Policy Reforms in Response to Climate Change and Capacity of Local Institutions: Bangladesh Perspective

Bangladesh Country Office

Policy Reforms in Response to Climate Change and Capacity of Local Institutions: Bangladesh Perspective

IUCN (International Union for Conservation of Nature)
December 2008

NCAP is a programme of the Netherlands Ministry of Foreign Affairs and is managed by an independent executing agency named ETC International. The NCAP supports studies and workshops in about 14 countries in support of vulnerability and adaptation analysis and policy relevant and scientific sound studies in the field of climate change.

This book is published with financial support received from The Netherlands Climate Assistance Programme through ETC International, Netherlands.

Published by: IUCN Bangladesh Country Office

Citation: IUCN Bangladesh. 2008. Policy Reforms in Response to Climate Change and Capacity of Local Institutions: Bangladesh Perspective. IUCN Bangladesh Country Office, Dhaka, Bangladesh, viii+72 pp.

ISBN: 978-984-33-0247-2

Design & Layout: Sheikh Asaduzzaman

Cover Photo: Bhumiheen Bazar Khaal, Noakhali, April 2008

Cover Photo by: Shehzad Chowdhury

Available from: IUCN (International Union for Conservation of Nature)
Bangladesh Country Office
House 11, Road 138, Gulshan 1
Dhaka 1212, Bangladesh
Tel: 880-2-9890423, 9890395
Fax: 880-2-9892854
E-mail: info@iucnbd.org

PREFACE

IUCN Bangladesh has implemented the 'Promotion of Adaptation to Climate Change and Climate Variability Project' in the Noakhali Sadar and Subarnachar upazilas under the Netherlands Climate Assistance Programme-Phase (NCAP) II. One of the objectives of NCAP is to build capacity for participating countries to mainstream climate change into development planning which focuses on creating enable condition for promoting adaptation to climate change and climate variability in national policies and plans, and also at the community level.

In Bangladesh, the project carried out a number of sectoral studies on agriculture, fisheries, vulnerability assessment, extreme events, policy and local institutions etc. Given the similar nature of the two separate studies on policy and local institutions, they have been compiled and are being published together.

One of the components of the project was 'Policy Reforms in Response to Climate Change', which was jointly carried out by M. Qamar Munir and Mohammad Hafijul Islam Khan. The policy gap analysis revealed the need for policy intrusion for sufficient community based adaptation measures, ensuring dissemination of appropriate adaptation options for preparedness, eco-specific adaptive knowledge such as saline tolerant varieties of crops, etc. that can enhance capacity of local communities.

Another component of the project was 'Capacity of Local Institutions', conducted by Mr. Mozaharul Alam. Assessment of the capacity of local institutions under this present study was limited to key local level institutions in Noakhali Sadar and Subarnachar upazila, working on agriculture, water, infrastructures and disaster management. It was found that targeted capacity building for different target groups and incorporation of climate change issues in sectoral institutions is absolutely essential.

On behalf of the authors, I would like to take this opportunity to thank the following institutions: Department of Agricultural Extension, Bangladesh Agriculture Development Cooperation, Local Government Engineering Department, Department of Public Health Engineering, Disaster management Unit (Upazila and Union Level), Red Crescent, Bangladesh water development Board, Local Government, Rural Development and Cooperatives, Water Resources Planning Organization, and Soil Resources Development Institute for sharing their information with us.

IUCN Bangladesh would also like to acknowledge the financial support received from the Netherlands Climate Assistance Programme through ETC International, Netherlands for supporting the 'Promotion of Adaptation to Climate Change and Climate Variability Project' in Bangladesh and publication of this report. We recognize the support of Ian Tellam and Bram Truijen of ETC Netherlands. I would also like to take this opportunity to thank Mr. Rakibul Haque, Ms. Remeen Firoz, Sheikh Asaduzzaman and Mr. Raquibul Amin who worked for this project and made this publication possible.

Dhaka
December 2008

Ainun Nishat, PhD
Country Representative
IUCN Bangladesh Country Office

Policy Reforms in Response to Climate Change

M. Qamar Munir
Mohammad Hafijul Islam Khan

Table of Contents

List of Abbreviations

ARP	Agricultural Rehabilitation Programs
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
DEFRA	Department for Environment, Food and Rural Affairs
DEM	Digital Elevation Model
DNA	Designated National Authority
DoE	Department of Environment
EIA	Environmental Impact Assessment
IPCC	Intergovernmental Panel on Climate Change
MDGs	Millennium Development Goals
MIS	Management Information System
MoEF	Ministry of Environment and Forest
NAPA	National Adaptation Programme of Action
NFIP	The National Flood Insurance Program
NLUP	National Land Use Policy
NWP	National Water Policy
SNPC	National System of Civil Protection
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNFCC	United Nations Framework Convention on Climate Change
WFD	Water Framework Directive

Chapter 1
INTRODUCTION

Emerging norms, principles and rules of prevention and mitigation have evolved, particularly since the 1972 Stockholm Declaration on Human Environment to address problems of global environmental changes. Twenty years later, climate change appeared as a distinct issue of international legal regime as of 1992, through adoption of United Nations Framework Convention on Climate Change (UNFCCC)[1] endowed with Kyoto Protocol, 1997[2]. However, from the Bangladesh perspective, climate change is recognized directly at policy level through adopting National Coastal Zone Policy in 2005 that has accepted climate change and its adverse impacts on lives and livelihoods in the coastal zone region[3].

Other than some of sectoral policies, there is no comprehensive national policy in place to address the risks of climatic change. An inclusive legal and institutional framework is required since it is well recognized both in the scientific and negotiating community that Bangladesh would be one of the most adversely affected country to climate change[4]. The Bangladesh perspective also requires regional policies with effective institutional mechanisms to address the trans-boundary dimension of climate change and adverse impacts.

However, the term public policy always refers to the actions of government and the intentions that determine those actions. Public policies can be created, revised or deleted by the organization involved in the administration of the policy. On the other hand, laws passed by legislatures, executive orders, referenda, and agency rules can all be declared null and void by the courts. Hence policies differ from laws as to the implementation mechanisms. Even policy entitled with substantive values, but lacks with procedural mandate that aggrieved persons cannot establish their rights enshrined from the policies through court procedures. Nevertheless public policy is a policy or set of policies which forms the foundation of public law. Therefore, this study report aims to review the existing policies those can create further path to develop legal frameworks with effective institutional mechanisms. Hence, this paper seeks to review the existing policies those are related with climate change mitigation and adaptation, to identify the inadequacy with a view to suggest amendments to national and sectoral policies.

---

[1] The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992.

[2] The Kyoto Protocol is a protocol to the international Framework Convention on Climate Change with the objective of reducing greenhouse gases in an effort to prevent anthropogenic climate change. It was adopted on 11 December 1997 by the 3rd Conference of the Parties, which was a meeting in Kyoto, and it entered into force on 16 February, 2005.

[3] Section 1.1 of the Coastal Zone Policy, 2005, that provides…….. The combination of natural and man-made hazards, such as erosion, high arsenic content in ground water, water logging, earthquake, water and soil salinity, various forms of pollution, risks from climate change, etc, have adversely affected lives and livelihoods in the coastal zone and slowed down the pace of social and economic developments in this region.

[4] National Adaptation Programme of Action (NAPA), adopted by Ministry of Environment and Forest Government of the People's Republic of Bangladesh, 2005.

The purpose of this study report is to review the existing regulatory norms and principles which provide the options for mitigation and adaptation to climate change that would lead to provision of guidance for policy reforms. Therefore, firstly it is important to understand the context of geographical and economic characteristics of Bangladesh. Different socio-physical factors such as huge population density, high rate of urbanization, unique geo-spatial settings contribute to make Bangladesh more vulnerable to the adverse effect of climate change. Following a brief introduction of the geographical and economic characteristics of Bangladesh, the paper takes a look at current climatic conditions and trends in the Bangladesh and expected climate change impacts and the key vulnerabilities of these changes.

The rationale for the scope and focus of the sectoral analysis leads to examine the existing policies and to identify the elements that are important for facilitating mitigation and adaptation to climate change. Secondly, once these issues have been identified and the existing level of knowledge regarding them is determined with lessons from some other countries' experience, key findings and recommendations for further analysis can be summarized. Considering the necessity for the case of Bangladesh this study report provides outline of policy reforms particularly on adaptation with due importance on mitigation option. However, this research study does not intend to give specific recommendations to adopt a policy framework. Rather it offers information, ideas and analysis that could be used by policy makers in designing policy frames regarding climate change.

1.1. Geographical and Economic Background of Bangladesh

Bangladesh is situated in South Asia between India and Myanmar. With an area of 148,393 sq. km and a population of approx. 130 million, it occupies the apex of the arch formed by the Bay of Bengal into which drain a large number of rivers and their tributaries crisscrossing the country and making it a very fertile delta. The country is an alluvial deltaic plain divided into three zones, namely hills, terraces, and flood plains. It has a unique geographical location on the lower part of the basins of three powerful rivers, the Padma, Brahmaputra, and Meghna[5].

Bangladesh is characterised by an extensive network of rivers, which drain around 113 million hectare- meter of water to the Bay of Bengal. Over 90 percent of water flows from the upper catchments in India, Nepal, Bhutan and China. Floodplains of the major rivers and their tributaries constitute about four-fifths of the country. The flat topography, high intensity rainfall and inadequate conveyance capacity of the rivers cause drainage congestion, resulting in extensive inundation during the monsoon. The country faces twin problems- abundance of water in the rainy season, often causing floods, and shortage of water in the dry season, often inflicting severe droughts. Besides, the country suffers from flash floods, rise of riverbeds, recurring cyclones, storm surges and saltwater intrusion[6].

Moreover, knowledge of the region's physical characteristics and processes is important for developing a better understanding of projected climate change impacts. For example, the projected average sea-level rise will be translated into various local relative rates of sea level rise that depend on geological composition and rates of sedimentation or subsidence. Large river deltas render coasts more vulnerable to sea level rise and storm surge floods[7]. A 1 m rise in sea level would inundate 18% of Bangladesh's total land, directly threatening 11% of the country's population with inundation (based on current population distribution). In addition, the backwater and increased river flow from sea level rise could affect 60% of the country's population[8]. The influence of tidal waters, salinity intrusion and cyclones/storm surges have been considered for determining the landward boundaries of the coastal zone of Bangladesh. 19 districts of the country are being affected directly or indirectly by some of these phenomena. The districts are considered including all upazilas/thanas. A total of 48 upazilas/thanas are considered as 'exposed' directly to vulnerabilities from natural disasters[9].

---

[5] Disaster Risk Management Profile, Bangladesh, 2006.

[6] Bangladesh: Poverty Reduction Strategy Paper, November 2005, Pp. 1022

[7] Ellina Levina, Policy Frameworks for Adaptation to Climate Change in Coastal Zones: The Case of the Gulf of Mexico,OECD, 2007.

[8] Shardul Agrawala, Tomoko Ota, Ahsan Uddin Ahmed, Joel Smith and Maarten van Aalst, Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans, Organisation for Economic Co-operation and Development, 2003, Pp. available at: http://www.oecd.org/dataoecd/46/55/21055658.pdf

[9] Sec. 3.1. of the Coastal Zone Policy, 2000

Bangladesh is an agricultural country, with some three-fifths of the population engaged in farming. Jute and tea are principal sources of foreign exchange. Major impediments to growth include frequent cyclones and floods, inefficient state-owned enterprises, inadequate port facilities, a rapidly growing labor force that cannot be absorbed by agriculture, delays in exploiting energy resources (natural gas), insufficient power supplies, and slow implementation of economic reforms. Economic reform is stalled in many instances by political infighting and corruption at all levels of government. Progress also has been blocked by opposition from the bureaucracy, public sector unions, and other vested interest groups.

For higher GDP growth, investments in both public and private sectors will need to be accelerated. The prevailing political and economic stability has greatly encouraged investment in the private sector. The trend of foreign direct investment is very encouraging. The government is committed to market economy and has been pursuing policies for supporting and encouraging private investment and eliminating unproductive expenditures in the public sector. A number of measures have been taken to strengthen the planning system and intensify reforms in the financial sector.

However, policy framework is needed to ensure the adaptation and mitigation measures of climate change and those should be consistently considered in public policy and investment decisions. Integrated approach is required to reflect interactions between sectors and climate change impacts, including positive and negative impacts of sectoral activity on the climate vulnerability as well as impacts of climate change on the sectoral activity. They could also be designed to reflect economic linkages between the sector and climate change impacts, including cost and benefits of adaptation measures to the sector and the economy as a whole.

Under the above discussion it demonstrates that a Possible Scenario Bangladesh would be one of the worst victim of incidence and intensity of hydro-meteorological disasters induced by climate alteration. Different socio-physical factors such as huge population density, high rate of urbanization, unique geo-spatial settings contribute to make Bangladesh more vulnerable to the adverse effects of climate change[10]. This forthcoming condition will cause enormous impacts on socio-economic growth of Bangladesh.

1.2. Impact of Climate Change and Challenges for Bangladesh

Climate change poses great risks for Bangladesh. Many projected climate change impacts including sea level rise, higher temperatures (mean temperature increases of 1.4°C and 2.4°C are projected by 2050 and 2100 respectively), evapo-transpiration losses, enhanced monsoon precipitation and run-off, potentially reduced dry season precipitation, and increase in cyclone intensity would in fact reinforce many of these baseline stresses that already pose a serious impediment to the economic development of Bangladesh[11]. Most damaging effects of climate change are floods, salinity intrusion, and droughts that are found to drastically affect crop productivity almost every year. National Adaptation Programme of Action (NAPA), prepared by Ministry of Environment and Forest, Government of the People's Republic of Bangladesh identified the climate change challenges for Bangladesh are as follows:

- Scarcity of fresh water due to less rain and higher evapo-transpiration in the dry season,
- Drainage congestion due to higher water levels in the confluence with the rise of sea level,
- River bank erosion,
- Frequent floods and prolonged and widespread drought,
- Wider salinity in the surface, ground and soil in the coastal zone.

It was found that the population living in the coastal area is more vulnerable than the population in other areas. The agricultural sector will face significant yield reduction. Thus food-grain self sufficiency will be at risk in future. Moreover, addressing future problems related to sea level rise appear to be a complex issue for Bangladesh and therefore integrated approach both in terms of sectors and technologies need to be analyzed along with acceptability by the communities for whom the technologies would be suggested[12]. Rapid growth of population, unplanned development activities, absence of policies with appropriate institutional arrangements increased the threat of vulnerability of climatic impacts and hence it requires the policy formulation to adapt to climate vulnerability.

[10] Nazmul Huq, Bangladesh and Climate Change: Need for a Comprehensive Adaptive Strategy, Centre for Trade and Development, Delhi, 2008

[11] Supra Note 8. Pp. 6

[12] Supra Note 4

Chapter 2
POLICY FRAMEWORKS IN RESPONSE TO CLIMATE CHANGE

Policy options for climate change are divided into policies for mitigation and policies for adaptation. Policy responses for mitigation are, themselves, divided into policies directed to pricing the cost of carbon into the cost of people's actions; technology policies directed to achieving changes needed to bring forward a range of low carbon and high efficiency technology; and policies of regulation, education and financing to break down barriers to behaviour change[13]. On the other hand adaptation policies are necessary to cope with the policy change which will occur despite the best efforts at mitigation. Adaptation is necessary to reduce vulnerability to climate change; to cope with unavoidable impacts; and also to reap the benefits in those regions where small changes actually provide some economic benefit[14].

However, the policy implication, as recommended in the IPCC report, is that decision making must involve repeated risk assessments addressing policy responses involving both mitigation and adaptation and taking into account actual and avoided climate change damages, co-benefits (for example, avoidance of other pollution production), sustainability, equity and attitudes to risk[15]. Adaptation to climate change is considered as an important policy priority for the least developed countries like Bangladesh which contributes little to increasing atmospheric concentrations of green house gases, and yet suffers disproportionately from the affects of climate change due to its location in one of the most vulnerable parts of the world and its low capacity to cope with climate change. It is yet to be a major policy issue for developing countries, but essential to prepare them for adapting to adverse impacts of climate change.

Therefore, it is realistic to speculate the policies in response to climate change adaptation in Bangladesh, which may contribute to policy reforms to deal with climate change. Following section provides brief overview on the sectoral vulnerability of climate change in Bangladesh followed by critical examination of salient features of existing policies in Bangladesh.

2.1. Policy Commitments under the International Instruments

The integration of adaptation and mitigation considerations into sectoral policies is one of the most challenging goals at an international level. The course of the implementation of different international agreements, in particular the Convention on Biological Diversity (CBD)[16] , Convention on Desertification (UNCCD)[17], the International Strategy for Disaster Risk Reduction,

[13] Nicholas Stern, The Economics of Climate Change The Stern Review, Cambridge University Press, 2006, at 349

[14] Ibid, Pp. 455

[15] Climate Change 2007: Mitigation of Climate Change: Working Group III contribution to the IPCC Fourth Assessment Report ("the IPCC report"), Pp. 27

[16] Convention on Biological Diversity was adopted in 1992. The main objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the equitable sharing of the benefits from the use of biodiversity resources.

[17] The Convention to Combat Desertification (UNCCD) was adopted in 1994. The aim of the Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification.

development assistance, and Millennium Development Goals, Bangladesh is obliged to formulate national policies regarding climate change. Bangladesh is a party to number of international legal instruments relevant to climate change and obliged to respond accordingly at national and international level.

UNFCCC calls the parties of the Convention to adopt policies and measures to protect the climate system against human-induced change. These should be appropriate for the specific conditions of each party and should be integrated with national development programs, taking into account that economic development is essential for adapting measures to address climate change[18]. The Kyoto Protocol further reaffirms the Parties' commitments, Article 2 (paragraph 3) of the Kyoto Protocol calls for Parties to implement policies and measures "…to minimize adverse effects of climate change." Article 10 requests that Parties to "formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures… to facilitate adequate adaptation to climate change."

Parties to the Convention on Biological Diversity (CBD) have called for the enhanced integration of climate change impact and response activities within the Convention. For example, the protection or restoration of mangroves can offer increased protection of coastal areas to sea level rise and extreme weather events. Similar to the Convention on Biological Diversity, Convention on Desertification has tight links with the adaptation component of the UNFCCC. The Convention to Combat Desertification (UNCCD) was adopted in 1994. The aim of the Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification. Many actions in drought-prone countries to address problems of land degradation could also be included at the policy level as response to the climate change impacts.

The Ramsar Convention also provides guidance to Contracting Parties on national wetland actions that would facilitate wise use and protection of wetlands through specific institutional and organizational arrangements, legal and policy instruments, and actions on increasing knowledge and awareness on wetlands and their value[19]. It is worthy to mention here that, Sundarbans Reserve Forest and Tanguar Haor are enlisted as Ramser site in Bangladesh. Adaptation and mitigation to climate change is not explicitly recognized in the Millennium Declaration[20] and is not featured in any of the eight Millennium Development Goals. However, target 9 calls to integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources. It is factual that achievement of the MDGs will contribute to adaptive capacity and adaptation.

Some of national policies also responded to the commitments, for instance, section 5 of the objective of the National Forestry Policy, 1994 states 'National responsibilities and commitments will be fulfilled by implementing various international efforts and government ratified agreements relating to global warming, desertification and control of trade and commerce of wild birds and animals[21]. Coastal Zone Policy, 2005 also emphasized the commitments made under different protocols stating as such to protect the environment, all commitments shall be honored as signatory to different international protocols and guidelines in planning and implementation[22].

Many of the proposed measures are found within the existing sectoral policies to reduce current vulnerability and to improve adaptation to climate change. Nevertheless, some of development policies and priorities in Bangladesh might potentially conflict with climate change responses[23]. Bangladesh has initiated a number of sectoral policies and plans to address the issues of mitigation and adaptation options to climate change directly or indirectly. Hence it requires investigatory efforts to review those policies.

---

[18] Article 3(4), UNFCCC, 1992

[19] The Ramsar Convention on Wetlands provides a framework for wetland protection and sustainable management. The broad aim of the Convention on Wetlands (Ramsar, Iran, 1971) is to halt the worldwide loss of wetlands and to preserve remaining wetlands through "wise use" and management. There are presently 154 Contracting Parties to the Convention, with 1669 wetland sites, totaling 151 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. Wetlands are designated as the Ramsar List wetlands according to the adopted criteria that focus on unique characteristics of wetlands and their importance as habitats for endangered species or significant populations of wildlife birds, fish and other fauna.

[20] In 2000, the international community agreed on a Millennium Declaration which specified eight goals for international development.

