

Climate-development Integrated Approach in Coastal Management of Bangladesh: Legal and Policy Responses

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Dedicated with love to my son (Nirbaan)

Abstract

Climate change and development are two cross-cutting issues that demand legal and policy responses from both international and national authorities. Bangladesh is predicted to be among the countries that will be the most substantially affected by climate change. The coastal zone of the country is particularly vulnerable. Almost all aspects of coastal development in Bangladesh could be affected by climate change. This thesis argues that Bangladesh can enhance its coastal management by strategically integrating climate change and development into its legislation and policies. For the purpose of this thesis, this integration is conceptualised as a ‘climate-development integrated approach’. This thesis investigates the extent to which this integrated approach has been incorporated into Bangladesh’s coastal laws and policies by reviewing 39 existing statutes and 21 policy documents using a ‘law and policy analysis’ methodology. The finding of this thesis is that most of the sectoral laws and policies in Bangladesh do not address the issue of climate change. This suggests that the integrated approach in coastal management can help Bangladesh to promote coastal development through low-carbon growth, the mitigation of carbon emissions (eg, through participation in a global REDD+ scheme) and adaptation to climate-related hazards in the coastal region. Lastly, this thesis contributes not only to the laws and policies for sustainable coastal management in Bangladesh, but also to the laws and policies in other developing countries.

Contents

Abstract.....	iii
Contents	iv
Candidate’s Certificate.....	x
Acknowledgements	xi
List of Publications and Conference Presentations Related to This Thesis	xiii
List of Abbreviations and Acronyms	xiv
List of National Legislations	xviii
List of National Policies	xx
List of International Instruments	xxii
List of Tables	xxiii
List of Figures.....	xxv
Chapter I. A Prologue to the Thesis	1
I.I Introduction	1
I.II Role of National Laws and Policies in Coastal Management	2
I.III Research Question	3
I.IV Definition of Key Words	4
I.V Rationale for the Bangladesh Case Study	6
I.VI Aim of the Research	8
I.VII Significance of the Study	9
I.VIII Research Methodology	9
I.VIII.A Research Design.....	10
I.VIII.B Research Methods	11
I.VIII.B.1 Literature Review.....	11
I.VIII.B.2 Law and Policy Analysis.....	11
I.VIII.B.3 Critical Thinking.....	13
I.IX Outline of the Study	15
I.X Limitations of the Study	20
I.XI Conclusion.....	22
Chapter II. Climate-development Integrated Approach: A New Development	
Landscape for Bangladesh	24
II.I Introduction.....	24
II.II Setting the Context: Understanding the Climate-development Nexus	24
II.III Case Study on Shrimp Farming to Understand the Climate-development Nexus	29
II.IV The Separate Evolution of Climate Change and Development Policies.....	32
II.IV.A Two Separate Disciplines.....	33
II.IV.B Different Scale of the Problem	35

II.IV.C Cost and Fund	35
II.V The Paradigm Shift towards an Integrated Approach	36
II.V.A Integration between Climate Change and Development	37
II.V.B Integration between Mitigation and Development	41
II.V.C Integration between Adaptation and Development	45
II.V.D Integration between Adaptation and Mitigation	50
II.VI Reasons behind this Paradigm Shift.....	54
II.VI.A Insufficient Mitigation Target	55
II.VI.B Insufficient Financial Commitments	56
II.VI.C Incoherencies between Climate and Development Policies	57
II.VI.D Human Wellbeing as a Policy Goal for Climate and Development Policies	59
II.VII Definition of a Climate-development Integrated Approach	60
II.VIII The Relevance of the Integrated Approach for Bangladesh.....	64
II.IX Case Study of Integrated Approach in Bangladesh	70
II.X Challenges to Bangladesh in Adopting this Integrated Approach	74
II.X.A Institutional Constraints	74
II.X.B Financial Constraints.....	75
II.X.C Lack of Awareness about the Concept.....	76
II.X.D Challenge from Anti-reform Groups	77
II.XI Conclusion	78
Chapter III. Coastal Zone Management in the Reality of Climate Change	80
III.I Introduction	80
III.II Coastal Zones and Typology of Coastal Management.....	81
III.III ICZM: A Dynamic and Continuous Process	83
III.IV Essential Features and Elements of ICZM	88
III.IV.A Integration	89
III.IV.B Coordination	91
III.V The Policy Cycle of ICZM.....	92
III.VI International Regime for ICZM	94
III.VII Climate Change: An Accelerator of Problems and a Novel Challenge for ICZM..	97
III.VIII Possible Responses of Climate Change for Coastal Management	102
III.IX Adaptation Options for Coastal Management	103
III.IX.A Planned Retreat	104
III.IX.A.1 Limit Development or Retreat the Line	105
III.IX.A.2 Limited Intervention or Planned Phase-out	106
III.IX.A.3 No Government Intervention	107
III.IX.B Accommodation	107
III.IX.C Protection	109
III.X Mitigation Options for Coastal Management	111
III.XI Blue Carbon and Coastal Management.....	112
III.XII Blue Carbon and International Climate Change Regime	113
III.XIII Blue Carbon under the UNFCCC	114
III.XIII.A. Blue Carbon under the Kyoto Protocol.....	116
III.XIII.A.1 Blue Carbon under the National LULUCF	116
III.XIII.A.2 Blue Carbon under the CDM	117
III.XIII.B Blue Carbon under the Durban Platform.....	118

III.XIII.B.1 Blue Carbon under REDD+	118
III.XIII.B.2 Blue Carbon under the NAMAs	120
III.XIV The Management of Coastal Carbon Sinks through ICZM	121
III.XV The Links between Adaptation and Mitigation in Coastal Management	123
III.XV.A Adaptation Affecting Mitigation	124
III.XV.B Mitigation Affecting Adaptation	125
III.XV.C Decisions that Include Trade-offs between Adaptation and Mitigation	126
III.XV.D Processes that have Consequences for both Adaptation and Mitigation	126
III.XVI Relevance of the Integration of Adaptation and Mitigation in ICZM	127
III.XVII Relevance of the Climate-development Integrated Approach for ICZM	129
III.XVIII Conclusion	131
Chapter IV. Climate-development Integrated Approach in Bangladesh's Climate	
Change Laws and Policies	133
IV.I Introduction	133
IV.II A Shift towards an Integrated Approach for Climate Responds in Bangladesh	134
IV.III The Administrative Structure of Bangladesh Related to Climate Change	136
IV.III.A Ministry of Environment and Forests	136
IV.III.B Economic Relations Division	137
IV.III.C Planning Commission	138
IV.IV Law and Policy-making Process in Bangladesh	139
IV.V The Climate Change Legal Framework in Bangladesh	141
IV.IV <i>The Bangladesh Climate Change Strategy and Action Plan 2008</i>	142
IV.IV.A Adaptation Strategies under the Action Plan	143
IV.IV.B Mitigation Strategies under the Action Plan	144
IV.VII <i>The National Adaptation Programme of Action 2005</i>	147
IV.VIII <i>Country Framework to Mainstream Climate Risk Management and Adaptation</i> 2006	148
IV.VII The Climate-development Nexus into the Climate Change Legal Framework of Bangladesh	151
IV.X Conclusion	151
Chapter V. Climate-development Integrated Approach in Bangladesh's	
Development Policies	153
V.I Introduction	153
V.II Inter-relationship of Climate Change and Development in Bangladesh	153
V.III The National Development Planning of Bangladesh	156
V.IV Climate-development Integrated Approach and <i>Vision 2021</i>	157
V.V Climate-development Integrated Approach and the <i>Perspective Plan</i>	159
V.V.A Planned Retreat	159
V.V.B Accommodation	160
V.V.C Protection	161
V.V.D Assessment Result of the Perspective Plan	162
V.VI Climate-development Integrated Approach and the <i>SFYP</i>	162
V.VI.A Environmental Management Objectives in the <i>SFYP</i> and its Relevance to Coastal Management	163
V.VI.B Environmental Management Strategies in the <i>SFYP</i> and its Relevance for Coastal Management	165

V.VI.B.1 Institutional Reform	165
V.VI.B.2 Legislative Reform.....	166
V.VI.B.3 Incentives and Fund	166
V.VI.C Climate Change Benchmark in the <i>SFYP</i> and its Relevance to Coastal Management	166
V.VI.C.1 Food Security, Social Protection and Health	167
V.VI.C.2 Infrastructure	167
V.VI.C.3 Research and Knowledge Management	168
V.VI.C.4 Low-carbon Development.....	168
V.VI.C.5 Capacity Building.....	168
V.VI.D Assessment Result of the <i>SFYP</i>	169
V.VII Conclusion.....	169
Chapter VI. Climate-development Integrated Approach in Bangladesh's Coastal Zone	
Policy and Strategy	171
VI.I Introduction	171
VI.II Uniqueness of the Coastal Zone of Bangladesh.....	172
VI.II.A The Geo-morphological Features of the Coastal Zone.....	173
VI.II.B Socio-economic Context of the Coastal Zone	176
VI.III The Evolution of ICZM in Bangladesh	181
VI.III.A Reactive Approach for a Disaster-prone Area	182
VI.III.B Construction Approach to Protect the Area	182
VI.III.C Integrated Approach for a Unique Area	183
VI.IV Conceptualising the First Generation of ICZM in Bangladesh	184
VI.V Climate-development Integrated Approach and <i>the Coastal Zone Policy 2005</i>	187
VI.VI Climate-development Integrated Approach and <i>the Coastal Development Strategy</i> <i>2006</i>	191
VI.VI.A Safety from Man-made and Natural Hazards	193
VI.VI.B Optimising Use of Coastal Lands	194
VI.VI.C Environmental Conservation.....	195
VI.VI.D Empowerment through Knowledge Management	196
VI.VI.E Creating an Enabling Institutional Environment.....	197
VI.VI.F Ensuring Fresh and Safe Water Availability	198
VI.VI.G Promoting Economic Growth Emphasising Non-farm Rural Employment	199
VI.VI.H Improving Livelihood Conditions of People	199
VI.VI.I Sustainable Management of Natural Resources	201
VI.VII Conclusion.....	202
Chapter VII. Climate-development Integrated Approach in Bangladesh's Coastal	
Management Legislation	203
VII.I Introduction	203
VII.II Influence of International Law on ICZM to Address Climate Change	204
VII.III Conceptualising ICZM Legislation and its Purpose.....	206
VII.IV Current Domestic Legal Framework for ICZM in Bangladesh	209
VII.V Climate-development Integrated Approach in the Supportive Legal Framework for ICZM in Bangladesh.....	210
VII.V.A The Environment Policy and Relevant Laws.....	213
VII.V.B The National Tourism Policy and Relevant Laws	217

VII.V.C The National Forestry Policy and Relevant Laws.....	221
VII.V.D The National Fisheries Policy and Relevant Laws	224
VII.V.E The National Water Policy and Relevant Laws	228
VII.V.F The National Land-use Policy and Relevant Laws	231
VII.V.G The National Energy Policy and Relevant Laws	233
VII.V.H The National Policy for Safe Water Supply and Sanitation	234
VII.V.I The National Agricultural Policy	237
VII.V.J The National Rural Development Policy	239
VII.VI Conclusion.....	240
Chapter VIII. A Way Forward to Achieve Climate-development Integration into Coastal Management of Bangladesh	242
VIII.I Introduction.....	242
VIII.II Context of the Study.....	243
VIII.III Climate-development Integrated Approach: A Triple Win kit for Coastal Management of Bangladesh.....	245
VIII.IV Findings of this Thesis.....	246
VIII.IV.A The Relevance of the Climate-development Integrated Approach for Bangladesh	246
VIII.IV.B The Relevance of the Climate-development Integrated Approach for Coastal Management	248
VIII.IV.C The Climate-development Integrated Approach in Climate Change laws and Policies	250
VIII.IV.D The Climate-development Integrated Approach in Development Policies.....	251
VIII.IV.E The Climate-development Integrated Approach in Coastal Policies.....	252
VIII.IV.F The Climate-development Integrated Approach in Coastal Management Legislation	253
VIII.V Recommendations for Adopting the Integrated Approach into Coastal Policies	254
VIII.V.A Integration into the Project Analysis Stage	257
VIII.V.A.1 Past and Current Climate Context.....	258
VIII.V.A.2 Future Changes to Climate Context due to Climate Change.....	259
VIII.V.A.3 Livelihoods-climate Linkages for Different Groups within the Community	259
VIII.V.A.4 Opportunity of Climate Change Mitigation from the Development Project	260
VIII.V.A.5 Process of Gathering Data, Synthesising Information and Validating the Analysis.....	261
VIII.V.B Integration into the Project Design Stage	262
VIII.V.B.1 Climate Change Adaptation and Mitigation into Project Objectives and Expected Results	263
VIII.V.B.2 Inclusion of Coastal Adaptation and Disaster Risk Reduction Strategies...	263
VIII.V.B.3 Climate-resilient Livelihoods	264
VIII.V.B.4 Inclusion of Climate Change Mitigation Strategies	265
VIII.V.B.5 Developing Indicator to Monitor Changes	266
VIII.V.C Integration into the Project Implementation Stage	267
VIII.V.C.1 Establishing Appropriate Partnerships to Achieve Expected Results	268
VIII.V.C.2 Monitoring Context and Adjusting Project Approach.....	269

VIII.V.C.3 Incorporating Emergency Preparedness Measures.....	270
VIII.VI Recommendations for Adopting the Integrated Approach into Coastal Legislation.	270
VIII.VII Conclusion	271

Candidate's Certificate

This is to certify that I, Tanzim Afroz, have not submitted this research work for a higher degree to any other university or institution other than Macquarie University. This thesis, to the best of my knowledge and belief, contains no copy or paraphrase of work by another person, except where duly acknowledged in the text.

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Journal Article

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<<http://www.sciencedirect.com/science/article/pii/S0964569112002785>>.

Book Chapter

T Afroz and M M Naser, ‘Adaptation to Climate Change in the International Climate Change Regime: Challenges and Responses’ in Dmitry Palekhov *Implementing Adaptation Strategies by Legal, Economic and Planning Instruments on Climate Change* (Series: Environmental Protection in European Union, 4thed) (Springer, 2014).

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Conference Presentation

1. T Afroz, ‘Sustainable Development and Climate Change: Challenges and Opportunities for International Law’ paper presented in *the 10th Annual Colloquium of the International Union for the Conservation of Nature (IUCN) Academy of Environmental Law*, held in the University of Maryland School of Law, Maryland, US, 1–5 July 2012.
2. T Afroz, ‘Climate-development Integrated Approach for the Coastal Management of Bangladesh’ paper presented in *the 2011 Human Rights and Governance Colloquium ‘Shifting Global Powers: Challenges and Opportunities for International Law’*, held in Queensland University of Technology, Brisbane, Australia, 24–25 November 2011.

List of Abbreviations and Acronyms

ACHR	African Charter on Human and Peoples' Rights
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Centre
AfCHPR	African Charter on Human and Peoples' Rights
ASEAN	Association of South East Asian Nations
AU	African Union
BCCSAP	Bangladesh Climate Change Strategies and Action Plan
BIISS	Bangladesh Institute of International and Strategic Studies
BMET	Bureau of Manpower, Employment and Training
CAT	Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
CBDR	Common But Differentiated Responsibility
CCC	Climate Change Cell
CDM	Clean Development Mechanism
CDMP	Comprehensive Disaster Management Plan
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CEGIS	Centre for Environment and Geographic Information Services
CERD	Convention on the Elimination of All Forms of Racial
CESCR	Committee on Economic, Social and Cultural Rights
CHT	Chittagong Hill Tracts
CoP	Conferences of Parties
CRC	Convention on Rights of Child
CRPD	Convention on the Rights of Persons with Disabilities
DFID	Department for International Development (UK)
	Discrimination
DRR	Disaster Risk Reduction
EACH-FOR	Environmental Change and Forced Migration Scenarios
ECA	Ecologically Critical Area

ECHR	European Convention of Human Rights and Fundamental Freedoms
ECtHR	European Court of Human Rights
ECtHR	European Court of Human Rights
ECZ	Environmentally Critical Zone
EDP	Environmentally Displaced Person
EU	European Union
EVC	Environmentally Vulnerable Communities
FAO	Food and Agriculture Organization
FAR	Fourth Assessment Report
FMO	Forced Migration Online
GATS	General Agreement on Trade in Services
GCM	General Circulation Model
GEF	Global Environment Facility
GHG	Greenhouse Gas
HDI	Human Development Indicators
HRC	Human Rights Committee
IASC	Inter-Agency Standing Committee
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICJ	International Court of Justice
ICRC	International Committee of the Red Cross
ICZM	Integrated Coastal Zone Management
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displaced Person
IDRL	International Disaster Response Laws, Rules and Principles
IFRC	International Federation of Red Cross and Red Crescent
IGO	Intergovernmental Organization
ILC	International Law Commission
ILO	International Labor Organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change

ISDR	International Strategy for Disaster Reduction
LDC	Least Developed Countries
LDCF	Least Developed Countries Fund
MDG	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
NAPA	National Plan of Action
NASA	National Aeronautics and Space Administration
NGO	Non-Governmental Organization
NHRC	National Human Rights Commission
NHRI	National Human Rights Institution
NRC	Norwegian Refugee Council
OAS	Organization of American States
OAU	Organization of African Unity
OCHA	Office for the Coordination of Humanitarian Affairs
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OHCHR	Office of the United Nations High Commissioner for Human Rights
R2P	Responsibility to Protect
RBE	River Bank Erosion
RMMRU	Refugee and Migratory Movements Research Unit
RSC	Refugee Studies Centre
RSG	Representative of the UN Secretary-General on the Human
SAARC	South Asian Association for Regional Cooperation
SCCF	Special Climate Change Fund
SPA	Strategic Priority on Adaptation
UDHR	United Nations Universal Declaration of Human Rights
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFP	United Nations Population Fund

UNGA	United Nations General Assembly
UNHCR	United Nations High Commissioner for Refugees
UNU-EHS	UNU Institute for Environment and Human Security
USA	United States of America
VGD	Vulnerable Group Development
VGF	Vulnerable Group Feeding
WB	World Bank
WCED	World Commission on Environment and Development
WHO	World Health Organization
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

List of National Legislations

Alluvial Lands Act 1920

Bangladesh Disaster Management Act, 2012

Bangladesh Hotel and Restaurant Ordinance 1982

Bangladesh Parjatan Corporation Order 1972

Bangladesh Private Forests Ordinance 1959

Bangladesh Tourism Board Act 2010

Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010

Bangladesh Tourist Act 2012 (Draft)

Bangladesh Travel Agencies (Registration and Control) Ordinance 1977

Bangladesh Water Act 2013

Bangladesh Water and Power Development Boards Order 1972

Bangladesh Water Development Board Act 2000

Bengal Alluvion (Amendment) Act 1868

Bengal Alluvion and Diluvion Regulation 1825

Canals Act 1864

Climate Change Trust Fund Act 2010

Coastal Regulation Zone Notification 1991 (India)

Coastal Zone Management Act 1998 (Belize)

Embankment and Drainage Act 1952

Energy Conservation Act 2008

Energy Efficiency and Conservation Rules 2012 (Draft)

Environment Conservation Act 1995

Environment Conservation Rules 1997

Environment Court Act 2000

Federal Coastal Zone Management Act 1972

Fish and Animal Food Act 2010

Fish and Fish Products (Inspection and Quality Control) Ordinance 1983 and Rules 1997

Fish Feed Rules 2011

Forest Act 1927

Government Fisheries (Protection) Ordinance 1959

Groundwater Management Ordinance 1985

Hatchery Act 2010 and Rules 2012

Hill District Local Government Parishad Act 1989

Integrated Coastal Management Act 2008 (South Africa)

Irrigation Act 1876

Irrigation Water Rate Ordinance 1983

Korean Coastal Zone Management Act 1999 (Korea)

Marine Fisheries Ordinance 1983

Marine Fisheries Rules 1983

Private Fisheries Protection Act 1889

Protection and Conservation of Fish Act 1950

Protection and Conservation of Fish Rules 1985

Queensland Coastal Protection and Management Act 1995 and the New South Wales Coastal Protection Act 1979

Resource Management Act 1991 (New Zealand)

Shrimp Cultivation Tax Act 1992

Social Forestry Rules 2004

Sustainable and Renewable Energy Development Authority (SREDA) Act 2012

Tanks Improvement Act 1939

Water Resources Planning Act 1992

List of National Policies

Bangladesh Climate Change Strategy and Action Plan 2008
Bangladesh National Building Code (BNBC) 1993
Bangladesh National Conservation Strategy 1987
Climate Change Strategy and Action Plan 2008
Coastal Development Strategy 2008
Coastal Zone Policy 2005
Country Framework to Mainstream Climate Risk Management and Adaptation 2006
Environment Policy and Implementation Plan 1992
Fish Feed Rules 2011
Fisheries Policy 1998
Irrigation Water Rate Ordinance 1983
Marine Fisheries Rules 1983
National Adaptation Programme of Action 2005
National Agricultural Policy 1999
National Agricultural Policy 1999
National Disaster Management Policy 2008
National Energy Policy 1995
National Energy Policy 2004
National Energy Policy 2008 (Draft)
National Environment Policy 2013
National Fisheries Policy 1998
National Forest Policy 1994
National Land Use Policy 2001
National Plan for Disaster Management of Bangladesh 2010-2015
National Policy for Safe Water Supply and Sanitation 1998
National Rural Development Policy 2001
National Tourism Policy 1992
National Water Policy 1999

New Zealand Coastal Policy Statement 2010
Social Forestry Rules 2004

List of International Instruments

Bern Convention on the Conservation of European Wildlife and Natural Habitats 1979
Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979
Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) 1992
Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) 1976
Convention on Biological Diversity 1992
Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971
International Convention for the Prevention of Pollution from Ships (MARPOL) 1973/78
International Convention on Civil Liability for Oil Pollution Damage (1969)
International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (1996)
International Convention on Oil Pollution Preparedness, Response and Co-operation (1990)
International Convention on Salvage (1989)
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971)
International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969)
Kyoto Protocol to the United Nations Framework Convention on Climate Change 1997
London Convention on the Convention of Marine Pollution by Dumping of Wastes and Other Matter (1972)
Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter (1996)
Report of the United Nations Conference on Environment and Development 1992
United Nations Convention on the Law of the Sea (UNCLOS) 1982
United Nations Framework Convention on Climate Change (UNFCCC) 1992

List of Tables

Table 2.1: List of Probable Effects of Climate Change on MDGs	26
Table 2.2: Evolution of Climate-development Nexus in the IPCC	39
Table 2.3: Evolution of Adaptation and Development in the UNFCCC and Kyoto Protocol Negotiations	47
Table 3.1: Relevant Treaties to Key ICZM Issues.....	96
Table 3.2: A Summary of Climate Change Effects in the Coastal Zone	99
Table 3.3: Response Strategies by the IPCC CZMS	104
Table 3.4: Adaptation Options for Coastal Management	105
Table 4.1: Climate Change Scenarios for Bangladesh in 2030 and 2050.....	134
Table 4.2: Adaptation Strategies under the <i>Bangladesh Climate Change Strategy and Action Plan</i>	143
Table 4.3: Average Score of National Climate Change Policies	151
Table 5.1: Average Score of <i>Vision 2021</i>	159
Table 5.2: Average Score of the <i>Perspective Plan</i> (2010–2021).....	162
Table 5.3: Average Score of the <i>SFYP</i>	169
Table 6.1: Population Growth Trend in the Coastal Zone	178
Table 6.2: Major Livelihood Groups	179
Table 6.3: Distribution of Land Ownership in the Coastal Areas.....	180
Table 6.4: Average Score of the <i>Coastal Zone Policy</i>	190
Table 6.5: Linkage between Development Objectives and Strategic Priorities.....	192
Table 6.6: Average Score of the <i>Coastal Development Strategy</i>	202
Table 7.1: Relevant Laws of Different Sectoral Policies.....	211
Table 7.2: Average Score of the Environment Policy and Relevant Laws.....	217
Table 7.3: Average Score of the National Tourism Policy and Relevant Laws	219
Table 7.4: Average Score of the Forest Policy and Relevant Laws.....	224
Table 7.5: Average Score of the Fisheries Policies and Relevant Laws.....	228
Table 7.6: Average Score of the Water Policies and Relevant Laws	230
Table 7.7: Average Score of the Land-use Policies and Relevant Laws	233

Table 7.8: Average Score of the Energy Policy and Relevant Laws	234
Table 7.9: Average Score of the National Policy for Safe Water Supply and Sanitation.....	237
Table 7.10: Average Score of the Agricultural Policy.....	239
Table 7.11: Average Score of the National Rural Development Policy	240

List of Figures

Figure 1.1: Diagram of Research Methodology	14
Figure 2.1: Climate-development Nexus	28
Figure 2.2: Diagram of Climate-development Integrated Approach	63
Figure 2.3: Climate-development Nexus in Bangladesh.....	65
Figure 3.1: The ICZM Policy Cycle	92
Figure 3.2: Integration of Adaptation and Mitigation in ICZM Policy Cycle	129
Figure 3.3: Climate-development Integrated Approach in ICZM Policy Cycle.....	131
Figure 6.1: The Coastal Zone of Bangladesh.....	174
Figure 6.2: Population Density in the Coastal Zone of Bangladesh	177
Figure 8.1: Climate-development Integrated Approach into ICZM Development Projects.....	256

Chapter I.A Prologue to the Thesis

I.I Introduction

The coastal zone of Bangladesh is instrumental in the development of the country, and it provides livelihoods for millions of people. Over the past few decades, the region has come under threat from climate change, and the effects are now starting to be felt. Bangladesh is predicted to be among the countries that will be the most substantially affected by climate change,¹ and the coastal zone is particularly vulnerable.² However, Bangladesh can enhance its coastal management by strategically integrating climate change and development into its laws and policies. The convergence of key policies and statutes is deemed instrumental to ensuring that coastal management is climate-resilient and sustainable.³ Thus, this thesis examines the level of integration of climate change and development in different national policies and statutes that are relevant to coastal management.⁴ The approach is conceptualised as a ‘climate-development integrated approach’ in this thesis. This research is based on the proposition that Bangladesh can make its coastal laws and policies climate-resilient by following an integrated approach. In Chapters II and III, this thesis presents strong arguments in favour of its hypothesis. In Chapters IV–VII, the thesis evaluates the extent of climate-development integration into the coastal laws and policies of Bangladesh. Therefore, the thesis is not confined to a wider contextual understanding of the climate-development integrated approach for coastal management. Further, the thesis will discuss the extent of integration and the potential bottlenecks of integration into coastal laws and policies.

¹ Ahsan Uddin Ahmed, *Bangladesh: Climate Change Impacts and Vulnerability A Synthesis* (Climate Change Cell, Department of Environment, 2006) 1.

² Chapter VI of this thesis describes the vulnerabilities of the coastal zone of Bangladesh in detail.

³ Nazmul Huq et al, ‘Climate Proofing’ Water Resources Development Policy: The Evidence from Bangladesh’ in W Leal Filho (ed), *Climate Change and the Sustainable Use of Water Resources, Climate Change Management* (Springer-Verlag Berlin Heidelberg, 2012) 389, 389.

⁴ Chapters IV–VII of this thesis evaluate 21 policies and 39 statutes.

I.II Role of National Laws and Policies in Coastal Management

Researchers frequently cite climate change as one of the most serious environmental problems confronting human development.⁵ Many climate factors are relevant to coastal regions,⁶ and deltaic areas (such as Bangladesh), small islands and coastal wetlands are particularly vulnerable to climate change.⁷ The Intergovernmental Panel on Climate Change (IPCC) states that coastal regions will respond dynamically to climate change and rising sea levels.⁸ Further, coastal laws and policies are fundamentally important procedural elements of coastal management, which is also affected by climate change.⁹ This thesis deals with the coastal areas of Bangladesh, and it evaluates national laws and policies that are relevant to coastal management.

National laws and policies play an important role in the coastal management of a country. Coastal policy sets out the goals and planned activities of the government to manage the coastal zone,¹⁰ while law is necessary to ensure that the government policy for coastal management is implemented.¹¹ Generally, it applies the conventional norms of international law in the regulative mechanism of coastal management.¹² At the same time, coastal states create their own legislative basis for coastal management, which correspond to their special conditions, the natural characteristics of coastal areas, the organisational and state structure, the geo-political situation, and the economic, historical and cultural traditions.¹³ Law can comprise an Act, ordinance, regulation, rule or other legislative measures, or a combination of measures. These are important

⁵Lisa Schipper and Mark Pelling, 'Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration' (2006) 30(1) *Disasters* 19, 26; Timothy O'Riordan (ed), *Environmental Science for Environmental Management* (Pearson Education Limited, 2nd ed, 2000); Luis Gómez-Echeverri (ed), *Climate Change and Development* (Yale School of Forestry and Environmental Studies and the United Nations Development Programme (UNDP), 2000).

⁶ Section III.VII describes the effects of climate change on coastal areas and coastal management in detail.

⁷Richard J T Klein et al, 'Technological Options for Adaptation to Climate Change in Coastal Zones' (2001) 17(3) *Journal of Coastal Research* 531, 532.

⁸Luitzen Bijlsma et al, 'Coastal Zones and Small Islands' in Robert T Watson, M C Zinyowera and Richard H Moss (eds), *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 1996) 289,291.

⁹ See Section III.VII for the effects of climate change on coastal management.

¹⁰ Chapter VI discusses the coastal policies and strategies of Bangladesh.

¹¹Rose-Liza V Eisma, Patrick Christie and Marc Hershman, 'Legal Issues Affecting Sustainability of Integrated Coastal Management in the Philippines' (2005) 48(3-6) *Ocean & Coastal Management* 336, 338.

¹²*Environment and Development in Coastal Regions and in Small Islands*, UNESCO <<http://www.unesco.org/csi/act/russia/legalpro5.htm>>.

¹³*Ibid.*

regulative tools in coastal management and in society in general.¹⁴ The legislative measures relate to bans, commands, rights and regulations,¹⁵ and they prescribe certain standards of behaviour and impose penalties for failure to comply.¹⁶ This type of governance is called ‘command and control’; it commands people to do, or refrain from doing, something, and then puts control measures in place to ensure that they comply.¹⁷ Coastal management-related laws prescribe what conduct a particular coastal society regards as socially acceptable or desirable.¹⁸ Thus, coastal management legislation can play an important role in changing the attitudes and conduct of the members of society.¹⁹

I.III Research Question

The research question asked in this thesis is: ‘To what extent is the climate-development integrated approach incorporated into the coastal laws and policies of Bangladesh?’ To address this question, six issues will be dealt with in this thesis:

1. relevance of the climate-development integrated approach for Bangladesh
2. relevance of the climate-development integrated approach for coastal management
3. extent of reflection of the climate-development integrated approach in Bangladesh’s climate change laws and policies
4. extent of reflection of the climate-development integrated approach in Bangladesh’s development policies
5. extent of reflection of the climate-development integrated approach in Bangladesh’s coastal policies
6. extent of reflection of the climate-development integrated approach in Bangladesh’s coastal management legislation.

¹⁴*Policy Instruments for Integrated Coastal Zone Management* (1 March 2013) Coastal Wiki <http://www.coastalwiki.org/wiki/Policy_instruments_for_integrated_coastal_zone_management>.

¹⁵*Ibid.*

¹⁶Cormac Cullinan, ‘Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management’ (FAO Legislative Study No 93, Food and Agriculture Organisation of the United Nations, 2006) 6 <<http://www.fao.org/docrep/012/a0863e/a0863e00.pdf>>.

¹⁷*Ibid.*

¹⁸*Ibid.* 7.

¹⁹Section VII.III further conceptualises the coastal management legislation and its purpose in detail.

These issues will be dealt with in different chapters of this thesis, and the findings will ultimately help to answer the research question.

I.IV Definition of Key Words

It is important to define the key words used in this thesis before commencing the active research. This thesis adopts the following definitions of the key concepts or key words from the existing literature.

Climate Change: According to Article 1 of the United Nations Convention on Climate Change (UNFCCC), climate change refers to a change of climate that is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.²⁰

Mitigation: An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases.²¹

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, and which moderates harm or exploits beneficial opportunities.²²

Development: This has been defined in a variety of ways by different people in different professions and organisations, at different times and in different places. Traditionally, it has been measured in terms of economic growth.²³ However, it now includes a broader range of factors, such as concepts of human wellbeing.²⁴ Chambers argues that the two main components of

²⁰United Nations Framework Convention on Climate Change, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992) Art 1.

²¹Robert T Watson, Robert T and the Core Writing Team (eds), *Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II, III to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2001).

²²Ibid.

²³Nermeen Shaikh, *Amartya Sen: A More Human Theory of Development* (6 December 2004) Asia Society <<http://asiasociety.org/business/development/amartya-sen-more-human-theory-development>>.

²⁴See Section II.VI.D.

development are that it is normative and that it involves change; thus, the most basic definition of development would be ‘good change’.²⁵

Low-carbon Development:Interface between mitigation and development. It aims to promote development while reducing emissions.²⁶

Climate-resilient Development:Development that has the capacity to absorb and quickly bounce back from climate shocks and stresses.²⁷

Sustainable Development:Although researchers say there is no single definition of sustainable development,²⁸ perhaps the most widely used definition is, ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’.²⁹ The concept supports strong economic and social development, and underlines the importance of protecting the natural resource base and the environment.³⁰

Integrated Coastal Zone Management (ICZM): This is a dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural and institutional resources to ensure the conservation and sustainable multiple uses of the coastal zone.³¹

²⁵Robert Chambers, *Ideas for Development: Reflecting Forwards* (IDS Working Paper No 238, Institute of Development Studies, November 2004) 2.

²⁶*What is Climate Compatible Development?* Climate Planning <<http://www.climateplanning.org/content/what-climate-compatible-development>>.

²⁷*Ibid.*

²⁸John Robinson, 'Squaring the Circle? On the Very Idea of Sustainable Development' in W. Chesworth, Michael R. Moss and Vernon G. Thomas (eds), *Sustainable Development: Mandate or Mantra?* (University of Guelph, 2002)

²⁹World Commission on Environment and Development, *Our common future* (Oxford University Press, 1987) 43.

³⁰United Nations Economic Commission for Europe, *Sustainable Development-Concept and Action*<http://www.unece.org/oes/nutshell/2004-2005/focus_sustainable_development.html>.

³¹CAMPNET, 'The Status of Integrated Coastal Zone Management: A Global Assessment' (Summary Report of the Workshop, Charleston, South Carolina, 4-9 July 1989); John R Clark (ed), *The Status of Integrated Coastal Zone Management: A Global Assessment* (Coastal Area Planning and Management Network, 1991).

I.V Rationale for the Bangladesh Case Study

Bangladesh has been recognised as one of the countries that are most at risk of climate change.³² More specifically, the coastal zone of Bangladesh is on the front line of climate change because it is directly affected by storm surges, drainage congestion and sea-level rises. The coastal area of Bangladesh comprises the second largest delta in the world after the Amazon.³³ It contains 46 percent of the Bangladeshi population living within 10 metres of the average sea-level.³⁴ This region is considered a biodiversity hotspot because it contains several ecosystems that have important conservation values. Sundarban is one of the largest mangrove forests in the world and is dense with a wide range of flora and fauna; it was declared a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO)³⁵ in 1987. Saint Martin's Island, which is surrounded by coral ecosystems, was declared an Ecologically Critical Area (ECA) under the *Environment Conservation Act 1995* by the government of Bangladesh. Cox's Bazar, which is the world's longest unbroken beach (120 kilometres),³⁶ is a large tourism future. As reported by the IPCC and many other international researchers, the coastal zone of Bangladesh is in grave danger because of the global climate change. It is predicted that the production of rice and wheat will decrease by 8 per cent and 32 per cent respectively by 2050 because of the effects of climate change.³⁷ It is estimated that more than one million people in Bangladesh will be directly affected by sea-level rises in 2050.³⁸ Accelerated global warming and sea-level rises will not only affect coastal people, but also the mangrove forest and coral ecosystem.

³²Helena Wright, Patti Kristjanson and Gopal Bhatta, 'Understanding Adaptive Capacity: Sustainable Livelihoods and Food Security in Coastal Bangladesh' (Working Paper No 32, CGIAR Research Programme on Climate Change, Agriculture and Food Security, 2012) 1.

³³Ministry of Environment and Forests, *Bangladesh: National Programme of Action for Protection of the Coastal and Marine Environment from Land-Based Activities*, 2000) 9.

³⁴Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy 2005* (2005) 2.

³⁵United Nations Educational, Scientific and Cultural Organisation, *The Sundarbans: Brief Description*, <<http://whc.unesco.org/en/list/798>>.

³⁶Bangladesh Parjatan Corporation, *Longest Unbroken Beach in the World* <http://www.parjatan.gov.bd/cox_bazar.php>.

³⁷Islam M Faisal and Saila Parveen, 'Food Security in the Face of Climate Change, Population Growth and Resource Constraints: Implications for Bangladesh' (2004) 34 *Environmental Management* 487.

³⁸Jason P Ericson et al, 'Effective Sea-Level Rise and Deltas: Causes of Change and Human Dimension Implications' (2006) 50 *Global Planet Change* 63.

Bangladesh has been chosen as a case study for this thesis because of the uniqueness of its coastal zone. The coastal zone of Bangladesh is known as a zone of vulnerabilities as well as opportunities.³⁹ It has significant value in economic development because it is endowed with diverse natural resources such as coastal fisheries and shrimp, forest, salt and minerals. It has sites for Export Processing Zones (EPZ), harbours, airports, land ports and tourism complexes, as well as opportunities for other industries. Thus, the coastal zone comprises distinctive development opportunities that can be instrumental in reducing poverty and contributing to the development of Bangladesh as a whole. However, if the coastal laws and policies are not climate-resilient, they cannot ensure the sustainable development of the area.

Thus, the rationale of selecting Bangladesh as a case study can be summarised as follows. First, Bangladesh is frequently cited as one of the most vulnerable least-developed countries (LDCs)⁴⁰ to climate change.⁴¹ Second, it is one of the LDCs that is the least responsible for the causes of climate change. Hence, the desire to mitigate opportunities is low⁴² and almost absent at its policy level. Third, there is potential for linkages among mitigation, adaptation and sustainable development; for example, Venema and Cisse note that ‘in Bangladesh ... the mitigation-nexus is particularly striking’.⁴³ Fourth, Bangladesh is particularly interesting because of its relatively long history of both environmental and climate change awareness, policy and action compared to other LDCs.⁴⁴ It is also party to many International Multilateral Environmental Agreements (IMEAs) and is signatory to the UNFCCC.⁴⁵ Fifth, the coastal zone of Bangladesh showcases what will happen under climate change and what many countries will need to do to protect their coastal zones in the coming years.⁴⁶ Thus, the coastal zone of Bangladesh is an interesting case study in order to explore the intractable connection between climate change and development.

³⁹ Ministry of Water Resources, above n 32, 1.

⁴⁰ The LDCs are a group of 49 of the world’s poorest countries.

⁴¹ A Atiq Rahman, *The South is Acting, Our Planet* 9.2 (December 1997) <<http://www.ourplanet.com/imgversn/93/rahman.html>>.

⁴² Jessica M Ayers and Saleemul Huq, ‘The Value of Linking Mitigation and Adaptation: A Case Study of Bangladesh’ (2009) 43(5) *Environmental Management* 753, 758.

⁴³ Henry David Venema and Moussa Cisse (eds), *Seeing the Light: Adapting to Climate Change with Decentralized Renewable Energy in Developing Countries* (International Institute for Sustainable Development & Climate Change Knowledge Network, 2004) 137.

⁴⁴ Ayers and Huq, above n 42.

⁴⁵ Ibid.

⁴⁶ Climate Change Cell, ‘Changing the Way We Develop: Dealing with Disasters and Climate Change’ (Paper Prepared for the Oslo Policy Forum, Oslo, Norway, 28-29 February 2008) 3.

I.VI Aim of the Research

Coastal zones around the world face a number of problems because of development and increased populations. For decades, Integrated Coastal Zone Management (ICZM) has been recognised and practiced globally as a strategy for the conservation and sustainable development of coastal zones. It is widely promoted as an appropriate policy framework to deal with current and long-term coastal challenges that cut across traditional departments (the sectoral approach).⁴⁷ Bangladesh has also adopted this integrated approach for its coastal management. Bangladesh's *Coastal Zone Policy* highlights medium- and long-term government policies to ensure the sustainable management of both biotic and abiotic resources, conservation and the enhancement of critical ecosystems in the coastal area.⁴⁸ According to Norman,⁴⁹ the focus of ICZM internationally has principally been on managing the global trend of urbanisation and harvesting coastal and marine resources. In fact, most of the coastal programs have viewed sea-level rises as an historic trend occurring at a constant rate. The coastal laws and policies of Bangladesh⁵⁰ pay less attention to this issue and fail to address the appropriate integration of climate change and development. The reality is that climate change is accelerating the problems in coastal areas at a more rapid pace than at any other time, and it is undoubtedly a novel challenge for ICZM.⁵¹ This will require revising local and state laws and policies to adopt new management priorities.⁵² Thus, the aim of this research is to place climate actions in the wider development context of coastal management. Coinciding with this aim, this thesis analyses 21 policy documents and 39 existing statutes that are relevant to coastal management in Bangladesh.

Both human-induced development activities and climate change lead to irreversible environmental degradation in the coastal area. If laws and policies are not climate-resilient, they

⁴⁷USAID, *Adaptation to Coastal Climate Change A guidebook for Development Planners* (2009) <http://www.usaid.gov/our_work/cross-cutting_programs/water/docs/coastal_adaptation/adapting_to_coastal_climate_change.pdf>.

⁴⁸Ministry of Water Resources, above n 32, 3.

⁴⁹Barbara Norman, 'Principles for an Intergovernmental Agreement for Coastal Planning and Climate Change in Australia' (2009) 33 *Habitat International* 293, 295.

⁵⁰ See Chapters VI and VII for Bangladesh's coastal laws and policies.

⁵¹ See Section III.VII for details.

⁵²USAID, *Adaptation to Coastal Climate Change A guidebook for Development Planners* (2009) <http://www.usaid.gov/our_work/cross-cutting_programs/water/docs/coastal_adaptation/adapting_to_coastal_climate_change.pdf>.

cannot ensure the sustainable development of the area. Only the true reflection of a climate-development integrated approach in coastal management can ensure the planned economic growth of the coastal region. Such an approach is coherent with the ‘basic necessities’ provision of the Constitution of Bangladesh, which implies that a fundamental responsibility of the State is ‘to attain, through planned economic growth, a constant increase of productive forces and a steady improvement in the material and cultural standard of living of the people’.⁵³

I.VII Significance of the Study

The intellectual contribution of this thesis is to provide understanding and a pathway to move beyond the traditional concept of coastal management in Bangladesh. This thesis intends to conceptualise a climate-development integrated approach for sustainable coastal zone management. Such a study is significant for several reasons. First, the importance of sustainable coastal management is a vital issue for ensuring quality of life and the survival of the inhabitants of the region. Second, a climate-resilient legal framework is essential to reduce the irreversible environmental degradation in the coastal area, which has been caused by climate change. Third, coastal management based on a climate-development integrated approach can ensure the planned economic growth of the coastal zone of Bangladesh. In addition to the environmental issues, this research is also important for social and economic reasons. Therefore, the fourth reason for the significance of this study is the evaluation made regarding the existing laws and policies of coastal management in Bangladesh. Although the study is based on a particular region of the country, it is an integral component of wider government policy cycles and planning processes. Lastly, this thesis contributes not only to the laws and policies of Bangladesh, but also to sustainable coastal management in other developing countries.

I.VIII Research Methodology

This thesis is doctrinal legal research, which is quite different from research conducted in natural science and laboratory studies. However, a scientific attitude has been adopted to carry out the research systematically, sceptically and ethically in order to seek the ‘truth’ about the subject of

⁵³*The Constitution of the Peoples’ Republic of Bangladesh 1972*, art. 15.

the research.⁵⁴ Thus, the entire thesis has undergone a process of investigating the problem, which is the research question, in a systematic, careful and thorough manner using arguments and forms of reasoning such as induction, deduction and analogy. There are steps in each argument that require information and analysis.⁵⁵ In this sense, the research philosophy espoused in this thesis is consistent with the ‘real-world enquiry’ advocated by Colin Robson.⁵⁶

As defined by Tan, the methodology of research is a way of producing and analysing data to test the hypothesis.⁵⁷ Thus, the term ‘methodology’ is closely related to: (i) the research design and (ii) methods⁵⁸ utilised to conduct the research. The research design followed in this thesis is a qualitative and flexible design strategy, and the methods adopted are literature review, policy analysis and critical thinking. The following two sections describe the research design and method of this thesis in detail.

