s. The National System of Duty Payments was introduced in 1982-83 for certain export items such as readymade garments which enabled the exporters to clear imported inputs without actually paying any duty or tax. (Bakht, 2001: 98) The export policy order (1997-2002) offered many incentives for export industries. The 100 per cent exporters are entitled to drawback on all duties and import taxes paid on importation of inputs of raw materials according to a flat rate determined by customs (using input-output

<sup>6</sup> As cited in: *The Fifth Five Year Plan (1997-2002)*, Ministry of Planning, Government of Bangladesh, p. 117.

tables), when the product is exported. Under special Bonded Warehouse Scheme the exporters are authorised to import and stock duty-free imports.

Until 1993 this facility was available only to the 100 per cent exporters in the garment industries and the suppliers selling 100 per cent of their output to garment exporters. Since 1993, the facility has been extended to all 100 per cent exporters and the 'deemed exporters'. (Bakht, 2001: 98) The firms established in Export Processing Zones (EPZs) are entitled to duty free imports of raw materials and capital goods; can retain foreign exchange earnings; and receive income tax exemption for a period of ten years and 50 per cent income tax rebate thereafter. The 1995-97 export policy allowed 100 export-oriented units outside the EPZ to import capital machineries on a duty free basis. The *Private Export Processing Zone Act 1996* enabled private companies to set up special EPZs. (Hossain et al, 1997:185)

**2.6.2.5 Reforms in FDI Policy:** The first Industrial Investment Policy, announced in 1973, allowed foreign collaboration in public enterprises only with minor equity participation. In 1974, the Revised Industrial Investment Policy allowed foreign investment in both government and local private industries, except in some basic industries. A major step in this regard was the *Foreign Private Investment (Promotion and Protection) Act 1980* which provided for:

- i. non-discriminatory treatment between foreign and local investment;
- ii. protection of foreign investment from expropriation by the state;
- iii. ensured repatriation of proceeds from sale of shares and profits. (Shahabuddin et al, 2004: 45)

It is important to note that in order to attract investment in export-oriented industries, the export processing zone was established under the BEPZA Act 1980. FDI policies were increasingly liberalised during 1980s. "The 1991 Industrial Policy, which allowed upto 100 per cent foreign private investment along with joint venture, brought the FDI policies to its most liberal phase." (Shahabuddin et al, 2004: 45) The 1999 Industrial Policy encouraged FDI in all industrial activities in Bangladesh including service industries and tool manufacturing while excluding those in the list of 'Reserved

Industries' and Readymade Garments, banking, insurance and other financial institutions. The Industrial Policy 1999 assured the protection of intellectual property rights of new products and processes. (Shahabuddin et al, 2004: 45) The Industrial Policy 2005 also reiterated that "steps will be taken to protect intellectual property in respect of new goods and formulae". The Policy also assured that "international norms and systems will be followed in respect of providing investment assurance and conflict resolution". (*Industrial Policy 2005*, Government of Bangladesh)

### **2.6.3 Industrial Sector: Structure and Performance**

In Bangladesh, manufacturing industries are divided into three categories: large, medium and cottage. Large includes an industry in which the value/replacement cost of durable resources other than land and factory building is above 100 million taka; medium industries consists of industries in which the value/replacement cost of durable resources other than land and factory building is between 15 to 100 million taka; and cottage means the industries in which members of a family are engaged, part time or full time, in production and service oriented activities. (*Bangladesh Industrial Policy*, Government of Bangladesh, 2005)<sup>7</sup> Earlier manufacturing industries were divided into two broad sub-sectors: large scale and small scale. The small sector covered all manufacturing establishments employing 10 persons or less and included cottage industries also. Manufacturing units employing more than 10 or more persons were classified as large-scale industries. (Huq and Love, 2001: 5)

War-ravaged economy of Bangladesh inherited a structure where agricultural sector contributed more than half of the GDP and four-fifth of the total employment. Average annual GDP growth rate during 1972/73 to 1979/80 was 3.71 per cent which continued over the next decade with a very slight improvement. During 1989/90 to 1997/98, Bangladesh witnessed a higher GDP growth rate of 4.69 per cent. Manufacturing sector grew at an average annual rate of 7.0 per cent during the 1970s. Overall average annual growth rate of the industrial sector during the same period was 5.56 per cent. Manufacturing growth rate during the next decade was much slower.

---

<sup>7</sup> Available at: [http://www.fbcci-bd.org/policy/Industrial\\_Policy\\_2005.htm](http://www.fbcci-bd.org/policy/Industrial_Policy_2005.htm)

During the 1980s, manufacturing grew at an average annual rate of only 2.6 per cent per annum while industrial sector as a whole witnessed a higher growth rate of 4.7 per cent. The late 1970s and 1980s was the period of shift from the inward-looking economy to market-oriented one when major policy reforms were initiated. The 1990s witnessed rather a higher growth rate in the manufacturing and overall industrial sector. During the 1990s, manufacturing grew at an average annual growth rate of 6.5 per cent whereas industrial sector grew at the rate of 6.4 per cent per annum. (Table 2.4)

**Table 2.4**

**Growth of the Major Sectors in the Bangladesh Economy, 1972/73 to 1997/98**  
(Average Annual Growth Rate in Percentage, at 84/85 prices)

	1972/73- 1979/80	1970/80- 1989/90	1989/90- 1997/98	Average annual growth between 1972-98
Agriculture	1.86	2.42	2.24	2.17
Industries	5.56	4.74	6.47	5.59
(Manufacturing)	7.02	2.55	6.49	5.35
Services	5.67	5.07	5.27	5.34
GDP	3.71	3.84	4.69	4.08

Sources: *Bangladesh Bureau of Statistics, Twenty Years of National Accounting of Bangladesh* (1993); *Statistical Yearbook of Bangladesh* (various issues).<sup>8</sup>

There has been significant change in the sectoral contribution of GDP in Bangladesh i.e. the economy has experienced considerable transformation. In 1980/81, agriculture and services accounted for approximately 34 and 50 per cent of the GDP respectively. By 2004/05 their share stood at 23 per cent and 49.22 per cent respectively. The share of industrial sector has increased from 17.31 per cent during 1980/81 to 28.31 per cent during 2004. (Table 2.5) In FY 2005-2006, the contribution of the industrial sector to GDP stood at 29.01 per cent. (*Bangladesh Economic Review 2006*, Government

<sup>8</sup> Quoted from, Huq, Mozammel and Love, Jim (2001), "Bangladesh Industrialization since Independence", Mozammel Huq and Jim Love (eds.) *Strategies for Industrialization: The Case of Bangladesh*, Dhaka, University Press Ltd. p. 3.

of Bangladesh, 2007: 8) Thus, the contribution of industrial sector to the economy has been on the increase. The data reflects a clear trend of structural change i.e. increasing share of non-agricultural sector to agricultural sector. Export led growth strategy adopted under economic reforms has resulted into rapid industrialisation.

**Table 2.5**

**Trends in Structural Transformation of Broad Sectoral Shares in GDP  
(Constant Prices at 1995-96, per cent)**

Sector	1980/81	1985/86	1990/91	1995/96	2000/01	2003/04	2004/05	2005/06
Agriculture	33.07	31.15	29.23	25.68	25.03	23.08	22.27	21.77
Industry	17.31	19.13	21.04	24.87	26.20	27.96	28.31	29.01
Service	49.62	49.73	49.73	49.45	48.77	49.22	49.42	49.22
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Bangladesh Bureau of Statistics.<sup>9</sup>

As far as manufacturing is concerned, its share in the GDP has remained nearly constant: from around 10 per cent during the 1970s and 80s to 11.5 percent during mid-1990s. However, late 1990s and subsequent years have witnessed a growing trend in the share of manufacturing to GDP. (Table 2.6)

**2.6.3.1 Manufacturing Sector: Growth and Performance**

Despite the implementation of intensive economic reforms and greater reliance on market forces, manufacturing sector in Bangladesh has not taken off. The share of the manufacturing sector to GDP has remained around 10 to 11 per cent during the last three decades. Rather low growth rate of manufacturing in Bangladesh is attributed to low investment in manufacturing sector. The share of investment in manufacturing (both public and private) as a percentage of GDP never exceeded 3 per cent, and since late 1980s it has varied from less than 1.3 per cent to 3 per cent. (Huq and Love, 2001: 10-11) Small size of domestic market, due to low per capita income, has also been a basic constraint to growth of manufacturing sector in Bangladesh. (Rahman and Bakht, 1997:

<sup>9</sup> Taken from: *Bangladesh Economic Review 2006*, Government of Bangladesh 2007: 28.

98) Continued regime of high real interest rates has also come in the way of the growth of manufacturing sector. Real interest rate on lending in Bangladesh was 10.71 per cent 11.30 per cent, and 8.28 per cent during 1992, 1996 and 1997 respectively. (Huq and Love, 2001: 13-14)

Within the manufacturing sector also, the structure has undergone considerable change. In 1972/73, large-scale manufacturing plants accounted for just under one-third of the total manufacturing activities. By 1997/98, the sector had come to be more heavily dominated by the large-scale plants, their share having risen to two-third of the manufacturing output. (Table 2.6)

**Table 2.6**  
**Share of Manufacturing to GDP (per cent, at constant prices: 1984/85)<sup>10</sup>**

Years	Manufacturing	Large & Medium Scale	Small Scale
1974/75	10.9	4.8	6.1
1976/77	11.1	5.4	5.2
1978/79	11.1	5.9	5.1
1980/81	10.5	5.4	5.1
1982/83	10.1	5.2	4.9
1984/85	9.8	5.2	4.6
1986/87	10.1	5.7	4.4
1988/89	9.8	5.5	4.3
1990/91	9.8	5.7	4.1
1992/93	10.5	6.5	4.0
1994/95	11.3	7.4	3.9
1996/97	11.1	7.2	3.9
1997/98	11.5	7.6	3.9
2000/01	15.59	11.13	4.46
2001/02	15.76	11.16	4.60
2002/03	15.97	11.29	4.68
2003/04	16.16	11.41	4.76
2004/05	16.51	11.66	4.85
2005/06 (prov.)	17.05	12.11	4.94

Source: Bangladesh Bureau of Statistics.<sup>11</sup>

<sup>10</sup> Note: Data for 2000/01 and onwards in 1995/96 prices.



This rapid growth of large-scale manufacturing has been mainly contributed by higher growth of the textiles industry. In the early 1970s, manufacturing output in Bangladesh was concentrated heavily on textiles, tobacco, chemicals and chemical products. During the early years after independence, textiles which accounted for 44 per cent of the total manufacturing, was mainly dependent upon processing of jute. Nevertheless, with the decline in demand for jute products in international market, the share of textiles witnessed a downward trend during the next two decades. By 1991/92, textiles' share in the manufacturing output was 27 per cent. However, there has been considerable change in the textile sector itself. Whereas in the 1970s and the early 1980s, textiles mainly comprised of jute goods; by the 1990s, it was replaced by readymade garments. (Table 2.7) (Huq and Love, 2001: 4-8)

**Table 2.7**  
**Bangladesh: Major Manufacturing Sectors**  
(% Distribution of Output: at 1984/85 Prices)

	1972/73	1975/76	1980/81	1985/86	1990/91	1991/92
Food Manufacturing	7.49	12.07	9.95	10.55	10.55	10.55
Beverages	0.77	1.26	1.07	0.76	0.76	0.25
Tobacco	22.21	25.04	13.53	14.04	14.05	14.05
Textile	44.27	32.10	35.55	27.19	27.19	27.19
Footwear	0.84	1.07	0.38	1.77	1.77	1.77
Wood Cork to Allied Products	(neg.)	0.12	0.30	1.14	1.14	1.14
Furniture and Fixture	0.33	0.16	0.14	0.17	0.16	0.16
Paper and Paper Products	2.49	0.70	2.54	2.39	2.39	2.39
Printing and Publishing and Allied Products	0.92	0.52	0.84	0.83	0.83	0.81
Leather and Leather Products	1.17	2.09	1.97	1.51	1.51	1.51
Rubber Products	-	-	0.44	0.15	0.15	0.15

<sup>11</sup> Taken from: *Bangladesh Economic Review 1999*, Government Bangladesh, 1999: 132 & *Bangladesh Economic Review 2006*, Government of Bangladesh 2007: 27.

Chemical and Chemical Products	10.40	10.53	11.53	12.10	12.08	12.08
Petroleum and Coal Products	-	1.74	0.21	10.06	10.06	10.06
Non-Metallic Mineral Products	0.85	1.45	1.82	0.83	0.83	0.83
Basic Metal Industries	1.42	6.01	6.03	4.21	4.21	4.21
Metal Products Except Machinery	2.33	1.29	1.22	1.49	1.50	1.50
Machinery Except Electrical	0.74	0.49	1.15	1.03	1.03	1.03
Electrical Machinery and Apparatus	1.25	1.76	2.80	2.10	2.10	2.10
Transport Equipment	0.58	1.04	1.93	1.08	1.08	1.08
Other Manufacturing Industries	2.24	0.54	6.61	6.61	6.62	6.62

Sources: Bangladesh Bureau of Statistics, *Twenty Years of National Accounting of Bangladesh (1993)*; and *Statistical Yearbook of Bangladesh* (various issues).<sup>12</sup>

### 2.6.3.2 Structural Changes in Manufacturing and Shift in the Export Basket of Bangladesh

This shift is clearly reflected by the changes in the export-basket of Bangladesh. In 1972/73, jute goods and raw jute accounted for 51.4 per cent and 38.5 per cent of the total exports respectively. Tea and leather accounted for another 2.9 and 4.5 per cent respectively. In 1981-82, jute goods were the single most important export item, accounting for 46.5 per cent of the total exports. Jute goods, raw jute and tea together accounted for about 69 per cent of the total exports in 1981-82. However, their share had gone down to 7.2 per cent, 2.6 per cent and 0.7 respectively during 1996/97 which further declined to 3.55, 1.11 and 0.18 respectively during 2004-05. (Tables 2.8 & 2.9)

<sup>12</sup> As quoted from: Huq, Mozammel and Love, Jim (2001), "Bangladesh Industrialization Since Independence", in Mozammel Huq and Jim Love (eds.) *Strategies for Industrialization: The Case of Bangladesh*, Dhaka: University Press Ltd. p. 7

On the other hand, the share of the readymade garments and knitwear has risen significantly. The share of the readymade garments in the total exports during 1981/82 was only 1.1 per cent while the share of knitwear was zero. In 1996/97, readymade garments accounted for 50.6 per cent and the share of knitwear was 41.6 per cent. As of 2004/05, readymade garments and knitwear accounted for 41.6 per cent and 32.6 per cent respectively i.e. their share was about 75 per cent of the total exports. (Table 2.8)

The dramatic increase in the share of readymade garments and knitwear has been a significant achievement of industrialization efforts under policy reforms. This spectacular growth has been triggered by both domestic and international factors. This industrial sub-sector has largely been benefited by direct export incentives such as *Special Bonded Warehouse Scheme* and *Duty Drawback Scheme*. Quota restrictions in developed countries under Multi-Fiber Arrangement were also particularly responsible for growth of RMG sector. (Rashid and Rahman, 1998: 210)

On the other hand, declining world demands for jute goods and raw jute contributed to the declining trend in jute exports. Changes in cargo handling methods that reduce the use of bags and competition from synthetic substitutes caused the market for jute products to shrink. (Rahman and Bakht, 1997: 98)

**Table 2.8**  
**Bangladesh: Share in Exports by Commodity Groups**  
**(Percentage of total exports, some selected commodities)**

	1972/73	1981/82	1990/91	1996/97	2001/02
Raw jute	38.5	16.2	6.07	2.6	1.02
Jute Goods	58.4	46.5	16.91	7.2	4.07
Tea	2.9	6.1	2.52	0.9	0.29
Frozen Food	0.9	8.4	8.26	7.3	2.94
Leather and Leather products	4.6	10.1	7.8	4.2	3.46
Knitwear	00	00	7.64	17.3	24.38
Woven garments	00	1.1	42.8	50.6	52.20

*Sources:* Bangladesh Export Promotion Bureau.

**Table 2.9**  
**Export Basket of Bangladesh: Major Commodities**  
**Composition and Growth Rate**

Commodities	Total Export (million US\$)			% of Total Exports			Growth Rate (%)		
	2003-04	2004-05	2005-06	2003-04	2004-05	2005-06	2003-04	2004-05	2005-06
Frozen Food	390.25	420.74	459.11	5.13	4.86	4.36	21.27	7.81	9.12
Tea	15.81	15.84	11.89	0.21	0.18	0.11	2.20	0.19	24.98
Raw Jute	79.70	96.19	148.27	1.05	1.11	1.41	(3.35)	20.69	54.14
Agricultural Products	41.11	82.47	105.40	0.54	0.95	1.00	61.53	100.61	27.80
Woven Garments	3538.07	3598.20	4083.82	46.54	41.58	38.80	8.59	1.70	13.50
Knitwear	2148.02	2819.47	3816.98	28.25	32.58	36.26	29.88	31.26	35.38
Leather	211.41	220.96	257.27	2.78	2.55	2.44	10.55	4.50	16.45
Jute Goods	246.45	307.48	361.03	3.24	3.55	3.43	(4.17)	24.76	17.42
Fertilizer and Chemical Products	121.46	197.18	205.58	1.67	2.28	1.95	20.87	62.34	4.26
Footwear	68.30	87.55	95.44	0.90	1.01	0.91	46.57	28.18	9.01
Engineering Products	41.87	85.02	111.02	0.55	0.98	1.05	224.32	103.06	30.58
Petroleum by-products	37.02	35.08	88.43	0.49	0.41	0.84	18.54	(5.24)	152.08

Source: Export Promotion Bureau, Ministry of Commerce.<sup>13</sup>

In this way, we see that the export basket of Bangladesh remains extremely narrow and is highly dependent on the readymade garments and knitwear. The concentration of Bangladesh exports on a narrow basket of products is so high that during 2005-06 about 78 per cent of total exports originated in three sub-sectors: woven garments, knitwear and frozen food industry. (Table 2.9) Secondly, there has been a discernible shift from jute to non-jute items as a major source of export earning. Thirdly, the share of industrial goods as percentage of total exports has risen significantly, reducing the high dependence

<sup>13</sup> As cited in: *Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 72  
Note: Figures in the parenthesis indicate negative number.

on primary commodities. As of 2004-05, primary commodities accounted for only 7.49 per cent of total exports whereas the share of industrial goods was 92.51 per cent. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 72) Fourthly, Bangladesh has also been successful in shifting its exports from traditional to non-traditional items. The table below shows this trend during 1990s. Traditional items constituted 25.15 per cent of total exports during 1990-91 whereas the share of non-traditional exports was 74.85 per cent. However, by 1999-2000, the share of traditional export items had come down to 6.12 per cent while the share of non-traditional export items increased to 93.88 per cent of total exports. (Table 2.10)

**Table 2.10**  
**Trends in Export by Traditional and Non-traditional Items**

Year	Traditional Exports (as % of total exports)	Non-traditional Exports (as % of total exports)
1990-91	25.15	74.85
1991-92	20.62	79.38
1992-93	16.76	83.24
1993-94	14.49	85.51
1994-95	12.17	87.83
1995-96	11.56	88.44
1996-97	10.59	89.41
1997-98	8.41	91.59
1998-99	7.76	92.24
1999-00	6.12	93.88

Source: Export Promotion Bureau, Government of Bangladesh<sup>14</sup>

#### 2.6.4 Overall Growth of Industrial Sector

Overall industrial sector grew rather slowly during the 1970s and 80s. According to official BBS data, industrial value-added grew at an annual compound rate of approximately 3 per cent between 1973 and 1993, while the GDP growth rate was around 4 per cent during the same period. When divided according to the plan periods, the

<sup>14</sup> Cited from: *Statistical Pocketbook of Bangladesh 2001*, BBS, 2002: 269.

growth rate of industrial value-added was about 7 per cent during the First Five-Year Plan (1973-77); 6.2 per cent during the Two-Year Plan (1978-79); around 1 per cent during the Second Five-Year Plan (1980-84); and 4.2 per cent during the Third Five Year Plan (1885-89). Thus, the sector performed poorly during 1980s when the most intensive reform measures were implemented. However, during the Fourth Five Year Plan (1990-95) the annual growth rate of industry was 7.05 per cent. (Table 2.10)

**Table 2.11**  
**Average Annual Growth of Industrial Sector According to Plan Period**

First Five-Year Plan (1973-77)	7 per cent
Two-Year Plan (1978-79)	6.2 per cent
Second Five-Year Plan (1980-84)	1 per cent
Third Five Year Plan (1885-89)	4.2 per cent
Fourth Five Year Plan (1990-95)	7.05 per cent

Source: Rahman and Bakht, 1997, p. 91 and *The Fifth Five Year Plan (1997-2000)*, Government of Bangladesh, p. 23

**Table 2.12**  
**South Asian Countries:**  
**Average Annual Growth Rate of GDP, Industrial Sector and Manufacturing for**  
**(Constant Prices, Base Year 1995)**

Countries	GDP		Industries		Manufacturing	
	1980-90	1990-2000	1980-90	1990-2000	1980-90	1990-2003
India	5.8	6.0	6.9	6.4	7.4	7.0
Pakistan	6.3	3.7	7.3	3.9	7.7	3.5
Bangladesh	4.3	4.8	4.9	7.3	3.0	7.2
Nepal	4.6	4.9	8.7	7.2	9.3	9.2
Sri Lanka	4.0	5.3	4.6	7.0	6.3	8.1
South Asia	5.6	5.6	6.8	6.2	7.0	6.6

Source: *World Development Indicators 2002*, World Bank.

As compared to the other South Asian countries, except for the 1990s, growth of the industrial sector in Bangladesh was sluggish. However, during the 1990s, with a growth rate of about seven per cent, the pace of industrialisation in Bangladesh has been the fastest in the region as shown in the table. (Table 2.11) this growth in industrial sector has been contributed by growth in manufacturing. In FY 2005-06 manufacturing experienced a double digit growth of 10.45 per cent. Owing to this robust growth, manufacturing has become the single largest contributor to GDP (17.05%) and has overtaken the agriculture (16.91%). The data clearly shows that Bangladesh economy has experienced quick transformation from an agrarian to industrial one. The average growth in manufacturing during FY 1992-1996 8.21 per cent that came down to 5.64 per cent FY 1997 to FY 2001. However, a strong policy support from the government facilitated the rapid growth in manufacturing. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 106)

In this way, we see that the growth pattern adopted under economic liberalisation has accelerated the pace of industrialisation and overall growth rate in Bangladesh.

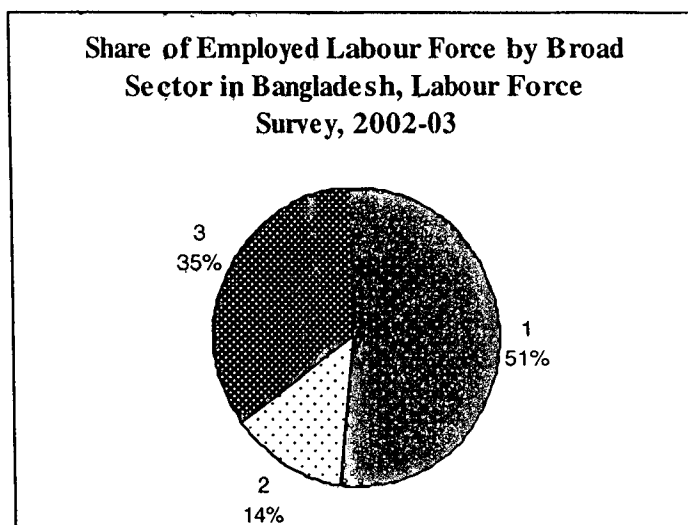
### **2.6.5 Contribution of Industrial Growth in Poverty Reduction and Employment Generation**

If we assess this growth of the economy in terms of poverty reduction and employment generation, the scenario is not much optimistic. The impact of economic growth on poverty reduction largely depends on the equitable distribution of income. Along with higher growth of economy, Bangladesh has witnessed a moderate decline in poverty of around 10 per cent over the past decade. Income inequality is however on increase: Gini Index of income inequality for the country has increased from 0.259 during 1991/92 to 0.306 in 2000. (*National Strategy for Accelerated Poverty Reduction*, Government of Bangladesh, 1995:14)

In terms of employment generation, agriculture still contributes for more than fifty per cent of the total employment. In 1994/1995, agriculture absorbed 52 per cent of the total labour force while the industrial sector accounted for 14.3 per cent of the total employment. But the declining share of agriculture to GDP indicates to a much lower

productivity of labour force in agriculture than in the non-agriculture sector. (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 9-10) According to Labour Force Survey 2002-03, 51.69 per cent of labour force was employed in agriculture, 13.56 per cent in industry, and 34.75 per cent in the services. Manufacturing accounted for the 9.71 per cent of the total employment. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 34) It is clear from the data that the industrial sector has not absorbed the labour force in the proportion on its share to GDP. The figure 2.A below shows this distribution.

**Figure 2.A**



Source: *Labour Force Survey 2002-03*, BBS<sup>15</sup>

## **2.7 Integration of Environmental Concerns in Industrial Policy**

As a fastest growing industrial sector in the region, Bangladesh needs to integrate environmental concerns and policies with industrial policy and overall development pattern in order to maintain a sustainable growth trend. Though one of the objectives of the Industrial Policy of 1999 was to ensure a process of industrialisation which was “environmentally sound” and “consistent with the resource endowment of the country”,

<sup>15</sup> As cited in: *Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 34.



out of 24 strategies of the industrial policy not even a single strategy talked about the environmental management.

The *Industrial Policy 2005* stated as its objective to “provide all necessary assistance for producing environment-friendly products with the objective of creating a pollution free environment in the industrial sector.” One of the strategies of the Industrial Policy 2005 was to “provide assistance to waste management development in order to ensure proper waste minimization and waste removal and produce pollution free goods.” The section on technical and institutional assistance stated that industrial enterprises would be encouraged to obtain ISO-14000 international standard. (*Bangladesh Industrial Policy*, Government of Bangladesh, 2005)<sup>16</sup>

Despite these references in the policy declarations, the level of industrial pollution is on increase in Bangladesh. The following section gives an overview of the intensifying environmental concerns related to rapid industrialisation.

## **2.8 Industrial Growth and Environmental Deterioration in Bangladesh**

Though the level of industrialisation is low in Bangladesh, the country faces severe environmental threats emanating from industrialisation and industrial pollution. Mismanagement, inferior technology, lack of facilities for treating industrial waste, wrong approach to industrialisation, so on and so forth have made environmental problems very acute in Bangladesh.