[21] Preamble, National Forest Policy, 1994

[22] 4.8.1. (f) of the Coastal Zone Policy, 2005

[23] Supra Note 8. Pp 7

Chapter 3
EXISTING SECTORAL POLICY COMMITMENTS

3. Existing Sectoral Policy Commitments

The level of vulnerability of Bangladesh is likely to increase as a result of severe land degradation, soil erosion, lack of appropriate technology and sea-level rise[24]. The main impacts of climate change will be on the water resources and water-level changes, food security and agriculture, ecosystem and natural resource management and biodiversity, and human health. A subjective ranking of key climate change impacts and vulnerabilities for Bangladesh identifies water and coastal resources as being of the highest priority in terms of certainty, urgency, and severity of impact, as well as the importance of the resources being affected[25]. Therefore, policies should be formulated to balance conflict of interest between livelihood requirements of the people and sound environmental resource management[26]. Therefore, the provisions of sectoral policies are being analyzed critically.

3.1. Review of Sectoral Policies

The National Water Policy, 1999

Water related impacts of climate change are likely be the most critical for Bangladesh – largely related to coastal and riverine flooding, but also enhanced possibility of winter (dry season) drought in certain areas. The effects of increased flooding resulting from climate change will be the greatest problem faced by Bangladesh. Both coastal flooding (from sea and river water), and inland flooding (river/rain water) are expected to increase[27]. In addition, changes of the riverbed due to sedimentation and changes in morphological processes due to seasonal variation of water level and flow are also critical for Bangladesh[28]. The policy regarding water was adopted in 1999 with title of National Water Policy (NWP), which may contribute to formulate further necessary regulatory regime.

Ministry of Water Resources formulated the National Water Policy in 1999 with a view to guiding both public and private actors to ensure optimal development and management of water sector that benefits both individuals and the society at large. However, there are no provisions that stipulate climate change inclusively. But some of them arguably can contribute towards mitigation and adaptation options of climate change.

From the adaptation perspective, flood risks and possibly drought risk are expected to increase due to climatic change and the National Water Policy insists on regional cooperation to adapt with the vulnerability of floods, drought and cyclone through developing a system for exchange of information and data on relevant aspects of management of flood and drought[29].

---

[24] Saleemul Huq, Atiq Rahman, Mama Konate, Youba Sokona and Hannah Reid, Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs), 2003, available at: http://www.un.org/special-rep/ohrlls/ldc/LDCsreport.pdf

[25] Supra note 8.

[26] Mozaharul Alam, Adverse Impacts of Climate Change on Development of Bangladesh: Integrating Adaptation into Policies and Activities. Pp.

[27] Supra note 8, Pp. 15.

[28] Supra note 26, Pp. 19.

[29] Section 4.1.(A), National Water Policy, 1999 provides that, a. Work with co-riparian countries to establish a system for exchange of information and data on relevant aspects of hydrology, morphology, water pollution, ecology, changing watershed characteristics, cyclone, drought, flood warning, etc., and to help each other understand the current and emerging problems in the management of the shared water sources.

It is worth mentioning here that the water ecosystem comprises the tributaries and distributaries of the three major rivers system, the Ganges-Padma, the Brahmaputra, and the Meghna (GBM). The GBM river system originates outside the country. In fact, among the 230 rivers of the country, 57 are Transboundary Rivers, of which 54 are flowing in from India, and three from Myanmar[30].

Section 4.1 of the said policy also correlates with mitigation aspects providing guideline to work jointly with co-riparian countries to harness, develop, and share the water resources of the international rivers to mitigate floods and augment flows of water during the dry season[31]. Moreover, said section calls for collaboration with co-riparian countries, for management of the catchment areas with the help of afforestation and erosion control for watershed preservation and reduction of land degradation[32].

However, regional cooperation to work jointly with co-riparian countries to adapt and to mitigate with the vulnerability of climate change is pointed out as it should be. But absence of adequate legal and institutional mechanisms between India and Bangladesh to share transboundary water resource management, necessitate further cooperation for water negotiation. Government of Bangladesh will argue the adverse impacts on Bangladesh in the line with legal provisions of Ganges Water Treaty and the emerging and established principles of international laws[33]. However, groundwork is needed to construct the arguments to resolve these existing and potential disputes and further intensive agreement among the co-basin states for sustainable management and development of the shared water resources, which is indispensable to adapt and mitigate the adverse impacts of climate change. Coordinated efforts between GO and NGOs of Bangladesh with the aid of international organizations is crucial to address the issues at the bilateral, regional and international level.

Moreover, risks associated with climate change to water resources are not addressed adequately in the existing water policy and hence it requires updating this policy through incorporating the issues of drainage patterns of basins, natural flow of the water, filling up of flood flow zones and low land, forestation and tree plantation and so on.

National Forest Policy, 1994

Increased rainfall as an impact of climate change during the monsoon would cause increased runoff in forest floor instead of infiltration into the soil. As a result there would be enhanced soil erosion from the forest floor. The erosion problem would be more pronounced in poorly dense hill forest areas. Prolonged floods would severely affect growth of many timber species, while it would cause high incidence of mortality for Artocarpus species. In contrast, enhanced evapotranspiration in winter would cause increased moisture stress, especially in the Barind and Madhupur Tract areas, affecting the Sal forest ecosystem. The tea plantations in the north-east would also suffer due to moisture stress. It was found that the Sundarbans mangrove forest would be the most severely affected by climate change. Due to a combination of high evapotranspiration and low flow in winter, the salinity of the soil would increase[34]. Considering these impacts of climate change on forest resources, a great need is felt for extensive sectoral forest policy.

Bangladesh, India and Pakistan had the same legislative history up to 1947 on the management and administration of forest in this sub-continent. The introduction to legal and institutional frameworks of forest was developed by the British in the nineteenth century. Even today, the basic forest legislative frameworks of these three countries are similar, excepting few national and provincial changes that have taken place in their respective legislative domains[35]. However, identifying fast depletion of forest resources as a major environmental concern Government of Bangladesh has adopted and represents the first shift towards recognition of the importance of 'people's participation' in forestry. Sustainable development, poverty alleviation, local people's participation in forest protection, and governmental support for forestry development from a broader

---

[30] Supra note 26, Pp. 9

[31] Section 4.1.(C), National Water Policy, 1999

[32] Ibid, Section 4.1.(D).

[33] Mohammad Hafijul Islam Khan, India-Bangladesh Transboundary Water Sharing Conflict: Emerging Principles of Cooperation on Shared Water Resources, LL.M Thesis, Central European University, 2007

[34] Supra note 4, Section 3.2.2.4.

[35] F. Mohiuddin, Laws and Customs on Forest in Bangladesh: Issues and Remedies, BELA, 1997

sector of society are some of the important policy commitments of the new people-oriented forestry initiative in Bangladesh[36].

The Forest Policy adopted in 1994, mentioned explicitly the issue of global warming and climate change in the preamble of the said policy stated for the preservation of climate and natural condition of the country. Section 5 of the objective of the National Forestry Policy provides that 'National responsibilities and commitments will be fulfilled by implementing various international efforts and government ratified agreements relating to global warming, desertification and control of trade and commerce of wild birds and animals'.

From the adaptation perspective, the important statements are made "need for massive plantation, maintenance and preservation in the coastal areas including the embankments on rivers and canals to protect forest, soil and related natural resources as to reduce the velocity and intensity of cyclone, tornado, and tidal bore so that air, water and others get less polluted and ecological balance remain undisturbed". The said policy calls for bringing 20% of the total land under forest cover[37]. Forest conservation aspects of the said policy could help reduce some of the other stresses on ecosystems such as the Sundarbans, thereby increasing their resilience to the impacts of climate change. Further, policies such as the development of coastal green belts would be a good "no-regrets" adaptation response to reduce the vulnerability of the coastline to cyclones and storm surges, both under current conditions as well as under climate change[38].

Forest policy however, should be more comprehensive integrating mitigation and adaptation options to stand for the impacts of climate change including increased runoff in forest floor instead of infiltration into the soil, high incidence of mortality for Artocarpus species, moisture stress, especially in the Barind and Madhupur Tract areas, the salinity of the soil that would affect Sundarbans mangrove.

Coastal Zone Policy, 2005

The coastal zone's vulnerability would be acute due to the combined effects of climate change, sea level rise, subsidence, and changes of upstream river discharge, cyclone and coastal embankments. Four key types of primary physical effects i.e. saline water intrusion; drainage congestion; extreme events; and changes in coastal morphology have been identified as key vulnerabilities in the coastal area of Bangladesh[39].

So, policy concerned with coastal zone management is important to reduce vulnerability. Coastal Zone Policy that was adopted in 2005 recognized the necessity of adoption measures clearly to face the challenges of climatic change. The said policy advocated for appropriate institutional arrangements for monitoring climate change, upgrading of technology and for enhancing their capacity for generation of better data and more accurate long-term prediction and risk related to climate change, such as sea level rise. Moreover, the said policy put due emphasis on adaptive measures in relation to climate change for coastal zone[40]. Moreover, afforestation and conservation efforts of forest should be taken in accordance with the said policy that would help to reduce climate change vulnerability[41].

Coastal Zone Policy, introduced widely the measures that would facilitate in overcoming the impacts of climate. However, initiatives to cope with different disasters and gradual deterioration of the environment are not attended to this policy. Apart form the Coastal Zone Policy, a number of sectoral policies are also related with coastal and marine environment of which Environment Policy and Implementation Plan (1992), National Forestry Policy (1994), National Tourism Policy (1992), National Water Policy (1999) and National Shipping Policy (2000) are interrelated and should be integrated to address the vulnerability of climate change. So formulation of integrated policy regarding coastal zone management is needed for reducing the coastal vulnerability of climate change.

---

[36] Millat-e-Mustafa, M. A review of Forest Policy Trends in Bangladesh , Pp.1available at: http://www.iges.or.jp/en/fc/pdf/report5/PTR0208.pdf

[37] Section 1 of the Statements of the National Forestry Policy

[38] Supra Note 8, Pp.33

[39] Supra note 4, Section 3.2.2.2.

[40] Supra note 37, section 4.8.3 provides that a. Existing institutional arrangements for monitoring of climate change in Bangladesh will continue. Steps will be taken to support upgrading of technology and institutional strengthening for enhancing their capacity for generation of better data and more accurate long-term prediction and risk related to climate change; b. Implementation of adaptive measures identified in relation to climate change for coastal zone and resources shall be gradually undertaken; c. Efforts shall be made to continuously maintain sea-dykes along the coastline as first line of defense against predicted sea-level rise; d. An institutional framework for monitoring/detecting sea level rise shall be made and a contingency plans for coping with its impact.

[41] Ibid, section 4.4.7 provides that a. Measures will be taken for afforestation in the coastal areas including newly accreted chars; b. Effective measures will be taken for conservation of forests; c. Social forestry will be encouraged and extended.

National Fisheries Policy, 1998

Impacts of climate change to Bangladesh's inland fisheries resources take account of water and soil conditions, particularly related to the annual flooding and flood control and irrigation schemes. However, one of the objectives to adopt the National Fisheries Policy is to maintain ecological balance, conserve biodiversity, ensure public health[42], and all these issues are related with climate change mitigation and adaptation options. The policy stated measures of chemical substances of municipal and industrial wastes discharging directly into the water bodies and discharging of harmful insecticides in the agricultural fields[43] will be considered a punishable crime. These proposed measures and remedial action to reduce current vulnerability will also contribute to enhanced adaptation to climate change.

The said policy also articulated necessary steps to conserve biodiversity in the coastal region, to stop mangrove forest destruction, conservation of marine biological resources, appropriate measures for dumping hazardous chemicals and atomic wastes into the sea[44], and all these remedial steps will reduce climate change risks.

However, Policy frame is needed to concentrate on adaptation in fisheries sector, in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices. Moreover, adaptation to coastal fisheries through culture of salt tolerant fish specially in coastal areas of Bangladesh is also important and needs to be addressed within Fisheries Policy.

Land and Land Use Policy 2001

In addition to structural change of land use, riverbank erosion is rampant in areas along the active river channels of the Ganges, the Jamuna and the Tista rivers and in the coastal and offshore areas of Bangladesh. Physical, chemical and biological properties of soil are deteriorating due to a number of reasons including loss of micro nutrient, salinity intrusion, lack of proper replenishment of plant nutrient etc. In Bangladesh most soils lack adequate organic matter[45]. Therefore, land policy is very important to face the challenges of climate change impacts.

The National Land Use Policy (NLUP) does not make direct reference to climate change. NLUP however, aims to bring 25% of the land under forest cover and highlights mangrove plantations in char lands, and coastal green belts more generally as a priority. It also advocates conservation of existing forest lands, including the Sundarbans. The objectives of land use policy endorsed that to ensure land use in harmony with the natural environment, protection of natural forest areas, prevention river erosion and the destruction of hills and hillocks,[46] it will reduce natural, environmental and overall human induced hazards.

The policy also highlighted the requirement of 25% forest land and extensive afforestation to be occupied though this targeted forests land deteriorating for rapid urbanization, industrial pollution, emission of defective vehicular smoke and it should immediately stop and ensure the preservation of present forest areas and to create reserve forest areas.[47] These preparations on target forests can be seen as adaptive measures against climate change risks. The policy stressed on unplanned industrialization, indiscriminate land filling, construction of roads and highways in low lands and sedimentation of silts which increases severity of flood during monsoon, water salinity.[48] All these worsen impacts and reduce resilience to the impacts of climate change. The policy also improvised the necessity of coastal belt in sandy land and new char areas, strengthen cyclone protection facilities and protection of newly formed chars in both sides of rivers and marshlands and dead rivers in the interior of the country.[49]

---

[42] Ibid, Section 2 (e)

[43] Ibid, Section 5 (5.8)

[44] Ibid, Section 7 (7.2 & 7.4) & Section 8.2 (8.2.6)

[45] Supra note 4, Section 2.2

[46] Section 2 (G) of the National Land Use Policy, 2001

[47] Ibid Section 7

[48] Abid, Section 8 (8.1) and Section 9 (9.2)

[49] Abid, Section 11 & Section 12

All of these aforesaid measures stipulated in the land use policy would be useful to adapt the risks and vulnerability of climatic change and to some extend to mitigate some of possible hazards like river erosion. Nevertheless, it requires further to adopt provisions particularly taking into account the impacts of climate change. In addition to structural change of land use, riverbank erosion predominantly in the coastal and offshore areas of Bangladesh, loss of micro nutrient, salinity intrusion, and proper replenishment of plant nutrient should be addressed with adequate institutional arrangements in the land policy.

National Agriculture Policy, 1999

Ministry of agriculture has formulated the National Agriculture Policy, 1999 with a view to providing proper guidelines for various development activities relating to crops, which is the largest sector of the agriculture.[50] It is also illustrated to some extent on fisheries, forestry, environment and land use policies which have already been formulated by the respective ministries.

Agriculture is dependent on the vagaries of nature and therefore it is risky.[51] The production of crops, especially Amon crop is heavily damaged every year due to inadequate soil moisture regime prevailing in drought affected areas. However to adapt with the natural vulnerability and climate risks, the said policy stated to take measures for supplementary irrigation for severe drought affected areas,[52] identification of suitable crops with respect to technological and economic parameters.[53]

Availability of cultivable land is decreasing due to lack of proper land use planning. It is also supported by the National Land Use Policy. However land use policy provided measures for maximum utilization of land through promotion of inter cropping with the main crops and by discouraging requisition of land for non-agricultural purposes.[54] Moreover, Section 12 articulated emergency Agricultural Rehabilitation Programs (ARP) to recover from the crop losses due to any natural disaster, and to strengthen early warning system to inform the farmers about their rules in an adverse weather condition.[55] All these referred measures would be useful to adapt with impacts of climate change.

Salinity, a great risk associated with climate change is appearing to be serious problem in some parts of the country including the coastal areas which is not only a threat to the agricultural activities in those areas but also can cause great damage to the overall environment. In this regard the policy endows provision of salt tolerant crop varieties will be developed and extended along with possible measures to resist salinity.[56]

National Agriculture Policy calls to create awareness so that the chemical fertilizers and pesticides used for increased crop production do not turn out to be responsible for environmental hazards that would be constructive for mitigation aspects. Issues, however, include floods, water logging and drainage congestion, early and untimely floods, localized inundation and flash floods, salinity intrusion due to reduction of freshwater flow from upstream, salinization of groundwater and fluctuation of soil salinity, continuous and prolonged droughts, extreme temperature and delayed rainfall (major concerns that agriculture sector is facing). Therefore, Agricultural Policy is needed, that would be more extensive addressing all of these identified and potential impacts of climate change.

National Industrial Policy, 1999

The economy of Bangladesh is predominantly based on agriculture, however, number of large scale industries take in jute, cotton, textile, paper and newsprint, sugar, cement, chemicals, fertilizers and tanneries. Recently developed Readymade Garments is playing significant role to earn foreign currency. Industrial growth and uncontrolled discharges of their untreated effluent in the nearby rivers cause harm for the quality of land, soil and water. However, among other sectors, industry is also vulnerable to climate change impacts and need to develop policy framework taking into account the impacts of climate change.

Industrial Policy, 1999 adopted with due influence from the focal point the proper guidelines on basis of the Bangladesh Environment Conservation Act, 1995. The said policy realistically speculated the considerations of

[50] Section 1 (1.3) of the National Agricultural Policy, 1999

[51] Ibid, Section 1 (1.5)

[52] Ibid, Section 3 (3.5)

[53] Ibid, Section 3 (3.5)

[54] Ibid, Section 12 (12.2)

[55] Ibid, Section 15

[56] Ibid, Section 17.2

Environmental Impact Assessment (EIA), appropriate environmental pollution control, related others precautionary measures such as availability of Effluent Treatment Plant (ETP), waste management for preventing water and air pollution and risks of public health hazards and ISO-9001 certificate.[57] From the mitigation perspective, Environmental Impact Assessment (EIA) option of the industrial policy shed light on mitigation measures to be adopted that would help to mitigate the climate change in Bangladesh.

National Policy on Disaster Management (Draft)

National Policy on Disaster Management is very significant as Bangladesh is a disaster prone country and causes reduction of loss of life and property from such disasters almost every year. The major natural hazards include flood, cyclone and storm surge, flash flood, drought, tornado, earthquakes, riverbank erosion, and landslide. Moreover, the frequency of extreme climatic events, such as floods and cyclones has increased in the recent years. Therefore, mainstreaming adaptation to climate change into disaster management policies and programs is essential.

The National Policy on Disaster Management announced the purposive statement to cope with disaster situations in Bangladesh.[58] The Policy highlighted priorities for adaptation and mitigation responses to climate change. From the mitigation point of view, preparedness and preventive measures such as hazard and risk analysis, community disaster preparedness, public awareness, integrated strategy of combining structural and non-structural mitigation, modern communication facilities, international integration in respect of overall disaster management and environmental protection in the country should be taken.[59]

The policy emphasized the integration of concerning agencies in relation to all aspects of disaster management, establish and maintain a framework of policies, legislation and regulations to reduce the risk of hazards, preparedness in imminent threat, provide in-time information in disaster-prone areas.[60] The policy also mentioned project conceptualization and design on natural disaster (namely cyclones, floods, river-bank erosions, tornadoes, droughts etc) preparedness, prevention and mitigation. This should progressively be incorporated into all development projects appropriately.[61] The policy stated for proper coordination mechanism through concerned agencies and shall be well developed warning system, appropriate training, communication and logistic facilities.[62]

On the counterpart of this policy is a good adaptation response for better coordination with prospects to decrease vulnerabilities and forthcoming risks of climate change. Increased intensity of such disasters implies major constraints to the country's social and economic development and hence it requires well coordinated legal and institutional frameworks for adopting appropriate policy guidelines to ensure proper adaptive measures.

National Energy Policy (NEP), 1996

The depletion of non-renewable energy sources is one of the major concerns of mankind today. Though energy derived from oil, gas and coal will play a vital role in meeting a growing demand for many years to come, the realization of the possible exhaustion of the world's fossil fuels has focused to formulated appropriate and environment-friendly energy policy. Bangladesh government adopted national energy policy in 1996 for better management of this sector.

The National Energy Policy articulated "jeopardizing on environmental degradation of unplanned use of biomass fuel".[63] This existing policy also guaranteed environmentally sound sustainable energy development programs causing minimum environmental damage.[64] It is obviously implied in this policy that programmes on sustainability of energy development and control of unplanned use of biomass fuels will reduce rectified risks of climate change.

[57] Chapter 15- Section 15.6 of the Industrial Policy, 1996

[58] Section 4 of the National Policy on Disaster Management

[59] Ibid, Section 7 (i), (iii), iv (a)

[60] Ibid, Section 9 (9.2, 9.4 & 9.6)

[61] Ibid, Section 10

[62] Ibid, Section 12.3 (ii)

[63] Section 1.1 (g) of the National Energy Policy, 1996

[64] Ibid, Section 1.2 (vi)

The policy also referred to technology assessment to ensure necessary arrangements are made to select appropriate technologies on energy sector to be considered on conversion efficiency, environmental effects[65] will enhance gradual adaptability on the hazards of climate change. The policy pointed out contemplation of environmental degradation of fuel exploration, appraisal, extraction, conversion, transportation to be envisaged, so that per capita emission of carbon dioxide gas would not exceed massively.[66] The legal measures of the policy stated that implementation of this policy will necessitate introduction of Energy Conservation Act and modifications of the relevant Acts and Ordinance and this policy considered environmental issues to be mandated under National Environment Policy and Environment Act.[67] These efforts to adopt legal mechanisms will strongly induce mitigation and adaptation techniques on climate change.