I.VIII.A Research Design

The justification of a qualitative and flexible research design is self-evident in light of the research question. A quantitative and inflexible design strategy is not appropriate for this research because of the nature of the real-world problem.⁵⁹ Such a problem cannot be addressed by fixed designs like artificially controlling the causal factors in a scientific laboratory. Rather, a qualitative design strategy is more appropriate because it is a process, as defined by Dobinson and Johns,⁶⁰ of selecting and weighting materials by taking into account hierarchy and authority, as well as understanding social context and interpretation.

⁵⁴Colin Robson, *Real World Research: A Resource for Social Scientists and Practitioner-Researchers* (Blackwell Publishers, Blackwell Publishers, 2nd ed, 2002) 18.

⁵⁵Terry Hutchinson, *Researching and Writing in Law* (Lawbook, 3rd ed, 2010) 38–37.

⁵⁶Robson, above n 54, 27.

⁵⁷Willie Tan, *Practical Research Methods* (Pearson Prentice Hall, 2nd ed, 2004) 14.

⁵⁸Christopher James McGrath, *How to evaluate the effectiveness of an environmental legal system* (PhD Thesis Thesis, PhD Thesis Thesis, Queensland University of Technology, 2007) 20.

⁵⁹Ibid.

⁶⁰Ian Dobinson and Francis Johns, ‘Qualitative Legal Research’ in Mike McConville and Wing Hong Chui (eds), *Research Methods for Law* (Edinburgh University Press, 2007) 22.

I.VIII.B Research Methods

The methods used to collect data and test the hypothesis in this research are: (i) literature review, (ii) law and policy analysis and (iii) critical thinking.

I.VIII.B.1 Literature Review

This research is more than a simple literature review because there is a fine difference between legal literature and regular literature. Legal literature comprises the primary documents that set out the law, and the screening criteria are necessarily more rule-bound and intricate than for regular literature.⁶¹ The results of the literature review carried out for this thesis are mostly presented in Chapters II and III. They are followed by citations of the relevant works in appropriate places. Both empirical and analytical methods were employed to generate ideas on the research theme. The study consulted both primary and secondary sources, including government documents, policies, books and monographs, which were explicitly related to climate change, development and coastal zone management. There is a rich tapestry of academic and professional writing that is relevant to these topics. Thus, the background research in the literature review identified ‘what is known and not known’⁶² about the research theme.

I.VIII.B.2 Law and Policy Analysis

21 policy documents and 39 statutes of Bangladesh have been reviewed and assessed throughout this thesis—mostly in Chapters IV–VII. The assessment of these policy documents and legislation provides an overview of how the climate-development integrated approach has been reflected to date in Bangladesh’s policies for coastal management, climate change and development. The method of assessment used in this thesis has been fixed through a review of pertinent studies conducted by Bojö et al,⁶³ Huge and Hens,⁶⁴ Kramer,⁶⁵ Prowse et al,⁶⁶ Klein et

⁶¹Hutchinson, above n 55, 37.

⁶²Maggie Walter (ed), *Social Research Methods* (Oxford University Press, 2nd ed, 2010) 485.

⁶³Jan Bojö et al, *Environment in Poverty Reduction Strategies and Poverty Reduction Support Credits* (The World Bank, 2004).

⁶⁴Jean Hugé and Luc Hens, 'The Greening of Poverty Reduction Strategy Papers: A Process Approach to Sustainability Assessment' (2009) 27(1) *Impact Assessment and Project Appraisal* 7.

al⁶⁷ and Huq et al.⁶⁸ In the Human Development Report 2007/2008, Kramer⁶⁹ describes this method of analysis as a subjective qualitative framework analysis. Like all other research methods, a qualitative approach also comprises knowledge acquisition and data analysis phases.⁷⁰ Lacity and Janson⁷¹ have shown how to analyse text data generated by a qualitative framework. Coincidentally, in a subjective qualitative framework of analysis, this thesis uses four major categories to examine the climate-development integrated approach of the policy documents:

1. **issues:** a description of specific concerns relating to climate change and its effect on development
2. **causal links:** an analysis of links between climate change and development
3. **responses:** policy and program responses to meet those challenges
4. **process:** approaches used to promote the inclusion of a climate-development integrated approach.

All four categories are given a score with respect to each document's merit:

- 0 = not mentioned
- 1 = identified but not elaborated
- 2 = elaboration of the concept
- 3 = good practice.

According to Bojö et al, 'the first three scores are related directly to the level of attention given, while the top score impels a judgment of the quality of the text'.⁷² As they mention, this is

⁶⁵Arnold Matus Kramer, *Adaptation to Climate Change in Poverty Reduction Strategies*, Human Development Report No 2007/34 (2007) .

⁶⁶Martin Prowse, Natasha Grist and Cheikh Sourang, 'Closing the Gap Between Climate Adaptation and Poverty Reduction Frameworks' (Project Briefings No 21, Overseas Development Institute, 2009).

⁶⁷Richard J T Klein et al, 'Portfolio Screening to Support the Mainstreaming of Adaptation to Climate Change into Development Assistance' (2007) 84 *Climate Change* 23.

⁶⁸Huq et al, above n 3.

⁶⁹Arnold Matus Kramer, *Adaptation to Climate Change in Poverty Reduction Strategies*, Human Development Report No 2007/34 (2007) .

⁷⁰Mary C Lacity and Marius A Janson, 'Understanding Qualitative Data: A Framework of Text Analysis Methods' (1994) 11(2) *Journal of Management Information Systems* 137.

⁷¹Ibid.

⁷²Bojö et al, above n 63, 13.

obviously a subjective interpretation.⁷³ Although the assessment does not intend to be scientifically precise, it is a good indication⁷⁴ of the integration of climate change and development in policies. The interpretation of the scores is also considered by Kramer⁷⁵ and Huq et al⁷⁶ as follows:

- 0–4 = little or no progress in the integration of climate change and development in the policy or legislation
- 5–8 = awareness of needs: the policy document or legislation has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach
- 9–12 = development of institutional response and solutions: this refers to an intermediate stage where the policy document or legislation is developing plans and tools to address the requirements of a climate-development integrated approach.

In this thesis, the assessment of the policy documents and legislation is qualitative in nature. This analysis method is a combination of the works conducted by Bojö et al,⁷⁷ Kramer⁷⁸ and Huq et al.⁷⁹ However, while those three are combative, they are used as a basis of comparison⁸⁰ to reach a solution.

I.VIII.B.3 Critical Thinking

The final method used for the reasoning process in this thesis is critical thinking. The inherent approach of this process is that careful consideration must be given to the premises, reasoning and evidence supporting or refuting claims or arguments.⁸¹ This is opposed to personal biases. In legal research, critical thinking is essential to successfully address the research question. The justifications of adopting such a research design in this thesis are twofold. First, critical thinking

⁷³Ibid.

⁷⁴Kramer, above n 69,5.

⁷⁵Ibid.

⁷⁶Huq et al, above n 3, 394.

⁷⁷Bojö et al, above n 63.

⁷⁸Kramer, above n 69.

⁷⁹Huq et al, above n 3.

⁸⁰Ibid 394.

⁸¹McGrath, above n 58, 30.

as a touchstone of the research process has established the intellectual landscape within which the thesis is situated. Second, such a thinking process has eliminated the subconscious biases as much as possible in the research methodology. Thus, it promotes intellectual rigour throughout the thesis in order to objectively arrive at the best solution possible. Moreover, such a research design is the basic building block of a ‘scientific attitude’ to the research conducted here.⁸²

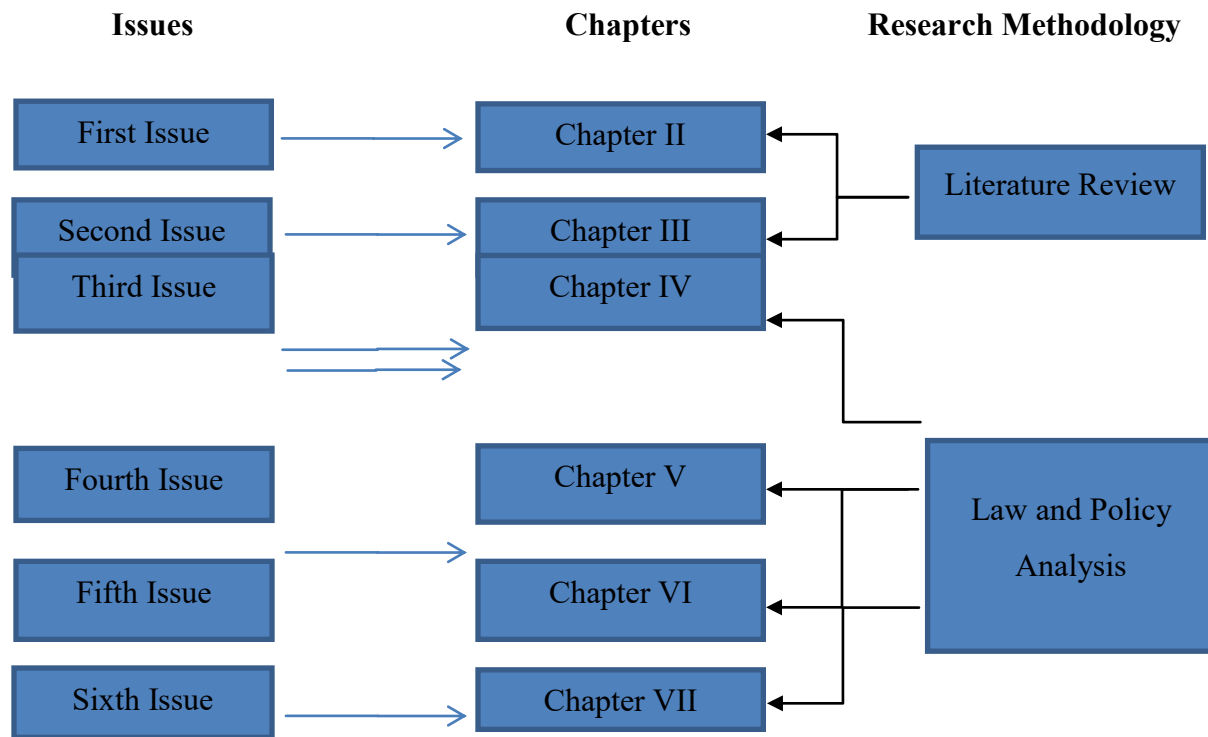


Figure 1.1: Diagram of Research Methodology

Figure 1.1 presents an overview of the thesis. It shows which issue is answered in each chapter, as well as which methodology is used. The findings of these six issues help to answer the research question: ‘To what extent is the climate-development integrated approach incorporated into the coastal laws and policies of Bangladesh?’ In Chapters II and III, the research method that is mostly used is the literature review. These two chapters are the background chapters of the thesis, as they set up the conceptual framework. Miles and Huberman define a conceptual framework as a written or visual presentation that ‘explains either graphically, or in narrative

⁸² Ibid.

form, the main things to be studied—the key factors, concepts or variables—and the presumed relationship among them’.⁸³ According to Maxwell,⁸⁴ it is primarily the concept of what is out there that one plans to study. Chapters II and III deal with the main concept of this thesis, which is the climate-development integrated approach. Chapters IV–VII are the body chapters, which evaluate 21 policy documents and 39 existing statutes of Bangladesh following the method of law and policy analysis. The ‘critical thinking’ method is applied in all chapters where there are reasoning processes, arguments, or supporting or refuting of claims.

I.IX Outline of the Study

This thesis is presented in eight chapters. An overview of these chapters is presented below.

Chapter I: A Prologue to the Thesis

This chapter starts with the background of the study and briefly narrates the role of laws and policies in coastal management. The heart of this chapter is the research question and the methodology used to answer the question. Chapter I breaks down the research question into six issues, which are discussed in Chapters II–VII. A comprehensive research design and method is outlined in this chapter for better understanding. Figure 1.1 shows which issue is dealt with in each chapter, as well as the methodology used. Thus, Chapter I is a guideline for the entire thesis. It not only justifies why Bangladesh has been chosen as a case study, but it also highlights the overall significance of conducting this type of research. This chapter showcases both the strengths and weaknesses of this thesis. It describes the significance of the study as well as its limitations. This chapter is designed to stimulate an interest in the following episodes.

⁸³Matthew B Miles and A Micheal Huberman, *Qualitative Data Analysis: An Expanded Sourcebook* (Sage Publications, 1994) 18.

⁸⁴Joseph A Maxwell, *Qualitative Research Design: An Interactive Approach* (Sage Publications, 2005) 33.

Chapter II: Climate-development Integrated Approach: A New Development Landscape for Bangladesh

Chapter II sets up the conceptual framework of the climate-development integrated approach based on the existing literature. It investigates the first issue of this thesis, which is the relevance of the climate-development integrated approach for Bangladesh. In addition, Chapter II explores the intractable connection between climate change and development, and then explores the reasons for the separate evolution of climate policies and development policies. A few trends of the paradigm shift towards an integrated approach and the motivation of that paradigm shift will then be discussed. Most importantly, the chapter defines the climate-development integrated approach and draws attention to the significance of the approach. Lastly, it presents a case study that shows how the climate-development integrated approach is being implemented in Bangladesh. The concepts discussed in Chapter II will be implemented in Chapters IV–VII in order to examine Bangladesh’s laws and policies.

Chapter III: Coastal Management in the Reality of Climate Change

Chapter III discusses the second issue, which is the relevance of the climate-development integrated approach for coastal management. The chapter first defines coastal management as a general term and then differentiates among different types of coastal management, such as enhanced sectoral management, coastal zone management and ICZM. The chapter emphasises ICZM, which Bangladesh has adopted. The chapter then discusses the possible responses of climate change in coastal management—namely, adaptation and mitigation—in detail. It narrates three different types of adaptation options: planned retreat, accommodation and protection. While exploring the mitigation options for coastal management, Chapter III focuses on blue carbon, which is also known as coastal carbon. It evaluates the opportunity to address blue carbon under the UNFCCC,⁸⁵ and it shows how Bangladesh can adopt this mitigation strategy for its coastal management. These coastal adaptation and mitigation strategies are taken into consideration while evaluating Bangladesh’s laws and policies in Chapters IV–VII. Most

⁸⁵United Nations Framework Convention on Climate Change, above n 20.

importantly, Chapter III focuses on the implication of a climate-development integrated approach in coastal management.

Chapter IV: Climate-development Integrated Approach in Bangladesh's Climate Change Laws and Policies

This is the first chapter that evaluates Bangladesh's laws and policies. A policy usually outlines what a government ministry hopes to achieve, as well as the methods and principles it will use to achieve its aims.⁸⁶ According to the Food and Agriculture Organization (FAO) of the United Nations (UN), a policy is a set of decisions that are oriented towards a long-term purpose or a particular problem.⁸⁷ Policies are only documents rather than law, but these policies can lead to new laws to achieve goals.⁸⁸ Government and parliament, as well as the different branches of government, play important roles in making laws and policies. Section IV.IV describes Bangladesh's law and policy-making process in detail. The chapter also gives a brief idea about the administrative structure of the country in relation to climate change. Chapter IV mainly addresses the third issue, which is the extent of reflection of the climate-development integrated approach in the climate-change laws and policies of Bangladesh. Using the law and policy analysis methodology, the chapter addresses the issue by analysing three vital documents: the *Bangladesh Climate Change Strategy and Action Plan 2008*, the *National Adaptation Programme of Action 2005* and the *Country Framework to Mainstream Climate Risk Management and Adaptation 2006*.

⁸⁶Education and Training Unit, *The Policy and Law Making Process* <<http://www.etu.org.za/toolbox/docs/govern/policy.html>>.

⁸⁷Valentin H von Massow, 'Dairy Imports into Sub-Saharan Africa: Problems, Policies and Prospects' (Research Report No 17, International Livestock Research Institute, May 1989) <<http://www.fao.org/wairdocs/ilri/x5459e/x5459e04.htm#definition%20of%20the%20term%20%27policy%27>>.

⁸⁸Satama, *What is the Difference between Law and Policy?* (1 July 2011) <<http://www.nairaland.com/703932/what-difference-between-law-policy>>.

Chapter V: Climate-development Integrated Approach in the Development Policies of Bangladesh

Article 3.4 of the UNFCCC states that policies and measures to address climate change _should be integrated with national development programmes‘.⁸⁹ While Chapter IV dealt with the domestic laws and policies to address climate change in Bangladesh, this chapter evaluates the extent to which these measures have been integrated into national development policies. Thus, Chapter V deals with the fourth issue, which is the extent of the reflection of the climate-development integrated approach in the development policies of Bangladesh. It analyses three national planning documents: *Vision 2012*, *Perspective Plan* of 2010–2021 and the *Sixth Five Year Plan*. As the focus of this thesis is coastal management in Bangladesh, this chapter limits its discussion to the provisions of these three documents, which are particularly relevant to coastal management. Chapter V provides a clear picture of the extent to which Bangladesh has endeavoured for a climate-development integrated approach.

Chapter VI: Climate-development Integrated Approach in Bangladesh’s Coastal Zone Policy and Strategy

Chapter VI deals with the fifth issue, which is the extent of reflection of the climate-development integrated approach in Bangladesh’s *Coastal Zone Policy* and the *Coastal Development Strategy*. These two documents are relevant to the coastal management of Bangladesh. Using the law and policy analysis methodology, the chapter evaluates these two policy documents in detail and elaborates nine strategic priorities of the *Coastal Development Strategy*. The chapter conceptualises the evolution and first generation of coastal management in Bangladesh, and it provides a brief geo-morphological and socio-economic context of the study area of this thesis.

⁸⁹ Ibid art 3.4.

Chapter VII: Climate-development Integrated Approach in Bangladesh's Coastal Management Legislation

This chapter narrates the importance of a legal framework in sustaining ICZM. It also shows the influence of international law on ICZM in addressing climate change adaptation and mitigation in coastal areas. However, its main focus is the domestic legal framework of ICZM in Bangladesh, and deals with the last issue of this thesis, namely: the extent of reflection of the climate-development integrated approach in other sectoral laws and policies that are relevant to Bangladesh's coastal management. Chapter VII assesses 13 sectoral policies⁹⁰ and 39 statutes⁹¹ using the law and policy analysis methodology.

Chapter VIII: A Way Forward to Achieve Triple Wins in the Coastal Management of Bangladesh

As mentioned earlier, Chapters II and III are the background chapters, Chapters IV–VII are body chapters, and Chapter VIII is the concluding chapter. Based on the findings of Chapters IV–VII, Chapter VIII addresses the research question: To what extent is the climate-development integrated approach incorporated into the coastal laws and policies of Bangladesh? It not only

⁹⁰ The sectoral policies are: (i) the *Environment Policy and Implementation Plan 1992*; (ii) the *National Tourism Policy 1992*; (iii) the *National Forestry Policy 1994*; (iv) the *National Fisheries Policy 1998*; (v) the *National Water Policy 1999*; (vi) the *National Land Use Policy*; (vii) the *National Energy Policy 2004*; (viii) the *National Policy for Safe Water Supply and Sanitation 1998*; (ix) the *National Agricultural Policy 1999*; and (x) the *National Rural Development Policy 2001*.

⁹¹ The relevant laws to the *Environment Policy* are the: *Environment Conservation Act 1995* and *Rules 1997*; *Environment Court Act 2000*. The relevant laws to the *National Tourism Policy 1992* are the: *Bangladesh Tourism Board Act 2010*; *Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010*; *Bangladesh Parjatan Corporation Order 1972*; *Bangladesh Hotel and Restaurant Ordinance 1982*; *Bangladesh Travel Agencies (Registration and Control) Ordinance 1977*; *Bangladesh Tourist Act 2012 (Draft)*. The relevant laws to the *National Forestry Policy* are the: *Forest Act 1927*; *Bangladesh Private Forests Ordinance 1959*; *Social Forestry Rules 2004*. The relevant laws to the *National Fisheries Policy* are the: *Protection and Conservation of Fish Act 1950*; *Protection and Conservation of Fish Rules 1985*; *Marine Fisheries Ordinance 1983*; *Marine Fisheries Rules 1983*; *Private Fisheries Protection Act 1889*; *Tanks Improvement Act 1939*; *Government Fisheries (Protection) Ordinance 1959*; *Fish and Fish Products (Inspection and Quality Control) Ordinance 1983*; *Shrimp Cultivation Tax Act 1992*; *Fish and Animal Food Act 2010*; *Fish Feed Rules 2011*; *Hatchery Act 2010 and Rules 2012*. The relevant laws to the *National Water Policy* are the: *Canals Act 1864*; *Irrigation Act 1876*; *Irrigation Water Rate Ordinance 1983*; *Embankment and Drainage Act 1952*; *Groundwater Management Ordinance 1985*; *Water Resources Planning Act 1992*; *Bangladesh Water and Power Development Boards Order 1972*; *Bangladesh Water Development Board Act 2000*; *Bangladesh Water Act 2013*. The relevant laws to the *National Land Use Policy* are the: *Bengal Alluvion and Diluvion Regulation 1825*; *Alluvial Lands Act 1920*; *Bengal Alluvion (Amendment) Act 1868*. The relevant laws to the *National Energy Policy* are the: *Energy Conservation Act 2008*; *Sustainable and Renewable Energy Development Authority (SREDA) Act 2012*; *Energy Efficiency and Conservation Rules 2012 (Draft)*.

evaluates the extent to which the coastal laws and policies of Bangladesh reflect the climate-development integrated approach, but it also provides several recommendations for the incorporation of this integrated approach in the coastal management of Bangladesh. While making recommendations, the thesis has mainly followed: Toolkit for Integrating Climate Change Adaptation into Development Projects,⁹² Climate Vulnerability and Capacity Analysis Handbook,⁹³ Community-based Risk Screening Tool—Adaptation and Livelihoods,⁹⁴ Climate Change Mitigation Tools⁹⁵ and Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects.⁹⁶ This chapter synthesises what has been previously discussed. This chapter justifies the approach used by the study and examines the pathways forward.

I.X Limitations of the Study

The climate-development integrated approach is a relatively new area, so some key limitations of this thesis must first be outlined. The infancy of the approach is the first limitation. There is not yet a strong body of empirical evidence that illustrates concrete examples of the climate-development integrated approach in action; nor is there a set of common indicators for assessing the climate compatibility of this initiative. Thus, the available theory and evidence on the climate-development integrated approach provides more of a conceptual guidance than a clear description of a set end-point. Some early work has been done to identify examples of practice that can be described as low-carbon, climate-resilient development (e.g. Bahadur et al⁹⁷), but this does not constitute a sufficient body of evidence to provide guidance on what a climate-development integrated approach looks like in practice for a range of scales and contexts. Many tools have been

⁹²CARE International, 'Toolkit for Integrating Climate Change Adaptation into Development Projects' (Digital Toolkit Version No 1.0, CARE International and International Institute for Sustainable Development, July 2010).

⁹³Angie Dazé, Kaia Ambrose and Charles Ehrhart, *Climate Vulnerability and Capacity Analysis Handbook* (CARE International, 2009).

⁹⁴*CRiSTAL User's Manual Version 5 Community-based Risk Screening Tool – Adaptation and Livelihoods* (The International Institute for Sustainable Development, 2012).

⁹⁵United Nations Environment Programme, *Climate Change Mitigation Tools* <<http://www.unep.org/climatechange/mitigation/Tools/tabid/4893/Default.aspx>>.

⁹⁶Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects' (Document No GEF/C 33/Inf 18, Global Environment Facility, 16 April 2008) <http://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf>.

⁹⁷Aditya V Bahadur, Maggie Ibrahim, Thomas Tannaer, *The Resilience Renaissance? Unpacking of Resilience for Tackling Climate Change and Disasters*, Strengthening Climate Resilience Discussion Paper 1 (2010).

developed along an axis, such as adaptation-development or mitigation-development, but few, if any, have genuinely sought to tackle all dimensions of the climate-development integrated approach.⁹⁸

The second limitation is that the thesis may not cover all national policies and legislation that have implications for coastal management, climate change and development. The diverse human activities within the coastal region of Bangladesh are regulated by a wide variety of policies and legislation with diverse purposes, including those related to: fishing, aquaculture, land-use planning and development, forest, energy, shipping and the environment. Undoubtedly, this is a large area of research, and dealing with all relevant laws and policies is beyond the scope of this paper. This thesis analyses and examines 21 policies and 39 statutes of Bangladesh that are relevant to coastal management in some way. These laws and policies have been chosen because: (i) they directly or indirectly cover the issues that are relevant to coastal management; and/or (ii) they directly or indirectly deal with climate change and development issues. Some of the laws and policies considered in the next few chapters may not meet all of these criteria; however, they have been included because they form part of a legislative framework that, taken as a whole, meets these criteria.⁹⁹

The third limitation of this thesis is the vastness of the key issues (climate change, development and coastal zone management). As a concept, development demands a multidisciplinary study encompassing economics, social science, politics, environmental science, law and many other aspects of knowledge, which is also true for coastal management study. However, only national law and policy issues will be dealt with in this thesis. More specifically, the extent to which the coastal management policies of Bangladesh address the climate change and development issue will be considered. Therefore, all-encompassing answers to legal queries about coastal management in Bangladesh are not provided.

⁹⁸Climate & Development Knowledge Network, Institute of Development Studies, Ecofys, *Guiding Climate Compatible Development User-oriented Analysis of Planning Tools and Methodologies*, Analytical Report, Final Report (2011) 21.

⁹⁹Cormac Cullinan, 'Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management' (Legislative Study No 93, The Food and Agriculture Organisation of the United Nations, 2006), 9.

The last limitation of this thesis is that it does not address all climate change risks and effects. The existing literature discusses several projected climate changes and climate change effects for many areas and sectors, but not all of them are considered relevant to coastal zones. For example, the European Commission states that ‘climate change risks such as heat waves, reduced crop yield in the agricultural sector and the emergence of new diseases are less specifically related to coastal zones’,¹⁰⁰ whereas sea-level rises, changes in temperature, the direction and power of waves, wind, precipitation, saline intrusion into soil, fresh water shortage and ice cover, as well as an increase in extreme weather events,¹⁰¹ are climate change risks and effects that are relevant to coastal zones. Interestingly, the existing literature does not address the response options for all risks. Most of the literature dealing with climate change response options in coastal zones is dedicated to potential measures to counteract sea-level rises, flooding and erosion.¹⁰² Other issues, including the direction and power of waves, wind and precipitation, are mentioned briefly.¹⁰³ Measures to overcome freshwater shortages are rarely discussed from a coastal zone perspective.¹⁰⁴ Thus, this thesis will mainly address the issue of sea-level rises.

This thesis avoids the north–south division in international climate negotiation. As mentioned by Kartha, Athanasious and Baer, these conflicts are long-lasting and will not be easily resolved.¹⁰⁵ This thesis will also not debate whether climate change is real. Despite these limitations, this research will help many other developing countries to manage their coastal zones.

LXI Conclusion

The thesis presents a constructive critique of the theory and practice of coastal zone management in Bangladesh. It is mainly focused on the existing laws and policies that are relevant to coastal

¹⁰⁰European Commission, *The Economics of Climate Change Adaptation in EU Coastal Areas*, Final Report (2009) 6.

¹⁰¹Ibid 5.

¹⁰²Ibid 12.

¹⁰³ Ibid 6.

¹⁰⁴ Ibid 12.

¹⁰⁵Sivan Kartha, Tom Athanasiou and Paul Baer, 'The North-South Divide, Equity and Development- The Need for Trust-building for Emergency Mobilisation' in Niclas Hallstrom (ed), *What Next: Climate, Development and Equity* (Dag Hammarskjöld Foundation and the What Next Forum, 2012) vol III, 47.

management rather than a detailed analysis of the statutory environment and planning law. It also takes into consideration the reality of climate change, which is a global phenomenon, but it attempts to accumulate the response strategies at the domestic level. With this aim, the thesis uses a law and policy analysis methodology to analyse the law and policy documents that are relevant to coastal management in Bangladesh so that the gaps can be sorted out for a better reflection of the climate-development integrated approach. This approach is recommended because the coast is an integrated ecological whole, and coastal management must consider the implications of any action or proposed action for the coastal system as a whole rather than for any particular sector.¹⁰⁶ Lastly, all of the recommendations aim to ensure the sustainable development of the coastal region in the face of climate change.

¹⁰⁶ Cullinan, above n 16.

Chapter II. Climate-development Integrated Approach: A New Development Landscape for Bangladesh

II.I Introduction

This chapter investigates the first issue, which is the relevance of the climate-development integrated approach to Bangladesh. It defines the climate-development integrated approach (Section II.VII) and then reviews the intractable connection between climate change and development in the existing literature (Section II.II), focusing on the reasons for the separate evolution of climate policies and development policies (Section II.IV). It assesses the existing literature that reflects the co-benefits of integrated climate change and development policies. The chapter then describes the four trends of the paradigm shift towards an integrated approach (Section II.V), as well as the motivations of that paradigm shift (Section II.VI). It narrates the relevance of the climate-development integrated approach for Bangladesh and mentions several substantive arguments for adopting this approach in this country (Section II.VIII). This chapter details a case study of how Bangladesh is already practicing this approach at the project level (Section II.IX). It defines the relevance and challenges of this approach for Bangladesh. The chapter also suggests several solutions that are practiced in different countries to address these challenges. The concepts discussed in this chapter will guide the rest of the research.

II.II Setting the Context: Understanding the Climate-development Nexus

In 1992, the world's leaders gathered at the first Earth Summit (the UN Conference on Environment and Development (UNCED))¹ in Rio de Janeiro and embraced the pledge of sustainable development through Agenda 21.² Another milestone achievement of this conference

¹ The UNCED is also known as the Rio Summit, Rio Conference and Earth Summit. It will be hereafter referred to as the Earth Summit.

² *Report of the United Nations Conference on Environment and Development*, UN Doc A/CONF151/26 Vol. ii (13 August 1992).

was the global agreement on the UNFCCC(1992)³ (hereafter referred to as the Convention), which in turn directed the Kyoto Protocol.⁴ The Convention and the Protocol ultimately led the international climate regime. Earlier climate change was frequently cited as one of the most serious environmental concerns,⁵ which was of little relevance to development policy-makers or practitioners.⁶ Since the first Earth Summit, climate change has emerged in the existing literature as a major challenge to both the environment and development.⁷ Researchers now consider that climate change is a development issue,⁸ and that it affects development.⁹ In 2009, the Declaration of the Commission on Climate Change and Development stated that:

Yet the climate upon which human civilisation is based is changing faster than imagined 20 years ago—or even two years ago. The change is accelerating and will affect future economic growth and deepen the economic gaps.¹⁰

The scientific understanding of climate change and its potential effects on social and economic development has advanced rapidly in the past two decades. According to Metz and Kok, '[i]t is now well established that climate change and its impacts can have a very negative influence on people and their economies'.¹¹ For example, they cite effects on agriculture, areas that are vulnerable to droughts and floods, and livelihoods of the poor undermined by more frequent natural disasters and extreme events.¹² The Climate and Development Knowledge Network (CDKN) mentions that 'the impact of climate change can hamper developmental efforts in key sectors, such as poverty reduction, agriculture, and health'.¹³ In its Development Report of 2010, the World Bank states that 'climate change will affect numerous sectors and productive

³United Nations Framework Convention on Climate Change, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992).

⁴Kyoto Protocol to the United Nations Framework Convention on Climate Change, opened for signature 16 March 1998, UN Doc 37 ILM 22 (entered into force 16 February 2005) .

⁵Lisa Schipper and Mark Pelling, 'Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration' (2006) 30(1) *Disasters* 19, 26.

⁶Saleemul Huq, Hannah Reid and Laurel A Murray, 'Climate change and Development Links' (Gatekeeper Series, 2006) 2.

⁷The Climate and Development Knowledge Network, *Climate and Development Research Review: Synthesis Report* (2012) 6.

⁸Martin L Parry, 'Climate Change is a Development Issue, and Only Sustainable Development can Confront the Challenge' (2009) 1 *Climate and Development* 5, 5.

⁹Simon Anderson, *Climate Change and Poverty Reduction*, Policy Brief (2011) 1.

¹⁰Commission on Climate Change and Development, *Closing the Gaps: Declaration and Executive Summary* (2009) 3.

¹¹Bert Metz and Marcel Kok, 'Integrating Development and Climate Policies' (2008) 8(2) *Climate Policy* 99, 99.

¹²*Ibid.*

¹³The Climate and Development Knowledge Network, *Climate and Development Research Review: Synthesis Report* (2012).

environments, including agriculture, forestry, energy, and coastal zones, in developed and developing countries'.¹⁴

Murphy,¹⁵ Schipper and Pelling,¹⁶ and Parry et al¹⁷ discuss a few other examples of the influence of the climate on development, such as reduced economic growth due to climate change damages, threatened or under-performing investments, and lower food production due to maladaptation to a changing climate.¹⁸ The 2007/08 UN Human Development Report¹⁹ provides evidence of how today's climate and future changes will affect the achievement of the Millennium Development Goals (MDGs). The world's political leaders agreed upon eight goals for poverty reduction, food access, education, gender equality, health and environmental sustainability in the Millennium Declaration of 2000. Table 2.1 provides examples of how the effects of climate change might affect the MDGs.

Table 2.1: List of Probable Effects of Climate Change on MDGs

MDGs	Examples of Climate Change Effects
Eradicate extreme poverty and hunger (Goal 1)	Climate change is projected to reduce the assets and livelihoods of many poor people—for example, health, access to water, homes and infrastructure.
	Climate change is expected to alter the path and rate of economic growth because of changes in natural systems and resources, infrastructure and labour productivity. A reduction in economic growth directly affects poverty through reduced income opportunities.
	Climate change is projected to alter regional food security. Particularly in Africa, food security is expected to worsen. Adverse effects on food security may be seen in Latin America, as well as in South and Southeast Asia.
Promote gender equality and empower women (Goal 3)	In the developing world in particular, women are disproportionately involved in natural-resource-dependent activities, such as agriculture, which are commonly vulnerable to climate change.
	Women's traditional roles as primary users and managers of natural resources, primary caregivers and labourers engaged in unpaid labour (i.e. subsistence farming) mean that they are involved in, and dependent on, livelihood and resources that are put most at risk by climate change.
Health-related goals:	Direct effects of climate change include increases in heat-related mortality and illnesses

¹⁴World Bank, 'World Development Report 2010: Development and Climate Change' (2010)39.

¹⁵Mary Murphy (ed), *Africa- Up in Smoke: 2, Second Report on Africa and Global Warming from the Working Group on Climate Change and Development* (New Economics Foundation, 2006).

¹⁶Schipper and Pelling, above n 5.

¹⁷Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007).

¹⁸Marcel Kok et al, 'Integrating Development and Climate Policies: National and International Benefits' (2008) 8(2) *Climate Policy* 103, 104.

¹⁹UN Development Programme, *Fighting Climate Change: Human Solidarity in a Divided World*, Human Development Report 2007/2008 (2007) .

Combat major diseases (Goal 6)	associated with heatwaves (although fewer cold-related deaths may occur in some regions). Climate change may increase the prevalence of some vector-borne diseases (e.g. malaria and dengue fever) and vulnerability to waterborne (e.g. cholera and dysentery), food-related or other contagious diseases.
Reduce child mortality (Goal 4)	Children and pregnant women are particularly susceptible to vector- and water-related diseases. Anaemia—resulting from malaria—is responsible for 25 per cent of childhood mortality in Africa.
Improve maternal health (Goal 5)	Climate change will likely proceed to a declining quantity and quality of drinking water in many locations, resulting in a steep increase in diarrhoeal disease and associated deaths. Decline in food production will exacerbate malnutrition—a significant source of ill health among children—by reducing natural-resource productivity and threatening food security—particularly in sub-Saharan Africa, but also in many other low-latitude areas.
Ensure environmental sustainability (Goal 7)	Climate change is likely to alter the quality and productivity of natural resources and ecosystems—some of which may be irreversibly damaged—and these changes may also decrease biological diversity and compound existing environmental degradation.
Global partnership (Goal 8)	Climate change is a global issue, and response requires global co-operation—especially in relation to a common response to mitigation and other global common goods, and in helping developing countries adapt to the adverse effects of climate change.

Source: Kreft et al²⁰

Kok et al state that any development effort will be seriously hampered by the risks of climate change²¹ if these are not addressed in time. According to UKAid:

Climate change may cause major reversals in the economic fortunes of countries at every development level—for both better and worse. This may result from both the direct impacts of climate change and the indirect ones such as political and economic restructuring, and the value attached to different resources.²²

Interestingly, scientific evidence also proves that social and economic development is the main driver of climate change.²³ According to Perry, unsustainable development in the past and present is the root cause of climate change.²⁴ Metz and Kok mention that:

The way in which human societies have transformed the land over the past centuries to produce food, timber and fuel, and the use of coal, oil and natural gas to fuel our economies are directly responsible for the strong increase in greenhouse gas concentrations in the atmosphere.²⁵

²⁰Sönke Kreft et al, *The Millennium Development Goals and Climate Change: Taking Stock and Looking Ahead* (2010) 10.

²¹Kok et al, above n 18.

²²UKAid, *The Future Climate for Development: Scenarios for Low-income Countries in a Climate-changing World* (2010) 8.

²³Metz and Kok, above n 11.

²⁴Parry, above n 8.

²⁵Metz and Kok, above n 11.

In its report on ‘Understanding the Links between Climate Change and Development’, the World Bank points out that:

Societies have always depended on the climate but are only now coming to grips with the fact that the climate depends on their actions... In other words, not only does climate affect development but development affects the climate.²⁶

The intractable connection between climate change and development can be portrayed as shown in Figure 2.1.

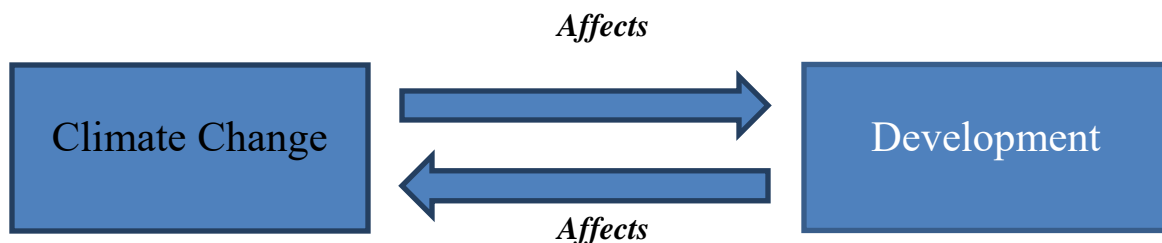


Figure 2.1: Climate-development Nexus

Scott and Shepherd²⁷ note that climate change is altering thinking regarding present and future development. Development that is socially, economically and environmentally sustainable is a challenge,²⁸ even without climate change. If left unmanaged, climate change will reverse the progress of development and compromise the well-being of current and future generations.²⁹ This means that unmitigated climate change is incompatible with sustainable development³⁰ (a concept that was echoed in the first Earth Summit). Kreft says that it has become increasingly clear that the existing path of development is adverse to climate stability.³¹ According to Kok et al,³² Sathaye et al³³ and Yohe et al,³⁴ development that does not take climate change into account

²⁶The World Bank, 'World Development Report 2010: Development and Climate Change' (2010) 37.

²⁷Lucy Scott and Andrew Shepherd, *Climate Change as Part of the Post-2015 Development Agenda*, Bankground Note (2011) 2.

²⁸World Bank, above n 4, 39.

²⁹Ibid 37.

³⁰Ibid 39.

³¹Sönke Kreft et al, *The Millennium Development Goals and Climate Change: Taking Stock and Looking Ahead* (2010), 7.

³²Kok et al, above n 18.

³³Jayant Sathaye et al, 'Sustainable Development and Mitigation' in Bert Metz et al (eds), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) .

³⁴GW Yohe et al, 'Perspectives on Climate Change and Sustainability' in Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) .

is unsustainable because it ultimately: (i) creates societies that are vulnerable to climate change and (ii) leads to high emissions of greenhouse gases from energy, transport or land use, which ultimately exacerbates climate change.³⁵ Thus, as Munasinghe notes, ‘climate change and development interact in a circular fashion’³⁶ (see Figure 2.1). The promotion of shrimp farming in the coastal areas of Bangladesh is an interesting case study to understand this nexus.

II.III Case Study on Shrimp Farming to Understand the Climate-development Nexus

The government of Bangladesh supports shrimp farming in the coastal areas because of its significant contribution to the national economy. Section 4.1.a of the *Coastal Zone Policy 2005* aims ‘...to enhance standard of living of coastal communities by investing in different sectors like...shrimp culture...’³⁷ This policy document provides general guidance to the development objectives and economic growth of the coastal people, but with inadequate implications of climate change regarding these development initiatives. Section VI.V deals with Bangladesh’s *Coastal Zone Policy* in detail, and it examines how far the climate change issue has been reflected in that policy.

Shrimp farming in Bangladesh has attracted development policy-makers due to large demand in the international market over the past two decades. The value of shrimp exports increased from around US\$322 million in 2000 to around US\$457 million in 2007.³⁸ Afroz and Alam³⁹ point out that the export-led growth strategy drew the attention not only of national policy-makers, but also of private sector investors and international development agencies such as the World Bank and the Asian Development Bank (ADB). As a result, several changes in policy in the past two decades were accompanied by governmental incentives. These changes included amendments to land-lease laws—especially government-owned (*khash*) lands—income tax rebates and

³⁵Kok et al, above n 18.

³⁶Mohan Munasinghe, 'Analysing the Nexus of Sustainable Development and Climate Change: An Overview' (COM/ENV/EPOC/DCD/DAC(2002)2/FINAL, Organisation for Economic Cooperation and Development, 2002) 7.

³⁷Ministry of Water Resources, Government of the People’s Republic of Bangladesh, *Coastal Zone Policy 2005*, 3.

³⁸Mohammad Yunus, 'EU Ban, HACCP Compliance and Shrimp Exports' (2009) XXXII(3) *The Bangladesh Development Studies* 41, 43.

³⁹Tanzim Afroz and Shawkat Alam, 'Sustainable Shrimp Farming in Bangladesh: A Quest for an Integrated Coastal Zone Management' (2013) 71 *Ocean & Coastal Management* 275, 275.

subsidised credit.⁴⁰ These incentives promoted shrimp farming in the coastal region, and it is now Bangladesh's second-largest export item after ready-made garments.⁴¹ More than 700,000 people are involved either directly or indirectly in shrimp farming and its associated activities.⁴² As a result, there is a 'blue revolution', which refers to the blooming of shrimp farming in coastal areas.⁴³

However, during the rapid expansion of shrimp farming in Bangladesh, neither the government nor the producers considered its long-term effects on climate change. One study reports that the loss of approximately 97.34 km² of mangrove in the southern part of Bangladesh could be directly attributed to shrimp farming.⁴⁴ In the Chakaria Sundarbans, most of the 75 km² of mangrove vegetation that existed in 1975 was cleared for shrimp farming, leaving only 9.73 km² of scrub forest in 1988.⁴⁵ This rapid deforestation along the Matamuhuri River basin led to an increase in both the discharge rate and sediment load of the river. The silting of the delta's distributary channels has increased because greater areas are isolated by the embankments for shrimp ponds and other uses.⁴⁶ Paul and Vogl suggest that the destruction of mangroves for shrimp farming ultimately results in land degradation, sedimentation, pollution, saltwater intrusion, diseases and negative effects on society and the economy.⁴⁷ Mangrove removal is causing coastal erosion,⁴⁸ changes in sedimentation patterns and shoreline configuration.⁴⁹

⁴⁰Stephane McLachlan, 'Export-oriented Shrimping, Rural People, and the Environment in Bangladesh: Good, Bad and Simply Ugly?' in Matiur Rahman (ed), *Globalization, Environmental Crisis and Social Change in Bangladesh* (University Press, 2002) ; Kazi Ali Toufique, *Impact of Structural Adjustment Policies on the Environment in Bangladesh* (2000) <http://www.saprin.org/bangladesh/research/ban_environment.pdf>.

⁴¹Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Development Strategy* (2006); A. Kamal Azad, Kathe R Jensen and CK Lin, 'Coastal Aquaculture Development in Bangladesh: Unsustainable and Sustainable Experiences' (2009) 44(4) *Environmental Management* 800.

⁴²R Banks, *Brackish and Marine Water Aquaculture*, Report on Fisheries Sector Review and Future Development (2003).

⁴³Apurba Krishna Deb, 'Fake blue revolution: environmental and socio-economic impacts of shrimp culture in the coastal areas of Bangladesh' (1998) 41(1) *Ocean and Coastal Management* 63.

⁴⁴A M Choudgury et al, *Study of Chokoria Sundarbans using Remote Sensing Techniques*, ISME Mangrove Ecosystems Technical Report 4 (1994).

⁴⁵Conner Bailey, 'The Social Consequences of Tropical Shrimp Mariculture Development' (1988) 11(1) *Ocean and Shoreline Management* 31.