In 1986, the Department of Environment had identified a total of 903 most polluting industrial units. But by 1997, the number of most polluting industries had gone up to 1176. The most polluting units listed in 1986 included 298 textile mills, 176 tanneries, 166 pharmaceutical units, 92 jute mills, 57 iron and steel mills, 34 plastic and rubber units, 25 pesticide factories, 23 chemical factories, 16 sugar mills, 5 paper and pulp mills, 5 fertiliser units, 3 distilleries and 3 cement factories. Latest data by the Department of Environment put the number of polluting textiles mills at 365, tanneries at 198, pharmaceutical units at 149, engineering workshops at 129, chemical and pesticide factories at 118, jute mills at 92, rubber and plastic units at 63, food and sugar industries

---

<sup>16</sup> Available at: [http://www.fbcci-bd.org/policy/Industrial\\_Policy\\_2005.htm](http://www.fbcci-bd.org/policy/Industrial_Policy_2005.htm)

at 38, paper and pulp at 10, cement factories at 5, fertilisers at 8, and distilleries at 4. (*Bangladesh Compendium of Environment Statistics 1997*, Bangladesh Bureau of Statistics, 1999: 92)

## 2.8.1 Some Key Indicators of Industrial Pollution

**2.8.1.1 CO<sub>2</sub> Emission:** One important indicator of industrial pollution is CO<sub>2</sub> emission.<sup>17</sup> In Bangladesh, the per capita CO<sub>2</sub> emission is quite low as compared to India and Pakistan. As of 2002, per capita CO<sub>2</sub> emission in Bangladesh was 0.3 metric tons whereas per capita emission in India and Pakistan was 1.2 and 0.7 metric tons respectively. (Table 2.13) There has been a steady increase in overall emission and emission per capita in each of the South Asian countries. In 1980, total CO<sub>2</sub> emission in Bangladesh was only 7.6 million tons which had gone up to 29.3 million tons by 2002. (Table 2.14) Though Bangladesh accounted for only 0.1 per cent of total world emissions in 2000, whereas the share of India and Pakistan was 4.5 per cent and 0.5 per cent respectively, this share is likely to go up as Bangladesh intensifies industrialisation because industrialisation in Bangladesh has not yet realised its full potential.

**Table 2.13**  
**Carbon Dioxide Emissions Per capita**  
(Metric Tons)

	India	Pakistan	Bangladesh	Sri Lanka	Nepal
1980	0.5	0.4	0.1	0.2	0.0
1995	1.0	0.7	0.2	0.3	0.1
2000	1.1	0.8	0.2	0.6	0.1
2002	1.2	0.7	0.3	0.5	0.2

*Sources: World Development Indicators, various issues, World Bank.*

<sup>17</sup> Note: CO<sub>2</sub> is a naturally occurring gas and also a byproduct of burning fossil fuels and biomass and other industrial process. It is the principal anthropogenic greenhouse gas that affects the Earth's temperature. It is the reference gas against which other greenhouse gases are measured. CO<sub>2</sub> is a principal contributor to global warming.

**Table 2.14**  
**Carbon Dioxide Emissions**  
(Millions of Tons)

	India	Pakistan	Bangladesh	Sri Lanka	Nepal
1980	347.3	31.6	7.6	3.4	0.5
1995	908.7	85.4	20.9	5.9	1.5
1997	1065.4	98.2	24.6	8.1	2.2
2000	1070.9	104.8	29.3	10.2	3.4

Sources: World Development Report, various issues, World Bank.

If we look at the carbon emissions in the terms of sector-wise share, industrial sector is the largest contributor to CO<sub>2</sub> emission. As of 1990, the industrial sector contributed to 40 per cent of the total emissions whereas the share of the agriculture was only 5 per cent. (Table 2.15)

**Table 2.15**  
**Bangladesh: Sectoral Share to CO<sub>2</sub> Emissions (1990)**

Sector	Contribution to Total Emissions (ktc)	As % of Total Emissions
Agriculture	58.9	5%
Industry	468.2	40%
Power Generation	300.3	26%
Transport	154.5	13%
Residential	166.9	14%
Commercial & Others	14.16	1%
Total	1162.9	100%

Source: Omar, K. L. and Hossain, I. 'Bangladesh Country Paper' in Asian Energy Institute, Collaborative Study on Strategies to CO<sub>2</sub> Emissions in Asia and Brazil (submitted to UNCAD), 1991.

### 2.8.1.2 Organic Water Pollutants

Organic water pollution is another important indicator of industrial pollution.<sup>18</sup> It also indicates the inadequacy of waste treatment. Throughout the South Asia emission of organic water pollutants has increased significantly.

**Table 2.16**  
**The Extent and Sources of Organic Water Pollution in South Asia**  
**(1980-2001)**

	Emissions of organic water pollutants (kg/day)			Industry share of organic water pollutants (%) (2001)					
	1980	1990	2001	Primary metals	Paper and pulp	Chemicals	Food and beverage	Textiles	Others
India	1,422,564	1,410,617	1,556,371	12.6	7.5	9.3	53.0	13.0	4.4
Pakistan	75,125	104,095	100,821	6.7	14.0	8.6	52.8	10.0	4.1
Bangladesh	66,713	171,087	273,082	1.8	6.8	2.5	23.2	64.0	0.7
Sri Lanka	30,086	53,024	88,943	0.5	7.0	6.4	52.3	31.0	1.5

Sources: *World Development Indicators 2005 & World Development Indicators 2000*, World Bank.

It is clear that during 1980 to 2001 Bangladesh experienced fastest growth in the emissions of organic water pollutants; its emissions increased nearly four fold over the past two decades. In South Asia, with the exception of Bangladesh, food and beverage industry is the greatest source of organic water pollution. In Bangladesh, textiles singularly account for more than 60 per cent of the total emissions followed by food and

<sup>18</sup> Note: Emissions of organic water pollutants are measured in terms of biochemical oxygen demand, i.e. the amount of oxygen required for decomposing the waste by the bacteria in water. This is a standard water treatment test for the presence of organic pollutants. BOD is an important variable to measure water pollution. More organic materials in water cause more bacteria as bacteria reproduce profoundly when they get organic materials to survive. As the bacteria use the dissolved oxygen in the water, the fish and other aquatic life face shortage of oxygen.

beverage industry which contributes for another 23 per cent. It is important to notice that the export basket of Bangladesh is dominated by textiles. As of 2001-02, woven garments and knitwear accounted for about 75 per cent of total exports. This clearly shows the dilemma of development in Bangladesh. (Table 2.16)

### **2.8.1.3 Emissions from Industrial Units**

Emissions<sup>19</sup> from industrial units are the major source of air pollution. Though vehicles were identified as the main source of air pollution, unplanned industrialisation has intensified this problem. A large number of industries in Bangladesh are located near the residential areas. Among all the industries, jute mills emit highest amount of dust particulates. Phosphate fertiliser plants generate considerable amount of dust. Triple Super Phosphate (TSP) plants pour out a huge quantity of dust-20 MT of dust a day on average. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 211) Urea fertilizer factories generate poisonous ammonia gas. Air pollution in tanneries is mainly caused by the emission of foul odour from decomposing raw hides and solid wastes. Paper and pulp mills emit toxic sulphur dioxide, hydrogen sulphide, methyl and particulate matter. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 219) Most industries in Bangladesh lack proper pollution abatement techniques and waste recycling system<sup>20</sup>. Though Bangladesh is the most densely-populated country in the world, pollution affects large number of people even if the overall pollution level is low.

### **2.8.1.4 Liquid Waste or Effluents**

Most of the industrial plants in Bangladesh are located at the banks of the rivers and the practice of dumping waste and effluent in the rivers has caused severe water contamination. According to the Department of Environment, each day, 15,800 cubic liters of wastes from Hazaribagh tannery factories, 3,500 cubic liters of waste from other sources are being thrown into Buriganga. (*Bangladesh Environment: Facing the 21<sup>st</sup>*

---

<sup>19</sup> Emissions from industries include various poisonous gases such as carbon dioxide, oxides of sulphur, carbon monoxide, smoke, etc.

<sup>20</sup> Pollution abatement techniques and waste recycling system are the techniques to reduce or treat the pollutant contained in waste before they discharged into environment.

*Century*, SEHD, 2002: 197) Pollution of Buriganga is one of the major reasons of drastic decrease in fish capture and death of other aquatic life. According to a survey by the Department of Environment, the level of dissolved oxygen in Buriganga at Hazaribagh is four mg/liter; at some places, it is one to zero mg/liter whereas the level of oxygen required for survival of aquatic life is 6 mg/liter. Same is the situation with river Karnaphuli. In Chittagong and Chondroghona alone 720 industrial units are located at the banks of the river Karnaphuli.

The DoE had identified 217 industrial units to be distinctly polluting and had recommended the cancellation of the trade licenses of 150 units. The polluting industrial units in Chittagong and Chondroghona included 19 tanneries, 26 textile mills, two chemical industries, five fish processing plants, two soap factories, two pesticide plants, two detergent plants, one oil refinery, four paint and dye manufacturing units, Chittagong Steel Mills Ltd., Karnafuli Paper Mills, Karnafuli Rayon Complex, Chittagong Urea Fertilizer Ltd., Karnafuli Fertilizer Company, etc.

According to a study, Karnafuli Paper Mills and Karnafuli Rayon Complex discharge 3000 kg mercury in the river every year. These two units discharge 0.35 tons of china clay and 4.0 tons of cellulose fiber every day. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 200) This is how the industrial units discharge untreated waste into the rivers, causing severe threat to human health and aquatic life.

#### **2.8.1.5 Deforestation**

Though a number of factors are responsible for deforestation in Bangladesh, industrialisation remains one of the major causes of shrinking forest cover. Industrial plantation of alien species has caused severe damage to natural forest cover.

According to different sources such as the Forestry Master Plan and the Forestry Policy of Bangladesh, only about 769,000 hectares or 6 per cent of the country has actual tree cover. However, data by the World Bank shows 10 per cent of land area to be under forest cover. Per capita forest land in Bangladesh has come down to around .022 hectares from 0.035 in 1968-69, one of the lowest in the world. According to the Forestry Master

Plan, the annual rate of deforestation for 1980-90 was around 3.3 per cent. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 77)

Though official sources show a net rate of reforestation of about 1 per cent annually, major areas of natural forest remain degraded. Much of the hill forest in Chittagong Hill Tracts has been depleted. Human intervention through development projects like Kaptai Hydroelectric Project and the industrial plantation of rubber and pulpwood have changed the flora and fauna of the hill area. The plantation of teak and rubber has not proved to be economically and environmentally sustainable. This monoculture has played a major role in rapid deforestation. Traditional *sal* forests stretching over districts of Dhaka, Modhupur, Rangpur, Dinajpur, and Rajshahi are degraded likewise.

In Bangladesh, the percentage of land area under forest cover is the second lowest in the region and total forest area is the lowest in the region. (*World Development Indicators 2005*, World Bank) The Table 2.7 below shows the distribution of forest cover in selected South Asian Countries.

**Table 2.17**  
**Forest Cover in Key South Asian Countries (1990-2000)-**

	Forest Area, (Thousand square km) , 2000	% of Total Land Area 2000	Average annual deforestation (sq km) 1990-2000	Average Annual Deforestation (%) 1990-2000
India	641	21.6	-381	-0.1
Bangladesh	13	10.2	-165	-1.3
Pakistan	24	3.1	394	1.5
Sri Lanka	19	30.0	348	1.6
South Asia	780	16.3	947	0.1

Sources: *World Development Indicators 2005*, World Bank

Commercial plantation of rubber and other exotic plants like eucalyptus has destroyed the natural features of *sal* forests. Sundarbans, the largest patch of mangrove forests in the world, are under threat largely due to the shrimp aquaculture. The near complete destruction of Chakoria Sunderbans in Cox Bazaar area is attributed to the shrimp farming. In 1972, Sundarbans in Cox's Bazaar occupied an area of 19,000 hectares. By 1981, this forest area squeezed down to a mere 9,000 hectares and, in 1985, it was further reduced to only 4,000 hectares. And again, half of this forest was destroyed by 1991. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 207) Adoption of an export led growth strategy has led to conversion of parts of Sundarbans into shrimp farms, causing deforestation and enhancing coastal salinity.

Many other factors such as charcoal and timber industries, illegal logging, oil spill, tourism industries, unplanned development projects, urban growth pressures, and worsening pollution level have contributed to the loss of mangrove forests. Mongla seaport and associated marine traffic is the source of oil spills, adversely affecting the mangrove forests. A possible threat to the Sundarbans would be the exploration of natural gas in future, which has been found abundant in this area. Allowing international oil giants for natural gas exploration in Sundarbans may cause irreparable damage to fragile mangrove ecosystem. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 120)

### **2.8.2 Industrialisation and Urban Pollution**

Industrialisation is generally accompanied with rapid urbanisation. Decreasing agricultural output and increasing burden on land has pushed large number of small land holders in industrial areas in the search of better livelihood opportunities, further contributing to the urban pollution. The four metropolitan areas – Dhaka, Chittagong, Rajshahi, and Khulna together are home to 9.53 million people, about nine per cent of the total population.

The rate of urbanisation in Bangladesh during 1990-2000 was double that of India and Pakistan, and the share of urban population living in slum was the second highest in



the region. Almost all future population growth, predicted to be some 100 millions over the next fifty years, is expected to occur in urban areas, further accentuating the problem of urban waste management and urban pollution. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 2) The Table 2.18 below shows the trend in population growth in Statistical Metropolitan Areas (SMA) in Bangladesh.

**Table 2.18**  
**Population of Statistical Metropolitan Areas in Census Years**

SMAs	Census Years			
	1974	1981	1991	2001
Dhaka	1679572	3430311	6950920	9912908
Chittagong	889760	1391877	2348428	3202710
Khulna	437302	646359	1001825	1227239
Rajshahi	132909	253740	544649	646716

Source: *Statistical Yearbook of Bangladesh 2001*.

According to the Bangladesh census 2001, total urban population is 29.25 million which is 23.53 per cent of the total population. Urban population density is 2756 persons per sq. km whereas the national ratio is 843 persons per sq. km. (*Population Census 2001*, Government of Bangladesh).<sup>21</sup> This growth in urban population is not a natural phenomenon; it can be partially explained by deteriorating resource base and shrinking livelihood opportunities in rural areas.

In this way, we see that Bangladesh, a naturally disaster-prone country, faces severe problems of industrial pollution and other related environmental hazards. Socio-economic costs of these environmental concerns have caused much tension and stress in the society. The export-led industrialisation strategy has given way to multiple complexities. The next chapter attempts to bring out some critical impacts of environmental degradation on the socio-economic profile of the country.

<sup>21</sup> Available at: [http://www.bbs.gov.bd/dataindex/census/bang\\_atg.pdf](http://www.bbs.gov.bd/dataindex/census/bang_atg.pdf)

## **CHAPTER 3**



## **Socio-Economic Impacts of Environmental Degradation**

### **3.1 Introduction**

As explained in Chapter 2 environmental degradation is closely linked to the complex socio-economic variables of a country. Various social indicators such as per capita income, poverty, illiteracy, female literacy, social inequality, health, nutrition, population growth, unemployment, etc. bear particular significance for environmental sustainability of a particular country. There exists a complex relationship between environmental sustainability and the socio-economic variables wherein both reinforce each other. (*Bangladesh Toward an Environment Strategy*, Country Environment Review, ADB, 2000: 21)

Human live and livelihood are closely associated with the environmental resources and the ecosystem. All human activities impinge upon the environment in some way or the other and, in turn, get affected by environmental sustainability itself. As mentioned in Chapter I, all environmental variables such as air and water pollution, land degradation, resource depletion, etc. become a threat to security while interacting with numerous socio-economic variables. This is the reason why some societies are able to manage their environmental problems while others experience disintegration and violent conflicts under the pressure inflicted by environmental degradation. In transitional societies like Bangladesh, where traditional patterns of livelihood have fast-changed under the influence of economic liberalisation and globalisation, environmental sustainability along with other political and economic variables becomes a critical factor for maintaining social stability and peace. The CHT in Bangladesh is a stark example where environmental degradation caused by unsustainable development policies, industrialisation, and neglect of the local tradition, culture and demands, aggravated by political factors, has generated social and political unrest with spill over effects in neighbouring India too. (Gaan, 2000: 177-182)

### **3.2 Poverty and Environmental Degradation**

Though all social groups/classes contribute to environmental deterioration in many ways, it is particularly the poor and disadvantaged sections of the society, who are the prime

victims of environmental deterioration. As Chapter 2 mentions, there exists a positive relationship between income growth and environmental sustainability. With the increase in income, demand for *green industrialisation* increases and the strictness of the environmental regulations also equally goes up. Given this conviction, poor are generally held responsible for environmental degradation, particularly rural poor who are totally dependent upon natural resources for their livelihood. Though environmental degradation in Bangladesh is seen as an externality of huge population and poverty, such a view is too simplistic. This largely ignores other dominant causes of environmental degradation and overexploitation such as rapid industrialisation, industrial pollution, intensive agriculture, infrastructural development, and inappropriate development policies.

For example, rural poor are generally accused for the overexploitation of forest and land resources because their dependence on land and forest for fuel and fodder is very high. However, destruction or over-exploitation of forest is not caused by the rural female fuel collectors because collecting fodder or fuel wood is not destructive to the nature. Deforestation is mainly caused by the commercial exploitation of forest resources. (Jahan and Alauddin, 1999: 309) The Table 3.1 briefly lists the impacts of human activities on environment.

**Table 3.1**

**Environmental Impacts of Human Activities**

<b>Human Activities</b>	<b>Environmental Impacts</b>
Deforestation	Loss of habitats Loss of biodiversity Changes in local ecology Changes in micro-climate Loss of carbon sink Soil erosion Less water retention Increased flooding
Industrialisation	Air, soil and water pollution Depletion of minerals and fossil fuel High demand for energy and water Waste generation

Intensive Agriculture	Water, soil and air pollution Organic waste and GHG emission Land degradation Bio-accumulation of toxic substances due use of herbicides and insecticides Water logging and salinisation Depletion of ground water
Upland cultivation	Erosion of topsoil and loss of productivity Reduction of water holding capacity Flooding in downstream areas
Urbanisation	Loss of natural eco-systems High population density and increased risk of disasters Large volume of solid wastes High demand for energy and water Air and noise pollution Groundwater mining and land subsidence
Development projects	Conversion of forest, agricultural land and wetland Removal of human settlements Blockage of natural drainage and water-logging Morphological changes of the river Increased demand for water, energy and transport Destruction of unique natural features and scenic beauty

---

Source: *Bangladesh Compendium of Environment Statistics 1997*, Bangladesh Bureau of Statistics.

Environmental sustainability of a country bears particular significance for steady economic growth and smooth livelihood patterns, especially for livelihood practices of the poor. So, any discussion on development and poverty alleviation will be incomplete if environmental concerns are not taken into account. “Vicious downward spiral relationship between poverty and environmental degradation in which the degradation of the environment increases poverty and poverty increases environmental degradation”, remains a major constraint in the path of sustainable development among most of the developing countries. (*Bangladesh Toward an Environment Strategy*, Country Environment Review, ADB, 2000: 44)

Bangladesh largely remains a poor country where 36 per cent of the population is still below \$1 income per day, 82.8 per cent of the population under \$2 a day, and 49.8 per cent are below the national poverty line. (*Human Development Report, 2006*) Though

Bangladesh has witnessed a declining trend in poverty which has come down from 59 per cent in 1990 to 49.8 in 2000 (a decline of about 9 percentage point), owing to the disparities in income distribution, situation has not much improved. According to the National Strategy for Accelerated Poverty Reduction, Gini Index of income inequality for the country increased from 0.259 during 1991/92 to 0.306 in 2000 whereas Gini Index for rural and urban areas increased from 0.243 to 0.271 and 0.307 to 0.368 respectively during the same period. In this way, Gini Index of inequality for national, rural and urban areas has increased by 0.047, 0.028, and 0.061 respectively during the said period. (*National Strategy for Accelerated Poverty Reduction*, GOB, 2005: 13)

Bangladesh has experienced faster improvements in human poverty trends. The human poverty index (based on deprivations in health, education and nutrition) which was as high as 61 per cent in the early 1980s (1981/83) dropped to 47 per cent in early nineties (1993-94) and further declined to 35 per cent in late nineties (1998/00), i.e. there has been significant improvement in human development over past two decades. (*National Strategy for Accelerated Poverty Reduction*, GOB, 2005: XIV)

The poor are both catalysts and victims of environmental degradation. Amidst lack of regular and remunerable employment, they often over-exploit natural resources to satisfy the immediate needs of livelihood. The poor are also the first and the foremost victims of environmental degradation as they tend to live in marginal environmentally hazardous areas and are exposed to natural disasters and health risks. For example, traditional agricultural practice *jum* or shifting cultivation in forest areas is supposed to be a major cause of deforestation but it simultaneously provides the primary source of livelihood for tribal people. *Jum* cultivation has been practiced in Bangladesh over centuries by people living around forests in Chittagong Hill Tracts. Traditionally, a *Jum* plot used to be cultivated only two/three years and then the land was left fallow for approximately 10 years or more to recover. But due to increasing pressure on land the fallow period for *jum* has drastically reduced to 2/3 years, accentuating the deforestation and soil erosion. The situation accompanied with forest logging, commercial or industrial plantation, and search for natural resources such as gas or oil has been largely responsible

for the rapid deforestation. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 80-84)

In Bangladesh, poverty is a major challenge for sustainable development. On the one hand, the country needs rapid industrialisation in order to reduce poverty; on the other hand, massive industrialisation without ecological considerations may deteriorate the resource base of the country, further accentuating the poverty level. Environmental sustainability is a precondition to eradicate poverty. A steady growth trend cannot be achieved with a depleted resource base.

In Bangladesh, the dependence on public commons is very high: some 80 per cent of the population derives their livelihood from the utilisation of these resources or from processing the resultant products. Villagers collect firewood and fodder from forests, are highly dependent upon land for their daily food consumption, and capture fish is their main source of protein intake. For example, according to an ESCAP survey, 500,000 to 600,000 people depend directly on the Sundarbans for their livelihood. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 76)

Access to the public commons such as land, wetlands, forests, grassland, rivers, estuaries, open sea, capture fish, etc. provides a vital social safety net to the poor. Therefore, an increased and sustained access to natural resources for poor, especially, for rural poor should be an important component of poverty alleviation policies. So, over-exploitation of common resources for commercial purposes, with a total exclusion of the poor may hollow out the very base of poverty alleviation. (*National Strategy for Accelerated Poverty Reduction*, GOB, 2005: 179) For example, shrimp farming for commercial purposes has proved disastrous for the local people. Most of the shrimp farms are cultivated by the entrepreneurs who are non-residents in the area without having any social obligations. Generally, marginal farmers are not allowed to work in shrimp farms. As a result, they have to look for employment often outside the village leaving the family, which may result in family dislocation. This sector is captured primarily by the urban dwellers, and the benefits are not distributed equally among all sections of the society who are involved in the sector. Thus, shrimp farming has deprived

local people from their traditional rights over land and has inflicted irreparable social costs in the terms of total marginalisation of small and marginal farmers. (Bhattacharya et al, 1999: 18)

Not only resource conservation, but control and mitigation of pollution are also inextricably linked to poverty alleviation. For example, indoor air pollution constitutes a major health risk for the women and children, especially for poor households. A study by the World Bank found that various variables related to indoor air pollution such as choices of cooking fuel, cooking location, ventilation practices etc. were significantly determined by family income and adult education level (particularly for women). It found that the poorest, least-educated households have twice the pollution levels of relatively high income households with highly educated adults. The study also found that young children and poorly educated women in poor households face indoor air pollution exposures four times those of men in high income households organised by well educated women. (Dasgupta et. al., 2006: 453) The inference can be drawn that higher income and awareness among women may result in cleaner fuel choices, reducing indoor air pollution to a considerable scale.

In Bangladesh government policies and planning have also accepted this link between poverty and environmental deterioration. *The National Strategy for Accelerated Poverty Reduction, 2005* stated that:

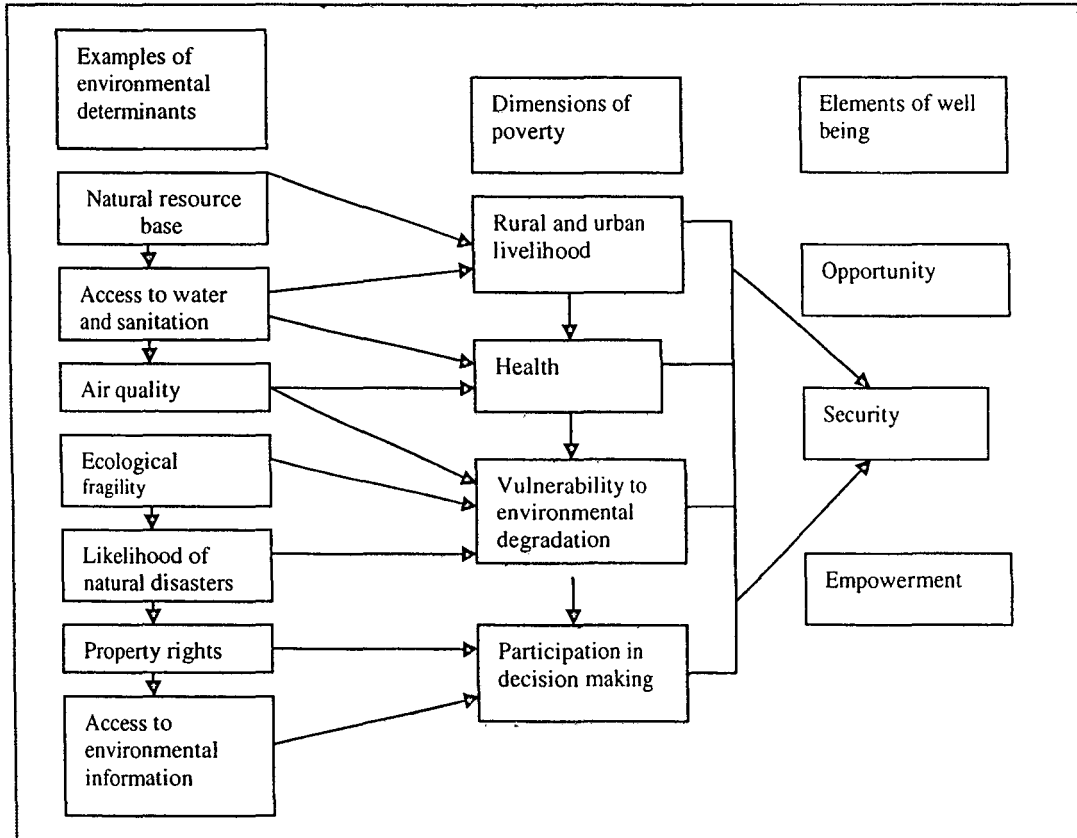
The linkage between poverty and conservation of natural resources is a mutually reinforcing process. Communities living in urban slums, people living in areas prone to severe floods, drought, salinity, and bank erosion; and river/estuarine islands, tribal communities living in hills and forests, communities of landless and migrant workers depend on natural resources for livelihood. On the one hand poverty perpetuates environmental degradation because the poor are forced to mine natural capital for survival beyond sustainable limit.... On the other hand, overexploitation of nature also implies decline in the per capita quantity and/or quality of water, land, forest, and biodiversity, which aggravates poverty. (*National Strategy for Accelerated Poverty Reduction, GOB, 2005: 177*)

The figure 3.A shows this complex relationship between poverty and environmental degradation.