Moreover, section 1.9 of the said policy noticeably stated that Environmental Impact Assessment (EIA) should be made mandatory to constitute any new energy development project, awareness to be promoted regarding environment conservation, coal based environmental emission, nuclear power plant based radiation emission, and lead free petrol should be measured and observed.[68] This vital part of the National Energy Policy obviously stated that all these mentioning environment based issues will reduce forthcoming threats of climate change.

It is noteworthy that this policy didn't emphasized particularly the concept of climate change yet some very important issues recovered under the aspect of mitigation and adaptation on climate change issue.

National Health Policy 2000

The risk associated with human heath due to climate change is uncertain. Increased risk to human health from increased flooding and cyclones seems most likely. Changes in infectious disease are less certain. The causes of outbreaks of infectious disease are quite complex and often do not have a simple relationship with increasing temperature or change in precipitation. However, extreme weather event, increase in prevalence of certain vector–borne and water-borne diseases, heat related mortality, decreased availability of portable water are the health related impacts of climate change and these issues should be addressed in the national policy framework.

However, National Health Policy, which was adopted in 2000, does not attend to the climate change issues. Only section 5 stated for epidemiological surveillance, and this provision might be endowed with health risks associated with climate change. The climatic change and its adverse impacts will affect human health both directly and indirectly. Therefore, more awareness about diseases due to climate change and changes in human behavior will be a feasible solution to protect human health. This will be particularly true for developing countries like Bangladesh that has low technical capability to fight against outbreaks of easily communicable diseases.[69]

Environment Policy 1992

Environment Policy 1992, endowed with the existence of all living beings, adopted in 1992 addresses policy direction of all sectors concerned with environmental degradation in Bangladesh. However, Ministry of Environment is the line agency to implement actions in response to environmental issues. Environmental Action Plan pointed towards sectoral line agencies of the government to implement action. This policy implies with basic sectoral environmental concerns, particular measures in relation to mitigation and adaptation to climate is not guided adequately. It is surprising that climate change is not even mentioned throughout the policy text. However, the provisions that correlate with climate changes are discussed below.

The policy mentioned the suitability of environmentally sound development on proper changes in production management and relations of production of agriculture sector to guaranteeing improvement of environment

---

[65] Ibid, Section 7.1.3

[66] Ibid, Section 7.1.9

[67] Ibid, Section 7.1.19

[68] Ibid, ,Section 1.9

[69] Supra Note 2, pp. 30

and sustainable use of its resources.[70] Moreover, the policy necessitated firmly to review Environmental Impact Assessment (EIA) on industries of public and private sectors. Also this policy encompassed the necessity of integrated environmental concerns that shaped into the National Health Policy.[71]

The more factual constituent of the said policy recommends to ensure environmentally sustainable steps in the local, zonal and national levels of Bangladesh on flood control and its related matters such as construction of embankments, dredging of rivers, digging of canals etc and to make certain alleviated measures of adverse environmental impact on flood control projects and water resources development projects.[72] The policy subsequently stated the formulation and application of national land use policy to ensure sound and balance environment and prevention of land erosion, preservation and increase in soil fertility, conservation of environmentally sound management of new accreted land, compatible land use system with various eco-systems, prevention of salinity and alkalinity on land.[73] These uphold adaptation mechanisms on land use systems will compress the risks and disasters of climatic change.

The policy notably insisted sustainable ecological balance on existing forests conservation, expansion and development of forests to establish programmes on tree plantation in all relevant development schemes and took measures to stop shrinkage and depletion of forest lands and resources.[74] All these remedial steps on this issue will facilitate adaptation measures against the climate change threats. The policy emphasized the protection viability of mangrove forests and eco-systems against adverse appliance of fisheries and livestock and suggested alternative fish culture upon environmental friendly conditions and environmentally sound conservation and development of coastal and marine eco-systems and resources.[75]

3.2. Clean Development Mechanism: Policy and Capacity

Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) entered into force on February 16, 2005, committing annex 1 countries to reduce their collective green house emissions by 5 percent below their 1990 levels on average by 2008-2012. In fulfilling these commitments, the industrialized countries can achieve their emission reduction through several mechanisms, including Clean Development Mechanism (CDM). The CDM allows companies or entities in developing countries to initiate projects aiming to reduce greenhouse gases emissions through verification and certification these emission reductions, and transferring the Certified Emission Reductions (CERs) to other entities or government in industrialized countries at a price, thus allowing companies in developing counties to cash in on their 'carbon assets' efficiently and effectively.

So, Clean Development Mechanism (CDM) can help developing countries like Bangladesh to reduce emissions of greenhouse gases. Bangladesh ratified the Kyoto Protocol in 2001. As a party to the protocol Bangladesh can participate in the Clean Development Mechanism, which one of the mechanisms of the said protocol that allows participation from non-industrialized countries (non-annex 1 countries). However, Bangladesh has not yet been able to take advantage of this mechanism, institutional initiatives taken by the government. The Government of Bangladesh has set up a two tier Designated National Authority (DNA) through a government Notification on 13-10-2003 to participate in the Kyoto Protocol CDM process for generating Certified Emission Reduction (CER).

The secretariat or operational body of the DNA, which is the lower tier of Designated National Authority (DNA), set up at the Ministry of Environment and Forest (MoEF) deals with all CDM related activities including giving preliminary approval of CDM projects through the CDM Committee. However, the CDM Board, the upper tier of DNA approves finally the CDM projects. The Principal Secretary to the Prime Minister leads the CDM Board as the Principal Secretary has jurisdiction over all secretaries of different ministries of the government, it is expected inter-ministerial coordination will be easily achieved. However, the main task of the DNA is to approve CDM projects, which can eventually be registered by the CDM Executive Board of the UNFCCC.

[70] Section 3.1.4 of the National Environment Policy, 1992

[71] Ibid, Section 3.2.2 and 3.3.2

[72] Ibid, Section 3.5.3 & 3.5.4

[73] Ibid, Section 3.6.1, 3.6.2, 3.6.3 and 3.6.4.

[74] Ibid, Section 3.7.1, 3.7.2 and 3.7.3

[75] Ibid, Section 3.8.3 and 3.8.4, 3.10.1

As per the Modalities and Procedures of CDM, approval by the DNA is mandatory before project validation by any Designated Operational Entity (DOE) and subsequent registration by the Executive Board of the CDM. Apart from establishment of DNA, the government has also established national procedures for evaluation and approval of CDM projects, developed sustainable development criteria for the evaluation of CDM projects and finalized the CDM strategy.

CDM strategy also recognized the necessity of sectoral policies provided that participation in CDM projects shall be in line with existing sectoral policies. However, several underlying causes make it difficult such as domestic investment policy, political and social unrest, corruption, bureaucracy of CDM governing board and complex CDM project approval system. Within the developing countries, countries of advanced economies like India, China, and Brazil are the most prime beneficiaries of CDM fund using their expertise and investment friendly environment. However, following section investigates the gaps and constrains of existing policies with due reference to the policies of different countries.

Chapter 4
POLICY GAPS AND CONSTRAINS

4. Policy Gaps and Constrains

The examination and analysis of the existing provisions of sectoral policies in the line with adverse impacts of climate change and potential future impacts, it is found that existing policy directions don't offer effective mechanisms to deal with climatic change. It is worthy to mention here that, even environment policy did not mention explicitly the term climate change and its adverse impacts. However, provisions incorporated are very useful to mitigate and adapt with climate change, but need to be reformed with the climatic vulnerability considerations. Experiences from other countries might be useful for policy reforms.

Water access and management is a big challenge for Bangladesh as water resources are already under stress due to meteorological conditions and demand pressures from the society. Moreover, climate change is likely to pose an additional burden on water resources and its management. To address the challenges of climate change and water management to changing climatic conditions require transparent governance based on the rule of law, cooperation among government agencies, and involvement of stakeholders, including local communities in the decision-making process. The key elements of policy frameworks include a system of rights for water abstraction, water management strategies, flood and drought plans, monitoring and scientific analysis of water resources and meteorological conditions, information sharing between scientific community and policy makers at all levels, and water infrastructure.

Risks associated with climate change and water resources are not addressed adequately in the existing water policy and hence it requires updating. There are some lessons that can be drawn from others country experiences. Policy frameworks on water regulations in Annex I countries are quite well developed. They are based on strong and enforceable legal provisions, sophisticated institutional structures, water management measures and policies that are constantly adjusting to changing climatic conditions. While not perfect, (most do not yet incorporate adaptation to climate change explicitly); they generally provide a good basis for adaptation in the water sector.[76] EU Water Framework Directive (WFD)[77] that does not explicitly mention that climate change impacts need to be recognized, however, has the approach that serves as an important adaptation tool. The Directive provides a means by which the EU member countries should develop integrated, sustainable and coherent water policies based on the ecosystem approach and include citizens in this process.

[76] Ellina Levina, For Adaptation to Climate Change in the Water Sector Part II: non-Annex I Countries Lessons Learned from Mexico, India, Argentina and Zimbabwe, OECD October 2006

[77] EU Water Framework Directive, 2000/60/EC of the European Parliament and of the Council of 23 October 2000

Its integrated river basin approach encourages strategic planning and water resources management that incorporates sustainable supply-side and demand-side management, drought measures, flood protection, water quality issues and environmental health of the basin. The EU member countries are also currently negotiating the new Flood Directive which will complement the Water Framework Directive.[78]

European countries that are the members of the EU have to comply with EC legislation by transposing the EC directives into domestic legislation. In the implementation of the Water Framework Directive, Department for Environment, Food and Rural Affairs (DEFRA) (UK) in 2002 adopted 'Directing the flow – Priorities for future water policy', a policy that sets out priorities for water policy over the next 20 years and beyond. This policy addressed climate change as one of the factors that will challenge the water sector by placing additional stress on water resources and quality, and presenting challenges for flood management.

Transboundary water issues should be addressed through particular region's policies and strategies. Special provisions have to be made for flood and drought management when water bodies are shared among several regions. Adaptation strategies will have to facilitate and incorporate inter-state agreements and provisions on shared water bodies and their management. The 1944 Water Treaty between Mexico and the US[79] is an example of how international water treaties might evolve with time depending on climatic conditions. New strategies and programs of the IBWC[80] have been developed in response to the emerging circumstances and necessities. For example, additional provisions for protection from floods were added to the original agreement later and proved to be necessary. A possible reform of the treaty of 1944, is now being discussed by the governments of Mexico and the United States in order to deal with issues that did not exist (e.g., drought) in 1944. In 2002 both governments signed the agreement regarding water conservation to address water scarcity resulting from population growth and frequent droughts.

In Bangladesh, adaptation measures for climate change need to account for flood and drought episodes that will most likely result in more frequent and severe disasters. Governments, at the appropriate level, with support of the relevant international organisations, should strengthen regional and national warning systems, with particular emphasis on the area of risk-mapping, remote-sensing, agrometeorological modeling, integrated multidisciplinary crop-forecasting techniques and computerized food supply/demand analysis.

Moreover, the institutional structure and mandates of a country influences its ability to mainstream adaptation in the water sector and the approach it takes. Other line ministries and 'departments' within the environment ministries (directly and indirectly connected with water resources) are another important group of stakeholders who may need to play a role in adaptation to climate change in the water sector. Ministry of Agriculture takes important decisions that affect and can be affected by water resources. Department of Fisheries develops strategies and plans that can be affected by water resources. Decisions by Department of Agriculture and Fisheries can have implications for the ministries of trade and economic relations. Department of waste management need to be integrated into the water sector adaptation network as waste sites might be affected by floods, and water quality might be affected by floods and droughts. Also, energy departments often have responsibilities for dams and other electricity generating facilities that are dependent on water resources. In Finland, the Ministry of Agriculture and Forestry is responsible for water resources and, along with the Department of the Environment, manages thirteen Regional Environmental Centers which implement water protection and water management measures at a regional level. Municipal environmental authorities implement water legislation at a local level.[81]

Forest Policy however, should be more comprehensive integrating mitigation and adaptation options to withstand the impacts of climate change including increased runoff in forest floor instead of infiltration into the soil, high incidence of mortality for Artocarpus species, moisture stress, especially in the Barind and Madhupur Tract areas,

[78] Supra note, 76, .Pp. 19

[79] Treaty between the United States and Mexico relating to the utilization of the waters of the Colorado and Tijuana Rivers and of the Rio Grande (Rio Bravo) from Fort Quitam, Texas, to the Gulf of Mexico, signed at Washington on 3 February1944, and supplementary Protocol, signed at Washington on 14 November 1944

[80] The Water Commission (IBWC/CILA), a bilateral organization arranged of two sections under the respective foreign ministries of Mexico and the U.S., was formed in according to the 1944 Water Treaty

[81] Ellina Levina, For Adaptation to Climate Change in the Water Sector Part II: non-Annex I Countries Lessons Learned from Mexico, India, Argentina and Zimbabwe, OECD October 2006

the salinity of the soil that would affect Sundarbans mangrove forest. However, integrated approach with well structured institutional formation could enhance sustainable forest management in the light of climatic vulnerability. In Indonesia there is a law that calls for well structured institutional mechanisms for sustainable forest management.

Presidential Instruction No. 4/2005 Indonesia has codified and reinforces the commitment to fight forest crime. The Decree directs eighteen agencies to cooperate in the control of illegal logging and prosecution of forest crimes. These agencies include the Coordinating Ministry of Political and Security Affairs, the Ministry of Forestry, the National Police, and financial sector regulators. An order of the Ministry of Home Affairs has called for cooperation at the district government level and has propitiated for further grants of logging concessions at that level. Officials from Police and Prosecutors Office have been stationed at the Ministry of Forestry.[82] However, integrated resources management coupled with a well thought-through land use management approach is another key legal provision that is essential for adaptation measures against the climatic changes.

The role of national and local level authorities in land-use management is an important condition for effective adaptation measures to face climatic vulnerability. Coordination of different activities under well structured institutional arrangements immediate to resource management, tourism sector, oil and gas extraction offshore, ports, and others is also important for coastal zone management. Disaster, one of the challenges for coastal zone management requires a well structured land-use planning with participation of local institutions. So, national and local authority engagement in land-use planning and disaster risk management are prerequisites for climate change adaptation since the local authorities have more knowledge and understanding of local conditions.

In USA, the National Flood Insurance Program (NFIP) was established under the National Flood Insurance Act of 1968 and aimed at assisting personal and community recovery after flood events. The NFIP has three main components: flood insurance, floodplain management and flood hazard mapping. Improvements to the National Flood Insurance Act over the years have required participating local governments to adopt building codes for flood proofing and to require elevation of structures above the base flood elevation. Land use planning, in terms of keeping new development out of the floodplain, is one of the areas that can contribute to a better score. It is estimated, that flood damage is reduced by nearly USD1 billion a year through communities implementing sound floodplain management requirements and property owners purchasing of flood insurance. Moreover, the Stafford Act and the Disaster Mitigation Act in USA, provide for advanced planning for disaster mitigation efforts. States are required to prepare advance mitigation plans to be able to continue to participate in the NFIP. In Mexico, this is the Federal Law of Civil Protection. This law establishes requirements for contingency planning, emergency preparedness and disaster recovery. It establishes a National System of Civil Protection (SNPC) under the Ministry of Internal Affairs, which is responsible for the planning of policies and strategies, creates mechanisms, instruments and instances, promotes funding to forward emergency and disaster declarations.[83]

Climate change would increase the frequency and impacts of coastal natural disasters and therefore provides an additional incentive to improve efficiency of disaster management strategies. Disaster mitigation and response strategies with long-term time horizons can lay a foundation for adaptation to climate change. In Mexico, the existence of specific funds for the prevention and mitigation of natural disasters (FONDEN and FOPREDEN) are positive examples of emergency preparedness. At the municipal level there are many examples, one of them being the Contingency Plan for tropical cyclones, floods and torrential rains of Tampico which illustrates what is being done at the municipal level regarding civil protection in Mexico. It contains an early alert system for tropical cyclones, cyclone forecasting, a hurricane locator, a guide for prevention and preparedness, gathering points and temporary shelters. Early warnings for both hurricanes and storms are issued throughout the coast by the National Meteorological System as well as preparedness information, (e.g., shelters) being available on-line for all states and coastal municipalities in Mexico.[84]

---

[82] Agus P. Sari (ed), Indonesia and Climate Change: Current Status and Policies, PEACE, 2007

[83] Supra note, 7, Pp.41

[84] Ibid, Pp. 58

The institutional set up of a country influences its ability to mainstream adaptation in the water sector and the approach it takes. The policy frameworks of different countries examined above evident the coordinated institutional framework under a single lead agency and usually Ministry of Environment is found to be the key instructional stakeholder. In this regard, it is important to examine the structural function of Ministry of Environment in Bangladesh and the environmental policy from a broader multisectoral perspective. Environment policy was adopted by the Ministry of Environment with the special mandate. This ministry has little influence to advocate adopting and integrating the sectoral policies. Integration among the different sectoral agencies is required to address the environment and climatic changes, though its not always easy task. Policies on resource management are divided by sectors and separate institutions manage them according to their own priorities. As a result no coordination has developed between the various public agencies all of which endeavor to adapt to climate change in their own sectors. However, environment policy, which provides sectoral directions, needs to be integrated to respond to climate change. At the same time, the functional and operational overlapping or contradictions of provisions and institutions should be identified and examined from overall environmental policies and strategies perspectives.

4.1. Policy on Adaptation

Conclusion of above section leads to raise the question of whether we need a comprehensive policy on climate change to be adopted by a particular public agency like Ministry of Environment or we need reforms of existing sectoral policy. Ministry of Environment could adopt a comprehensive policy on climate change, and initiate integration and policy advocacy for sectoral reforms. The main advantage of this kind of policy framework is that it clearly states what exactly we are trying to achieve by agreeing on certain actions. In this regard Indonesian policy initiatives could be take into account. Currently the Ministry of Environment is working on the adaptation policy in Indonesia. The draft of National Strategy on Adaptation, which was generated at national workshop on 22 December, 2006 is completed. The strategy contains compilation of research activities, identification on adaptation issues which need to revised and added with implementation experience of UNFCCC methodology.[85]

The ability of a society to adapt to climate change depends on the extent of climate change, as well as on available technical, financial, institutional and other capacity. In other words, adaptive capacity is influenced by a variety of things, including education (general and specific), health care, financial resources, scientific information and understanding of climate change, availability of technologies, techniques and practical tools for various sectors and natural resources management. At the same time, adaptive capacity does not guarantee adaptation actions. Adaptation occurs when in addition to adaptive capacity there is also a political will and formal mechanisms that enable adaptation.[86]

However, both options require identifying the loopholes and lacuna of existing policies and to recommend reforms and thus the identification of priorities of the sectoral reforms justifies its need. So following the limitations of existing provisions would lend a hand to recommend suggestions to reform.

---

[85] Supra Note, 83, Pp. 67

[86] Ellina Levina, Adaptation to Climate Change: International Agreements for Local Needs, OECD 2007. Pp. 9

Chapter 5
CONCLUSIONS AND RECOMMENDATIONS

Recommendations

This research report addressed the issues of adverse impacts of climate change and reviewed and analyzed comprehensively relevant sectoral policies related to land, agriculture, forestry, water resources, coastal zone management, health, industry, energy and disaster management. The study reviewed the existing options to address the mitigation and adaptation options to advocate for further amendments. The critical examination and analysis of the existing provisions of national policies substantiate that existing policies are not adequate for adaptation to climate change.

The above views led to draw conclusions that necessary reform initiatives should be taken for effective policy intervention by responsible public agencies through a coordinated effort among all the responsible agencies. Some of the measures are recommended to address adverse effects of climate change and suggested future strategies that can be incorporated into the existing policies.

- To ensure the feasibility of all national policies relevant to climate change, concerned policy makers should take measures on mitigation and adaptation process to build up central database and Management Information System (MIS) integrating all obtained information from the research organizations. Input into the policies of data on geo-morphological, meteorological, ecological, biological and hydrological data can make them better informed to understand the causes and effects.

- Provisions for strengthening monitoring and warning and proofing systems of all the disastrous events of weather, such as tropical cyclones, drought and floods. Policy interventions need to ensure the availability of technological elements such as Digital Elevation Model (DEM) for monitoring accurate water levels in the concerned spots and tools (software) for use by the research centers.

- It is necessary to provide direction through policy intervention for coastal polders and flood control management, ascertain suitable technology system to reserve rain, surface and ground water, provide infrastructure that alter the drainage patterns of basins. Integrated coastal zone management policy should give special priority to these issues.

- Policy commitments are required for enhancing resilience of urban infrastructure and industries in environment friendly process and make viewpoints to scope on exploring options for insurance to cope with enhanced climatic disasters, macro level policies for disaster risk reduction, mitigation and management. These must be adopted with view of alleviating disaster-induced poverty.