⁴⁶N Mahmood, *Present State of the Mangroves of Bangladesh*, A Consultative Paper for IOC-UNEP Program on Potential Impacts on Coastal Zones and Areas from Expected Sea-level and Temperature Rises Induced by Climate Changes in the South Asia Seas Region, IOC-UNEP (1989).

⁴⁷Brojo Gopal Paul and Christian Reinhard Vogl, 'Impacts of Shrimp Farming in Bangladesh: Challenges and Alternatives' (2011) 54(3) *Ocean & Coastal Management* 201, 204–206.

⁴⁸Jean Carter, 'Mangrove Succession and Coastal Change in South-West Malaya' (1959) (26) *Transactions and Papers (Institute of British Geographers)* 79.

The destruction of mangroves ultimately reduces the resilience of coastal ecosystems in this region. Resilience is the ability of a system to undergo, absorb and respond to changes and disturbances while maintaining its function.⁵⁰ The loss of mangroves makes the coastal community vulnerable to the effects of climate change. The mangroves work as a shield to bar cyclones and natural disasters, which have increased in frequency. On 15 November 2007, a category IV Cyclone Sidr struck the southwestern coast of Bangladesh. Paul says that '[t]he Sundarbans bore the brunt of Cyclone Sidr, thus saving residents near this area from more disastrous consequences'.⁵¹ The Sundarbans is the largest mangrove forest in that region, and this incident highlights the importance of mangroves during extreme events.

The destruction of mangroves not only makes coastal communities vulnerable, but it also reduces the ability of natural ecosystems to bind carbon through photosynthesis⁵² and store it. This is known as green carbon.⁵³ Section III.XI discusses another type of carbon that is stored by the world's coastal and marine ecosystems in soil sediments and vegetation. These coastal carbon stocks are increasingly referred to as blue carbon⁵⁴ or marine and coastal carbon.⁵⁵ Emerging scientific evidence (e.g. Pendleton et al,⁵⁶ Barbier et al,⁵⁷ Irving, Connell and Russell⁵⁸) indicate

⁴⁹Samuel C Snedaker and Charles D Getter, *Coastal Resources Management Guidelines*, Renewable resources information series (Research Planning Institute, 1985).

⁵⁰Steve Carpenter et al, 'From Metaphor to Measurement: Resilience of What to What?' (2001) 4(8) *Ecosystems* 765, 766.

⁵¹Bimal Kanti Paul, 'Why Relatively fewer People Died? The Case of Bangladesh's Cyclone Sird' (2009) 50(2) *Natural Hazards* 289, 298.

⁵² Photosynthesis is the process of converting light energy to chemical energy and storing it in the bonds of sugar. This process occurs in plants. For example, see <<http://biology.clc.uc.edu/courses/bio104/photosyn.htm>>.

⁵³ Terrestrial carbon stored in plant biomass and soils in forest land, plantations, agricultural land and pasture land is often called green carbon. Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 15.

⁵⁴ For example, see Gariel Grimsditch, 'Options for Blue Carbon within the International Climate Change Framework' (2011) 11(2) *Sustainable Development Law & Policy* 22; Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 15; Brian C Murray and Tibor Vegh, *Incorporating Blue Carbon as a Mitigation Action under the United Nations Framework Convention on Climate Change: Technical Issues to Address*, Nicholas Institute Report 12-04 (2012).

⁵⁵Brian C Murray et al, 'Coastal Blue Carbon and the United Nations Framework Convention on Climate Change: Current Status and Future Directions' (Policy Brief 12-01, Nicholas Institute 2012) 1.

⁵⁶Linwood Pendleton et al, 'Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems' (2012) 7(9 e 43542) *PLoS ONE* 1.

⁵⁷Edward B Barbier et al, 'The value of estuarine and coastal ecosystem services' (2011) 81 *Ecological Monographs* 169.

⁵⁸Andrew D Irving, Sean D Connell and Bayden D Russell, 'Restoring coastal plants to improve global carbon storage: Reaping what we sow' (2011) 6(3 e18311) *PLoS ONE* 1.

that the conversion of coastal and marine ecosystems (such as mangroves), is a significant source of greenhouse gas emissions throughout the world.⁵⁹

Without taking into account any of these climate change effects, the large-scale destruction of mangroves has occurred⁶⁰ as a result of shrimp farming in the name of economic growth.⁶¹ The *Coastal Zone Policy* of Bangladesh highlighted the investment of shrimp farming but did not consider its long-term effects on the issue of climate change. Such a development policy ultimately makes the coastal community vulnerable to climate change, and it is leading to high emissions of greenhouse gases, which exacerbate climate change. This case study justifies the necessity of integrated policies for development and climate change.⁶²

II.IV The Separate Evolution of Climate Change and Development Policies

According to Swart, Robinson and Cohen,⁶³ Martens, McEvoy and Chang,⁶⁴ and Huq, Reid and Murray,⁶⁵ climate change and development communities in the areas of both research and policy have largely operated independently of one another, even recently. Klein says that '[c]limate policy and development policy each have their own history and tradition, as do climate research and development studies'.⁶⁶ There is a significant amount of literature on the possible reasons for their separate and parallel discourses in initial deliberations.

⁵⁹Brian C Murray and Tibor Vegh, *Incorporating Blue Carbon as a Mitigation Action under the United Nations Framework Convention on Climate Change: Technical Issues to Address*, Nicholas Institute Report 12-04 (2012) 5.

⁶⁰Mohammed M. Rahman, M. Motiur Rahman and Kazi S. Islam, 'The Causes of Deterioration of Sundarban Mangrove Forest Ecosystem of Bangladesh: Conservation and Sustainable Management Issues' (2010) 3 *AACL Bioflux* 77, 80; M S Iftekhar and M R Islam, 'Degeneration of Bangladesh's Sundarbans Mangroves: A Management Issue' (2004) 6(2) *International Forestry Review* 123, 125.

⁶¹Afroz and Alam, above n 39, 276.

⁶²Kok et al, above n 18, 104.

⁶³Rob Swart, John Robinson and Stewart Cohen, 'Climate Change and Sustainable Development: Expanding the Options' (2003) 3(Supplement 1) *Climate Policy* S19, S19.

⁶⁴Pim Martens, Darryn McEvoy and Chiung Chang, 'The Climate Change Challenge: Linking Vulnerability, Adaptation, and Mitigation' (2009) 1(1) *Current Opinion in Environmental Sustainability* 14, 16.

⁶⁵Huq, Reid and Murray, above n 6.

⁶⁶Richard J T Klein, 'Climate and Development in Times of Crisis' (2009) 1(1) *Climate and Development* 1, 2.

II.IV.A Two Separate Disciplines

As discussed by Cohen et al,⁶⁷ one of the reasons for the separate evolution of climate change and development policy is the domination of two separate disciplines: climate change by the natural sciences and development by the social sciences. The theory of global climate change due to enhanced greenhouse gas emission has been debated since the late nineteenth century. However, as mentioned by Hart and Victor,⁶⁸ two scientific research programs shape the present international concern about the climate change issue. The first scientific program is based on oceanography and is concerned with the global carbon cycle and fluxes between the earth, ocean and atmosphere. The second program is founded in atmospheric science and is concerned with the numerical modelling of atmospheric behaviour. The coalescence of these two scientific research programs resulted in the General Circulation Model (GCM).⁶⁹ Wynne and Shackley⁷⁰ note that the GCM not only provides the best evidence for global climate change, but it also holds the promise of the detailed predictions that are necessary to manage the problem. These predictions first attracted widespread public anxiety and international regulation at the Toronto Conference in 1988.⁷¹ That year, the WMO and the United Nations Environment Programme (UNEP) jointly established the IPCC⁷² for the scientific study of climate change and its response options. Since then, an international network of scientists, governmental bureaucrats and environmental activists have gathered under the same banner, relying on the scientifically determined threat of global climate change. In fact, the national and international attempts that

⁶⁷ Stewart Cohen et al, 'Climate Change and Sustainable Development: Towards Dialogue' (1998) 8(4) *Global Environmental Change* 341, 342.

⁶⁸ David M. Hart and David G. Victor, 'Scientific Elites and the Making of U.S. Policy for Climate Change Research' (1993) 23 *Social Studies of Science* 643.

⁶⁹ The GCM mathematically models the flow of matter and energy within and between coupled global ocean and atmospheric systems.

⁷⁰ B Wynne and S Shackley, 'Global Climate Change: The Mutual Construction of an Emergent Science Policy Domain' (1995) 22(4) *Science and Public Policy* 218; S Shackley and B Wynne, 'Integrating Knowledges for Climate Change 1: Pyramids, Nets and Uncertainties' (1995) 5(2) *Global Environmental Change* 113; S Shackley and B Wynne, 'Representing Uncertainty in Global Climate Change Science and Policy: Boundary-ordering Devices and Authority' (1996) 21(3) *Science, Technology & Human Values* 275; S Shackley and B Wynne, 'Global Warming Potentials: Ambiguity or Precision as an Aid to Policy?' (1997) 8(2) *Climate research* 89.

⁷¹ World Meteorological Organisation, 'The Changing Atmosphere: Proceedings of the World Conference on the Changing Atmosphere- Implications for Global Security' (WMO No.710, World Meteorological Organisation, 1988).

⁷² F M J Hoozemans et al, *The Coast in Conflict: An Interdisciplinary Introduction to Coastal Zone Management* (Coastal Zone Management Centre, 1995) 7.2.

surround climate change—largely through the UNFCCC—continue to rely on the science community of the IPCC to inform policy.⁷³

In contrast, the development community comprises a multitude of social sciences that try to identify and describe the social, political and economic obstacles to development.⁷⁴ Although environmental problems such as land degradation, natural resource scarcity and pollution are recognised as impediments to development, climate change has largely escaped notice. According to Huq, Reid and Murray, this may be because climate change has been defined as a ‘science’ problem rather than a social one.⁷⁵ They further explain that climate change science is generally most robust on issues related to emissions and mitigation, which tend to have less direct relevance for poverty alleviation, poor communities and development.⁷⁶ Scientists are able to visualise the alarming future of climate change and model it mathematically with data. Nevertheless, this science-driven nature of climate change has not been helpful in figuring out how to respond politically. Cohen, Demeritt, Robinson and Rothman have determined the reasons for such failure as ignorance of the human dimensions of the problem and the difficult and locally differentiated politics of responding to climate change.⁷⁷ By constructing climate change as a matter of simple science, the IPCC and other national and international scientific bodies have largely excluded the underlying social factors that cause the problem. Thus, climate change was divorced from its social context.⁷⁸ As noted by Gupta:

The problem was seen in terms of greenhouse gas emissions and sinks, and solutions were crafted in terms of reducing such emissions and enhancing such sinks. It was assumed that climate change could perhaps be addressed without making links to the complex issue of development.⁷⁹

⁷³Huq, Reid and Murray, above n 6, 6.

⁷⁴*Ibid.*

⁷⁵*Ibid.*

⁷⁶*Ibid.*

⁷⁷Cohen et al, above n 67, 342.

⁷⁸Swart, Robinson and Cohen, above n 63, S20.

⁷⁹Joyeeta Gupta, 'Climate Change and Development Cooperation: Trends and Questions' (2009) 1(2) *Current Opinion in Environmental Sustainability* 207, 207.

II.IV.B Different Scale of the Problem

Another reason for the separate evolution of climate change and development policy is the different scales at which the problems are perceived. Swart, Robinson and Cohen,⁸⁰ and Huq, Reid and Murray⁸¹ consider that development practitioners view climate change as a long-term problem, but they do not compare the problem of climate change with more urgent development concerns such as poverty reduction, food security, health issues or pollution.⁸² The reason for such a stand by the development community is based on the long-term projection of climate change discourse. It is generated mostly by the GCM, which typically runs for up to 100 years, and in the case of sea-level rises, for several hundred years.⁸³ In contrast, most development scenarios are much shorter term. For example, most MDGs (as mentioned in Table 2.1) are set for 2015.⁸⁴

II.IV.C Cost and Fund

As well as being treated separately from the broader development perspective, climate change may have also received disproportional political attention during international negotiations to tackle the problem. Swart, Robinson and Cohen⁸⁵ consider the reason as the perceived high costs of addressing the problem in industrialised economies, which largely depend on cheap fossil fuels that release greenhouse gases (such as carbon dioxide (CO₂)) and accelerate global warming and climate change. Interestingly, some parties to the climate negotiations feared that attention on development linkages would detract from efforts to reduce emissions and thereby divert funds to more general development projects.⁸⁶ They viewed the links between climate change and development as a threat because they might draw attention away from the main negotiating issue (which they considered to be climate change only) and slow down the progress

⁸⁰Swart, Robinson and Cohen, above n 63, S20.

⁸¹Huq, Reid and Murray, above n 6.

⁸²Ibid 2.

⁸³Ibid 2.

⁸⁴Ibid 2.

⁸⁵Swart, Robinson and Cohen, above n 63, S20.

⁸⁶Ibid.

of climate change negotiations.⁸⁷ This caused the separate and largely parallel evolution of climate policies and development policies.

II.V The Paradigm Shift towards an Integrated Approach

The integration of climate change and development was originally stated by the UNFCCC. The state parties in the Preamble of the Convention affirm that climate change should be coordinated with social and economic development in an *integrated* manner...⁸⁸ Article 3.4 of the Convention says that [p]olicies and measures to protect the climate system against human-induced change...should be *integrated* with national development programmes...⁸⁹ Although the Convention addressed the integrated approach of climate change and development, the spirit faded, and largely parallel agendas were pursued. Section II.IV evaluates the historical reasons behind the disconnection in science and policy between climate change and development discourses.

However, it has been increasingly recognised that this artificial separation results in missed chances for synergies and in unrecognised, undesirable trade-offs.⁹⁰ The CDKN published an in-depth review of 572 papers between January 2010 and August 2011 that provide insights into two key questions: (i) How does climate change affect development? (ii) How can development contribute to climate change adaptation and mitigation? The introduction to the review states that the links between climate change and development cannot be overstated.⁹¹ In fact, a sizeable body of literature on the climate-development nexus has been developed by the research community in recent times. Different stakeholders, including international and national governments, the private sector, research institutes, non-government organisations (NGOs), community-based organisations and development agencies have produced numerous studies on the integrated approach. This literature can be divided into four categories: (i) integration between development and climate change; (ii) integration between mitigation and development;

⁸⁷Ibid.

⁸⁸*United Nations Framework Convention on Climate Change*, above n 3, 6 (emphasis added).

⁸⁹ Ibid 10 (emphasis added).

⁹⁰Swart, Robinson and Cohen, above n 63, S21.

⁹¹The Climate and Development Knowledge Network, *Climate and Development Research Review: Synthesis Report* (2012), 6.

(iii) integration between adaptation and development; and (iv) integration between the adaptation and mitigation of climate change.

II.V.A Integration between Climate Change and Development

The research community (e.g. Markandya and Halsnaes,⁹² Baruni and Weyant,⁹³ Beg et al,⁹⁴ Román,⁹⁵ Klein, Schipper and Dessai,⁹⁶ Halsnæs and Trærup,⁹⁷ Munasinghe and Swart,⁹⁸ Gupta,⁹⁹ Román, Linnér and Mickwitz,¹⁰⁰ Halsnaes, Shukla and Garg¹⁰¹) has responded by producing a wide range of studies on climate-development integration. In fact, since the start of this decade, there has been a major push in the policy arena¹⁰² to recognise the two-way links between climate change and development. Agrawala and Berg say that:

[D]evelopment and climate change policies imply a two-way relationship: choices about development pathways influence climate change as well as the vulnerability of societies to climate change impacts; on the other hand, climate change impacts could influence the rate and level of economic development itself.¹⁰³

Metz and Kok describe this two-way linkage as: (i) the influence of climate change and (climate change) policy, strategy and action on development; and (ii) the influence of development

⁹²Anil Markandya and Kirsten Halsnaes, *Climate Change and Sustainable Development* (Earthscan, 2002).

⁹³Tariq Banuri and John Weyant, 'Setting the Stage: Climate Change and Sustainable Development.' in Bert Metz et al (eds), *Climate Change 2007: Mitigation, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2001) .

⁹⁴Noreen Beg et al, 'Linkages between Climate Change and Sustainable Development' (2002) 2(2) *Climate Policy* 129.

⁹⁵Mikael Román, 'Introduction: SD-PAM and the Potential of Promoting Climate Action through Development Policies' (2012) 4(3) *Climate and Development* 167.

⁹⁶Richard J. T. Klein, E. Lisa F. Schipper and Suraje Dessai, 'Integrating Mitigation and Adaptation into Climate and Development Policy: Three Research Questions' (2005) 8(6) *Environmental Science & Policy* 579.

⁹⁷Kirsten Halsnæs and Sara Trærup, 'Development and Climate Change: A Mainstreaming Approach for Assessing Economic, Social, and Environmental Impacts of Adaptation Measures' (2009) 43 *Environmental Management* 765.

⁹⁸Mohan Munasinghe and Rob Swart, *Primer on Climate Change and Sustainable Development* (Cambridge University Press, 2005).

⁹⁹Gupta, above n 79.

¹⁰⁰Mikael Román, Björn-Ola Linnér and Per Mickwitz, 'Development Policies as a Vehicle for Addressing Climate Change' (2012) 4(3) *Climate and Development* 251.

¹⁰¹Kristen Halsnaes, P R Shukla and Amit Garg, 'Sustainable Development and Climate Change: Lessons from Country Studies' (2008) 8 *Climate Policy* 202.

¹⁰²Gupta, above n 79.

¹⁰³Shardul Agarwala and Martin Berg, *Development and Climate Change Project: Concept Paper on Scope and Criteria for Case Study Selection* (2002) 6.

policies, strategies and decisions on climate change. According to Anderson, 'climate change and development are inextricably linked'.¹⁰⁴ UKAid says that:

Climate change and development should be seen as complementary, not competing issues: acting on one involves acting on the other. If ignored, climate change has the potential to fundamentally undermine even the best development initiatives.¹⁰⁵

Even the IPCC has been significantly influenced by this paradigm shift (see Table 2.2). As mentioned in Section II.IV.A, the IPCC is an amalgamated body of scientists that produces peer-reviewed literature that is relevant to climate change, and it provides the policy community with syntheses of prevailing knowledge.¹⁰⁶ Previously, writers such as Newby,¹⁰⁷ Agrawala,¹⁰⁸ Siebenhüner¹⁰⁹ and Cohen, Demeritt, Robinson and Rothman¹¹⁰ have criticised the IPCC for not effectively addressing the human and social dimensions of climate change. To date, the IPCC has produced four assessment reports: First Assessment Report 1990 (FAR), Second Assessment Report 1995 (SAR), Third Assessment Report 2001 (TAR) and Fourth Assessment Report 2007 (AR4). The Fifth Assessment Report is being published in stages throughout 2013 and 2014. The Working Group I Report, called the Physical Science Basis, was released on 27 September 2013.

¹⁰⁴Simon Anderson, *Climate Change and Poverty Reduction*, Policy Brief (2011) 1.

¹⁰⁵UKAid, *The Future Climate for Development: Scenarios for Low-incoming Countries in a Climate-changing World* (2010) 8.

¹⁰⁶Imran Habib Ahmed, *Climate Policy Integration: Towards Operationalization*, DESA Working Paper No 73 (2209) 4.

¹⁰⁷H Newby, 'Global Environmental Change and the Social Sciences: Retrospect and Prospect' (The International Group of Funding Agencies for Global Change Research (IGFA) Preparatory Meeting, Noordwijk, Netherlands, 1993).

¹⁰⁸Shardul Agrawala, 'Context and Early Origins of the Intergovernmental Panel on Climate Change' (1998) 39 *Climate Change* 605; Shardul Agrawala, 'Structural and Process History of the Intergovernmental Panel on Climate Change' (1998) 39 *Climate Change* 621; Shardul Agrawala, 'Early Science-policy Interactions in Climate Change: Lessons from the Advisory Group on Greenhouse gases' (1999) 9 *Global Environmental Change* 157.

¹⁰⁹Bernd Siebenhüner, 'How do Scientific Assessments Learn?: Part 1. Conceptual Framework and Case Study of the IPCC' (2002) 5(5) *Environmental Science & Policy* 411; Bernd Siebenhuener, 'The Changing Role of Nation States in International Environmental Assessments -the Case of IPCC' (2003) 13 *Global Environmental Change* 113.

¹¹⁰Cohen et al, above n 67.

Table 2.2: Evolution of Climate-development Nexus in the IPCC

First Assessment Report 1990(FAR)	Second Assessment Report: Climate Change 1995 (SAR)	Third Assessment Report: Climate Change 2001 (TAR)	Fourth Assessment Report: Climate Change 2007 (AR4)
Climate + effects	Climate + effects	Climate + effects	Climate + effects
Cost-effectiveness	Cost-effectiveness	Cost-effectiveness	Cost-effectiveness
	Equity	Equity	Equity
		Alternate development pathways	Alternate development pathways
			Sustainable development

Source: Ahmed¹¹¹

As shown in Table 2.2, the FAR and the SAR do not address the linkage between climate change and development. The TAR launches the assessment of the formal linkage of climate change and alternative development pathways. The AR4 ultimately highlights the extensive literature on development choices. It assesses the climate change-development nexus with expanded coverage of the drivers, pillars and connections of the two-way linkage between development and climate policy. It identifies a ‘climate first’ approach in which mitigation is the essential objective, and a ‘development first’ approach in which sustainability is the key. According to Ahmed, ‘the AR4 finds *integration* an essential element of pursuing a climate-resilient development approach...’¹¹²

However, it is still a challenge to bring the climate change and development communities closer together. Progress has been made largely through the efforts of key NGOs and developing countries.¹¹³ Their strong and continuous lobbying has led to increased political interest in the climate change negotiations since 2001. They successfully brought renewed attention to the climate-development nexus in the 2002 World Summit on Sustainable Development. In that year, the major donor agencies (such as the World Bank, Asian Development Bank, African Development Bank, United Nations Environment Programme, United Nations Development Programme, Organisation for Economic Cooperation and Development (OECD), United Kingdom’s Department for International Development, European Commission’s Directorate-General for Development, Germany’s Federal Ministry for Economic Cooperation and

¹¹¹ Imran Habib Ahmed, *Climate Policy Integration: Towards Operationalization*, DESA Working Paper No 73 (2209), 4.

¹¹² Ibid 7 (emphasis added).

¹¹³ Huq, Reid and Murray, above n 6, 9.

Development, and Netherlands' Ministry of Foreign Affairs and Development Cooperation) released a paper called 'Poverty and Climate Change'¹¹⁴ at the 8th Conference of Parties (COP8)¹¹⁵ of the UNFCCC held in Delhi. Huq, Reid and Murray mark this as a major shift by the development community to incorporate climate change into their thinking.¹¹⁶

Since then, many international development organisations have launched projects to address climate change—for example, the OECD Development and Climate Project,¹¹⁷ the Growing in the Greenhouse Project¹¹⁸ and the Development and Climate Programme. Many working groups have been formed to bridge the gap between climate change and development communities. The Working Group on Climate Change and Development is a coalition of roughly 20 environment and development NGOs. Another similar type of grouping is Stop Climate Chaos. Research organisations such as the Climate and Development Knowledge Network (CDKN), the Energy and Resources Institute (TERI), the International Institute for Environment and Development (IIED), the Climate Change Knowledge Network, the Institute of Development Studies (IDS) and the Stockholm Environment Institute (SEI) have expanded climate research to include development issues.¹¹⁹

One recent example of such policy integration in the global context was in 2012 at the twentieth anniversary of the first Earth Summit in Rio de Janeiro. The report of the Secretary-General of the UN said it was time to 'revive its promise of *integration*, unity, and aspiration—the spirit of Rio'.¹²⁰ In fact, as noted by Román, Linnér and Mickwitz,¹²¹ policy makers around the world are

¹¹⁴*Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation* (2002) <<http://www.oecd.org/env/cc/2502872.pdf>>.

¹¹⁵Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Eighth Session, Held at New Delhi from 23 October to 1 November 2002-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Eighth Session*, UN Doc FCCC/CP/2002/7/Add.2 (28 March 2003).

¹¹⁶Huq, Reid and Murray, above n 6, 9.

¹¹⁷Shardul Agrawala (ed), *Bridge Over Troubled Water: Linking Climate Change and Development*, (OECD Publishing, 2005).

¹¹⁸Rob Bradley and Kevin A Baumert (eds), *Growing in the Greenhouse: Protecting the Climate by Putting Development First* (World Resources Institute, 2005).

¹¹⁹Huq, Reid and Murray, above n 6, 10.

¹²⁰*Progress to Date and Remaining Gaps in the Implementation of the Outcomes of the Major Summits in the Area of Sustainable Development, as well as an Analysis of the Themes of the Conference-Report of the Secretary-General*, The Preparatory Committee for the United Nations Conference on Sustainable Development, UN Doc A/CONF.216/PC/2 (1 April 2010) 1 (emphasis added).

¹²¹Román, Linnér and Mickwitz, above n 100, 251.

now gradually trying to integrate climate change and development policies. President Obama's attempt in early 2009 to overcome the US economic crisis through a Green New Deal¹²² is one example of such an attempt. Similarly, as mentioned by Schreurs¹²³ and Kern and Bulkeley,¹²⁴ other states and cities around the world are currently trying to meet the challenges of climate and socio-economic development through integrated policies and networks for collaboration.¹²⁵

II.V.B Integration between Mitigation and Development

The response options of climate change have gone through several phases during last few decades. The problem was initially ascribed to the emissions of greenhouse gases leading to higher atmospheric temperatures, and then to other changes in the climate system over the next decades.¹²⁶ Therefore, the solution to the problem was framed as reducing or mitigating the emission of greenhouse gases. This was reflected in the SAR, which was heavily biased towards addressing climate change by way of mitigation.¹²⁷ The ultimate objective of the UNFCCC is also mitigation, as shown in Article 2 of the Convention:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve...stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.¹²⁸

At the third Conference of Parties (COPs) of the UNFCCC in 2001, the Kyoto Protocol was adopted and signed by 186 countries. Under Article 3.1 of the Kyoto Protocol,¹²⁹ the developed countries (the Annex 1 Parties) agreed to reduce emissions by at least 5 per cent from 1990 between 2008 and 2012. In 2007, at COP13, the Bali Action Plan vastly expanded the mitigation

¹²²Mikael Román and Marcus Carson, 'Sea Change: US Climate Policy Prospects under the Obama Administration' (The Commission on Sustainable Development, March 2009).

¹²³Miranda A Schreurs, 'From the Bottom up: Local and Subnational Climate Change Politics' (2008) 17(4) *The Journal of Environment Development* 343.

¹²⁴Kristine Kern and Harriet Bulkeley, 'Cities, Europeanization and Multi-level Governance: Governing Climate Change through Transnational Municipal Networks' (2009) 47(2) *JCMS: Journal of Common Market Studies* 309.

¹²⁵Román, above n 95, 169.

¹²⁶Julia Illman et al, 'Scoping Study on Financing Adaptation-Mitigation Synergy Activities' (Nordic Working Papers, Ved Stranden 18, Nordic Council of Ministers, 11 January 2013) 10.

¹²⁷Klein, Schipper and Dessai, above n 96, 583.

¹²⁸*United Nations Framework Convention on Climate Change*, above n 3, art 2.

¹²⁹*Kyoto Protocol to the United Nations Framework Convention on Climate Change*, above n 4, art 3.1.

obligations and placed responsibilities on developing countries as well. The document states that in order to '[e]nhance national/international action on mitigation of climate change', developing countries must take 'nationally appropriate mitigation actions...in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner'.¹³⁰ Subsequent COPs held in Copenhagen (COP15 in 2009), Cancun (COP16 in 2010), Durban (COP17 in 2011) and Doha (COP18 in 2012) progressively clarified the mitigation framework for developing countries,¹³¹ who are now obligated to report on their national emissions and mitigation actions,¹³² and to prepare their own Nationally Appropriate Mitigation Actions (NAMAs).

Emission reduction or climate mitigation policies have far-reaching implications for the development issue. According to Agrawala and Berg, there are important synergies between mitigation and economic development planning.¹³³ Researchers have termed it 'climate-friendly development',¹³⁴ 'low-emission development',¹³⁵ 'low-carbon pathway',¹³⁶ or 'low-carbon development'.¹³⁷ This thesis uses the term 'low-carbon development', as defined in Section I.IV.

The FAR found that integration is an essential element of pursuing low-carbon development,¹³⁸ mentioning that the development policies in various sectors can have strong effects on

¹³⁰Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Thirteenth Session*, UN DocFCCC/CP/2007/6/Add.1 (14 March 2008) 3.

¹³¹Sudhir Sharma, 'Understanding the Nationally Appropriate Mitigation Action: Developing Country Mitigation Framework under the Convention (Technical Paper on NAMAs, Climate Action Network South Asia, January 2013) 7.

¹³²Martin Khor, 'A Clash of Paradigms- UN Climate Negotiations at a Crossroads' in Niclas Hallstrom (ed), *What Next: Climate, Development and Equity* (Dag Hammarskjold Foundation and the What Next Forum, 2012) vol III, 76, 91.

¹³³Shardul Agarwala and Martin Berg, *Development and Climate Change Project: Concept Paper on Scope and Criteria for Case Study Selection* (2002), 7.

¹³⁴Metz and Kok, above n 11, 99.

¹³⁵Alina Averchenkova, *How to Guide: Low-emission Development Strategies and Nationally Appropriate Mitigation Actions: Eastern Europe and CIS* (UNDP, 2010).

¹³⁶Gregg Butler et al, *Towards a Low Carbon Pathway for the UK* (Smith School of Enterprise and the Environment and University of Oxford, 2012).

¹³⁷Metz and Kok, above n 11, 99; UKAid, above n 22, 8; Actalliance, *Low Carbon Development Strategies and Actions Challenges and Opportunities for Developing countries: Facing the Future*, Policy Report (2012).

¹³⁸Ahmed, above n 106, 7.

greenhouse gas emissions.¹³⁹ Swart, Robinson and Cohen point out that ‘broader development policies can have important implications for greenhouse gas sources or sinks’,¹⁴⁰ which means that the development paths that countries adopt are also critical in deciding their capacity to reduce emissions.¹⁴¹ The IPCC scientists are not alone in putting climate change mitigation ahead of development policies. Different development organisations (such as the World Bank) also promote low-carbon development and insert greenhouse gas mitigation into prescriptions for development planning.¹⁴² The OECD project on Development and Climate Change examines a few case studies in relation to the linkages between mitigation and economic development planning.¹⁴³ The *South African proposal regarding Sustainable Development—Policies and Measures* (SD-PAM), which was presented in 2006, outlines a rationale under which climate change mitigation may be achieved through the primary pursuit of other development objectives.¹⁴⁴ Consequently, the ambition to use development policies as a vehicle to address climate change mitigation has gained attention within the UNFCCC.

NAMAs by developing countries are interesting because they constitute an emerging institutional mechanism where development priorities become a vehicle to address mitigation.¹⁴⁵ The Clean Development Mechanism (CDM), where Annex 1 countries can meet part of their emission caps by attaining Certified Emission Reductions from mitigation projects in developing countries, also has sustainable development criteria.¹⁴⁶ However, unlike such project-based efforts, NAMAs are designed for policy- or sector-wide efforts, and they are a large step towards the ambition to link mitigation and development objectives.¹⁴⁷

¹³⁹Sathaye et al, above n 33, 723.

¹⁴⁰Swart, Robinson and Cohen, above n 63, S29.

¹⁴¹Lily Ryan-Collins, Karen Ellis and Alberto Lemma, *Climate Compatible Development in the Infrastructure Sector: An Overview of the Opportunities and Challenges at the Nexus of Climate Change, Infrastructure and Development* (2001) 7.

¹⁴²Hadi Dowlatabadi, 'On Integration of Policies for Climate and Global Change' (2007) 12 *Mitigation and Adaptation Strategies for Global Change* 651, 655.

¹⁴³Shardul Agarwala and Martin Berg, *Development and Climate Change Project: Concept Paper on Scope and Criteria for Case Study Selection* (2002).

¹⁴⁴Román, Linnér and Mickwitz, above n 100, 252.

¹⁴⁵Román, above n 95, 170.

¹⁴⁶Román, Linnér and Mickwitz, above n 100, 252.

¹⁴⁷*Ibid* 253.

Bangladesh has expressed an interest in undertaking low-carbon development through its *Climate Change Strategy and Action Plan*.¹⁴⁸ It also participated in the Asia Least-cost Green House Gas Abatement Strategy (ALGAS) Study in 1995–1998. The ALGAS study included the formation of national greenhouse gas abatement strategies consistent with national development priorities, as well as preparation of a portfolio of greenhouse gas abatement projects.¹⁴⁹ In June 2011, the country presented its ‘Low Carbon Path of Development and NAMA’¹⁵⁰ to the UNFCCC. The presentation indicated Bangladesh’s plan to reduce emissions from business-as-usual projections by at least one-third by 2030.¹⁵¹ The country reviewed its multiple government planning documents and identified 18 NAMA opportunities, including three for the agriculture sector, seven for the energy sector, two for the forestry sector, two for the industry sector, two for the transport sector and two for the waste sector.¹⁵²

Bangladesh is also carrying out research and studies for CDM activities. It set up a high-profile Designated National Authority (DNA) to coordinate CDM activities.¹⁵³ Currently, Bangladesh has two CDM projects related to solar energy and waste management.¹⁵⁴ Both projects have been praised for their success in low-carbon development. For example, ‘Composting of Organic Waste in Dhaka’ was the second CDM project in Bangladesh and the first composting project globally.¹⁵⁵ The project was implemented by the NGO Waste Concern, and it has been internationally acknowledged for its success through several awards.¹⁵⁶ This project serves the dual benefits of producing compost and reducing methane emissions. The waste is collected by trained ‘waste pickers’, thus preventing uncontrolled dumping of waste, creating jobs

¹⁴⁸Ministry of Environment and Forests, Government of the People’s Republic of Bangladesh, *Bangladesh Climate Change Strategy and Action Plan* (2008).

¹⁴⁹Ayers and Huq, above n , 760.

¹⁵⁰Ministry of Environment and Forests, Government of the People’s Republic of Bangladesh, ‘Low Carbon Path of Development and NAMA: The Case of Bangladesh’ (Presented at the session of the AWG-LCA, Bangkok, Thailand, 4 April 2011) .

¹⁵¹Jason Dion et al, ‘Low-Carbon, Climate-Resilient Development: NAMA Concepts for Bangladesh’ (Policy Brief, International Institute for Sustainable Development, December 2012) 7.

¹⁵²Ibid 13.

¹⁵³Ayers and Huq, above n 149, 759.

¹⁵⁴Ministry of Environment and Forests, above n 150, 22.

¹⁵⁵Ayers and Huq, above n 149, 760.

¹⁵⁶Ibid 761.

(particularly for less-educated women) and creating valuable compost which in turn combats highly problematic land degradation.¹⁵⁷

II.V.C Integration between Adaptation and Development

The TAR was published in 2001 and shows the continuing increase of greenhouse gases despite the pledges of the world community to reduce emissions. The Report also highlights the unavoidable onset of climate change in the next one to three decades. Illman et al note that:

While mitigation was still important to avoid long-term (over 5–10 decades) catastrophic levels of climate change, it is necessary to also carry out adaptation to the unavoidable impacts of climate change which had become ‘locked-in’ already due to past and current emission of greenhouse gases.¹⁵⁸

According to Verheyen,¹⁵⁹ the law on adaptation is still in its infancy, as mitigation has been dealt with widely in the climate change regime to date. However, Article 4 of the UNFCCC is the pivotal section for undertaking adaptation and enhancing adaptive capacity in the climate change regime.¹⁶⁰ Paragraph 1(b) of Article 4 states that parties must formulate and implement national or regional programs containing ‘measures to facilitate adequate adaptation to climate change’.¹⁶¹ Article 3(3) complements this clause by committing parties to ‘take precautionary measures to anticipate, prevent or minimize the causes of climate change’.¹⁶² Thus, the Convention states that all stateparties must address adaptation in a precautionary and strategic way through programs rather than simply relying on autonomous adaptation by nature.¹⁶³ Moreover, according to paragraph 1(e) of Article 4, all parties must commit to cooperate in

¹⁵⁷Waste Concern, *Composting of organic waste in Dhaka: Project Design Document Form (CDM PDD), Version 2* (1 July 2004) <<http://cdm.unfccc.int/filestorage/H/1/F/H1F6UCFPGCJ6PEKAYDZSQJINZYRBMO/Project%20Design%20Document.pdf?t=amF8bW0zdDdmfDDjsj2wCEjvE69WT5CSeRqD>> 2–3.

¹⁵⁸Julia Illman et al, 'Scoping Study on Financing Adaptation-Mitigation Synergy Activities' (Nordic Working Papers, Ved Stranden 18, Nordic Council of Ministers, 11 January 2013).

¹⁵⁹Roda Verheyen, 'Adaptation to the Impacts of Anthropogenic Climate Change –The International Legal Framework' (2002) 11(2) *Review of European Community & International Environmental Law* 129, 129.

¹⁶⁰Tanzim Afroz and Mostafa Mahmud Naser, 'Adaptation to Climate Change in the International Climate Change Regime: Challenges and Responses' in *Implementing Adaptation Strategies by Legal, Economic and Planning Instruments on Climate Change* (Series: Environmental Protection in European Union, 4th ed, Springer, 2013) (forthcoming).

¹⁶¹*United Nations Framework Convention on Climate Change*, above n 3, art 4.

¹⁶²Ibid art 3.

¹⁶³Verheyen, above n 159.

preparing for adaptation to climate effects.¹⁶⁴ The international collaboration for adaptation responses has been stressed in several sensitive fields such as coastal zone management, water resources and agriculture. As the focus of this thesis is coastal zone management, Section III.V will discuss the adaptive options for coastal zone management in detail.

Adaptation is starting to be associated with the interests of developing countries, and the international community recognises that adaptive capacity is dependent on development contexts.¹⁶⁵ This was translated into policy in Bonn (COP6 part 2 in 2001) and Marrakesh¹⁶⁶ (COP7 in 2001), and three new funds were created to assist adaptation in developing countries: a Least Developed Countries Fund (LDCF), a Special Climate Change Fund (SCCF) under the UNFCCC and an Adaptation Fund under the Kyoto Protocol.¹⁶⁷ COP15 in Copenhagen established a new Green Climate Fund. These initiatives have been undertaken in recognition of the high vulnerability of some developing countries to climate change, and the consequent need for their adaptation.¹⁶⁸ Funding opportunities have been created for Least Developed Countries (LDCs) to prepare the National Adaptation Programmes of Action (NAPAs). Bangladesh was the first LDC to complete the NAPA in 2005.¹⁶⁹ In Bali in 2007, COP13 finally brought adaptation onto equal footing with mitigation by highlighting it as one of the four ‘building blocks’ to come out of the negotiations alongside mitigation, technology cooperation and finance.¹⁷⁰ Table 2.3 shows the evolution of adaptation and development in the UNFCCC and Kyoto Protocol negotiations.

¹⁶⁴United Nations Framework Convention on Climate Change, above n 3, art 4.

¹⁶⁵Jessica M Ayers and David Dodman, 'Climate Change Adaptation and Development I: The State of the Debate' (2010) 10(2) *Progress in Development Studies* 161, 163.

¹⁶⁶Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Seventh Session*, UN DocFCCC/CP/2001/13/Add.2 (21 January 2002).

¹⁶⁷Salceemul Huq, 'The Bonn—Marrakech Agreements on Funding' (2002) 2(2) *Climate Policy* 243, 243.

¹⁶⁸Klein, Schipper and Dessai, above n 96, 580.

¹⁶⁹Ayers and Huq, above n , 759.

¹⁷⁰Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Thirteenth Session*, UN DocFCCC/CP/2007/6/Add.1 (14 March 2008)132.

Table 2.3: Evolution of Adaptation and Development in the UNFCCC and Kyoto Protocol Negotiations

COP6 in Bonn, Germany (July 2001)	Established three new funds: the Special Climate Change Fund (SCCF), the Least Developed Countries Fund (LDCF) and the Adaptation Fund.
COP7 in Marrakesh, Morocco (October–November 2001)	Prompted the formation of the LDC Expert Group. The COP also laid out the objectives of the three new funds. The SCCF would finance activities relating to climate change in the areas of adaptation, technology transfer, energy, transport, industry, agriculture, forestry and waste management. The LDC Fund would support the preparation of NAPAs for LDCs. Lastly, the Adaptation Fund would be financed from 2 per cent of charges on all Clean Development Mechanism projects and other sources of funding.
COP8 in Delhi, India (October–November 2002)	Produced the Delhi Declaration, which reaffirms the importance of development and poverty eradication. It calls for policies and measures that are specific to national circumstances, and the integration of climate change objectives into national sustainable development strategies. The COP proceedings also refuted the perceived divide between environment and development agendas.
COP10 in Buenos Aires, Argentina (December 2004)	Brought to light the difficulties of funding adaptation projects in the context of development. At present, the Global Environment Facility (which administers UNFCCC funds) will only finance projects with a core focus on adaptation. Adaptation projects with additional development benefits will not receive full-cost funding, even though most adaptation projects are built on or embedded in larger national or local development projects. Co-financing from development and donor agencies would therefore be required, which places an additional burden on poor countries seeking funds.
COP11 in Montreal, Canada (November–December 2005)	Finally adopted the Marrakesh Accords, which enable the operation of three different international funds for adaptation. The Montreal meeting was also the first Meeting of the Parties (MOP1) after the Kyoto Protocol came into force. One important new element of discussion was the issue of raising funds for the Adaptation Fund from other flexible mechanisms in addition to the adaptation levy on the Clean Development Mechanism alone.
COP12 in Nairobi, Kenya (November 2006)	Nairobi work program on effects, vulnerability and adaptation to climate change was adopted.
COP15 in Copenhagen, Denmark (7–19 December 2009)	A new Green Climate Fund was established.
COP16 in Cancun, Mexico (November–December 2010)	Decided to establish an Adaptation Committee to promote enhanced adaptation action.
COP17 in Durban, South Africa (November–December 2011)	Developed countries continue to blur the distinction between adaptation and other development processes so they can characterise Official Development Assistance (ODA) as adaptation finance and limit the scale of their financial commitments.
COP18 in Doha, Qatar (November–December 2012)	Invited UN organisations, specialised agencies and other relevant organisations, as well as bilateral and multilateral agencies, to support the national adaptation plan process in the LDC parties.

Source: Huq, Reid and Murray¹⁷¹

Adaptation is now receiving recognition in the academic arena and in climate policy, which many adaptation scholars (eg, Burton,¹⁷² Pielke Jr,¹⁷³ Smith et al¹⁷⁴) have been advocating. Burton

¹⁷¹Huq, above n 6, 15.

et al¹⁷⁵ suggest that research on adaptation should focus on assessing the social and economic determinants of vulnerability in a development context.¹⁷⁶ Klein, Schipper and Dessai say that the link between adaptation and...development is particularly relevant when seeking to enhance the capacity of countries and communities to adapt to climate change...¹⁷⁷ According to Anderson,¹⁷⁸ economic development has contributed not only to an unsustainable rise in greenhouse gas emissions, but also to an inequitable distribution of people's ability to cope with these changes —their adaptive capacity'.¹⁷⁹ Smith, Klein and Huq¹⁸⁰ have explored the linkages between adaptive capacity and development. The TAR states that:

Ability to adapt clearly depends on the state of development...underdevelopment fundamentally constrains adaptive capacity, especially because of a lack of resources to hedge against extreme but expected events.¹⁸¹

Since 2002, researchers and NGO communities have increasingly incorporated climate change within their development work.¹⁸² They undertake locally appropriate vulnerability reduction activities, which have led an emerging discourse of Community-Based Adaptation (CBA). According to Ayers and Dodman, CBA is often similar to development in practice.¹⁸³ Many donors (such as the World Bank) are integrating adaptation into development policies and

¹⁷²Ian Burton, 'Adaptation to Climate Change and Variability in the Context of Sustainable Development' in Luis Gómez-Echeverri (ed), *Climate Change and Development* (Yale School of Forestry and Environmental Studies, 2000) 153.

¹⁷³Roger A Pielke Jr, 'Rethinking the Role of Adaptation in Climate Policy' (1998) 8(2) *Global Environmental Change* 159.

¹⁷⁴Joel B Smith et al, 'Development and Adaptation Funding: Coordination and Integration' in Erik Haites (ed), *International Climate Finance* (Routledge, 2013) .

¹⁷⁵Ian Burton et al, 'From Impacts Assessment to Adaptation Priorities: the Shaping of Adaptation Policy' (2002) 2(2) *Climate Policy* 145, 154.

¹⁷⁶Kirsten Halsnaes et al, 'Framing Issues' in Bert Metz et al (eds), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 117, 142.

¹⁷⁷Klein, Schipper and Dessai, above n 96, 583.