**Figure: 3.A**

**Environmental Links to Dimensions of Poverty**



Source: *The World Bank Environment Strategy, Annex B, 'Poverty and Environment'*<sup>1</sup>

**3.2.1 Environmental Degradation and Poor Women**

Among the poor, the women are the most vulnerable to the adverse impacts of the shrinking resource base. Women constitute around 49 per cent of the total population in Bangladesh. As compared to men, women are generally ill-educated, have little access to security to land tenure, get low wages and most of their contribution to the economy and households remains unaccounted or undervalued. As of 2004, 59.9 per cent of the women (age group of 15 and above) were involved in economic activities. As of 2003, 77 per cent of the economically active women were involved in the agriculture whereas only 53 per cent of the men were employed in the same; only 9 per cent of the women were

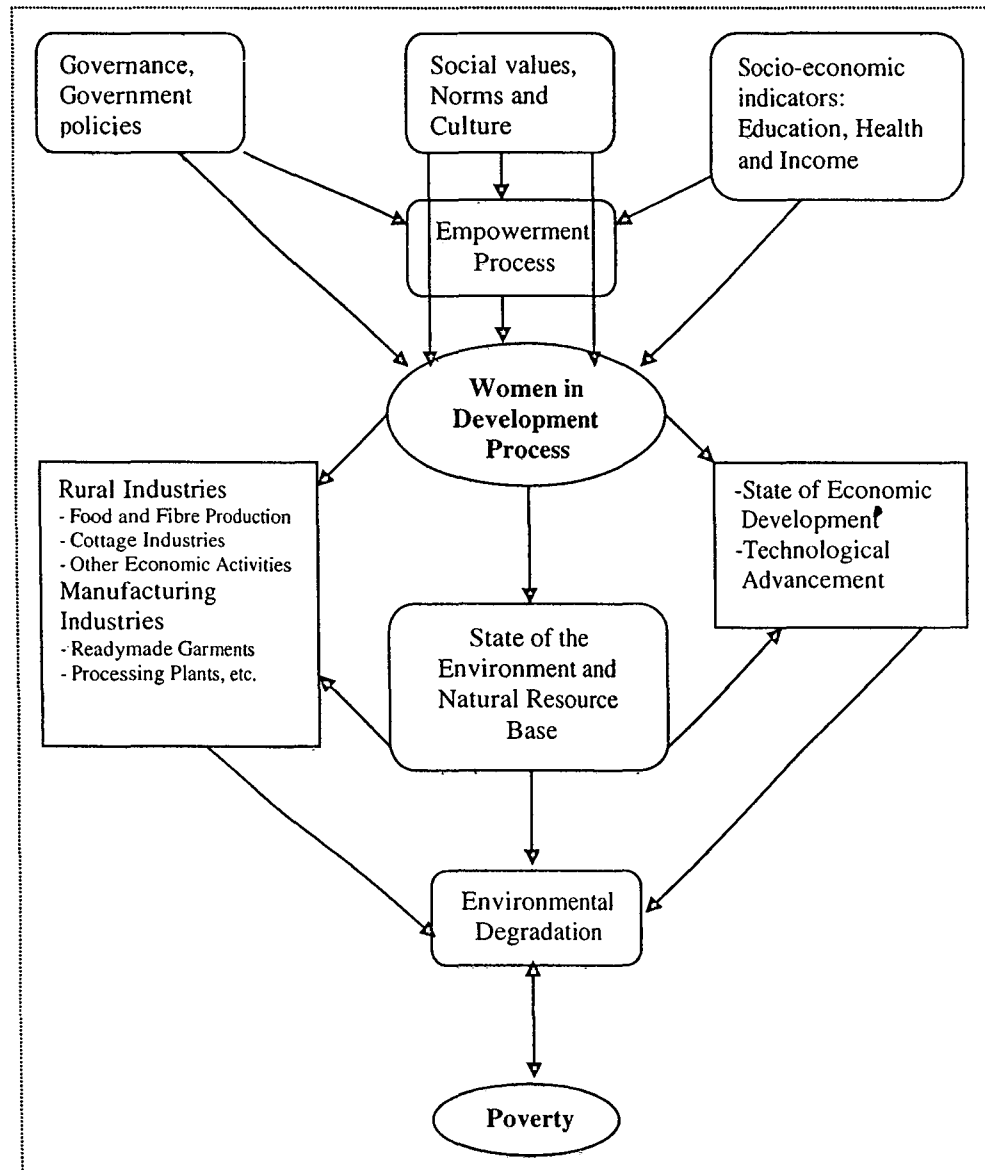
<sup>1</sup> As quoted in: *People's Report 2002-2003: Bangladesh Environment*, vol. I. 2004, Unnayan Shamannay.

employed in the industrial sector while the ratio for the men was 11 per cent; and 30 per cent of the men were engaged in the services whereas only 12 per cent of the women were employed in the same. (*Human Development Report 2006*, UNDP) It is clear from the available data that more women are employed in labour-intensive activities as compared to men. Total working hours for women are also longer in comparison to men and much of the time is spent in non-market activities. As of 1990, total working time for the women were 9 hours 5 minutes a day while working hours for men were 8 hours 16 minutes. Moreover, women spent only 35 per cent of their total working hours in market-activities and 65 per cent of the time was spent in non-market activities whereas 70 per cent of the men's working hours were spent on market-activities i.e. only 30 per cent was spent on non-market activities. (*Human Development Report 2006*, UNDP) It can be observed from the data how contribution of the women to the economy remains unaccounted.

In rural areas, life of the women is totally dependent upon natural resources. For example, they are responsible for managing food and vegetables, collecting fuel wood, water, fodder, etc. Rural women also play vital role in management of natural resources such as soil, water, forest resources and energy sources. "Their tasks in agriculture, forestry, animal husbandry as well as in the household make them daily managers of the living environment." (*Women in Bangladesh Country Briefing Paper*, ADB, 2001: 26) Caught into the complex cycle of poverty, flawed development policies i.e. marginalisation of women from development process, and environmental degradation, women are the worst sufferers. In addition to government policies, social values, norms and culture of a particular society play decisive role in socio-economic development of the women, which, in turn, shapes the whole cycle of poverty and environmental degradation. (*Women in Bangladesh Country Briefing Paper*, ADB, 2001: 27)

The figure 3.B below shows the complex relationship among status of the women, environmental degradation and poverty.

**Figure 3.B**  
**Women, Environment and Poverty**



Source: Nilufar Jahan and Mohammad Alauddin, 1999: 308

Deforestation, soil erosion, loss of fisheries, drying of wetlands, contamination of water and soil degradation due to agro-chemicals and industrial wastes, etc. have deprived the women from their traditional means of livelihood. Such conditions force them to migrate to marginal environments with low availability of natural resources where they have to struggle hard to survive. For example, deforestation means that women have to spend more time in gathering fuel wood over long distances; loss of

fisheries implies less protein intake for women and children. Women experience the hunger and poverty resulting from environmental degradation and reduced access to common property resources in more intense ways than men. In urban areas, due to scarcity of fuel-wood women are forced to use industrial wastes as fuel which emits toxic fume, causing indoor air pollution and respiratory diseases. In Bangladesh women have been the worst sufferers of the shrimp farming. Flooding and embankments for shrimp farming have reduced the availability of pastureland and as a result number of cattle has also drastically reduced. This situation has caused the shortage of dairy products and fuel, creating livelihood problems for women. Mainly women are engaged in the collection of shrimp fries and the processing of shrimp. They are forced to work in degraded environment, which poses serious threat to their health. They are also tortured and harassed by the owners of the shrimp farms. (Bhattacharya et al., 1999: 18)

Mainstreaming of the women in development process is vital for the protection of environment because women can provide first-hand knowledge on the causes and impacts of environmental deterioration. (Jahan and Alauddin, 1999: 307)

### **3.2.2 Environmental Degradation and Conflict**

As mentioned in Chapter I, environmental degradation and resulting social stress may be a potential cause of conflict also. "Environmental destruction, besides being the immediate factor in fuelling competition over natural resources, can also potentially lead to loss of source of living, which may result in the migration of the affected people." (Ashok Swain, 1996: 20) This migration may cause instability in the host society which may ultimately escalate into violent conflicts.

Swain in his study found evidences of large scale migration from the south-western part of Bangladesh in neighbouring India through West Bengal. The study suggested a declining trend in population growth in Khulna division. The author found that during 1981-1991, the population growth in Khulna was only 1.62 per cent while rest of the country experienced the population growth above the 2 per cent mark during the same period. However, historically, the population growth in this region has always been

higher than the national average. (Table 3.2) The table below presents the trends in population growth in four divisions in Bangladesh.

**Table 3.2**  
**Trends in Population Increase in Four Divisions in Bangladesh**

<b>Divisions</b>	<b>1961-1974</b>	<b>1974-1981</b>	<b>1981-1991</b>
Chittagong	2.87 %	2.48 %	2.22 %
Dhaka	3.11 %	2.75 %	2.22 %
Khulna	3.31 %	2.41 %	1.62 %
Rajshahi	3.56 %	2.64 %	2.09 %
Bangladesh	3.21 %	2.57 %	2.03 %

Source: *Statistical Yearbook of Bangladesh 1992*, Bangladesh Bureau of Statistics.<sup>2</sup>

This low population growth in Khulna has been a result of water diversion of Ganges river at Farakka by India. Poor people in the Farakka-affected region have been forced to leave their home due to the loss of rural economy resulting from loss of agriculture, reduced fish catch, river bank erosion and flood related damage. These people have migrated to West Bengal, Assam and other north-eastern Indian states which has resulted into native-migrants conflicts.

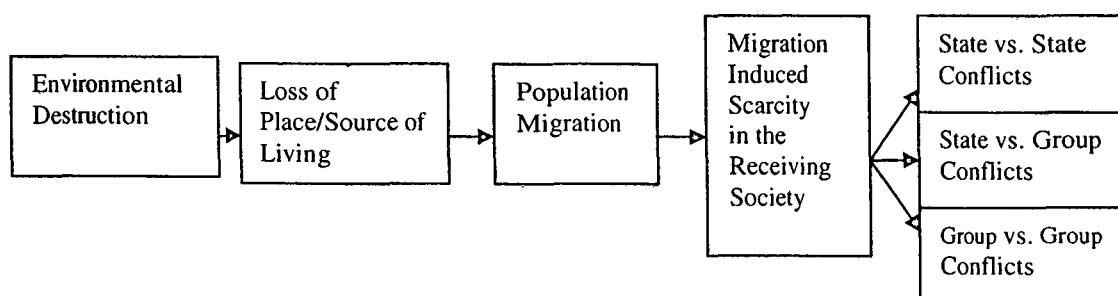
Rural-urban migration in Bangladesh also largely reflects this phenomenon where reduced agricultural productivity and loss of traditional sources of livelihood have forced people to rush to urban centres, further deteriorating the environmental sustainability. This migration may cause conflict at three levels: state vs. state conflicts, state vs. group conflicts, and group vs. group conflicts. Figure 3.C illustrates this phenomenon.

---

<sup>2</sup> As cited from: Ashok Swain, 1996: 82.

Figure 3.C

**Environmental Degradation, Population Migration and Types of Conflicts**



Source: Ashok Swain, 1996

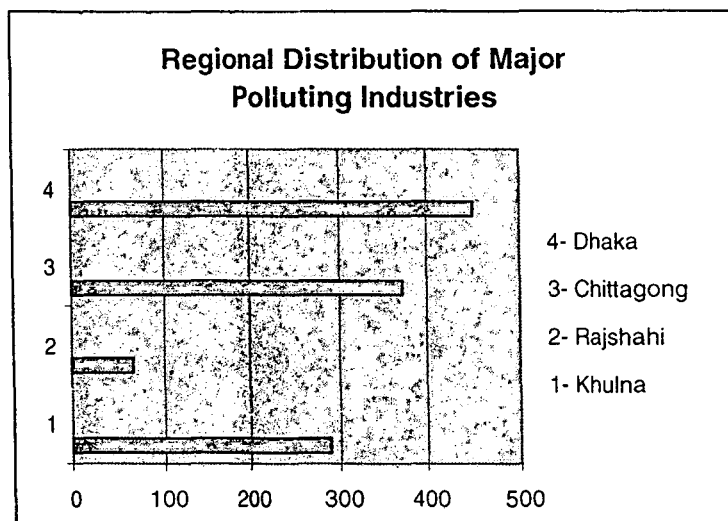
In addition to the above mentioned general issues, the following section concentrates on the socio-economic impacts of industrial pollution and related problems.

**3.3 Industrial Pollution and its Socio-Economic Impacts**

Bangladesh has experienced the fastest growth in industrial sector in South Asia, a growth rate of about 7 per cent per annum, over the past decade. This rapid growth in industrial sector has caused considerable damage to environment resulting into multifaceted socio-economic problems. Due to unplanned industrialisation, Bangladesh faces serious problems of industrial pollution such as water, air and noise pollution, river pollution, soil degradation caused by toxic wastes, etc.

Some of the important industries in Bangladesh are tanneries, textiles, paper and pulp, fertilizer, sugar, steel, oil refineries, chemical industries, pharmaceuticals, and other small scale, agro-based and agro-allied industries. Most of the industries are located in three Divisions: Dhaka, Chittagong, and Khulna. Within Dhaka industries are mainly located at Tejgaon, Hazaribag, Demra, Tongi, Joydevpur, Narshingdi, and Narayangang. In Chittagong industries are located mainly at Kalurghat, Nasirabad, Sholashahar, Patenga, Kaptai, Bhatiary, Barabkuda, and Fauzdarhat. In Khulna, industrial units are generally concentrated in Shiromoni, Khalishpur, Boyra and Rupsha. (*People's Report on Bangladesh Environment 2001*, vol. 1, 2001: 154) The figure 3.D below shows the regional distribution of major polluting industries in Bangladesh.

Figure 3.D



Source: Department of Environment, Government of Bangladesh.<sup>3</sup>

Dhaka has the largest concentration of polluting industries, followed by Chittagong and Khulna: 450 polluting industries are located in Dhaka, 370 polluting units are there in Chittagong, 290 in Khulna, and Rajshahi is the home of 66 polluting industrial units. (Figure 3.D)

In terms of waste-generation, most polluting industries are paper and pulp, textiles (dyeing and printing), and tanneries. In addition, sugar, food and fish processing industries, and distilleries are also major sources of waste generation. Industries generate all three types of wastes – liquid waste, solid waste and gaseous emissions. Though gaseous emissions and solid wastes are major cause of concern, liquid effluents cause most harmful impacts on human health and aquatic life. Effluents, mostly untreated, are discharged into water bodies such as rivers and streams which are used for multiple uses, for example, drinking, washing, cooking, bathing, as well as for irrigation and fishing.

Industrial effluents contain mainly four types of pollutants:

- i. biodegradable organic compounds (measured in terms of biochemical oxygen demand or BODs);

<sup>3</sup> As Quoted in *Bangladesh Compendium of Environmental Statistics 1997 (1999)*, BBS.

- ii. non-biodegradable or persistent organic compounds (measured in terms of chemical oxygen demand or CODs);
- iii. heavy metals such as mercury (Hg), chromium (Cr), cadmium (Cd), lead (Pb), copper (Cu); and,
- iv. a wide range of other dissolved substances as well as suspended particles.

Textile, paper and pulp, food and fish processing industries, tanneries and distilleries discharge biodegradable organic wastes. Mainly pesticide, chemical, and pharmaceutical industries generate non-biodegradable organic wastes. Toxic heavy metals are found in the effluents from tanneries, pulp and paper industry, paint, pesticide and other chemical industries. (*People's Report on Bangladesh Environment 2001*, vol.1, 2001: 154) The tables below show the pollution load and concentration of selected pollutants in effluents from selected industries.

**Table 3.3**

**Estimated Waste Water Loads from Industries**

Industry	Public (num.)	Private (num.)	Wastewater Discharge m <sup>3</sup> /day	Pollution Load kg/day
Leather	1	195	15,800	17,600
Textiles	20	482	40,000	26,000
Paper and Pulp	4	1	228,000	40,000
Fertilizers	7	1	na	
Urea				1,748
TSP				323
Ammonium				16
Chemicals	1	99		
Soap			1,350	1,200
Glycerine			98	195
Others			na	na
Pharmaceuticals	2	100	3,500	700
Sugar	12	4	30,000	4,000
Food and Fish	-	193		
Biscuits			799	1,670
Shrimps			4,009	4,184
Fish Products			268	81
Fruits & vegs.			225	18
Beverages			79	38



Milk Products			na	na
Rubber		25	na	1,755
Plastics		30	na	na
Pesticides	1	3	200	na
Distilleries	-	4		
Spirits			945	3,300
Syrup+compounds			963	2,420
Metal Finishing	17	67	13,802	na
Cement	1	1	na	na

Source: Department of Environment, Government of Bangladesh (1994 data)<sup>4</sup>

**Table 3.4**

**Concentration of Selected Parameters of Pollution in Industrial Liquid Wastes**

Selected Parameters	Unit	Textile Wastewater <sup>a</sup>	Tannery Wastewater <sup>b</sup>	Pulp & Paper Wastewater <sup>c</sup>	Effluent Standard <sup>d</sup> (GOB, 1997)
BOD	Mg/l	8,100	36,000	600	50
COD	Mg/l	17,100	56,400	1,700	200
Suspended Solids	Mg/l	15,221	7,498	2,024	150
Nitrate	Mg/l	200	700	-	10
Chloride	Mg/l	80,000	62,500	5,900	600
Chromium	Mg/l	0.47	3,818	-	0.5
Sulfide	Mg/l	-	1,500	-	1.0

Source: BUET as reported in Rahman (1997).<sup>5</sup>

**Note:** a- maximum concentration among waste water from 17 textiles;

b- maximum concentration among waste water from 16 tanneries;

c- maximum concentration among waste water from 3 paper and pulp industries;

d- for discharge into surface water bodies.

The tables show an alarming rate of pollution from industries. Much of these pollutants are thrown into rivers without any treatment, causing severe pollution of water bodies. In Dhaka, only major industrial units discharge more than 8 million kg of BOD

<sup>4</sup> As quoted in *Bangladesh Compendium of Environment Statistics 1997* (1999), BBS.

<sup>5</sup> As quoted in *People's Report on Bangladesh Environment 2001*, vol.1, 2001

into four rivers around it annually. (*People's Report on Bangladesh Environment 2001*, vol.1, 2001: 154) In Dhaka, tanneries in the Hazaribagh area discharge their wastewater into Buriganga river regularly. Out of 270 registered tanneries in Bangladesh, 90 per cent are located at Hazaribagh on about 25 hectares of land. Everyday the tannery units all over the country generate 8.47 million liter liquid wastes and 98 MT solid wastes. Of these, tanneries in Hazaribagh area alone generate 7.70 million liter liquid waste and 88 MT solid wastes. (*Leather Industry Environmental Pollution and Mitigation Measures*, SEHD, 2000: 1)

Industrial units (mainly textiles and steel re-rolling units) at Tongi near Dhaka discharge wastewater through canal Tongi *Khal* into river Turang, which joins the river Buriganga in the south. Tongi Khal and Turang river have turned into dumping ground for industrial wastes and effluents. Shitalakkhya river is another example of intensive pollution. More than 150 large and small industries release liquid waste in the river regularly. Table 3.5 presents the water quality status of major rivers in Bangladesh.

**Table 3.5**

**Water Quality Status of Major Rivers in Bangladesh (1996)**

Parameter	Jamuna	Burigonga	Shitalakhya	Meghna	Padma	Standards for fishing water
pH	6.7-7.5	6.8-7.3	7.1-7.8	6.3-8.0	7.0-7.8	6.5-8.5
EC	160-505	160-390	175-495	60-900	136-740	800-1000
Chloride	1-22	9-27	2-22	2-24	5-46	600
TS	148-260	179-339	143-254	39-267	398-700	-
DO	5.1-7.5	1.3-6.6	6.3-8.8	5.5-8.8	5.5-7.7	4-6
BOD	1-40	.06-12	0.8-2.5	1.1-3.4	1.1-1.0	0

Source: Department of Environment.<sup>6</sup>

Note: All units in mg/L excepting EC in micro S/cm. BOD at 20°C and five days.

<sup>6</sup> As quoted in *Bangladesh Compendium of Environment Statistics 1997* (1999), BBS.

**Table 3.6****Estimated Waste Water Flow and BOD Loads at Selected Industrial Areas**

<b>Industrial Area</b>	<b>Number of Industries</b>	<b>Wastewater Discharge (m<sup>3</sup>/day)</b>	<b>Pollution Load BOD (kg/day)</b>
Hazaribagh, Dhaka	149	15,800	17,600
Tongi, Dhaka	42	3,080	1,570
Tejgaon, Dhaka	71	3,500	1,850
Fatullah, Narayanganj	25	4,630	3,150
Kanchpur, Narayanganj	9	3,320	2,070
Tarabo, Narayanganj	14	1,150	1,475
Nasirabad, Chittagong	51	4,240	2,544
Fauzdarhat, Chittagong	6	3,845	3,350
Kalurghat, Chittagong	16	1,380	1,500

Source: BKH (1995)<sup>7</sup>

Though all suffer from water pollution, the poor are the most vulnerable and prone to water-borne diseases as they have no other option but to use the water from polluted rivers and other water bodies. Even they cannot move away from the pollution hotspots such as slum clusters, river banks, periphery of industrial areas, etc. to relatively safer places. The worst sufferers from pollution of river bodies are farmers and fishermen. In Bangladesh, though culture fish has witnessed an increase largely owing to the shrimp farming, capture fish in inland water bodies has declined to a considerable level due to water pollution. Though other factors such as loss of wetlands, encroachment and degradation of water bodies, a large number of flood control, drainage and irrigation projects, and rapid urbanisation are also responsible for loss of capture fish, pollution of rivers, is supposed to be a prime cause of loss of various fish species. The table below shows the trends in fisheries production in Bangladesh.

---

<sup>7</sup> As quoted in *People's Report on Bangladesh Environment 2001*, vol.1, 2001.

**Table 3.7**  
**Inland Water Fish Production in Bangladesh (1984-1994)**

Source	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	
<b>Inland Waters</b>											
<b>A) Capture</b>											
1)	River & Estuary	213057	199500	195117	183317	181140	173410	135355	124843	138746	130235
2)	Sundarban	5825	7112	6035	3055	6416	5393	6651	6297	6939	6970
3)	Depression (Beels & Haors)	45893	45258	42077	45610	47019	46594	47923	49201	53019	56678
4)	Kaptai Lake	2700	2433	3991	4068	3439	3713	4392	4216	4142	4815
5)	Flood Land	194130	187396	183795	182037	186126	193762	249083	295185	329573	353530
	Sub-total	461605	441699	431015	418087	424140	422872	443404	479742	532419	552228
<b>B) Culture</b>											
1)	Pond	111557	123804	142876	148423	155012	153730	131018	195034	202177	231530
2)	Baors	962	968	1174	1254	1321	1357	1544	1682	1803	2250
3)	Farm	11232	19951	22050	25248	27172	27505	28431	30147	33773	41500
	Sub-total	123811	144723	166100	175925	183505	192592	210993	226863	237743	275280
	Inland Total	585416	586422	597115	594012	607645	615464	654397	706605	770162	827508

Source: Department of Fisheries, Bangladesh 1984-1994: Bulletins on Annual Fish Catch Statistics for the years 1984-85 to 1994-95.<sup>8</sup>

It is clear from the table that fish capture from the rivers has declined to a considerable level. Consumption information from the Household Expenditure Survey, 2000 by the BBS shows that average fish consumption in the country declined by 12 per cent since 1995 while fish consumption of the poorest 22 per cent of the population had declined by 38 per cent. The data shows that decline in capture fish has deprived the poor of their natural protein intake. (*Bangladesh Country Environment Analysis*, World Bank, 2006: 46)

<sup>8</sup> Quoted from: *Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 109.

In some areas crop production has also declined due to the use of polluted water for irrigation purposes, causing direct impact upon the livelihoods of the poor farmers. For example, villages near the Dhaka Export Processing Zone-1 in Savar Upazila have complained of the severe pollution of Dhalai *Beel* and resulting decline in rice production. Villagers from the area reported that before the industrial units were established and effluents were discharged in the Dhalai *Beel*, the paddy yield was 30-35 *maunds* per *bigha* which had declined to 10-12 *maunds*. A black layer of untreated waste from the industrial units covers most of the paddy fields in the adjoining villages near the Dhalai *Beel*. (*People's Report on Bangladesh Environment 2001*, vol.1, 2001:162-63)

Apart from effluents, gaseous emissions and industrial solid wastes are the major sources of air and soil pollution. Generally, gaseous emissions from industries contain hydrogen sulphide (H<sub>2</sub>S), ammonia (NH<sub>3</sub>), suspended particulate matter (SPM), sulphur dioxide (SO<sub>2</sub>) and other oxides of sulphur, oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOC). Industrial solid wastes include biodegradable organics, usable organics such as paper and pulp, recyclable waste such as metal, plastics, glasses, and hazardous waste like heavy metals, pesticides, chemical residues, etc. (*People's Report on Bangladesh Environment 2001*, vol.1, 2001: 156)

### **3.3.1 Polluting Industries in Residential Areas**

Polluting industrial units in residential areas, which are often the major sources of air and noise pollution, cause serious threat to human health. In Islamabag area of Dhaka, plastic recycling units and hide and skin processing factories are the main sources of pollution. A survey revealed that there were about 57 industrial units in an only 220 feet-wide lane and in another 300 feet-wide lane there were 68 such factories. (*People's Report 2002-2003: Bangladesh Environment*, vol. I, 2004: 117) Small industrial units including printing, garment manufacturing, moulding, welding, repairing, plastic factories, chemical manufacturing, packaging and many other industries have flourished in most of the residential areas of the capital city. These industrial units produce foul odour, smoke, dust, noise, solid wastes and effluents. In the absence of proper waste disposal system, these industries dump their wastes along the road sides, lanes and in drains also. The Table 3.8 gives a picture of industrial units at various municipal wards in Dhaka.

**Table 3.8**  
**Industrial Units in Five Municipal Wards in Dhaka**

Municipal Wards	Number of Industrial Units	Types of Industrial Units
5 (Pallabi and its adjoining areas)	500	Saree, welding, moulding paints, candle, mosquito repellent, rubber shoe etc.
27 (Sabujbag and its adjoining areas)	20-25	Foundry, welding, moulding
42 (Mohammadpur and its adjoining areas)	40-50	Shoe, rubber sandal, welding, moulding, foundry, candle, incense etc.
65 (Islamabag and its adjoining areas)	2500-3000	Plastic, engineering etc.
81 (Gendaria and its adjoining areas)	100-150	Padlock, engineering, pharmaceuticals, moulding, foundry etc.