- Clear policy direction is required to solve the transboundary water issues with India. Existing Ganges Treaty should be reviewed comprehensively to establish that its governing principles are in line with UN Water Convention. However, Efforts need to be undertaken to promote a regional treaty to include all other international rivers shared by the SAARC countries. The same should integrate the global environmental principles to frame an effective arrangement.

- Policies related to agriculture, forestry, water resources and rural development should be harmonized with regard to sustainable land management. Livelihood adaptation to climate change in the drought prone areas needs institutional integration. In the policy making process inter-ministerial and inter-departmental coordination are obligatory to allow adaptive measures on the impacts of climate change related disasters.

- Policy directions are needed for adaptive crop agriculture and farming practices. Policies ought to include promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future.

- Policy intrusion for sufficient community based adaptation measures and the policy must ensure systematic dissemination process of adaptation information to vulnerable communities for emergency preparedness measures and awareness raising on climatic disasters. Development of eco-specific adaptive knowledge (including indigenous knowledge) on adaptation to climate variability can enhance adaptive capacity for future climate change.

- Policy commitments for advance knowledge and technology for methane recovery and collection from aerobic composting, initiation of research and development of renewable forms of energy, carbon dioxide sequestration technologies, and innovative environmentally sound technologies should be prioritized.

Conclusions

Under present and potential impacts of climate change, the Government of Bangladesh will adopt a comprehensive policy commitment for adaptation and mitigation measures relevant to climate change that would create further pathway for appropriate legal and institutional frameworks. In doing so, inter-ministerial and inter-departmental coordination is the primary condition. However, coordinated efforts between GOs and NGOs of Bangladesh with the aid of international organizations is crucial to address the issues of climate change at the bilateral, regional and international level and to face the present and future challenges of climate change.

REFERENCES

Agus P. Sari (ed), *Indonesia and Climate Change: Current Status and Policies*, PEACE, 2007, available at website: www.eisu.org.uk

Andrew L. Strauss, *The Legal Option: Suing the United States in International Forums for Global Warming Emissions*, Environmental Law Institute, Washington, DC, 2003

Brent D. Yacobucci and Larry Parker, *Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions*, February 22, 2006, Available at http://www.cnie.org

Ellina Levina, *Adaptation to Climate Change: International Agreements for Local Needs*, OECD 2007, available at http://www.oecd.org

Ellina Levina, *For Adaptation to Climate Change in the Water Sector Part II: non-Annex I Countries Lessons Learned from Mexico*, India, Argentina and Zimbabwe, OECD October 2006, available at http://www.olis.oecd.org

Ellina Levina, *Policy Frameworks for Adaptation to Climate Change in Coastal Zones: The Case of the Gulf of Mexico*,OECD, 2007, available at: www.oecd.org

F. Mohiuddin, *Laws and Customs on Forest in Bangladesh: Issues and Remedies*, BELA, 1997

Iain MacGill, *Australian Climate Change Policy and its Implications for AP6 Countries*, April 2007, available at: http://www.ceem.unsw.edu.au

Ian Burton, *Adaptation to Climate Change: International Policy Options*, November 2006, available at: http://www.pewclimate.org

Jason Shogren and Michael Toman, *Climate Change Policy*, May 2000

Joni Hersch, W. Kip Viscusi, P*aying for Climate Change Policies in Europe*, 2005, available at : http://www.law.harvard.edu

Jyoti K. Parikh and Kirit Parikh, *Climate Change: India's Perceptions, Positions, Policies and Possibilities*, OECD 2002, available at: http://www.oecd.org

Millat-e-Mustafa, M. A, *Review of Forest Policy Trends in Bangladesh*, available at: http://www.iges.or.jp

Mozaharul Alam, *Adverse impacts of Climate change on Development of Bangladesh: Integrating Adaptation into Policies and Activities*, available at: http://www.iied.org

Myles Allen, *Liability for climate change: Will it ever be possible to sue anyone for damaging the climate?* Nature Publishing Group, 2003, available at: www.nature.com

National Adaptation Programme of Action (NAPA), Ministry of Environment and Forest Government of the People's Republic of Bangladesh, Final Report November 2005, availableat: http://unfccc.int/resource/docs/napa

Nazmul Huq, *Bangladesh and Climate Change: Need for a Comprehensive Adaptive Strategy*, Centre for Trade and Development, Delhi, 2008, available at www.bangladeshstudies.org

N.J. Ericksen,Q.K. Ahmad, A. R. Chowdhury, *Socio-Economic Implications of Climate Change for Bangladesh*, Bangladesh Unnayan Parishad (BUP), available at: http://www.waikato.ac.nz

Saleemul Huq, Atiq Rahman, Mama Konate,Youba Sokona and Hannah Reid, *Mainstreaming Adaptation to Climate Changein Least Developed Countries (LDCs)*, 2003, available at: http://www.un.org

Saleemul Huq, Atiq Rahman, Mama Konate, Youba Sokona and Hannah Reid, *Mainstreaming Adaptation to Climate Change in Least Developed Countries(LDCS)*, April 2003,

Salmah, Zakaria, *National Policy Responses to Climate Change: Malaysian Experience*

Shardul Agrawala, Tomoko Ota, Ahsan Uddin Ahmed, Joel Smith and Maarten van Aalst, *Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans*, Organisation for Economic Co-operation and Development, 2003, available at: www.oecd.org

Stef Proost, Denise, Van Regemorter, *Climate Change Policy in European Countries and its Effects on Industry*, March 2003, available at http://www.econ.kuleuven.be

Stephen Keim SC, *Environmental Law Challenges of Climate Change*, A paper presented at the Queensland Environmental Law Conference, northern New South Wales, 16-18 May 2007

Warwick J. McKibbin, *Climate Change Policy for India*, April 2004

Annexure -1

ENVIRONMENT POLICY, 1992

1. Preamble and Perspective:

The existence and progress of life on earth depend on nature and environment. In recent times, gradual degradation of the natural environment has posed a serious threat to the existence of all living beings and to the progress of human civilization.

In view of the various adverse impacts on environment, the Government of Bangladesh have attached special importance to its protection and improvement. A number of environmental problems, which inter-alia include natural disasters life recurrent floods, droughts, cyclones, tidal bores etc., primary signs of desertification in the northern districts, intrusion of salinity in the rivers, land erosion, fast depletion of forest resources, instability of the weather and climatic conditions etc are prevalent in the country. Against this backdrop, the Government has established the Ministry of Environment and Forest (MoEF) and upgraded the Department of Environment (DoE) in order to coordinate and supervise the activities concerning protection and improvement of the environment. Simultaneously, major problems related to environmental pollution and degradation have also been clearly identified.

Since various socio-economic malaises life 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. Implementation of government's commitment to environment and mitigation of other environment related problems are possible only through a well defined national policy.

In the context of the environment, the Government recognizes that:

1.1 Since global and regional environmental pollution and degradation affect the nature, environment and resource base of Bangladesh, it is essential to have coordinated vigilance and undertake necessary action programme to address such issues.

1.2 The geophysical location of Bangladesh, the gradual degradation of its environment, and lack of appropriate technology, sustainable management techniques and processes for the exploitation of resources have made it imperative to adopt an integrated environment policy on priority basis.

1.3 With a view to ensuring preservation and improvement of environment, it is essential that people at all levels are involved for sustainable use of national resources. This can only be achieved through mass awareness.

1.4 For immediate and long term solution of the problems concerning natural disaster, it is necessary that the issues are considered as an integral part of the overall programme for protection and improvement of environment and sustainable resource management.

1.5 It is necessary to undertake activities at local and national level. It is also feasible and essential to ensure improvement of national environment and thus global environment at large, as well as environmentally sound and sustainable use of resource through regional and global cooperation in relevant fields.

2. Objectives:

The objectives of environment policy are:

2.1 to maintain ecological balance and overall development through protection and improvement of the environment;

2.2 to protect the country against natural disasters;

2.3 to identify and regulate activities which pollute and degrade the environment;

2.4 to ensure environmentally sound development in all sectors;

2.5 to ensure sustainable, long term and environmentally sound use of all national resources; and

2.6 to actively remain associate with all international environmental initiatives to the maximum possible extent.

3. Policies:

Environmental activities encompass all geographical regions and development sectors of the country. As such, policies towards realization of the overall objectives of this environment Policy are described in 15 sectors below.

3.1 ***Agriculture:***

3.1.1 All steps taken and technologies adopted for agricultural development and attainment of self-sufficiency in food are to be made environmentally sound.

3.1.2 While in the process of development all agricultural resource bases are to be conserved and their environmental compatibility and long term use are to be ensured.

3.1.3 The application of agro chemicals, artificial materials and inputs which adversely affectthe fertility as well as organic properties of the soil and also cause adverse impacts on man and animals are to be regulated. Safety of agricultural workers in applying those inputs is to be ensured. At the same time, the application of different natural fertilizers and insecticides is to be encouraged.

3.1.4 Assist environmentally sound development in agriculture through appropriate changes in production management and production relations with a view to protect and improve the environment and ensuring sustainable use of resources.

3.1.5 The use of environment friendly fibres like jute and jute products are to be increased.

3.2 ***Industry:***

3.2.1 Adoption of corrective measures by polluting industries in phases.

3.2.2 Undertake Environmental Impact Assessment (EIA) for all new industries both in public and private sectors.

3.2.3 Impose ban on establishment of industries producing goods which cause environment pollution; close down such already existing industries in phases and discourage use of such polluting products through development introduction of their environmentally sound substitutes.

3.2.4 Encourage development of environmentally sound and appropriate technology and initiatives on research and extension in the fields of industry Balance such initiatives with the best use of labour and provision of proper wages.

3.2.5 Prevent wastage of raw materials in industries and ensure their sustainable use.

3.3 ***Health & Sanitation:***

3.3.1 Prevent activities which are harmful to public health in all spheres, including development activities in the country.

3.3.2 Integrate environmental concerns into the National Health Policy.

3.3.3 Incorporate environmental issues in health education curriculum.

3.3.4 Develop healthy environment in the rural and urban areas.

3.3.5 Ensure healthy workplace for workers.

3.4 ***Energy and Fuel:***

3.4.1 Reduce and discourage the use of those fuels which pollute the environment and increase the use of environmentally sound and less harmful fuels.

3.4.2 Reduce the use of fuel wood, agricultural residues etc. to meet energy need and increase the use of alternative energy sources.

3.4.3 Adopt appropriate precautionary measures against adverse environmental impact of the use of nuclear energy and take preventive steps against nuclear radiation and pollution.

3.4.4 Develop improved energy saving technology and proliferate its use.

3.4.5 Conserve country's fossil fuel reserves and renewable sources of energy.

3.4.6 Conduct Environmental Impact Assessment before implementing the projects for extraction of fuel and mineral resources.

3.5 ***Water Development, Flood Control and Irrigation:***

3.5.1 Ensure environmentally sound utilisation of all water resources.

3.5.2 Ensure that water development activities and irrigation net-works do not create adverse environmental impact.

3.5.3 Ensure that all steps taken for flood control, including construction of embankments, dredging of rivers, digging of canals etc. be environmentally sound at the local, zonal and national levels.

3.5.4 Ensure mitigatory measures of adverse environmental impact of completed water resources development and flood control projects.

3.5.5 Keep the rivers, canals, ponds, lakes, haors, baors and all other water bodies and water resources free from pollution.

3.5.6 Ensure sustainable, long term, environmentally sound and scientific exploitation and managment of the underground and surface water resources.

3.5.7 Conduct Environmental Impact Assessment before undertaking projects for water resources development and management.

3.6 ***Land:***

3.6.1 Formulate a balanced and environmentally sound national landaus policy and plan.

3.6.2 Prevent land erosion, preserve and increase soil fertility, and expand activities for conservation and environmentally sound management of newly accreted land.

3.6.3 Encourage land use systems compatible with various eco-systems.

3.6.4 Prevent spread of salinity and alkalinity on land.

3.7 ***Forest, Wildlife and Bio-diversity:***

3.7.1 Conserve, expand and develop forest to sustain the ecological balance and meet the socio economic needs and realities.

3.7.2 Include tree plantation programmes in all relevant development schemes.

3.7.3 Stop shrinkage and depletion of forest land and forest resources.

3.7.4 Develop and encourage use of substitutes of forest products.

3.7.5 Conserve wildlife and bio-diversity, strengthen related research and help insemination and exchange of knowledge in the concerned area.

3.7.6 Conserve and develop wetlands and protect migratory birds.

3.8 ***Fisheries and Livestock:***

3.8.1 Ensure appropriate environment for the conservation and development of fisheries and livestock.

3.8.2 Prevent activities which diminish the wetlands/natural habitats of fish and encourage rehabilitative measures in this area.

3.8.3 Ensure that development activities in fisheries and livestock do not create any adverse impact on the mangrove forests and other ecosystems.

3.8.4 Evaluate existing projects on water resources development, flood control and irrigation to determine their adverse impact on fisheries and adopt measures for alternate fish culture upon improvement of environmental conditions.

3.9 ***Food:***

3.9.1 Ensure hygienically and environmentally sound methods for production, preservation, processing and distribution of food.

3.9.2 Dispose rotten or harmful food stuff and food crops in an environmentally acceptable manner.

3.9.3 Prohibit import of food items likely to create adverse impact on the environment and public health.

3.10 ***Coastal and Marine Environment:***

3.10.1 Ensure environmentally sound conservation and development of coastal and marine ecosystems and resources.

3.10.2 Prevent all internal and external activities polluting the coastal and marine areas.

3.10.3 Strengthen necessary research to preserve and develop coastal and marine environment and resources.

3.10.4 Limit coastal and marine fish catch within tolerable regeneration/respwaning limits.

3.11 ***Transport and Communication:***

3.11.1 Ensure that road, rail, air and inland water transport systems do not pollute the environment or degrade the resources. Conduct Environmental Impact Assessment before undertaking related projects.

3.11.2 Ensure that vehicles and people using roads, rails, air and inland waterways do not pollute the environment and take steps to protect health of the workers running these transports.

3.11.3 Control activities in inland ports and dockyards which cause pollution of water and the local environment.

3.12 ***Housing and Urbanisation:***

3.12.1 Integrate environmental considerations into all housing and urban planning activities and research.

3.12.2 Extend environmentally sound amenities to all the existing urban and rural housing areas in phases.

3.12.3 Control housing and urban development schemes having adverse impact on the local and overall environment.

3.12.4 Focus greater importance on the role of water bodies in enhancing beautification of the cities.

3.13 ***Population:***

3.13.1 Ensure integrated, planned and environmentally sound utilization of manpower.

3.13.2 Integrate environmental conservation and development concerns in the population policy and action programme.

3.13.3 Ensure the role of women in development.

3.13.4 Encourage utilization of unemployed manpower in development activities.

3.14 ***Education and Public Awareness:***

3.14.1 Integrate people in the spread of education and overall development of the country through eradication of illiteracy and increase in the rate of literacy.

3.14.2 Create widespread mass awareness regarding environmental conservation and improvement, sustainable, long term and environmentally sound utilization of all resources.

3.14.3 Ensure inclusion and dissemination of environmental knowledge and information in the formal and informal systems of education and media.

3.14.4 Induce spontaneous and direct participation of people in all environmental activities.

3.14.5 Incorporate environmental issues in all government and non-government training programmes and also in such programmes for industrial and commercial workers.

3.15 ***Science, Technology and Research:***

3.15.1 Incorporate environmental pollution supervision and control measures into national science and technology policy.

3.15.2 Encourage necessary research and evolve technology to ensure long term, sustainable and environmentally sound utilization of all resources for conservation and improvement of environment.

3.15.3 Incorporate environmental consideration as an integral part of priority areas for research and development within the framework of National Science and Technology Policy (1986).

3.15.4 Consideration of environmental issues in all research activities by research and development institutions.

4. **Legal Framework:**

4.1 Amend all laws and regulations related to protection of environment, conservation of natural resources, and control of environmental pollution and degradation with a view to meet present day's need.

4.2 Frame new laws in all sectors necessary to control activities concerning environmental pollution and degradation.

4.3 Ensure proper implementation of all relevant laws/regulations and create wide spread public awareness in this regard.

4.4 ratify all concerned international laws/ conventions/ protocols which Bangladesh considers ratifiable and amend/modify existing national laws/ regulations in line with the ratified international laws/ conventions/ protocols.

5. **Institutional Arrangements:**

5.1 The Ministry of Environment and Forest would coordinate the implementation of this policy.

5.2 A National Environmental Committee with the head of the Government as the Chairperson would be constituted to give overall direction for implementation of this policy.

5.3 The Ministry of Environment and Forest would take timely steps for appropriate amendment and modification of this policy on the backdrop of changes in the state of environment and socio-economic and other needs of the country.

5.4 Department of Environment will make final review and approve all Environmental Impact Assessments (EIAs).

Annexure -2

National Water Policy, 1998

1. **Introduction**

Water is central to the way of life in Bangladesh and the single-most important resource for the well-being of its people. It sustains an extremely fragile natural environment and provides livelihood for millions of people. Unfortunately, it is not infinite and cannot be treated as a perpetual free gift of nature to be used in any manner chosen. The unitary nature of water makes its use in one form affect the use in another. Its availability for sustenance of life, in both quantitative and qualitative terms, is a basic human right and mandates its appropriate use without jeopardising the interest of any member of the society.

Availability of water, including rainwater, surface water, and groundwater, in usable forms calls for its sustainable development, a responsibility that has to be shared collectively and individually by members of the society. Private users of water are the principal agents for its development and management and private investments need to be actively promoted in the water sector, ensuring equal opportunity to all. However, development of water resources often requires large and lumpy capital investment and generates economies of scale, which justifies public sector involvement. Government's role also becomes important because of the necessity of protecting the needs of the society at large and addressing important environmental as well as social issues such as poverty alleviation and human resources development.

Water resources management in Bangladesh faces immense challenge for resolving many diverse problems and issues. The most critical of these are alternating flood and water scarcity during the wet and the dry seasons, ever-expanding water needs of a growing economy and population, and massive river sedimentation and bank erosion. There is a growing need for providing total water quality management (checking salinity, deterioration of surface water and groundwater quality, and water pollution), and maintenance of the eco-system. There is also an urgency to satisfy multi-sector water needs with limited resources, promote efficient and socially responsible water use, delineate public and private responsibilities, and decentralise state activities where appropriate. All of these have to be accomplished under severe constraints, such as the lack of control over rivers originating outside the country's borders, the difficulty of managing the deltaic plain, and the virtual absence of unsettled land for building water structures.

The water policy provided hereunder, lays down the broad principles of development of water resources and their rational utilisation under these constraints. It will help guide both public and private actions in the future for ensuring optimal development and management of water that benefits both individuals and the society at large.

1. **Declaration of National Water Policy**

As water is essential for human survival, socio-economic development of the country and preservation of its natural environment, it is the policy of the Government of Bangladesh that all necessary means and measures will be taken to manage the water resources of the country in a comprehensive, integrated and equitable manner. The policies enunciated herein are designed to ensure continued progress towards fulfilling the national goals of economic development, poverty alleviation, food security, public health and safety, decent standard of living for the people and protection of the natural environment.

The National Water Policy will be reviewed periodically and revised as necessary. It will guide management of the country's water resources by all the concerned ministries, agencies, departments, and local bodies that are assigned responsibilities for the development, maintenance, and delivery of water and water related services as well as the private users and developers of water resources.

3. **Objectives of National Water Policy**

The water policy of the government aims to provide direction to all agencies working with the water sector, and institutions that relate to the water sector in one form or another, for achievement of specified objectives. These objectives are broadly:

a. To address issues related to the harnessing and development of all forms of surface water and ground water and management of these resources in an efficient and equitable manner

b. To ensure the availability of water to all elements of the society including the poor and the underprivileged, and to take into account the particular needs of women and children

c. To accelerate the development of sustainable public and private water delivery systems with appropriate legal and financial measures and incentives, including delineation of water rights and water pricing

d. To bring institutional changes that will help decentralise the management of water resources and enhance the role of women in water management

e. To develop a legal and regulatory environment that will help the process of decentralisation, sound environmental management, and improve the investment climate for the private sector in water development and management

f. To develop a state of knowledge and capability that will enable the country to design future water resources management plans by itself with economic efficiency, gender equity, social justice and environmental awareness to facilitate achievement of the water management objectives through broad public participation

4. **National Water Policy**

The policies set forth herein are considered essential for addressing the objectives of improved water resources management and protection of the environment. Every public agency, every community, village and each individual has an important role to play in ensuring that the water and associated natural resources of Bangladesh are used judiciously so that the future generations can be assured of at least the same, if not better, availability and quality of those resources.