¹⁷⁸Simon Anderson, *Climate Change and Poverty Reduction*, Policy Brief (2011) 1.

¹⁷⁹Adaptive capacity refers to the success with which people, organisations and enterprises are able to cope with, overcome and take advantage of the effects of climate change.

¹⁸⁰Joel B Smit, Richard J T Klein and Saleemul Huq, *Climate Change, Adaptive Capacity and Development* (Imperial College Press, 2003).

¹⁸¹Barry Smit et al, 'Adaptation to Climate Change in the Context of Sustainable Development and Equity' in James J McCarthy et al (eds), *Climate Change 2001: Impacts, Adaptation, and Vulnerability. A Contribution of Working Groups II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2001) 877, 899.

¹⁸²Ayers and Dodman, above n 165, 164.

¹⁸³*Ibid.*

programs or ‘climate proofing’ their development investments.¹⁸⁴ Nevertheless, this integrated approach of donors has been depicted by Ayers and Dodman as ‘adaptation plus development’, in contrast to a CBA approach, which adopts an ‘adaptation as development’ approach. From a development viewpoint, ‘adaptation and development are often viewed as synonymous’.¹⁸⁵ However, there is a danger of going too far, because not all adaptation is development, and not all development contributes towards adaptation.¹⁸⁶

Adger,¹⁸⁷ Cohen et al¹⁸⁸ and Sen¹⁸⁹ consider that development makes an important contribution to climate change adaptation by strengthening entitlements and boosting the resilience of individuals and communities.¹⁹⁰ Agrawala and Berg mention that adaptations are likely to enhance the resilience of societies to cope with many adverse effects of climate change.¹⁹¹ This is why some researchers call the adaptation–development nexus ‘climate-resilient development’,¹⁹² ‘climate-safe development’,¹⁹³ ‘climate-proofing development’¹⁹⁴ or ‘CBA’. This thesis uses the term ‘climate-resilient development’, as defined in Section I.IV.

In 2013, the Adaptation Knowledge Platform conducted a research on adaptation and development in Bangladesh and observed that ‘there is significant overlap between the two’.¹⁹⁵ The government of Bangladesh has established the Bangladesh Climate Change Resilience Fund (BCCRF) with the financial support of the World Bank, Denmark, the European Union, Sweden,

¹⁸⁴Richard T J Klein et al, ‘Portfolio Screening to Support the Mainstreaming of Adaptation to Climate Change into Development Assistance’ (Tyndall Centre Working Paper 102, Tyndall Centre for Climate Change research, 2007).

¹⁸⁵Ayers and Dodman, above n 165, 165.

¹⁸⁶Ibid.

¹⁸⁷W. Neil Adger, ‘Social Vulnerability to Climate Change and Extremes in Coastal Vietnam’ (1999) 27(2) *World development* 249.

¹⁸⁸Cohen et al, above n 67.

¹⁸⁹Amartya Sen, *Development as Freedom* (Oxford University Press, 1999).

¹⁹⁰Ayers and Dodman, above n 165, 163.

¹⁹¹Shardul Agarwala and Martin Berg, *Development and Climate Change Project: Concept Paper on Scope and Criteria for Case Study Selection* (2002) 8.

¹⁹²Ahmed, above n 106, 7; Imasiku Nyambe, ‘Toward Climate Resilient Development: Strengthening the Science-Policy-Institutional-Finance Dialogue in Africa’ (paper presented at AfricaAdapt Climate Change Symposium 2011, Addis Ababa, Ethiopia, 9-11 March 2011).

¹⁹³Metz and Kok, above n 11, 99.

¹⁹⁴Ibid 99; Marlene Hahn and Alexander Fröde, *Climate Proofing for Development: Adapting to Climate Change, Reducing Risk* (Deutsche Gesellschaft für Technische Zusammenarbeit, 2011).

¹⁹⁵Malin Beckman et al, ‘Adaptation or Development? Exploring the Distinctions (or Lack thereof) through Case studies in Bangladesh and Vietnam’ (Partner Report Series No 8, Adaptation Knowledge Platform, 2013) 17.

the United Kingdom, Switzerland, Australia and the United States. This fund is channelling over US\$170 million in grants to millions of Bangladeshis to increase their resilience to the effects of climate change.¹⁹⁶ The government also created a separate Bangladesh Climate Change Trust Fund (BCCTF) and allocated US\$350 million from its own resources for 2009–2012. Bangladesh has been implementing 106 projects to address climate change,¹⁹⁷ and a number of international NGOs are working with local communities to ensure climate-resilient development—for example, in response to the flooding in 2007, the Practical Action is organising the ‘floating garden’ technique in the district of Gaibandha.¹⁹⁸ A floating garden is built from a raft of water hyacinths. The raft is covered with soil, compost and manure, in which villagers grow the vegetables. These floating gardens provide an alternative source of income when the vegetables are sold in the market, and it reduces vulnerability to inundation. As the rafts can be moved from place to place, they are also suitable for those who have temporarily or permanently lost their homes and land during increasingly severe flooding conditions.¹⁹⁹

II.V.D Integration between Adaptation and Mitigation

From the discussion in Sections II.V.B and II.V.C, it is clear that the UNFCCC has so far identified two response options for climate change: (i) mitigation of climate change by reducing greenhouse gas emissions and enhancing sinks, and (ii) adaptation to the effects of climate change.²⁰⁰ These highlight the separate evolution of mitigation and adaptation. Historically, both have been perceived and treated as separate climate change management strategies in both

¹⁹⁶Government of People's Republic of Bangladesh, *The Bangladesh Climate Change Resilience Fund* (2013) BCCRF

<file:///F:/1.Phd/1.Materials%20Collected%20&%20Writing%20for%20PhD/1%60.Aricles/4.%20Climate%20change/4%28c%29%20CC-Legal.Dom/18.%20Bangladesh%20Climate%20Resilient%20Fund.htm>.

¹⁹⁷Bangladesh and Maldives Respond to Climate Change Impacts (7 December 2012) The World Bank <<http://www.worldbank.org/en/news/press-release/2012/12/07/bangladesh-maldives-respond-to-climate-change-impacts>>.

¹⁹⁸Aka Firowz Ahmad, *Community Based Adaptation to Climate Change in Bangladesh: The Global Initiative at Local Level* <http://www.monash.edu.au/research/sustainability-institute/asia-projects/community_based_adaptation_bangladesh.pdf> 11.

¹⁹⁹*Ibid.*

²⁰⁰Richard J T Klein et al, 'Inter-relationships between Adaptation and Mitigation' in Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 745, 748.

science and policy.²⁰¹ There is abundant research (eg, Adger,²⁰² Ayers and Huq,²⁰³ Corfee-Morlot and Agrawala,²⁰⁴ Wilbanks et al,²⁰⁵ Tol²⁰⁶ and Goklany²⁰⁷) highlighting the differences between the two response options. Ayers and Huq²⁰⁸ distinguish them in terms of spatial, temporal and socioeconomic scales.

Spatially, the advantages of mitigation fall on all sectors in all countries, whereas adaptation is sector-specific and often country-specific.²⁰⁹ This means that mitigation benefits are more global while adaptation benefits are more localised.²¹⁰ Temporally, adaptation reduces vulnerability to immediate and near-term climate risks, whereas mitigation benefits are lagged in time. The benefits of mitigation carried out today will be realised in several decades because of the long residence time of greenhouse gases in the atmosphere.²¹¹ Finally, Ayers and Huq²¹² consider that adaptation is more of a priority for vulnerable developing countries. Their mitigative capacity is lower than the rich north, but their vulnerability to climate change is acute. In contrast, mitigation is prioritised by industrialised countries. Table 2.4 presents the main differences between mitigation and adaptation in relation to climate change.

²⁰¹ Ayers and Huq, above n , 753.

²⁰² W Neil Adger, 'Scales of Governance and Environmental Justice for Adaptation and Mitigation of Climate Change' (2001) 13(7) *Journal of International Development* 921.

²⁰³ Ayers and Huq, above n ,755.

²⁰⁴ Jan Corfee-Morlot and Shardul Agrawala, 'The Benefits of Climate Policy' (2004) 14(3) *Global Environmental Change* 197.

²⁰⁵ Thomas J Wilbanks et al, 'Toward an Integrated Analysis of Mitigation and Adaptation: Some Preliminary Findings' (2007) 12 *Mitigation and Adaptation Strategies for Global Change* 713, 714.

²⁰⁶ Richard S J Tol, 'The Double Trade-off between Adaptation and Mitigation for Sea Level Rise: An Application of Fund' (2007) 12 *Mitigation and Adaptation Strategies for Global Change* 741, 742.

²⁰⁷ Indur M Goklany, 'Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development' (2007) 12 *Mitigation and Adaptation Strategies for Global Change* 755, 756.

²⁰⁸ Ayers and Huq, above n ,755.

²⁰⁹ Tol, above n 742.

²¹⁰ Wilbanks et al, above n 714.

²¹¹ Klein et al, above n , 768.

²¹² Ayers and Huq, above n ,755.

Table 2.4: A Comparison of Mitigation and Adaptation

	Mitigation	Adaptation
Aim	Reduce the potential effects of climate change (limit CO ₂ emissions)	Reduce societies' vulnerability to the effects of climate change
Timeframe	Long-term (30–40 years) global benefits	Short- to medium-term local benefits
Primary Actors	(Supra-) national governments in the context of international negotiations	Responsible managers ((supra-) national governments, regional authorities, local water boards, land/property owners)
Advantages	For all sectors in all countries	For specific sectors and countries

Source: European Commission²¹³

However, many of these distinctions are not valid when considered more carefully. For example, in addition to local benefits, adaptation may have global benefits, where it reduces threats to biodiversity and natural systems.²¹⁴ Although the demand of mitigation is for the global good, both mitigation and adaptation options are implemented on the same local or regional scale.²¹⁵ As opposed to the long-term benefits, the ancillary benefits of mitigation (such as reduced air pollution) are possible in the short term. Mitigation is now not a concern of the rich north alone. The recent climate change negotiations oblige developing countries to take mitigative actions in addition to industrialised countries (see Section II.V.B). As a result, studies are increasingly beginning to view mitigation and adaptation as complementary to each other (eg, Dang, Michaelowa and Tuan,²¹⁶ Goklany,²¹⁷ Kane and Shogren,²¹⁸ Klein, Schipper and Dessai,²¹⁹ Swart, Robinson and Cohen,²²⁰ Wilbanks et al²²¹). Increased focus on such integration within the research community has led to new work in this area.²²²

²¹³European Commission, *The Economics of Climate Change Adaptation in EU Coastal Areas*, Final Report (2009) 11.

²¹⁴Ayers and Huq, above n , 757.

²¹⁵Klein et al, above n , 768.

²¹⁶Hanh H Dang, Axel Michaelowa and Dao D Tuan, 'Synergy of Adaptation and Mitigation Strategies in the Context of Sustainable Development: The Case of Vietnam' (2003) 3(S1) *Climate Policy* S81.

²¹⁷Indur M Goklany, 'Relative Contributions of Global Warming to Various Climate Sensitive Risks, and their Implications for Adaptation and Mitigation' (2003) 14(6) *Energy & Environment* 797.

²¹⁸Sally M Kane and Jason F. Shogren, 'Linking Adaptation and Mitigation in Climate Change Policy' in Sally M Kane and Gary W Yohe (eds), *Societal Adaptation to Climate Variability and Change* (Springer Link, 2000) 75.

²¹⁹Klein, Schipper and Dessai, above n 96.

²²⁰Swart, Robinson and Cohen, above n 63, S29.

²²¹Wilbanks et al, above n 205, 714.

²²²Goklany, above n 207, 756.

There is growing recognition that both mitigation and adaptation efforts are intrinsically linked through their ‘cause and effect’ relationship. Illman et al,²²³ Ayers and Huq,²²⁴ and Dang, Michaelowa and Tuan²²⁵ narrate this relationship as: the more effective mitigation is now, the less need for adaptation in the future. There is also a clear link between the costs of these two response options. According to Illman et al, the more mitigation activities that are undertaken, the higher their cost, but the less need to engage in adaptation activities in the future and invest in adaptation.²²⁶ Nevertheless, mitigation efforts are not progressing as rapidly as was once hoped. Rather, the effects of climate change are already emerging.²²⁷ Such a situation calls for simultaneous action of mitigation and adaptation in response to climate change. The unsteady progress of the Kyoto Protocol is another reason why an integrated approach now figures more prominently in the discussions of the UNFCCC or in the COPs.²²⁸ The COP7²²⁹ links adaptation and mitigation through the Adaptation Fund, which is financed by a 2 per cent levy on the CDM. Thus, the more effective the CDM, the greater the level of funding for adaptation. In 2007, the AR4 included a separate chapter on the ‘Inter-relationships between Adaptation and Mitigation’,²³⁰ which raised the profile of the dual necessity of both strategies and encouraged policy-makers to explore the synergies and trade-offs between them.

According to Jones et al, ‘adaptation and mitigation work from the bottom up and top down of the range of global warming, respectively’.²³¹ Bizikova, Neale and Burton say that an integration of mitigation and adaptation measures is necessary in order to decrease climate risks and capture

²²³ Julia Illman et al, 'Scoping Study on Financing Adaptation-Mitigation Synergy Activities' (Nordic Working Papers, Ved Stranden 18, Nordic Council of Ministers, 11 January 2013).

²²⁴ Ayers and Huq, above n 149.

²²⁵ Dang, Michaelowa and Tuan, above n 216.

²²⁶ Julia Illman et al, 'Scoping Study on Financing Adaptation-Mitigation Synergy Activities' (Nordic Working Papers, Ved Stranden 18, Nordic Council of Ministers, 11 January 2013) 13.

²²⁷ Thomas J Wilbanks, Jayant Sathaye and Richard J T Klein, 'Introduction' (2007) 12 *Mitigation and Adaptation Strategies for Global Change* 639, 639.

²²⁸ Goklany, above n , 756.

²²⁹ Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Seventh Session*, UN DocFCCC/CP/2001/13/Add.2 (21 January 2002).

²³⁰ Klein et al, above n , 768.

²³¹ Roger N Jones et al, 'The Relationship between Adaptation and Mitigation in Managing Climate Change Risks: a Regional Response from North Central Victoria, Australia' (2007) 12(5) (2007/06/01) *Mitigation and Adaptation Strategies for Global Change* 685, 692.

co-benefits.²³² Particularly compelling is the idea that policy integration potentially provides opportunities for both mitigation and adaptation to climate change. Klein, Schipper and Dessai state that:

Synergies in climate policy are created when measures that control atmospheric greenhouse gas concentrations also reduce adverse effects of climate change, or vice versa. Such measures have ancillary benefits, which produces win-win situations.²³³

As noted by Ayers and Huq, such a win-win situation can increase the relevance of mitigation for the most vulnerable developing countries, moving beyond the perception of mitigation as an issue only for the north.²³⁴ According to Klein, Schipper and Dessai, this synergy ultimately connects mitigation and adaptation with natural resource management, biodiversity conservation and measures to combat desertification.²³⁵ According to Huq and Grubb²³⁶ and Ayers and Huq, ‘opportunities for win-win mitigation and adaptation integrated approaches are most likely at the local level, where they are linked in more action-specific ways’.²³⁷ As this thesis focuses on coastal management, Section III.VI will explore the links between adaptation and mitigation in coastal management in detail.

II.VI Reasons behind this Paradigm Shift

Tanner and Allouche consider that ‘climate change has become one of *the* defining contemporary international development issues’.²³⁸ Ultimately, the world could possibly face an alarming situation where development is in a state of crisis because of climate change, like a crossroads of crises that feed on one another.²³⁹ So far, mitigation and adaptation have been acknowledged as only two policies to confront climate change. However, researchers now argue

²³²Bizikova Livia, Tina Neale and Ian Burton, *Canadian Communities' Guidebook for Adaptation to Climate Change: Including an Approach to Generate Mitigation Co-benefits in the Context of Sustainable Development* (Environment Canada and University of British Columbia, 1st ed, 2008) 20.

²³³Klein, Schipper and Dessai, above n 96.

²³⁴Ayers and Huq, above n , 757.

²³⁵Klein, Schipper and Dessai, above n 96, 582.

²³⁶Saleemul Huq and Micheal Grubb, 'Preface' (2007) 12(5) *Mitigation and Adaptation Strategies for Global Change* 645, 646.

²³⁷Ayers and Huq, above n ,757.

²³⁸Thomas M Tanner and Jeremy Allouche, 'Towards a New Political Economy of Climate Change and Development' (2011) 42(3) *IDS BULLETIN* 1, 1.

²³⁹Climate Action Network, France and ENDA Tiers Monde, *Climate & Development: Local Strategies and International Governance* (2010) 6.

that, taken alone, these would not work, as they are simply patching up a flawed development system.²⁴⁰ According to Dupar, '[t]he smartest climate policy choices should add a wider development dimension to adaptation and mitigation goals'.²⁴¹ This triple-win situation (integration of adaptation, mitigation and development) is a significant shift from the traditional approach of addressing climate change. Section II.V describes in detail how there is a paradigm shift towards an integrated approach of climate change and development. There are several concerns and situations that ultimately lead to the development of paths for such a paradigm shift.

II.VI.A Insufficient Mitigation Target

In 2012, the twentieth anniversary of the first Earth Summit of the UNFCCC was celebrated. It is now apparent that the UNFCCC's ultimate objective of 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'²⁴² is far from being achieved. Rather, the statistics narrate a different story. The World Bank has published that global CO₂ emissions between 1990 and 2005 increased by 29.5 per cent.²⁴³

The Kyoto Protocol, which was created under the UNFCCC in 1997, is the only legally binding plan for combating greenhouse gas emissions. The aim of the Protocol for its first commitment period (2008–2012) was to reduce the collective greenhouse gas emissions of developed country parties by at least 5 per cent below 1990 levels.²⁴⁴ The researchers argue that this figure is far from what the scientific community demands and far from being reached by the industrial countries.²⁴⁵ In fact, most of the signatory countries have seen their emissions increase. The

²⁴⁰Parry, above n 8, 8.

²⁴¹Mairi Dupar, *Defining Climate Compatible Development* (25 June 2011) Climate & Development Knowledge Network <<http://cdkn.org/2011/06/defining-climate-compatible-development/>>.

²⁴²*United Nations Framework Convention on Climate Change*, above n 3, art 2.

²⁴³The World Bank, *The Little Green Data Book* (2009) 2.

²⁴⁴*Kyoto Protocol to the United Nations Framework Convention on Climate Change*, opened for signature 16 March 1998, UN Doc 37 ILM 22 (entered into force 16 February 2005) art 3.1.

²⁴⁵Climate Action Network, France and ENDA Tiers Monde, *Climate & Development: Local Strategies and International Governance* (2010) 7.

situation is worst in countries that have never ratified the Protocol—for example, US emissions increased by 20 per cent between 1990 and 2008.²⁴⁶

The COP18²⁴⁷ of the UNFCCC in 2012 decided to establish a second commitment period for the Protocol from 2013 to 2020. The Warsaw Climate Change Conference 2013 (COP19) ended with few genuine cuts in greenhouse gas emissions from deforestation.²⁴⁸ Therefore, the poor emission reduction target in international climate negotiations is now a real challenge. Most importantly, scientific evidence now considers that the current mitigation targets, even if fully achieved, would not avoid major global effects.²⁴⁹ Thus, something more meaningful is expected from the international community.

II.VI.B Insufficient Financial Commitments

As there are limits to damage avoidance by mitigation, the challenge for adaptation is truly enormous.²⁵⁰ The climate change regime is significant in both legal and political terms, as it provides developing countries with a legal basis to claim funds from developed countries for the purpose defined in the UNFCCC.²⁵¹ Under Article 4(3), the developed state parties and other developed parties included in Annex II²⁵² must commit to providing ‘full incremental costs’ and transferring adaptive technologies as required by the developing state parties.²⁵³ The developed countries must also commit to assisting particularly vulnerable developing countries to meet their adaptation costs under Article 4(4).²⁵⁴ However, regarding adaptation finance, there is no legally

²⁴⁶Ibid 7.

²⁴⁷Conference of the Parties, United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on Its Eighteenth Session, Held in Doha from 26 November to 8 December 2012-Addendum- Part 2: Action Taken by the Conference of the Parties at Its Eighteenth Session, UN DocFCCC/CP/2012/8/Add.2 (28 February 2013).

²⁴⁸*Warsaw Climate Change Conference-November 2013*, United Nations Framework Convention on Climate Change < <http://unfccc.int/2860.php#decisions>>.

²⁴⁹Parry, above n 8, 5.

²⁵⁰Ibid 6.

²⁵¹Verheyen, above n , 134.

²⁵²Western Organization for Economic Cooperation and Development. OECD members are considered Annex II countries under the UNFCCC; Annex I lists all Annex II countries plus countries with economies in transition in Central and Eastern Europe as well as Russia and the Ukraine.

²⁵³*United Nations Framework Convention on Climate Change*, above n 3, art 4.

²⁵⁴Ibid.

binding quantitative obligation.²⁵⁵ All such funds under the Convention or Protocol, as described in Section II.V.C, comprise voluntary contributions from developed countries.

The costs of adapting to a world that is approximately 2°C warmer by 2050 were estimated to be between US\$75 billion and US\$100 billion per year from 2010 to 2050.²⁵⁶ However, the total available annual funding for adaptation under the Convention or Protocol up to 2012 ranges from US\$20 million to US\$300 million at best.²⁵⁷ The insufficient and increasingly limited climate financial commitment in international climate negotiations is a significant concern for vulnerable developing countries. The current economic slump is preventing any calm debate on the issue of the financing needed to enable the most vulnerable countries to opt for climate-resilient or low-carbon development.²⁵⁸ Purdon identifies that climate funds are more vulnerable to systemic forces.²⁵⁹ The COP18 in Doha marked a key moment in this debate, as there was no bridge between the fast-start finance period (which ended in 2012) and the US\$100 billion commitment made in COP15, which begins in 2020. Even the latest COP in Warsaw ended with no clear pathway that requires developed countries to reach the target of mobilising US\$100 billion annually by 2020.²⁶⁰

II.VI.C Incoherencies between Climate and Development Policies

Currently, there are large coordination gaps or incoherencies between development policies and climate policies. Developing countries are obliged to design new plans with each new international agreement and convention in order to have access to international funding.²⁶¹ They also go through the same process with each new funding program of donors, which ultimately

²⁵⁵Laurens M Bouwer and Jeroen C J H Aerts, 'Financing Climate Change Adaptation' (2006) 30(1) *Disasters* 49, 58.

²⁵⁶World Bank, *Costs to Developing Countries of Adapting to Climate Change. New Methods and Estimates: The Global Report of the Economics of Adaptation to Climate Change Study*, Consultation Draft (2009) 4.

²⁵⁷Ancha Srinivasan, 'Adaptation to Climate Change' in Ancha Srinivasan (ed), *Asian Aspirations for Climate Regime Beyond 2012: Energy Security and Developmental Needs Clean Development Mechanism Technology Development and Transfer Adaptation to Climate Change* (Institute for Global Environmental Strategies, 2006) 77, 85.

²⁵⁸Climate Action Network, France and ENDA Tiers Monde, above n 245,7.

²⁵⁹Mark Purdon, 'Neoclassical Realism and International Climate Change Politics: Moral Imperative and Political Constraint in International Climate Finance' (2013) *Journal of International Relations and Development* 1, 1.

²⁶⁰*Report of the Adaptation Fund Board*, United Nations Framework Convention on Climate Change <http://unfccc.int/files/meetings/warsaw_nov_2013/decisions/application/pdf/cmp9_second_review_af.pdf>.

²⁶¹Climate Action Network, France and ENDA Tiers Monde, above n 245,9.

leads to confusion or the overlapping of plans—for example, national development plans; sector-based plans; Poverty Reduction Strategy Papers (PRSP) of the International Monetary Fund (IMF); Country Assistance Strategies (CAS) of the World Bank; national strategies of economic growth; United Nations Development Assistance Frameworks (UNDAF); and MDGs. Developing countries often pile up these documents and strategies one after the other, but can rarely implement them because of a lack of financial resources, poor governance and strict financial conditions imposed by donors.²⁶² Many environmental policies that address the climate change issue can also be added to this list—for example, National Action Programme to Combat Desertification (NAPCD); National Environment Action Plan (NEAP); Biodiversity Strategy, Action Plan and National Report (BSAP); Agenda 21; National Adaptation Programmes of Action (NAPA); National Communications; Technology Needs Assessment (TNA); and NAMAs as part of the UNFCCC. They are useful but often ineffective documents, as they do not necessarily coincide with national development priorities, and they lack funding for implementation.²⁶³ Sometimes there is a large gap between the donors' perspective and national priorities.

Moreover, national development policies and climate policies are often placed under the responsibility of different government ministries. This lack of inter-ministerial coherency can lead to grotesque results,²⁶⁴ to the extent that some economic development policies can accelerate the effects of climate change (see Section II.III for a relevant case study in this regard). These incoherencies often stem from prior lack of coordination between the embryonic climate objectives and the national and sector-based development plans. A different approach to development is necessary, as researchers now emphasise that 'future vulnerability will depend more on development pathways than on climate change'.²⁶⁵

²⁶² Ibid.

²⁶³ Ibid 10.

²⁶⁴ Ibid 10.

²⁶⁵ Parry, above n 8, 8.

II.VI.D Human Wellbeing as a Policy Goal for Climate and Development Policies

A group of development theories has evolved in recent times, with a focus on development and human wellbeing. These include works by Sen²⁶⁶ and Dasgupta.²⁶⁷ Sen narrates development in terms of the freedoms of individuals and “[t]he motivation underlying the approach of ‘development as freedom’ is not so much to order all states...but to draw attention to important aspects of the process of development’.”²⁶⁸ Human wellbeing paradigms are affecting recent development policies for the energy, food and water sectors. For instance, it has been reflected in the World Bank’s Poverty Reduction Strategies.²⁶⁹

As noted by Halsnaes and Verhagen, the theories that focus on human wellbeing are closely related to ethics in emphasising the rights of all human beings to have access to specific resources.²⁷⁰ Climate change adaptation and mitigation policies have a number of implications on resources, including access to natural resources, food, water and energy. These resources are considered important factors for human wellbeing. Therefore, the argument can be set, from a national perspective, that climate change policies should be embedded in development policies in order to ensure individuals’ access to those resources that are directly related to climate change adaptation and mitigation policies.²⁷¹ Individuals’ rights and freedom must not be infringed. Halsnaes and Verhagen more specifically mention that adaptation policies should compensate any climate change losses that individuals may experience in relation to basic needs, and mitigation policies should not imply any reduction in access to, and affordability of, energy, food and water resources.²⁷²

²⁶⁶Sen, above n 189.

²⁶⁷Partha Dasgupta, *An Inquiry into Wellbeing and Destitution* (Oxford University Press, 1993).

²⁶⁸Sen, above n 189, 33.

²⁶⁹Kirsten Halsnæs and Jan Verhagen, 'Development based climate change adaptation and mitigation—conceptual issues and lessons learned in studies in developing countries' (2007) 12(5) (2007/06/01) *Mitigation and Adaptation Strategies for Global Change* 665, 669.

²⁷⁰Ibid 668.

²⁷¹Halsnæs and Verhagen, above n 269, 669.

²⁷²Ibid.

II.VII Definition of a Climate-development Integrated Approach

The climate research community, development organisations, policy-makers, NGOs and practitioners use a wide range of terminology to describe the integration between climate change and development policies. The popular term used in this regard is ‘Climate Compatible Development’ (CCD). According to Kaur and Ayers, integrated planning is the key in CCD.²⁷³ The CDKN²⁷⁴ uses this term widely in its research and projects. CDKN is funded by the Department for International Development (DFID) in the UK, and it aims to help developing nations adapt to the consequences of climate change and build capacity for a low-carbon economy. It is run by an alliance of organisations, headed by the professional services firm PricewaterhouseCoopers LLP (PwC) and includes: the Overseas Development Institute (a UK-based think tank on development and humanitarian issues); Fundación Futuro Latinoamericano (an NGO for sustainable development based in Ecuador); LEAD International (a UK-based NGO that aims to inspire leadership in developing countries); LEAD Pakistan; SouthSouthNorth, which aims to reduce poverty in Sub-Saharan Africa; and International NGO Training and Research Centre (INTRAC).²⁷⁵ The CDKN has published the definition²⁷⁶ and strategies²⁷⁷ of CCD, planning tools and methodologies,²⁷⁸ drivers and challenges²⁷⁹ for this integrated approach. The network provides support to policy-makers to design and deliver CCD to around 40 developing countries, including Bangladesh. This support includes loss and damage agenda

²⁷³Nanki Kaur, Jessica Ayers, *Planning Climate Compatible Development: Lessons from Experience* (November 2010) Climate & Development Knowledge Network (CDKN), Policy Brief <<http://cdkn.org/wp-content/uploads/2010/12/Planning-CCD.pdf>> 3.

²⁷⁴Tom Mitchell and Simon Maxwell, *Defining Climate Compatible Development* (November 2010) Climate & Development Knowledge Network (CDKN), Policy Brief <<http://cdkn.org/wp-content/uploads/2010/11/CDKN-CCD-DIGI-MASTER-19NOV1.pdf>> 1.

²⁷⁵Mičo Tatalović, *Policymakers to Get Hotline to Climate Experts* (17 March 2010) SciDev.Net <<http://www.scidev.net/en/news/policymakers-to-get-hotline-to-climate-experts.html>>.

²⁷⁶Mitchell and Maxwell, above n 274.

²⁷⁷McKinsey & Company, *Building Climate -Compatible Development Strategies: An Approach to Develop Climate Compatible Growth Plans in Developing Countries* (2010).

²⁷⁸Climate & Development Knowledge Network, Institute of Development Studies, Ecofys, *Guiding Climate Compatible Development User-oriented Analysis of Planning Tools and Methodologies*, Analytical Report, Final Report (2011).

²⁷⁹Karen Ellis, Ali Cambray and Alberto Lemma, *Drivers and Challenges for Climate Compatible Development*, Working Paper (2013).

promotion in Bangladesh,²⁸⁰ policy dialogue on CCD in Pakistan,²⁸¹ an interim action plan for CCD in Papua New Guinea²⁸² and a draft CCD plan for the Dominican Republic.²⁸³ The CDKN covers a range of CCD topics, including coastal zone, REDD+, agriculture, water security, renewables, conservation, disaster management, climate-resilience policy and clean-energy investment. Sector-based initiatives that address CCD include ‘Exploring the Linkages and Guiding Concepts Relevant to Climate Change, Agriculture and Development’,²⁸⁴ ‘Climate Smart Disaster Risk Management—An Approach for Climate Compatible Development’²⁸⁵ and ‘Climate Compatible Development in the Infrastructure Sector’.²⁸⁶ ‘iCOAST—Understanding the Fiscal and Regulatory Mechanisms Needed to Achieve Climate Compatible Development in the Coast Zone’ is a research project funded by CDKN in Sri Lanka and Kenya that seeks to better understand how the coastal zone could support CCD by applying the right policy and regulatory framework.²⁸⁷

In addition to CCD, another common term used for integration between climate change and development policies by researchers is ‘mainstreaming’ (eg, Klein, Schipper and Dessai,²⁸⁸ Halsnaes, Shukla and Garg²⁸⁹). According to AR4, the term ‘mainstreaming’ has emerged ‘to describe the integration of policies and measures that address climate change into development

²⁸⁰Climate & Development Network, *News from CDKN: Loss and Damage Agenda Promoted within Bangladesh* (March 2013) Bangladesh Country Snapshot <<http://cdkn.org/wp-content/uploads/2013/03/Bangladesh-Country-Snapshot.pdf>>.

²⁸¹LEAD Pakistan, *Policy Dialogue on Climate Compatible Development* (24 July 2011) <http://www.lead.org.pk/action_lab/attachments/event_reports/Inspiring%20Speakers%20-%20CCD.pdf>.

²⁸²Government of Papua New Guinea, *Interim Action Plan for Climate-Compatible Development: Document for Public Consultation* (2010).

²⁸³Government of Dominican Republic, *A Journey to Sustainable Growth: The Draft Climate Compatible Development Plan of the Dominican Republic* (2011).

²⁸⁴Valerie Nelson and Richard Lamboll, *A Detailed Resource Document: Exploring the Linkages and Guiding Concepts Relevant to Climate Change, Agriculture and Development*, (2012).

²⁸⁵Maurice Onyango, ‘Climate Smart Disaster Risk Management - An Approach for Climate Compatible Development’ (paper presented at AfricaAdapt Climate Change Symposium 2011, Addis Ababa, Ethiopia, 9-11 March 2011).

²⁸⁶Lily Ryan-Collins, Karen Ellis and Alberto Lemma, *Climate Compatible Development in the Infrastructure Sector: An Overview of the Opportunities and Challenges at the Nexus of Climate Change, Infrastructure and Development* (2011).

²⁸⁷iCoast: *Climate Compatible Development in the Coastal Zone, Sri Lanka*, Planet Action <<http://www.planet-action.org/web/85-project-detail.php?projectID=10019>>.

²⁸⁸Klein, Schipper and Dessai, above n 96, 584.

²⁸⁹Halsnaes, Shukla and Garg, above n 101, 202.

planning and ongoing sectoral decision-making'.²⁹⁰ Based on the literature of mainstreaming, Gupta defines:

Mainstreaming of climate change into development as the process by which existing development processes are (re)designed and (re)organized, and evaluated from the perspective of climate change mitigation and adaptation.²⁹¹

Ahmad²⁹² narrates it as 'mainstreaming' or the 'integrated approach'. He also describes it as 'Climate Policy Integration' (CPI).²⁹³ Goklany²⁹⁴ calls it an 'integrated approach of mitigation, adaptation and sustainable development'. A group of Canadian academics and researchers term it 'Sustainable development, Adaptation and Mitigation' (SAM).²⁹⁵ Swart, Robinson and Cohen refer to it as 'policy synergies' or 'linkages between climate and development policies',²⁹⁶ while Halsnaes and Verhagencallit 'development-based climate change adaptation and mitigation'.²⁹⁷ Perch describes it as 'development-oriented adaptation and mitigation interventions'.²⁹⁸ Metz and Kok,²⁹⁹ Huq, Reid and Murray,³⁰⁰ and Kok, Metz, Verhagen and Rooijen³⁰¹ term the concept 'integrating climate change and development'.

For simplicity and consistency in this thesis, the term 'climate-development integrated approach' has been used. The thesis has adopted the definition used by the CDKN: 'development that minimises the harm caused by climate impacts, while maximising the many human development opportunities presented by a low emissions, more resilient future'.³⁰² The climate-development integrated approach moves beyond the traditional separation of adaptation, mitigation and

²⁹⁰Klein et al, above n 200, 768.

²⁹¹Gupta, above n 79, 207.

²⁹² Ahmed, above n 106, 1.

²⁹³ Mitchel and Maxwell, above n 274.

²⁹⁴ Goklany, above n 207, 756.

²⁹⁵ Bizikova Livia, Neale and Burton, above n 232, 15.

²⁹⁶ Swart, Robinson and Cohen, above n 63, S21.

²⁹⁷ Halsnæs and Verhagen, above n 269, 665.

²⁹⁸ Leisa Perch, 'Reconciling Participation and Benefit-sharing: Policy Implications for How Africa Adapts to Climate Change' (paper presented at AfricaAdapt Climate Change Symposium 2011, Addis Ababa, Ethiopia, 9-11 March 2011).

²⁹⁹ Metz and Kok, above n 11, 99.

³⁰⁰ Huq, Reid and Murray, above n 6, 10.

³⁰¹ Kok et al, above n 18, 104.

³⁰² Mitchel and Maxwell, above n 275, 1.

development strategies.³⁰³ According to Mitchell and Maxwell, '[u]nless policymakers integrate mitigation, adaptation and development strategies, they will miss efficiency savings and may pursue strategies that solve one problem but aggravate others'.³⁰⁴ Therefore, the climate-development integrated approach fuses together strategies that have, to date, tended to work in isolation.³⁰⁵ It brings together and builds upon the long-established concepts of adaptation and mitigation, as well as the newer concepts of low-carbon development (see Section II.V.B) and climate-resilient development (see Section II.V.C). Figure 2.2 presents a diagram of the climate-development integrated approach.

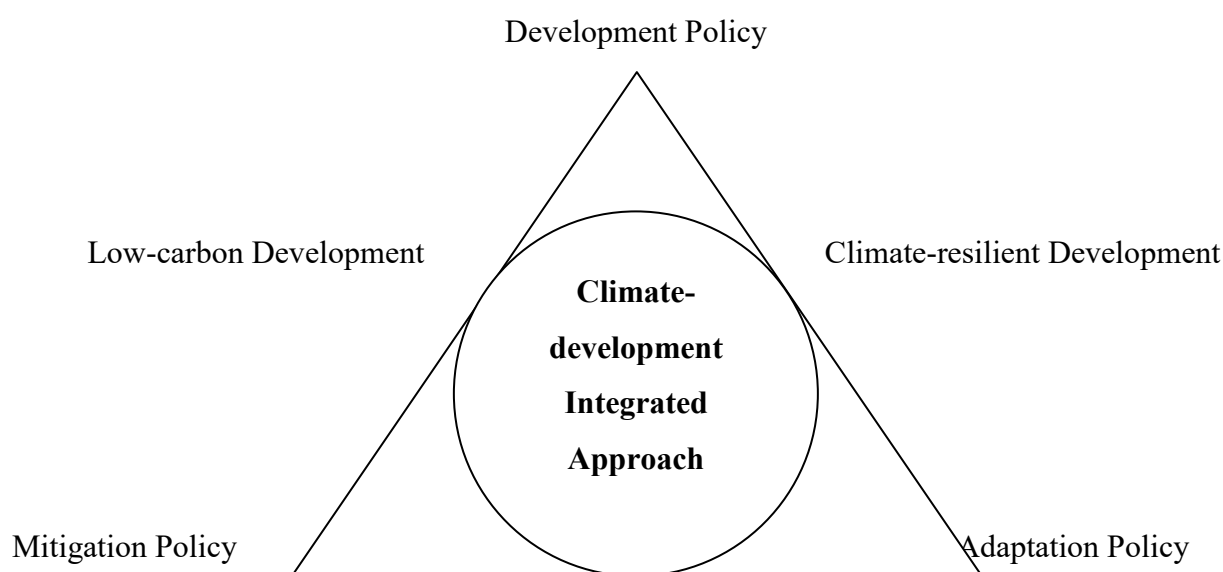


Figure 2.2: Diagram of Climate-development Integrated Approach³⁰⁶

³⁰³Feri Gwata, *Climate Compatible Development: Key Messages from the Climate Change Symposium 2011* (16 June 2011) Cosultancy Africa Intelligence <http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=779:climate-compatible-development-key-messages-from-the-climate-change-symposium-2011&catid=92:enviro-africa&Itemid=297>.

³⁰⁴ Mitchel and Maxwell, above n 274, 1.

³⁰⁵ Ibid 2.

³⁰⁶ Inspired by the venn diagram used by Mitchel and Maxwell, above n 274, 2 and Mairi Duper, *Defining Climate Compatible Development* (25 June 2011) Climate and Development Knowledge Network <<http://cdkn.org/2011/06/defining-climate-compatible-development/>>.

II.VIII The Relevance of the Integrated Approach for Bangladesh

The AR4 has listed Bangladesh as one of the countries that is most vulnerable to climate change.³⁰⁷ The country is already feeling the effects—for example, the frequency of disasters (eg, cyclone, flood and drought) has risen above normal levels,³⁰⁸ resulting in large socio-economic and environmental constraints for the country. Cyclone Sidr, which hit the coastal areas of Bangladesh in 2007, caused damages of around US\$1.4 billion in the short term and US\$4 billion over a 15-year period.³⁰⁹ Section III.II details how the effects of climate change are imposing a novel challenge for coastal management in Bangladesh. In fact, almost all aspects of development in Bangladesh could be affected by climate change.³¹⁰ The government has raised particular concerns about the vulnerability of agriculture, forest and biodiversity, fisheries and marine resources, water resources, public health, infrastructure and settlements, industry, and settlement.³¹¹ Figure 2.3 shows an assessment of the government regarding the effects of climate change in different sectors and its linkages with development.

³⁰⁷ Rex Victor Cruz et al, 'Asia' in Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 469, 476.

³⁰⁸ A K Enamul Haque, *An Assessment of Climate Change on ADP of Bangladesh* (15 November 2009) <http://www.ergonline.org/documents/25_11_09%20Climate%20Change%20EHq.pdf> 1. Cruz et al, above n .

³⁰⁹ Government of Bangladesh, *Bangladesh: Strategic Program for Climate Resilience (SPCR), Prepared for the Pilot Program for Climate Resilience (PPCR)* (2010) 28.

³¹⁰ Beckman et al, above n 195, 12.

³¹¹ Government of Bangladesh, above n 308, 20.

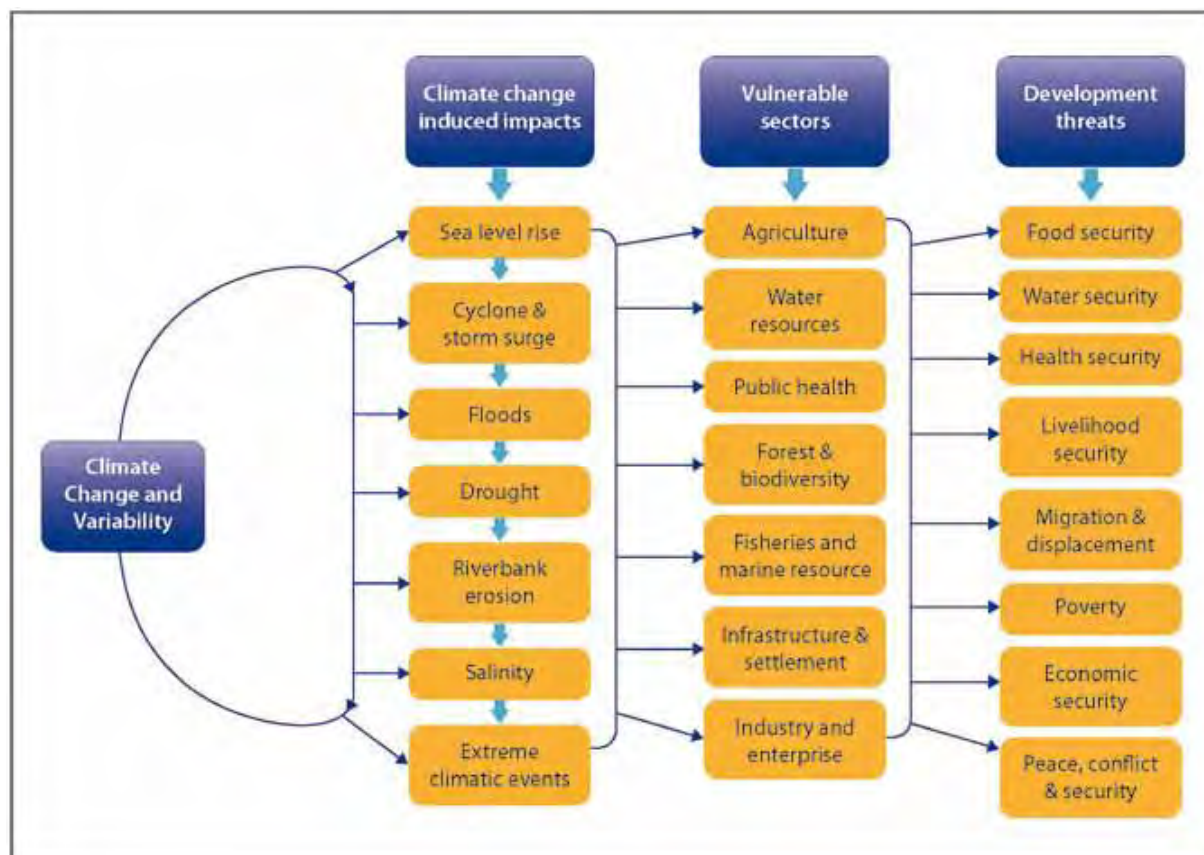


Figure 2.3: Climate-development Nexus in Bangladesh³¹²

Researchers also anticipate that Bangladesh will face large macroeconomic effects on growth, employment, trade, inflation and balance of payments because of climate change.³¹³ If no action is taken, the changing climate may cause damages of around US\$4–14 billion per year.³¹⁴ This is a nightmare for Bangladesh, whose annual government budget is around US\$24.30 billion.³¹⁵ The issue of climate change in Bangladesh is often surpassed by a number of immediate development priorities, including poverty eradication, food and water security, health, energy access and transportation needs. The government spends around US\$4–5 billion in development projects every year,³¹⁶ but these investments may be at risk because of climate change, which will be a

³¹² Ibid 20.

³¹³ Beckman et al, above n 195, 12.

³¹⁴ Haque, above n 6, 2.