Source: *People's Report 2002-2003: Bangladesh Environment*, vol. I., 2004

These industrial units have caused a large number of problems such as odour, dust, traffic congestion, noise, waste, clogging of drains, various diseases, etc. However, ironically enough, residents in these areas have not raised any major protest against the pollution from these industries. Generally, local residents are owners of these factories and a large number of people from these localities are also employed in these units. Given the fact that these industrial units are the major sources of employment, it is very difficult to relocate them. In most of the places people have habituated to the hazards caused by polluting industries. (*People's Report 2002-2003: Bangladesh Environment*, vol. I., 2004: 117-118)

Industrial pollution has inflicted considerable socio-economic costs. An estimate by Haque, Faisal, and Bayes (1997) showed that land prices in Hazaribagh area had fallen by 7-8 % due to pollution from the tanneries. Simultaneously, health cost had increased by \$25 per month owing to health hazards caused by pollution in the area. (*Bangladesh Compendium of Environment Statistics 1997*, BBS, 1999: 92) Poor industrial labourers, who are forced to work in unhygienic and polluted environment, are the immediate victims of industrial pollution. A study conducted on 179 tannery workers from six tanneries in Hazaribagh area by the Society for Environment and Human Development

(SEHD) revealed that about 90 per cent of the Hazaribagh tannery workers die before the age of 50 because of unhygienic working environment. About 58.10 per cent of workers suffer from ulcer, 38.26 per cent experience skin diseases, 16.76 per cent suffer from malnutrition, 11.73 per cent have high blood pressure and 10.61 per cent suffer from rheumatic fever. The study found that about 894 workers per thousand suffer from diseases whereas the national ratio is 150.85 per thousand. (*People's Report 2002-2003: Bangladesh Environment*, vol. I., 2004: 127)

The study also found that most of the workers were not aware of the precautionary and safety measures at work. It was found that only 30 per cent of the workers wear shoes at workplace, only 3 per cent wear aprons, only 3 per cent wear masks and only 12 per cent wear gloves.

Not only workers, but residents in surrounding areas of these tanneries also suffer from a number of diseases. A survey conducted by the Allergy, Asthma, Environment Research and Skin Care Institute found that most of the residents in Hazaribagh area were suffering from various diseases. The study conducted on 140 persons in the area found that 45 of the respondents were suffering from skin diseases, 52 from asthma, 76 from chest pain, 32 from jaundice, 19 from dysentery and 3 from blood pressure. (*People's Report 2002-2003: Bangladesh Environment*, vol. I, 2004: 127)

### **3.3.2 Industrial Pollution and Resulting Health Hazards**

Industrial pollution in Bangladesh has significantly added to the burden of morbidity and health costs. According to a World Bank study, in Bangladesh nearly one-fifth of the total burden of disease may be attributed to the environmental factors. Top two causes of death and sickness in Bangladesh are respiratory and diarrhoeal diseases which are directly associated with air and water pollution. In Bangladesh some 16.5 to 22 per cent of the total health risk is caused by four environmental health risks:

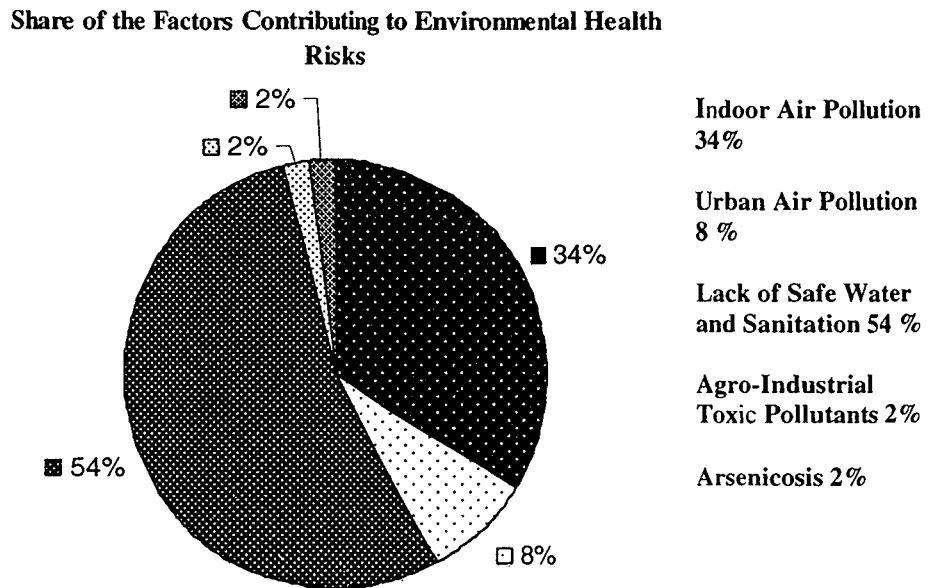
- i. poor indoor air quality and urban air pollution leading to respiratory infections and diseases;
- ii. lack of access to clean water combined with other sanitation and hygiene related problems, causing diarrhoeal diseases;

- iii. chronic exposure to toxic pollutants from pesticides and industrial sources;
- iv. exposure to high level of naturally occurring arsenic in drinking water, causing cancer, heart diseases, diabetes, etc. (*Bangladesh Country Environment Analysis*, World Bank, 2006: 8)

Figure 3.E presents the estimated burden of health risks caused by the above mentioned factors associated with environmental degradation.

**Figure 3.E**

**Contributing Factors to Environmental Health Risks**



Source: *Bangladesh Country Environment Analysis*, World Bank, 2006.

In this way, we see that diarrhoeal/water-borne diseases contribute to 54 per cent of total environment health risks which are directly related to the lack of access to safe and clean drinking water. Both indoor and urban air pollution are responsible for 34 and 8 per cent of environmental health risks respectively, contributing to acute respiratory infections and chronic lung infections. Toxic chemicals from agricultural and industrial sources, which account for 2 per cent of total health risks, may cause certain types of cancer, particularly those related with renal and digestive functions, skin and blood



cancer. Arsenic poisoning of the ground water, which is largely supposed to be a natural calamity, is responsible for cancer, skin diseases, heart diseases and diabetes. Children and women are the worst victims of diseases caused by the lack of clean water and indoor air pollution. (*Bangladesh Country Environment Analysis*, World Bank, 2006:8)

In addition to social costs, these diseases caused by environmental deterioration, impose heavy economic costs in terms of poor quality of life, reduced life span, less productivity, increased health costs, etc. over the long run. Simply, deaths, diseases, increased health costs etc. add to the burden of national expenditure. Table III.9 below presents an estimate of national savings by reduced exposure to environmental health risks.

**Table 3.9**  
**Potential Reductions in Mortality and Morbidity and Economic Savings by Reducing Exposure to Environmental Health Risks**

Reduced Exposure	No. of Deaths Avoided	Sickness Avoided	Savings (US\$ million)	Savings as percentage of GNI
Indoor Air Pollution: reduce exposure by 20%-80%	7,600-3,0400	0.3-1.2 million DALYs	114-458	0.23-0.92
Urban Air Quality: reduce PM <sub>10</sub> concentration by 20%-80%	1,200-3,500	80-235 million cases	169-492	0.34-1.0
Water Supply and Sanitation: universal access to improved water sources and sanitation	—	0.82-1.94 million DALYs	313-739	0.63-1.43
Arsenicosis: prevent exposure above fifty ppb	9,100	0.13-0.17 million DALYs	48-66	0.1-0.13
<b>Total</b>			<b>644-1755</b>	<b>1.3-3.5</b>

Source: M. Khaliqzaman, *Health Impact of Air and water pollution in Bangladesh*. World Bank. December 2004<sup>9</sup>.

**Note:** DALYs stand for Disability Adjusted Life Years. DALYs are calculated as the present value of future years of disability free life that are lost as the result of premature deaths or cases of disability occurring in a particular year.

<sup>9</sup> As Quoted in *Bangladesh Country Environment Analysis, 2006*, World Bank.

The data presented in the table reflects that environmental degradation has inflicted considerable toll on the national economy. If exposure to indoor and urban air pollution, arsenic poisoning, and lack of access to clean water is brought down to the above mentioned level, it may result into the saving of 1.3-3.5 per cent of the GNI. (Table 3.9)

A study by the ADB found that a considerable amount of Bangladesh's national resources has been lost owing to environmental degradation. The study estimated that one time 'cost of remediation' of environmental damage would be \$0.42 billion (in 1990 prices) or about 2 per cent of the GDP. The study calculated the cost of remediation by placing monetary value on air, water, land and other elements of ecosystem while the costs of disease and death resulting from pollution were not counted. (*Bangladesh Toward an Environment Strategy*, Country Environment Review, ADB, 2000: 21)

### 3.3.3 Industrialisation, Urbanisation and Urban Pollution

Industrialisation in Bangladesh has been closely accompanied with rapid urbanisation. The urban population growth rate, which was 4.25 per cent in 1974, had increased to 6.03 per cent during 1996. The Table 3.10 below shows the trends in urban population growth rate in Bangladesh.

**Table 3.10**  
**Trends in Urban Population Growth Rate in Bangladesh**

Year	Growth Rate of Urban Population
1974	4.25 (8.8)
1975	6.74 (9.3)
1981	6.63 (15.2)
1985	6.52 (16.2)
1991	- (17.2)
1992	6.30 (18.0)
1993	6.27 (20.0)

1994	6.22 (21)
1995	6.09 (22)
1996	6.03 (23)

Source: *Fifth Five Year Plan 1997-2002*, Government of Bangladesh, p.14

Note: Data in parenthesis shows the urban population as percentage of total population.

Rapid urbanisation is closely associated with environmental factors also. “In a vicious circle familiar in many developing nations, growth begets rapid industrialisation and urbanisation with cumulative environmental effects so devastating that air and water pollution, for instance, comes to act as breakers on future progress.” (*Bangladesh 2020: A Long-Run Perspective Study*, World Bank, 1999: 57) Economic reforms and resulting changes in the structure of economy have been a basic determinant of rural-urban push and the urban boom. Declining share of agriculture to the national economy and increasing share of services and industries is a factor which has fundamentally changed the life patterns of millions of people. As of 2005, the share of agriculture to GDP was 21 per cent while services and industries accounted for 52 per cent and 28 per cent respectively, i.e. both services and industries contribute about 80 per cent of the GDP.

“Much of the investment and consequent increase in employment of a different kind (low paid, female, flexible labour for export-oriented industries) is taking place in or around more developed city centres like Dhaka and Chittagong.” (*People’s Report 2002-2003: Bangladesh Environment*, vol. I, 2004: 5) This structural change in the economy has accelerated the pace of rural-urban migration. While this phenomenon has caused pressure on environmental sustainability, to some extent, it has also been a result of environmental degradation itself.

This rapid urbanisation has not been matched with the improvements in basic amenities like water supply, sanitation, and waste management, causing heavy pressure on existing natural resource base, infrastructure and basic services. Rapid urbanisation coupled with widespread poverty is supposed to be a major contributing factor to environmental degradation. This complex interplay of globalisation (economic

liberalisation), urbanisation, poverty and environmental degradation raises some important questions about economic policies, environmental justice, social justice, and governance as well.

As of 2001, urban population consisted of about a quarter of the total population (23.53 per cent) out of this Dhaka alone contributes about one-third (33.2 %) of the total urban population of the country. According to the Population Census 2001, total urban population in 2001 was 29.255 million, which is 23.53 per cent of the total population while the population of Dhaka SMA was 9.67 million.<sup>10</sup> It is projected that population size of Dhaka will leap from 10 million to 21.2 million by 2015, making it the fourth largest city in the world. (*People's Report 2002-2003: Bangladesh Environment*, Vol. I, 2004: 4) The Table 3.11 presents the trends in urban population growth in Bangladesh.

**Table 3.11**

**Trends in Urban Population Growth in Bangladesh**

<b>Year</b>	<b>Total Urban Population (million)</b>	<b>Urban Population As % of Total Population</b>
1981	13.227	15.18
1991	20.872	19.63
2001	29.255	23.53
2003	37.0	27

Sources: Compiled from *Bangladesh Bureau of Statistics*, Government of Bangladesh & *World Development Indicators 2005*, World Bank.

This urban population boom in Bangladesh has caused relentless pressure on the basic services such as waste disposal and sanitation. For example, according to a survey by Centre for Urban Studies (1996), total estimated slum population in Dhaka Metropolitan Area (DMA) was 1.1 million. The survey estimated that 19.8 per cent of population in DMA was living in slums and squatter settlements. The survey found the number of slum clusters with 10 or more households each to be 3,007. (*Bangladesh*

<sup>10</sup> Available at: <http://www.bbs.gov.bd/dataindex/census/metropot.pdf>

*Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 281) However, according to a World Bank study, in Dhaka city about 4.2 million people live in slum areas. (*Bangladesh Country Environment Analysis*, World Bank, 2006: 27) These slum areas lack basic amenities such as safe drinking water, electricity, proper drainage and waste disposal system, toilet facilities etc. Slum dwellers are most exposed to water-borne diseases.

The management of solid waste in Dhaka remains a major challenge. More than 10 million people living in Dhaka produce nearly 5000 tons of solid waste daily, out of which only 42 per cent is collected and disposed by the Dhaka City Corporation (DCC). Around 16 per cent of the solid waste is recycled, mostly by the informal sector (households, hawkers, and waste pickers) and around 50 per cent of waste is thrown into streets, drains, ditches, canals and open streets, highly contributing to the deteriorating quality of life and environment in the city. As of present, DCC spends Tk. 2660 for the collection and transportation of one metric ton urban waste. The World Bank has estimated that by the year 2025, urban areas in Bangladesh would generate 47,064 tons of waste every day. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 218)

In terms of social costs, this rapid urbanisation has upset the social fabric of society with increase in slum areas, urban poverty, number of people without basic amenities, and deteriorating governance scenario. Crime rate in Bangladesh has increasingly gone up. While the total number of registered criminal cases in 1987 was 53732, it had increased to 108927 by 1999. (Table 3.12)

**Table 3.12**

**Trends in Increase in Number of Crimes in Bangladesh**

<b>Year</b>	<b>Total No. of Registered Crimes</b>	<b>Index of Registered Crimes (base 1999)</b>
1987	53732	86
1988	52912	85

1989	57005	92
1990	61354	99
1991	67682	109
1992	71602	115
1993	71961	116
1994	75309	121
1995	82931	133
1996	93310	150
1997	102161	164
1998	103068	169
1999	108927	264

Source: *Statistical Yearbook of Bangladesh 2001*, Bangladesh Bureau of Statistics, p. 663.

It is clear from the above data that there has been a dramatic increase in crime rate since 1995. This spectacular growth in crime can be partially explained by deteriorating resource base and resulting social dislocations.

Given the fact that urban areas are the centres of economic activity and sources of the national income, economic costs of urban pollution are considerably high. Dhaka is one of the most densely-populated cities in the world, with population density at more than 20000 people per square km. In Dhaka, about 4.2 million people live in slum areas and it is estimated that up to 55 per cent of the Dhaka residents live below the poverty line. At the same time, Dhaka contributes about one-fifth of the GDP, this very fact makes the issue of urban pollution and environmental sustainability a national concern. (*Bangladesh Country Environment Analysis*, World Bank, 2006: 27) Dhaka suffers from severe air and water pollution and the situation is further compounded by inadequate solid waste management system.

Concentrations of respirable particulate matters in air in Dhaka city exceed tolerable standards for more than hundred days of the year, contributing to an estimated 3,500 premature deaths annually. The economic costs, associated with the death and disease caused by poor air quality in Dhaka, are estimated to be about US\$500 million

per year. (*Bangladesh Country Environment Analysis*, World Bank, 2006: 27) Severe lead pollution in the city is one of the biggest health threats. A team of scientists from the Bangladesh Atomic Energy Commission found the lead concentration in Dhaka Air during the months of November-December-January to be 463 nanograms per cubic meter ( $\text{ng/m}^3$ ), which is the highest level of lead pollution in the world. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 215) The table below shows the concentration of major air pollutants in Dhaka city.

**Table 3.13**

**Air pollutants in Dhaka City (March 2001) as Compared to WHO Recommended Standard**

Compound	Hourly extreme $\mu\text{g/m}^3$	Times the WHO recommended standard
NO <sub>2</sub>	601-714	>10
SO <sub>2</sub>	300-500	>10
Particles	5-400	>15
Ozone	600-900	>5
VOCs	783000	>50-100
Benzene	783000	>7-10
Toluene	200000	>10

Source: Internet<sup>11</sup>

Both surface and ground water in and around Dhaka city are highly polluted. Many factors such as unregulated industrial establishments, high population density, encroachment of rivers, inadequacy of waste treatment facilities and moreover, ineffectiveness of environmental regulations, etc. are responsible for highly polluted surface water. Rivers and canals in and around Dhaka are highly polluted, especially in dry season when the flow of rivers is very low but discharge of effluents remains the

<sup>11</sup> URL: Online Web

[http://www.bdix.net/sdnbd\\_org/world\\_env\\_day/2005/data/atmosphere/air\\_pollutants\\_dhaka\\_compared\\_who.pdf](http://www.bdix.net/sdnbd_org/world_env_day/2005/data/atmosphere/air_pollutants_dhaka_compared_who.pdf), accessed on 17 Aug. 07.

same. The table below gives details of the status of the key parameters of water pollution in Dhaka during both dry and wet seasons.

**Table 3.14**  
**Water Quality in River and Canal System around Dhaka (2002-03)**

Location	Parameters (all mg/L)									
	Total Dissolved Solids		Dissolved Oxygen		Biological Oxygen Demand		Chemical Oxygen Demand		Ammonia	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Postogola (Buriganga river)	319	69	2.3	8.3	29.9	0.9	82.7	67.3	7.4	0.4
Convergence of Sitalakhya and Dhaleswari Rivers	127	63	7.2	8.9	2.0	1.3	58.0	70.7	0.6	0.7
Narayangan Ghat (Sitalakhya River)	189	63	5.1	8.6	9.0	1.0	88.0	73.3	2.3	0.4
Kanchon	193	56	7.2	8.7	2.0	1.0	72.3	53.3	0.6	0.6
Demra Sitalakhya River	234	56	4.3	8.8	14.3	1.4	130.7	74.7	2.6	0.6
Balu River	257	76	2.1	6.4	28.0	1.4	151.7	81.3	6.7	0.7
Singair	220	66	7.6	8.5	1.6	0.7	16.7	31.3	0.6	0.4
Ashulia Turang River	326	62	6.4	8.2	5.1	0.9	98.7	58.0	2.2	0.4
Uttar Khan	356	53	7.3	8.0	12.1	0.8	41.7	52.7	4.5	0.4
Dholai Khal Dhaka East	396	-	2.4	-	77.7	-	167.8	-	20.8	-
Begunbari Khal Dhaka East	386	-	2.1	-	75.9	-	187.5	-	22.4	-
Norai Khal Dhaka East	343	-	2.6	-	54.8	-	137.9	-	21.5	-
Saidabad Beel Dhaka East	179	-	5.3	-	11.0	-	64.8	-	2.2	-

Source: *Bangladesh Country Environment Analysis*, World Bank, 2006.



The Table 3.14 shows that Sitalakhya and Buriganga rivers are the most polluted ones. High level of biological oxygen demand and low level of dissolved oxygen shows the high concentration of organic waste and untreated industrial waste.

Agricultural yields and fisheries production have declined to a considerable level in the polluted areas. In these areas, about 45 per cent of households complained of persistent loss in rice production and more than 20 per cent families reported loss in vegetable production. It is estimated that agricultural and fisheries production in the DSMA (Dhaka Statistical Metropolitan Area)<sup>12</sup> would be reduced by about one-third owing to the poor water quality. A cost-benefit assessment conducted for the Bangladesh Environment Management Project estimated that the annual economic costs associated with surface water pollution were as high as \$400 million, including lost agriculture and fisheries production (17 per cent), costs to industries (22 per cent), lost amenity (21 per cent), and health costs (40 per cent), excluding the costs associated with inadequate water supply and flood control. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 29-32)

In this way, the above discussion shows that rapid industrialisation coupled with urbanisation has inflicted irreversible damage on environmental sustainability, resulting into irreparable socio-economic costs. If we examine this phenomenon in the broader context of the structural adjustment policies, it becomes clear that structural changes in the economy have not promoted an environmentally sustainable growth trend. "As resources switch from non-tradables to tradable sectors of the economy and as major shifts occur in production and cropping patterns in response to the adjustment policies, resource degradation has manifested itself as by-products of this particular pattern of growth." (Bhattacharya et al., 1999: 7) The share of agriculture to GDP has dipped down from 55 per cent in 1970 to 21 per cent in 2005 whereas the share of the industrial sector has increased from 9 per cent to 28 per cent during the same period. But the export-led industrialisation strategy has caused considerable damage to natural resource base of the country, leading to the broader socio-economic implications.

---

<sup>12</sup> The DSMA includes the areas administered by the Dhaka City Corporation, Dhaka District, Gazipur District and, Narayanganj District.

Though the government has implemented reforms on economic front, this has not been matched with simultaneous legislative reforms to avoid downside environmental externalities. The government has enacted some rules and regulations to control pollution but the implementation of the rules suffers from widespread corruption and bureaucratic delays. Generally, poor governance in Bangladesh has precipitated the environmental problems and related social tensions. The following chapter examines environmental governance in Bangladesh, focusing on legal provisions, institutional setup and the implementation issues.

## **CHAPTER 4**



# Environmental Governance in Bangladesh

## 4.1 Introduction

In Bangladesh, there has been a gradual increase in awareness about environmental degradation and depletion of the resource base of the country at both governmental and non-governmental levels. It is increasingly realised that long term growth can not sustain on a deteriorating environment base. The Bangladesh State of Environment Report 2001 noted that:

“Despite a rising awareness about the needs for protecting the environment, environmental degradation already cut a swathe through Bangladesh quite fast during the last three decades (1971-2001). The country’s ecology has been damaged, the forests have been depleted, the wetlands destroyed, different species of flora and fauna have vanished, wildlife has almost disappeared, bio-diversity has been greatly reduced and the air quality deteriorated. And even drastic measures are taken to halt the deteriorating trend, it is difficult to visualize an optimistic scenario for the country over the next 30 years (2001-2030).” (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 3)

But the lack of clear regulatory frameworks, institutional capacity, lack of knowledge and technology, weakness of effective implementation mechanisms and bureaucratic inefficiency are some of the major hurdles in the way of maintaining *green industrialisation*.

While it is widely acknowledged that there is a clear relationship between economic development and environmental degradation and much of the economic development in most of the poor countries has been achieved at the costs of environment, the role of governance in environmental management has largely been ignored. There is a close interlink between economic development, environment and governance. (Alauddin and Hasan, 1999: 3) Sustainable development can not be achieved without improvement in governance. A democratic political system, efficient and honest bureaucracy, independent judiciary, rule of law, administrative accountability, transparency in public policy formulation and implementation, respect of human rights and freedom of

expression, constructive media, participatory development, local self- governance, are some of the prerequisites of good governance.

To count a few, governance in Bangladesh generally suffers from lack of transparency and accountability, confrontational politics, absence of consensus on basic national issues among major political parties and pervasive corruption. Bureaucratic procrastination, absence of effective local self-governance, lack of proper coordination among various levels of administration, lack of proper implementation of existing legal and regulatory provisions, and the absence of clear cut demarcation of economic and social responsibilities of the government, the private sector and the non-governmental sector are also major impediments to effective governance. (Q K Ahmad, 2001)

In a country like Bangladesh where nearly half of the population lives below the poverty line, rapid industrialisation is but the only option to maintain a steady growth rate and to employ large section of population. Some crucial questions are:

- i. how to regulate industrial pollution and minimise other downside environmental and social costs;
- ii. what can be an effective mechanism to ensure clean production - whether market mechanisms or government regulations;
- iii. what can be the role of local communities in environmental management;
- iv. how to integrate non-governmental sector with formal regulation in environmental management; and,
- v. how to formulate and implement environmental regulations in a pro-poor approach.

Against this backdrop, this chapter examines the policies and institutions of environmental governance in Bangladesh both at governmental level and non-governmental level.

#### **4.2 Constitutional Base of Environmental Protection**

Article 31 and 32 of the Constitution of Bangladesh enshrine the “right to life and personal liberty” as a fundamental right. Though these articles do not clearly stipulate

right to safe and healthy environment as fundamental right, the Supreme Court of Bangladesh has established in its judgment that “right to life” includes “the right to healthy environment” (XLVIII DLR, 1996, p438 and XVII *Bangladesh Legal Digest* (BLD),1996 (AD), pg.1). (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 288) The Constitution of Bangladesh also stipulates that “it shall be a fundamental responsibility of the state to attain, through planned economic growth, a constant increase of productive forces and a steady improvement in the material and cultural standard of living of the people.” (Article 15,) So, the inference can be drawn that *a steady improvement in the material and cultural standard* cannot be attained without integrating environmental concerns into growth strategy.

### **4.3 The Institutional Context for Environmental Management**

The initial steps taken for environmental management by the government after the independence were the *Water Pollution Control Act 1973* and the *Bangladesh Wildlife Preservation Act 1973*. In 1977, the government issued the *Environmental Pollution Control Ordinance 1997*. The objective of the ordinance was “to provide for the control, prevention and abatement of pollution of the environment of Bangladesh”. The ordinance provided for the establishment of an Environment Pollution Control Board. The structure and functions of the board were as follows.

#### **4.3.1 Environment Pollution Control Board**

The board consisted of the following members:

- i. The member in-charge of Physical Planning and Housing Sector of the Planning Commission;
- ii. Secretary, Local Government, Rural Development and Cooperative Division;
- iii. Secretary, Agriculture Division;
- iv. Secretary, Ministry of Industries;
- v. Secretary, Ministry of Home Affairs;
- vi. Secretary, Ministry of Power, Water Resources and Flood Control;
- vii. Secretary, Ministry of Public Works and Urban Development;
- viii. Secretary, Forest, Fisheries and Livestock Division;

- ix. Chief, Flood Control and Water Resources, Planning Commission;
- x. Deputy Secretary dealing with the administration of this ordinance, Local Government, Rural Development and Cooperatives Division;
- xi. Director of Health Services;
- xii. Director of Fisheries;
- xiii. Chief Engineer, Public Health Engineering;
- xiv. Chief Engineer, Bangladesh Inland Water Transport Authority;

The ordinance even provided for the nomination of one person by the Ministry of Defense from the Bangladesh Meteorological Department. This broad and cross-sectoral membership of the Board reflects how the Act considered the inter-sectoral nature of environmental problems. The mandate of the board was to:

- i. Formulate policies for the control, prevention and abatement of pollution of environment;
- ii. Suggest measures for the implementation of its policies.

The ordinance also provided for an Implementation Cell to carry out the policies of the Board. (*The Environment Pollution Control Ordinance 1977*, Ordinance no. XIII of 1977, Government of Bangladesh)<sup>1</sup>

It was mainly during the 1980s that environmental issues attracted wider attention along with other development issues. In 1989, a separate Ministry of Environment and Forest (MoEF) was created. The Department of Environmental Pollution Control came under the MoEF and was renamed as the Department of Environment (DoE) and the Forestry Division under the Ministry of Agriculture was renamed as the Forest Department (FD) and came under the MoFE. The MoEF also oversees the activities of the Bangladesh Forest Industries Development Corporation (BFIDC), the Forest Research Institute and the Institute of Forestry and the National Herbarium. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 67)

---

<sup>1</sup>Available at: [http://www.moef.gov.bd/html/laws/env\\_law/267-272.pdf](http://www.moef.gov.bd/html/laws/env_law/267-272.pdf)

Though MoEF is primarily responsible for environmental conservation, many other public, private and civil society institutions also play important role in environmental management. At the top level is the National Environment Council (NEC) headed by the Prime Minister. The Executive Committee of the National Environment Council (ECNEC), headed by the Minister of Environment and Forest provides guidelines to other ministries on national environmental issues.