4.1 River Basin Management:

Basin planning provides the most rational basis of development of water resources under the influence of one or more major rivers. International river basins, however, such as the Ganges basin, the Brahmaputra basin, and the Meghna basin present special problems. Due to its location as the lower-most riparian, Bangladesh has no control over the rivers entering through its borders. The adverse effects of this are the floods and water scarcity, which occur frequently. Although the 1996 Treaty on Sharing of the Ganges Waters with India has brought some relief to the drought-prone area of the southwest, the water shortage problem during the dry season is likely to aggravate in the Ganges and other basins with rising demands of the increasing population. It is, however, encouraging to note that the relevant provision of the treaty will provide the basis in the future for discussion on sharing of waters of the common rivers.

It may take considerable effort and time for Bangladesh to work out joint plans for different river basins with other co-riparian countries. As a long-term measure, therefore, it is the policy of the government to undertake essential steps for realising basin-wide planning for development of the resources of the rivers entering its borders.

The Government will endeavour to enter into agreements with co-riparian countries for sharing the waters of international rivers, data exchange, resource planning and long-term management of water resources under normal and emergency conditions of flood, drought and water pollution. While moving towards the attainment of basin-wide plans in the long run, it will also be necessary for Bangladesh to concentrate on the development of individual hydrological areas to meet short and intermediate term requirements.

The policy of the Government of Bangladesh, in the short and intermediate term, for fostering international cooperation in water management is, in italics letter, to:

a. Work with co-riparian countries to establish a system for exchange of information and data on relevant aspects of hydrology, morphology, water pollution, ecology, changing watershed characteristics, cyclone, drought, flood warning, etc., and to help each other understand the current and emerging problems in the management of the shared water sources.

b. Work with co-riparian countries for a joint assessment of all the international rivers flowing through their territories for better understanding of the overall basins' potentials.

c. Work jointly with co-riparian countries to harness, develop, and share the water resources of the international rivers to mitigate floods and augment flows of water during the dry season.

d. Make concerted efforts, in collaboration with co-riparian countries, for management of the catchment areas with the help of afforestation and erosion control for watershed preservation and reduction of land degradation.

e. Work jointly with co-riparian countries for the prevention of chemical and biological pollution of the rivers flowing through these countries, by managing the discharge of industrial, agricultural and domestic pollutants generated by human action.

f. Seek international and regional cooperation for education, training, and research in water management.

4.2. Planning and Management of Water Resources:

The Government recognizes that the process of planning and managing water resources requires a comprehensive and integrated analysis of relevant hydrological, topographical, social, political, economic, environmental and institutional factors across all related water-using sectors.

The intricate nature of drainage systems within the country requires that activity for planning and management of the nation's river systems is undertaken within the context of hydrological regions. The principal river systems create natural boundaries for these regions. The hilly areas of the east form another hydrological region.

Henceforth, to address these issues the policy of the Government will be as follows:

a. The Water Resources Planning Organisation (WARPO) will delineate the hydrological regions of the country, based on appropriate natural features, for planning the development of their water resources.

b. WARPO will prepare, and periodically update, a National Water Management Plan (NWMP) addressing the overall resource management issues in each region and the whole of Bangladesh, and providing directions for the short, intermediate, and long runs. The plan will be executed by different agencies as determined by the Government from time to time.

c. The NWMP and all other related plans will be prepared in comprehensive and integrated manner, with regard for the interests of all water-related sectors. The planning methodology will ensure co-operation across sectors and people's participation in the process.

Within the macro framework of the NWMP:

d. Sector agencies of the Government and local bodies will prepare and implement subregional and local water-management plans in conformance with the NWMP and approved Government project appraisal guidelines. The Executive Committee of the National Water Resources Council (ECNWRC) will resolve any interagency conflict in this regard.

e. The Bangladesh Water Development Board (BWDB) will implement all major surface water development projects and other FCDI projects with command area above 1000 hectares. The Local Government will implement FCDI projects having a command area of 1000 hectares or less after identification and appraisal through an interagency Project Appraisal Committee. Any interagency dispute will be resolved by means prescribed by the Government.

f. The participation of all project affected persons, individually and collectively, will be ensured in the planning, design, implementation, and operation and maintenance (O&M) of publicly funded surface water resources development plans and projects. Local Governments (Parishads) will be the principal agencies for coordinating these efforts. Community level self-help groups (private) and Non-Government Organisations will also be relied on to assist in the participatory process.

The Government will further:

g. Frame rules, procedures, and guidelines for combining water-use and land-use planning

h. Frame, and periodically revise, the rules, procedures and guidelines on all aspects of water management

i. Make social and environmental assessments mandatory in all plan development

Through its responsible agencies, the Government will:

j. Undertake comprehensive development and management of the main rivers through a system of barrages and other structural and non-structural measures

k. Develop water resources of the major rivers for multipurpose use, including irrigation, fisheries, navigation, forestry, and aquatic wildlife

l. De-silt watercourses to maintain navigation channels and proper drainage

m. Delineate water-stress areas based on land characteristics and water availability from all sources for managing dry season demand

n. Take steps to protect the water quality and ensure efficiency of its use

o. Develop early warning and flood-proofing systems to manage natural disasters like flood and drought

p. Designate flood risk zones and take appropriate measures to provide desired levels of protection for life, property, vital infrastructure, agriculture and wetlands. In this regard the following principles will guide future action:

i. Regions of economic importance such as metropolitan areas, sea and air ports, and export processing zones will be fully protected against floods as a matter of first priority. Other critical areas such as district and upazila towns, important commercial centers, and places of historical importance will be gradually provided reasonable degree of protection against flood. In the remaining rural areas, with the exception of those already covered by existing flood control infrastructure, the people will be motivated to develop different flood proofing measures such as raising of platform for homesteads, market places, educational institutions, community centers, etc., and adjusting the cropping pattern to suit the flood regime.

ii. In future all national and regional highways, railway tracks, and public buildings and facilities will be constructed above the highest ever-recorded level of flood in the country. This principle will also apply in cases of reconstruction of existing structures of this nature.

iii. All plans for roads and railways embankment will adequately provide for unimpeded drainage.

q. Undertake survey and investigation of the problem of riverbank erosion and develop and implement master plans for river training and erosion control works for preservation of scarce land and prevention of landlessness and pauperisation.

r. Plan and implement schemes for reclamation of land from the sea and rivers.

4.3 ***Water Rights and Allocation:***

The ownership of water does not vest in an individual but in the state. The Government reserves the right to allocate water to ensure equitable distribution, efficient development and use, and to address poverty. The Government can redirect its use during periods of droughts, floods, cyclones, and other natural and man-made disasters, such as contamination of groundwater aquifers that threaten public health and the ecological integrity. Allocation rules will be the formal mechanism for deciding who gets water, for what purpose(s), how much, at what time, for how long, and under what circumstances water use may be curtailed. Rules for water allocation will be developed for in-stream needs (ecological, water quality, salinity control, fisheries and navigation) during low-flow periods; for off-stream withdrawal (irrigation, municipal and industrial, power), and for ground-water recharge and abstraction. Allocation for non-consumptive use (e.g. navigation) would imply ensuring minimum levels in water bodies used for that purpose.

Henceforth, the policy of the Government to regulate the use of water, where required, will be exercised in the following manner:

a. The Government will exercise its water allocation power in identified scarcity zones on the basis of specified priorities.

b. In general, the priority for allocating water during critical periods in the water shortage zones will be in the following order: domestic and municipal uses, non-consumptive uses (e.g. navigation, fisheries and wild-life), sustenance of the river regime, and other consumptive and non-consumptive uses such as irrigation, industry, environment, salinity management, and recreation. The above order of priority could however be changed on specific socio-economic criteria of an area by local bodies through local consensus.

c. For sustaining rechargeable shallow groundwater aquifers, the Government will regulate the extraction of water in the identified scarcity zones with full public knowledge.

d. Specific drought monitoring and contingency plans will be prepared for each region experiencing recurrent seasonal shortages of water with due consideration to conjunctive use of rainwater, surface water and ground water and alternative ways of satisfying demand. The contingency plan will include action to limit the use of groundwater according to priorities. Appropriate provisions of law should be made to protect specific users' rights in these extreme cases.

e. The Government may empower the local government or any local body it deems fit, to exercise its right to allocate water in scarcity zones during periods of severe drought, and it will monitor the water regime and enforcement of the regulations through specifically designed mechanisms.

f. The Government may confer water rights on private and community bodies to provide secure, defensible and enforceable ownership/usufructuary rights to ground water and surface water for attracting private investment.

g. In specifying surface water rights, the minimum requirement of stream-flow for maintaining the conveyance channel will be ensured.

4.4 ***Public and Private Involvement:***

Water resources management requires involvement of the public and private sectors, communities and individuals that benefit from the delivery of water-related services. The ultimate success and effectiveness of public water resources management projects depends on the people's acceptance and ownership of each project. It is important to delineate the roles and responsibilities of every one involved in water resources management. The principle that community resources should be managed by the community concerned, along with local government institutions unless a greater national interest prevails, should guide water resource management. It is recognised that women have a particular stake in water management because

they are the principal providers and carriers of water, main caretaker of the family's health, and participants in many stages of pre and post harvest activities. The policies of the Government regarding the respective roles of the public and private sectors are:

a. Governments investments in water programme will be directed towards creation of public goods or for addressing specific problems of market failure and protecting particular community interests.

b. Policies and programmes of any public agency involving water resources will be coordinated with the policies and programmes of all other public and private bodies to build synergy and avoid conflict.

c. Public water institutions will, to the extent feasible, use private providers of specific water resources services in carrying out their mandates, giving preference to beneficiary groups and organisations.

d. The management of public water schemes, barring municipal schemes, with command area up to 5000 ha will be gradually made over to local and community organisations and their O&M will be financed through local resources.

e. Public water schemes, barring municipal schemes, with command area of over 5000 ha will be gradually placed under private management, through leasing, concession, or management contract under open competitive bidding procedures, or jointly managed by the project implementing agency along with local government and community organisations.

f. Ownership of FCD and FCDI projects with command area of 1000 ha or less will gradually be transferred to the local governments, beginning with the ones that are being satisfactorily managed and operated by the beneficiary/ community organisations.

g. Appropriate public and private institutions will provide information and training to the local community organisations for managing water resources efficiently.

h. Enabling environment will be created for women to play a key role in local community organisations for management of water resources.

i. Government, where appropriate, will restructure its present institutions and design all future institutions for efficient implementation of the above policies.

4.5 ***Public Water Investment:***

The Government considers that a consistent and uniformly applied analytical framework for project appraisal is essential to equitable, efficient and effective water resources management. A true multi-objective analysis of the water needs of an area, and the formulation of options for investment and management must consider the interrelations among different sources of water, different management schemes and the interaction between needs of different users and purposes. Investments in infrastructure may displace people and disturb ecosystems and, as such, broader water resources planning assessments and specific project appraisals must consider these cross-sectoral implications.

The policy of the Government in this regard is to ensure that:

a. Water resource projects, as far as possible, are developed as multipurpose projects with an integrated multi-disciplinary approach from planning to implementation to monitoring.

b. Planning and feasibility studies of all projects will follow the Guidelines for Project Assessment (GPA), the Guidelines for Peoples Participation (GPP), the Guidelines for Environmental Impact Assessment (EIA), and all other instructions that may be issued from time to time by the Government.

c. All relevant analytical procedures and evaluation methods, such as mathematical modelling, physical modelling, cost-benefit analysis, risk analysis and multi-criteria decision making are routinely used as part of water resources planning and project appraisal.

d. Public water projects are designed with specific provision for future disinvestment, if and when feasible.

e. Interests of low-income water users, and that of women, are adequately protected in water resource management.

f. There is continuous updating and archiving of water resource data and basic information by relevant public sector agencies.

4.6 ***Water Supply and Sanitation***

The rural areas of Bangladesh suffer from lack of quality drinking water. Surface water supplies are generally polluted and groundwater, which till now had been the best source of safe drinking water, is contaminated with arsenic in many parts of the country. Heavy withdrawals of groundwater for irrigation have also lowered the water table in many areas below the effective reach of hand tubewells. Seepage of agro chemicals into shallow aquifers may also pollute water for human and animal consumption. Salinity intrusions from seawater deep into the land in the southwest are rendering groundwater unfit for consumption. Cities and urban areas too are facing the problem of receding water table due to heavy groundwater extraction. These water supply and sanitation problems have obvious implications for public health. Diarrheal diseases, arising largely from drinking unsafe water, are a leading cause of death in the rural areas. Lack of proper sanitation and drainage facilities, inadequate water supply, and insufficient health and hygiene education are the primary causes of diseases in the urban areas. Lack of access to safe water supply in the rural areas is a special hardship for women who have to carry water over long distances, with significant impact on their health and productivity.

To address these problems, it is the policy of the Government to:

a. Facilitate availability of safe and affordable drinking water supplies through various means, including rainwater harvesting and conservation.

b. Preserve natural depressions and water bodies in major urban areas for recharge of underground aquifers and rainwater management.

c. Mandate relevant public water and sewerage institutions to provide necessary drainage and sanitation, including treatment of domestic wastewater and sewage and replacement of open drains and construction of sewers, in the interest of public health.

d. Empower, and hold responsible, municipalities and urban water and sewerage institutions to regulate the use of water for preventing wastage and pollution by human action.

e. Mandate local governments to create awareness among the people in checking water pollution and wastage.

4.7 ***Water and Agriculture***

Support of private development of groundwater irrigation for promoting agricultural growth will continue, alongside surface water development where feasible. But there will be a renewed focus towards increasing efficiency of water use in irrigation through various measures including drainage-water recycling, rotational irrigation, adoption of water conserving crop technology where feasible, and conjunctive use of groundwater and surface water.

Water allocations in irrigation systems have to be done with equity and social justice. At the same time, serious consideration should be given to non-point pollution of water systems by fertilizer and pesticides that are either leached to the groundwater or washed off the fields to rivers and lakes. For this purpose, the policy of the Government is to:

a. Encourage and promote continued development of minor irrigation, where feasible, without affecting drinking water supplies

b. Encourage future groundwater development for irrigation by both the public and the private sectors, subject to regulations that may be prescribed by Government from time to time.

c. Improve efficiency of resource utilisation through conjunctive use of all forms of surface water and groundwater for irrigation and urban water supply.

d. Strengthen crop diversification programmes for efficient water utilisation.

e. Strengthen the regulatory system for agricultural chemicals that pollute ground and surface water, and develop control mechanism for reducing non-point pollution from agro-chemicals.

f. Strengthen appropriate monitoring organisations for tracking groundwater recharge, surface and groundwater use, and changes in surface and groundwater quality.

4.8 ***Water and Industry***

Excessive water salinity in the southwest region is a major deterrent to industrial growth. Also, pollution of both surface and groundwater around various industrial centers of the country by untreated effluent discharge into water bodies is a critical water management issue. The policy of the Government in this regard is that:

a. Zoning regulations will be established for location of new industries in consideration of fresh and safe water availability and effluent discharge possibilities.

b. Effluent disposal will be monitored by relevant Government agencies to prevent water pollution.

c. Standards of effluent disposal into common watercourses will be set by WARPO in consultation with DOE.

d. Industrial polluters will be required under law to pay for the cleanup of water- body polluted by them.

4.9 ***Water and Fisheries and Wildlife***

Fisheries and wildlife are integral aspects of economic development in Bangladesh and strongly linked to advancement of target groups, poverty alleviation, nutrition, and employment generation. Availability of water for fisheries is thus important from the point of view of sustenance as well as commercial ventures. It is, therefore, the policy of the Government that:

a. Fisheries and wildlife will receive due emphasis in water resource planning in areas where their social impact is high.

b. Measures will be taken to minimise disruption to the natural aquatic environment in streams and water channels.

c. Drainage schemes, to the extent possible, will avoid state-owned swamps and marshes that have primary value for waterfowl or other wildlife.

d. Water bodies like baors, haors, beels, roadside borrow pits, etc. will, as far as possible, be reserved for fish production and development. Perennial links of these water bodies with the rivers will also be properly maintained.

e. Water development plans will not interrupt fish movement and will make adequate provisions in control structures for allowing fish migration and breeding.

f. Brackish aquaculture will be confined to specific zones designated by the Government for this purpose.

4.10 ***Water and Navigation***

Inland navigation is of substantial economic importance to Bangladesh because its numerous watercourses provide the cheapest means of transportation. Siltation, however, has disrupted river communications in many water channels. De-siltation of these channels is required not only to restore their navigational capability but also to assist surface drainage. The policies of the Government in this regard are:

a. Water development projects should cause minimal disruption to navigation and, where necessary, adequate mitigation measures should be taken.

b. Minimum stream-flows in designated rivers and streams will be maintained for navigation after diversion of water for drinking and municipal purposes.

c. Dredging and other suitable measures would be undertaken, wherever needed, to maintain navigational capability of designated waterways.

4.11 ***Water for Hydropower and Recreation:***

Bangladesh has limited potential for hydropower due to its flat terrain and the absence of suitable reservoir area. However, it may be possible to build mini hydropower plants at small dam and barrage sites. A major environmental concern of hydropower development is the impediment to a river's natural flow imposed by structures built on it. A hydropower facility may be restrictive for fish movement also.

Use of water for recreational purposes is useful for developing tourism facilities. Introducing these facilities at the sites of reservoirs, lakes, dighis (big ponds), sea resorts, etc. would help the tourism industry of the country. The policy of the Government is therefore that:

a. Mini-hydropower development schemes may be undertaken provided they are economically viable and environmentally safe.

b. Recreational activities at or around water bodies will be allowed provided it is not damaging to the environment.

4.12 ***Water for the Environment:***

Protection and preservation of the natural environment is essential for sustainable development. Given that most of the country's environmental resources are linked to water resources, it is vital that the continued development and management of the nation's water resources should include the protection, restoration, and preservation of the environment and its bio-diversity including wetlands, mangrove and other national forests, endangered species, and the water quality.

Accordingly, water resource management actions will take care to avoid or minimise environmental damages. Water quantity and water quality issues are uniquely linked. Poor water quality affects the availability of fresh water for different uses. Contamination of surface water bodies and groundwater aquifers by agricultural pollutants, industrial discharge, domestic pollution, and non-point source urban runoff exacerbate water quality problems and endanger both natural ecosystem integrity and public health. Other environmental problems include: excessive soil erosion and sedimentation, waterlogging and salinisation of agricultural land, groundwater depletion, watershed degradation and deforestation, reduction of biodiversity, wetland loss, saltwater intrusion, and coastal zone habitat loss.

Henceforth, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation, and maintenance) will have to enhance environmental amenities and ensure that environmental resources are protected and restored in executing their tasks. Environmental needs and objectives will be treated equally with the resources management needs. It is, therefore, the policy of the government that all water management agencies and related natural resources departments will:

a. Give full consideration to environmental protection, restoration and enhancement measures consistent with the National Environmental Management Action Plan (NEMAP) and the

National Water Management Plan (NWMP)

b. Adhere to a formal environmental impact assessment (EIA) process, as set out in EIA guidelines and manuals for water sector projects, in each water resources development project or rehabilitation programme of size and scope specified by the Government from time to time.

c. Ensure adequate upland flow in water channels to preserve the coastal estuary eco-system threatened by intrusion of salinity from the sea.

d. Protect against degradation and resuscitate natural water-bodies such as lakes, ponds, beels, khals, tanks, etc. affected by man-made interventions or other causes.

e. Completely stop the filling of publicly-owned water bodies and depressions in urban areas for preservation of the natural aquifers and environment.

f. Take necessary steps to remove all existing unauthorised encroachments on rivers and watercourses and to check further encroachments that cause obstructions to water flows and create environmental hazards.

g. Stop unplanned construction on riverbanks and indiscriminate clearance of vegetation on newly accreted land.

h. Encourage massive afforestation and tree coverage specifically in areas with declining water table.

i. Enforce the "polluter pay" principle in the development of regulatory guidelines for all regulatory actions designed to protect public health and the environment.

j. Provide education and information to the industrial and farming communities on self administered pollution control mechanisms and their individual and collective responsibilities for maintaining clean water sources.

4.13 ***Water for Preservation of Haors, Baors, and Beels:***

Water bodies like haors, baors, and beels are precious assets of Bangladesh with unique regional characteristics. Apart from their scenic beauty, they have great economical and environmental value. Even during extremely dry seasons, when the smaller beels turn into quagmires, the haors and the baors retain considerable amount of water. These water bodies account for a large share of the natural capture fisheries and provide a habitat for a wide variety of aquatic vegetation and birds. They also provide sanctuary to migratory birds during winter.

The haors and the beels usually connect to some adjoining river through khals. In the past, many beels have been drained through engineering interventions and turned into cropland for immediate gains. The adverse effects of such interventions have been deleterious to the environment. They have destroyed the fish and aquatic vegetables that thrive in these wetlands and are important in the diet of the rural poor. They have also blocked the flow of wastes, discharged from the flood plains and domestic sources, which naturally move out of the beels through the khals into the river's drainage system. Only submersible dikes have provided tangible benefits in certain haor areas by enabling cultivation of high yielding variety boro rice.