³¹⁵ *Bangladesh Unveils 24.30 bln-USD Proposed Budget Targeting 7.2 pct Economic Growth* (7 June 2012) Business <http://news.xinhuanet.com/english/business/2012-06/07/c_131638485.htm>.

³¹⁶ Haque, above n 308, 2.

challenge for the economy. In fact, researchers have been assessing the effect of climate change on Bangladesh's Annual Development Programme (ADP); according to Haque, around US\$2.7 billion of investments in different development projects are at risk due to climate change.³¹⁷ If the potential synergies and trade-offs between development and climate change are overlooked, such development programs would be less effective or may even cause adverse effects on the changing climate.

There are between 900 and 1000 different projects financed by the government each year under the ADP. Haque conducted research on ADP projects for two consecutive years (2004–2005 and 2008–2009)³¹⁸ in Bangladesh and scrutinised a total of 1901 development projects, finding that nearly 40 per cent of the projects needed to be modified for possible mitigation or adaptation options.³¹⁹ In terms of the total investment funds that are at risk, Haque shows that nearly 41 per cent of all ADP expenses are at risk if the government does not modify the project design with adaptation measures.³²⁰ He also found that nearly 6 per cent of ADP expenses need to be adjusted to accommodate measures to reduce emissions (see Figure 2.4).

³¹⁷ Ibid 6.

³¹⁸ Projects in two consecutive fiscal years are often similar due to time overlap during implementation; thus, projects from two fiscal years with gaps in years in between were taken for this research.

³¹⁹ Haque, above n 6, 4.

³²⁰ Ibid 6.

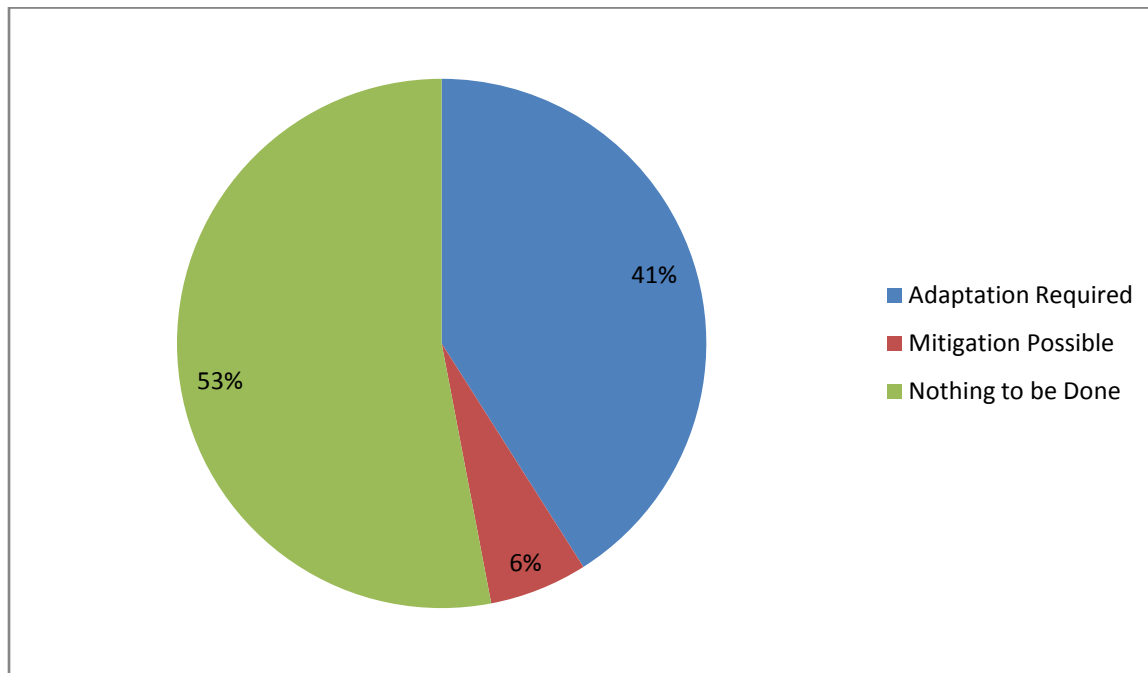


Figure 2.4: Percentage of ADP Expenses under Climate Change Risk³²¹

Therefore, Bangladesh needs to adopt a new development process that safeguards development from climate effects (climate-resilient development) and reduces or keeps emissions low without compromising development goals (low-emissions development).³²² A climate-development integrated approach is a new development landscape for policy-makers in Bangladesh and reflects the growing recognition that ‘mitigation, adaptation and development need to be tackled together, not as separate issues’.³²³ It embraces development strategies that integrate the threats and opportunities of a changing climate.³²⁴ Such an approach can minimise the negative effects of climate change while maximising ‘triple wins’ of low emissions, increased resilience and development benefits³²⁵ under the same policy framework.³²⁶ It is time for Bangladesh’s policy-makers to consider this strategy.

³²¹ Ibid 5, 13.

³²² Mitchel and Maxwell, above n 274, 1.

³²³ Climate & Development Knowledge Network, above n 280, 14.

³²⁴ Mitchel and Maxwell, above n 274, 1.

³²⁵ Climate & Development Knowledge Network, above n 280, 14.

³²⁶ Gwata, above n 304.

The CDKN highlights five reasons or drivers to adopt such an approach for a developing country: (i) a recognised need at the national level to adapt to climate change in order to bolster resilience, achieve growth and reduce poverty; (ii) a need for energy security and natural resource efficiency; (iii) a desire to capitalise on new economic opportunities; (iv) a desire to improve access to climate finance and aid; and (v) strong government leadership.³²⁷ Further, there are several substantive arguments for adopting a climate-development integrated approach in Bangladesh:

1. **Logical Perspective:** In a changing climate, Bangladesh needs to grow and reduce poverty while simultaneously emitting fewer emissions. It also needs to find ways to adapt to higher temperatures and sea levels and more frequent extreme weather events.³²⁸ Therefore, policy-makers must promote growth and social development while building climate resilience and cutting emissions.³²⁹ The climate-development integrated approach provides this ‘triple wins’ strategy.
2. **Resource-use Perspective:** As a developing country, Bangladesh has minimum resources to meet its development goals. In contrast, significant resources and funding are required to address climate change effects. Therefore, a climate-development integrated approach may be cost-effective for the country.
3. **Developing Country Perspectives:** The issue of climate change in Bangladesh—as in many other developing countries—is often overshadowed by development priorities. The climate-development integrated approach can prioritise climate change in national contexts.
4. **Donors’ Perspective:** In early 1998, the World Bank raised the issue of climate change—particularly the potential for the economic effects of sea-level rises in its 2020 Long-run Perspective Study for Bangladesh.³³⁰ The OECD also carried out analysis of donor portfolios in Bangladesh in 2005.³³¹ It notes that donor country strategies and

³²⁷ Ellis, Cambray and Lemma, above n 279, 1.

³²⁸ Mitchel and Maxwell, above n 274, 1.

³²⁹ Ibid.

³³⁰ The World Bank and Bangladesh Centre for Advanced Studies, *Bangladesh 2020: A Long-run Perspective Study* (World Bank, 1998).

³³¹ Shardul Agrawala, 'Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans' (Project Document No COM/ENV/EPOC/DCD/DAC (2003)3/FINAL, Organisation for Economic Co-operation and Development, 2003).

project documents generally lack explicit attention to climate change.³³² More specifically, it reveals that 22–53 per cent of development assistance of aid amounts, and 22–37 per cent of aid-funded projects in Bangladesh, are in sectors that are potentially affected by climate risks.³³³ However, more recently, and in line with increasing international attention to climate change, most donors and development partners of Bangladesh have evolved their development portfolios to accommodate climate change.³³⁴ They have used more innovative and collaborative support models,³³⁵ and their funds have increasingly been channelled into climate-development integration-related initiatives.³³⁶ Therefore, engaging with the climate-development integrated approach is likely to become more important for Bangladesh.

5. **Climate Finance Perspective:** National priorities in Bangladesh favour widespread adaptation and climate-resilient development to enhance adaptive capacity. However, until recently, the international focus (particularly with regard to funding) had been on mitigation, meaning that international incentives lay primarily in mitigation.³³⁷ Based on the ‘common but differentiated responsibility’ under the UNFCCC,³³⁸ developing countries had no legal obligation to reduce emissions. However, the politics of international climate negotiation has changed in recent times. Developing countries are now willing to take NAMAs on the condition that developed countries will support them with technology, finance and capacity building.³³⁹ Therefore, Bangladesh can achieve a balance between its national priorities and international concern by adopting a climate-development integrated approach. The planning of an integrated approach requires Bangladesh to identify, implement, monitor and evaluate country-scale adaptation and low-emissions development objectives. According to Kaur and Ayers, this planning

³³² Ibid 28.

³³³ Saleemul Huq and Jessica Ayers, 'Climate Change Impacts and Responses in Bangladesh' (Note IP/A/CLIM/NT/2007-09, Policy Department Economic and Scientific Policy, European Parliament, January 2008) 17.

³³⁴ Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 3.

³³⁵ McKainsey & Company, above n 278, 10.

³³⁶ Ellis, Cambray and Lemma, above n 279, 3.

³³⁷ Ayers and Huq, above n 149, 759.

³³⁸ *United Nations Framework Convention on Climate Change*, above n 3, art 4.

³³⁹ Conference of the Parties, above n 170, 3.

process will be supported by international climate finance, technology transfer and capacity building under the UNFCCC.³⁴⁰

6. **New Markets Perspective:** By adopting a climate-development integrated approach, Bangladesh can seize opportunities as new markets open—for example, carbon sequestration or new renewable energy technologies.³⁴¹ It can develop new industries to meet growing global demand for certain types of green goods and services (e.g. solar energy applications).³⁴² Bangladesh can also ensure the value of its forests as the world's carbon store, and it can take advantage of new sources of finance through REDD+. ³⁴³
7. **Reporting Perspective:** Under international mechanisms, both development and climate change policy processes call for developing countries to prepare specialised reports. Integrating these reports may be more effective and efficient in the long run.³⁴⁴

A climate-development integrated approach at the policy level can ultimately help Bangladesh in: (a) the promotion of economic development through low-carbon growth; (b) the mitigation of carbon emissions by participating in a global REDD+ scheme; and (c) the adaptation to climate-related hazards.³⁴⁵ It includes policies such as financial and technology transfer, institutional strengthening and market improvements, which ultimately enhance the productive capacity of the country. The approach can also help to improve the economic efficiency of Bangladesh by, for example, strengthening local institutions and introducing new technologies where there are synergies between development and climate policy objectives.³⁴⁶

II.IX Case Study of Integrated Approach in Bangladesh

Development projects that simultaneously enable adaptation and mitigation already exist in Bangladesh. These projects can be reproduced and are a good illustration of the mitigation, adaptation and development advantages of the integrated approach.

³⁴⁰ Kaur and Ayers, above n 273, 1.

³⁴¹ Mitchel and Maxwell, above n 274, 1.

³⁴² Ellis, Cambray and Lemma, above n 279, 11.

³⁴³ Reducing Emissions from Deforestation and Degradation.

³⁴⁴ Gupta, above n 79, 210.

³⁴⁵ Government of Papua New Guinea, above n 282, 4.

³⁴⁶ Halsnæs and Verhagen, above n 269.

About the Project: The official title of the project is Community-Based Adaptation for Climate Change through Coastal Afforestation (CBACC-CA). The government of Bangladesh is implementing this project in partnership with the UNDP.³⁴⁷ The project is funded by the LDCF. The overall budget is US\$5.4 million, and the timeframe of the project is April 2009 to March 2013.³⁴⁸

Project Area and Vulnerabilities: The project is spread across 14km of Bangladesh's 710km coastline, which is particularly vulnerable to the effects of climate change.³⁴⁹ It covers four project sites: Char Kukri-Mukri in the district of Bhola, Raipur in Chittagong, Sukhchar in Noakhali and Naltuna in Borguna.³⁵⁰ These four coastal communities belong to a weak local economy that is heavily reliant on climate-sensitive natural resources such as forests and fishery stocks as their livelihoods. They have a low adaptive capacity because they suffer from widespread poverty, which reduces their ability to respond to, and withstand, climate-induced threats.³⁵¹ They are already experiencing a marked increase in both the frequency and intensity of cyclones and accompanying tidal surges, which result in massive erosion.³⁵² These changes are threatening the communities, who already live below the poverty line.

Development Effects: The project uses a 'Triple-F' model, which refers to 'Forest, Fish and Fruit'. It is a locally invented model that uses a combination of protective and productive vegetation, mound and ditch land structures, and a fish nursery pond to create multiple sources of

³⁴⁷ Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, *Community Based Adaptation to Climate Change through Coastal Afforestation in Bangladesh* (Annual Progress Report 2010) 4.

³⁴⁸ United Nations Development Programme, *Community Based Adaptation to Climate Change through Coastal Afforestation in Bangladesh (CBACC-CF Project)* (November 2011) Environment and Energy <<http://www.thegef.org/gef/sites/thegef.org/files/documents/document/Bangladesh%20-%20Coastal%20Afforestation%20-%20November%202011.pdf>>.

³⁴⁹ United Nations Development Programme, *Community-based Adaptation to Climate Change through Coastal Afforestation* (Project Factsheet, March 2011).

³⁵⁰ *Community Based Adaptation to Climate Change through Coastal Afforestation* (17 November 2011) Adaptation Learning Mechanism <<http://www.adaptationlearning.net/community-based-adaptation-climate-change-through-coastal-afforestation>>.

³⁵¹ United Nations Development Programme, above n 348.

³⁵² United Nations Development Programme, *Bangladesh: Mangrove Forests Provide Protection from Climate Change* (11 November 2010) News Room <<http://content.undp.org/go/newsroom/2010/november/bangladesh-mangrove-forests-provide-protection-from-climate-change.en>>.

income and climate-risk protection.³⁵³ Applying the Triple-F model can produce an estimated US\$700 of income per mound per year, and a single ditch can generate an annual income of up to US\$300.³⁵⁴ Harvesting rain water in ditches provides regular water supply to plantations on mounds, and it also increases water security.³⁵⁵ For the first time, high-yielding/salt-tolerant varieties and improved agricultural and aqua-cultural technologies are being introduced by the project in these remote coastal areas.³⁵⁶ These new options for income-generation had never before been widely practiced in Bangladesh. The project is establishing 6,100 hectares of mangrove plantations and 935 hectares of timber species and fruit trees.³⁵⁷ Women are being trained in forest management and shown how to grow mangrove saplings, as well as trees used for timber (e.g. bamboo).³⁵⁸ Such nursery projects are creating job opportunities for women.³⁵⁹ The Triple-F model can accommodate 8–10 families per hectare.³⁶⁰ Therefore, it represents a pioneering rational land-use model for a highly land-scarce country. In addition, it ensures livelihood security and provides at least US\$1000 of additional income per family every year in addition to their usual livelihood activities.³⁶¹ This additional income enriches families' nutrition and ultimately supports diversified and sustainable livelihood options. Therefore, an important effect of this project is that _the coastal communities, who were previously considered a threat to coastal forests, become the protectors of these vegetative shelter belts due to sharing of ownership'.³⁶²

³⁵³ Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, above n 346, 16.

³⁵⁴ Ibid 18.

³⁵⁵ *Community Based Adaptation to Climate Change through Coastal Afforestation*, Author Stream <<http://www.authorstream.com/Presentation/dconnorcraig-1569056-community-based-adaptation-climate-change-coastal-afforestation/>>.

³⁵⁶ Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, above n 346, 13.

³⁵⁷ United Nations Development Programme, above n 352.

³⁵⁸ Ibid.

³⁵⁹ Bettina Koelle, *Bangladesh: Mangrove Island Reflects People's Creativity* (28 March 2011) International Institution for Environment and Development <<http://www.iied.org/bangladesh-mangrove-island-reflects-peoples-creativity>>.

³⁶⁰ Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, above n 346, 14.

³⁶¹ *Community Based Adaptation to Climate Change through Coastal Afforestation*, above n 354.

³⁶² Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, above n 346, 13.

Adaptation Effects: The additional income from project activities will increase the adaptive capacity of the coastal people and assist in withstanding additional stressed conditions anticipated by climate change.³⁶³ The protective patch of mangroves along the coastal shore builds a green shield surrounding these vulnerable communities.³⁶⁴ Mangroves serve as a protective barrier against increased storm surges, cyclones and high-velocity winds, and they protect coastal ecosystems from anticipated climate change threats.³⁶⁵ Mangroves also provide physical protection to the coast. They trap sediments in their intricate root structures at such a high rate that they can potentially reverse the effect of sea-level rises or river erosion through land reclamation.³⁶⁶ Every year, millions of tonnes of sediment are washed through Bangladesh's river delta near these project areas. This offers one of the few natural lifelines that the country can use to protect itself against the effects of climate change and to combat coastal erosion.³⁶⁷

Mitigation Effects: The project also contributes to global mitigation efforts. The tree plantations of the project act as an effective carbon sink to absorb greenhouse gases. Specifically, mangrove forests act as extremely effective carbon sinks. They are able to absorb 97.57 tonnes of carbon per hectare, or more than three times the absorptive capacity of non-mangrove forests.³⁶⁸ It is expected that the four project sites alone will absorb more than 610,000 tonnes of carbon.³⁶⁹

This is the first global LDCF project, and it is innovative in the way that it draws together climate change adaptation and economic development through coastal afforestation that also addresses mitigation concerns.³⁷⁰ In this sense, Bangladesh is conducting the piloting work in selecting the best mangrove species and trialling optimum management practices for plantations. It is a good time to enhance the project's effects beyond these four communities and possibly beyond the borders of Bangladesh.³⁷¹

³⁶³ Ibid.

³⁶⁴ *Community Based Adaptation to Climate Change through Coastal Afforestation*, above n 350.

³⁶⁵ Global Environmental Facilities, Government of Bangladesh and United Nations Development Programme, above n 346, 13.

³⁶⁶ *Community Based Adaptation to Climate Change through Coastal Afforestation*, above n 354.

³⁶⁷ United Nations Development Programme, above n 352.

³⁶⁸ Ibid.

³⁶⁹ United Nations Development Programme, above n 348.

³⁷⁰ Ibid.

³⁷¹ Ibid.

II.X Challenges to Bangladesh in Adopting this Integrated Approach

In order to obtain the maximum benefit of the climate-development integrated approach, it is important to understand and address the constraints of this approach for Bangladesh. Below, the thesis suggests four such challenges, along with solutions that could help to overcome them.

II.X.A Institutional Constraints

Many current policies of Bangladesh are not integrated and lack a qualitative fact base. Revising and restructuring the policies following an integrated approach requires significant research and coordination among different government institutions. Given the complexity and multi-dimensional nature of the climate-development integrated approach, inter-ministerial approaches are likely to be required.³⁷² Nevertheless, this process may require long and drawn-out negotiations. Moreover, there is unclear differentiation, or even conflict, among responsibilities across different ministries, resulting in turf wars that prevent inter-ministerial collaborations or parallel processes led by different ministries.³⁷³ Bangladesh addresses the climate change issue through the Ministry of Environment. However, a key message to emerge from the groundwork of the CDKN is that climate change is not an environmental issue; rather it is an economic and planning challenge that requires ministries of finances and planning to play a leading role.³⁷⁴ Sometimes it is the weakness of the lead ministry to assert policies over other ministries, which hampers the design and implementation of an integrated policy.

To overcome these institutional constraints, Bangladesh needs to develop appropriate coordination mechanisms to facilitate inter-ministerial discussions and decision-making. A clear mandate, long-term funding and appropriate human resources are required to facilitate inter-ministerial cooperation. There are several examples in Brazil and Colombia of creating inter-ministerial committees with a specific mandate³⁷⁵ to articulate climate-development integration

³⁷² Ellis, Cambray and Lemma, above n 279, 9.

³⁷³ Ibid.

³⁷⁴ CDKN Global, *Feature: Identifying the Best Routes to Climate Compatible Development* (8 April) Climate & Development Knowledge Network <<http://cdkn.org/2013/04/feature-identifying-the-best-routes-to-climate-compatible-development/>>.

³⁷⁵ Ellis, Cambray and Lemma, above n 279, 10.

into policy beyond the environmental agenda. Bangladesh can follow the examples of the positive effects of those inter-ministerial committees.

II.X.B Financial Constraints

A climate-development integrated approach at the policy level is important, but it is only part of the answer; the implementation of the policy is also crucial.³⁷⁶ In some cases, Bangladesh has such policies, but the level of implementation is disturbingly low. Financial constraints are a principal cause of the low implementation. As a developing country, Bangladesh often chooses immediate growth over a climate-development integrated approach that may be socially beneficial in the long term. The increased investment in shrimp farming in coastal areas, coal mining in the north-west of the country,³⁷⁷ fossil fuels extraction or the nuclear power plant³⁷⁸ close to the mangrove forest generates a significant new opportunity for growth, but it makes climate-development integration more difficult to achieve. However, ignoring these opportunities would generate significant opportunity costs for the country.

For example, after estimating the economic cost of leaving oil in the Yasuni-ITT oilfield underground, Ecuador has invited the world to contribute 50 per cent of that opportunity cost to cover development areas, such as health and education, and to ensure biodiversity conservation, the protection of indigenous peoples and emissions avoidance.³⁷⁹ Guyana has estimated the amount of compensation it will need from the international community to forgo the benefits that could be derived from alternative land uses.³⁸⁰ Similarly, Bangladesh can estimate the Economic Value to the Nation (EVN) of its mangrove forest and its contribution to the global economy each year through the conservative valuations of the Economic Value to the World (EVW). Compensation of an amount somewhere between the EVN and EVW is considered sufficient to protect the forest.³⁸¹ Therefore, Bangladesh can refrain from deforestation of the mangrove forest

³⁷⁶ McKinsey & Company, above n 277, 10.

³⁷⁷ *Bangladesh: Ban Coal Mine, Save Forests and Farms* (February 2011) Global Response Campaign Alart <<http://www.culturalsurvival.org/take-action/bangladesh-ban-coal-mine-save-forests-and-farms>>.

³⁷⁸ 'Rooppur Nuke Power Plant Project gets ECNEC Nod', *The Financial Express* (online), 3 April 2013 <<http://www.thefinancialexpress-bd.com/index.php?ref=MjBfMDRfMDNfMTNfMV85MF8xNjUxOTg=>>>.

³⁷⁹ Ellis, Cambray and Lemma, above n 280, 5.

³⁸⁰ Ibid.

³⁸¹ Ibid.

for shrimp farming and seek for compensatory mechanisms through public finance or mechanisms such as REDD+.

Another effective measure for Bangladesh is undertaking national- and sectoral-level Economic Impact Assessments (EIA). The EIA helps to set the costs of a climate-development integrated approach more robustly in the context of the higher longer-term economic costs of inaction.³⁸² In fact, there are many opportunities for climate-development integration at the sector level of the country within existing investments and budgets. For example, the integrated approach can be followed in the national procurement processes for road building in Bangladesh's coastal areas. This can make the market drive innovation and resilience within the current budget package.

II.X.C Lack of Awareness about the Concept

Climate-development integration is a new development at the policy level in Bangladesh. Traditionally, development investment takes into account whether the project will be affected by the changing climate. For example, new roads might be fully weather-proof from an engineering standpoint, or even for climatic conditions in the far future. However, these roads might trigger new settlements in high-risk areas, or they might have a negative effect on the resilience of the natural environment of that area. Thus, the same development project can expose the area to increased climate risks.³⁸³ The climate-development integrated approach suggests taking into account all of these factors. In fact, robust information is needed for such integrated decision-making. The information must be accurate, with assumptions and limitations clearly defined. This may be challenging for Bangladesh given the inherent uncertainties in modelling and assessing long-term climate change effects. It also requires the creation of a strong evidence base at the project level to identify the costs and benefit of such integration. Stakeholders and decision-makers must be engaged in the evidence-building process so that there is trust and belief in the data and the messages they imply. However, it can also be difficult in Bangladesh due to the gaps in reliable longitudinal monitoring.

³⁸² Ibid 6.

³⁸³ Shardul Agrawala, 'Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans' (Project Document No COM/ENV/EPOC/DCD/DAC(2003)3/FINAL, Organisation for Economic Cooperation and Development, 2003), 24.

The country can address this problem by following the Mitigation Action Plans and Scenarios (MAPS) process as a key part of the integrated planning process. According to Ellis, Cambray and Lemma:

It is a process for revealing creative and in-depth evidence about a country's needs and opportunities for a low-carbon and climate-resilient economy. Combining research with participative policy and planning processes, and involving stakeholders from all sectors, the scenario-based approach supports robust decision-making in the face of uncertainties in climate data and projections.³⁸⁴

This process has been developed in South Africa and is now being applied in Latin America. The CDKN is co-funding an integrated planning process in several countries. Researchers, policy-makers, civil society and the private sectors of Bangladesh can come together to explore the key issues and examine different scenarios and their implications for low-carbon, climate-resilient growth. In fact, there is modest evidence of triple wins for development, mitigation and adaptation at the project level (see Section II.IX). Most of them are driven by livelihood or poverty-reduction imperatives and are set up as integrated conservation or development programs without explicit climate goals. However, in action, they deliver excellent climate adaptation and mitigation co-benefits. These aspects are poorly monitored or are being captured only post-facto, as they were not integral to the initial program designs. Widespread awareness is required among policy-makers to accommodate these co-benefits and make them an integral part of these projects.

II.X.D Challenge from Anti-reform Groups

According to Ellis, Cambray and Lemma, some resistance to change is always inevitable, even where the overall outcome of that change is beneficial to the country.³⁸⁵ Climate-development integration may be opposed in Bangladesh by industrialists if they consider it a threat to their growth. Opposition groups may consist of those with vested interests in highly polluting industries, as well as groups representing the interests of poor people.

³⁸⁴ Ellis, Cambray and Lemma, above n 279, 7.

³⁸⁵ Ibid.

Bangladesh can address this challenge by designing policies in a way that compensates the losers of any particular reform. For example, a policy to promote more sustainable forest management might explicitly support alternative livelihood strategies for those negatively who are affected by the reform. However, the best way to solve the problem is to arrange dialogues among the diverse groups. Although the national policy of Bangladesh is implemented at the sub-national and sectoral levels, municipal and sub-national participation in the development of national policy is often lacking. Therefore, dialogues among all interested groups, including government, political parties, private sector and civil society representatives, can mobilise public support for a climate-development integrated approach. These groups can then explore and discuss the benefits and costs of climate-development integration. Such a participatory process can help to draw out concerns, negotiate possible solutions and mobilise interest groups in favour of reform.³⁸⁶ Broad public support for a climate-development integrated approach can also strengthen incentives to undertake large reforms at the national level.

II.XI Conclusion

As a disaster-prone developing country, Bangladesh not only needs sufficient energy and food, but it also needs to manage natural resources and address increased climate effects. It increasingly recognises the urgency of an integrated policy approach that meets the essential needs of people while protecting them from the effects of climate change. Today, it seems difficult to meet these two objectives without also aiming to mitigate the emissions that are responsible for climate change.³⁸⁷ Bangladesh has a desire to benefit from the new economic opportunities and to improve access to climate finance. This requires strong policies, leadership and political will.

This chapter justifies the relevance of a climate-development integrated approach for Bangladesh because the country needs to become more resilient to climate change, achieve growth via a low greenhouse gas emissions pathway and reduce poverty. This triple-win goal can be achieved through an integrated approach at the policy level. This chapter produces references from

³⁸⁶ Ibid.

³⁸⁷ Climate Action Network, France and ENDA Tiers Monde, above n 245,9.

international documents and national estimates and shows the importance of this integration. The chapter identifies seven specific drivers for the adoption of the climate-development integrated approach. At the same time, it identifies the challenges of this approach and suggests recommendations for Bangladesh to address these challenges. This investigation further the understanding of the relevance of the climate-development integrated approach for Bangladesh. Chapter III will explore how relevant this approach is for coastal management. The concepts built up in Chapters II and III will help to explore the main research question of this thesis.

Chapter III. Coastal Zone Management in the Reality of Climate Change

III.I Introduction

This chapter deals with the second conceptual issue of this thesis, which is the relevance of the climate-development integrated approach for coastal management. Coastal zones are significantly affected by climate change¹ in addition to several other problems related to unplanned development.² In fact, coastal zones figure among the most vulnerable of all environments to human-induced global climate change.³ Throughout the twentieth century, global rises in sea levels contributed to increased coastal inundation, erosion and ecosystem losses.⁴ Annually, around 120 million people are exposed to tropical cyclone hazards, which killed 250,000 people from 1980 to 2000.⁵ The low-lying coastal areas of Bangladesh are key societal hotspots of coastal vulnerability. In these areas, the stresses on the natural systems coincide with low human adaptive capacity and high exposure. Such a situation demands an explicit understanding of coastal management in the reality of climate change. As mentioned in AR4, the effects of climate change on the coastal zone are exacerbated by increasing human-induced pressures⁶ and development activities in this region. Therefore, researchers suggest new paradigms for coastal management.⁷ Chapter II mentions the paradigm shift of integrating climate change and development strategies. It also defines the climate-development integrated approach and identifies the challenges and response options for Bangladesh to address this integration. This chapter explores the implications of a climate-development integrated approach for coastal management, with particular reference to Bangladesh.

¹Hoozemans et al, above n 8.7.

² Here, 'unplanned development' refers to development that has not occurred under the umbrella of government-led plans or through an incomplete framework of plans and policies.

³David Michel and Amit Pandya (eds), *Coastal Zones and Climate Change* (The Henry L. Stimson Center, 2010) ix.

⁴R. J. Nicholls et al, 'Coastal systems and low-lying areas' in Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 315, 317.

⁵ Ibid 317.

⁶Nicholls et al, above n .

⁷VN de Jonge et al, 'The Need for New Paradigms in Integrated Socio-economic and Ecological Coastal Policy Making' (Paper presented at the Proceedings of 10th International Wadden Sea Symposium, 2003) 270.

This chapter is presented as follows. Section III.II narrates different types of coastal management, while Section III.III defines ICZM. The chapter also narrates the policy cycle (Section III.IV) and essential elements of ICZM (Section III.V). Then it briefly describes the development of ICZM in the international regime (Section III.VI). Section III.VII shows how climate change is becoming a novel challenge for ICZM. The possible responses of climate change in coastal management are discussed in Section III.VIII. Sections III.IX–III.XIII explore how the adaptation and mitigations options can be addressed through ICZM. It also shows the links between adaptation and mitigation in coastal management (Section III.XIV) and the relevance of integrating adaptation, mitigation and development for ICZM (Section III.XV).

III.II Coastal Zones and Typology of Coastal Management

Coastal zones are the broad interface between land and water. According to Kay, ‘the transitional region between the land and the ocean is commonly referred to as the coastal zone or coastal area’.⁸ They represent one of the most dynamic natural environments and one of the most important contexts in which human activity, economy, ecology and geomorphology interact.⁹ From the early rise of human civilisation, coastal areas have been densely inhabited. At present, more than 2.5 billion people live in coastal areas.¹⁰ It was estimated that up to 75 per cent of the global population could be living within 60 km of the coast by 2020.¹¹ Estimations may vary, but it is nonetheless apparent that there is an increasing and competing demand upon the lands and waters of coastal areas, not only for population growth, but also for increased economic activities in the region, such as production, consumption, resource exploitation (including fisheries, forestry, gas, oil and mining), infrastructure (including transportation, ports, harbours, shoreline protection work and defence), recreation and exchange processes.¹² The general trend is to categorise these

⁸ Robert Kay, 'Integrated Coastal Planning and Management in Asian Tsunami Affected Countries' (Paper presented at Workshop on Coastal Area Planning and Management in Asian tsunami-affected countries, Bangkok, 27-29 September 2006) 2.

⁹ Karen P Fabbri, 'A Methodology for Supporting Decision Making in Integrated Coastal Zone Management' (1998) 39(1–2) *Ocean & Coastal Management* 51, 52.

¹⁰ *Thematic Areas - Coastal Zone Management* (2010) ENVIS Center for Coastal Zone Management and Coastal Shelf Terbelt (COAST) <<http://www.iomenvi.in/czm.php>> at 6 May 2010; C Shi et al, 'Towards a Sustainable Coast: An Integrated Coastal Zone Management Framework for Shanghai, People's Republic of China' (2001) 44(5-6) *Ocean & Coastal Management* 411, 411.

¹¹ *Report of the United Nations Conference on Environment and Development*, UN Doc A/CONF151/26 Vol. ii (13 August 1992) sec 17.3.

¹² Kay, above n 8, 6.

human activities into different sectors, such as agriculture, fishing, mining, transport and tourism, and manage them separately under the authority of different government agencies. However, inappropriate planning and inadequate management of coastal development can exacerbate ecological problems and cause adverse socio-economic effects.¹³ This raises the issue of coastal management to ensure the wise use of coastal resources and achieve a balance between ecology and economy.

Coastal management is a general term used around the world for many different purposes. Generally, it is the understanding of different uses of coastal land and the physical processes affecting the coast. It usually refers to any activity taking place in the coastal zone that has a specific purpose, including management for nature conservation (including grazing management), management of recreational activity, habitat and species restoration, and coastal defence (protection from coastal erosion and flooding).¹⁴ According to Clark, coastal management entails the cyclic, iterative processes of assessment, planning and implementation of management regimes.¹⁵ While discussing coastal management, it is important to distinguish different degrees of sectoral integration that are being attempted in most coastal management initiatives. The Coastal Resources Centre of the University of Rhodes conducted a survey to evaluate coastal management projects and programs funded by international donors.¹⁶ They mention three types of coastal management in their study:

1. **Enhanced Sectoral Management:** This approach focuses on the management of a single sector or topic. However, it explicitly addresses effects and interdependencies with other sectors and the ecosystems affected. Investments in coastal tourism and transportation infrastructure that are funded by development banks¹⁷ increasingly feature in this approach. Such an approach is also taken by several nations while addressing the fisheries issues¹⁸ and the conservation of biodiversity.¹⁹

¹³Thia-Eng Chua, 'Coastal Aquaculture Development and the Environment: The Role of Coastal Area Management' (1992) 25(1-4) *Marine Pollution Bulletin* 98, 101.

¹⁴Coastal Wiki, *Definition of Coastal Management* (2013) <http://www.coastalwiki.org/wiki/Coastal_management>.

¹⁵John R Clark, *The Coastal Zone Management Handbook* (CRC Lewis Publishers, 1996).

¹⁶Stephen Olsen et al, *Survey of Current Purposes and Methods for Evaluating Coastal Management Projects and Programs Funded by International Donors* (Coastal Resources Center, 1997).

¹⁷Michele H Lemay, 'Coastal and Marine Resources Management in Latin America and the Caribbean' (Technical Study, Inter-American Development Bank, December 1998).

¹⁸Donna J Nickerson-Tietze, 'Community-based Management for Sustainable Fisheries Resources in Phang-nga Bay, Thailand' (2000) 28(1) *Coastal Management* 65.

¹⁹Timothy B Werner et al, 'Abrolhos 2000: Conserving the Southern Atlantic's Richest Coastal Biodiversity into the Next Century' (2000) 28(1) *Coastal Management* 99.

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2. **Coastal Zone Management:** This is a multi-sectoral management approach that focuses on both development and conservation issues within narrow, geographically delineated stretches of coastline and near-shore waters. Many state coastal management programs in the US,²⁰ as well as the initial phases of the Sri Lanka program,²¹ illustrate this approach.
 3. **Integrated Coastal Zone Management:** This approach expands the cross-sectoral feature of coastal management. In fact, the unique nature of coastal zones requires a concerted, well-thought-through and holistic, coordinated, integrated management and planning approach.²² ICZM is a type of management process that addresses the use, sustainable development and protection of the entire coastal area.²³ It not only provides an institutional framework for the allocation, development and management of coastal resources, but it also addresses conflicting coastal issues through policy intervention, management strategies and regulatory measures to prevent or mitigate adverse environmental changes.²⁴ ICZM is now widely viewed as a mainstream activity for coastal management. More than 142 national governments and semi-sovereign states are actively engaged in ICZM.²⁵ Bangladesh has also adopted this process by enacting the *Coastal Management Policy* of 2005.²⁶ Therefore, the thesis demands a broad discussion on ICZM to understand the implications of a climate-development integrated approach in this management.

III.III ICZM: A Dynamic and Continuous Process

Several names and corresponding acronyms are available in the current literature for this type of coastal management, including ICZM, Integrated Coastal Management (ICM), Integrated Coastal Area Management (ICAM), Integrated Marine and Coastal Area Management (IMCAM), Integrated Management of Coastal and Marine Areas (IMCMA), Integrated

²⁰Timothy Beatley, David J Brower and Annak K Schawab, *An Introduction to Coastal Management* (Island Press, 1994).

²¹Kem Lowry and HJM Wickremeratne, 'Coastal Area Management in Sri Lanka' (1987) 15 *Coastal Management* 1.

²²Kay, above n 8, 3.

²³GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 'The Contributions of Science to Integrated Coastal Management' (Reports and Studies No 61, Food and Agriculture Organisation of the United Nations, 1996) 3.

²⁴Chua, above n 13, 102.

²⁵Kay, above n 8, 3.

²⁶Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy 2005*, sec 3.2.

Coastal and Ocean Zone Management (ICOZM) and Coastal Resource Management (CRM). According to Dr Korakandy, these different phrases have evolved in different geo-political and economic contexts.²⁷ However, for simplicity and to maintain consistency, the term 'ICZM' has been used throughout this thesis.

ICZM has been defined in diverse ways. In some cases, it has been defined with common elements that have emerged from relevant conferences, international agreements, academic literature and reports of different international entities such as the World Bank, the OECD and the FAO. According to Boelaert-Suominen and Cullinan, there is no generally accepted definition of the term.²⁸ However, defining the term is necessary to distinguish between what is and is not ICZM efforts among the myriad of approaches to environmental planning and management. This is also important for conducting international or national comparative analysis and the consequent exchange of information.²⁹ Therefore, this section considers a few definitions of ICZM and finally adopts one for the purpose of this thesis.

The US Congress introduced an early version of coastal management in the *Federal Coastal Zone Management Act* of 1972. The Congress declares that it is the national policy 'to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations'.³⁰ To this end, the Act aims:

[T]o encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programmes to achieve wise use of the land and water resources of coastal zone...³¹

Although it is not a definition in a strict sense, it gives directions at the national level to set programs for the management of US coasts. A considerable number of authors and scholars have formulated the definition of ICZM in the past two decades. As mentioned earlier, they have defined the term from somewhat different aspects. This is partly because of their diverse

²⁷Ramakrishana Korakanddy, *Coastal Zone Management: A Study of the Political Economy of Sustainable Development* (Kalpaz Publications, 2005) 57.

²⁸S Boelaert-Suominen and C Cullinan, 'Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management' (FAO Legislative Study No 93, Food and Agriculture Organisation of the United Nations, 1994) 9.

²⁹Jens Sorensen, 'The International Proliferation of Integrated Coastal Zone Management Efforts' (1993) 21(1) *Ocean & Coastal Management* 45, 48.

³⁰*Coastal Zone Management Act 1972*, s 303.

³¹*Ibid.*

disciplinary backgrounds and partly as a reflection of their varied experiences with ICZM in different parts of the world.³² A few examples are set out here.

Chua defines ICZM as a resource management system and narrates that such a management system employs an integrative, holistic approach and an interactive planning process to address the complex management issues in the coastal area.³³ At the same time, Chua highlights how ICZM could serve as the blueprint for attaining the goals and objectives of sustainable development by maintaining the functional integrity of coastal resource systems, reducing resource-use conflicts, maintaining the health of the environment and facilitating the progress of multi-sectoral development.³⁴

Knecht and Archer define ICZM as a dynamic and continuous process³⁵ for administering the use, development and protection of the coastal zone. It administers the resources towards the common objectives of national and local authorities and the aspirations of different resource-use groups.³⁶ In another article, Cicin-Sain and Knecht point out that the ICZM process is designed mainly to overcome the fragmentation inherent in both the sectoral management approach and the splits in jurisdiction among levels of government at the land–water interface.³⁷ This is done by ensuring that the decisions of all sectors (e.g. fisheries, oil and gas production, water quality) and all levels of government are harmonised and consistent with the coastal policies of the nation in question.³⁸

Sorenson defines the term as the integrated planning and management of coastal resources and environments.³⁹ He explains that this integrated planning and management is based on the physical, socioeconomic and political interconnections both within and among the dynamic coastal systems.⁴⁰ Clark notes that:

³²Biliana Cicin-Sain and Robert W Knecht, *Integrated Coastal and Ocean Management: Concepts and Practices* (Island Press, 1998) 38.

³³Chua Thia-Eng, 'Essential elements of integrated coastal zone management' (1993) 21(1-3) *Ocean & Coastal Management* 81, 84.

³⁴*Ibid* 84.

³⁵Robert W Knecht and Jack Archer, 'Integration' in the US Coastal Zone Management Program' (1993) 21(1-3) *Ocean & Coastal Management* 183, 186.

³⁶*Ibid*.

³⁷Cicin-Sain and Knecht, above n 32, 39.

³⁸*Ibid*.

³⁹Jens Sorensen, 'National and International Efforts at Integrated Coastal Management: Definitions, Achievements, and Lessons' (1997) 25(1) *Coastal Management* 3, 9.

⁴⁰*Ibid*.

ICZM is a system for resource management operated by governments at the local/regional level with central government assistance. ICZM focuses on sustaining coastal resources, conserving biodiversity, protecting the littoral environment, and countering natural hazards. It does so by influencing the form of shoreline development through education, resource management regulations, and environmental assessment.⁴¹

He further states that ICZM recognises the uniqueness of coastal resources management.⁴² This means that it differs greatly from either land or water resources; it is a combination of both. The key is the unitary management of the zone—that is, treating shore-lands and coastal waters as a single interacting unit.⁴³

In addition to this academic literature, all key institutions that are involved in the management and planning of coastal zones have focused on ICZM in their individual policy papers or reports. According to the 1996 report of the international Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP),⁴⁴ ICZM is:

[A] process that unites government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal ecosystem and resources.⁴⁵

Several other GESAMP reports, including GESAMP 1980,⁴⁶ GESAMP 1991⁴⁷ and GESAMP 1994⁴⁸ address ICZM. A report of the OECD on coastal management⁴⁹ mentions that ICZM

⁴¹John R Clark, 'Coastal Zone Management for the New Century' (1997) 37(2) *Ocean & Coastal Management* 191, 199.

⁴²Ibid 191.

⁴³Ibid.

⁴⁴GESAMP is an advisory body consisting of specialized experts nominated by the sponsoring agencies, which are: International Maritime Organization (IMO), FAO, UNESCO–International Oceanographic Commission (UNESCO-IOC), World Meteorological Organization (WMO), World Health Organization (WHO), International Atomic Energy Agency (IAEA), UN and the UN Environment Programme (UNEP). The principal task of GESAMP is to provide scientific advice to the sponsoring agencies concerning the prevention, reduction and control of the degradation of the marine environment.

⁴⁵GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), above n 23, 2.

⁴⁶GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 'Marine Pollution Implications of Coastal Area Development' (Reports and Studies No 11, Food and Agriculture Organisation of the United Nations, 1980).

⁴⁷GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 'Global Strategies for Marine Environmental Protection' (Reports and Studies No 45, Food and Agriculture Organisation of the United Nations, 1991).

⁴⁸GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 'Guidelines for Marine Environmental Assessment' (Reports and Studies No 54, Food and Agriculture Organisation of the United Nations, 1994).

⁴⁹The Organisation for Economic Co-operation and Development, *Report on Coastal Zone Management: Integrated Policies and Draft Recommendations of the Council on Integrated Coastal Zone Management*, Environmental Directorate, Environment Committee (1991) 37.

is the management of the coastal zone as a whole in relation to local, regional, national and international goals. Such management imposes a particular focus on the interaction between the various activities that occur in the coastal zone.⁵⁰ The International Union for Conservation of Nature (IUCN) published cross-sectoral, integrated coastal area planning guidelines in 1993. According to this document, ICZM is increasingly used to refer to the process of combining all aspects of the physical, biological and human components of the coastal zone within a single management framework.⁵¹ In 1996, the FAO published technical guidelines for the integration of fisheries into coastal area management, declaring that integrated coastal management usually refers to the process of resource management in the interface between the sea and the land.⁵² The World Bank defines the term as:

[A] process of governance and consists of the legal and institutional framework. Such a framework is necessary to ensure development and management plans for coastal zones which are integrated with environmental (including social) goals and are made with the participation of those affected.⁵³

The definition noted by the European Commission is worth mentioning here. It defines ICZM as:

[A] dynamic, continuous and iterative process designed to promote sustainable management of coastal zones. ICZM seeks, over the long term, to balance the benefits from economic development and human uses of the Coastal Zone, the benefits from protecting, preserving, and restoring Coastal Zones, the benefits from minimising loss of human life and property, and the benefits from public access to and enjoyment of the Coastal Zone, all within the limits set by natural dynamics and carrying capacity.⁵⁴

It is apparent that the abovementioned definitions of ICZM are invariably focused on the objectives, mode and arena of the management program. Whether in the long or short form, most of the definitions stress the dynamic nature of ICZM and its emphasis on sectoral

⁵⁰Ibid; The Organisation for Economic Co-operation and Development, *Coastal Zone Management: Integrated Policies* (Nature, 1993).