#### **4.3.2 National Environment Council**

In 1992 the National Environment Council was officially established by the President. The mandate of the Council is to review the implementation of the National Environment Policy, identify inter-ministerial environmental problems, and to pass the necessary orders to solve them. (*Bangladesh Toward an Environment Strategy*, ADB Country Environment Review, 2000: 31) The NEC has largely been a defunct institution. The Fifth Five Year Plan stated as its strategy to activate the NEC.

#### **4.3.3 Planning Commission**

In addition, the Planning Commission has the authority to coordinate and supervise the inter-ministerial and cross-sectoral activities having implications for environmental protection. Though environmental issues got low priority in the first three Five Year Plans the Fourth Five Year Plan (1990-95) and the Fifth Five Year Plan(1997-2002) paid adequate attention to environmental issues.

Other development partners such as donor agencies like the World Bank and the Asian Development Bank and the civil society organisations have also play crucial role in influencing environmental decision-making.

#### **4.3.4 Ministry of Environment and Forest (MoEF)**

Main responsibility of the MoEF is to work for the conservation and development of the environment and to ensure that natural resources including land, air, water, forests, are exploited in an environmentally sustainable way. Powers and functions of the MoEF are broadly defined by the National Environment Policy (1992) and the National Forest Policy (1994). The Minister of Environment and Forest is a permanent member of the



Executive Committee of the National Economic Council (NEC), a key decision-making body of national economic policy. The NEC also approves all public investment projects. Resources and activities of the MoEF are mainly focused on forest management and comparatively, environmental protection gets less attention. Some formal functions of the MoEF are as follows:

- To define overall Government policy regarding forests and the environment, and to implement and evaluate such policies through its departments;
- Management of forest resources and conservation and development of forest resources, forest land and wildlife;
- To preserve and maintain natural and environmental sustainability;
- To increase the forest cover of the country in a planned way, and;
- To carry out environmental improvement and pollution control policies.  
(*Bangladesh Country Environmental Analysis*, World Bank, 2006: 68)

There are five institutions under the MoEF: Forest Department, Department of Environment, Bangladesh Forest Research Institute, Bangladesh Forest Industries Development Cooperation, and the Bangladesh National Herbarium. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 69)

#### **4.3.5 Department of Environment (DoE)**

The DoE, a technical body of the MoEF, is responsible for environmental planning, management, monitoring, and implementation. It is headed by the Director General with divisional offices in Dhaka, Chittagong, Bogra, Khulna, Barisal, and Syhlet. The DoE is mainly entrusted with the responsibilities of:

- Monitoring environmental quality;
- Promoting environmental awareness through public awareness programmes, conduct environmental training, and to undertake research on environmental management;
- To control and monitor industrial pollution;

- To review environmental impact assessments and to issue environmental clearance for industrial units and projects; and,
- Establishing regulations and guidelines for the activities affecting the environment.

The DoE also coordinates the implementation of a number of international treaties and conventions signed by the Bangladesh government.

#### **4.3.5.1 Environmental Clearance Process: Major Issues**

The Environment Conservation Act 1995 gives broad mandate to the DoE for pollution control. One of the main assignments of the DoE is to issue environmental clearance to all types of industrial and non-industrial units and projects. The act stipulates that “no industrial unit or project shall be established or adopted without obtaining environmental clearance, in the manner prescribed by the rules, from the Director General.” (*Environment Conservation Act 1995, Government of Bangladesh*)<sup>2</sup>

The DoE offices in each of the six Divisions receive applications and issue Environmental Clearance Certificates for proposed investments in the division. In 2000-2001, the DoE processed almost 1,300 environmental clearance applications, a threefold increase since the enactment of the ECA in 1995. (Department of Environment, Government of Bangladesh, 2002)

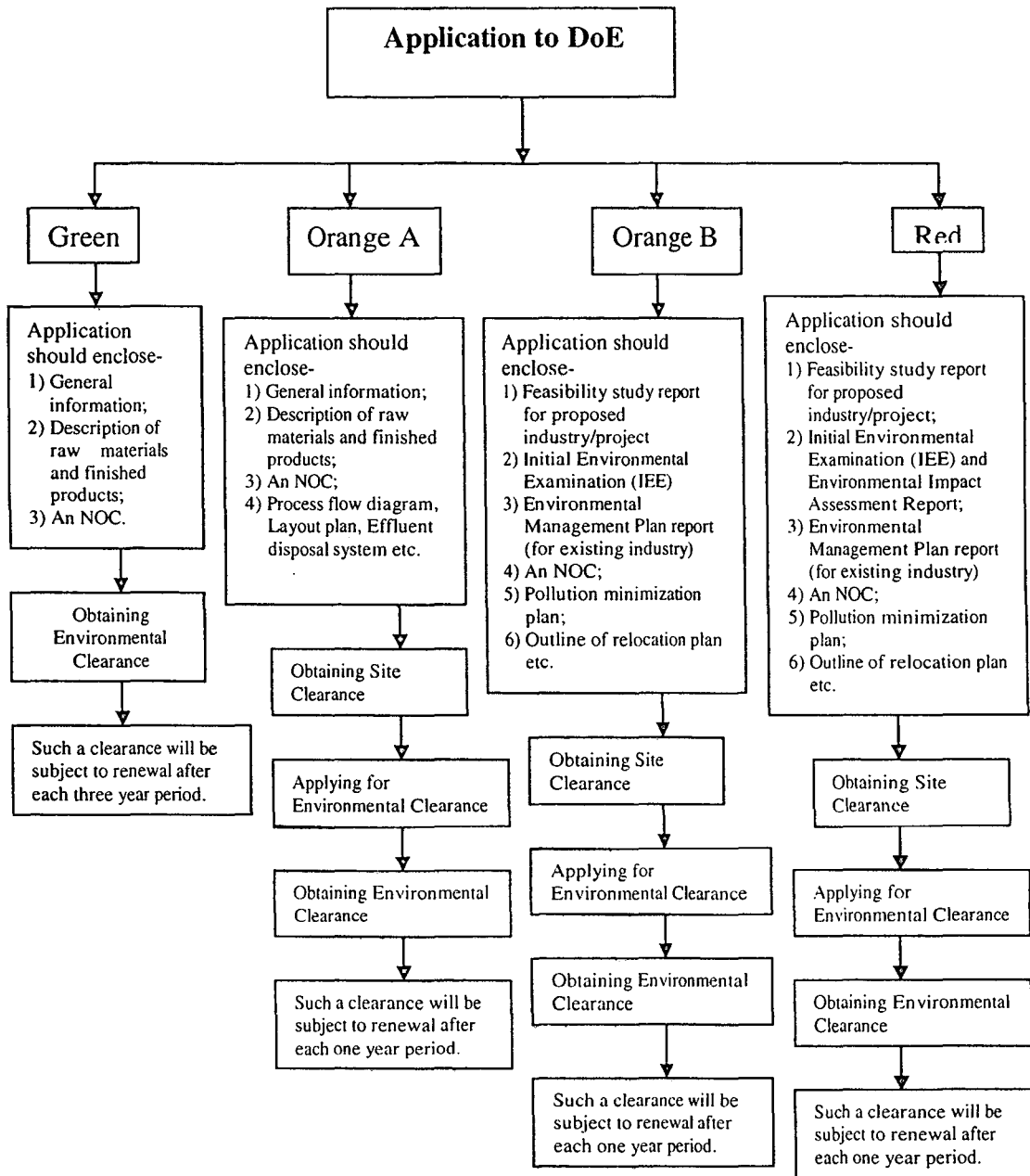
According to the Environmental Conservation Rules 1997, industrial/development projects have been divided into four categories – Green, Orange A, Orange B and Red keeping in view their environmental significance and location of proposed industry. Green Category projects do not require initial environmental examination (IEE) and environmental impact assessment (EIA). A no objection certificate from the local authority is adequate for a project that fall into the Green category. On the other hand Red category projects, require both IEE and EIA. The Figure below shows the process of getting environmental clearance.

---

<sup>2</sup> Available at: [www.doe-bd.org](http://www.doe-bd.org)

Figure 4.A

Process of Getting Environmental Clearance from the DoE



Source: Department of Environment, 1997.

4.3.5.2 Environmental Impact Assessment

Legal basis of environmental impact assessment in Bangladesh is the Environment Conservation Act 1995 and Environmental Conservation Rules 1997. The Environment

Conservation Act stipulates that rules will be made to “evaluate, review the EIA of various projects and activities, and procedures be established for approval”. As mentioned earlier, Department of Environment under the MoEF is responsible for the Enforcement of these legislations. Environmental Impact Assessment (EIA) of the projects is required for all Red Category projects. Though responsibility of conducting EIA lies with the proponent of the project, it is DoE’s responsibility to review EIAs for issuing Environmental Clearance Certificate (ECC).

The above figure shows that Environmental Impact Assessment is an important step in issuing environmental clearance to Red Category projects. *EIA Guidelines for Industries 1997* prepared by the DoE prescribes important steps for conducting EIA. Some important steps are:

- i. Screening/scoping;
  - ii. Identification of significant environmental issues and mechanisms to resolve these issues;
  - iii. Adequacy of mitigative measures and the Environmental Management Plan.
- (Momtaz, 2002: 166)

There is no uniform procedure for conducting EIA for all projects as the responsibility of carrying out EIA is of the proponent of the projects. A large number of agencies are involved in EIA process with their own separate guidelines and procedures. There is no mechanism for coordination among these agencies. In such situation, donor agencies such as the World Bank and The ADB have developed their own EIA procedures for projects funded by them. The presence of donor agencies as parallel bodies to the DoE in project approval may lead to the duplication in EIA procedures. (Momtaz, 2002: 176)

There is a strong opinion in Bangladesh that EIAs should be conducted by independent bodies not by the proponents of projects itself. It is generally believed that these EIAs are conducted only to satisfy government legislation and donor agencies, not to ensure sustainability of projects or to develop better management plans. EIAs are used as a tool to justify projects rather than as a means to environment-friendly development.

Moreover, the DoE lacks skilled professionals who can examine and review the EIAs conducted by project sponsors. (Momtaz, 2002: 176)

Generally, proponents of the projects hire consultants to conduct EIA of the projects/industries. Their objective is to get an EIA done which would highlight the benefits and justify the proposal in order to get clearance from the DoE or from the donor agencies. Therefore, EIAs are done to satisfy the proponent's requirements rather than for carrying out objective EIAs to ensure environmental and social soundness of projects. (Momtaz, 2002: 176)

In this way, the environmental clearance process is not transparent and there are various loopholes and limitations in the environmental assessment laws and regulations. There is also an absence of clear legal provisions for EIA compliance and monitoring. There is no proper channel for public consultations during the environmental assessment process, though the *Environmental Impact Assessment Guidelines for Industries* suggests that an environmental impact assessment should involve the people. EIA Guidelines 1997 state in this regard that "A comprehensive EIA. . . involves study of the probable changes in the physical and biological as well as socioeconomic environment which may result from the proposed development activity or project. . ." (Department of Environment, 1997: 2) It further states that "since the general public is the ultimate recipient of the economic benefits and environmental damages, an EIA study should involve the public as part of the decision-making process". (Department of Environment, 1997: 34)

This social component of EIAs has often been neglected. The legislation also does not mention the requirement of social environment impact separately. A research conducted on the environmental impacts of multi-storied residential buildings in Dhaka city revealed that despite significant potential social impacts of the multistoried buildings in the form of traffic congestion, risk on public health through air pollution and increase in social conflicts and crime, the developers only considered internal comfort and liveability of the residential units. The basic reason behind the neglect of these key issues lies in legislation itself. The residential development falls under category Orange B which requires only Initial Environmental Examination (not a full EIA) for site clearance and

ultimately environmental clearance certificate from the DoE. It is therefore implied in the legislation and categorisation of projects that the industries, which do not require EIA, need not consider social factors either. This is but one example of legislative loophole. (Momtaz and Bhuiyan, 2002)<sup>3</sup>

Environmental assessment process in Bangladesh is not transparent and is influenced by various external pressures. Though Environment Conservation Act 1995 makes it compulsory to obtain environmental clearance for all development projects, it also makes an exception that “nothing in this section shall apply to particular class of industries or projects, which the government may from time to time, specify for such purpose”. (*Environment Conservation Act 1995*, Government of Bangladesh) This section provides an opportunity for the influential to exert pressures to avoid the requirement of getting the clearance.

#### **4.3.5.3 Powers and Duties of the Director General of the DoE**

The Environment Conservation Act 1995 (ECA) gives broad powers to the Director General of the DoE. The ECA states that “the Director General may take all such steps as may be deemed reasonable and necessary for the conservation of environment, improvement of environmental standard and control and mitigation of pollution of environment and may give necessary direction, in writing, to any person for performing his duties under the act”. Such measures may include:

- Coordination with any authority or agency for the fulfillment of the objectives under the ECA;
- To prevent probable accidents which may cause degradation and pollution of environment, to adopt safety measures and determine precautionary steps against such accidents;
- To advise and direct concerned persons about the environment-friendly handling, storage, transportation, import and export of hazardous substances or its components;

---

<sup>3</sup> As cited in: Momtaz, Salim (2005), “Institutionalizing Social Impact Assessment in Bangladesh Resource Management: Limitations and Opportunities”, *Environmental Impact Assessment Review*, vol. 25, p. 41.

- To carry out research about the conservation, improvement and pollution of the environment and assist any other authority or institute in the similar function;
- Inspect any place, plants, equipments, manufacturing or other processes and substances or ingredients for the purpose of improvement of environment and control and mitigation of pollution and give directions or orders to concerned authority for the purpose of prevention, control and mitigation of environmental pollution;
- Collect, publicise and disseminate knowledge about environmental pollution;
- Advise the government to disallow such manufacturing process, materials and substances as are likely to cause environmental pollution; and,
- Carry out drinking water quality surveillance and submit reports.  
(*Environment Conservation Act 1995*, Government of Bangladesh)

In addition, the Director General has power to order the closure of industrial units in case they do not meet environmental standards. According to the ECA 1995, any person affected by damage or likely damage to environment can appeal to the Director General for corrective measures and Director General may adopt any measures including public hearing to settle such issues.

#### **4.3.5.4 DoE: Some Key Weakness and Limitations**

Though the DoE has been given broad powers to deal with environmental degradation under the ECA and ECR it is severely ill-equipped and under-funded to carry out these responsibilities. The section on budget allocation for environmental management, later discussed in this chapter, clearly reflects the resource crunch faced by the DoE.

There is a lack of coordination among various projects funded by donor agencies and moreover, it is impossible to transfer resources in between these projects. For example, several organisations such as the World Bank, ADB, USAID, CARE Bangladesh, etc are involved in environmental management projects. But there is no coordinating mechanism in place to avoid duplication and overlapping. These constraints put further limits on the limited resources and capacity of the DoE.

Much of the effort and capacity of the DoE is focused on environmental clearance process and less attention is paid on collecting and analysing environmental information. Monitoring of environmental quality is conducted on an ad-hoc basis and there is no arrangement of systematic compilation, interpretation, or subsequent publication of these data. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 72) So far the DoE has only published Dhaka City State of Environment Report with financial assistance of the UNEP. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 217)

In addition, work-culture in the DoE is characterised by frequent changes in management and leadership, bureaucratic red-tapes, administrative delays, lack of accountability and pervasive corruption. Generally, Director Generals are not appointed from the background of environmental management. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 72)

#### **4.3.5.5 Centralised Management: A Key Hurdle**

Moreover, the DoE is a centralised organisation, decentralised at the Division level only. Lack of coordination between the DoE and its divisional branches is another limitation on the efficiency of the DoE. Divisional offices are mandated to issue environmental clearance only to Orange-A category firms and projects (Orange-B and Red Categories fall under the sole purview of DoE at the national level). They can do monitoring and enforcement works but they are not authorised to give technical advice to firms and projects. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 75)

Furthermore divisional offices get little support from the DoE to carry out their activities. A survey of the Rajshahi divisional office revealed the institutional and resource limitations of the divisional offices. With only 17 staff and only one environmental inspector, the monitoring and inspection capacity of the divisional office was very limited which was authorised to carry out monitoring and inspection of a large number of highly polluting public sector enterprises like sugar mills, distilleries, and chemical factories. (World Bank, 2006)



The divisional office was mandated to issue environmental clearance to the Orange A-category firms which included numerous medium and small scale enterprises such as rice husking, brick making, dyeing and handloom industries, etc. With limited number of staff, the office was quite inefficient to perform this task. (World Bank, 2006)

At the division level, there is a Divisional Environmental Advisory Committee headed by the Divisional Commissioner. The mandate of the Divisional Environmental Advisory Committee is to give directions and advice to district level agencies and coordinate among line agencies at the local and regional level. These committees suffer from functional inefficiency and lack of authority to implement their decisions. For local self-governing bodies such as divisions, districts, Upazilas, Union Parishads and Gram Sarkars, there are no clearly defined functions and responsibilities for environmental management. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 75-76)

Lack of a decentralised structure of environmental protection is a key hurdle in the proper implementation of environmental policies and regulations. At the Upazila level, there is no separate institutional mechanism to deal with environmental concerns and environmental issues are addressed in ad hoc manner by sectoral officers. The ECR 1997 confers an important role for Union Parishads which stipulates that before applying for environmental clearance from the DoE, the applicant will have to obtain and submit a No Objection Certificate issued by the Chairman of the Union Parishad. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 75-76)

#### **4.4 Environmental Policies**

During the 1990s, the Bangladesh Government announced various environmental policies. In 1991, the MoEF, in collaboration with the Bangladesh Agricultural Research Council, prepared the National Conservation Strategy. It recommended a wide-ranging list of actions for environmental protection but it did not lay down specific priorities. (*Bangladesh Toward an Environment Strategy*, ADB Country Environment Review, 2000) A major step in this regard was National Environment Policy 1992.

#### **4.4.1 National Environment Policy 1992**

In 1992, the Cabinet announced the Environment Policy (1992). It provided policy guidelines for fifteen sectors of the government and identified some institutions to implement the policy guidelines. It acknowledged that “since various socio-economic malaises like poverty, population pressure, illiteracy, inadequate health care, lack of public awareness etc. have emerged as serious impediments to the protection of environment, it is necessary that these problems are adequately addressed simultaneously along with issues concerning to improvement of environment in an integrated manner”. (*National Environment Policy 1992, Government of Bangladesh*)<sup>4</sup>

The policy deals with various important issues such as health and sanitation, energy and fuel, water development, flood control and irrigation, land, forest, wildlife and biodiversity, fisheries and livestock, food, coastal and marine environment; transport and communication, housing and urbanisation, population, education and public awareness, science, technology and research, legal framework for environmental management, and institutional mechanisms for environmental protection. In order to implement the recommendations of the Environment Policy 1992, the government has adopted the Environmental Action Plan 1992 which recommends a sector-wise action plan. (Mohiuddin and Hasan, 1996: 729-737)

#### **4.4.2 Environmental Action Plan 1992**

Environmental Action Plan 1992 specified environmental issues/activities for each sector of government and identified institutions to carry out these activities. As far as industries are concerned the Plan stipulated that:

- i. industries identified by the Department of Environment will take pollution control measures as soon as possible;
- ii. existing industries that are potential polluters, will make provisions to introduce pollution control measures;
- iii. all new industries either government or private will conduct Environmental Impact Assessment and incorporate pollution control measures;

---

<sup>4</sup> Available at: [www.doe-bd.org](http://www.doe-bd.org)

- iv. steps will be taken to shift the industries located in residential areas to appropriate locations. Planned industrial zones will be delineated;
- v. approval of new industries for production of environmentally hazardous and non-biodegradable wastes as goods will be prohibited gradually;
- vi. industries using heavy metals such as mercury, chromium, lead will be initially discouraged and finally prohibited;
- vii. pollutant industries will install their own pollution monitoring devices;
- viii. “waste permit/consent order” system will be established in the industrial sector, so that waste disposal and waste refinement will be facilitated;
- ix. recycling will be encouraged to reduce waste; and,
- x. appropriate steps will be taken to ensure protection of health of industrial workers. (Mohiuddin and Hasan, 1996: 738-742)

#### **4.4.3 National Environment Management Action Plan 1995**

The MoEF in collaboration with the UNDP prepared the National Environment Management Action Plan (NEMAP) in 1995. The main feature of the NEMAP is that it was prepared by a comprehensive participatory planning process ranging from grassroots to the national level. Inputs for the preparation of the NEMAP were provided from local communities, government agencies, non-governmental organisations, professional groups, academics, parliamentarians, lawyers and journalists. This group of multiple stakeholders identified institutional, sectoral, location specific, and long term issues and actions. The NEMAP sketched out policy framework and action plan for key environmental problems. The action plan mainly emphasised the following issues:

- Maintenance of the ecological balance and growth and development of the country through protection and improvement of the environment;
- Protection of the country against natural disasters;
- Adopting environmentally sound development programmes in all sectors;
- Environmentally sustainable use of natural resources;

- Activities in association with all environment related national and international initiatives. (*Bangladesh State of Environment Report 2001*, Forum of Environmental Journalists of Bangladesh, 2001: 179)

The NEMAP addressed a wide-range of environmental issues. It divided environmental issues into four categories: institutional issues, sectoral issues, local issues and long term issues. Institutional issues covered five key problem areas:

- i Absence of institutional mechanisms to deal with inter-sectoral issues at national level;
- ii Lack of institutional mechanisms to resolve inter-sectoral issues at local level;
- iii Need for the participation of all sections of civil society in the implementation of the NEMAP;
- iv Need to implement, monitor and follow up on the NEMAP;
- v Strengthen the capabilities of the MoEF and the DoE in order to make their mandates effective.

Under the sectoral issues, the NEMAP identified some important issues such as health and sanitation, forest, biodiversity, natural hazards, education and awareness about environment, industrial pollution, water, agriculture, energy, fisheries, land, housing, and transport. The local issues included salinity and shrimp, coastal marine eco-system, management of wetlands, hill cutting, and local environmental issues in Barind Tract and Modhupur Tract. Among the long-term issues the NEMAP included regional water sharing, urbanisation, climate change, research and development of technology about environmental management. (*National Environment Management Action Plan*, Vol.1, Government of Bangladesh, 1995: 11) Especially in the industrial sector the NEMAP identified five problems:

- i. Pollution from the untreated effluents and emissions;
- ii. Lack of appropriate technology for pollution abatement;
- iii. Lack of proper legislation for control of emissions and effluents;

- iv. Lack of environmental awareness among the industrialists and entrepreneurs and;
- v. Problem of occupational health. (*National Environment Management Action Plan*, Vol.1, Government of Bangladesh, 1995: 22)

In this way, the NEMAP provided a comprehensive outlook on key environmental issues in Bangladesh. As a follow up programme to the NEMAP, the government has adopted UNDP-funded Sustainable Environment Management Programme.

#### **4.5 Rules and Regulations Related to Environmental Management**

Bangladesh has formulated and implemented a wide-range of regulations and laws dealing with environmental issues. Some important and recent legislations related to the effective management of environment are: the Environment Conservation Act 1995, Environment Conservation Rules 1997, and the Environment Court Act 2000.

##### **4.5.1 Environment Conservation Act 1995**

In 1995, the Environment Conservation Act was enacted and it repealed the Environment Pollution Control Act 1977. The legislation defines environment in relatively narrow term. It states that environment “includes water, air, land and physical properties and the inter-relationship which exists among and between them and human beings, other living beings, plants and micro organisms”. Though the focus of the legislation is more on pollution mitigation as compared to conservation and protection of the environment, the Act stipulates some important measures to maintain the ecological balance of the country:

- The legislation provides for the establishment of the Department of Environment headed by a Director General. The act broadly describes the powers and functions of the Director General.
- Under this act the government can declare an area ecologically critical area if it is satisfied that due to degradation of environment the eco-system of an area has reached or is threatened to reach a critical state.

- The act prohibits the use of vehicles which emit smoke injurious to health and environment.
- The act grants the right that any person affected or likely to be affected by environmental degradation may apply to the Director General for the remedial action.
- The act makes the provision for taking samples. The act states that “any person empowered by the Director General shall have power to take, for the purpose of analysis, samples of air, water, soil, or other substances from any factory, premises, or place”.
- The act makes the provision for the punishment and penalty to the non-complying companies.
- The act stipulates that the government, from time to time, may formulate and declare environmental guidelines for control and mitigation of environmental pollution and the conservation and improvement of the environment.

This indicates that that main thrust of the Act was on pollution control rather than on conservation and development of the resources and biodiversity. One of the major shortcomings of the Act is that it makes mandatory for citizens to require the prior approval of the DOE if they have to file petition against the violation of the Act. The Act states in this regard that “no court shall take cognizance of any offence under this act except upon a written complaint by any person empowered by the Director General in this behalf”. (*Environment Conservation Act 1995*, Government of Bangladesh) This provision leaves a major loophole for external influences and red tapes.

#### **4.5.2 Environment Conservation Rules 1997**

The Environment Conservation Act 1995 was followed by the Environment Conservation Rules of 1997 (ECR) which provides a broad regulatory framework for environmental management in Bangladesh. The act explicates specific rules and regulations for the implementation of the ECA. Main provisions of the ECR are as follows:

- The ECR sets up the environmental quality standard for air, water, soil etc. It also lays down environmental standard for specific industries like fertilizer plants, textile plants, pulp and paper industry, cement industry, distilleries, sugar industry, tanneries, food processing, fish canning, dairy, starch and jute industries, crude oil refinery and nitric acid plants:
- Under the ECR, 186 types of industries/ projects are grouped into four categories: 22 under Green Category, 26 under Orange A category, 69 under Orange B category, and 69 under Red category. The ECR stipulates that Green category projects are least harmful and have no potential harmful impact. But for Orange A and Orange B category industries Initial Environmental Examination (IEE) is required and for Red category industries/projects a complete Environmental Impact Assessment is necessary. The ECR sets out in detail procedures for getting environmental clearance.
- The Act specifies the factors which the government shall take into account while declaring an area as ecologically critical area. These factors include human habitat, ancient monuments, archeological sites, forest sanctuary, national park, game reserves, wild animal habitat, wetland, mangroves, forest areas, and other relevant factors. But the Act does not explicate the procedures for the management of ecologically critical areas in detail.

The ECR stipulates some other crucial regulations also such as rules about applications related to pollution or environmental degradation, regulations about collecting samples, rules dealing with emissions from vehicles, standards for sewage discharge, standards for waste from industrial units, standards for gaseous emissions from industries, standards for emissions from motor vehicles, standards for sound from motor vehicle etc. (*Environment Conservation Rules 1997, Government of Bangladesh*)<sup>5</sup>

In this way, the ECR is a tool to implement the ECA (1995). The ECA and ECR cover wide ranging environmental concerns but their focus has been on pollution control rather than on sustainable development and these legislations fail to take into

---

<sup>5</sup> Available at: [www.doe-bd.org](http://www.doe-bd.org)

account overall development strategy. Though these laws are positive steps for pollution mitigation, overall environmental conservation and protection of resource base needs more detailed and comprehensive laws.