The Government believes that in order to assist the natural processes of groundwater recharge, maintenance of aquatic life and ecological balance, disposal of wastes through the dynamic river system, and for turning the huge water bodies into recreational areas, their planned development is essential.

It is, therefore, the policy of the Government that:

a. Natural water bodies such as beels, haors, and baors will be preserved for maintaining the aquatic environment and facilitating drainage.

b. Only those water related projects will be taken up for execution that will not interfere with the aquatic characteristics of those water bodies.

c. Haors that naturally dry up during the winter will be developed for dry season agriculture.

d. Take up integrated projects in those water bodies for increasing fish production.

e. Natural water bodies will be developed, where possible, for recreational use in support of tourism.

4.14 ***Economic and Financial Management:***

Changes are required in the system of prices and other economic incentives affecting water demand and supply in Bangladesh. Unless the users pay a price for water, there will be a tendency to misuse and deplete it under scarcity conditions. Desirable practices such as conjunctive use, water-saving agricultural and industrial technologies, water harvesting, water transfers, and water recycling, both within and between sectors, will emerge only when users perceive the scarcity value of water.

A system of cost recovery, pricing, and economic incentives/disincentives is necessary to balance the supply and demand of water. Cost recovery of services such as flood control, drainage, irrigation, and wastewater treatment has not been considered adequately. Failure to recover O&M cost leads to decline of service quality and deterioration of the system. This, in turn, makes the consumers less willing to pay for the deteriorating services. An important principle, for the long-term, in this regard is that public service agencies should be converted into financially

autonomous entities, with effective authority to charge and collect fees. The participation of users in managing and maintaining water facilities and operations is an important element of financial accountability. It is, therefore, the policy of the Government that:

a. Water will be considered an economic resource and priced to convey its scarcity value to all users and provide motivation for its conservation. For the foreseeable future, however, cost recovery for flood control and drainage (FCD) projects is not envisaged in this policy. In case of flood control, drainage, and irrigation (FCDI) projects water rates will be charged for O&M as per Government rules.

b. Relevant public water supply agencies will be gradually given authority to charge for their services.

c. Recovery of O&M cost will, as far as possible, be made through private collection means such as leasing and other financial options. Beneficiaries and other target groups will be given preference for such contracts.

d. The pricing structure will match the goals and needs of the water provider and the population served. Water rates will be lower for basic consumption, increasing with commercial and industrial use. The rates for surface and groundwater will reflect, to the extent possible, their actual cost of delivery.

e. Water charges realised from beneficiaries for O&M in a project would be retained locally for the provision of services within that project.

f. Effective beneficiary participation and commitment to pay for O&M will be realised at the project identification and planning stages by respective public agencies.

g. Appropriate financial incentives will be introduced for water re-use and conservation, responsible use of groundwater, and for preventing overexploitation and pollution.

4.15 ***Research and Information Management:***

Informing policy makers of the choice of appropriate technology to meet policy goals and make them aware of their significance and impact is an essential requirement of a dynamic water management policy. It is important to reach a common understanding between specialists, planners, politicians and the general public about the changing environment and the optimal ways and means of achieving the national water management goals. As management decisions become increasingly complex and information-sensitive, the demand for supporting research and information management increases.

It is the policy of the Government in this regard to:

a. Develop a central database and management information system (MIS) consolidating information from various data collection and research agencies on the existing hydrological systems, supply and use of national water resources, water quality, and the eco-system.

b. Restructure and strengthen, where appropriate, water resource and agriculture research institutions to undertake systematic research and analysis of water and land management issues and problems arising both nationally and internationally.

c. Investigate thoroughly important flood control and management issues, such as the efficacy of coastal polders, for guiding future policy on structural interventions.

d. Investigate important sociological issues, such as the phenomenon of interference with water structures (e.g. public cuts), and the motives and conflicting interests behind them, to assist the process of building public support and acceptance of government water management programmes.

e. Strengthen and promote the involvement of public and private research organizations and universities to:

i. Develop and disseminate appropriate technologies for conjunctive use of rainwater, ground water and surface water.

ii. Develop and promote water management techniques to prevent wastage and generate efficiency of water and energy use.

iii Produce skilled professionals for water management.

4.16 ***Stakeholder Participation:***

Decisions regarding water resources management can affect nearly every sector of the economy and the public as a whole, and stakeholder participation should be established in a form that elicits direct input from people at all levels of engagement. Stakeholder involvement should be an integral part of water resources management, at all stages of the project cycle. Towards that objective there should be a complete reorientation of the institutions for increasing the role of stakeholders and the civil society in decision making and implementation of water projects. The Government has to be at the core of the effort to help build the local institutions and to impart a precise awareness of the issues and an unambiguous understanding of their role in water management. Similarly, Government must lead the effort to ensure greater participation of women in this endeavour.
In order to ensure that all stakeholders actively and fruitfully participate in water resources management decision making at all stages, it is the policy of the Government that:

a. The "Guidelines for People's Participation (GPP) in Water Development Projects" be adhered to as part of project planning by all institutions and agencies involved in public sector management of water resources.

b. Guidelines for formation of water user groups (WUG) and similar community organisations will be formulated.

c. Generally 25 percent of the earthwork of any public water project will be offered to specific target groups or beneficiaries.

d. All opportunities are explored and efforts undertaken to ensure that the landless and other disadvantaged groups are directly involved in participatory management of local water resources.

e. New projects proposed by a community or local institution will be considered for implementation on a priority basis only when the beneficiaries have mobilised a certain percentage of the total cost as their contribution to the project.

5. Institutional Policy

The governance and management of the national water resources require a great deal of coordination of existing institutions and in some cases reform and creation of new community based institutions. Water resources management extends across many water using sectors as well as political jurisdictions and geographically and hydrologically diverse areas. Properly functioning institutions are essential for effective implementation and administration of the country's water and related environmental resource management policies and directives.

The Government will restructure and strengthen, where appropriate, the existing institutions to ensure that the agenda for reform and the action plan is implemented efficiently. Two important principles will govern institutional restructuring. Firstly, there should be separation of policy, planning, and regulatory functions from implementation and operational functions at each level of government. Secondly, each institution must be held accountable for financial and operational performance.

It is the policy of the Government that:

a. The Government will formulate a framework for institutional reforms to guide all water sector related activities. It will periodically review the mandates of all water sector institutions and redefine their respective roles, as necessary, to ensure efficient and effective institutions commensurate with changing needs and priorities.

b. The National Water Resources Council (NWRC) will coordinate all water resources management activities in the country, and particularly:

   i. Formulate policy on different aspects of water resource management.
   ii. Provide directions for optimal development and utilisation of the national water resources.
   iii. Oversee the preparation and implementation of the National Water Management Plan.

iv. Provide directions on the development of efficient institutions for managing the water resources.

v. Provide policy directives for appropriate coordination among different water sector agencies.

vi. Look after any other water resource management matter that may require its attention.

c. The Executive Committee of the National Water Resources Council (ECNWRC) will have the following responsibilities:

i. It will provide directives on all matters relating to the planning, management, and coordination of water resources across all sectors, as may be required by the NWRC.

ii. It will guide water management institutions at the national, regional, and local levels in the formulation and implementation of policies and plans for improved water management and investment.

iii. It will apprise and advise the National Water Resources Council periodically on matters of water resource management.

iv. It will undertake any other function, as may be required from time to time, by the NWRC.

d. WARPO will be the exclusive government institution for macro-level water resource planning. It will also serve as the Executive Secretariat of the ECNWRC with the following principal responsibilities:

i. Providing administrative, technical, and legal support to the ECNWRC.

ii. Advising the ECNWRC on policy, planning, and regulatory matters of water resources and related land and environmental management.

iii. Preparing and periodically updating the National Water Management Plan for approval of the NWRC.

iv. Setting up and updating the National Water Resources Database (NWRD) and Information Management System.

v. Acting as a "clearing house" for all water sector projects identified by different agencies and reporting to the ECNWRC on their conformity to the NWMP.

vi. Undertaking any special study, as may be required by the ECNWRC, for fulfilling the objectives and programmes envisaged in the National Water Policy and the Bangladesh Water and Flood Management Strategy.

vii. Performing any other function as may be assigned to it from time to time by the Government.

e. The Government will lead the effort towards developing grassroot institutions, in conjunction with the civil society, for managing water resources at community levels.

f. Public water projects will include a training component for transfer of knowledge and technology to the users that will be monitored by the executing agency at every stage of the project work

6. Legislative Framework

Setting the appropriate legislative framework is fundamental to effective implementation of the water policy. The existing legislation related to any form of water management in Bangladesh requires supplementing in a number of key areas. This policy will be given effect through a National Water Code encoding specific provisions of the water policy to facilitate its implementation.

The policy of the Government in this regard is:

a. To periodically review the provisions of the body of laws and regulations that have an impact on water resource management and to recommend changes and amendments in them for efficient coordination of the work of different water-related sub-sectors.

b. To enact a National Water Code revising and consolidating the laws governing ownership, development, appropriation, utilisation, conservation, and protection of water resources.

Annexure -3

Coastal Zone Policy 2005

Ministry of Water Resources
Government of the People's Republic of Bangladesh

1. INTRODUCTION

1.1 Coastal Setting

According to 2001 population census, Bangladesh has a population of about 13 crore living on 147,570 square kilometer of land. The Ganges, the Brahmaputra and the Meghna that constitute one of the largest river systems in the world drain through the Bangladesh into the Bay of Bengal. The country has a coastline of 710 km along the Bay of Bengal.

The coast of Bangladesh is known as a zone of vulnerabilities as well as opportunities. It is prone to natural disasters like cyclone, storm surge and flood. The combination of natural and man-made hazards, such as erosion, high arsenic content in ground water, water logging, earthquake, water and soil salinity, various forms of pollution, risks from climate change, etc, have adversely affected lives and livelihoods in the coastal zone and slowed down the pace of social and economic developments in this region.

The coast has distinctive development opportunities that can be instrumental in reducing poverty and can contribute significantly to the development of Bangladesh as a whole. The zone has diversity of natural resources including coastal fisheries and shrimp, forest, salt and minerals. It has sites for Export Processing Zones, harbors, airports, land ports and tourism complexes and opportunity for other industries. This zone also has high potential for exploitation of both onshore and offshore natural gas. Some of these resources still remained untapped while there are opportunities for using many o them for their significant expansion potentials.

The coast also contains several ecosystems that have important conservation values. Part of the Sundarban, the world's largest stretch of mangrove ecosystem, has been declared a World Heritage Site, whereas coral ecosystems are found around St Martin's Island. The coastal zone has not only biodiversity hot spots, but also provides the ecological foundation for an important common property resource; a large portion of these resources is various types of fisheries the Bay of Bengal.

Increasing population, competition for limited resources, natural and man-made hazards, lack of economic opportunities, important ecological hot spots, etc, calls for distinctive coastal management. The Government of Bangladesh realizes this need, and special reference to coastal issues has been repeatedly made in government policies, strategies (including the national strategy for poverty reduction) and planning documents.

1.2 Existing Policies

Different Ministries of the Government have announced, over the years, their respective policies for carrying out the mandates. The Ministries implement various programs directly and indirectly through their concerned agencies and the coastal issues are being adopted directly or indirectly with these policies1.

1.3. Rationale

The Government considers the following three reasons for initiating the coastal zone policy: a) the coastal zone is lagging behind in socio-economic developments on many aspects;

b) Poor initiatives to cope with different disasters and gradual deterioration of the environment;
c) The coastal zone has the potential to contribute much to national development.

2. DECLARATION

Coastal zone is different in a number of aspects from rest of the country. A participatory and integrated approach holds the promise of reducing conflicts in the utilization of coastal resources and optimum exploitation of opportunities. The Government, therefore, has formulated this coastal zone policy (CZPo) that would provide a general guidance to all concerned for the management and development of the coastal zone in a manner so that the coastal people are able to pursue their life and livelihoods within secure and conducive environment.

This CZPo may be revised if and when it becomes necessary. The coastal zone policy is unique in the sense that it is a harmonized policy that transcends beyond sectoral perspectives. The CZPo initiates a process that commits different Ministries, Departments and Agencies to agree to harmonize and coordinate their activities in the coastal zone and elaborates the basis for a firm co-ordination mechanism.

3. COASTAL ZONE MANAGEMENT

3.1. Area of Management

Three indicators have been considered for determining the landward boundaries of the coastal zone of Bangladesh. These are: influence of tidal waters, salinity intrusion and cyclones/storm surges. 19 districts[2] of the country are being affected directly or indirectly by some of these phenomena. The districts are considered including all upazilas/thanas. A total of 48 upazilas/thanas are considered as 'exposed' directly to vulnerabilities from natural disasters. The exclusive economic zone (EEZ) is regarded as the seaward coastal zone. One-third of the country belongs to the coastal zone. According to 2001 population census, population of the coastal zone is 3 crore and 48 lakh.

3.2. ICZM -- Key to Coastal Development

The Government hereby declares its intention of integrated coastal zone management following the principles of coastal zone policy. Following this policy, all concerned Ministries, Agencies, Local Government Institutions, NGOs, private sector and the civil society will put their efforts for the development of the coastal zone. While preparing policy and strategy it is important to take into account the conflict of interest in using the resources and the explored activities that are responsible for the adverse impact on the environment.

The main principles in ICZM approach would include:

a. integration through harmonization and coordination;
b. adoption of a process approach;
c. linkage to national planning mechanisms;
d. implementation through respective line agencies;
e. co-management and participatory decision;
f. gender equality;
g. participatory monitoring and evaluation;
h. supporting national policy of decentralization and development of the private sector;
i. interventions based on the best available knowledge; efforts to fill knowledge gaps;
j. priority setting on issues of the coastal zone.

[2] The districts are Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Gopalganj, Jessore, Jhalkati, Khulna, Lakshmipur, Narail, Noakhali, Patuakhali, Pirojpur, Satkhira and Shariatpur.

3.3. Goal

The coastal development process aims to meet, on an overall basis, National Goal for Economic Growth, Poverty Reduction & Social Development; Code of Conduct for Responsible Fisheries, Code of Conduct for Responsible Mangrove Management and other international conventions and treaties including to achieve the targets of the Millennium Development Goals (MDGs). The goal of integrated coastal zone management is: to create conditions, in which the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national processes can take place.

4. POLICY FRAMEWORK

The Government has made the coastal zone policy statements in relation to development objectives. These policies provide general guidance so that the coastal people can pursue their livelihoods under secured conditions in a sustainable manner without impairing the integrity of the natural environment.

4.1. Economic growth

Effective measures will be taken to realize the objectives of poverty reduction through enhancing economic growth in the coastal zone. Policies in this context are:

a. Efforts shall be made to enhance annual growth rate to a level required to achieve national goal for poverty reduction and economic growth;

b. Available opportunities of the coastal zone will be used through sustainable management to enhance standard of living of coastal communities by investing in different sectors like marine fisheries, salt production, shrimp culture, crab culture, shell culture, pearl culture, livestock development, area-based agricultural development and agro-based industries, transport, ship building, ship-breaking, tourism, extraction of beach minerals, renewable and non-renewable energy, etc;

c. A strategy shall be formulated covering all routes to development taking multidimensional nature of poverty. However, priority would be accorded to (i) labor-intensive and low technology investments should be given importance where the poor and the disadvantaged can find employment, as well as (ii) to promote those industries and activities that will reasonably use manmade coastal resources as basic raw material;

d. Emphasis will be given on building efficient power, transportation and telecommunication links, particularly with islands;

e. Special emphasis will be given to utilize gas-based power, manufacturing and processing industries;

f. Settled isolated chars and islands will be brought under 'special rural development programs';

g. Necessary measures will be taken to increase the flow of investments in the coastal zone including direct foreign investment (DFI), especially by setting up more export processing zones (EPZ);

h. Cox's Bazar, Nijhum Dwip, St. Martin Island and Kuakata sea beaches and Sundarban will be further developed to attract tourists and those areas and islands will be developed as 'Special Zone for Tourism'. Private sector initiatives will be encouraged in this respect;

i. Steps will be taken for medium and small private investments for coastal development.

4.2 Basic needs and opportunities for livelihoods

The 2002 World Summit on Sustainable Development (WSSD)3 adopted five areas for particular focus: water and sanitation, energy, health, agriculture and biodiversity (WEHAB)4. The coastal zone is lagging behind in some of these key areas. To meet basic needs of the coastal people and enhance livelihood opportunities, Government policy will be as follows:

World Summit on Sustainable Development
Water, Energy, Health, Agriculture and Bio-diversity

a. Alleviation of poverty through creation of job opportunities and finding options for diversified livelihoods would be the major principles of all economic activities. Economic opportunities based on local resources will be explored to enhance income of the people;

b. The intensity of coverage of primary education, health care, sanitation and safe drinking water facilities will be increased;

c. Food production will be continued at the self-sufficiency level and of higher production of diversified high-value export goods;

d. Private sector and the non-governmental organizations (NGO) will be encouraged to implement activities for the poor people;

e. Collateral-free credit under easy terms will be arranged as part of all livelihood enhancement programs and activities;

f. No alteration or stoppage of an existing employment opportunity shall be made without creating opportunities for alternative employment;

g. Special measures will be taken during the period of disaster;

h. Khas land will be distributed among the landless and a more transparent process of land settlement will be ensured;

i. An effective program for land reclamation will be developed;

j. To facilitate coastal navigation, the following steps will be taken:

   1. development and maintenance of main channels of seaports and main important channels of inland navigation;
   2. development of two existing seaports and installation of a communication network between main river ports, ghat and inland container ports and depots;
   3. Initiatives of establishing deep sea port;
   4. development of communication network with islands for passengers and freight traffic;
   5. ensuring shipping security for passengers and freight;
   6. maintaining river ways;
   7. increasing excavation capacity to maintain the navigability of the waterways;

k. An integrated network of communication including highways, major roads, rural roads, railways and waterways will be developed;

l. The law and order situation will be improved by setting up police outposts in remote and far flung areas;

m. Free flow of information for the people will be ensured.

4.3 Reduction of vulnerabilities

The level of the well being of households has direct correlation with exogenous phenomena influencing them. Disasters like cyclone, drainage congestion, land erosion and drought that take toll on life and property and depletion of natural resource base that supports particularly the poor. Majority households are vulnerable to climate change. In the coastal zone, agriculture continues to be a major source of employment, which is seasonal in nature. In this regard, Government policy is as follows:

a. Reduction to vulnerability to natural disasters would be an integral aspect of the national strategies for poverty reduction;

b. Integration will be made with 'Comprehensive Disaster Management Plan' on aspects concerning the coastal zone;

c. Effective measures will be taken to enhance coping capacity of the poor during the period of disaster and to initiate insurance scheme for improving their social security;

d. Effective measures will be taken for protection against erosion and for rehabilitation of the victims of erosion;

e. Safety measures will be enhanced by combining cyclone shelters, multi-purpose embankments, killas, road system and disaster warning system. It should include special measures for children, women, the disabled and the old;

f. Sea-dykes will be regularly maintained as first line of defense against storm surges and afforestation on it according to the existing policy;

g. Earthquake management will be strengthened and capacity to cope with earthquakes will be enhanced;

h. Adequate provision will be made for safety of livestock during disaster and post-disaster period;

i. Programs shall be taken to encourage all for tree plantation in a planned manner in the coastal zone. Emphasis will be given to social forestry and other forms of plantations, plant care and maintenance;

j. The asset base of the poor, with special focus on women, shall be improved through ownership or access so that their coping capacity improves.

4.4 Sustainable management of natural resources

Coastal zone is full of diverse natural resources: inland fisheries & shrimp, marine fisheries, mangrove and other-forests, land, livestock, salt, minerals, sources of renewable energy like tide, wind and solar energy. Medium and long term Government policy to ensure sustainable management of both biotic and abiotic coastal resources will be as follows:

a. Every possible step shall be taken to secure just share from all international rivers reaching the coastal zone and the Bay of Bengal;

b. Suitable measures will be taken for sustainable use of renewable resources and, to that end, limit harvesting, extraction or utilization to the corresponding cycles of their regeneration;

c. Sustainable use of coastal resources shall be ensured. Combination of resource use, e.g. agriculture, forestry and fishing including aquaculture is often the major economic activity. Efforts will be given to make this sustainable;

d. Optimum utilization of resources will be ensured by taking advantage of the complementarities and trade-offs between competing uses;

e. Rigid enforcement of conservation regulations will affect the livelihoods of many people and such conservation efforts will be linked, as far as possible, with alternative opportunities of employment;

f. Initiation of plan and its implementation will be ensured by participation of people of all sectors.

4.4.1 Land

a. Planning will be done under land use policy to control unplanned and indiscriminate use of land resources. Strategies for new chars will be developed. Zoning regulations would be formulated and enforced in due course;

b. Through its responsible agencies, the Government will proper plan and implement schemes for reclamation of balanced land from the sea and rivers.