⁵¹John C Pernetta and Danny L Elder, 'Cross-sectoral, Integrated Coastal Area Planning (CICAP): Guidelines and Principles for Coastal Area Development' (1993) 4.

⁵²Food and Agriculture Organization of the United Nations, 'Integration of fisheries into coastal area management' (FAO Technical Guidelines for Responsible Fisheries No 3, Food and Agriculture Organization of the United Nations, 1996) iv; John R Clark, SM Garcia and JF Caddy, *Integrated Management of Coastal Zones* (Food and Agriculture Organization of the United Nations, 1992); Sonja Boelaert-Suominen and Cormac Cullinan, *Legal and Institutional Aspects of Integrated Coastal Area Management in National Legislation* (Food and Agriculture Organisation of the United Nations, 1994).

⁵³Jan C Post, Carl G Lundin and Banco Mundial, *Guidelines for Integrated Coastal Zone Management* (World Bank Washington, DC, 1996) 1.

⁵⁴European Commission, 'Towards a European Integrated Coastal Zone Management (ICZM) Strategy: General Principles and Policy Options' (1999) 16.

integration.⁵⁵ For the purpose of this thesis, a comparatively simple definition has been adopted from the Coastal Area Management and Planning Network (CAMPNET) of the University of Miami. In 1989, the CAMPNET globally assessed the status of ICZM. In its summary report, ICZM is defined as:

A dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural, and institutional resources to achieve the conservation and sustainable multiple uses of the coastal zone.⁵⁶

The key words and phrases in this definition have been expanded by the Caribbean Environment Programme.⁵⁷ ‘Dynamic process’ indicates the constantly changing nature of the coast. To accommodate these changes, the process of coastal zone management must be flexible. ‘Coordinated strategy’ indicates such a plan or a program that may be spread among different groups or agencies working together. ‘Allocation of environmental, socio-cultural and institutional resources’ refers to apportioning and balancing the various natural and human resources in the coastal zone. ‘To achieve the conservation and sustainable multiple use of the coastal zone’ refers to the need to preserve the coastal zone and to maintain and strengthen its many uses.⁵⁸ This thesis recommends that the coastal management of Bangladesh must be flexible in order to coordinate development strategies and climate change strategies in its plan and program in the context of climate change. Chapter II details the paradigm shift of integrating development strategies and climate change adaptation and mitigation strategies. This chapter recommends this climate-development integrated approach for the allocation of environmental, socio-cultural and institutional resources of Bangladesh’s coastal areas.

III.IV Essential Features and Elements of ICZM

Several definitions in Section III.III mention that ICZM moves beyond the traditional single-sector approach and is built on the essential elements of integration and coordination throughout the entire policy cycle. However, there is a fine difference between integration and coordination. Sections III.IV. A and III.IV.B narrate these two elements of ICZM.

⁵⁵Stephen Olsen, James Tobey and Meg Kerr, 'A Common Framework for Learning from ICM Experience' (1997) 37(2) *Ocean & Coastal Management* 155, 157.

⁵⁶CAMPNET, 'The Status of Integrated Coastal Zone Management: A Global Assessment' (Summary Report of the Workshop, Charleston, South Carolina, 4-9 July 1989); Clark, above n .

⁵⁷The Caribbean Environment Programme, *Coastal Zone Management*<<http://www.cep.unep.org/issues/czm.html>>.

⁵⁸Ibid.

III.IV.A Integration

Integration ensures internal consistency between policies and actions, and projects and programs. It also maintains the coherency and linkages between the process of planning and implementation. Kenchington and Crawford identify the necessary characteristics for integration as strategic, comprehensive and interactive.⁵⁹ From a practical aspect, there are three broad categories of integration: (i) policy integration, (ii) functional integration and (iii) system integration.⁶⁰ In consideration of this classification, Karim and Hoque state that an ICZM program in any country needs to have three basic elements: (i) a legal framework, (ii) an institutional framework and (iii) stakeholders' participation.⁶¹ The following paragraphs define these three integrations:

1. **Policy Integration:** This ensures internal consistency of the management program in terms of national and local government policies. A well-defined legal framework is a pre-requisite for successful policy integration in ICZM. The US was the first country in the world to promulgate a *Coastal Zone Management Act* in 1972.⁶² India enacted the *Coastal Regulation Zone Notification* in 1991. South Africa passed the *Integrated Coastal Management Act* in 2008. There is no such statute in Bangladesh for ICZM. At least 90 different laws are particularly relevant for coastal management in Bangladesh.⁶³ Both the *Coastal Zone Policy*⁶⁴ and the *Coastal Development Strategy*⁶⁵ state that all of the country's laws are applicable to coastal management. However, both documents recommend reviewing the necessity of an umbrella legislation for ICZM. This thesis reviews the laws and policies that are relevant to ICZM in Bangladesh. Section III.V describes the policy cycle of ICZM, Chapter IV conceptualises the first generation of the policy cycle of ICZM of Bangladesh in detail and Chapter V evaluates the climate-development integrated approach in the legal framework of ICZM in Bangladesh.

⁵⁹Richard Kenchington and David Crawford, 'On the Meaning of Integration in Coastal Zone Management' (1993) 21(1-3) *Ocean & Coastal Management* 109, 115.

⁶⁰LF Scura et al, 'Lessons for Integrated Coastal Zone Management: The ASEAN Experience' (Paper presented at the Regional Workshop on Coastal Zone Planning and Management in ASEAN Lessons Learned, Bandar Seri Begawan (Brunei Darussalam), 28-30 Apr 1992, 1992).

⁶¹Md Saiful Karim and Ridwanul Hoque, 'Integrated Coastal Zone Management and Sustainable Development of Coastal Area: A Short Overview of International Legal Framework' in Einar Dahl and Josianne Stottrup Erlend Moksness (ed), *Integrated Coastal Zone Management* (Wiley-Blackwell, 2009) 170, 171.

⁶²*Coastal Zone Management Act 1972*, above n 30.

⁶³Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Development Strategy* (2006) 45.

⁶⁴Ministry of Water Resources, above n 26, 12.

⁶⁵Ministry of Water Resources, above n 63, 45.

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2. **Functional Integration:** This relates to the linkages among various management actions to avoid duplication among concerned line agencies, and it determines the types and levels of activities permissible in line with the goals and objectives of the ICZM program. An institutional framework is required to achieve functional integration. Bangladesh's *Coastal Zone Policy* and *Coastal Development Strategy* narrate the institutional framework for the national and local levels. The national-level structure relates to the National Council, Inter-Ministerial Steering Committee (SC), Inter-Ministerial Technical Committee (TC), Focal Points and a Program Coordination Unit (PCU).⁶⁶ The National Council of the Ministry of Water Resources (MoWR) acts as a higher-level decision-making body for the ICZM programs and activities at the national level.⁶⁷ The SC provides policy guidelines for ICZM, while the TC removes planning and implementation bottlenecks and resolves inter-organisational conflicts.⁶⁸ The PCU liaises with service ministries such as the Ministry of Finance (MoF), Ministry of Planning (MoP), Ministry of Establishment (MoE) and development partners.⁶⁹ According to the *Coastal Development Strategy*, the local-level structure for ICZM comprises the District Council, Upazila Parishad, Union Parishad and Gram Sharakar.⁷⁰
3. **System Integration:** This integration takes into account the spatial and temporal dimensions of the coastal resource systems in terms of physical (including seasonal) changes of the environment, resource-use patterns and the socio-economic setting.⁷¹ If important stakeholders are left out (e.g. tribal chiefs, port authorities, housing departments, tourist industries, fishermen, economic development planners), the whole initiative can fail. Therefore, system integration employs a multidisciplinary approach and tries to find the optimum balance among the relevant management issues arising from the physical, social and economic linkages in the specific zone. The *Coastal Development Strategy* narrates a wide range of community-based organisations, from genuinely indigenous institutions (e.g. samaj, mosque, market

⁶⁶ Ibid 37.

⁶⁷ Ministry of Water Resources, above n 26, 10.

⁶⁸ Ibid 11.

⁶⁹ Ibid.

⁷⁰ Ministry of Water Resources, above n 63, 43.

⁷¹ Thia-Eng, above n 33, 85.

committees) to project-based village development and water management groups.⁷² It recommends an all-out effort for system integration in Bangladesh.⁷³

III.IV.B Coordination

Coordination is an axiom of an ICZM program.⁷⁴ Even integration can be achieved only through an effective coordinating mechanism at both the program planning and implementation levels. Coordination strengthens the policy and management integration of the entire ICZM program. According to Sorenson, it can be classified on the basis of vertical and horizontal levels.⁷⁵ Vertical coordination is essential between agencies of the national and local governments to ensure policy complementarities and internal consistency, technical assistance and budget allocation.⁷⁶ At the same time, horizontal coordination (or interagency coordination) is equally important among various implementing agencies to execute the management actions, otherwise it can cause interagency conflicts at various government levels. To avoid this constraint, the common practice among different nations is to engage an interagency coordinating body with appropriate legislative authority to implement the ICZM. Examples of such agencies include: the Interagency Committee in Brunei Darussalam; the Coastal Conservation Department of the Ministry of Fisheries in Sri Lanka; the Ministry of Science, Technology and the Environment in Thailand; and the State Oceanic Administration in the People's Republic of China. In Bangladesh, neither the *Coastal Zone Policy* nor the *Coastal Development Strategy* envisage the creation of a super body for the coordination of the ICZM program. According to Section 5.4 of the *Coastal Zone Policy*, a lead Ministry (MoWR) and a lead agency (Water Resources Planning Organization (WARPO)) are designated for the overall coordination of ICZM in Bangladesh.⁷⁷ Section 4.1 of the *Coastal Development Strategy* says that 'the ICZM processes and programs would be planned centrally but executed through the concerned line Ministries and agencies within an integrated planning and management framework'.⁷⁸

⁷² Ministry of Water Resources, above n 63, 44.

⁷³ Ibid.

⁷⁴ Thia-Eng, above n 33, 89.

⁷⁵ Sorensen, above n 39.

⁷⁶ Thia-Eng, above n 33, 89.

⁷⁷ Ministry of Water Resources, above n 26, 10.

⁷⁸ Ministry of Water Resources, above n 63, 37.

III.V The Policy Cycle of ICZM

The process by which ICZM programs evolves is called the ICZM policy cycle.⁷⁹ The cycle consists of five stages: (i) issue identification and assessment, (ii) program preparation, (iii) formal adoption and funding, (iv) implementation and (v) evaluation. The European Commission mentions the same five stages as information collection, planning, decision-making, management and monitoring of implementation.⁸⁰

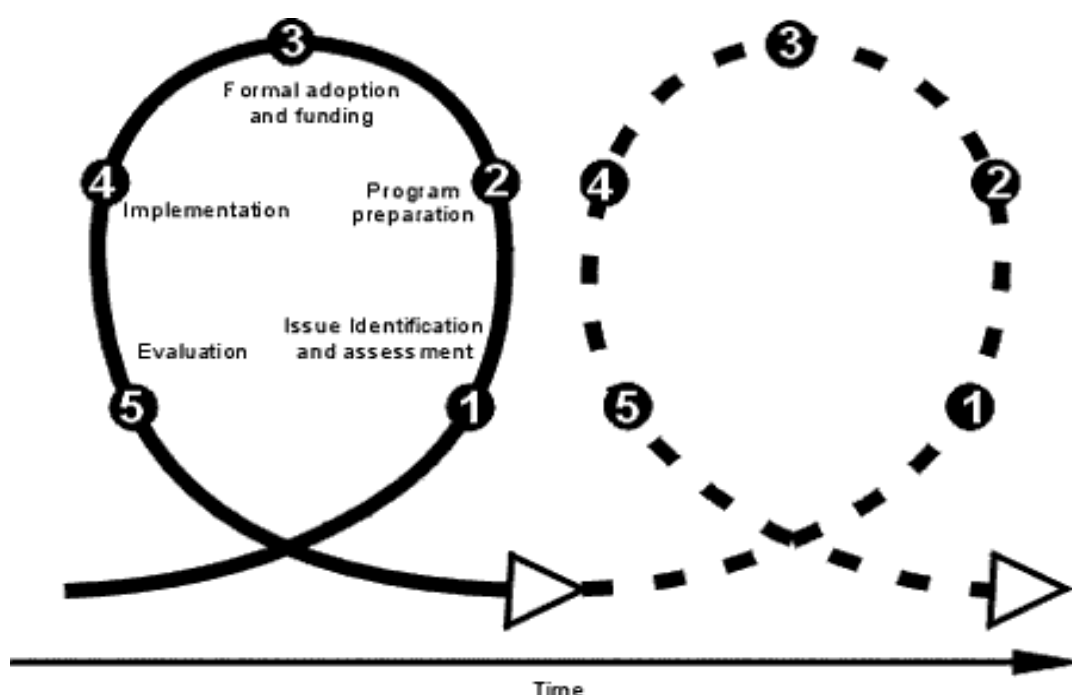


Figure 3.1: The ICZM Policy Cycle⁸¹

As shown in Figure 3.1, in Stage 1, the ICZM policy cycle starts with identifying and analysing the issues that are relevant to specific coastal areas. Usually, the first task in this stage is to prepare a coastal profile to identify the coastal resources, activities, uses, habitats and protected areas, as well as major resource management issues such as open access to coastal resources, multipurpose use, development patterns, user conflicts and specific priorities for management in the coastal area.⁸² The problems of the area and their causes are

⁷⁹Olsen, Tobey and Kerr, above n 55, 160.

⁸⁰European Commission, above n 54.

⁸¹GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), above n 23, 5.

⁸²B R Subramaniam, 'Integrated Coastal and Marine Area Management: Principles, Needs, Policy and Legislation' in S Ramachandran (ed), *Coastal Environment and Management Book* (Institute for Ocean Management, Anna University, 2001) 309, 312.

also identified in this stage.⁸³ Stage 2 proceeds to set objectives and prepare a plan of policies and actions. Stage 3 begins by formalising a law, decree or interagency agreement and securing funds to implement a selected set of actions. In Stage 4, the procedures and actions planned in the policy formulation stage are made operational. According to Olsen, Tobey and Kerr, mechanisms in this stage may include public meetings, conflict resolution and enforcement procedures, while actions span the building of physical infrastructure, the strengthening of institutions and the dissemination of appropriate forms of resource use.⁸⁴ Stage 5 is the formal evaluation of the results; in most cases, this stage is often ignored or poorly executed. This thesis partially evaluates the coastal management of Bangladesh.⁸⁵ It is a partial evaluation because the thesis only evaluates whether the climate change strategies have been reflected in the stages of issue identification, program preparation, formal adoption and implementation.⁸⁶ As mentioned in Section I.IX, other aspects of coastal management in Bangladesh have not been evaluated in this thesis.

As shown in Figure 3.1, these five consecutive stages have to work as an on-going and iterative process⁸⁷ for successful coastal management. The completion of each stage (or cycle) is called the generation of a program.⁸⁸ The ICZM programs in a range of developed and developing countries suggest that the completion of an initial cycle (or first generation) typically requires 8–15 years.⁸⁹ From this perspective, the ICZM program in Bangladesh is in its first generation. According to the 1996 GESAMP report, the ICZM policy cycle may go through a number of cycles before the program is sufficiently refined to produce effective results,⁹⁰ but evaluation is very important during each generation.

⁸³Ibid 312.

⁸⁴Olsen, Tobey and Kerr, above n 55.

⁸⁵ This thesis evaluates the coastal management policies and statutes of Bangladesh in Chapter IV.

⁸⁶ See Section IV.IV for this evaluation.

⁸⁷GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), above n 23, 5.

⁸⁸Olsen, Tobey and Kerr, above n 55, 161.

⁸⁹Ibid.

⁹⁰GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), above n 23, 5.

III.VI International Regime for ICZM

This section briefly presents a number of international initiatives that have played an important role in establishing ICZM in an international policy context. The international community first recognised that coastal areas require special protection at the UN Conference on the Human Environment,⁹¹ which was held in Stockholm in 1972 (the same year that the *Federal Coastal Zone Management Act*⁹² was enacted in the US). The Conference adopted an Action Plan and endorsed the need to protect coastal zones—particularly those that are not yet degraded.⁹³ This was followed by a recommendation in the 1987 report of the World Commission on Environment and Development, which is also known as the Brundtland report. This report suggests providing assistance for developing countries ‘to strengthen their legal and institutional frameworks needed for integrated management of coastal resources’.⁹⁴

The concept was strengthened at the UN Conference on Environment and Development (UNCED) in 1992. As mentioned in Chapter II, the success of this conference is reflected in the adoption of the UNFCCC and Agenda 21. Article 4 of the UNFCCC states, among other things, that all signatories will develop and elaborate appropriate and integrated plans for coastal zone management.⁹⁵ The UNFCCC is legally binding for all signatories, but Agenda 21 is not. However, Agenda 21 devotes one of its 40 chapters (Chapter 17), specifically to the protection of oceans and seas. Chapter 17 (program area A) deals with the integrated management of coastal and marine areas. While every section of program area A contains text that is relevant to coastal managers and decision-makers, Sections 17.5 and 17.6 are perhaps the most important in the context of this thesis. The objectives of Section 17.5 state that:

Coastal States commit themselves to integrated management and sustainable development of coastal areas and the marine environment under their national jurisdiction.⁹⁶

⁹¹ This is also known as the Stockholm Conference and will be mentioned as such in this thesis.

⁹² *Coastal Zone Management Act 1972*, above n 30.

⁹³ Report of the United Nations Conference on the Human Environment, UN Doc A/CONF.48/14/Rev.1 (5-16 June 1972) 22.

⁹⁴ Gro Harlem Brundtland and World Commission on Environment Development, *Our Common Future* (Oxford University Press Oxford, 1987) 226.

⁹⁵ *United Nations Framework Convention on Climate Change*, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992) art 4.

⁹⁶ *Report of the United Nations Conference on Environment and Development*, above n 11.

Section 17.5 contains a number of sub-sections that elaborate on specific coastal management objectives, including inter-sectoral planning, adopting a precautionary approach and monitoring needs.⁹⁷ The 'Management Related Activities' of Section 17.6 state that:

Each coastal State should consider establishing, or where necessary strengthening, appropriate coordinating mechanisms (such as a high-level policy planning body) for integrated management and sustainable development of coastal and marine areas and their resources, at both the local and national levels. Such mechanisms should include consultation, as appropriate, with the academic and private sectors, non-governmental organizations, local communities, resource user groups, and indigenous people. Such national coordinating mechanisms could provide, inter alia, for:...(b) Implementation of integrated coastal and marine management and sustainable development plans and programmes at appropriate levels.⁹⁸

Following these international initiatives, a World Coast Conference was organised in Noordwijk in the Netherlands in November 1993. The World Bank developed the Noordwijk Guidelines for ICZM⁹⁹ for this conference. The guidelines identify the necessity of ICZM to move beyond the traditional approaches of coastal management, which tend to be sectorally oriented and fragmented in character.¹⁰⁰ The Conference brought together more than 90 nations, 19 international organisations, and 23 NGOs,¹⁰¹ and it provided an opportunity to exchange information regarding coastal management. The final statement¹⁰² of the Conference set a deadline for coastal states to undertake ICZM by the year 2000.¹⁰³

Several international agreements and treaties have evolved in the wake of the abovementioned global initiatives. The most important of these from an ICZM perspective is the UN Convention on the Law of the Sea (UNCLOS)¹⁰⁴ and the conventions concerning marine pollution that have been adopted under the auspices of the IMO.¹⁰⁵ The UNCLOS is relevant

⁹⁷ R C Kay, S Paul and M Q Mirza, 'Bangladesh Coastal Management in 1993 and Beyond' in Orville T Magoon et al (eds), *Coastal Zone '93* (1993) 3381, 3390.

⁹⁸ *Report of the United Nations Conference on Environment and Development*, above n 11.

⁹⁹ Post, Lundin and Mundial, above n 53.

¹⁰⁰ Jean-Paul Ducrotoy and Siân Pullen, 'Integrated Coastal Zone Management: commitments and developments from an International, European, and United Kingdom perspective' (1999) 42(1) *Ocean & Coastal Management* 1, 6.

¹⁰¹ *World Coast Conference '93: Agenda for Action* <<http://www.gdrc.org/oceans/ocn-icm1.html>>.

¹⁰² 'Preparing to Meet the Coastal Challenges of the 21st Century' (Conference Report, World Coast Conference, Noordwijk, The Netherlands, 1-5 November 1993).

¹⁰³ *World Coast Conference '93: Agenda for Action*, above n 101.

¹⁰⁴ *United Nations Convention on the Law of the Sea* (16 November 1994, adopted 10 December 1982).

¹⁰⁵ The principal IMO Conventions relating to marine environmental protection are: International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969); International Convention on Civil Liability for Oil Pollution Damage (1969); International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971); London Convention on the Convention of Marine Pollution by Dumping of Wastes and Other Matter (1972);

for the scope of ICZM, coastal planning to address sea-level rises, nature conservation, land-based pollution control and EIAs (see Table 3.1). Other global treaties that deal with issues of importance to ICZM include the Convention on Biological Diversity,¹⁰⁶ the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat,¹⁰⁷ the Bonn Convention on the Conservation of Migratory Species of Wild Animals,¹⁰⁸ the UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage¹⁰⁹ and the 1989 Basel Convention. Table 3.1 indicates some of the treaties that states take into account when developing national ICZM.

Table 3.1: Relevant Treaties to Key ICZM Issues

	Issue	Treaty
1.	Scope of ICZM	UNCLOS (defines marine areas; e.g. territorial sea, exclusive economic zone and jurisdiction of states—particularly in relation to marine living resources)
2.	Coastal Planning	(i) Convention on Biological Diversity (requires preparation of national biological diversity planning, which will affect ICZM planning) (ii) World Heritage Convention (provides for the establishment and protection of world heritage sites for the natural and cultural heritage of international significance) (iii) UNFCCC (requires states to plan and take measures to address sea-level rises) (iv) Regional conventions (e.g. the Helsinki Convention requires its parties to establish coastal buffer zones to protect the Baltic sea area)
3.	Nature Conservation	UNCLOS (duty to protect and preserve marine environment) (Part XII)
4.	Protected Areas	(i) Convention on Biological Diversity, Ramsar Convention on Wetlands, Ramsar site criteria (ii) World Heritage Convention World Heritage site criteria (iii) Bonn Convention on Migratory Species (iv) UN Fish Stocks Agreement
5.	Alien Species	Convention on Biological Diversity, Draft IMO Ballast Water Convention
6.	Pollution Control	(i) UNCLOS and regional treaties and protocols for land-based pollution control (ii) IMO Conventions for marine oil pollution control (iii) UNCLOS, London Dumping Convention (especially 1996 Protocol) for dumping and incineration at sea

International Convention for the Prevention of Pollution from Ships (1973/78) (MARPOL); International Convention on Salvage (1989); International Convention on Oil Pollution Preparedness, Response and Co-operation (1990); International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (1996); Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter (1996).

¹⁰⁶Convention on Biological Diversity (29 December 1993, adopted 5 June 1992).

¹⁰⁷Convention on Wetlands of International Importance Especially as Waterfowl Habitat (21 December 1975, adopted 2 February 1971).

¹⁰⁸Bonn Convention on the Conservation of Migratory Species of Wild Animals (1 November 1983, adopted 23 June 1979).

¹⁰⁹UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage, UN GCONF, 17th sess (16 November 1972).

		(iv) Basel Convention, regional conventions; e.g. Bamako Convention for waste and hazardous materials
7.	Development Control	(i) UNCLOS and regional conventions, e.g. Espoo Convention for EIA
		(ii) Protocols to regional seas conventions; e.g. Kuwait Convention for trans-boundary effects
		(iii) Regional conventions; e.g. Aarhus Convention for Public Participation

Source: Cullinan¹¹⁰

In 1975, 16 Mediterranean countries and the European Community adopted the Mediterranean Action Plan (MAP). This was the first regional attempt under the UNEP's umbrella.¹¹¹ In 1976, the state parties adopted the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention).¹¹² The 14 contracting parties of the Barcelona Convention signed an ICZM Protocol in Madrid in 2008.¹¹³ The international coastal management initiatives described above provide a strong stimulus for Bangladesh to formulate coastal zone management policies and plans.¹¹⁴ Chapters VI and VII present detailed descriptions of the present status of ICZM laws and policies in Bangladesh.

III.VII Climate Change: An Accelerator of Problems and a Novel Challenge for ICZM

As mentioned in Chapter I and at the beginning of this chapter, coastal zones face a number of problems as a result of development and increased population pressures around the world. Some of these problems include pollution, structural damage, habitat loss and modification, silting and shoaling, and the over-exploitation of living resources.¹¹⁵ Inland activities (e.g. construction of dams, diversion of river flows, removal of ground water or hydrocarbons) result in coastal erosion, subsidence and shifts in the fresh- and salt-water interface.¹¹⁶

¹¹⁰Cormac Cullinan, 'Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management' (Legislative Study No 93, The Food and Agriculture Organisation of the United Nations, 2006) 43.

¹¹¹United Nations Environment Programme Mediterranean Action Plan for the Barcelona Convention, *Barcelona Convention* <<http://www.unepmap.org/index.php?module=content2&catid=001001004>>.

¹¹² Ibid.

¹¹³The Coastal Management Centre, *Protocol on Integrated Management of Coastal Areas for the Mediterranean* <http://www.pap-thecoastcentre.org/about.php?blob_id=56>.

¹¹⁴Kay, Paul and Mirza, above n 97, 3391.

¹¹⁵Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) 1.

¹¹⁶Martin W Holdgate, *Climate Change: Meeting the Challenge* (Commonwealth Secretariat, 1989).

Dronkers et al¹¹⁷ consider these activities highly critical to the maintenance of coastal habitats and fisheries. Shoreline alterations, mangrove and coral harvesting, dredge and fill activities, sand and gravel extraction, and disposal of wastes in the marine environment all result in changes to the natural character of the coast.¹¹⁸ ICZM of a particular area or nation mostly recognises these risks and the problems based on the primary need and concern of that area or nation. It usually addresses the management of coastal resources in such a manner that it outweighs the risks and continues to attract human activity and development to the coastal zone. For example, Bangladesh's *Coastal Zone Policy* highlights medium- and long-term government policies to ensure the sustainable management of both biotic and abiotic resources, conservation and enhancement of critical ecosystems in the coastal area.¹¹⁹ At the same time, it provides general guidance so that coastal people can pursue their livelihoods under secure conditions in a sustainable manner without impairing the integrity of the natural environment.¹²⁰

The focus of ICZM internationally has principally been to manage the global trend of urbanisation and to harvest coastal and marine resources.¹²¹ However, as Norman¹²² considers, the effects of the tsunami on Southeast Asia in 2005 and Cyclone Katrina on New Orleans in the same year has resulted in increasing attention being given to the potential effect of climate change on coastal areas. Recent studies and reviews show that changes in climate and sea levels will exacerbate many of the problems mentioned above—particularly for small islands, deltas (such as Bangladesh) and low coastal plains.¹²³ A number of writers, including Corre,¹²⁴ Chappell,¹²⁵ Georgas and Perissoratis,¹²⁶ Gibb,¹²⁷ Griggs,¹²⁸

¹¹⁷ Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) 1.

¹¹⁸ Ibid 1; John C Pernetta and Danny L Elder, 'Climate, Sea Level Rise and the Coastal Zone: Management and Planning for Global Changes' (1992) 18(1) *Ocean & Coastal Management* 113, 116.

¹¹⁹ See Section VI.V for details on Bangladesh's *Coastal Zone Policy*.

¹²⁰ Ministry of Water Resources, above n 26, 3.

¹²¹ Norman, above n , 295.

¹²² Ibid.

¹²³ For example, Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) 1.

¹²⁴ Jean-Jacques Corre, 'Implication des Changements Climatiques dans le Golfe du Lion' (UNEP(OCA)/WG.2/4, 1988).

¹²⁵ John Chappell, 'The Effects of Sea Level Rise on Tropical Riverine Lowlands' in J C Pernetta and P J Hughes (eds), *Potential impacts of climatic change in the Pacific* (UNEP Regional Seas Reports and Studies No 128, 1990) 68.

¹²⁶ D Georgas and Kōnstantinos D Perisoratēs, *Implication of Future Climatic Changes on the Inner Thermaikos Gulf* (United Nations Environment Programme, 1988).

¹²⁷ J G Gibb, 'Impacts of Sea Level Rise in the Coastal Zone and Strategies to Reduce Impacts' in R Blakeley (ed), *Climate Change, The New Zealand Response* (Ministry for the Environment, New Zealand, 1988) 102.

Hendry,¹²⁹ Hicks,¹³⁰ Hollis,¹³¹ Jelgersma and Sestini,¹³² Sánchez-Arcilla et al,¹³³ Feagin, Sherman and Grant,¹³⁴ Milliman, Broadus and Gable,¹³⁵ Grady et al,¹³⁶ Sestini,¹³⁷ and Roessig et al,¹³⁸ have concentrated on the potential effects of climate changes on physical processes in habitats such as coastal lowlands, deltas, gulfs, estuaries and rivers, coastlines and lagoons.¹³⁹ The projected effects of global warming on coastal areas include rising sea levels, increasing sea surface temperatures, stronger tropical cyclones, larger storm surges and the growing acidification of surface waters as the oceans absorb more of the carbon dioxide that human activities emit to the atmosphere (see Table 3.2).

Table 3.2: A Summary of Climate Change Effects in the Coastal Zone

Coastal Effects	Observations	Projected Trends
Sea-level Rises	<ul style="list-style-type: none"> In the twentieth century, sea levels rose at a rate of 1.7 to 1.8 mm per year In the last decade, the worldwide average rate was measured to be 3 mm per year Coastal erosion is increasingly observed around the world; it can be related to either sea-level rises, subsidence or both 	<ul style="list-style-type: none"> Sea levels are expected to rise by at least 0.6 m by the century's end; glacial melt is expected to increase this rise Coastal flooding could grow tenfold or more by the 2080s, affecting more than 100 million people per year due to sea-level rises, especially in Southeast Asia Seawater intrusion due to sea-level rises could severely affect aquaculture in heavily populated mega-deltas such as in Southeast Asia 1 m rise in sea levels could inundate 17% of Bangladesh and completely flood the Maldives and reduce Bangladesh's rice

¹²⁸G A Gritfiths, 'Climate change and river sedimentation' in R Blakeley (ed), *Climate Change, The New Zealand Response* (Ministry for the Environment, New Zealand, 1998) 236.

¹²⁹M Hendry, 'Geology: Physical Processes, Coastal Impacts' in A Maul (ed), *Implications of Climatic Changes in the Wider Caribbean Region* (United Nations Environmental Programme, 1988) 53.

¹³⁰D M Hicks, 'Effects of Sea Level Rise and Climatic Change on Shoreline Planform' in R Blakeley (ed), *Climate Change, The New Zealand Response* (Ministry for the Environment, New Zealand, 1988) 224.

¹³¹G E Hollis, *Implications of Climatic Changes on the Garaet El Ichkuel and Lac de Bizerte, Tunisia* (United Nations Environmental Programme, 1988).

¹³²S Jelgersma and G Sestini, *Impact of Future Rise in Sea-level on the Coastal Lowlands of the Mediterranean*. (United Nations Environmental Programme, 1988).

¹³³Agustín Sánchez-Arcilla et al, 'Implications of Climatic Change on Spanish Mediterranean Low-Lying Coasts: The Ebro Delta Case' (2008) 24(2) *Journal of Coastal Research* 306.

¹³⁴Rusty A Feagin, Douglas J Sherman and William E Grant, 'Coastal Erosion, Global Sea-level Rise, and the Loss of Sand Dune Plant Habitats' (2005) 3(7) *Frontiers in Ecology and the Environment* 359.

¹³⁵John D Milliman, James M Broadus and Frank Gable, 'Environmental and Economic Implications of Rising Sea Level and Subsiding Deltas: The Nile and Bengal Examples' (1989) *Ambio* 340.

¹³⁶AE Grady et al, 'The Influence of Sea Level Rise and Changes in Fringing Reef Morphology on Gradients in Alongshore Sediment Transport' (2013) 40 *Geophysical Research Letters* 3096.

¹³⁷Giuliano Sestini, *Implications of Climatic Changes for the Po Delta and Venice Lagoon* (United Nations Environment Programme, 1989); Giuliano Sestini, *Implications of Climatic Changes for the Nile Delta* (United Nations Environment Programme, 1988).

¹³⁸Julie M Roessig et al, 'Effects of Global Climate Change on Marine and Estuarine Fishes and Fisheries' (2004) 14(2) *Reviews in Fish Biology and Fisheries* 251.

¹³⁹Pernetta and Elder, above n , 116.

		farming land <ul style="list-style-type: none"> • 2 °C increase in temperature could result in the loss of a number of island states
Sea Surface Temperature Change	<ul style="list-style-type: none"> • Between 1970 and 2004, sea surface temperatures around the planet rose 0.2–1.0°C, with a mean increase of 0.6°C • Caribbean Sea has warmed by 1.5°C in the past 100 years • Observations since 1961 show that the ocean has been absorbing more than 80% of the heat added to the climate system • Changes in water temperature caused wide-scale coral bleaching in the Asia region, damaging as much as 75–100% of coral in the Philippines in 1998 	<ul style="list-style-type: none"> • By 2100, temperatures are projected to rise in the tropical Atlantic (2–4 °C), Pacific (1.5–3.5 °C) and Indian (3 °C) Oceans • Increases in sea surface temperatures of around 1–3 °C are projected to result in more frequent coral bleaching events and widespread mortality • Studies project that with a 1 °C increase in sea surface temperatures, all coral reefs in the Great Barrier Reef, Southeast Asia and the Caribbean could be bleached
Increased Frequency of Extreme Weather Events	<ul style="list-style-type: none"> • Increases in category 4 and 5 tropical cyclones, hurricanes and typhoons during the twentieth century have been reported • Tropical cyclone activity has increased since 1970, with a trend towards longer-lived storms and storms of greater intensity • Mass mortality of mangrove species in the Caribbean has been attributed to increased frequencies of hurricanes in the region • El Niño events have become more frequent, persistent and intense during the past 20 years compared to the previous 100 years 	<ul style="list-style-type: none"> • Models project a likely increase of peak wind intensities and increased mean and peak near-storm precipitation in future tropical cyclones • Population exposed to flooding by storm surges will increase during the twenty-first century, especially in South, Southeast and East Asia
Precipitation Change	<ul style="list-style-type: none"> • Precipitation has increased by up to 10% in the Northern Hemisphere and decreased in other regions (e.g. North and West Africa, parts of the Mediterranean and the Caribbean) • Frequency and severity of droughts has increased in some regions, such as parts of Asia and Africa • Very dry areas have more than doubled since the 1970s • Australia incurred over US\$13 billion in drought damage between 1982 and 2003 	<ul style="list-style-type: none"> • Projections for Latin America show a general year-round drop in seasonal precipitation of up to 60%, with the greatest effects felt in Mexico and Central America • Precipitation change is likely to increase the frequency of flash floods and large-area floods in many regions • In Tarawa, Kiribati, it is projected that drought damage could reach 18% of gross domestic product by 2050
Ocean Acidification	<ul style="list-style-type: none"> • Since 1750, an average decrease in pH of 0.1 units has been observed 	<ul style="list-style-type: none"> • pH of the world's oceans could fall by 0.3–0.4 units by 2100, resulting in the lowest ocean pH levels in 20 million years

Source: USAID¹⁴⁰

As predicted by many researchers, the repercussions of these effects (see Table 3.2) could be substantial for most coastal ecosystems and communities. They will threaten the livelihoods, health and welfare of millions of people.¹⁴¹ A number of researchers have further suggested

¹⁴⁰USAID, *Adapting to Coastal Climate Change: A Guidebook for Development Planners* (2009), 22.

¹⁴¹Michel and Pandya, above n 3.

that extreme events may become more frequent as a result of climate change.¹⁴² For example, Dronkers et al¹⁴³ mention that increased ocean temperatures may result in changes in the frequency, duration and intensity of tropical storms. Moreover, the effect of storm surges could be intensified by higher sea levels. For instance, very severe Cyclonic Storm Sidr hit Bangladesh on 15 November 2007, Cyclone Nargis impacted Myanmar (near Bangladesh's coast) on 2 May 2008, Cyclone Rashmi hit Bangladesh on 26 October 2008 and Cyclone Aila occurred on 25 May 2009.¹⁴⁴ The inundation of coastal areas in Bangladesh is already common during tropical storms. Therefore, increases in the extent or frequency of inundation may render numerous heavily populated coastal areas of Bangladesh marginal or uninhabitable.¹⁴⁵ Michel and Panday¹⁴⁶ say that higher water levels and larger wave surges can contribute to accelerated shoreline erosion and retreat.¹⁴⁷ Warmer water temperatures and acidifying oceans can degrade the ecology of coral reefs and threaten the artisanal and commercial fisheries that nourish many seaboard communities.¹⁴⁸

Chapter I briefly paints a sombre picture of how these changes in climate and their effects are already affecting the coastal areas and ecosystems of Bangladesh. Rising sea levels pose a greater threat for Bangladesh than the other effects mentioned in Table 3.2. A 1 m rise in sea levels could inundate 17 per cent of the country, reduce its rice farming land by half and affect millions of livelihoods.¹⁴⁹ Many studies and reports of the IPCC¹⁵⁰ and European Commission¹⁵¹ consider an accelerated rise in global sea level as the most significant effect of global climate change on coastal areas. Dupont and Pearman¹⁵² mention it as a matter of national security and, by implication, international security. Sea-level rises are of particular concern to them because of the density of coastal populations and the potential for the large-scale displacement of people in Asia.¹⁵³ It also triggers the possibility of increasing flood-

¹⁴²Dronkers et al, above n 115.

¹⁴³Ibid.

¹⁴⁴Mohammad Mahatab Hossain, *Storm Surges and Coastal Erosion in Bangladesh- State of the System, Climate Change Impacts and 'Low Regret' Adaptation Measures* (Masters Thesis, Leibniz Universität Hannover, 2012) 27.

¹⁴⁵Dronkers et al, above n 115, 1.

¹⁴⁶Michel and Pandya, above n 3.

¹⁴⁷Ibid.

¹⁴⁸Ibid.

¹⁴⁹USAID, *Adapating to Coastal Climate Change: A Guidebook for Development Planners* (2009) 22.

¹⁵⁰Dronkers et al, above n 115.

¹⁵¹European Commission, *The Economics of Climate Change Adaptation in EU Coastal Areas*, Final Report (2009) 5.

¹⁵²Alan Dupont and Graeme Pearman, *Heating up the Planet: Climate Change and Security* (Lowy Institute for International Relations, 2006).

¹⁵³Ibid.

related deaths and damage to property and the environment. Sea-level rises may also cause some nations to lose territorial seas and hence change the relative values of the coastal zone to society.¹⁵⁴ This will inevitably lead to decisions regarding response options to climate change in coastal management.¹⁵⁵ In fact, climate change is a novel challenge for ICZM, as climate threats to coastal regions reverberate well beyond the shoreline. Both farmland affected by saltwater incursion and fisheries menaced by higher ocean acidity feed populations that are distant from the water's edge. Ports, roads, rail lines and other facilities that could be damaged by cyclones and storm surges serve producers and consumers who are located far inland. Refugees fleeing coastal flooding may be driven into neighbouring countries or even further afield. Countering such risks presents opportunities for international cooperation and possibilities for international conflict. Many of the coastal countries that are most vulnerable to global warming, such as Bangladesh, possess limited capacity and few resources to counter or cope with prospective climate damages.¹⁵⁶ While ICZM has provided a solid base for coastal management to date, it is evident that climate change has introduced a level of uncertainty not previously planned for.¹⁵⁷ In this context of climate change, this thesis recommends a climate-development integrated approach for ICZM to address these pressing challenges. This is a changing reality for ICZM; ultimately, it must contend with the various options available for reducing the exposure and sensitivity of coastal areas to climate effects.

III.VIII Possible Responses of Climate Change for Coastal Management

As mentioned in Chapter II, the UNFCCC¹⁵⁸ identifies two responses to climate change: (i) mitigation of climate change by reducing greenhouse gas emissions and enhancing sinks, and (ii) adaptation to the effects of climate change.¹⁵⁹ According to Dronkers et al,¹⁶⁰ there is also an option to do nothing. One then has to face the consequences as described in Table 3.2.

¹⁵⁴Dronkers et al, above n 115.

¹⁵⁵ Possible responses to climate change in coastal management are discussed in Section III.VIII.

¹⁵⁶ Michel and Pandya, above n 3.

¹⁵⁷ Norman, above n 121, 298.

¹⁵⁸ *United Nations Framework Convention on Climate Change*, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992).

¹⁵⁹ Klein et al, above n , 748.

¹⁶⁰ Job Dronkers, Rein Boeijs and Robbert Misdorp, 'Socioeconomic, Legal, Institutional, Cultural, and Environmental Aspects of Measures for the Adaptation of Coastal Zones at Risk to Sea Level Rise' in James G Titus (ed), *Changing Climate and the Coast: Report of the Intergovernmental Panel on Climate Change from the Miami Conference on Adaptive Responses to Sea Level Rise and Other Impacts of Global Climate Change* (UNEP, 1990) vol 1, 175.

Bangladesh is a signatory country of the UNFCCC and adopted a *Climate Change Strategy and Action Plan* in 2008. It committed to considering both types of responses (i.e. mitigation and adaptation) to climate change in the document. Although the document does not discuss the coastal zone, a detailed discussion on the response strategies of Bangladesh regarding climate change is presented in Section V.VII.

III.IX Adaptation Options for Coastal Management

Section II.V.A mentions that the IPCC has been established to clarify the issues surrounding global climate change and its response strategies.¹⁶¹ The IPCC has three working groups: WGI, WGII and WGIII.¹⁶² WGIII assesses response strategies to climate change. In 1989, this working group established four subgroups to carry out a work plan for formulating response strategies.¹⁶³ Two of the subgroups (Energy and Industry Subgroup, and Agriculture and Forestry Subgroup) examined mitigation options (i.e. options to limit global climate change), while the other two subgroups (Coastal Zone Management Subgroup (CZMS) and Resource Use Management Subgroup) examined adaptive options.¹⁶⁴ In 1990, the IPCC CZMS identified three possible adaptation strategies in response to anticipated rising sea levels: (i) planned retreat (ii) accommodate and (iii) protection¹⁶⁵ (see Table 3.3). These strategies have since been applied by many authors (e.g. Klein et al,¹⁶⁶ Nicholls and Klein,¹⁶⁷ Tol et al¹⁶⁸). However, as notified by the European Commission,¹⁶⁹ most of the literature dealing with climate change adaptation in coastal zones is dedicated to potential measures to counteract sea-level rises, flooding and erosion. Some studies and reports highlight the effects of flooding- and erosion-related adaptation measures on coastal ecosystems. In the literature,

¹⁶¹Hoozemans et al, above n 1, 7.2.

¹⁶² WGI—the Science Working Group to assess the available scientific information on climate change; WGII—the Impacts Working Group to assess the environmental and socio-economic effects of climate change; WGIII—the Response Strategies Working Group to formulate response strategies.

¹⁶³World Meteorological Organisation, *Report of the Second Session of the WMO/UNEP Intergovernmental Panel on Climate Change* (WMO/UNEP International Panel on Climate Change, 28-30 June 1989) 14.

¹⁶⁴Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) ii.

¹⁶⁵European Commission, *The Economics of Climate Change Adaptation in EU Coastal Areas*, Summary Report (2009) 12.

¹⁶⁶Richard JT Klein et al, 'Technological Options for Adaptation to Climate Change in Coastal Zones' (2001) *Journal of Coastal Research* 531.

¹⁶⁷Robert J Nicholls and Richard JT Klein, 'Climate Change and Coastal Management on Europe's Coast' in *Managing European Coasts* (Springer, 2005) 199.

¹⁶⁸Richard SJ Tol, Richard JT Klein and Robert J Nicholls, 'Towards Successful Adaptation to Sea-level Rise Along Europe's Coasts' (2008) *Journal of Coastal Research* 432.

¹⁶⁹European Commission, above n 151, 12.

measures to overcome freshwater shortage are rarely discussed from a coastal zone perspective.¹⁷⁰ The IPCC CZMS also focused particular attention on sea-level rises, where most research on effects has been conducted.¹⁷¹ Therefore, the remainder of this chapter focuses primarily on adaptation strategies in response to anticipated rising sea levels rather than the other effects of climate change in coastal zones shown in Table 3.1. The following sections detail different adaptation strategies for coastal management.