#### **4.5.3 Environment Court Act 2000**

In April 2000, the Parliament passed the Environment Court Act 2000 under which seven environment courts were set up: two in Dhaka and five in other divisional headquarters. The act was formulated with an objective to ensure proper implementation of the ECA (1995). The main provisions of the act are as follows:

The court shall consist of one judge who will be appointed by the government in consultation with the Supreme Court from the existing Joint District Judge. The Environment Court shall be established in Divisional Headquarters and in case, more than one Environment Courts are established in a Division, the government shall by notification in official Gazette, specify the territorial jurisdiction of each such court.

Citizens can bring cases to the Environment Court only after taking permission from the DoE. The Act states that “no Environment Court shall take cognizance of an offence or receive any suit for compensation except on the written report of an Inspector or any other person authorised by the Director General.” Only in cases, where the DoE fails to address such complains within sixty days after the complain is lodged, the Environment Court shall directly receive the petition. This provision under the Section IV of the Act inevitably makes the process of judicial redressal slow and difficult.

The Act provides for the establishment of the Environment Appeal Court also. The government shall, by notification in official Gazette, establish one or more than one Environment Appeal Courts. It shall be constituted with one judge who will be appointed by the government in consultation with the Supreme Court. In order to ensure the speedy trial of cases, the Act specifies that hearing of a case at the trial shall not be adjourned more than thrice and the Environment Court shall conclude the trial within one hundred eighty days. If the trial is not completed in the said time-limit, the Environment Court shall, within fifteen days after expiry of the period, inform the Environment Appeal Court



of the delay and the reasons for such delay, and shall complete the trial of the case within ninety days after the expiry of the above mentioned one hundred eighty days. The Act authorises the Environment Court to convert the fine as compensation for the affected people. (*Environment Court Act 2000*, Government of Bangladesh)<sup>6</sup>

The government has taken various steps under these regulations. For example, in compliance with the ECA 1995 and ECRs 1997, the government now issues environmental clearance certificates for the new industries of projects after assessing project area and pollutants to be emitted or discharged by the industrial units to be set up. Initiatives have been undertaken to set up effluent treatment plants for existing industries. The project, “Programmes to Save Dhaka” has been undertaken to save the surrounding rivers of Dhaka. Under the programme, the existing tanneries in Hazaribagh area are to be shifted at Horindhara, a place between Savar and Keranigonj Upazila. A central effluent plant will be set up in the said leather industry. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 215) Following the ECA 1995, the Government has drafted the Noise Pollution (Control) Rules 2004 with the consultation from all walks of life.

Furthermore, the government has declared six areas: Cox’s Bazar, Teknaf Sea Beach, St. Martin’s Island, Sonadia Island, Hakaluki Island, Tanguar Haor, Marjat Baor as Ecologically Critical Area under the ECA 1995. In order to control air pollution the government has amended the ECR 1997. An Air Quality Monitoring has been set up in Dhaka with the financial assistance of the World Bank. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 215) But as far as the day to day implementation of the above mentioned rules is concerned, there is a lack of technological efficiency and expertise to monitor the compliance. Widespread corruption is a big hurdle in the proper implementation of the rules.

#### **4.6 Environment and National Planning in Bangladesh**

Bangladesh has been following the path of planned development since independence. Though planning process has accommodated shifts and changes in the development

---

<sup>6</sup> Available at: [www.doe-bd.org](http://www.doe-bd.org)

paradigm, the issue of environment figured out very late in the Bangladesh policy planning. Given the worldwide recognition of the environment as a development issue, Bangladesh has also gradually tried to integrate environmental concerns in development process. Bangladesh's National Strategy for Accelerated Poverty Reduction acknowledged that "a careful balancing act must be orchestrated where economic growth is maximised without compromising environmental protection."

#### **4.6.1 Fourth Five Year Plan (1990-1995)**

In the Fourth Five Year Plan (1990-1995), environmental problems were given explicit recognition. The Second Five Year Plan (1980-85) and the Third Five Year Plans (1985-1990) mentioned only the potential danger to ecological balance that would result from implementation of policies and strategies in the forest sub-sector. "The Fourth Five Year Plan marks the beginning of Bangladesh's shift towards an environment friendly regime." (*Bangladesh Environment: People's Report 2002-2003*, vol. 1, 2004: 405) The Plan considered environment as a separate and cross-cutting issue. The plan also addressed environmental issues in relevant sectoral chapters. In order to "promote, nurture, protect and expand nature and natural resources and link all development activities with environment towards improving the quality of life" the plan set the government's environmental objectives as:

- To control pollution and degradation related to soil, water and air;
- To promote environment friendly activities in the development areas;
- To preserve, protect and develop natural resource bases;
- To strengthen the capabilities of public and private sectors to manage environmental concerns as a basic requisite for sustainable development; and,
- To create people's awareness for participation in environment promotion activities. (*Fourth Five Year Plan (1990-95)*, Revised Draft II, Government of Bangladesh, 1991: ix-3)

The Fourth Five Year Plan also identified some priority areas to ensure environmental protection and achieve sustainable development:

- Improvement of institutional infrastructure;
- Preparation of regional environmental development plan;
- Development of technological capability on Environment Impact Assessment in the country;
- Human resources development and research programmes;
- Study and preparation of action programmes for clean up of pollution prone rivers;
- Development of appropriate environmental quality standards in industry;
- Public awareness creation programme;
- Promotion of improved oven/stove/*chula* in the country;
- Conducting environment impact related studies;
- Updating existing environmental laws and formulation of new laws;
- Procurement of a laboratory ship for marine environment surveillance;
- Study of mangrove ecosystem. (*Fourth Five Year Plan (1990-95)*, Revised Draft II, Government of Bangladesh, 1991: ix-3)

#### **4.6.2 Fifth Five Year Plan (1997-2002)**

The Fifth Five Year Plan addressed environmental problems more comprehensively. A full chapter was devoted to environmental concerns and sustainable development issues. It defined the environment broadly as the *sum total of social, physical, biological and ecological factors*. Some key environmental issues such as shrinking agricultural resource base, loss of biodiversity, acute crisis of biomass fuel, impact of chemicals, industrial pollution, deforestation, declining wetland and fisheries, degradation of mangrove ecosystem, coastal and marine water pollution, salinity, unsatisfactory sanitation, and urban environmental problems received due attention in this plan. (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 181-184) Some important objectives of the Fifth Five Year Plan are:

- Promotion of sustainable environmental management for improvement in the quality of livelihood and reduction in poverty;

- Promoting participatory, community based environmental resource management and environmental protection (considering the poor's access, equity as well as gender issues);
- Ensuring active participation of the poor, especially women, in environmental protection activities;
- Promoting environment-friendly activities in development policies;
- Preserving, protecting and developing the natural resource base;
- Strengthening the capabilities of public and private sectors to address environmental concerns;
- Controlling and preventing environmental pollution and degradation related to soil, water and air;
- Creating public awareness for participation in environment promotion activities; and,
- Conserving non-renewable resources and sustaining auto and eco-generation of renewable resources. (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 181-184)

The Plan also underlined the need of adequate funding for environmental management, cooperation between the government and NGOs and inter-sectoral linkages. In order to reduce industrial pollution and urban environmental management, the Plan, called for the cooperation between public and private sector. The Fifth Five Year plan also marks a departure in the government approach to curb industrial pollution. The Plan, for the first time, emphasised the need of market-based policies for pollution control such as tradable discharge rights, changes in relative prices, tax swaps, privatisation of the state-owned enterprises, dissemination of new technologies to all enterprises, promoting clean technology, and improving energy efficiency through access to information, training and credit. The Plan clearly stated that “increased managerial and technical efficiencies as well as increased environmental accountability to the public can possibly be obtained by the privatisation of SOEs”.

For improvement in urban environmental quality also the Plan affirmed its belief in privatisation. The Plan expected that “through the possible commercialisation, or even privatisation of the concerned sector, more efficiency will be ensured in the delivery of multiple services such as solid waste disposal, water supply and sanitation.” The Plan suggested that relevant policy formulation and legal issues can be left with the government but actual service delivery should be increasingly brought under competition. Instead of coercive measures, the Plan emphasised the need of incentive-based policies to ensure compliance with environmental regulations and standards. In order to make the private sector a partner in environmental management, the Plan emphasised the need of study and research on the following issues:

- The net financial implications of pollution abatement and improved water management;
- Information and incentives regarding investments in cleaner technology;
- Ways to introduce ISO 9000/9001/14000 in Bangladesh; and,
- New business opportunities emerging from improved environmental management.

To facilitate market instruments to pollution control, the Plan asserted government’s commitment for preparing and publishing a data-base of pollution level, providing financial incentives for pollution abatement and investment in cleaner technology. In this way, the Plan clearly reflected the government’s trust in market forces rather than in bureaucratic machinery. Though this trend is more attuned with liberal economy, greater reliance on market forces can result into total neglect of social and environmental justice. The explicit recognition of the importance of market forces in environmental management also partially reflects the compulsions of liberal economy and free trade. Despite asserting its faith in market-mechanisms for environmental management at home, the Plan raised concerns about environmental problems caused by integration with global economy. The Plan stated that:

“There is a little opposition to a unified global economy but a little realisation about its social and environmental disadvantages ... there is almost no recognition that economic unification and technological uniformity are

actually causing environmental destruction and the disintegration of communities. Rather than bringing people together, economic unification is fostering divisiveness and creating a gap between the affluent and the lesser beings.” (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 192-193)

This particular concern reflects a common dilemma faced by most of the developing countries as to how find *a sustainable middle path* while keeping with economic liberalisation and globalisation. The plan also raised some crucial issues about public-private partnership in the context of privatisation and greater reliance on market forces.

#### **4.6.3 Achievements During Fourth Five Year Plan**

This broad analysis of environmental problems and solutions reflects how environmental problems are increasingly getting wider attention in policy planning. However, as for as implementation of these lofty and ambitious objectives is concerned, during the Fourth Five Year Plan NEMAP was prepared which identified major environmental problems and their solutions in different sectors of the economy. The Fourth Plan mainly focused on strengthening the capabilities of the DoE. In this regard, a vital project titled “Improvement in Dhaka Urban Environmental Infrastructure Project” was implemented. Under this project, a laboratory and functional building was constructed along with procurement of 24 items of laboratory equipment and logistic supports. (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 268)

#### **4.6.4 National Strategy for Poverty Reduction 2002**

After completion of the Fifth Five Year Plan the government has not prepared any new plan. However, the government strategy paper on poverty reduction includes environmental concerns. The strategy paper titled *Bangladesh: A National Strategy for Economic Growth, Poverty Reduction and Social Development* emphasised the links between poverty and environmental degradation and the importance of environmental management for poverty reduction. The strategy paper stated that:

“The link between environment and poverty can hardly be overemphasized. Factors influencing poverty like inadequate access to physical asset bases,

preponderance of risks, uncertainties and vulnerabilities and spatial problems affecting livelihoods and crisis coping capacities do indeed originate from environmental factors and one can, therefore, find certain linkages between the two.” (*Bangladesh: A National Strategy for Economic Growth, Poverty Reduction and Social Development*, 2002: 51)

The paper also emphasises the necessity of people’s knowledge, perception and awareness for the planning and implementation of environment-friendly development policies.

#### 4.7 Budget Allocation for Environmental Protection

If we look at the fund allocation for environmental programmes and projects, it can be observed that there has been a steady increase in allocation for environment related projects as reflected in the Annual Development Programmes during past few years. As mentioned earlier, the DoE is mainly responsible for dealing with environmental issues. In Revised Annual Development Programmes (RADPs) the allocation of funds for the DoE as a percentage of total allocation is on increase, though overall funding is still very low. This is still less than one percent of the total allocations of RADP. It is important to note that there was no separate allocation for environment before the fiscal year 1990. During FY 2005-06, the MoEF was implementing 29 projects with an RADP allocation of Tk 158 crore 72 lack. In addition, 6 programmes were under implementation at a cost of Tk 8 crore 49 lack from revenue budget. (*Bangladesh Economic Review 2006*, Government of Bangladesh, 2007: 224) Much of the funds to the DoE come from external sources rather than from the government budget. (Table 4.1)

**Table 4.1**  
**Allocation of Funds to DoE**

Year	Allocation in Lac Taka			Allocation to DOE as % of RADP
	Total RADP	DoE		
		Total	Government of Bangladesh	
FY1990	612,600.00	00	00	00
FY1995	1,115,000.00	99.45	99.45	0.0089
FY2000	1,650,000.00	1,019.38	100.00	0.0618

FY2002	1,600,000.00	1,397.34	274.34	0.0873
FY2003	1,710,000.00	1,636.98	130.98	0.0957

Source: Planning Commission, Government of Bangladesh<sup>7</sup>

Thus, environmental management in Bangladesh suffers from inadequate financial support. If we look at the budget of FY 2006-2007, there is no concrete financial measure to monitor and curb pollution except for the reiteration of the problem of environmental degradation. Though it proposes the creation of a website and maintenance of database on climate change by the DoE, no separate fund for this purpose has been allotted. (Centre for Policy Dialogue, 2007: 45)

The total financial outlay for development of environment in public sector during the Fifth Five Year Plan period was only 400 million Tk. The Table 4.2 shows the programme and financial outlay of government for environmental management during the Fifth Five Year Plan period.

**Table 4.2**  
**Physical Programme and Financial Outlay for Development of Environment**  
**During Fifth Five-Year Plan (1997-2002) (In Million Taka)**

Programme	Physical Activities	Financial Outlay
Strengthening of DoE at regional and sub-regional levels.	18 offices	120.00
Phasing-out of ozone depleting substances.	-	20.00
Biodiversity management	11 centres	110.00
Environmental quality control, monitoring and management	19 air monitoring stations and 6 treatment plants	120.00
Public awareness on environmental standard	-	10.00
Alternative energy development	-	10.00
Agenda-21: Implementation follow up	-	10.00
<b>Total</b>		<b>400</b>

Source: *Fifth Five Year Plan (1997-2002)*, Government of Bangladesh.

<sup>7</sup> Quoted from: *People's Report: Bangladesh Environment 2002-2003*, vol. 1, 2004.



The table clearly shows that there is no financial support for research and technological improvement in pollution control. As compared to financial support to forestry sub-sector, this proposed investment in environmental management is grossly low. Total financial outlay for the development of forestry sub-sector in the Fifth Plan was 6982.10 million Tk. (*Fifth Five Year Plan (1997-2002)*, Government of Bangladesh, 1998: 267-270)

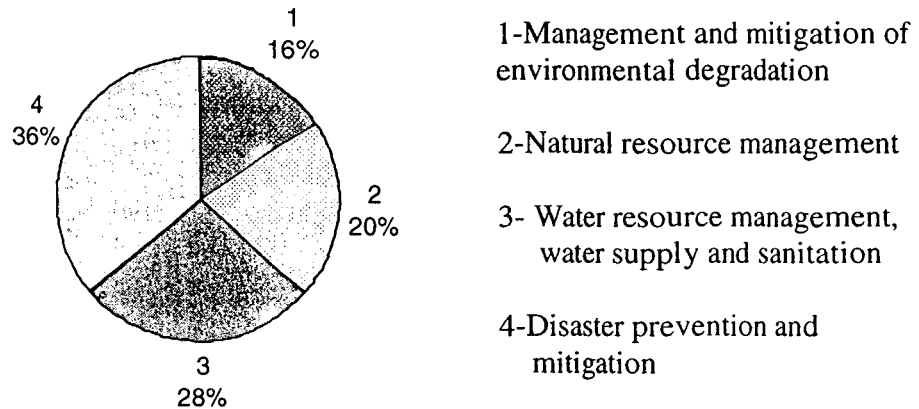
Though the MoEF with its departments is directly responsible for environmental protection and management, other ministries whose activities have major implications for environment like Energy, Transportation, Agriculture, Fisheries and Livestock, Water Resources, and Relief and Disaster Management, account for much public expenditure as compared to the MoEF. According to the World Bank, almost 10 per cent of the public expenditure is spent on environmental purposes if we take a broader definition of the environment including:

- environmental degradation related public expenditures such as sampling, establishment of laboratories for testing and other projects;
- public expenditure on resource management, for example, afforestation programmes, coastal management programmes, programmes related to the development of eco-tourism, agricultural research programmes, etc.;
- public expenditure related to water management; and,
- public expenditure on disaster management, for example, flood management, expenditure on establishing early warning system, etc.

The study found that, out of the total public expenditure on environment, 36 percent was allocated to disaster management; water resource management accounted for 28 per cent of total public expenditures; natural resource management accounted for 20 per cent; and only 16 per cent was allocated to management and mitigation of environmental degradation. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 77) The figure below shows this distribution.

**Figure 4.B**

**Allocation of Environmental Budget**



Source: World Bank, 2006

**4.8 Role of NGOs and Civil Society in Environmental Protection**

A large number of NGOs are playing an important role in environmental management at both national and grassroot level and they have influenced the policy making in a decisive way. The NGOs working for environmental causes have grouped themselves under the Coalition of Environmental NGOs (CEN). It is a member of the Association of Development Agencies of Bangladesh, the apex coordinating body of NGOs. Some well known NGOs working for environment include Bangladesh Environmental Lawyers Association (BELA), Forum of Environmental Journalists of Bangladesh (FEJB), Society for Environment and Human Development (SEHD), International Union for the Conservation of Nature, etc. Other civil society think-tanks like Bangladesh Unnayan Parishad, Bangladesh Centre for Advanced Studies and Bangladesh Centre for Policy Research have been actively engaged in academic research, study and awareness-building about environmental issues.

**BELA** has played a pioneering role in raising legal aspects of environmental concerns. It has filed public interest litigations on behalf of the victims, raised public

awareness and organised public meetings to raise environmental issues. It also provides training in the implementation of environmental laws. BELA has undertaken extensive research work and published a large number of books such as *Environmental Regulatory Regime: A Selected Bibliography Covering SAARC Region* edited by Mohiuddin Farooque et al, *Laws Regulating Environment in Bangladesh* by Mohiuddin Farooque and S. Rizwana Hasan, *Law and Custom on Forests in Bangladesh: Issues and Remedies* by Mohiuddin Farooque, *Regulatory Regime on Inland Fisheries in Bangladesh: Issues and Remedies* by Mohiuddin Farooque, etc. BELA has also initiated educational programmes about environmental rights and duties at school level. It has also launched training programmes for teachers of educational institutes.<sup>8</sup>

BELA has emerged as a prime organisation to file legal complaints on behalf of environmental victims. The first ever environmental litigation in Bangladesh was filed by the BELA in 1994. In the famous case of radioactively contaminated skimmed milk powder, filed by BELA chief Dr Mohiuddin Farique, the Divisional Bench of High Court has broadened the constitutional *right to life* right to safe environment. The Court held that “If right to life under Article 31 and 32 of the Constitution means right to protection of health and normal longevity of an ordinary human being endangered by the use or possibility of use of any contaminated food etc., then it can be said that fundamental right to life of a person has been threatened or endangered”. In a landmark judgment in *Dr. Mohiuddin Farooque Vs Bangladesh and Others*, (CA No.24 of 1995), the Appellate Division of the Supreme Court has expanded the concept of *locus standi* and interpreted the term “aggrieved person” in broader sense. The decision has enabled the voluntary groups, representative organisations, trade unions, and social activists, who have no personal interest in the case, to file cases on behalf of those who are directly aggrieved but are unable to complain on their own. This judgment marks the beginning of public interest litigation in Bangladesh. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 294-295)

---

<sup>8</sup> Available at: [http://www.jeef.or.jp/EAST\\_ASIA/bangladesh/BELA.htm](http://www.jeef.or.jp/EAST_ASIA/bangladesh/BELA.htm).

**FEJB** has played an important role in dissemination of knowledge and information about environmental issues. It has also published the *Bangladesh State of Environment Report 1998*. FEJB was actively involved in the creation of the MoEF. It played a key role in the preparation of the NEMAP as a member of the NEMAP Steering Committee and organised several workshops in the process of preparation of the plan.<sup>9</sup>

**Bangladesh Rural Advancement Committee (BRAC)**, one of the largest NGOs in Bangladesh, has been engaged in social forestry, horticulture, health education, and in building environmental awareness. BRAC's Environmental Research and Evaluation Division has been active in various important activities such as preparing Environmental Impact Assessment guidelines for rural programmes, awareness training, health implications in agriculture, studies on renewable energy, study on lead pollution in Dhaka and arsenic contamination, etc. (*Bangladesh Toward an Environment Strategy*, ADB Country Environment Review, 2000: 32-33)

The **SEHD** has worked extensively on forest management, rights of tribal people, role of multilateral development banks, and human rights of the affected people. It has published some important books on environmental degradation and people's rights.

The **BUP** has carried out research on a wide range of issues covering sustainable development, social, economic, environmental and cultural aspects of development efforts, environmental degradation, regional cooperation etc. The BUP has been engaged in research on potential benefits of regional cooperation, especially in the sharing of common water resources. It has conducted a comprehensive study titled *Potential for Sharing of Common Regional Resources in the Eastern Himalayan Region: Focus on Sapta Kosi High Dam Project*. It has also published a large number of books such as *Ganges-Brahmaputra-Meghna Region: A Framework for Sustainable Development* by Q. K. Ahmad et al, *Development of Whom, for Whom, by Whom* by Q. K. Ahmad, *Bangladesh: Citizens Perspective on Sustainable Development* edited by Q. K. Ahmad and Ahsan Uddin Ahmed, *Contemporary Issues in Development: Essays in Honour of Q.*

---

<sup>9</sup> Available at: [http://www.semp.org.bd/admin/menu\\_page\\_view.php?sia\\_id=22](http://www.semp.org.bd/admin/menu_page_view.php?sia_id=22).

K. Ahmad by Asit K. Biswas et al, *Bangladesh Water Vision 2025: Towards a Sustainable Water World* edited by Q. K. Ahmad, *Democracy and Development* edited by Q. K. Ahmad, *Resources, Environment and Development in Bangladesh: With Particular Reference to the Ganges-Brahmaputra-Meghna Basins* by Q. K. Ahmad et al, etc.<sup>10</sup>

These NGOs have fought vociferously against the violation of environmental rules by the MNCs and other industrial enterprises. Magurchhara gas exploration fire in Maulvi Bazar district in Sylhet region is an example of struggle by NGOs for legal addressal and compensation for victims. The Occidental Company of USA, under a partnership contact with Bangladesh Government, started digging gas-well in Magurchhara on June 5, 1997. On June 14, immense fire broke out during the drilling of the gas field. The fire severely damaged the surrounding forest areas. According to a Forest Department report, a forest patch of 111.15 acres was totally destroyed, another 111.15 acres of land was identified as damaged. The report marked another 106.21 acres of forest as possibly damaged area. The Forest Department estimated the total loss at about Tk. 108 crore or \$24 million.

The BELA filed a petition at the High Court against the Occidental that it had violated the clauses on environment as established by Bangladesh Petroleum Act, 1974 and Bangladesh Environment Protection Law, 1975. It also complained that Occidental had not obtained compulsory certificate from the Department of Environment. The committee formed to look into the causes of accident also held the Occidental responsible for accident. While these legal procedures were being followed, UNOCAL, an US oil giant, purchased Occidental's Bangladeshi stakes in 1999. It is alleged that Bangladesh Government did not take proper steps to ensure compensation payments during this contact between Occidental and UNOCAL. Still there exists a conflictual situation between the UNOCAL and Bangladesh Government over the amount of compensation to be paid. Magurchhara tragedy reflects the inadequacy of institutional and legal provisions

---

<sup>10</sup> Available at: <http://www.bup-bd.org/water&environment.htm>.

to fight against such accidents where MNCs are involved. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 170-172)

#### **4.9 Forest Management**

The Forest Department (FD) under the MoEF is responsible for the conservation and management of the forest cover in Bangladesh and the implementation of the Forest Policy, Forest Mater Plan, and the Forestry Act. The Forest Department is headed by the Chief Conservator of Forests who is assisted by three Deputy Chief Conservators of Forest. There are 37 forest divisions in Bangladesh including the National Botanical Garden. Divisional Forest Officers are responsible for forest administration in these divisions. Under each division there are several forest officers controlled by Forest Range Officers. Apart from the Forest Department other agencies involved in forest management and development are the Bangladesh Forest Industrial Development Corporation, Forest Research Institute and the Institute of Forestry and Environmental Science. During the recent years, forest policy in Bangladesh has been significantly influenced by the Asian Development Bank and the World Bank who have provided much of the finances in forestry sector projects. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 94)

##### **4.9.1 Forest Policy 1979**

Historically, two trends characterise the forest-management in Bangladesh: first, state sponsored commercialisation of forests and, second, alienation of local ethnic communities from forest use and management. (Khan, N. A., 2000) The first ever forest policy in independent Bangladesh was promulgated in 1979 (Gazatte Notification No-1/For-1/77/345/8 July 1979). The main objective of the policy was to protect and conserve country's forest assets as well as develop the forestry sector for industrial and commercial purposes. Main features of the Forestry Policy 1979 were as follows:

- i. careful preservation and scientific management of forests for qualitative improvement;

- ii. designation of all government owned forests as national forests which will not be used for any non-forestry purpose;
- iii. expansion of forests on the new land formation along the coastal belt, on the depleted hills of unclassified state forest and, on suitable *khas* (government owned fallow lands of the country);
- iv. optimal utilisation of forest resources to meet the needs of people and country by using modern technology;
- v. setting up forest-based industries and adopting measures to meet raw material requirements;
- vi. initiating mass motivation programmes for forestry and providing technical assistance to interested people; and
- vii. organising forestry research, education and training to meet scientific, technological and administrative needs. (Md. Millat-e-Mustafa, 2002: 118)<sup>11</sup>

The Forestry Policy 1979 largely ignored the broader issues such as sustainable development, poverty alleviation, rights of local communities, rural energy needs, community participation, role of non-governmental sector, etc. Rural forestry and local people were given less attention in this policy. Despite the implementation of the Forest Policy 1979, Bangladesh experienced a net loss in the forest cover and all policy initiatives proved to be ineffective. Huge population, pressure on limited agricultural land, decreasing land productivity, limited employment in industrial sector and poor governance were some major causes of the forest loss. As an alternative approach the Government of Bangladesh introduced second and the current forest policy in 1994.

#### **4.9.2 The National Forestry Policy 1994**

The National Forestry Policy 1994 marks a departure from the commercial emphasis of the earlier policies, to an emphasis on the sustainable development, poverty alleviation, participation of local communities, support for private sector afforestation initiatives, and global environmental concerns (including bio-diversity conservation and climate change). (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 73) The main feature

---

<sup>11</sup> Available at: <http://www.enviroscope.iges.or.jp/modules/envirolib/upload/371/attach/08-Bangladesh.pdf>.

of the National Forestry Policy 1994 is its focus on participatory forestry. Some important policy statements of the policy are as follows:

- Attempts will be made to bring about twenty per cent of the country's land under the afforestation programmes of the government and the private sector by 2015 through coordination of the government, NGOs and private participation of people in order to maintain ecological balance and achieve self sufficiency in forest products.
- Private initiatives will be encouraged to implement tree plantation and afforestation programmes on fallow, hinterland, banks of ponds and homestead lands. Technical and other support will be provided for introducing agro-forestry on privately owned land.
- Massive forestation will be initiated on the sides of rail, roads, dams, ponds etc. with the partnership of local people and NGOs. In addition, rubber plantation will be encouraged in suitable areas of the county including Chittagong Hill Tracts, Sylhet, and Modhupur.
- Massive afforestation programmes will be undertaken in the denuded hilly areas of Unclassified State Forest Areas of Rangamati, Khagrachari, and Bandarban. While implementing the programme, participation and rehabilitation of local *Jhum* cultivators will be ensured.
- Denuded and encroached areas under reserved forests will be identified and afforestation in these areas would be done with mass participation. In this regard, use of agro-forestry will be encouraged. Along with this afforestation programme, unutilised land, earlier allotted for tea plantation in Chittagong Hill Tracts and Sylhet, will be used for tree plantation and afforestation.
- Women will be encouraged to participate in homestead and farm forestry, and participatory afforestation programmes.
- Eco-tourism will be promoted, keeping into consideration carrying capacity of the eco-system.