4.4.2 Water

a. Adequate upland flow shall be ensured in water channels to preserve the coastal estuary ecosystem threatened by the intrusion of soil salinity from the sea;

b. Small water reservoirs shall be built to capture tidal water in order to enhance minor irrigation in coastal areas. Appropriate water management system within the polder utilizing existing infrastructures will be established for freshwater storage and other water utilization;

c. Rainwater harvesting and conservation shall be promoted;

d. Ponds and tanks will be excavated for conservation of water and local technology for water treatment (such as, pond sand filtering - P.S.F.) will be used for the supply of safe water;

e. Step will be taken to ensure sustainable use and management of ground water.

4.4.3 Capture fisheries

a. Comprehensive policies, as dealt in the National Fish Policy, in relation to exploitation, conservation and management of marine fisheries resources will be followed;

b. Fishers' right will be established on open water bodies for sustainable fisheries management.

4.4.4 Aquaculture

a. Environmentally adopted and socially responsive shrimp farming will be encouraged. In this regard, internationally accepted quality control measures will be introduced;

b. All opportunities and potentials of aquaculture will be utilized in the coastal zone. Crab culture, pearl culture, sea grass will be encouraged.

4.4.5 Agriculture

a. Programs for intensification of agriculture and crop diversification for improving the economic conditions of both male and female farmers and increasing food security at local and regional level shall be supported;

b. Special development programs will be taken-up with a view to increasing the production of crops suitable for the coastal area with attention to maintenance of soil health;

c. Use of chemical fertilizers and pesticides will be reduced, while organic manure and integrated pest management will be encouraged;

d. Salt-tolerant crop varieties will be developed and extended along with possible measures to resist salinity;

e. The scope of irrigation facilities will be explored and / or extended and a comprehensive water management for agriculture will be implemented.

4.4.6 Livestock

a. Grazing land for livestock will be arranged. Facilities for livestock development will be enhanced;

b. Facilities for rearing of poultry of different species including the local ones will be enhanced.

4.4.7 Afforestation

a. Measures will be taken for afforestation in the coastal areas including newly accreted chars;

b. Effective measures will be taken for conservation of forests;

c. Social forestry will be encouraged and extended.

4.4.8 Energy

a. Assessments shall be made on the prospect of tidal and wave power in coastal areas' as potential energy source;

b. An assessment of all types of energy resources (e.g., oil, gas, coal, nuclear minerals, hydropower, biomass fuels, solar, wind and tidal waves) will be undertaken on a regular/continuous basis by the appropriate authorities. Special measures will be undertaken for exploration and appraisal of petroleum resources in the offshore areas without undermining the nature;

c. Potentials of area-based renewable sources of energy will be assessed;

d. Remote and isolated areas including offshore islands, which are not likely to be brought under the networks of commercial fuels in a foreseeable future, are to be considered as potential sites for implementing renewable energy technologies, in spite of their high capital cost. Solar photovoltaic will be used for cyclone shelters;

e. Special projects will be identified, for example power plants in the offshore islands. Plans for the generation of electricity in isolated and remote areas like offshore islands will be prepared separately.

4.5 Equitable distribution

Different kind of social, economic, technical or institutional barriers limit access of the poor people to opportunities. The resources available in a particular jurisdiction may be good enough to meet everyone's basic need. However, due to ineffective access mechanism, the disadvantaged cannot get there. To ensure right of the neglected and disadvantaged groups, Government policy is as follows:

a. Actions will be designed to reach the poorest and the remote rural areas (including the cyclone prone coastal regions, chars and river erosion affected areas), which are vulnerable to adverse ecological processes and those with high concentrations of socially disadvantaged;

b. In order to ensure equitable distribution of national economic benefits, priority will be given to exposed upazilas and coastal islands;

c. In order to ensure equity, the thrust should be on human development of the poor for raising their capability through education, health, nutrition, employment-oriented skill training and social interventions;

d. Measures will be adopted that increase access to natural resources for the poor and the disadvantaged (on which they are dependent for their livelihood).

4.6 Empowerment of communities

Mainstreaming of the coastal people will be done by enhancing their safety and capacity. In this context, Government policy will be as follows:

a) Equal participation of all stakeholders shall be ensured and establishing effective co-operation between the government agencies, local government institutions and non-governmental organizations;

b) Co-management procedures shall be established that will bring decision-making power to the grass-root levels;

c) Specific vulnerabilities of the coastal communities shall be addressed: like farmers in the saline zone, marine fishers, salt producers, dry fish processors, people living on forestry resources, ship breaking workers, vulnerable ethnic communities and so forth;

d) Vesting on local government institutions, at the union, upazila and district levels, the power and responsibilities for design, formulation and implementation of local level development programs and projects;

e) An awareness campaign shall be mounted about the long-term benefits of ICZM, recent initiatives in the coastal zone, and coastal development strategy among the NGOs, private sector, civil society and coastal communities;

f) Initiatives will be taken to keep up the cultural heritage of different communities living in the coastal zone.

4.7 Women's development and gender equity

It is recognized that gender inequalities and gaps exist in the coastal zone, in particular in the fields of access to livelihoods assets and access to resources. Malnutrition in coastal zone is twice the national average as severe among girls. Poor access to sources of potable water for domestic purposes contributes to heavy workload on poor women. Other gender issue that affects women's life and limits their participation is personal insecurity, more serious in remote coastal areas. Enabling cultural and institutional environment is necessary to remove hurdles to mobility of women.

The national strategy of the Government clearly states the importance of women's development and reduction of gender gaps as a development objective. The Government has ratified major international conventions on the rights of women and children. Government policy will be as follows:

a. A gender sensitive and participatory approach will be adopted that focuses at the reduction of gender inequalities and that takes into account differences in needs and interests between men and women;

b. Efforts will be made to close the gender gap, giving priority to women's education, training and employment and special support for broadening their coping capacity;

c. Special attention will be paid towards employment generation for women, the promotion of women entrepreneurs as well as the removal of restrictions on women's employment and economic opportunities;

d. During distribution of newly accreted khas lands, special attention will be paid to the allocation of land titles to women;

e. Special projects will be implemented exclusively addressed to livelihoods enhancement and empowerment of disadvantaged women;

f. Necessary institutional measures including mass awareness and motivation on violence against women will be taken.

4.8 Conservation and enhancement of critical ecosystems

Necessary measures will be taken to conserve and develop aquatic and terrestrial including all the ecosystems of importance identified by the Bangladesh National Conservation Strategy (Mangrove, coral reef, tidal wetland, sea grass bed, barrier island, estuary, closed water body, etc).

Implementation of all laws for the protection of all special areas5 will be ensured for environmental balance. Government policy will be as follows:

4.8.1 Conserving the ecosystems

a. Meaningful conservation shall be enforced of critical ecosystems including ECAs, heritage sites and marine reserves;

b. Special measures will be taken for conservation and development of the natural environment of Sundarban;

c. The programs for institutional strengthening and capacity building shall be supported along with further development of the regulatory framework for the protection of the environment;

d. The role of the Coast Guard will be acknowledged with emphasis and its capacity will be enhanced so that it can be used on behalf of all relevant institutions as a common resource for enforcement of different regulations applicable to the coastal zone;

e. For activities that have direct adverse consequences on bio-diversity, steps will be taken to stop those activities and specific mitigation measures will be taken to minimize those effects;

f. To protect the environment, all commitments shall be honored as signatory to different international protocols and guidelines in planning and implementation;

g. Efforts shall be made to harmonize in the provisions of different existing laws and enact new laws, where required, to protect and preserve the coastal environment and its resources;

h. Special measures will be taken for bio-diversity conservation;

i. Measures will be taken for hill management including prohibition of hill cutting.

4.8.2 Pollution Control

a. Zoning regulations will be established for location of new industries in consideration of fresh and safe water availability and effluent discharge possibilities;

b. All industrial units will be required to install built-in safeguards against pollution within a given timeframe and will help them in obtaining financial support from international bodies to carry out the adjustments. Units failing to comply with the pollution standards will be required to pay "green tax" for cleanup of the environment polluted by them;

c. Sewage treatment plants will be set up for the major cities like Chittagong, Khulna and Barisal and gradually in other urban centers;

d. Steps will be taken to handle the issue of discharge of bilge water from ships and oil-spill according to international conventions to which Bangladesh is a signatory;

e. A review of the desirability of supporting ship breaking as an industry `will be done and, in the event of its continuation, environmental standards will be prescribed under which it has to conduct its activities.

4.8.3 Climate Change

a. Existing institutional arrangements for monitoring of climate change in Bangladesh will continue. Steps will be taken to support upgrading of technology and institutional strengthening for enhancing their capacity for generation of better data and more accurate long-term prediction and risk related to climate change;

b. Implementation of adaptive measures identified in relation to climate change for coastal zone and resources shall be gradually undertaken;

c. Efforts shall be made to continuously maintain sea-dykes along the coastline as first line of defense against predicted sea-level rise;

d. An institutional framework for monitoring/detecting sea level rise shall be made and a contingency plans for coping with its impact.

5 reserve forest, wildlife sanctuary, world heritage site, marine reserve, national park, eco park, game reserve, Ecologically Critical Areas (ECAs), Ramsar site, etc.

5. ENABLING INSTITUTIONAL ENVIRONMENT

Measures will be taken to formulate an appropriate institutional framework and to enact necessary laws and regulations in order to harmonize and coordinate all development activities in the coastal zone.

5.1 Mainstreaming Coastal Zone Management

There are three pre-requisites to be met before reaching a satisfactory level of mainstreaming integrated coastal zone management (ICZM):

a. focus on coastal development in national strategy documents, multi-year and annual development plans (Example: PRSP);

b. based on the above focus, a commonly agreed framework for coastal development;

c. agreed division of responsibilities for implementation among different levels of administration.

In order to set a national focus on coastal development and to formulate a broad based, well-debated and commonly agreed framework, coordination between work procedures and strategies of different institutions is a must. Working through the LGIs in the field level should be the strategy for mainstreaming ICZM. Through the adoption of this policy document, the Government reiterates its commitment to support the approach of ICZM for continued and enhanced development of the coastal zone. Policy with regard to mainstreaming will be as follows:

a. Special focus shall be given on coastal development in all national strategy documents (like PRSP), multi-year and annual development plans;

b. A Coastal Development Strategy (CDS) shall be developed and adopted in line with national strategy documents as a commonly agreed framework document;

c. Coastal zone development shall be mainstreamed through existing Ministries/ Departments and organizations;

d. Existing policies shall be harmonized and coastal issues shall be incorporated in all future policy and strategy documents;

e. There shall be special mention of resource allocation for coastal development in the Annual Development Plan (ADP) of all Ministries. At the same time, efforts shall be made to increase that allocation gradually. Work through the local Government institutes as a first step towards mainstreaming adhering

to the principles of decentralization. Co-management, understood as a range of management systems where responsibilities are shared between the government and the communities, will be the preferred mode of management at the local and regional levels.

5.2 Strategic Planning and Program Development

A Coastal Development Strategy for poverty reduction, economic growth and social development will be formulated and implemented. This strategy will be a time and resource-bound specification of the priority actions in coastal development, but it will be about building a process to implement the policies, not preparing a classic master plan. Such a strategy makes critical choices, for example in relation to targeted regions, disadvantaged groups and issues. Focus is on implementation, including a set of indicators and corresponding monitoring arrangements to assess performance.

The strategy document will reflect the specific actions needed to achieve coastal development objectives. In particular, links will be made to the content and process of the National Strategy for Economic Growth and Poverty Reduction and the subsequent multi-year development plans and to other national policy and planning processes.

The strategy document is a component of the chain: *policy strategy priority investment program*.

Policy with regard to strategic planning and program development will be as follows:

a. It will support the preparation of a Coastal Development Strategy (CDS) as an ICZM framework document by all concerned Ministries and agencies through an intensive consultative process;

b. For ensuring ownership of the CDS by the beneficiaries and for sustainable management, the procedures and guidelines relating to people's participation along with all relevant analytical procedures and evaluation methods will be adhered to;

c. It will support the relevant Ministries and agencies to work together and in partnership with the Local Government Institutions (such as District, Upazila and Union Parishads), NGOs, private sector, civil society and community organizations to reach an agreed framework for coastal development;

d. In the long term, the aim is to internalize the process of integration as a standard mode of operation for all the concerned agencies. Towards that end, the CDS will identify the social, economic, organizational and institutional barriers that hinder the adoption of an integrated approach.

5.3 Implementation

Implementation will be the responsibility of the respective Ministries and the agencies. With regard to implementation of the CDS, Government policy will be as follows:

a. A 'Priority Investment Program (PIP)', as operational arm of the CDS, will be the basis for implementation of ICZM process;

b. Implementation would be the responsibility of the concerned Ministries and the agencies within the existing regulations and framework of multi-sector program implementation. Linkage with

LGIs will be established during implementation;

c. A Program Co-ordination Unit (PCU), based within the lead agency (WARPO), will be established to discharge the coordination functions during the implementation stage. Monitoring and evaluation of projects in relation to ICZM indicator framework will be the main function;

d. The agencies will take necessary steps to inform and orient their officials at regional and local levels about the CDS and the plan for its implementation;

e. The community organizations will be based on existing social institutions and will be closely linked with the LGIs for their integration with higher levels of government.

5.4 Co-ordination

ICZM being a multi-level and multi-sectoral activity, institutionalization of ICZM would require the development of mechanisms for coordination and interaction between and among the many parties involved at national, regional and local levels. One aim of the program is to develop, in course of time, the ICZM principles and practices as the standard mode of operation for all the agencies operating in the coastal zone.
To co-ordinate these activities, a lead Ministry, MoWR and a lead agency, WARPO is designated. Inter-ministerial Technical Committees and Program Steering Committees, constituted at appropriate levels, will assist the lead agency and the lead Ministry, respectively in overall coordination.

To ensure overall coordination, the following institutional arrangements will be made:

a. The National Council of the lead Ministry will act as higher level coordinating and decision making body for ICZM programs and activities, especially implementation of the Coastal Development Strategy and to support overall ICZM process;

b. An Inter-Ministerial Steering Committee (SC) will be set up to provide policy guidelines on issues related to the coastal zone. This high level committee will be chaired by the Minister of the lead Ministry and will include representatives (at the Secretary level) of concerned Ministries and agencies. The lead Ministry will act as the Secretariat for this Committee;

c. An Inter-Ministerial Technical Committees (TC) will be set up, headed by the Secretary of the lead Ministry and participated by the representatives of all the concerned agencies, for removing planning and implementation bottlenecks and resolving inter-organizational conflicts. The TC also comprises of representatives from universities, NGOs, private sector and the civil society.

The lead agency will act as the Secretariat for this Committee;

d. A Program Co-ordination Unit (PCU) will be established to provide technical support to the lead agency in the discharge of their coordination functions. The terms of reference of the PCU would include, among others, the mandate to liaison with the service Ministries like the Ministry of Finance, Ministry of Planning and the Ministry of Establishment and the development partners;

e. Focal Points will be established in all relevant agencies and will act as operational contact points in relation to ICZM activities and maintain contact with the lead agency;

f. Existing Local Government structure (district, upazila, union) will ensure people's participation in planning and implementation. Participatory and integrated planning process at the local level will be promoted with linkages to PCU and sector agencies at the national level;

g. During the preparatory phase, Program Development Office (PDO), which has been established for a limited period, will be responsible for delivery of defined project output as well as to foster and initiate ICZM as a process.

5.5 Supporting Activities

In order to strengthen enabling institutional environment, the following supporting activities have been identified:

5.5.1 Coastal Resources Survey

This is primarily concerned with the biophysical characteristics of the coastal area and their impact on the coastal communities. Biophysical information will include: biological resources, major habitats and ecosystems, reproduction sites (nurseries, and species) and the presence of species and areas (rare, threatened, and endangered). Among other resources are river, soil, forest, sea, water, wind, minerals, etc.

5.5.2 Integrated Coastal Resources Database:

An Integrated Coastal Resources Database (ICRD) will be set up;

5.5.3 Modeling Tools:

Mathematical modeling, remote sensing and geographic information system to be continued to support ICZM planning and implementation;

5.5.4 Information Dissemination:

In order to create awareness among the general public about the ICZM program, coastal zone policy, CDS and other initiatives, an exhaustive information dissemination mechanism has to be evolved;

5.5.5 Capacity Building:

In order to strengthen meaningful participation of relevant agencies, especially LGIs, in planning and implementation of ICZM framework, a supporting capacity building program is important. In the medium and long term, Government policy in this regard will be as follows:

a. A baseline 'Profile of the Coastal Zone' will be prepared which will be updated periodically through inputs from partner organizations. Similarly 'profile of the districts' will be prepared with available information;

b. Support the establishment of the ICRD with linkage to other databases and facilitate the formulation of agreed guidelines that will enunciate the principles of common standard, protocols, and data sharing;

c. Ensure free flow of data among all users by reviewing the existing regulations. If necessary, new legislation will be considered to ease dissemination protocols and rationalize the mandates of the data collecting agencies;

d. Continue its support for further strengthening of institutions dedicated to modeling, satellite imagery and geographic information system;

e. Support updating of available coastal zone hydrodynamic modeling tool in ICZM framework. To get a clear understanding of the coastal dynamics, small-scale physical modeling will be done for some appropriate areas;

f. Encourage building up a strong survey and research component in the CDS and other plans of relevant sector institutions. Identify, in consultation with the concerned agencies of the government and stakeholders, priority areas for research;

g. Necessary steps will be taken by the concerned agencies to create awareness among all the participants about the ICZM, benefits of the CDS and to develop their skills in planning and executing activities under such a program. Tailor made training programs will be developed and delivered to meet those ends.

5.6 Legislative Framework

Setting the appropriate legislative framework is fundamental to effective implementation of the coastal zone policy. A number of laws are in operation since long authorizing surveillance and patrolling of the coastal and marine waters for the preservation of the natural environment and sustainable use of coastal resources. All the laws of Bangladesh are applicable to coastal zone.

The enforcement of existing legal coverage is a key issue in sustainable coastal management. This policy will be given effect, if needed, through revision, modification of existing laws, rules and regulations specifying provisions of the coastal zone policy to facilitate its implementation.

Government policy with regard to establishing a viable and transparent legal framework for coastal management will be:

a. In this respect, a "Compendium on the Laws Relating to and/or having bearing on Coastal Areas" will be prepared. The purpose of such a compilation would be to: (i) identifying areas of conflict and contradiction among and within the laws; (ii) to find out the solutions of conflicts (iii) to prepare a list of rules/laws which are conflicting with existing policies along with suggesting necessary amendments to harmonize them; and (iv) to review the necessity of an umbrella legislation for the coastal zone.

b. Enforcement of existing legal coverage will be facilitated with adequate logistics and support, to relevant agencies.

Capacity of Local Institutions

Mozaharul Alam

Table of Contents

Chapter 1
INTRODUCTION

1.1. Background of the Study

IUCN, Bangladesh is carrying out a study on "Promotion of Adaptation to Climate Change and Climate Variability in Bangladesh" under the Netherlands Climate Change Assistance Program (Phase II). The study focuses on how people's livelihood, especially the most vulnerable groups, would be affected in the changed climatic conditions and what adaptation measures would be useful in the changed context. Noakhali Sadar Upazila and newly declared Subarna Char Upazila have been selected for this study. The study area is one of the most likely vulnerable coastal regions of Bangladesh.

The principal objective of the overall study is to create enabling conditions in Bangladesh for promoting adaptation to climate change and climate variability in national policies and plans and also at the local community level. The specific objectives of the study are:

- To promote understanding of the impact of climate change and climate variability on livelihood of coastal community with focus on the central part of the Bangladesh coastline.
- To raise awareness through dissemination of information regarding the impact, adaptation and variability due to climate change among the local community in the study area as well as among the key national policy makers.
- To prepare a set of recommendations to integrate climate change adaptation in various national actions with focus on issues related to coastal zone management.

The scope of work of this particular component of the study, is to analyze the capacity of the local institutions and recommend different measures to enhance capacity of local institutions to facilitate coping and adaptation measures of different grassroot level stakeholders in the context of climate change.

1.2. Scope of Work

The specific scope of work of this particular component of the study which has been defined in the Terms of Reference were:

- Developing and finalizing appropriate methodology which will be used while conducting the study;
- Collecting secondary information on various aspects related to institutions and livelihood particularly to the coastal region;
- Undertaking field studies and consultations for need assessment and carry out overall assessment of the local institutions in the project site;
- Preparing an initial set of indicators/issues for institutional analysis;
- Developing SWOT for local institutions for adaptation;
- Reviewing the arrangement of the local institutions to identify their capacities to address the adaptation strategies

and suggest capacity enhancement of local institutions may lead to issue identification and recommendation for policy setting;

- Draw linkage with National institutional framework or how the local institutional set up is influenced by national set up;
- Linkage with disaster forecasting units/Red Crescents/DAE

1.3. Methodology

In order to accomplish the scope of tasks mentioned above, the study has followed the following methodoogy and steps.