Table 3.3: Response Strategies by the IPCC CZMS

	Retreat = effort to abandon vulnerable areas	Accommodate = effort to continue living in vulnerable areas by adjusting living and working habits	Protect = effort to continue use of vulnerable areas
<i>Hard</i>	Relocating threatened buildings	Building on pilings, adapting drainage, emergency flood shelters	Dikes, seawalls, groins, breakwaters, salt-water intrusion barriers
<i>Soft</i>	Land use restriction, set-back zones	New building codes, growing flood- or salt-tolerant crops, early warning and evacuation systems, risk-based hazard insurance	Sand nourishments, dune building, wetland restoration or creation

Source: European Commission¹⁷² (slightly changed)

III.IX.A Planned Retreat

The first strategy introduced by the IPCC¹⁷³ involves no effort to protect the land from the sea. It emphasises the abandonment of land and structures in highly vulnerable areas and the resettlement of inhabitants.¹⁷⁴ This strategy involves planned retreat from, or the prevention of, future major developments in coastal areas that may be affected.¹⁷⁵ In extreme cases, entire areas may be abandoned.¹⁷⁶ The IPCC CZMS provides the following options for retreat (see Table 3.4):

1. retreat the line—that is, preventing development in areas near the coast
2. limited intervention—that is, allowing development to take place on the condition that it will be abandoned if necessary (planned phase-out)

¹⁷⁰ Ibid 12.

¹⁷¹ Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) iv.

¹⁷² European Commission, above n 165, 13.

¹⁷³ J Gilbert J and Pier Vellinga, 'Coastal Zone Management' in World Meteorological Organisation and United Nations Environment Programme (eds), *Climate Change: The IPCC Response Strategies* (1990) 129, 147.

¹⁷⁴ Bijlsma et al, above n , 313.

¹⁷⁵ Ibid 311.

¹⁷⁶ Dronkers et al, above n 115, iv.

3. no intervention—that is, no direct government role other than through withdrawal of subsidies and the provision of information about associated risks.¹⁷⁷

Table 3.4: Adaptation Options for Coastal Management

Coastal Adaptation	Adaptation Objectives	Adaptation Responses	Example
Retreat	Enhanced adaptability	Retreat the line → Limited intervention → No intervention →	Managed realignment <i>Ad hoc</i> seawall Monitoring only
Accommodate	Increased flexibility		Flood-proof buildings; floating agricultural systems
Protect	Increased robustness	Advance the line → Hold the line →	Land claim; empoldering Estuary closure Dyke; beach nourishment

Source: Robert J Nicholls et al¹⁷⁸ (slightly changed)

III.IX.A.1 Limit Development or Retreat the Line

Governmental efforts to limit development generally involve land acquisition, land-use restrictions, prohibited reconstruction of property damaged by storms, and reductions of subsidies and incentives for development in vulnerable areas. Many nations have purchased large areas on the coast and designated them as nature reserves. Preventing development can reduce future expenditures for adaptation.¹⁷⁹ However, in many countries, it would be unconstitutional to prohibit development in every area likely to be flooded by sea-level rises without compensation,¹⁸⁰ and even where it would be legal, as Titus says,¹⁸¹ it would probably not be politically feasible. Nevertheless, it might be possible to implement this strategy for areas that are likely to be flooded in the next few decades.

¹⁷⁷ Ibid 6.

¹⁷⁸ Robert J Nicholls et al, 'Coastal Systems and Low-lying Areas' in Martin L Parry et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 316, 341.

¹⁷⁹ Dronkers et al, above n 115, 6.

¹⁸⁰ Stephen P Leatherman, 'Environmental Implications of Shore Protection Strategies along Open Coasts (with a Focus on the United States)' in James G Titus (ed), *Changing Climate and the Coast: Report of the Intergovernmental Panel on Climate Change from the Miami Conference on Adaptive Responses to Sea Level Rise and Other Impacts of Global Climate Change* (UNEP, 1990) vol 1, 201.

¹⁸¹ James G Titus, 'Options for Responding to a Rising Sea Level and other Coastal Impacts of Global Warming' in James G Titus (ed), *Changing Climate and the Coast: Report of the Intergovernmental Panel on Climate Change from the Miami Conference on Adaptive Responses to Sea Level Rise and Other Impacts of Global Climate Change* (UNEP, 1990) vol 1, 141.

Bangladesh already requires new buildings be set back from the sea. On 13 March 2012, the High Court Division of Bangladesh directed the government to take effective steps immediately to stop construction of all types of structures on the Cox's Bazar sea beach until further notice.¹⁸² A similar direction was given for Kuakata beach on 2 June 2011.¹⁸³ The first one was a *suo moto* rule issued by the High Court Division of Bangladesh,¹⁸⁴ and the second one was in response to public interest litigation filed by the NGO Human Rights and Peace for Bangladesh.¹⁸⁵ As Leatherman¹⁸⁶ suggests, these initiatives would require compensation for coastal property owners. Section 10.5.A of the Perspective Plan mentions financial incentives for the coastal population to help them relocate to inland growth centres and assist them to find alternate occupations.¹⁸⁷ However, there is no such initiative from the Government of Bangladesh yet. Section V.V.A will further highlight the planned retreat strategies of Bangladesh.

III.IX.A.2 Limited Intervention or Planned Phase-out

Titus says that the planned phase-out option in response to sea-level rises gives the government a limited role to lay out the rules of the game—that is, the eventual transgression of the sea.¹⁸⁸ Investors and real-estate markets are accustomed to evaluating uncertainty and can determine whether development should proceed given the constraint.¹⁸⁹ According to Dronkers et al,¹⁹⁰ this approach can be implemented through: (i) regulations that prohibit private construction of protective structures, or (ii) conversion of land ownership to long-term or conditional leases, which expire when the sea reaches a particular level or when the property owner dies. Neither the *Coastal Zone Policy* of 2005 nor the *Bangladesh Climate Change Strategy and Action Plan* of 2008 outline any such phase-out plan by the government. However, Section 10.5.A of the *Perspective Plan* discusses phasing out non-

¹⁸²Staff Correspondent, 'Stop Construction of all Structures', *The Daily Star* (Dhaka), 14 March 2012 <<http://www.thedailystar.net/newDesign/news-details.php?nid=226225>>.

¹⁸³Staff Correspondent, 'Remove all Structures from Kuakata Beach: HC', *The Daily Star* (Dhaka), 3 June 2011 <<http://www.thedailystar.net/newDesign/news-details.php?nid=188358>>.

¹⁸⁴Staff Correspondent, 'Stop Construction on Cox's Bazar Sea Beach: HC', *The Daily Star* (Dhaka), 13 March 2012 <http://www.thedailystar.net/newDesign/latest_news.php?nid=36435>.

¹⁸⁵Staff Correspondent, above n 183.

¹⁸⁶Leatherman, above n 180, 201.

¹⁸⁷Planning Commission, *Outline Perspective Plan of Bangladesh 2010-2021: Making Vision 2021 A Reality* (2010) 110.

¹⁸⁸Titus, above n 181, 145.

¹⁸⁹*Ibid.*

¹⁹⁰Dronkers et al, above n 115.

essential development in the coastal zone and encourages out-migration by introducing disincentive fiscal measures.¹⁹¹

III.IX.A.3 No Government Intervention

As mentioned by the IPCC CZMS, the third option of planned retreat would be to depend on the workings of the private market. Productive crop and timber lands may be left to slowly and progressively deteriorate as a result of salt intrusion into the groundwater or by surface flooding. Wells and surface water that are exposed to salt-water intrusion would gradually be abandoned. Natural resources such as mangroves, marshes and coral reefs would be left to their natural processes as sea levels rise. For a country like Bangladesh, where land is scarce, this does not offer a broadly applicable alternative. There would be little or no land for resettlement, in addition to the loss of heritage and the cultural upheaval.¹⁹²

Under this option, governments could take the more limited role of ensuring that all participants in potentially vulnerable areas have full knowledge of the expected sea-level rises and their associated uncertainties. The IPCC CZMS considers that development would presumably not occur if developers, lenders and insurers were not willing to accept the risks.¹⁹³ However, the situation is different in Bangladesh because of poverty, the scarcity of land and other socio-economic consequences. If people continue to build in vulnerable areas, governments must be prepared to take the necessary actions to ensure public safety.¹⁹⁴ Ironically, there is no such preparedness by the government of Bangladesh.

III.IX.B Accommodation

The second adaptive option of coastal management in response to sea-level rises is accommodation. This strategy assists to continue living in vulnerable areas by adjusting living and working habits¹⁹⁵ (see Tables 3.3 and 3.4). It emphasises the conservation of ecosystems harmonised with the continued occupancy and use of vulnerable areas and

¹⁹¹See Section V.V for the *Perspective Plan*.

¹⁹²Dronkers et al, above n 115, 7.

¹⁹³Ibid.

¹⁹⁴Ibid.

¹⁹⁵European Commission, above n 165, 7.

adaptive management responses.¹⁹⁶ Accommodation implies that people continue to use the land at risk but do not attempt to prevent the land from being flooded.¹⁹⁷ This strategy is in practice in the coastal areas of Bangladesh. Accommodation includes adaptive responses such as erecting emergency flood shelters, elevating buildings on piles, converting agriculture to fish farming, growing flood- or salt-tolerant crops, modifying drainage systems and changing landuse.¹⁹⁸ Bangladesh adopted the *National Adaptation Programmes of Action* in 2005, which mentions some of these adaptive responses. This document will be discussed in detail in Section IV.VII.

Similar to the retreat strategy, the accommodation strategy requires advanced planning and acceptance that some coastal zone values could be lost. Many coastal structures—particularly residential and small commercial buildings—could be elevated on pilings for protection from floods. To counter surging water and high winds, building codes could specify minimum floor elevations and piling depths, as well as structural bracing.¹⁹⁹ The *Bangladesh National Building Code (BNBC)* of 1993 does not address these issues.²⁰⁰ Storm warning and preparedness plans could be instituted to protect the affected populations from extreme events. The *National Plan for Disaster Management of Bangladesh* covers these issues, and Section VI.V will discuss this document in detail.

Under this adaptive strategy, human activities that destroy the natural protection values of coastal resources can be prohibited. Perhaps the most important controls would be to prohibit filling wetlands, damming rivers, mining coral and beach sands, and cutting mangroves. Undeveloped land with sufficient elevation and slope can be set aside to accommodate the natural re-establishment of wetlands and mangroves. Within deltaic areas, natural processes can be maintained by diverting water and sediment. In response to salinity intrusion into groundwater aquifers, management controls can be implemented to regulate

¹⁹⁶Luitzen Bijlsma, 'Coastal Zone and Small Islands' in Robert T Watson, M C Zinyowera and Richard H Moss (eds), *Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses, Contribution of Working Group II to the Report Second Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 1995) .

¹⁹⁷Dronkers et al, above n 115, iv.

¹⁹⁸Bijlsma, above n 174, 313.

¹⁹⁹Dronkers et al, above n 115, 7.

²⁰⁰*Bangladesh National Building Code, 1993* (1 April 2008) Open Library <https://openlibrary.org/books/OL640567M/Bangladesh_national_building_code_1993>.

pumping and withdrawal practices.²⁰¹ *The Coastal Zone Policy* emphasises the meaningful conservation of critical ecosystems but is silent about many of these adaptive options.

The IPCC CZMS considers that requiring private insurance coverage in vulnerable areas is an important method to compensate injuries and damages caused by natural disasters. It forces people to consider whether risks are worth taking, and it provides the necessary funds to repair damages and compensate victims.²⁰² However, poor households in coastal areas cannot afford commercial insurance. Chapter VIII will focus on a community-based model for insurance against losses from natural disasters in Bangladesh.

III.IX.C Protection

The third adaptive measure for coastal management introduced by the IPCC CZMS aims to continue the use of vulnerable areas²⁰³ (see Tables 3.3 and 3.4). It involves defensive measures and seeks to maintain shorelines at their present position by either building or strengthening protective structures, or by artificially nourishing or maintaining beaches and dunes.²⁰⁴ Protective measures tend to cause a coastal squeeze, trapping ecosystems between the sea and coastal constructions.²⁰⁵ This strategy could involve the loss of natural functions and values,²⁰⁶ as they allow ecosystems such as wetlands to migrate landwards in response to sea-level rises.²⁰⁷ According to Pope and Chisholm²⁰⁸ and Sorensen, Weisman and Lennon,²⁰⁹ this strategy involves defensive measures and other activities to protect areas against inundation, tidal flooding, effects of waves on infrastructure, shore erosion, salinity intrusion and the loss of natural resources. As shown in Table 3.3, the measures may be drawn from an array of hard and soft structural solutions. The soft or dynamic structures (eg, sand nourishments, dune building, wetland restoration or creation) attempt to modify the natural processes through the management of physical systems and maintenance practices. Hard or

²⁰¹ Dronkers et al, above n 115, 7.

²⁰² Ibid.

²⁰³ European Commission, above n 165, 7.

²⁰⁴ Bijlsma, above n 174, 311.

²⁰⁵ European Commission, above n 165, 7.

²⁰⁶ Bijlsma, above n 174, 311.

²⁰⁷ European Commission, above n 165, 7.

²⁰⁸ Joan Pope and Thomas A Chisholm, 'Coastal Engineering Options by which a Hypothetical Community might Adapt to Changing Climate' in James G Titus (ed), *Changing Climate and the Coast: Report of the Intergovernmental Panel on Climate Change from the Miami Conference on Adaptive Responses to Sea Level Rise and Other Impacts of Global Climate Change* (UNEP, 1990) vol 1, 151.

²⁰⁹ Robert M Sorensen, Richard N Weisman and Gerard P Lennon, 'Control of Erosion, Inundation, and Salinity Intrusion Caused by Sea Level Rise' (1984) *Greenhouse Effect and Sea Level Rise* 179.

static structures (eg, dikes, seawalls, groins, breakwaters, salt-water intrusion barriers) involve the construction of permanent devices²¹⁰ that can be applied alone or in combination, depending on the specific conditions of the site. As Dronkers et al²¹¹ say, there is no single or generic best solution, as each situation must be evaluated and treated according to its particular merits. The *Coastal Zone Policy* should deal with these adaptation options in detail, as there are some basic steps in the selection of measures that are likely to produce the highest economic returns. First, those charged with planning, design or management responsibilities in coastal zones should be cognisant of the potential for future sea-level rises. Moreover, proposed plans should have options for the most appropriate future response. For example, many protection structures can be planned and designed with features that allow for future incremental additions that, if needed, could accommodate increased water levels and wave action. This can often be done without significant additional costs in the initial investment. Dronkers et al²¹² consider that the capital costs associated with the hard set of options may be a barrier to the consideration of this option by developing countries and small island states.

The European Commission²¹³ advocates the first two options (i.e. accommodation and retreat) over protective measures in order to sustain the ecology of the coastal zones. These two strategies are based on the premise that increases in land loss and coastal flooding will be allowed to occur, and that some coastal functions and values will change or be lost. In contrast, these strategies help to maintain the dynamic nature of coastal ecosystems and thus allow them to adapt naturally.²¹⁴ However, the *Coastal Zone Policy* states that ‘efforts shall be made to continuously maintain sea-dykes along the coastline as first line of defense against predicted sea-level rise’.²¹⁵ Therefore, to date, mainly protective measures have been undertaken to safeguard Bangladesh’s coastal zone from flooding and erosion. It is thus time to explore the other two strategies introduced by the IPCC because successful adaptation to the effects of sea-level rises requires a comprehensive approach to the management of coastal areas and their resources.²¹⁶

²¹⁰Pope and Chisholm, above n 208, 151.

²¹¹Dronkers et al, above n 115, 1.

²¹²Ibid 1.

²¹³European Commission, above n 165, 7.

²¹⁴Bijlsma, above n 174, 311.

²¹⁵Ministry of Water Resources, above n 26, 8.

²¹⁶Marcella Jansen, 'The Role of Coastal Zone Management in Sea Level Rise Response' in James G Titus (ed), *Changing Climate and the Coast: Report of the Intergovernmental Panel on Climate Change from the*

III.X Mitigation Options for Coastal Management

As mentioned in Section II.V, the ultimate objective of the UNFCCC is to achieve the stabilisation of greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous anthropogenic interference with the climate system.²¹⁷ Anthropogenic climate change is caused by the rising content of greenhouse gases and particles in the atmosphere.²¹⁸ This occurs in several ways.

First, burning fossil fuels releases greenhouse gases such as CO₂ (commonly known as brown carbon) and dust particles (part of black carbon). Second, emissions are caused by clearing natural vegetation, forest fires and agricultural emissions, including those from livestock. The third cause is the reduced ability of natural ecosystems to bind carbon through photosynthesis²¹⁹ and store it. This is known as green carbon.²²⁰

Apart from brown, black and green carbons, there is another kind of carbon that is stored by the world's coastal and marine ecosystems in soil sediments and vegetation. These coastal carbon stocks are increasingly referred to as blue carbon,²²¹ or sometimes simply as marine and coastal carbon.²²² As the focus of this thesis is coastal management, blue carbon requires a detailed description.

Miami Conference on Adaptive Responses to Sea Level Rise and Other Impacts of Global Climate Change (UNEP, 1990) vol 1, 161.

²¹⁷ *United Nations Framework Convention on Climate Change*, above n 158, art 2.

²¹⁸ Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 15.

²¹⁹ Photosynthesis is the process of converting light energy to chemical energy and storing it in the bonds of sugar. This process occurs in plants. For example, <<http://biology.clc.uc.edu/courses/bio104/photosyn.htm>>.

²²⁰ Terrestrial carbon stored in plant biomass and soils in forest land, plantations, agricultural land and pasture land is often called green carbon. Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 15.

²²¹ Grimsditch, above n ;Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 15; Brian C Murray and Tibor Vegh, *Incorporating Blue Carbon as a Mitigation Action under the United Nations Framework Convention on Climate Change: Technical Issues to Address*, Nicholas Institute Report 12-04 (2012).

²²² Brian C Murray et al, 'Coastal Blue Carbon and the United Nations Framework Convention on Climate Change: Current Status and Future Directions' (Policy Brief 12-01, Nicholas Institute 2012) 1.

III.XI Blue Carbon and Coastal Management

Attention to the sources of blue carbon emissions has been fairly recent.²²³ Section II.III mentions emerging scientific evidence (e.g. Pendleton et al,²²⁴ Barbier et al,²²⁵ Irving, Connell and Russell²²⁶) that shows that the conversion of coastal and marine ecosystems such as mangroves, tidal salt marshes and sea-grass meadows is becoming a significant source of greenhouse gas emissions throughout the world.²²⁷ The exact amount of carbon stored by these ecosystems is still an active area of research, but as Pendleton et al²²⁸ state, the potential contribution to greenhouse gases from their loss is becoming clear. According to Donato et al,²²⁹ these coastal and marine ecosystems often release more CO₂ than an equivalent area of tropical forest. The UNEP blue carbon report²³⁰ shows that 45 per cent of green carbon is stored in natural terrestrial ecosystems, and the remaining 55 per cent is captured by living organisms in blue carbon sinks. However, these coastal and marine ecosystems are being degraded and are disappearing 5–10 times faster than rainforests.²³¹ According to Murray and Vegh,²³² when disturbed via conversion or degradation, the carbon pools may be burned or oxidised via aerobic exposure. Then they release relatively large amounts of CO₂ to the atmosphere, where it accumulates with other greenhouse gases and increases the risk of climate change.²³³ An emerging body of literature recognises the importance of coastal habitat loss to climate change.²³⁴

If the degradation of coastal and marine ecosystems could be stopped, it could have an immense effect on the reduction of global emissions. The UNEP blue carbon report²³⁵ also mentions that halting the degradation of green and blue carbon that binds ecosystems together

²²³Brian C Murray and Tibor Vegh, *Incorporating Blue Carbon as a Mitigation Action under the United Nations Framework Convention on Climate Change: Technical Issues to Address*, Nicholas Institute Report 12-04 (2012) 5.

²²⁴Pendleton et al, above n .

²²⁵Barbier et al, above n .

²²⁶Irving, Connell and Russell, above n .

²²⁷Murray and Vegh, above n 223.

²²⁸Pendleton et al, above n 224.

²²⁹Daniel C Donato et al, 'Mangroves among the Most Carbon-Rich Forests in the Tropics' (2011) 4 *Nature Geoscience* 293.

²³⁰Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 19.

²³¹Ibid 19.

²³²Murray and Vegh, above n 223.

²³³Ibid.

²³⁴C M Duarte CM, Middelburg J and Caraco N, 'Major Role of Marine Vegetation on the Oceanic Carbon Cycle' (2005) 2 *Biogeosciences* 1; Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 19; Irving, Connell and Russell, above n 226.

²³⁵Nellemann et al (eds), above n 218.

would represent an emission reduction equivalent to 1–2 times that of the entire global transport sector or at least 25 per cent of the total global carbon emission reductions needed, with additional benefits for biodiversity, food security and livelihoods. Coastal management, or more specifically the ICZM, usually addresses the degradation issue of coastal and marine ecosystems of a particular area or nation. For example, Section 4.8.1 of the *Coastal Zone Policy* deals with conserving ecosystems and asks for a regulatory framework for its protection.²³⁶ The conservation and degradation control of coastal and marine ecosystems such as mangroves, tidal salt marshes and sea-grass meadows ultimately work to control the emissions of blue carbon. This means that the management and protection of coastal ecosystems—especially the vegetated coastal habitat—or blue carbon sinks, play a crucial role in mitigating the effects of climate change. In fact, oceans and coastal ecosystems have removed around 25 per cent of the CO₂ emitted by human activities between 2000 and 2007, and around half of the anthropogenic CO₂ released since the start of the industrial revolution.²³⁷

III.XII Blue Carbon and International Climate Change Regime

The existing climate change mitigation framework mainly focuses on black or brown carbon emissions and briefly mentions green carbon, but it neglects blue carbon. For instance, the Emissions Trading System of the European Union (EU-ETS) is a black–brown carbon system that does not incorporate forestry credits for green carbons. The Kyoto Protocol’s Clean Development Mechanism (CDM)²³⁸ in principle includes forestry credits; however, as Nellemann et al²³⁹ state, demand and prices have always been too low to encourage success. Therefore, CDM has also become, for all practical purposes, another black carbon mechanism. The importance of green carbon was recognised by agreement at COP15 in Copenhagen.²⁴⁰ This includes forest carbon through various mechanisms, such as REDD and

²³⁶ *United Nations Framework Convention on Climate Change*, above n 158, 8.

²³⁷ *Fisheries and Climate Change* (17 June 2013) Wikipedia
<http://en.wikipedia.org/wiki/Fisheries_and_climate_change>.

²³⁸ The Clean Development Mechanism (CDM), defined in Article 12 of the Kyoto Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets.
<http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php>.

²³⁹ Nellemann et al (eds), above n 218.

²⁴⁰ Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Fifteenth Session, Held in Copenhagen from 7 to 19 December 2009–*

afforestation, REDD+ and/or others (e.g. Forest Carbon for Mitigation).²⁴¹ However, it is becoming increasingly clear that an effective regime to control emissions must control the entire spectrum of carbon rather than just one colour.²⁴²

The concept of payments to conserve blue carbon, or carbon captured by coastal ecosystems such as mangroves, sea-grasses and intertidal marshes has recently been the focus of reports by the IUCN,²⁴³ the UNEP,²⁴⁴ the World Bank²⁴⁵ and Duke University.²⁴⁶ There is growing interest in exploring the potential of including blue carbon in existing and emerging policy mechanisms for reducing greenhouse gas emissions.²⁴⁷ The following sections examine the policy options for blue carbon and discuss how these might fit into the UNFCCC framework.

III.XIII Blue Carbon under the UNFCCC

Blue carbon was first specifically discussed in the UNFCCC in June 2011 at the 34th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA).²⁴⁸ Due to the apparent greenhouse gas mitigation potential of coastal and marine ecosystems, there was active conversation concerning the role of blue carbon in this session.²⁴⁹ Murray et al²⁵⁰ and Herr, Pidgeon and Laffoley²⁵¹ consider that the importance of coastal and marine ecosystems (e.g. mangroves, tidal salt marshes, sea-grass meadows) as reservoirs of carbon is specifically

Addendum- Part 2: Action Taken by the Conference of the Parties at Its Fifteenth Session, UN Doc FCCC/CP/2009/11/Add.1 (30 March 2010).

²⁴¹ Nellemann et al (eds), above n 218, 15.

²⁴² Ibid.

²⁴³ Dan Laffoley and Gabriel Grimsditch, *The Management of Natural Coastal Carbon Sinks* (2009).

²⁴⁴ Nellemann et al (eds), above n 218, 15.

²⁴⁵ Crooks et al, *Mitigating Climate Change through Restoration and Management of Coastal Wetlands and Near-shore Marine Ecosystems: Challenges and Opportunities*, Paper No 121 (2011).

²⁴⁶ Murray et al, above n 222.

²⁴⁷ Roger Ullman, Vasco Bilbao-Bastida and Gabriel Grimsditch, 'Including Blue Carbon in climate market mechanisms' (2013) 83 *Ocean & Coastal Management* 15.

²⁴⁸ Murray et al, above n 222.

²⁴⁹ At SBSTA 34, Papua New Guinea introduced 'blue carbon: coastal marine ecosystems' as a new agenda item. There were several consultations on this issue and it raised significant momentum. The majority of Parties, including Honduras, Suriname, Colombia, Brazil, Tuvalu, Guatemala, Democratic Republic of the Congo, Guyana and Pakistan, supported addressing blue carbon under the agenda item on research and systematic observation, thereby seeing it as an issue that required further research before it would become an agenda item in its own right. This was to include consideration of mangroves, tidal saltmarshes and seagrass meadows. However, this was met with resistance from mainly two countries—Bolivia and Venezuela—who view blue carbon as the introduction of a new market-mechanism. For detail, see Blue Carbon Policy Working Group, *Blue Carbon Related Activities in International Agreements and Fora to Date* (2011) 7.

²⁵⁰ Murray et al, above n 222.

²⁵¹ Dorothée Herr, Emily Pidgeon and Dan Laffoley (eds), *Blue Carbon Policy Framework: Based on the discussion of the International Blue Carbon Policy Working Group* (2012) 13.

established within the Convention. Grimsditch²⁵² and Herr et al²⁵³ also mention several opportunities for blue carbon that exist within the UNFCCC. The Convention includes coastal and marine ecosystems in Article 4.1(d), which states that all parties will:

[p]romote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all GHG not controlled by the Montreal Protocol, including...oceans as well as other...coastal and marine ecosystem.²⁵⁴

As Murray and Vegh state,²⁵⁵ this passage provides a clear and specific foundation for the inclusion of coastal and marine ecosystems and blue carbon in the existing mechanism of the Convention. However, the current UNFCCC processes do not include blue carbon (whether through avoided emissions from habitat loss or carbon stock enhancement) as a distinct climate change mitigation strategy.²⁵⁶ This may be more a matter of classification and terminology rather than overt omission. Blue carbon is a descriptive term that captures the carbon stored and potentially lost from coastal and marine ecosystems; it is not an officially recognised category under the UNFCCC.

To this end, Murray and Vegh²⁵⁷ consider that attention to this carbon reservoir and their emissions at the UNFCCC level do not require the establishment of a new category of activity. As discussed below, blue carbon mitigation activity may fall into other established categories under the UNFCCC. The associated UNFCCC mechanisms and incentives outlined below may operate at the project scale, the national scale or both. Currently, the UNFCCC process has two parallel paths for mitigation: (i) the Kyoto Protocol, which includes a series of binding commitments from countries to reduce greenhouse gas emissions, and (ii) the Durban Platform, a process agreed to at COP17 in Durban, South Africa, to replace the Kyoto Protocol with a new agreement by 2015. Each path has relevant plug-in points for blue carbon, as described below.

²⁵²Grimsditch, above n 221.

²⁵³Herr, Pidgeon and Laffoley (eds), above n 251.

²⁵⁴*United Nations Framework Convention on Climate Change*, above n 158, art 4.1(d).

²⁵⁵Murray and Vegh, above n 223, 6.

²⁵⁶For example, Grimsditch, above n 221, 22.

²⁵⁷Murray and Vegh, above n 223, 6.

III.XIII.A. Blue Carbon under the Kyoto Protocol

Although the UNFCCC is legally non-binding, the Kyoto Protocol (hereafter the Protocol) adopted in 1997 commits industrialised countries to reduce emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride) by at least 5 per cent from 1990 levels.²⁵⁸ Blue carbon may have a bearing on two provisions of the Protocol: (i) national accounting of sources and removals by sinks from Land Use, Land Use Change and Forestry (LULUCF) and (ii) the CDM. The following sections briefly discuss how blue carbon can be addressed under each provision.

III.XIII.A.1 Blue Carbon under the National LULUCF

Countries that have signed the UNFCCC (both Annex I countries that hold emission reduction obligations and non-Annex I countries, such as Bangladesh, that do not) are required to submit annual National Inventory Submissions (NIS). These submissions record the country's greenhouse gas emissions from anthropogenic activity, as well as sequestration from land use and forestry, based on guidance from the IPCC.²⁵⁹ Within the NIS, there is a section in LULUCF that accounts for the carbon budget (i.e. emissions and reductions) due to the management of terrestrial ecosystems such as forests, peatlands, grasslands and agricultural wetlands.²⁶⁰ Articles 3.3 and 3.4 of the Protocol require countries to report on the changes in carbon stock and greenhouse gases emissions relating to LULUCF activities for each year of the commitment period.²⁶¹ Moreover, when these reported LULUCF activities result in a net removal of greenhouse gases, an Annex I party can issue removal units (RMUs) on the basis of these activities as part of meeting its commitment under the Protocol.

Murray and Vegh²⁶² note that countries have leeway on what to include under LULUCF and thereby could, in principle, include a more comprehensive account that includes blue carbon categories. If these categories are included, there is some incentive to protect these carbon sources, especially in Annex I countries with commitments. In this regard, the focus may be

²⁵⁸ *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, opened for signature 16 March 1998, UN Doc 37 ILM 22 (entered into force 16 February 2005) .

²⁵⁹ Grimsditch, above n 221, 22.

²⁶⁰ Ibid.

²⁶¹ Murray and Vegh, above n 223, 7.

²⁶² Ibid 6.

on the inclusion of tidal salt marshes, which are more abundant in the temperate zone where many Annex I countries exist. Mangroves are tidal forests and are thus readily includable under the category of forest. Most mangrove areas are located in non-Annex I countries, and Bangladesh has the world's largest compact mangrove forest (Sundarbans) on the south-west coast.²⁶³ Although Bangladesh has no emission reduction obligations under the UNFCCC, the country recently adopted a national policy that expresses a wish to play a role in reducing emissions now and in the future. Thus, Bangladesh can include its blue carbon sinks (especially the mangroves) under LULUCF while submitting the NIS.

III.XIII.A.2 Blue Carbon under the CDM

The Protocol includes flexible mechanisms (known as CDM) such as emissions trading and offsets for industrialised countries. It allows countries to meet their emission reduction obligations by funding carbon capture in developing countries.²⁶⁴ Non-Annex I countries (such as Bangladesh) can host emission reduction (or carbon removal/sequestration) projects under CDM. Section II.V discusses CDM projects in Bangladesh. CDM ultimately generates certified emission reduction (CER) credits that Annex I countries can purchase and use to meet national obligations under the Protocol.²⁶⁵

Since its inception, the only LULUCF type of activity that has been approved under the CDM is afforestation and reforestation (A/R), which until recently had been focused primarily on the establishment of traditional forest systems. However, in 2011, the CDM Executive Board approved a methodology for the A/R of degraded mangrove habitats.²⁶⁶ Blue carbon projects could potentially become an offset category for CDM projects. There is already at least one approved CDM methodology for the A/R of degraded mangrove habitats.²⁶⁷ This methodology²⁶⁸ establishes a precedent for the direct inclusion of blue carbon in the CDM.²⁶⁹ While current methodologies are limited to A/R, the potential list of additions could be large;

²⁶³ Afroz and Alam, above n , 276.

²⁶⁴ Grimsditch, above n 221, 23.

²⁶⁵ Murray and Vegh, above n 223, 7.

²⁶⁶ CDM Executive Board, *United Nations Framework Convention on Climate Change, Approved Afforestation and Reforestation Baseline and Monitoring Methodology: Afforestation and Reforestation of Degraded Mangrove Habitats*, UN Doc R-AM0014 / Version 01.0.0 .

²⁶⁷ Murray et al, above n 222, 4.

²⁶⁸ CDM Executive Board, *United Nations Framework Convention on Climate Change, Simplified Baseline and Monitoring Methodology for Small Scale CDM Afforestation and Reforestation Project Activities Implemented on Wetlands*, UN Doc R-AMS0003 / Version 02.0.0.

²⁶⁹ Murray and Vegh, above n 223, 7.

however, blue carbon activities could, in principle, be among them.²⁷⁰ As Murray and Vegh state,²⁷¹ the UNFCCC is currently considering the possible expansion of LULUCF activities within CDM, which could consider avoiding the conversion of mangroves and including other blue carbon categories. Bangladesh has immense potential for hosting emission reduction projects under the approved CDM methodology for the A/R of degraded mangrove habitats in its coastal areas.

III.XIII.B Blue Carbon under the Durban Platform

COP17, which was held in December 2011 in Durban, South Africa, temporarily extended the Protocol beyond 2013. It forged an agreement to develop a successor plan to the Protocol by 2015 involving legally binding obligations by all countries.²⁷² Such a plan is not likely to be fully enacted earlier than 2020. The Durban Platform may draw from mechanisms that currently exist under the Protocol, as well as mechanisms developed since the Bali Action Plan in 2007 established the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA). Two mechanisms that are relevant to blue carbon are: (i) reducing emissions from deforestation and degradation (REDD+), and (ii) NAMAs, which are discussed in the following sections.

III.XIII.B.1 Blue Carbon under REDD+

According to Grimsditch,²⁷³ the Reducing Emissions from Deforestation and Forest Degradation (REDD) program within the UNFCCC presents an opportunity for blue carbon ecosystem protection. Its enhanced version is known as REDD+, and this program goes beyond REDD in the valuation of carbon-stored forests. REDD+ includes conservation, enhancement of carbon stocks and sustainable management of forests.²⁷⁴ In 2010, parties to the UNFCCC at COP16 recognised and encouraged developing countries to contribute to mitigation actions for the forest sector through REDD+ activities.²⁷⁵ This program aims to create financial incentives to reduce forest destruction and degradation, thus reducing

²⁷⁰Murray et al, above n 222, 4.

²⁷¹Murray and Vegh, above n 223, 7.

²⁷²Ibid.

²⁷³Grimsditch, above n 221.

²⁷⁴UN-REDD Programme, *About REDD+* <<http://www.un-redd.org/AboutREDD/tabid/102614/Default.aspx>>.

²⁷⁵Herr, Pidgeon and Laffoley (eds), above n 251.

emissions and maintaining sequestration.²⁷⁶ REDD+ is a program defined under the Cancun Agreement as including activities such as: (i) reducing emissions from deforestation; (ii) reducing emissions from forest degradation; (iii) conservation of forest carbon stocks; (iv) sustainable management of forests; and (v) enhancement of forest carbon stocks.²⁷⁷

REDD+ carbon credits would allow funding from industrialised countries to reduce deforestation and rehabilitate degraded forests in developing countries.²⁷⁸ After the decision in Cancun at COP16, it is clear that mangroves are eligible for REDD+ funding.²⁷⁹ Several countries already include mangroves in their national REDD+ plans. For example, Costa Rica, Tanzania, Indonesia and Ecuador refer to mangroves under their national submissions to the UN-REDD program and the Forest Carbon Partnership Facility (FCPF),²⁸⁰ although they are mostly limited in extent and detail.²⁸¹

Bangladesh can ensure the full and comprehensive inclusion of mangrove forests under REDD+. This can include: (i) implementation of REDD+ decisions, (ii) identification of REDD+ readiness activities such as improved mangrove carbon storage, sequestration and emissions data, and (iii) identification of drivers of deforestation and degradation in mangroves.²⁸² There is also a need to develop a monitoring system to collect data and ensure that the reporting of estimates and information is consistent with UNFCCC decisions and IPCC methods. Bangladesh can develop such a monitoring system for its mangrove ecosystems, as the Cancun Agreement calls for the development of monitoring and reporting systems at the national level.²⁸³

²⁷⁶UN-REDDProgramme, above n 274.

²⁷⁷United Nations Framework Convention on Climate Change, Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, U.N. Doc. FCCC/AWGLCA/2010/L.7 (10 October 2010) 10.

²⁷⁸Ibid 11.

²⁷⁹Grimsditch, above n 221.

²⁸⁰Herr, Pidgeon and Laffoley (eds), above n 251.

²⁸¹For more detail, see David Gordon et al, 'Financing Options for Blue Carbon Opportunities and Lessons from the REDD+ Experience' (Report No NI R11-11, Nicholas Institute for Environment Policy Solutions, Duke University, 2011) <http://lindentrust.org/pdfs/2011-12_Financing_Options_for_Blue_Carbon_Duke.pdf>.

²⁸²Herr, Pidgeon and Laffoley (eds), above n 251, 14.

²⁸³Grimsditch, above n 221.

III.XIII.B.2 Blue Carbon under the NAMAs

Under the Copenhagen Accord established at COP15 in 2009, developing countries agreed to report NAMAs to the UNFCCC every two years; such mitigation actions are monitored domestically.²⁸⁴ NAMAs are a set of policies and actions that countries undertake as part of a commitment to reduce greenhouse gas emissions.²⁸⁵ These actions recognise the common but differentiated responsibilities of all countries to the Convention, and they are attuned to the conditions of each country.²⁸⁶ Although there is no formal definition of NAMAs, the general expectation is that they are initiated by developing countries but supported by finance and technology transfers from developed countries.²⁸⁷

Murray et al²⁸⁸ and Herr, Pidgeon and Laffoley²⁸⁹ believe that NAMAs may be an appropriate venue for blue carbon activity in several countries. Many countries (eg, Congo, Eritrea, Ghana, Sierra Leone) have already mentioned coastal and marine ecosystems explicitly in their NAMA documentation. As mentioned in Climate Focus,²⁹⁰ countries such as Nigeria, Malaysia, Bangladesh and Mozambique, which have not yet submitted any NAMA-related information but have large mitigation potential in mangrove ecosystems,²⁹¹ have the opportunity to develop blue carbon NAMAs. Other countries that have already submitted NAMAs may make further submissions or refine their existing submissions.²⁹²

Bangladesh can use NAMA readiness activities to: (i) increase the understanding of the sink capacity of blue carbon ecosystems and of the emissions resulting from the conversion and degradation of mangroves, saltmarshes and/or sea-grasses, (ii) identify drivers of these emissions, and (iii) identify the activities needed to address those drivers.²⁹³ Funding for

²⁸⁴Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Fifteenth Session, Held in Copenhagen from 7 to 19 December 2009- Addendum- Part 2: Action Taken by the Conference of the Parties at Its Fifteenth Session*, UN Doc FCCC/CP/2009/11/Add.1 (30 March 2010).

²⁸⁵*Bali Action Plan*, UN Doc FCCC/CP/2007/6/ Add1 (14 March 2008).

²⁸⁶Murray and Vegh, above n 223, 8.

²⁸⁷Ibid.

²⁸⁸Murray et al, above n 222, 4.

²⁸⁹Herr, Pidgeon and Laffoley (eds), above n 251, 15.

²⁹⁰Climate Focus, 'Blue Carbon Policy Options Assessment' (Version 4.0, The Linden Trust for Conversation, 15 June 2011) 23.

²⁹¹C Giri et al, 'Status and Distribution of Mangrove Forests of the World using Earth Observation Satellite Data' (2001) 20 *Global Ecology and Biogeography*, 154.

²⁹²Climate Focus, above n 290.

²⁹³Herr, Pidgeon and Laffoley (eds), above n 251, 15.

readiness activities and the implementation of NAMAs for coastal ecosystem management could be accessed through multilateral and bilateral initiatives that are currently providing fast-start finance. However, it is crucial that parties wishing to access GCF funds for blue carbon-based NAMAs in the future state this possibility now. GCF will support developing countries to pursue project-based and programmatic approaches in accordance with climate change strategies and plans, such as low-emission development strategies or plans, NAMAs, NAPAs, National Adaptation Plans (NAPs) and other related activities.

III.XIV The Management of Coastal Carbon Sinks through ICZM

The world's coastal and marine ecosystems are in rapid decline. Between 1980 and 2005, around 20 per cent of the world's total area of mangroves (35,000 km²) was lost.²⁹⁴ Crooks et al.²⁹⁵ estimate that this area alone will continue to release 0.07 GtCO₂ every year. Loss of the remaining 152,308 km² of mangroves would release 0.3 GtCO₂ over the same time. This will also result in incalculable losses in other ecosystem processes and services.²⁹⁶ Sea-grass beds have declined by 29 per cent since the nineteenth century, with an upsurge in recent decades.²⁹⁷ Salt marshes and freshwater tidal marshes have lost more than 50 per cent of their historical global coverage, with the current rate of loss estimated at 1–2 per cent per year. The scenario is no different in Bangladesh, where coastal and marine ecosystems are being rapidly converted for agriculture, shrimp farms and other land uses. Afroz and Alam²⁹⁸ note that the loss of approximately 97.34 km² of mangroves in the southern part of Bangladesh can be directly attributed to shrimp farming.²⁹⁹ Section II.III mentions that in the Chakaria Sundarbans, most of the 75 km² of mangrove vegetation that existed in 1975 has been cleared for shrimp farming.³⁰⁰ The rapid loss of mangroves and other coastal ecosystems ultimately leads to significant emissions. For the wise management of coastal carbon sinks, it is important to explore the reasons for their decline.

²⁹⁴Mark Spalding, Mami Kainuma and Lorna Collins, *World atlas of mangroves* (Earthscan, 2010).

²⁹⁵Crooks et al, *Mitigating Climate Change through Restoration and Management of Coastal Wetlands and Near-shore Marine Ecosystems: Challenges and Opportunities*, Paper No 121 (2011) 2.

²⁹⁶Ibid 2.

²⁹⁷Michelle Waycott et al, 'Accelerating Loss of Seagrasses Across the Globe Threatens Coastal Ecosystems' (2009) 106(30) *Proceedings of the National Academy of Sciences* 12377.

²⁹⁸Afroz and Alam, above n 263, 276.

²⁹⁹AM Choudhury, DA Quadir and MJ Islam, 'Study of Chokoria Sundarbans Using Remote Sensing Techniques' (ISME Mangrove Ecosystems Technical Report No 4, Bangladesh Space Research and Remote Sensing Organization, 1994).

³⁰⁰Bailey, above n .

According to Crooks et al,³⁰¹ coastal and marine ecosystems are under direct and increasing threat from land-use change pressures, indirect effects of development pressures and rising sea levels³⁰² because of climate change. The IUCN reports that significant losses of coastal carbon sinks are occurring due to poor management and climate change (especially rising sea levels) coupled with a lack of policy priority to address current and future threats.³⁰³ Laffoley and Grimsditch³⁰⁴ remark that certain human effects (such as nutrient and sediment run-off from land, displacement of mangrove forests by urban development and aquaculture, and overfishing) are degrading these ecosystems. These activities are also threatening the sustainability of these carbon sinks and compromising their capacity to naturally sequester carbon.³⁰⁵

The good news is that human effects on coastal carbon sinks can be addressed and mitigated by effective management regimes. ICZM provides a major opportunity to address the degradation of coastal and marine ecosystems. As it offers advantages over purely sectoral approaches, ICZM links the multiple sectors depending on coastal resources to those organisations with climate change. Therefore, ICZM not only assists in climate-proofing sector-specific development strategies, but it also mainstreams aquatic-based sectors into climate change strategies.³⁰⁶

For example, the *Coastal Zone Policy* already supports a management approach (although for other reasons) that can secure the carbon storage potential of these ecosystems. Other reasons include biodiversity protection (Section 4.8.1.e),³⁰⁷ sustainable livelihoods of coastal communities (Section 3.3)³⁰⁸ and sustainable management of natural resources (Section 4.4).³⁰⁹ The management approaches mentioned in the policy document that would be effective for the sustainable management of coastal carbon sinks include: Marine Protected Areas, Marine Spatial Planning, area-based fisheries management approaches, buffer zones to allow inland migration of coastal carbon sinks, regulated coastal development and ecosystem

³⁰¹Crooks et al, *Mitigating Climate Change through Restoration and Management of Coastal Wetlands and Near-shore Marine Ecosystems: Challenges and Opportunities*, Paper No 121 (2011) 2.

³⁰²Ibid 2.

³⁰³Dan Laffoley and Gabriel Grimsditch, *The Management of Natural Coastal Carbon Sinks* (2009) vi.