- The Forest Department will be strengthened in order to achieve the goal and objectives of the National Forest Policy. A new department 'Department of Social Forestry' will be established.
- Emphasis will be given on the modernisation of forest based industries to ensure the effective utilisation of forest raw materials.
- Initiatives will be taken to encourage forest resource based, labour intensive, small scale and cottage industries in rural areas.
- Steps will be taken to reduce wastage by using modern technology for extraction and processing of forest products. (*National Forestry Policy 1994*, Government of Bangladesh)<sup>12</sup>

This policy was prepared with the support and advice of the Asian Development Bank and has proved to be highly controversial. Especially, initiatives taken for social forestry have not yielded expected results. Policies of the Bangladesh Government have been greatly influenced by external factors i.e. actual design and implementation of the projects is shaped by conditionalities imposed by project-funding institutions while concerns of the local people and tribal communities have largely been ignored.

There has always been a conflictual situation between the Forest Department and local communities. Though the Forestry Policy 1994 talks about the participation of local communities in forest management, some of the provisions of the policy are adverse to their interests. For example, if the provision of reforesting twenty per cent of the land cover is implemented fully a large amount of land, which has been encroached and turned into agricultural land for a long time, will be confiscated. Another provision of the policy states that "a large number of tribal people lived around a few forest zones. Since the ownership of land under their disposal is not determined, they grab the forest land at will. They will be imparted ownership of certain amount of land through the forest settlement process.

The rest of the forest land will be brought under permanent protection". This policy will have adverse impacts mainly on ethnic communities, living traditionally on

---

<sup>12</sup> Available at: [www.bforest.gov.bd/act.php](http://www.bforest.gov.bd/act.php)

forest resources for centuries. This policy statement also shows the antagonistic approach of the FD towards tribal communities. Forest Department's perception of local communities is that of encroachers while local people think that corruption in Forest Department is a major cause of the loss of forest cover. Given this antagonistic perception, people have been reluctant to participate in social forestry programmes.

Some of the targets set in the policy are unrealistic. For example, the first policy statement sets a target to bring about 20 per cent of the land of the country under forest cover during 1995-2015. In 1995, total designated forest land of the country was about 10 per cent. In order to achieve the target of 20 per cent of the land cover another 10 per cent of forest cover is to be achieved over a period of 20 years i.e. an average increase of 0.5 per cent per annum. But by 2002 forest cover had increased only by one per cent i.e. an average increase of 0.14 per cent per annum, which is far below the said target. (Nur Muhammed et al., 2005: 379)<sup>13</sup> The policy also emphasises that necessary rules and regulations will be enacted to implement the provisions of the National Forestry Policy 1994. The policy states in this regard that "in the light of the aims, objectives and targets set up in the policy statement, the acts and rules related to forestry shall be modified, amended and if necessary new Rules and Acts would be promulgated." (*National Forestry Policy 1994*, Government of Bangladesh) But nothing significant has been done so far in this regard except for the promulgation of the Social Forestry Rules in 2004.

There is a general perception that whatever rules have been enacted, the aim of these initiatives is to ensure the funding from donor agencies. This culture of external funding and loans has become deeply entrenched in the political circles of Bangladesh. It is widely believed that "the Forest Department people, the politicians and their sponsors do not care for a *sal*, a *Garjan*, or a *Chapalis* but for dollars that swim around". (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 104)

#### **4.9.3 Social Forestry in Bangladesh and Role of Multilateral Development Banks**

Social forestry or participatory forestry is supposed to be one of the most effective tools of reforestation, poverty alleviation and employment creation. The major forms of social

---

<sup>13</sup> available at: <http://www.forestry.oxfordjournals.org>

forestry in Bangladesh are agro-forestry, strip plantation, homestead plantation, and fuelwood plantation. The large scale participatory forestry in Bangladesh was introduced in 1982 with the help of US\$ 11 million loan from ADB and US\$ 2.09 million Technical Assistance grant from the United Nations Development Programme. In 1989, the ADB granted a large loan of US\$ 40.9 million to forestry sector for the Thana Afforestation and Nursery Development Project. Fuelwood plantation was the major component of this project. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 98) The ADB has also assisted Bangladesh in the preparation of the Forestry Master Plan. The objective of the Forestry Master Plan is to “optimise the contribution of forest resources for environmental stability and economic and social development.” (ADB, 1996: 3)<sup>14</sup> Under this plan the government has set an objective of investing US\$ two billion over a period of twenty years (1995-2015).

These projects funded by the ADB are intended to promote commercial or industrial plantation. Though the ADB claims all its projects to be successful both in terms of benefit to people and ecological sustainability, but in many project sites ADB funded projects have proved to be highly controversial. For example, in Modhupur *sal* forest area local people have complained about economic, social and ecological problems. Plantation of eucalyptus and acacia has proved to be ecologically destructive to natural *sal* forest cover. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 96)

The World Bank has played a key role in the forestry sub-sector by financing a large number of projects. For the first time, the World Bank had funded US\$ 11 million for the Mangrove Afforestation Project which was implemented in 1985. Again in 1985, the IDA funded US\$ 28 million for the Second Forestry Project. In 1993 the World Bank provided a credit of US\$ 50 million for the Forest Resources Management Project. Another big investment by the Bank is Coastal Rehabilitation Project in which it has contributed US\$ 53 million. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 100)

---

<sup>14</sup> As cited in: *Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SHED, 2002: 98.

Though the government and donor agencies claim social forestry to be a great success, social forestry in Bangladesh suffers from many obstacles such as the lack of organisational capabilities, skilled manpower, clear budgetary arrangements, legitimate and fixed land tenure for participants, lack of planned rotation of the felling of trees, lack of people's participation from grassroot level and, corruption in Forest Department. Under-financing is one of the major reasons of low yields from social forestry programmes. In the Forestry Sector Master Plan, there is an estimated expenditure of US\$ 1368 over a period of twenty years (1995-2015) to reach the set target of forest cover i.e. \$68.32 million per annum. But actual expenditure during past few years has remained well below the estimated one. (Nur Muhammed, et al., 2005: 380) The Table 4.3 shows the poor scenario of expenditure in the forestry sector.

**Table 4.3**  
**Expenditure in Forestry Sector in Bangladesh (1995-2002)**

Year	Estimated Expenditure	Actual Expenditure million US\$	Actual expenditure as % of estimated one
1995/96	68.38	13.4	19.6
1996/97	68.38	14.0	20.5
1997/98	68.38	13.2	19.3
1998/99	68.38	11.6	17.0
1999/00	68.38	17.4	25.4
2000/01	68.38	20.4	29.8
2001/02	68.38	17.9	26.2
Total	478.66	107.9	22.5

Source: Development Planning Database Survey 2003, Bangladesh Forest Department (unpublished data).<sup>15</sup>

In this way, we see that the Bangladesh Government has taken some crucial legal and institutional initiatives to maintain the environmental sustainability of the country.

<sup>15</sup> Quoted from Nur Muhammed et. al (2005) "Reckoning Social Forestry in Bangladesh: Plan and Policy versus Implementation" in *Forestry*, vol. 78, No.4, pp. 373-383, available at: <http://www.forestry.oxfordjournals.org>

The civil society organisations and NGOs also have been involved in voicing environmental concerns, building environmental awareness and in implementing environmental protection policies and programmes. Multilateral development banks and other aid giving agencies have also invested large sums in the environmental sector in Bangladesh.

#### **4.10 Importance of Informal Regulation or Community Pressure for Environmental Protection:**

In addition to formal environmental regulations, informal pressure by adversely affected communities for natural resource conservation and pollution abatement remains a critical factor for environmental management. A study by Haq, Hartman and Wheeler found that high income of local people was a powerful determinant of informal regulation. The authors also found that economic policy has several implications for environmental regulations. They assumed that “privatisation, to the extent that it increases plant efficiency, can significantly improve environmental performance. As private ownership, competitiveness, and per capita income rise, communities may be in better position to exert strong local pressure on polluting facilities to clean up production”. (Hartman, Haq and Wheeler, 1997) The study concluded that “clean production is not uncommon in very poor countries such as Bangladesh. Even in the absence of formal regulations large, efficient, domestically owned plants operating near relatively affluent communities have proven capable of excellent environmental performance”. (Hartman, Haq and Wheeler, 1997: 32) However, where people are relatively poor and illiterate, government regulations are necessary to avoid environmental injustice. As communities vary in their capabilities and awareness to complain against environmental pollution, a uniform set of environmental regulations may prove ineffective. If local conditions are not taken into account while formulating a policy and regulations are imposed uniformly, local problems can not be addressed properly. So, the “importance of informal regulation represents a promising foundation for decentralised regulatory policy”. (Hartman, Haq and Wheeler, 1997: 27)

If we analyse environmental management in Bangladesh in this context of informal regulation, socio-economic conditions of the people bear particular significance for pollution control. Bangladesh is a country where nearly half of the population lives below poverty line. So, most of the people are unable to exert effective pressure on industrial units for pollution abatement and clean production. Immediate livelihood concerns of the people make them subservient to pollution and polluting industrial units. Moreover, even if people raise their voices it remains unheard in political circles, especially, successive governments in Bangladesh have been insensitive to concerns of the tribal people. Though various historical, political and strategic reasons are responsible for this particular neglect of tribal people, intense population pressure and need for rapid industrialisation has accentuated intervention in tribal hilly areas.

#### **4.10.1 Development Projects, Environmental Policies and the Tribal People**

Various government policies have gone against the interests of the tribal people. For example, expansion of 'Reserve Forest Areas' has caused severe damage to livelihood practices of small tribal communities. The Khyang tribal group in Rangamati district is an example of worst hit community by the expansion of reserved forests. Most of the Khyang families have lost their croplands, to reserved forests. Even their homesteads have also been notified as reserve forests. The traditional agricultural practice *jum* is totally ruined due to expansion of government forest areas and industrial plantation. Several development projects and restrictions of *jum* cultivation have totally ruined the subsistence economy in the hill areas. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 92) Though the CHT Agreement signed in December 1997, assigns *Hill District Councils* with executive powers on 33 subjects including management on land, environment and forest (Mouza forests) and the *CHT Regional Council* with supervisory powers on the HDCs, these institutions have not been consulted while declaring the reserve forest areas. (*Bangladesh Report on Indigenous People and Protected Areas*, 2002: 6)<sup>16</sup>

---

<sup>16</sup> Available at:

<http://www.aippfoundation.org/documents/Bangladesh%20Report%20on%20IPs%20and%20PAs%20%5BFINAL%5D.pdf>

Industrialisation in CHT has caused immense damage to the flora and fauna of the hill area. For example, Karnaphuli Paper Mills is a major source of pollution and ecological imbalance in Chittagong Hill Tracts. Millions of tons of bamboo and softwood have been extracted from the CHT to run the mill. Plantation of paper-wood and pulpwood has further deteriorated the ecological balance of the hill district and has proved disastrous for the livelihood of the people. (*Bangladesh Environment: Facing the 21<sup>st</sup> Century*, SEHD, 2002: 92) It is interesting to note that first ever Export Processing Zone was established in CHT in 1978. (*The Fourth Five Year Plan 1990-1995*, Revised Draft II, 1991: XI-21)

In addition, development projects like Kaptai Hydroelectric Project, which were prepared in total defiance of local concerns, have proved determinant for the socio-economic conditions of local people. The dam project inundated 40,000 acres of cultivated flat lands, the main granary of the region. The project affected nearly 100,000 indigenous populations who were never properly rehabilitated or compensated.

#### **4.11 Environmental Policies: Major Constraints to Implementation**

**4.11.1 The Problem of Governance:** Generally, the governance scenario in Bangladesh, which is characterised by rampant corruption, puts a question mark over all the efforts for environmental management by various agencies and institutions. Implementation of the regulations is very weak. For example, under the Environment Court Act, two Environment Courts were established in Dhaka and Chittagong. But few cases have been brought to the court so far and the record of successful prosecution is very poor. In Dhaka, only about ten cases have been filed by the DoE, but in total, some 84 cases have been brought before the Dhaka Environment Court. The number of cases brought to the Environment Courts has been so less that Environment Courts have asked for permission to hear non-environmental cases also. (*Bangladesh Country Environmental Analysis*, World Bank, 2006: 81)

Though government policies and plans have increasingly accepted the governance as a development issue, practically, governance scenario in Bangladesh remains

miserable. *Bangladesh National Strategy for Accelerated Poverty Reduction* (2005) identified five broad sectors for improving governance:

- Improving implementation capacity;
- Promoting local governance;
- Strengthening Anti-Corruption Strategy;
- Reforming criminal justice and enhancing access to justice for the poor; and
- Improving sectoral governance. (*Bangladesh Unlocking the Potential: National Strategy for Accelerated Poverty Reduction*, Government of Bangladesh, 2005: 163)

Widespread corruption is the biggest challenge for good governance in Bangladesh. The *Corruption Index 2006* prepared by the Transparency International placed Bangladesh on 156<sup>th</sup> out of 163 countries. (*Transparency International Corruption Perceptions Index 2006*) Even judicial system in Bangladesh is highly corrupt. A survey undertaken by the Bangladesh Chapter of Transparency International revealed that 89 per cent of those interviewed believed that it was almost impossible to get fair and quick justice without money power or political influence. It also revealed that 63 per cent of the households, involved in some type of court cases, had paid bribes to judicial officials.

**4.11.2 Lack of Democratic Culture:** Lack of democratic culture poses another threat to public accountability and transparency. Though the 1990s witnessed democratic governments in Bangladesh, there was a clear lack of democratic political culture and the politics of the country was characterised by *bandhs*, agitations and boycotts. “There are strong theoretical reasons to think of democracy as conducive to environmental protection and economic efficiency in general”. (*World Development Report 2003*, World Bank, 2003: 46) It is generally believed that democratic governments are more accountable to public grievances and tend to give priority to public interests rather than favouring specific group-interests. Furthermore, in democratic system freedom of expression and protest provides a space to raise public grievances.



Therefore, localised-environmental concerns can best be resolved by decentralised local-self governing bodies. Democratic governments are also more open in providing public information and database which is necessary for taking appropriate measures to handle environmental problems. Democracies are also more likely to be committed to international environmental obligations. It is important to notice that in Bangladesh, key environmental legislations and policies have been formulated and implemented during democratic regimes.

The shift from a system of public control to a market-based economy implies several significant repercussions for environmental governance in Bangladesh. In order to attract FDI and funds from the aid giving agencies, Bangladesh is bound to initiate reforms on governance front. Some major environmental initiatives like formulation of the NEMAP, Forestry Policy 1994, and Social Forestry Programmes have been prepared with the assistance of the ADB, World Bank and the UNDP. The ADB had provided \$504.60 million as loan and \$16.201 million in technical assistance for environmental projects by 1999. These aid giving institutions have increasingly emphasised the issue of governance in implementation of the projects.

Thus, the above discussion shows that the Bangladesh government has taken some important steps for environmental sustainability. However, despite the recognition of environmental issues in policy decision-making, weak institutional capacity for implementation and monitoring, lack of incentives and rewards for better environmental performance have put strict limitations on the efforts to maintain environmental sustainability. All these are topped by the State's failure to utilise the ability of the market for better environmental performance, alienation of the local people, corruption, lack of inter-sectoral coordination, and lack of clear enforcement rules for day to day practice.

## **CONCLUSION**

---

---

## Conclusion

This study has attempted to establish correlation between industrial development, environmental degradation, poor governance and resulting socio-economic stress in Bangladesh in the backdrop of ongoing economic reform programmes. Theoretically, the study seeks to answer the question of how industrial development impinges upon various aspects of environment and also examines whether environmental degradation poses national security threat or not.

Our study does indicate that industrial growth in Bangladesh has caused immense damage to environmental sustainability, particularly, threatening the traditional livelihood practices of people. Economic liberalisation and resulting changes in the structure of the economy have not translated into environment-friendly growth pattern. Though the government has taken some important steps for controlling pollution and maintaining ecological balance, most of the rules and regulations focus only on pollution control. There is a lack of regulatory framework formulated in a broader perspective of sustainable development. In Bangladesh, where nearly half of the population lives below poverty line, environmental problems have exacerbated already existing socio-economic problems.

As discussed in Chapter 1, after the end of the Cold War non-traditional security threats, environmental threats being prime among those, have emerged as a dominant discourse on both political and academic spectrum. The traditional connotation of *security* defined in terms of military power has proved to be inadequate to address multi-dimensional challenges that threaten the security of people, especially the vulnerable sections of society such as the women, children, poor and the people excluded from the *fair share* of development paradigm shaped and defined by economic liberalisation and globalisation. These non-tradition threats emanate from such sources, as makes the idea of security of sovereign territorial nation-state an incomplete, though not totally irrelevant theorem. As threats to security emanate from sources that were not considered as threats in mainstream security debate, redefinition of security demands new means and approaches to deal with such challenges. There has been always a debate that broadening

the scope, nature and dimension of security may result into *dedefinition* rather than *redefinition* of the security. So the question remains about the soundness of including non-traditional threats in security paradigm without disturbing the theoretical coherence of the *term* itself.

Secondly, if the scope of *security* is broadened to include non-traditional security threats, the question arises as to *security for whom* i.e. what should be the referent object of *security*. Classical tradition of *security* considers territorial integrity of the state as main referent object, but territorial integrity does not guarantee security against multifaceted threats to the citizens that emanate from sources other than military invasion. So, if security is understood in terms of security of people i.e. *human security*, then only non-traditional threats can be put under the orbit of *security*.

Linking environmental threats to *security* remains a disputed concept and has been criticised on methodological, theoretical and practical grounds. Though environmental degradation does not pose a direct threat to territorial integrity of the state, it can strain social cohesion and aggravate already existing social cleavages on the lines of class, religion and ethnicity, challenging the authority of the state. Some scholars have also tried to interpret environmental threats in terms of realist security paradigm. They argue that in a state-centric world order environmental degradation in one state may cause spill over effects in neighbouring state or actions of a state can threaten the environmental sustainability in another state, threatening the *national interest*. This situation may ultimately escalate into military confrontation.

Theoretical discussion in Chapter 1 makes it clear that environmental degradation poses a serious threat to human well being and social harmony. However, in most of the cases environmental degradation has been a cause of intra-state conflict rather than inter-state conflict. In most of the developing world, where democratic institutions are weak, competition for control over scarce resources has fuelled inter-group conflicts. And even in some cases revenues from natural resources have been major funding sources for prolonged civil wars. For example, earnings from illegal trade in drugs, mainly opium were major sources of income during civil war in Afghanistan. As globalisation has

narrowed the space among nation-states and made the borders porous, these conflicts may well infiltrate into another state, causing major political, economic and social upheavals.

It is also well established that environmental degradation does not lead to conflict in itself. Environmental variables become a probable cause of conflict while interacting with other social, political and economic variables of a particular society. In addition to being a cause of conflict, environmental degradation coupled with rapid population growth can jeopardise the economic wellbeing over long run. This is particularly true about fast industrialising countries like Bangladesh.

Though free market environmentalists believe that market mechanisms such as *polluter pay taxes*, tradable permits, putting property rights on natural assets etc. can correct the ecological imbalance, it may not work among developing countries which are still in the process of liberalising and lack clear regulatory framework and implementation mechanisms for environmental management. Market based mechanisms can be effective only when people are well-informed and aware about the adverse impacts of pollution and are empowered enough to raise their voices. In a country, fraught with poverty and corruption, implementing market-mechanisms for environmental protection can aggravate social tension. For example, putting prices on common natural resources can deprive the social groups of their traditional sources of living. Moreover, democratic institutions and good governance are prerequisites for the implementation of market mechanisms of environmental management.

As discussed in the Chapter 2, Bangladesh had initiated reform measures in late 1970s, however, during the immediate following decade pace of reforms was sluggish and growth rate of GDP nearly remained the same. In 1987, Bangladesh adopted the structural adjustment programme as outlined by the IMF and major policy changes were carried out in the direction of open economy. During the 1990s, Bangladesh witnessed a higher GDP growth rate and structure of economy experienced major shifts and changes. While average annual GDP growth rate during 1970s and 1980s was 3.71 per cent and 3.84 per cent respectively, 1990s witnessed a higher growth rate of around 5.3 per cent

with an impressive 3.3 per cent growth of per capita GDP. GDP growth has experienced further momentum and reached to 5.7 per cent per annum over past six years.

Sectoral structure of GDP experienced considerable changes during this period. In 1972/73 agriculture and services accounted for approximately 50 per cent and 36 per cent of GDP respectively however, by 2004 their share stood at 21 per cent and 53 per cent respectively. The share of industrial sector has increased from 13.78 per cent during 1972/73 to 27 per cent in 2003-04. In fiscal year 2004-05 the sectoral share of industries stood at 28.31 per cent.

In this way, we see that during 1990s, high growth rate of the industrial sector was a key contributing factor to high growth rate of economy. During 1990s, industrial sector witnessed the increase in growth rate of 1.2 per cent, whereas, increase in growth rate for agriculture and services sector was 0.8 per cent and 0.7 per cent respectively. Bangladesh needs sustained and high rate of economic growth for rapid poverty reduction, which is a precondition for sustainable development. So, on the one hand, Bangladesh has to industrialise fast in order to maintain a steady growth rate, on the other hand, persistent industrial pollution may, to some extent, neutralise the benefits of growth. Thus, Bangladesh faces a dilemma of *Brown versus Green*, a phenomenon common to most of the developing countries.

Furthermore, GDP growth rate does not reflect the downside environmental costs and associated social costs. The question remains whether this economic growth has been translated into improvement in the social sector or not, secondly, whether industrial growth has been environmentally sustainable or not. Chapter 3 establishes that there exists a complex relationship between various social indicators (human development and deprivation indicators) and environmental sustainability. It is highly probable that benefits of economic growth may not be transmitted to common people who bear the brunt of environmental degradation resulting from industrialisation and other development projects.

Though since 1990 Bangladesh has witnessed rapid advances in human development, nearly half of the population is still below poverty line and income gap

between the rich and the poor is increasingly widening. Child and infant mortality rates have been falling at the rate of 5% a year and malnutrition among mothers has fallen from 52% in 1996 to 42% in 2002. Primary school enrolment rate has improved from 70% in 1990 to more than 90% during 2002, life expectancy at birth has increased from 45.2 during 1970-75 to 62.6 years during 2000-05 and the percentage of population with sustained access to an improved water source has increased from 71 per cent in 1990 to 75 per cent in 2002. This achievement in the social sector can not be interpreted by economic growth alone because Bangladesh is still extremely poor with average per capita income of \$ 1770, second lowest in South Asia.

This accomplishment in social sector is, to a large extent, tarnished by the gap between the poor and the rich. According to the National Strategy for Accelerated Poverty Reduction, Gini Index of income inequality for the country increased from 0.259 during 1991/92 to 0.306 in 2000 whereas Gini Index for rural and urban areas increased from 0.243 to 0.271 and 0.307 to 0.368 respectively during the same period. In this way, Gini Index of inequality for national, rural and urban areas has increased by 0.047, 0.028, and 0.061 respectively. The data clearly shows that higher growth in GDP has not resulted into equitable growth for all. The data also informs that income inequality for urban areas is higher than both national and rural indices. Even in the terms of human poverty, there are considerable variations across the lines of poverty, gender, and rural-urban gap. For example, infant mortality is about 70 per cent higher for the poorest quintile than the richest quintile.

These social indicators are particularly significant for how variables of environmental degradation interact with and impact upon social relationships. As discussed in the Chapter 3, there is considerable interface between poverty and environmental degradation. Industrial pollution and other related problems have caused immense damage to environmental sustainability of the country, inflicting irreversible socio-economic costs such as health risks, reduced agricultural production, loss of fisheries, loss of forests, rural-urban migration, resulting pressure on basic urban services etc. These social pressures have played a key role in fuelling already existing political and social divides. For example, industrialisation coupled with other development

projects in CHT has inflicted immense damage to local culture, tradition and very way of life of tribal people. The industrialisation in CHT, which was accompanied with massive settlement of Bengali people from the plain-lands in the hill area, has been a major factor behind the discontent of tribal people and resulting demands of separatism. CHT is a typical example where environmental variables have ignited violent conflict while interacting with other political, ethnic and religious factors.

River pollution, huge waste problem, health hazards and urban pollution are some immediate problems caused by rapid industrialisation. All major rivers in Bangladesh such as, Burigonga, Shitalakhya, Turang, Balu, Meghna, Padma, etc. are highly polluted. In Dhaka, only major industrial clusters discharge more than 8 million kg of BOD annually to the four rivers around it. In Dhaka, the tanneries in Hazaribagh area discharge their wastewater into the Burigonga river; the Fatullah (Narayanganj) industrial area, mainly comprising textiles and steel re-rolling industries, drains its waste-water in the same river; the Tongi industrial area (mainly textiles industries) discharges its effluents to the river Turag which joins the river Burigonga. Textiles, chemical, paper, and steel re-rolling industries in Tejgaon industrial area discharge effluents into the rivers Burigonga, Turag, and Balu. In Chittagong, industries at Nasirabad industrial area (mainly textile, leather, chemical and steel re-rolling industries) and Kalurghat area (textile, leather, and chemical) discharge their waste water into surface drains and drainage canals which is ultimately discharged into Karnaphuli river.

This untreated discharge of effluents into rivers has caused a major threat to human and aquatic life. For example, fish is scarce within 30 km of Karnaphuli estuary. Water from rivers can not be used for irrigation, drinking and daily household purposes owing to the high level of pollutants. Owing to this severe river pollution, fish capture and crop yields have declined to a considerable level.

Tanneries, paper and pulp industries and textiles industries are the most polluting industries in Bangladesh. As discussed in Chapter 2, textiles are the greatest source of organic water pollution (contributing to 64 per cent of total organic pollutants) followed by food and beverage industry which contributes to 23.2 per cent of the total pollution.



Paper and pulp industry is also a key source of organic water pollution contributing to 6.8 per cent of the total organic water pollution. Simultaneously, these industries are also the major sources of export-earnings.

Industries are the key sources of air pollution, causing severe respiratory health problems. As of 1990, industries contributed to 40 per cent of total CO<sub>2</sub> emissions. Working conditions in industries are miserably poor and in most of the industries there are no proper safety measures for the health of workers. For example, according to a study by SEHD, about 90 per cent of the Hazaribagh tannery workers die before the age of 50 owing to the unhygienic working environment. In textile industries gaseous emissions and poisonous vapours during dyeing and printing operations adversely affect the health of workers due to inadequate ventilation.