A. Identification of Institutions and Mandates: This step has identified the key local institutions dealing with water, agriculture and infrastructure. It has also reviewed policies and mandates of the identified key institutions in terms of supporting rural development and improvement of livelihoods.

B. Preparation of Checklist: A checklist has been prepared to assess institutional capacity of the identified local institutions. The checklist has the following questions.

   i. Mandate and scope of work during normal climatic condition and extreme situation;
   ii. Number of staff with different technical capacity to comply with mandate and scope of work;
   iii. Availability of logistical support to perform duties;
   iv. Level of knowledge on climate change issues (attended training, workshop, seminar etc.); and
   v. Do they receive any early warning/forecast for their area of work?

C. Preparation of a set of Indicators: A set of indicators has been prepared to assess strength and weakness of local institution. These include:

   i. **Strength** (level of awareness, trained personnel, financial resource, relations with other institutions, measures to deal adverse situation)
   ii. **Weakness** (inadequacy of human resources, training, knowledge, information flow, finance, institutional relationship)
   iii. **Opportunities** (new research, new programme, etc.)
   iv. **Threat** (erratic behaviour of rainfall, temperature etc.)

D. Discussion at Field Level: A number of field level discussions and meeting with representatives of the identified key local institutions were carried out.

Chapter 2
CLIMATE SENSITIVE SECTORS

2.1. Responsible Local Institutes

It is reported in a number of national level studies on impacts and vulnerability assessment for Bangladesh that agriculture and water sector are the two most vulnerable sectors to climate change and sea level rise. In terms of geographical area, coastal area of the Bangladesh is susceptible to salinity intrusion, cyclone and storm surges, and drainage congestion. It is reported by the representatives of the local level institutions in Noakhali Sadar and Subarna Char Upazila that drought, flood and drainage congestion, salinity in the surface and groundwater and, cyclone and storm surges are the key concerns for Noakhali and Subarna Char Upazila.

It is found from the national level policies and institutional arrangement that public sector involvement in agriculture, irrigation for agriculture and water management in Bangladesh is shared between the Ministry of Agriculture (MoA) and the Ministry of Local Government, Rural Development and Co-operatives (LGRD), with jurisdiction over minor irrigation, and the Ministry of Water Resources (MoWR), with jurisdiction over all other forms of water management.

The Water Resources Planning Organisation (WARPO), under the Ministry of Water Resources, has a mandate to ensure coordination of all relevant ministries through the National Water Council and to plan all aspects of water development including major and minor irrigation, navigation, fisheries and domestic water supply. The Bangladesh Water Development Board (BWDB) is responsible for the planning, implementation and operation of small, medium and large-scale flood control, drainage and irrigation schemes.

The Bangladesh Agricultural Research Council (BARC) under the Ministry of Agriculture coordinates work of the Bangladesh Agricultural Research Institute (BARI), four crop-based institutes (for rice, jute, sugar cane and tea) and an institute for nuclear research.

The Soil Resource Development Institute (SRDI) is a separate institute concerned with inventory and evaluation of soil resources; it also transfers knowledge for extension purposes. With international cooperation, the Institute has acquired a considerable amount of detailed information, and is the main repository of knowledge on soil resources of the country.

Discussion with representatives of the local level institutions revealed that climate sensitive sectors in Noakhali and Subarna Char areas are agriculture, water resources, and human health. From the national level policy documents and local level discussions, it is revealed that a number of institutions are dealing with above sectors and problems. The following table shows different climate sensitive sectors and responsible local institutes of the government.

Table 1. Climate Sensitive Sectors and Responsible Local Institutions

Climate Sensitive Sectors/Problems	Responsible Local Institutes
Agriculture (drought, flood, salinity)	• Department of Agriculture (DoA) • Department of Agricultural Extension (DAE) • Bangladesh Agriculture Development Cooperation (BADC) • Private Sector Seed Distribution and Sales Agents • Minor Irrigation by Local Government Engineering Department (LGED)
Water (flood control, drainage, irrigation)	• Bangladesh Water Development Board (BWDB) • Minor Irrigation by Local Government Engineering Department (LGED)
Health (drinking water)	• Department of Public Health Engineering (DPHE)
Cyclone and storm surges	• Disaster Management Unit (Upazila and Union Level) • Red Crescent

2.2. Policies and Mandates

Considering the vulnerability context (drought, flood, drainage congestion, salinity, cyclone and tidal surge) and its impacts on livelihood of different groups with special focus on farmer community of Noakhali Sadar and Subarna Char Upazila, policy and mandate of four key departments under four ministries has been reviewed. These are Department of Agricultural Extension (DAE) under Ministry of Agriculture, Bangladesh Water Development Board (BWDB) under Ministry of Water Resources, Local Government Engineering Department (LGED) under Ministry of Local Government, Rural Development and Cooperatives, and Upazila Disaster Management Unit. A brief review of policy and mandate of the above mentioned departments are given below.

2.2.1. Ministry of Agriculture and Agriculture Policy

The Ministry of Agriculture (MoA) is mainly concerned with agricultural policy development, planning and monitoring. Project delivery is the responsibility of its various agencies, the most important being the Bangladesh Agricultural Development Corporation (BADC). In the past, the BADC had been directly involved in input supplies. It is now withdrawing from all commercial operations relating to minor irrigation, leaving them to the private sector. The Department of Agriculture Extension as the largest public sector bodies demonstrates and extends information to farmers on crops, varieties and agronomic practices for irrigated agriculture.

The National Agricultural Policy of Bangladesh has mentioned a number of constraints including dependency on the unpredictable change of nature and risks. Amongst others, it has also recognised widespread poverty between the population engaged in agriculture and lack of required capital for agricultural activities. Absence of efficient as well as effective farmers' organizations at the grass root level and inadequate use of improved seeds, fertilizers and irrigation and other inputs are also identified as constraints. Climate change has not been mentioned explicitly but unpredictable change of nature relates with variability and extreme events of weather and climate.

2.2.2. Department Agricultural Extension

The Department of Agricultural Extension (DAE) is the largest public sector extension service provider in Bangladesh. It recognizes agriculture as a driver of the country's development. The core function of the Department is to facilitate increase in agricultural productivity, human resource development and technology transfer. In particular, the Department is paying attention to:

- increase in agricultural productivity;
- ensuring food security;
- pro-poor services;
- poverty reduction as a priority;
- partnership development;
- gender awareness;
- farmers' charter;
- input and credit support;

- crop diversification;
- appropriate land use;
- sustainable agriculture and environment;
- soil health improvement;
- proper water management;
- gender and social development;
- commercialization in agriculture;
- non-land based opportunities for the poor;
- opportunities for the non-farm economy; and
- ensuring quality services to its clients.

Over the years, the Department has contributed significantly to crop production, especially in rice and wheat, thus helping the country to attain grain self sufficiency. Considering farmers' diversified needs, the Department has already started providing a "whole farm service" in partnership with other service providers.

2.2.3. Bangladesh Water Development Board

Bangladesh Water Development Board, the implementing wing of the Ministry of Water Resources, implements the FCD/FCDI and other development projects. It also collects, processes, stores and disseminates hydrological and hydraulic data and information. Flood forecasting and warning information through Flood Forecasting and Warning Center (FFWC) is also provided by the BWDB. The Ministry prepared the Guidelines for Participatory Water Management (GPWM) with the help of BWDB and LGED. GPWM is being widely followed by the stakeholders at all levels.

Other principal activities include expansion of irrigated areas, water conservation, surface and groundwater use, estuary control, anti-salinity measures and anti-desertification activities, re-excavation of canals and rehabilitation of embankments.

2.2.4. Local Government Engineering Department (LGED)

The main functions of Local Government Engineering Department (LGED) are to provide technical support to the rural and the urban Local Government Institutions (LGIs) and also planning and implementation of infrastructure development projects in the rural and urban areas to improve communication/transport network, employment generation and poverty reduction. The key functions, among others, are given below.

- Plan and implement "Works Programme" at the Upazila level through the Upazila Engineering setup and provide technical support to the Upazila Development Coordination Committee (UDCC) and the Union Parishads (UP).
- Plan and monitor development of growth centres connecting roads and construction of bridges/culverts through the Project Implementation Committees (PIC) constituted by the Union Parishads with food aid from the World Food Programme (WFP).
- Implement and monitor construction of roads and bridges/culverts in the rural areas under the Integrated Food for Development (IFFD) project with food aid supported by CARE.
- Plan, implement and monitor Rural Infrastructure Maintenance Programme (Paved roads and bridges/ culverts).
- Plan, implement and monitor development projects with assistance from the development partners for construction of feeder roads, rural roads (including necessary bridges/culverts) and development of growth centres and river ghats etc.
- Plan, implement and monitor the development of growth centre/market connecting roads with the Upazila HQ.
- Prepare, implement and monitor small scale irrigation, flood control and drainage schemes at the Upazila and the Union levels.
- Improve capability of the officers and staff of all levels of LGED through training on relevant topics.

Chapter 3
CAPACITY OF THE SELECTED LOCAL LEVEL INSTITUTIONS

Capacity of the selected local level institutions to deal with existing and future problems related to climate change has been assessed based on their understanding on scope of work during normal climatic situation and extreme condition. Numbers of technical staff, level of knowledge about problems, and anticipated problems of the sector have been used to assess institutional capacity. Access to information, planning and implementation have also used for assessing institutional capacity. Information for assessing the institutional capacity has been derived through discussion with different government and non-government staff at upazila level. A summary of the findings is given below.

3.1. Department of Agricultural Extension

The representatives of the upazila agriculture office and Department of Agricultural Extension reported that noticeable changes in cropping pattern, crop yield and cultivation system have occurred over the last 30 years in the Noakhali Sadar Upazila. They have also reported that food demand is increasing due to increased population and will increase in future along with changes in consumption behaviour. Regarding climatic condition, they have mentioned that the situation is changing. According to their observation, length of winter season has reduced and there is less rainfall in the monsoon.

It is reported that general mandate of the upazila agriculture office and Department of Agricultural Extension is to make an assessment on input requirement (seed, fertilizers, pest etc.) for crop agricultural and prediction of crop production. It has also reported that main activities are with farmers.

Human Resources and Services

There are two types of staff i.e. a) agriculture extension officer and b) block supervisor. It is reported that they have 30 staff providing their services to the farmers. Normally they provide i) seasonal weather information based on their own understating and traditional knowledge, ii) availability of new agricultural technologies, iii) information related to seeds, fertilizers and pest, and iv) emergency services during pre and post disaster period.

It is reported that number of present staff are not adequate compared to the volume of work. Agricultural staff needs to be doubled to provide services to the farmers. They do not get additional staff during pre and post disaster period but depending on scale of disaster, government deploys additional staff to run relief works from other districts.

Training is important to keep agriculture extension officers updated on the new technologies and farming practices but unfortunately grassroot level officers are not receiving any training. They have expressed their need and willingness to participate in training and workshops. It has also been suggested that organizing training at local level, using local level information will help extension officers to deal with local problems.

Seed, Fertilizer and Pest Control

It has been observed that gradually local seeds are disappearing due to intensification of crop agriculture and promotion of high yielding varieties. Promotion of high yielding varieties is also making it more difficult for farmers as they are losing control on seeds. Seeds and fertilizers are supplied by private sectors and they are not accountable to the local institution. It has also been reported that new disease and pest are affecting crops in the area.

Allocation of Fund and Logistic Support

About 30 percent of the local development budget is allocated for agriculture but they never get the whole amount. They have limited resources to go to the field and visit farmers, particularly movement in the rainy season becomes difficult. It has been suggested that construction related to facilitate agriculture should be coordinated with agriculture department.

Access to Information

Seasonal weather forecast is very important for agricultural planning which is absent at local scale. The agriculture department in this area depends on traditional knowledge and know-how. They listen radio and television programme for weather forecast and use their own judgment when advising farmers. It is also revealed that local level extension officers do not attended any training or workshop related to climate change and its impact on agriculture.

The agriculture department at local level does not have any provision or capacity to collect weather related information for dissemination at local level. It is necessary to collect information on local problems and also to find out possible measures to address them.

3.2. Bangladesh Water Development Board

The representative of the Bangladesh Water Development Board (BWDB), Noakhali mentioned that drainage congestion is the key problem associated with water due to siltation in the river bed. He also mentioned that drainage and re-excavation are not carried out on a regular basis. There are two projects currently being implemented to address drainage problems.

It was reported that operation and maintenance of existing infrastructure is inadequate due to down-scaling of staff of the Bangladesh Water Development Board. Revenue collection is also a problem. At present, there is no gate operator to operate sluice gates but there is a new approach for operating sluice gate and maintenance of water infrastructure. Water Development Board has set up "Water Management Group" for operating sluice gates and maintaining infrastructures. However motivation and training are necessary to set up and effectively functioning "Water Management Group".

In the Noakhali area, Char Development and Settlement Project (CDSP) III is referred to as a successful project, with an integrated approach bringing the key agencies together.

Human Resources and Services

Operation and maintenance staff has decreased due to down-scaling staff of the Bangladesh Water Development Board (BWDB) but technical level staff has not decreased significantly. New approach for managing sluice gates was found to be effective but it needs continuous social motivation and different skills to deal with people, which is almost absent in the highly "techno-centric" organization.

Climate change and sea level rise and its impacts on their infrastructure are not clear to the policy makers and planners. Therefore, climate change and issues are not incorporated in the design and maintenance. It is suggested that technical capacity of the personnel is enhanced to deal with new problems if necessary.

Access to Information

Early warning on cyclone and storm surges is necessary to operate sluice gates to protect crops and settlement inside embankment. There is a coordination mechanism during disaster. They receive information on cyclone and storm surges from radio and television.

3.3. Local Government Engineering Department (LGED)

Representatives of Local Government Engineering Department (LGED) informed that their designs include highest level of flood recorded in this area (2007). It has also been mentioned that existing designs do not include future sea level rise and its consequences. Most importantly, decisions come from central level and therefore there is little to do at local level. However, they act on an 'ad hoc' basis whenever there is a need to increase water flow to address drainage congestion.

The local representative mentioned that climate change issues need to be discussed at higher level to sensitize the decision makers at the top. LGED has trained personnel and incorporates sea level rise issues in their plans and programmes.

It is important to note that local level staff of the Local Government Engineering Department (LGED) do not attend any climate change related seminar and workshop.

3.4. District Disaster Management Unit, Noakhali

Meeting with District Disaster Management Unit revealed that season of cyclones has changed over time. According to them April–May and October–November was normal time of cyclones which has changed to February and December. They have also mentioned that water logging is a problem which is man-made and intense rainfall over short duration of time.

Different activities of the Disaster Management Unit start depending on signal numbers. It is worth mentioning that there is no compensation for the committee members and volunteers. Maintenance of the exiting cyclone centres is poor and there is no sanitation facility there.

Chapter 4
CONCLUSIONS

4.1. Institutional Strengths-Weaknesses-Opportunities-Threats (SWOT)

Strength of local level institutes is assesses based on level of awareness, trained personnel, financial resources, relations with other institutions, measures to deal with adverse situation. Weakness is assessed based on inadequacy of human resources, lack of training, knowledge, information flow, finance, and institutional relationship. On the other hand opportunities are assessed based on new research, new programme, etc. and threats have been assessed which are outside their control like erratic behaviour of rainfall, temperature etc. A summary of the institutional strengths-weaknesses-opportunities and threats is given below.

Table 2. Summary of the institutional strengths -weaknesses - opportunities and threats of four Local Institutions

Name of the Local Institute	Strengths	Weaknesses	Opportunities	Threats
Department of Agricultural Extension	• Strong relation with local farmers • Acceptability by the farmers • Have foundation training on agriculture • Willingness to learn • Capacity to do bottom-up planning	• Planning is still top-down • No provision for seed germination, storage, and distribution • Inadequate training on local problems • Inadequate logistics • Lack of local level field research	• New research and variety development by BARI and BRRI • Demonstration of new crop varieties at local level	• Uncertainty of weather • Gradual loss of control on seeds by farmers • Unavailability of (bank loans when) increase and match with others it is required
Bangladesh Water Development Board	• Trained engineers for revising design • Initiated new approach to manage infrastructure • Initiated integrated approach to manage infrastructure	• Lack of trained personnel to know social structure • Need new types of training to motivate local people to manage water infrastructure • Lack of funds	• Increase awareness at policy level • Importance of integrated water resource management is increasing	• Uncertainty of weather including rainfall • Scale of sea level rise
Local Government Engineering Department (LGED)	• Trained engineers for revising design	• Low level of awareness on climate change issues • Top-down decision making		• Decision is coming from central
District Disaster Management Unit	• Strong coordination • Trained personnel • Education and awareness level is high on natural disasters • Fund has been created to support only emergency period	• Inadequate funds for volunteer • Inadequate equipments • Inadequate cyclone centres • Lack of maintenance of existing cyclone centre	• New project support such as CDMP	• Additional risk like earthquake, tshunami

4.2. Capacity Need to Address Adaptation at Local Level

One of the most effective ways to enhance institutional capacity to address adaptation to climate change, variability and extreme events, to overcome institutional weakness and to obtain benefits from opportunities identified by the local level institutions. It is revealed from policy review, institutional mandate and local level discussion that different types of capacity enhancement activities are necessary. The identified capacity building needs for local level institutions are given below.

a. Access to Data and Information: It is necessary to establish mechanisms to generate and provide access to user friendly data and information on climate change, variability and extreme events to strengthen local level institutions and support local level decision making processes.

b. Training and Awareness Raising: Training and awareness raising on climate change issues are absent in the two upazilas i.e. Noakhali Sadar and Subarna Char. Local level decision makers and support staff are not aware about adverse impacts of climate change, variability and extreme events. Training at local level using local level problems and solution can be more helpful. Training on social institutions and cultural sensitivity are also necessary.

c. Promote Local Level Planning: It is revealed that most of the planning and decisions are taking place at national level. Adaptation to climate change, variability and extreme events are context specific and therefore local level planning needs to be promoted for which capacity building to integrate climate change is necessary.

d. Defining Functions and Functionaries: Different local level institutions are playing different roles in rural development, including livelihood promotion. In the context of climate change, different local level institutions have to redefine their roles. Therefore, it is necessary to define functions of different functionaries at local level and carryout targeted capacity building activities.

e. Funds and Allocation: Lack of funds is a major constraint. It is necessary to work on mechanisms to increase funds and allocation to address problems and promote livelihoods. Increased inter departmental coordination and cooperation can also help in assisting rural development activities.

f. Institutional Linkage: Institutional coordination to address national disasters particularly cyclones have been found to be effective where Red Cross and its volunteers are working. Disaster management unit at district and upazila level is also playing important roles in pre and post disaster period. Institutional coordination to address other climatic problems needs to be established and learning from disaster management can be helpful.

4.3. Conclusions and Recommendations

Assessment of capacity of the local institutions under this present study was limited to key local level institutions working on agriculture, water, infrastructures and disaster management. Therefore, capacity needs to address the range of adverse impacts of climate change, variability and extreme events are not reflected in this document. Local level institutions working with local farmers and involved in providing services noticed changes in cropping pattern but not necessarily due to changes in weather and climate only. There are many others factors contributing to these changes particularly irrigation and agricultural inputs. It is important to note that they have observed changes in both winter and rainy season. Upazila agriculture department and Department of Agriculture is directly working with farmers who are most vulnerable to adverse impacts of climate change.

Extension and technical staff of Department of Agricultural Extension (DAE) have not attended any climate change related workshop and seminar at home or abroad. Therefore, they have limited knowledge on anticipated impacts of climate change. There is a need to provide information on future threats related to climate change in local context and problems must be dealt at local level.

Engineering related local level institutes have technical people and can incorporate climate change concerns into their design, provided there is higher level decision and funds are available. It is also important to note that changes in infrastructural design need local level data and information on climate change impacts on different infrastructures. Managing water infrastructure by engaging multi-stakeholders through forming "water management group" was found to be good approach.

Awareness raising and targeted capacity building for different groups is necessary to promote rural development and livelihoods of the local community. Incorporation of climate change issues in the sectoral policies and institutional mandate and awareness raising at senior level (decision makers) is equally important.

About IUCN

IUCN, the International Union for Conservation of Nature, helps the world find pragmatic solutions to our most pressing environment and development challenges by supporting scientific research; managing field projects all over the world; and bringing governments, NGOs, the UN, international conventions and companies together to develop policy, laws and best practice.

The world's oldest and largest global environmental network, IUCN is a democratic membership union with more than 1,000 government and NGO member organizations, and almost 11,000 volunteer scientists and experts in some 160 countries. IUCN's work is supported by over 1,000 professional staff in 60 offices and hundreds of partners in public, NGO and private sectors around the world. IUCN's headquarters are located in Gland, near Geneva, in Switzerland.

IUCN

NCAP is a programme of the Netherlands Ministry of Foreign Affairs and is managed by an independent executing agency named ETC International. The NCAP supports studies and workshops in about 14 countries in support of vulnerability and adaptation analysis and policy relevant and scientific sound studies in the field of climate change.

NCAP
The Netherlands Climate Assistance Programme