Industrial growth has been accompanied with huge rural-urban migration and rapid urbanization, causing immense pressure on basic amenities like water supply, sanitation, and waste management. For example, in Dhaka city alone around 4.2 million people live in slum areas and more than 10 million people living in Dhaka produce nearly 5000 tons of solid waste daily out of which only 42 per cent is properly collected and disposed. In this way, the study indicates that industrial growth is a key source environmental degradation.

The crucial question before Bangladesh is how to maintain industrial growth while minimising the downside environmental costs. Here comes the crucial issue of governance. Proper implementation of environmental rules and regulations is central for pollution control. Involvement of local people in environmental management is imperative for addressing local environmental concerns. A pro-poor growth strategy and decentralised governance can, to a larger extent, lessen the social disharmony, arising out of environmental deterioration. As Chapter IV discusses, Bangladesh has adopted some key environmental regulations during 1990s such as Environment Conservation Act, Environment Conservation Rules, Environment Court Act 2000, etc. However, the operationalisation of these regulatory frameworks has been weak and scattered. Various factors such as lack of political will, rampant corruption, lack of incentives for industries

to invest in pollution control, lack of financial and technical support, etc are responsible for non-compliance of these regulations.

As discussed in Chapter 4, institution and financial capacities of the DoE are very limited. Total financial outlay for development of environment in public sector during the Fifth Five Year Plan period was only 400 million Tk. There has been a persistent lack of investment in research in environmental management. Centralised structure of the DoE is also inappropriate to deal with localised environmental problems. Divisional offices of the DoE lack authority and capacity to monitor and implement environmental regulations.

Regulatory framework to deal with industrial pollution is not very transparent and there are several loopholes. For example, according to the Environment Conservation Act 1995 and Environmental Conservation Rules 1997, environmental impact assessment (EIA) is necessary for all Red Category projects or industries. However, there is no uniform procedure or institution to carry out the EIAs and the responsibility of conducting EIAs lies with the sponsors of the project who are interested only in getting their project cleared. A large number of agencies such as the ADB and World Bank are involved in EIA process with their own separate guidelines and procedures.

Though the *Fifth Five Year Plan* ((1997-2002) envisaged a market-based approach for environmental management, major policy reforms in this direction such as eco-tax reforms, subsidy policy, land tenure, incentive schemes, etc. are yet to be formulated. The Plan affirmed the Government's commitment for incentive-based environmental policies, operating through a system of prices and taxes, and information on industrial pollution. However, so far the government has not conducted the study and research in this regard drawing from the experiences of other developing countries. There is no provision for systematic compilation of data on industrial pollution and related information. In fact, basic requirement for the implementation of market-based reforms is regular availability of information and database on industrial pollution. This lack of data and access to information about environmental degradation is a key hurdle in the way of implementation of environmental regulations.

It is important to notice that most of the crucial steps for environmental sustainability were taken by democratic regimes. One simple inference can be drawn that

democracy is conducive to environmental protection and sensitive to the concerns of common people. As democracy provides a space for public resistance and popular criticism, people can raise their voices against ecologically destructive development policies and projects. The activism for environmental protection by civil society in Bangladesh can be viewed in this context. Bangladesh's response to environmental problems in future may largely depend upon the functioning of democratic institutions and strengthening of democratic culture.

Lastly, the question can be asked whether environmental problems in Bangladesh have reached to a point where it can be termed as national security threat/problem. Our findings do indicate that though environmental degradation has caused considerable socio-economic toll, it may not have devastating and collapsing impact on Bangladesh. Rather, Bangladesh has shown some positive indications during the past decade. Official statistics show that Bangladesh has achieved an afforestation rate of 1 per cent per annum during the past decade, largely with the participation of common people; growth rate of economy has improved; income poverty has decreased by nearly 10 per cent over past decade; human development indicators have shown an improving trend; population growth rate has come down and most importantly, Bangladesh has witnessed democratic regimes, though, lack of democratic culture has been a persistent feature of the democracy in Bangladesh. Moreover, international links of Bangladesh can also be beneficial to the environment in some aspects. Multilateral development banks such as the World Bank and the ADB have invested huge amount in various environmental projects. Vibrant civil society and link of NGOs, a key feature of Bangladesh society and polity, is another positive factor for environmental protection.

In this way, we see that industrialisation remains an imperative for Bangladesh and downside environmental externalities can not be totally avoided. These downside costs may be minimised to a larger extent through efficient governance, investment in social sector and empowerment of weaker sections of society, especially women. Given the above mentioned positive developments, it can be concluded that Bangladesh could never be a part of the *coming anarchy or endangered planet*.

## REFERENCES

---

---

## REFERENCES

### *Primary Sources*

- \*Asian Development Bank (2001), *Asian Environment Outlook 2001*, ADB, Manila.
- \*Asian Development Bank (2001), *Country Briefing Paper: Women in Bangladesh*, ADB.
- \*Asian Development Bank (2000), *Country Environment Review: Bangladesh Toward an Environment Strategy*, ADB, Manila.
- \*Forum of Environmental Journalists of Bangladesh in collaboration with Ministry of Environment and Forest and UNDP (2001), *Bangladesh State of Environment Report 2001*, Dhaka.
- \*Government of Bangladesh (1998), *The Fifth Five Year Plan 1997-2002*, Planning Commission, Ministry of Planning, Dhaka.
- \*Government of Bangladesh (1991), *The Fourth Five Year Plan 1990-1995*, Revised Draft II, Planning Commission, Ministry of Planning, Dhaka.
- \*Government of Bangladesh (1985), *The Third Five Year Plan 1985-1990*, Planning Commission, Ministry of Planning, Dhaka.
- \*Government of Bangladesh (1980), *The Second Five Year Plan 1980-85*, Draft, Planning Commission, Ministry of Planning, Dhaka.
- \*Government of Bangladesh (1995), *National Environment Management Action Plan*, Volume 1 a- summery, Ministry of Environment and Forest, Dhaka.
- \*Government of Bangladesh (2001), *Statistical Yearbook of Bangladesh 2001*, Bangladesh Bureau of Statistics, Dhaka.
- \*Government of Bangladesh (2002), *Bangladesh: A National Strategy for Economic Growth, Poverty Reduction and Social Development*, Ministry of Finance, Dhaka.
- \*Government of Bangladesh (2005), *Bangladesh Unlocking the Potential: National Strategy for Accelerated Poverty Reduction*, Planning Commission, Ministry of Planning, Dhaka.
- \*Government of Bangladesh (2005), *Industrial Policy 2005*.
- \*Government of Bangladesh (2000), *Bangladesh Economic Review 1999*, Ministry of Finance, Dhaka.
- \*Government of Bangladesh (2002), *Statistical Pocketbook of Bangladesh 2001*, Bangladesh Bureau of Statistics, Dhaka.

- \*Government of Bangladesh (1999), *Bangladesh Compendium of Environment Statistics 1997*, Bangladesh Bureau of Statistics, Dhaka.
- \*Government of Bangladesh (2007), *Bangladesh Economic Review 2006*, Ministry of Finance, Dhaka.
- \*Society for Environment and Human Development (2002) *Bangladesh Environment: Facing the 21st Century*, Dhaka: SEHD.
- \*Society for Environment and Human Development (SEHD) (2000), *Leather Industry: Environmental Pollution and Mitigation Measures*, Dhaka: SEHD.
- \*SAARC, (1992), *Regional Study on Greenhouse Effect and its Impact on the Region*, Katmandu: SAARC Secretariat.
- \*UNDP (1994), *Human Development Report 1994*, New York: Oxford University Press.
- \*UNDP (2005), *Human Development Report 2005*, New York: Oxford University Press.
- \*UNDP (2006), *Human Development Report 2006*, New York: Palgrave Macmillan,
- \*UNEP (2004), *The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges*, New York: United Nations Publications.
- \*Unnayan Shamannay (2001), *People's Report on Bangladesh Environment 2001*, Vol. I, Dhaka: University Press Limited.
- \*Unnayan Shamannay (2001), *People's Report on Bangladesh Environment 2001*, Vol. II, Dhaka: University Press Limited.
- \*Unnayan Shamannay (2004), *People's Report 2002-2003: Bangladesh Environment*, Vol. I, Dhaka: University Press Limited.
- \*Unnayan Shamannay (2004), *People's Report 2002-2003: Bangladesh Environment*, Vol. II, Dhaka: University Press Limited.
- \*World Bank (2000), *Greening Industry New Roles for Communities, Markets, and Governments: A World Bank Policy Research Report*, Oxford University Press: New York.
- \*World Commission on Environment and Development (1987), *Our Common Future*, Oxford University Press: New York.
- \*World Bank (2002), *World Development Report 2002*, Oxford University Press: New- York.
- \*World Bank (2003), *World Development Report 2003*, Oxford University Press: New- York.

- \*World Bank (2004), *World Development Report 2004*, Oxford University Press: New- York.
- \*World Bank (2005), *World Development Report 2005*, Oxford University Press: New- York.
- \*World Bank (2006), *World Development Report 2006*, Oxford University Press: New York.
- \*World Bank (2000), *World Development Indicators 2000*, Oxford University Press: New York.
- \*World Bank (2002), *World Development Indicators 2002*, Oxford University Press: New York.
- \*World Bank (2005), *World Development Indicators 2005*, Oxford University Press: New York.
- \*World Bank (2006), *Bangladesh Country Environment Analysis*, Bangladesh Development Series Paper No. 12, World Bank Office, Dhaka.
- \*World Bank & Bangladesh Centre for Advanced Studies (1998), *Bangladesh 2020: A Long-Run Perspective Study*, Dhaka: University Press Limited, Second Edition 1999.

## ***Secondary Sources***

### **Books**

- Anderson, Terry L. and Leal, Donald R (eds.) (2001), *Free Market Environmentalism*, London: Palgrave.
- Ahmad, Q.K. (1998), *Economic Reforms, People's Participation and Development in Bangladesh*, Dhaka: The Asiatic Society of Bangladesh & Bangladesh Unnayan Parishad.
- Alauddin, Mohammad and Hasan, Samiul (eds.) (1999), *Development, Governance and the Environment in South Asia: A Focus on Bangladesh*, London, McMillan Press Ltd.
- Alauddin, Mohammad and Tisdell, Clement Allan (1998), *The Environment and Economic Development in South Asia: An Overview Concentrating on Bangladesh*, London: McMillan Press Ltd.
- Barnett, Jon (2001), *Meaning of Environmental Security: Ecological Politics and Policy in New Security Era*, New York: Zed Books Ltd.

- Bhagwati, Jagdish (2004), *In Defense of Globalization*, New York: Oxford University.
- Buzan, Barry (1983), *Peoples, State and Fear: The National Security Problem in International Relations*, Chapel Hill: University of North Carolina Press.
- Chowdhury, Omar Haider and Geest, Willem van der (eds.) (2004), *Economic Reforms and Trade Performance in South Asia*; Dhaka: Bangladesh Institute of Development Studies & the University Press Ltd.
- Carson, Rachel (1962), *Silent Spring*, Boston: Houghton Mifflin Co., reprinted in 2000 by Penguin Modern Classics, Paperback.
- Dalby, Simon (2002), *Environmental Security*, London: University of Minnesota Press.
- Deudney, Denied H. and Mathew, Richard A. (eds.) (1999), *Contested Grounds: Security and Conflict in the New Environmental Politics*, Albany: State University of New York.
- Dryzek, John S. and Schlosberg, David (2005), *Debating the Earth: The Environmental Politics Reader*, New York: Oxford University Press, Second Edition.
- Eckersley, Robyn (ed.) (1996), *Markets, The State and The Environment: Towards Integration*, London: Macmillan Press Ltd.
- Farooque, Mohiuddin and Hasan, S., Rizavana (eds.) (1996), *Laws Regulating Environment in Bangladesh*, Dhaka: Bangladesh Environmental Lawyer's Association.
- Fukuyama, F. (1992), *The End of History and the Last Man*, New York: Avon.
- Falk, Richard (1971), *This Endangered Planet: Prospects and Proposals for Human Survival*, New York: Random House.
- Gaan, Narottam (2000), *Environment and National Security: The Case of South Asia*, New Delhi: South Asian Publishers.
- Gain, Philip (1995), *Bangladesh: Land Forest and Forest People*, Dhaka: Society for Environment and Human Development (SHED), Second Edition, 1998.
- Guha, Ramachandra and Martinez-Alier, Juan (eds.) (1997), *Varieties of Environmentalism*, London: Earthscan.
- Haq, Mozammel and Love, Jim (eds.) (2000), *Strategies for Industrialization: The Case of Bangladesh*, Dhaka: University Press Ltd, reprinted 2001.
- Homer Dixon, Thomas F. and Percival, Valerie (1996), *Environment Scarcity and Violent Conflict*, Toronto: Briefing Book.



Homer Dixon, Thomas F. (1999), *Environment, Scarcity and Violence*, Princeton: Princeton University Press.

M.G. Quibria (ed.) (1997), *The Bangladesh Economy in Transition*, Delhi: Oxford University Press.

Mol, Arthur P. J. (2003), *Globalization and Environmental Reform: The Ecological Modernization of the Global Economy*, Massachusetts: The MIT Press.

Meadows, Donella et. al. (1972), *The Limits to Growth*, New York: Universe Books.

Stavins, Robert N. (ed.) (2005), *Economics of the Environment: Selected Readings*, New York: W. W. Norton & Company, Fifth Edition.

Swain, Ashok (1996), *The Environmental Trap: The Ganges River Diversion, Bangladeshi Migration and Conflicts in India*, Report No. 41, Department of Peace and Conflict Research, Sweden: Uppsala University.

### **Chapters in Edited Volume**

Asaduzzaman M. and Hye Sayed A. (1998), "When Both Market and State Fail: The Crisis of Solid Waste Management in Urban Bangladesh", in Rehman Sobhan (ed.) *Crisis in Governance: A Review of Bangladesh's Development 1997*, Dhaka: Centre for Policy Dialogue & University Press Limited.

Bhattacharya, Debapriya (1997), "Bangladesh Manufacturing Sector in the 1990's: An Update", in Rehman Sobhan (ed.) *Growth or Stagnation?: A Review of Bangladesh's Development 1996*, Dhaka: Centre for Policy Dialogue & University Press Limited.

Dalby, Simon (1994), "The Politics of Environmental Security", in Jyrki Kakonen (ed.) *Green Security or Militarized Environment*, Aldershot: Dartmouth.

Dalby, Simon (1999), "Threats from the South: Geopolitics, Equity and Environmental Security", in Denied H. Deudney and Richard A. Mathew (eds.) *Contested Grounds: Security and Conflict in the New Environmental Politics*, Albany: State University of New York.

Deudney, Denied H. (1999), "Environmental Security: A Critique" in Denied H. Deudney and Richard A. Mathew (eds.) *Contested Grounds: Security and Conflict in the New Environmental Politics*, Albany: State University of New York.

Farouk, Bakhtier (1996), "Air Pollution in the City of Dhaka: How Long Can We Ignore?", in Ashraf Ali, M. Faizul Islam and Ruhul Kuddus (eds.) *Development Issues of Bangladesh*, Dhaka: University Press Limited.

Frankel, Jeffery A. (2005), "The Environment and Globalization", in Robert N. Stavins (ed.) *Economics of the Environment: Selected Readings*, New York: W. W. Norton & Company, Fifth Edition.

Hossain, Ismail et al (1997), "Current External Sector Performance and Emerging Issues", in Rehman Sobhan (ed.) *Growth or Stagnation?: A Review of Bangladesh's Development 1996*, Dhaka: Centre for Policy Dialogue & University Press Limited.

Jahan, Nilufar and Aladdin, Mohammad (1999), "Women and the Environment", in Mohammad Alauddin and Samiul Hasan (eds.) *Development, Governance and the Environment in South Asia: A Focus on Bangladesh*, London: McMillan Press Ltd.

Moran, Alan (1996), "Tools of Environmental Policy: Market Instruments versus Command-and-control", in Robyn Eckersley (ed.) *Markets, The State and The Environment: Towards Integration*, London: Macmillan Press Ltd.

Nath, Narayan Chandra (1995), "The Export Performance of Bangladesh", in Roy H Grieve and M Mozammel Huq (eds.) *Bangladesh Strategies for Development*, Dhaka: University Press Limited.

Rana, Pradumna B. (1997), "Reforms in Bangladesh: A Comparative Assessment in Relation to Other South Asian Countries", in M.G. Quibria (ed.) *The Bangladesh Economy in Transition*, Delhi: Oxford University Press.

Rahman, Masihur and Bakht, Zaid (1997), "Constraints to Industrial Development: Recent Reforms and Future Directions", in M.G. Quibria (ed.) *The Bangladesh Economy in Transition*, Delhi: Oxford University Press.

Rasheed, K.B. Sajjadur (2002), "Environmental Governance in Bangladesh", in Asit K. Biswas et al (eds.) *Contemporary Issues in Development: Essays in Honour of Q.K. Ahmed*, Dhaka: Bangladesh Unnayan Parishad & Academic Press and Publishers Ltd.

Rashid, Ali M. and Rahman, Mustafizur (1998), "Management of Import Liberalization and Export Promotion Strategies in Bangladesh", in Rehman Sobhan (ed.) *Crisis in Governance: A Review of Bangladesh's Development 1997*, Dhaka: Centre for Policy Dialogue & University Press Limited.

Reazuddin, Md. (1994), "Industry and Pollution Related Issues", in A Atiq Rahman, Raana Haider, Saleemul Huq and Eirik G Jansen (eds.) *Environment and Development in Bangladesh*, Volume II, Dhaka: University Press Limited.

## Articles

Allaiddin, Mohammad (2004), "Environmentalizing Economic Development: A South Asian Perspective", *Ecological Economics*, No.51: 251-270.

Brock, Lothar (1991), "Peace through Parks: The Environment on the Peace Research Agenda", *Journal of Peace Research*, 28 (4): 407-423.

Barnett, Jon and Dovers, Stephen (2001), "Environmental Security, Sustainability and Policy", *Pacifica Review*, 13 (2): 157-169.

Brown, Lester (1977), "Redefining National Security", *World Watch Paper No. 14*.

- Dalby, Simon (1998), "Ecological Metaphors of Security: World Politics in the Biosphere", *Alternatives*, 23 (4): 291-319.
- Deudney, Daniel (1990), "The Case Against Linking Environmental Degradation and National Security", *Millennium*, 19 (3): 461-476.
- Dasgupta, Susmita et al. (2002), "Confronting the Environmental Kuznets Curve", *Journal of Economic perspective*, 16 (1): 147-168.
- Dasgupta, Susmita et al. (2006), "Who Suffers from Indoor Air Pollution? Evidence from Bangladesh, Development Research Group, World Bank, Washington DC.
- Dasgupta, Susmita et al. (1997), "Surviving Success: Policy Reform and the Future of Industrial Pollution in China" World Bank, *Policy Research Development Working Paper No. 1856*.
- Gurr, Ted Robert (1985), "On the Political Consequences of Scarcity and Economic Decline", *International Studies Quarterly*, 29 (1): 51-75.
- Graegar, Nina (1996), "Environmental Security?" *Journal of Peace Research*, 33 (1): 109-16.
- Homer-Dixon, Thomas F. (1991), "On the Threshold: Environmental Changes as Causes of Acute Conflict", *International Security*, 16 (2): 76-116.
- Homer-Dixon, Thomas F. and Levy, Marc A. (1995-1996), "Environment and Security", *International Security*, 20 (3): 189-198.
- Homer-Dixon, Thomas F. (1994), "Environmental Scarcities and Violent Conflict: Evidence from Cases", *International Security*, 19 (1): 5-40.
- Hardin, Garret (1968), "The Tragedy of Commons", *Science*, 162, 13 December.
- Hartman, Raymond S., Huq, Mainul and Wheeler, David (1997), "Why Paper Mills Clean Up: Determinants of Pollution Abatement in Four Asian Countries", World Bank, *Policy Research Working Paper No. 1710*.
- Kaplan, Robert (1994), "The Coming Anarchy", *The Atlantic Monthly*, 273 (2): 44-76.
- Levy, Marc A. (1995), "Is the Environment a National Security Issue?", *International Security*, 20 (2): 35-62.
- Mani, Muthukumara and Wheeler, David, (1998) "In Search of Pollution Havens? Dirty Industries in the World Economy, 1960-1995", *Journal of Environment and Development* 7 (3): 215-247.
- Mathews, Jessica Tuchman (1989), "Redefining Security", *Foreign Affairs*, 68 (2): 162-177.

Myres, Norman (1989), "Environment and Security", *Foreign Policy*, 74 (47): 23-41.

Matthew, Richard A. et al (2003), "Elusive Quest: Linking Environmental change and conflict" *Canadian Journal of Political Science* 36 (4): 857-878.

Mohammad, Alauddin (2004), "Environmentalizing Economic Development: A South Asian Perspective", *Ecological Economics*, 51 (3-4): 251-270.

Momtaz, Salim (2005), "Institutionalizing Social Impact Assessment in Bangladesh Resource Management: Limitations and Opportunities", *Environmental Impact Assessment Review*, 25: 33-45.

Momtaz, Salim (2002), "Environmental Impact Assessment in Bangladesh: A Critical Review", *Environmental Impact Assessment Review*, 22: 163-179.

Muhammed, Nur (2005), "Reckoning Social Forestry in Bangladesh: Policy and Plan versus Implementation", *Forestry* 78 (4): 373-383.

Pettiford, Lloyd (1996), "Changing Conceptions of Security in Third World", *Third World Quarterly* 17 (2): 289-306.

Soroos, Marvin S. (1994), "Global Change, Environmental Security, and the Prisoner's Dilemma", *Journal of Peace Research*, 31 (3): 317-332.

Stern, Eric K. "Bringing the Environment In: The Case for Comprehensive Security", *Cooperation and Conflict* 30 (3): 211-237.

Swain, Ashok (1993), "Conflicts over Water: The Ganges Water Dispute", *Security Dialogue* 24 (4): 429-439.

Ullman, Richard H. (1983), "Redefining Security", *International Security*, 8 (1): 129-153.

Wheeler, D (2000), "Racing to the Bottom? Foreign Investment and Air Pollution in Developing Countries", World Bank, *Policy Research Working Paper No. 2524*.

### **Internet Sources**

Government of Bangladesh (1995), *Environmental Conservation Act 1995, Act No. 1 of 1995*, [Online: Web] accessed 5 July 2007 URL: [http://www.moef.gov.bd/html/laws/env\\_law/153-166.pdf](http://www.moef.gov.bd/html/laws/env_law/153-166.pdf)

Government of Bangladesh (1997), *Environmental Conservation Rules, 1997*, [Online: Web] accessed 5 July 2007 URL: [http://www.moef.gov.bd/html/laws/env\\_law/178-189.pdf](http://www.moef.gov.bd/html/laws/env_law/178-189.pdf)

Government of Bangladesh (2000) *Environmental Court Act 2000, Act No. 12 of 2000*, [Online: Web] accessed 2 July 2007 URL: [http://www.moef.gov.bd/html/laws/env\\_law/167-177.pdf](http://www.moef.gov.bd/html/laws/env_law/167-177.pdf)

CPD (1999), Centre for Policy Dialogue, Bhattacharya, Debapriya et al, *Environmental Consequences of Structural Adjustment: Towards Sustainable Shrimp Culture in Bangladesh, Paper 2*, [Online: Web] accessed 4 July 2007 URL: <http://www.cpd-bangladesh.org/publications/op/op2.pdf>.

Chakma, Goutam Kumar, (2000) "Bangladesh Report on Indigenous People and Protected Areas", [Online: Web] accessed 5 July 2007 URL: <http://www.aippfoundation.org/documents/Bangladesh%20Report%20on%20IPs%20and%20PAs%20%5BFINAL%5D.pdf>

Government of Bangladesh (1977) *The Environment Pollution Control Ordinance 1977, Ordinance no. XIII of 1977* [Published in the Bangladesh Gazette, Extraordinary, dated the 6th April 1977], [Online: Web] accessed 5 July 2007 URL: [http://www.moef.gov.bd/html/laws/env\\_law/267-272.pdf](http://www.moef.gov.bd/html/laws/env_law/267-272.pdf)

Ahmed, Q.K. "Perspectives on Sustainable Development in Bangladesh", [Online: Web] accessed 1 July 2007 URL: <http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN022858.pdf>

Millat-e-MUSTAFA, Md., (2002) *A Review of Forest Policy Trends in Bangladesh*, Institute of Forestry and Environmental Sciences, University of Chittagong, [Online: Web] accessed 30 June 2007 URL: <http://www.iges.or.jp/en/fc/pdf/report5/PTR0208.pdf>

World Bank "Is Globalization Causing A 'Race To The Bottom' In Environmental Standards?", [Online: Web] accessed 5 July 2007 URL: <http://www1.worldbank.org/economicpolicy/globalization/documents/AssessingGlobalizationP4.pdf>.

UNEP (1999), United Nations Environment Programme (Kenya) *Global Environmental Outlook, Overview GEO 2000* [Online: Web] accessed 5 June 2007 URL: <http://www.unep.org/geo2000/ov-e.pdf>.

CPD (2003) Centre for Policy Dialogue, (Dhaka) Sobhan, Rahman, "Aid and Governance in Bangladesh", [Online: Web] accessed 10 July 2007 URL: <http://www.cpd-bangladesh.org/publications/rs/rs1.PDF>.

CPD (2007), Centre for Policy Dialogue (Dhaka) "State of the Bangladesh Economy and Budget Responses 2008: An Analysis of the National Budget for FY2007-08", [Online: Web] accessed 15 July 2007 URL: [http://www.cpd-bangladesh.org/Budget%20analysis\\_FY08.pdf](http://www.cpd-bangladesh.org/Budget%20analysis_FY08.pdf)

Rashid, Mohammed Ali, "Impact of trade policy reforms on industrial capacity and employment In Bangladesh", [Online: Web] accessed 1 April 2007 URL: [http://www.saprin.org/bangladesh/research/ban\\_trade.pdf](http://www.saprin.org/bangladesh/research/ban_trade.pdf).

Dabelko, Geoffrey D. and Dabelko, David D. (1995), "Environmental Security: Issues of Conflict and Redefinition", *Environmental Change and Security Project*

*Report*, No. 1 [Online: Web] accessed 14 April 2007 URL:  
<http://www.wilsoncenter.org/topics/pubs/ECSP1.pdf>.

UNEP (1999), United Nations Environment Programme (Nairobi), *Environmental Conditions, Resources, and Conflicts: An Introductory Overview and Data Collection*, [Online: Web] accessed 17 April 2007  
URL: <http://www.na.unep.net/publications/Conflicts.pdf>

Stavins, Robert N. (2001), "Experience with Market-Based Environmental Policy Instruments" Resources for the Future, Discussion Paper, [Online: Web] accessed 14 May 2007 URL: <http://www.rff.org/documents/RFF-DP-01-58.pdf>.

OECD (2000), *State-of-the-Art Review of Environment, Security and Development Co-operation*, Working paper Conducted on behalf of the OECD DAC Working Party on Development Co-operation and Environment, [Online: Web] accessed 14 May 2007 URL: <http://www.oecd.org/dataoecd/8/51/2446676.pdf>.