³⁰⁴Ibid.

³⁰⁵Ibid.

³⁰⁶Nellemann et al (eds), above n 230, 63.

³⁰⁷Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy* (2005)26, sec 4.8.1.e.

³⁰⁸Ibid sec 3.3.

³⁰⁹Ibid sec 4.4.

rehabilitation.³¹⁰ These management strategies are incorporated in the *Coastal Zone Policy*—not because the coastal and marine ecosystems work as carbon sinks, but because they are vital sources for the food security of coastal communities. They also provide nurseries and fishing grounds for artisanal fisheries. Further, they provide natural coastal defences that mitigate erosion and storm action, as mentioned in Section II.IX. Therefore, moving forward with the sustainable management of these ecosystems is not only a political imperative for biodiversity conservation, food security and shoreline protection, but also for helping to mitigate climate change.³¹¹

III.XV The Links between Adaptation and Mitigation in Coastal Management

While Sections III.IX and III.X explore the adaptation and mitigation options for coastal management, this section will deal with the existing literature that shows how adaptation and mitigation are related at different levels of decision-making in ICZM. Researchers such as Barbier and Pearce,³¹² Nordhaus,³¹³ Parry et al³¹⁴ and Schelling³¹⁵ consider mitigation and adaptation as substitutes and seek optimal policy integration.³¹⁶ This thesis also aims for optimal policy integration. However, there are others who emphasise the diversity and differences of these from the options shown in Table 2.4. For example, Tol considers the asymmetry of social actors who need to mitigate versus those who need to adapt.³¹⁷ He also says that adaptation has less scope than mitigation in some sectors.³¹⁸ Conversely, according to Goklany, adaptation is the only available option for reducing climate change effects in the short to medium term, while the long term has a mix of adaptation and mitigation.³¹⁹ Klein et al consider these positions not as contradictory, but as underlining different aspects of the same problem.³²⁰

³¹⁰Laffoley and Grimsditch, above n 243, vi.

³¹¹Ibid.

³¹²Edward B Barbier and David W Pearce, 'Thinking Economically about Climate Change' (1990) 18(1) *Energy Policy* 11.

³¹³William D Nordhaus, 'To Slow or not to Slow: The Economics of the Greenhouse Effect' (1991) 101(407) *The Economic Journal* 920.

³¹⁴Martin Parry et al, 'Adapting to the Inevitable' (1998) 395(6704) *Nature* 741.

³¹⁵Thomas C Schelling, 'Some Economics of Global Warming' (1992) 82(1) *The American Economic Review* 1.

³¹⁶Klein et al, above n 159, 750.

³¹⁷Richard SJ Tol, 'Adaptation and Mitigation: Trade-offs in Substance and Methods' (2005) 8(6) *Environmental Science & Policy* 572, 574.

³¹⁸Ibid.

³¹⁹Goklany, above n .

³²⁰Klein et al, above n 159, 754.

Based on the available literature, IPCC distinguishes among four types of inter-relationships between adaptation and mitigation³²¹ in coastal management: (i) adaptation actions that have consequences for mitigation; (ii) mitigation actions that have consequences for adaptation; (iii) decisions that include trade-offs or synergies between adaptation and mitigation; and (iv) processes that have consequences for both adaptation and mitigation. The following sections focus on different types of inter-relationships between adaptation and mitigation in coastal management, with a particular focus on Bangladesh.

III.XV.A Adaptation Affecting Mitigation

Section 4.8.3 of the *Coastal Zone Policy* states that ‘efforts shall be made to continuously maintain sea-dykes along the coastline as first line of defence against predicted sea-level rise’.³²² The NAPA of the country prioritises the construction of flood shelters³²³ to cope with enhanced recurrent floods and inundation. Many of these adaptation options in coastal management involve increased energy use and hence interfere with mitigation efforts if the energy is supplied from carbon-emitting sources. IPCC distinguishes two main types of adaptation-related energy use in coastal areas: (i) one-time energy input for building large infrastructures (materials and construction), and (ii) incremental energy input that is continuously needed to counterbalance climate effects in providing goods and services.³²⁴

In Bangladesh, the largest amount of construction work to counterbalance climate change effects occurs in water management and in coastal zones. The former involves hard measures in flood protection (eg, dykes, dams, flood-control reservoirs), while the latter comprises coastal defence systems (eg, embankments, dams, storm surge barriers).³²⁵ However, adaptation-related construction comprises only a small part of the total annual construction in Bangladesh. Therefore, associated greenhouse gas emissions are likely to be merely a small proportion of the total energy use and energy-related emissions.³²⁶ In fact, Bangladesh's contribution to greenhouse gas emissions is miniscule. Nevertheless, in the design or

³²¹Ibid.

³²²Ministry of Water Resources, above n 26, 8.

³²³Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, *National Adaptation Programme of Action (NAPA)* (2005) 24.

³²⁴Klein et al, above n 159, 759.

³²⁵Ibid.

³²⁶Ibid.

appraisal of adaptation projects, the consideration of mitigation options can be brought in, for example, when considering reduced energy use in project design.³²⁷

III.XV.B Mitigation Affecting Adaptation

Section III.XI discusses in detail how the conversion of coastal and marine ecosystems (such as mangroves) has become a significant source of greenhouse gas emissions. Mangroves (also called salt-water forests) are the coastal equivalent of tropical forests on land.³²⁸ They act as extremely effective carbon sinks and are able to absorb 97.57 tonnes of carbon per hectare, or more than three times the absorptive capacity of non-mangrove forests.³²⁹ The A/R of mangroves in Bangladesh's coastal areas can be an important mitigation option, as shown in the case study in Section II.IX. The case study also shows how mangroves provide physical protection for coastal communities. Mangroves trap sediment in their intricate root structure at such a high rate that they can potentially reverse the effects of sea-level rises.³³⁰ Thus, abating and halting the degradation of mangroves in coastal areas not only avoids greenhouse gas emissions (mitigation), but also minimises the effects of climate change (adaptation).

The IPCC explores many other mitigation actions that might affect a country's capacity to adapt or its actual adaptation actions. The categories for coastal management may include: (i) more efficient energy use and renewable sources that promote local development in coastal communities; (ii) CDM projects on land use or energy use that support coastal economies and livelihoods, perhaps by placing a value on their management of the natural resources of the area; (iii) urban planning, building design and recycling, with benefits for both adaptation and mitigation in coastal areas; (iv) health benefits of mitigation through reduced environmental stresses in coastal communities; (v) afforestation, leading to depleted water resources and other ecosystem effects, with consequences for the livelihoods of coastal people; (vi)

³²⁷Ibid 763.

³²⁸*Bangladesh: Mangrove Forests, far more Generous than the Shrimp Industry*, World Rainforest Movement's Bulletin No 102 (2006) <<http://www.wrm.org.uy/bulletin/102/Bangladesh.html>>.

³²⁹United Nations Development Programme, *Bangladesh: Mangrove Forests Provide Protection from Climate Change* (11 November 2010) News Room <<http://content.undp.org/go/newsroom/2010/november/bangladesh-mangrove-forests-provide-protection-from-climate-change.en>>.

³³⁰*Community Based Adaptation to Climate Change through Coastal Afforestation* (17 November 2011) Adaptation Learning Mechanism <<http://www.adaptationlearning.net/community-based-adaptation-climate-change-through-coastal-afforestation>>.

mitigation actions that transfer finance to developing countries (such as per capita allocations) that stimulate investment, with benefits for adaptation; (vii) effects of mitigation—for example, through carbon taxes and energy prices—on resource use (generally to reduce use) that affect adaptation—for example, by reducing the use of tractors in semi-subsistence farming due to higher fuel costs.³³¹ Most of these categories have implications for the coastal management of Bangladesh.

III.XV.C Decisions that Include Trade-offs between Adaptation and Mitigation

Klein et al explore several categories where explicit trade-offs between adaptation and mitigation exist.³³² Such categories for coastal management include: (i) annual budgetary processes of coastal management that allocate funding to both adaptation and mitigation; (ii) strategic coastal planning related to development pathways to include climate responses; (iii) allocation of funding (e.g. Bangladesh National Climate Funds, Bangladesh Climate Multi Donor Trust Fund, Bangladesh Climate Change Resilience Fund); (iv) analysis of costs and benefits of mitigation in coastal regions to inform targets for greenhouse gas concentrations; (v) effects of large-scale mitigation in coastal areas (e.g. geo-engineering) on adaptation.

III.XV.D Processes that have Consequences for both Adaptation and Mitigation

According to Klein et al,³³³ some actions result from the simultaneous consideration of adaptation and mitigation. These concerns may be raised within the same decision framework or sequential process but without explicitly considering their trade-offs or synergies.³³⁴ For example, monitoring systems and reporting requirements for Bangladesh may cover indicators of both adaptation and mitigation. Similarly, the management of multilateral environmental agreements for coastal management may benefit both adaptation and mitigation.

³³¹Klein et al, above n 159, 761.

³³²Ibid 761–762.

³³³Ibid 762.

³³⁴Ibid.

III.XVI Relevance of the Integration of Adaptation and Mitigation in ICZM

According to Jones et al, adaptation and mitigation work from the bottom up and top down of the range of global warming, respectively.³³⁵ Section II.V.D details why integration between adaptation and mitigation in a policy is considered a win-win situation for both. Klein et al³³⁶ point out that the perception of limits to adaptation motivates action on mitigation; conversely, the perception of limits to mitigation reinforces urgent action on adaptation. Therefore, Tol³³⁷ and Nicholls and Lowe³³⁸ argue that adaptation and mitigation need to be considered together when addressing the consequences of climate change for coastal areas. Collectively, these interventions can provide a more robust response to human-induced climate change than the consideration of each policy alone.³³⁹ This thesis strongly advocates this integrated approach in coastal management and investigates how a climate-development integrated approach can be enhanced in the coastal management of Bangladesh.

The existing literature shows twofold benefits of integrating adaptation and mitigation options in ICZM. Adaptation will provide immediate and short-term reductions in risk in coastal areas. Conversely, mitigation reduces future risks in the longer term and at the global level.³⁴⁰ In fact, all long-term sea-level rise projections indicate that risks will grow for many generations unless there is substantial and ongoing investment in coastal adaptation. Hence, Nicholls et al state that sustainability for the coastal zone depends on a combination of adaptation and mitigation³⁴¹ in ICZM. According to Rodolfo and Siringan, there will be substantial benefits if coastal management plans are developed and implemented in order to address coastal changes due to climate and other factors, such as those processes that also contribute to relative sea-level rises.³⁴² This requires increased effort to move from reactive to

³³⁵Roger N Jones et al, 'The Relationship Between Adaptation and Mitigation in Managing Climate Change Risks: A Regional Response from North Central Victoria, Australia' (2007) 12(5) *Mitigation and Adaptation Strategies for Global Change* 685, 685.

³³⁶Klein et al, above n 159, 762.

³³⁷Richard SJ Tol, 'The Double Trade-off Between Adaptation and Mitigation for Sea Level Rise: An Application of FUND' (2007) 12(5) *Mitigation and Adaptation Strategies for Global Change* 741.

³³⁸Robert J Nicholls and Jason A Lowe, 'Climate Stabilisation and Impacts of Sea-level Rise' (Paper presented at International Scientific Symposium: Avoiding Dangerous Climate Change, Hadley Centre, Exeter, 1-3 February 2005).

³³⁹Nicholls et al, above n 178, 345.

³⁴⁰*Ibid.*

³⁴¹*Ibid.*

³⁴²Kelvin S Rodolfo and Fernando P Siringan, 'Global Sea-level Rise is Recognised, but Flooding from Anthropogenic Land Subsidence is Ignored Around Northern Manila Bay, Philippines' (2006) 30(1) *Disasters* 118.

more proactive responses in coastal management. ICZM is a proactive policy process.³⁴³

According to Fabbri:

ICZM is an inherently dynamic process which involves decision making under uncertainty, where uncertainty includes socio-economic, demographic, ecological, physical, climatic and technological conditions.³⁴⁴

The UNCED, World Coast Conference and IPCC have endorsed ICZM as the most appropriate process to deal with current and long-term coastal challenges, including climate change and sea-level rises.³⁴⁵ Therefore, the integration of adaptation and mitigation must be reflected in ICZM. Strengthening integrated approaches helps to improve the prospects for sustaining coastal resources and communities.

The integration of adaptation and mitigation in ICZM is complementary in two main areas. First, they each manage different components of future climate-related risk in coastal areas. According to Jones et al, mitigation reduces the number and magnitude of potential climate hazards.³⁴⁶ Adaptation increases the ability of coastal communities to cope with climate hazards (see the case study in Section II.IX). Second, they manage risks at different extremes of the potential range of future climate change.³⁴⁷ According to Jones et al,³⁴⁸ adaptation works best with changes of lesser magnitude at the lower end of the potential range, whereas mitigation limits the upper part of the range by moving from uncontrolled emissions towards the stabilisation of greenhouse gases in the atmosphere. Therefore, ICZM can maximise the benefits of managing climate risks by integrating adaptation and mitigation measures at every stage of its policy cycle (see Figure 3.2).

³⁴³Nicholls and Klein, above n 167, 214.

³⁴⁴Fabbri, above n 9, 54.

³⁴⁵Bijlsma et al, above n 174, 315 and 318.

³⁴⁶Jones et al, above n 335, 685.

³⁴⁷Ibid.

³⁴⁸Ibid.

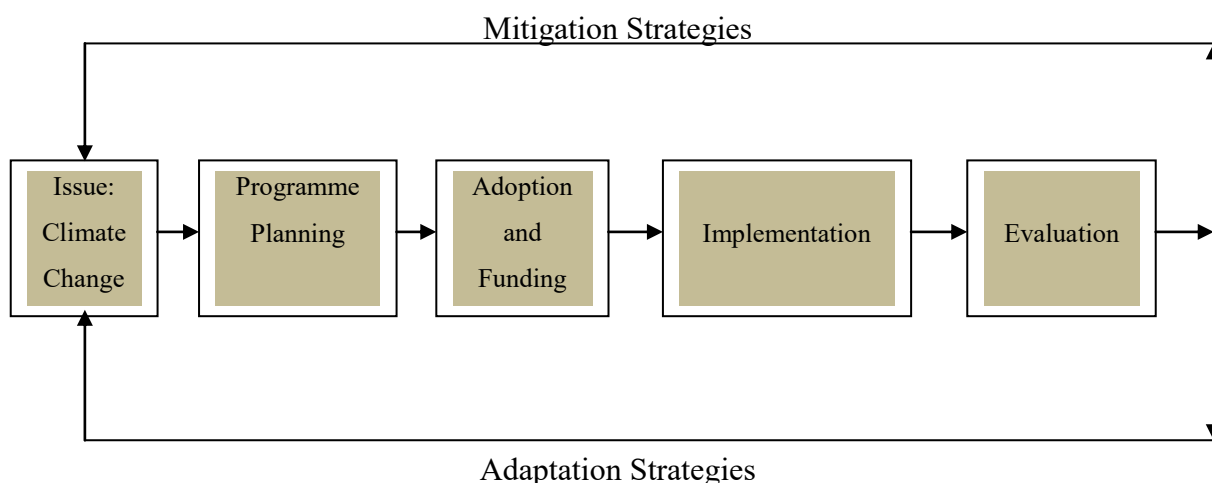


Figure 3.2: Integration of Adaptation and Mitigation in ICZM Policy Cycle³⁴⁹

III.XVII Relevance of the Climate-development Integrated Approach for ICZM

Section II.VII defines the climate-development integrated approach as development that minimises the harm caused by climate effects while maximising the many human development opportunities presented by a low-emission, more resilient future.³⁵⁰ Section II.VIII narrates the relevance of this approach for Bangladesh. This section examines the implication of this integrated approach for ICZM.

ICZM has been practiced globally as a strategy for the conservation and sustainable development of the coastal zone for several decades.³⁵¹ With the climate-development integrated approach, coastal management needs to move beyond the traditional separation of adaptation, mitigation and development strategies. Bangladesh's ICZM program already involves planning and decision-making to improve economic opportunities and development for its coastal populations.³⁵² For example, the *Coastal Zone Policy* has been enacted in Bangladesh in relation to development objectives.³⁵³ However, in the context of climate change, it needs to integrate the long-established concepts of adaptation and mitigation (as narrated in Section III.XVI), as well as the newer concepts of low-carbon development³⁵⁴ and

³⁴⁹ Inspired by Nicholls and Klein, above n 343, 214.

³⁵⁰ Tom Mitchell and Simon Maxwell, *Defining Climate Compatible Development* (November 2010) Climate & Development Knowledge Network (CDKN), Policy Brief <<http://cdkn.org/wp-content/uploads/2010/11/CDKN-CCD-DIGI-MASTER-19NOV1.pdf>> 1.

³⁵¹ USAID, *Adapating to Coastal Climate Change: A Guidebook for Development Planners* (2009) 138.

³⁵² See Section VI.V for Bangladesh's *Coastal Management Policy*.

³⁵³ Ministry of Water Resources, above n 26, sec 4.

³⁵⁴ See Section II.V.B for low-carbon development.

climate-resilient development.³⁵⁵ Section I.IV defines low-carbon development as an interface between mitigation and development. It promotes coastal development while reducing blue carbon emissions from coastal sinks. Chapter I also defines climate-resilient development as development that has the capacity to absorb and quickly bounce back from climate shocks and stresses.³⁵⁶ The climate-development integrated approach minimises the harm caused by climate effects in the coastal zone (climate-resilient development) and maximises the development opportunities of the zone while reducing emissions (low-carbon development). Unless the policy makers integrate coastal development, mitigation and adaptation strategies (see Figure 2.2), they will miss efficiency savings and may pursue legislation or policies that solve one coastal problem but aggravate others.

The climate-development integration approach has a number of implications for ICZM. First, it enhances the resilience of natural coastal systems and reduces the vulnerability of coastal communities (i.e. adaptation to climate change). Second, it works for the management of coastal carbon sinks, as described in Section III.XIV (i.e. mitigation). Third, this approach is beneficial from both economic and development perspectives. Fourth, a climate-development integrated approach minimises the conflicts between development objectives and climate change response options in the coastal management of developing countries. Lastly, it encompasses the large lengths of shoreline that are presently undeveloped but may be subject to significant pressures from climate change in the coming decades. By acting now, future development may be designed to be sustainable and to accommodate the potential effects of climate change and sea-level rises.³⁵⁷

The process of adopting a climate-development integrated approach in ICZM follows the same model as the ICZM policy cycle (see Section III.IV and Figure 3.4):

- Stage 1: Both development and climate change must be taken into account when identifying and analysing the issues that are relevant to specific coastal areas.
- Stage 2: The climate-development integrated approach must be reflected in the programs and objectives of ICZM.

³⁵⁵ See Section II.V.B for climate-resilient development.

³⁵⁶ *What is Climate Compatible Development?* Climate Planning <<http://www.climateplanning.org/content/what-climate-compatible-development>>.

³⁵⁷ Bijlsma et al, above n 174, 315.

- Stage 3: All strategies, mechanisms, policies and actions prepared for the ICZM program must reflect the climate-development integrated approach.
- Stage 4: The mandate, policies, funds and administrative arrangements must be forged for an operational program that generates tangible results.
- Stage 5: The results must be compared against the desired outcome(s), and necessary adjustments must be made on a periodic basis.

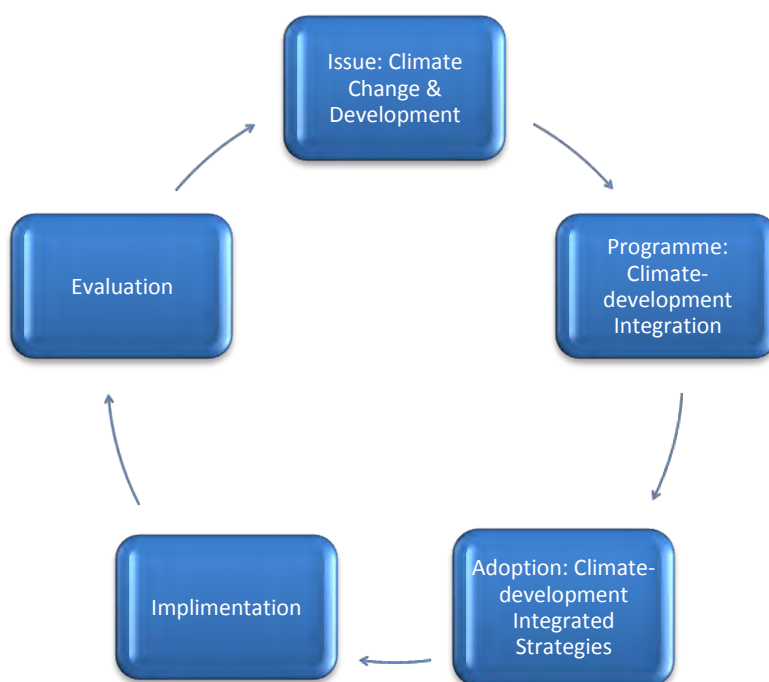


Figure 3.3: Climate-development Integrated Approach in ICZM Policy Cycle

III.XVIII Conclusion

The coastal zone of Bangladesh is already host to a number of often-competing and sectoral activities. Given the additional challenge of climate change, the country is facing a major challenge for coastal management. In this context, this chapter discusses the conceptual basis for linking development policies and climate change adaptation and mitigation policies in coastal management. Chapter II defines this linkage as a climate-development integrated approach and shows the implications of this approach for Bangladesh (first issue). This chapter explores all of the available adaptation and mitigation options for coastal management and shows the relevance of integrating them in ICZM (second issue). The chapter indicates that the purpose and design of ICZM of Bangladesh needs to be revisited, as does the policies and statutes that are relevant to its coastal management. Chapters IV–VII

will review the climate change policies and legislation (Chapter IV), development policies (Chapter V), coastal management policies (Chapter VI) and other laws and policies that are relevant to Bangladesh's coastal management (Chapter VII). The aim of this review is to explore to what extent the climate-development integrated approach has been reflected in the country's policies.

Chapter IV. Climate-development Integrated Approach in Bangladesh's Climate Change Laws and Policies

IV.I Introduction

The research question of this thesis is: ‘To what extent is the climate-development integrated approach incorporated into Bangladesh’s coastal laws and policies?’ Before addressing this question, Chapter II explains what the climate-development integrated approach involves¹ and the extent to which this approach is relevant to Bangladesh (first issue).² Chapter III addresses the second issue, which is the relevance of the climate-development integrated approach to coastal management. To do so, it describes how coastal areas are particularly vulnerable to climate change,³ elaborates the available adaptation and mitigation options for coastal management,⁴ and addresses the relevance of the integrated approach to coastal management.⁵ Therefore, Chapters II and III set the conceptual background of this thesis. Chapters IV–VII aim to evaluate Bangladesh’s relevant laws and policies. Chapter I narrates the methodology of law and policy analysis⁶ in detail, and this methodology is followed in Chapters IV–VII. The object of this analysis is to determine to what extent these laws and policies reflect the climate-development integrated approach. These findings will ultimately help to address the research question of this thesis.

This chapter deals with the third issue of this thesis, which is the extent of reflection of the climate-development integrated approach in Bangladesh’s climate change laws and policies. Before dealing with specific climate change laws and policies, Section IV.II highlights how climate change has become a development concern rather than an environmental issue in the country. Section IV.III provides a brief overview of the administrative structure of Bangladesh related to climate change. As this thesis deals with 39 laws and 21 policy documents, Section IV.IV provides an understanding of Bangladesh’s law and policy-making process. Sections IV.V–IV.VIII then narrate the domestic legal framework to address climate

¹ See Section II.VII for the definition of ‘climate-development integrated approach’.

² See Section II.VIII for the relevance of the integrated approach in Bangladesh.

³ See Section III.VII.

⁴ See Section III.IX for adaptation options and Section III.X for mitigation options for coastal management.

⁵ See Section III.XVII for the relevance of the integrated approach to coastal management.

⁶ See Section I.VIII.B.2 for law and policy analysis methodology.

change. Lastly, Section IV.IX evaluates the extent to which these laws and policies reflect the climate-development integrated approach (third issue).

IV.II A Shift towards an Integrated Approach for Climate Responds in Bangladesh

Over the past decade, numerous national and international research have been carried out on climate change effects, vulnerabilities and response strategies for Bangladesh.⁷ The World Bank has forecast potential changes in sea levels, temperatures and precipitation for the country in 2030 and 2050 (see Table 4.1). According to the *Bangladesh Climate Change Strategy and Action Plan 2009*, the country is one of the most vulnerable in the world to climate change.⁸ All of the IPCC's previous reports confirm the country's vulnerabilities.⁹ Climate change is no longer something that will happen in the future; the country is already facing hardship. Figure 2.3 presents the Government's assessment of the effects of climate change in different sectors, as well as its linkages with development. Sections VII.V.A–VII.V.J further explain the vulnerabilities of different sectors (e.g. agriculture, water, fisheries, forest, environment, land, energy, rural development, tourism), which have implications for the coastal management of Bangladesh.

Table 4.1: Climate Change Scenarios for Bangladesh in 2030 and 2050

Year	Sea Level Rise (cm)	Temperature Increase (°C)	Precipitation Fluctuation Compared to 1990 (%)
2030	30	+0.7 in monsoon; +1.3 in winter	-3 in winter; +11 in monsoon
2050	50	+1.1 in monsoon; +1.8 in winter	-37 in winter; +28 in monsoon

Source: The World Bank¹⁰

Bangladesh has actively participated in, and demonstrated its willingness and sincerity for, a proper solution to the problem of global warming and climate change since the inception of

⁷ For example, see Abu Mostafa Kamal Uddin et al, 'Climate Change and Bangladesh: Annotated Bibliography' (Comprehensive Disaster Management Program (CDMP), Government of the People's Republic of Bangladesh, January, 2009).

⁸ Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, *Bangladesh Climate Change Strategy and Action Plan 2009*, xvii.

⁹ Nazmul Huq et al, "Climate Proofing" Water Resources Development Policy: The Evidence from Bangladesh' in W Leal Filho (ed), *Climate Change and the Sustainable Use of Water Resources, Climate Change Management* (Springer-Verlag Berlin Heidelberg, 2012) 389, 389; Michael J Kennish, 'Environmental Threats and Environmental Future of Estuaries' (2002) 29(1) *Environmental Conservation* 78; S Jahangir Hasan Masum and M M Mahbub Hasan, *Climate Change Impact on Food Sovereignty in Bangladesh* (2 September 2009) Climate Frontlines <<http://www.climatefrontlines.org/en-GB/node/479>>.

¹⁰ The World Bank, 'Bangladesh Climate Change and Sustainable Development' (Report No 21104-BD, 19 December 2000) 11.

the UNFCCC in 1992. It became a signatory of the UNFCCC in 1992 and ratified it in April 1994.¹¹ The country strongly supported the Kyoto Protocol and ratified it in October 2001.¹² Bangladesh submitted the Initial National Communication (INC)¹³ to the UNFCCC in October 2002 and is now preparing its second national communication. The country has started to address the issue of climate change very seriously in its overall policies and actions. However, even recently, policy-makers have viewed climate change as an environmental concern with little relevance to development policy. Fortunately, that situation is changing. According to Alam et al:

Policies of the major bilateral and multilateral donors [in Bangladesh] went through a shift to include climate change concern into their development assistance. Climate change moved from a peripheral issue to a central issue to the discussion and action of donor agencies...¹⁴

However, the change process was not generated by the country but by changes in the international policy of the donors. While understanding the political economy of low-carbon development¹⁵ and climate-resilient development¹⁶ in Bangladesh, Alam et al note three reasons for this paradigm shift: (i) investment in studies to understand climate change implications (for internal purposes) and influence broader policy initiatives; (ii) screening of some donors' (such as DFID and Danida) program portfolios; and (iii) including climate change in the lending portfolio and country assistance strategy by the World Bank and the ADB.¹⁷ These initiatives ultimately resulted into a climate-development integrated approach in Bangladesh. The country now considers climate change a development challenge rather than an environmental or geo-climatic problem.¹⁸

¹¹Fahmida Khatun and AKM Nazrul Islam, 'Policy Agenda for Addressing Climate Change in Bangladesh: Copenhagen and Beyond' (Occasional Paper No 88, Centre for Policy Dialogue, March 2010).

¹²Ibid 20.

¹³Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, *Initial National Communication under the United Nations Framework Convention on Climate Change (UNFCCC)* 2002.

¹⁴Khurshid Alam et al, 'Understanding the Political Economy of Low Carbon and Climate Resilient Development: Planning exceptionalism? Political Economy of Climate Resilient Development in Bangladesh' (The Learning Hub, Institute of Development Studies, 2011) 15.

¹⁵ See Section I.IV for the definition of low-carbon development and Section II.V.B for a detailed discussion.

¹⁶ See Section I.IV for the definition of climate-resilient development and Section II.V.C for a detailed discussion.

¹⁷Alam et al, above n 14.

¹⁸Fahmida Khatun and AKM Nazrul Islam, 'Policy Agenda for Addressing Climate Change in Bangladesh: Copenhagen and Beyond' (Occasional Paper No 88, Centre for Policy Dialogue, March 2010) 17.

IV.III The Administrative Structure of Bangladesh Related to Climate Change

The government of Bangladesh has designated its Ministry of Environment and Forests as the climate change focal point.¹⁹ Several other government agencies play important roles in climate response, including the Economic Relations Division under the Ministry of Finance and the Planning Commission under the Ministry of Planning. A brief discussion about these institutions will help to explore the climate-development institutional nexus in the country.

IV.III.A Ministry of Environment and Forests

The Ministry of Environment and Forests is the focal ministry of Bangladesh for coordinating national climate change strategies with other ministries. It is also responsible for maintaining direct coordination with the UNFCCC and its related activities at the global and regional levels. This entails preparing national communications, formulating a NAPA, approving CDM projects, attending international negotiations and facilitating the integration of climate change at the sectoral level.²⁰ The Ministry of Environment and Forests has several agencies and institutional mechanisms that implement its climate change mandate, including the Climate Change Cell under the Department of Environment and the Climate Change Unit.

The Department of Environment was created in 1977 under the Ministry of Environment and Forests.²¹ Its mandate is to implement policies to ensure sustainable development and to conserve and manage Bangladesh's environment. In 2004, the Climate Change Cell was established under this department to focus solely on the issues of climate change.²² The cell provides the central focus for the government's climate change-related work. It is tasked with integrating climate change considerations into various aspects of national planning. The objective of the Climate Change Cell is to enable the management of long-term climate risks and uncertainties as an integral part of national development planning.²³ It lobbies the

¹⁹Malin Beckman et al, 'Adaptation or Development? Exploring the Distinctions (or Lack thereof) through Case Studies in Bangladesh and Vietnam' (Partner Report Series No 8, Adaptation Knowledge Platform, 2013) 13.

²⁰Ibid.

²¹Ministry of Environment and Forestry, Government of the People's Republic of Bangladesh, *Low Carbon Path of Development and NAMA: The Case of Bangladesh* (2011).

²²Beckman et al, above n 19.

²³Ministry of Finance, Government of the People's Republic of Bangladesh, *Economic Relations Division (ERD)* (2008) <<http://www.erd.gov.bd/>> 2.

Planning Commission to include climate change directives in the national development plan to be implemented and funded by the line ministries.²⁴

In January 2010, the Ministry of Environment and Forests established a Climate Change Unit under its own setup.²⁵ This unit was formulated to facilitate the financial and institutional mechanisms for the implementation of the Bangladesh Climate Change Trust Fund.²⁶ Section IV.XI will discuss this trust fund.

IV.III.B Economic Relations Division

The Economic Relations Division is one of the four divisions under the Ministry of Finance.²⁷ It mobilises external resources for the socio-economic development of the country. The division leads as the focal point of the government for interfacing with development partners and coordinating all external assistance inflows into the country.²⁸ Requests for financing projects are usually made by ‘implementing agencies’ to donor agencies through this division. Sometimes donor agencies that are willing to assist with a project approach this division.²⁹ As a result, the Economic Relations Division plays an important role in managing climate change finance. As the government’s aid-coordinating authority, the division undertakes aid programming and budgeting, initiating, negotiating and signing agreements, and informing development partners of the use of development assistance.³⁰ It also manages foreign debt, including the repayments of principal and interest amounts that are due to different lenders.

The Economic Relations Division is headed by a secretary who is responsible for aid negotiation and programming. The division was separated from the Planning Commission in 1978³¹ and given the status of a division of the Ministry of Finance with powers to decide development priorities and negotiate foreign aid programs with donor countries. It assesses the need for external assistance, devises strategies for negotiations and mobilising foreign

²⁴Alam et al, above n 14, 13.

²⁵Ibid.

²⁶Ibid.

²⁷Ministry of Finance, Government of the People’s Republic of Bangladesh, *Economic Relations Division (ERD)* (2008) <<http://www.erd.gov.bd/>>.

²⁸Alam et al, above n 14, 13.

²⁹Ibid.

³⁰Ministry of Finance, above n 27.

³¹Alam et al, above n 14, 13.

assistance, formalises and enables aid mobilisation by signing loans and grant agreements, and determines and executes external economic policy.³²

IV.III.C Planning Commission

Established in January 1972, the Planning Commission is Bangladesh's central planning body.³³ It translates the ideas, aspirations and commitment of the government through the formulation of *Five Year Plans (FYPs)* and the Annual Development Programme (ADP).³⁴ The commission's activities include the following elements of development planning: (i) policy planning, (ii) sectoral planning, (iii) program planning, (iv) project planning and (v) evaluation of the plans and their effect on the country's economic development.³⁵ The output-oriented function of the Planning Commission is the preparation and evaluation of the country's *Perspective Plan*,³⁶ medium-term plan (*FYP*),³⁷ ADP and *Poverty Reduction Strategy*.³⁸ It also has advisory, executive and coordinative roles. The commission is responsible for counselling the government in the matters of development goals, preferences, strategies and policy measures.³⁹ As an executive role, it processes development projects for approval and prepares all types of macro- and micro-economic plans and policies for the government.⁴⁰ It also coordinates the entire range of planning activities.⁴¹ The Planning Commission launches the detailed economic, financial and technical appraisal of projects and mobilises resources for their implementation in consultation with the Finance Division and the Economic Relations Division.⁴²

In August 1990, the Bangladesh government made an important change in the approval procedures of different projects.⁴³ Previously, the Planning Commission was primarily

³²Ministry of Finance, above n 27.

³³Bangladesh Directory, Bangladesh Planning Commission <http://www.bangladeshdir.com/webs/catalog/bangladesh_planning_commission.html>.

³⁴Alam et al, above n 14, 13.

³⁵Ministry of Planning, Government of the People's Republic of Bangladesh, *Welcome to Planning Commission* (2013) <<http://www.plancomm.gov.bd/>>.

³⁶See Section V.V for the Perspective Plan (2010–2021).

³⁷See Section V.VI for the Sixth Five Year Plan.

³⁸Jafar Ahmed Chowdhury, 'Planning Commission as a Think Tank', *The Financial Express* (Dhaka), April 13, 2013 <<http://www.thefinancialexpress-bd.com/index.php?ref=MjBfMDRfMTNfMTNfMV85Ml8xNjYyNzc=>>>.

³⁹Bangladesh Directory, above n 33.

⁴⁰Alam et al, above n 14, 13.

⁴¹Chowdhury, above n 38.

⁴²Alam et al, above n 14, 14.

⁴³Ibid 13.

responsible for the scrutiny and approval of development projects. Under the current arrangement, the administrative ministries and executing agencies are responsible for examining projects. With the approval of the Planning Minister, the project then goes to the Executive Committee of the National Economic Council (ECNEC) for final approval.⁴⁴ After the project is approved, the relevant department or agency appoints a project director with the prior consent of the administrative ministry.⁴⁵ While the Planning Commission is responsible for macro-and micro-economic plans and policies (e.g.*FYPs* and *ADPs*), the ministries are responsible for sectoral policy formulation. Section IV.IV explains the law and policy-making process in detail.

IV.IV Law and Policy-making Process in Bangladesh

Article 65 of the Constitution of Bangladesh empowers the Parliament (known as the House of the Nation) as the sovereign law-making body. The Parliament is vested with the power to make both primary and secondary laws.⁴⁶ However, it cannot make any law that is inconsistent with any of the provisions of the Constitution. Article 7 proclaims the supremacy of the Constitution, stating that if any other law is inconsistent with the Constitution, that other law will, to the extent of the inconsistency, be void. The drafting and enactment of legislation in most Commonwealth countries are often similar to that of the UK. The enactment of legislation in Bangladesh follows various stages, including developing policy, drafting legislation, presenting proposed laws to Parliament, receiving final approval from the President and publishing the legislation in the Official Gazette.

Articles 80 and 82 of the Constitution lay down the basic provisions regarding the enactment of legislation.⁴⁷ The proposed legislation is termed a legislative Bill and is introduced into

⁴⁴Chowdhury, above n 38.

⁴⁵Alam et al, above n 14, 14.

⁴⁶ Primary laws, also referred to as Acts or statutes, are the most formal expression of the will of the state. Secondary laws, also referred to as subordinate legislation, consist of rules, regulations, orders, by-laws or other instruments that have a legislative effect.

⁴⁷ Art 80 and art 82 of the constitution read as follows:

80. Legislative Procedure:

(1) Every proposal in Parliament for making a law shall be made in the form of a Bill.

(2) When a Bill is passed by Parliament it shall be presented to the President for assent.

(3) The President, within fifteen days after a Bill is presented to him, shall assent to the Bill or, in the case of a Bill other than a Money Bill may return it to Parliament with a message requesting that the Bill or any particular provisions thereof be reconsidered and that any amendments specified by him in the message be considered; and if he fails so to do he shall be deemed to have assented to the Bill at the expiration of the period.

Parliament when initiating the primary law-making process. In Bangladesh, there is no central planning for legislative proposals.⁴⁸ There is neither a legislative calendar nor any coordination among ministries that wish to bring forward new bills.⁴⁹ Bills are brought forward on a casual basis as and when found necessary, and the Cabinet approves them on an individual basis.⁵⁰

The same ministry in Bangladesh develops both the policy underlying a legislative proposal and the preliminary draft Bill outline. According to the *Secretariat Instructions* of 1976, a ministry or division is responsible for formulating the policies of the government within its jurisdiction, and also for the execution and review of those policies. The *Rules of Business* of 1996 and the *Secretariat Instructions* of 1976 also require that any legislative proposal be initiated at the administrative ministry to which the law or subject matter is assigned. Senior ministerial officials, such as joint secretaries, generally prepare policy papers. Experts within the ministry, or sometimes outside lawyers, usually draft a preliminary Bill. Inter-ministerial consultations are usually conducted after the Bill is drafted, and legislative drafters from the Ministry of Law, Justice and Parliamentary Affairs are invited to attend these sessions to provide comments and suggestions regarding the draft Bill. Thus, drafters play a key role in policy formulation at an early stage in the drafting process. Nevertheless, widespread public consultation is not generally the rule.⁵¹

According to Rule 16(i) of the *Rules of Business* of 1996, cases involving legislation, including the promulgation of ordinances, are to be brought before Cabinet for consideration.⁵² Further, Rule 4(ii) states that no important policy decision will be taken

(4) If the President so returns the Bill, Parliament shall consider it together with the President's message, and if the Bill is again passed by Parliament with or without amendments by the votes of a majority of the total number of members of Parliament, it shall be presented to the President for his assent, whereupon the President shall assent to the Bill within the period of seven days after it has been presented to him, and if he fails to do so he shall be deemed to have assented to the Bill on the expiration of that period.

(5) When the President has assented or is deemed to have assented to a Bill passed by Parliament, it shall become law and shall be called an Act of Parliament.

82. No Money Bill, or any Bill which involves expenditure from public moneys, shall be introduced into Parliament except on the recommendation of the President:

Provided that no recommendation shall be required under this article for the moving of an amendment making provision for the reduction or abolition of any tax.

⁴⁸Gavin Murphy, 'How Legislation is Drafted and Enacted in Bangladesh' (2006) 27(3) *Statute Law Review* 133, 136.

⁴⁹*Ibid.*

⁵⁰*Ibid.*

⁵¹*Ibid* 136.

⁵² See Chapter V, Instruction 239 of the *Secretariat Instructions* of 1976.

without Cabinet approval.⁵³ Cabinet is the ultimate authority that approves a policy. There is inadequate debate on policy and legislation in Parliament. Many important matters, including the *FYP*, are not discussed in Parliament. Most policies that are formulated at the ministry level are not even announced in the Parliament, so it is not surprising that such policies have little public understanding and are often implemented half-heartedly. The *Flood Action Plan* is an example of how supposed beneficiaries of flood control in Bangladesh—the country's poor majority—have been virtually excluded from the decision-making process. The World Bank concedes that past embankment projects have been undermined by the deliberate cutting of embankments by disgruntled farmers and fishermen, and it calls for ‘closer involvement of the beneficiaries’ and ‘more cooperation among farmers’.⁵⁴ In summary, the two decades of policy-making suggest the following trends. First, most policies are driven by expert and bureaucrats following a top-down process. While the participation of stakeholders has increased, the quality of participation of poor people remains weak. Second, policy agendas are often set through external requirements as opposed to domestic demand that creates limited ownership by society at large. Externally driven processes create limited political ownership and often create a parallel process to the already-existing planning process. Third, the participation of political parties and debate in the Parliament on major policy issues remains weak.⁵⁵

IV.V The Climate Change Legal Framework in Bangladesh

Bangladesh has taken various legal steps to minimise the effects of climate change. These are the cornerstones of the domestic legal framework to address climate change. The government formulated the *Bangladesh Climate Change Strategy and Action Plan* in 2008, the *National Adaptation Programme of Action* in 2005 and the *Country Framework to Mainstream Climate Risk Management and Adaptation* in 2006. In addition to these legal instruments, the government created a National Climate Adaptation Fund and the Bangladesh Climate Change Trust Fund. Another fund that is sponsored by several donors is the Bangladesh Climate Change Resilience Fund. There are also two multi-donor programs on climate change.⁵⁶ One is the Bangladesh Special Programme for Climate Resilience, which is part of the World

⁵³Murphy, above n 48, 137.

⁵⁴Alam et al, above n 14.

⁵⁵Ibid 15.

⁵⁶Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 61.

Bank's Pilot Programme for Climate Resilience. The second one is the Comprehensive Disaster Management Programme whose second phase commenced in 2010.⁵⁷ Sections IV.V–IV.VII evaluate Bangladesh's climate change-related laws and policies following a 'law and policy analysis' methodology.

IV.IV The Bangladesh Climate Change Strategy and Action Plan 2008

The Ministry of Environment and Forests formulated the *Bangladesh Climate Change Strategy and Action Plan* in 2008 and revised it in September 2009.⁵⁸ The revised document is a reflection of the changed development priorities of the government.⁵⁹ Its objective is to integrate climate change constraints and opportunities into the overall plan and programs involving all sectors and processes for economic and social development in the country.⁶⁰ This *Action Plan* is a comprehensive strategy to address the country's climate change challenges.⁶¹ It describes a 10-year program (2009–2018) to build the capacity and resilience of the country to meet the challenge of climate change over the next 20–25 years.⁶²

The *Bangladesh Climate Change Strategy and Action Plan* is presented in two parts. The first part provides the background, which consists of physical and climatic contexts, core socio-economic realities and policies in the country, and the consequent rationale for a strategy for climate change.⁶³ The second part pursues an action plan with six pillars or thematic areas. Forty-four programs and 145 actions have been identified within these six thematic areas.⁶⁴ The number of programs and actions under each thematic area is as follows:

1. food security, social protection and health (nine programs, 29 actions)
2. comprehensive disaster management (four programs, 10 actions)
3. infrastructure development (eight programs, 31 actions)
4. research and knowledge management (seven programs, 24 actions)
5. mitigation and low-carbon development (10 programs, 33 actions)

⁵⁷Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Working Paper No 12, Seventh Framework Programme, EDC 2020, March 2011) 6.

⁵⁸Alam et al, above n 14, 17.

⁵⁹Ministry of Environment and Forests, above n 8, xv.

⁶⁰Alam et al, above n 14, 17.

⁶¹Hedger, above n 56, 17.

⁶²Disaster Management and Relief Division, Government of the People's Republic of Bangladesh, *National Plan for Disaster Management 2010-2015* (April 2010) 34.

⁶³Ibid 33.

⁶⁴Ministry of Environment and Forests, above n 8, 32–76.

6. capacity building and institutional strengthening (six programs, 18 actions).

These six thematic areas have direct implications for coastal zone management. Sections IV.IV.A and IV.IV.B focus on the adaptation and mitigation strategies mentioned in the revised *Bangladesh Climate Change Strategy and Action Plan* of 2009.

IV.IV.A Adaptation Strategies under the Action Plan

Currently, few countries have formulated climate change-related strategies and action plans. Most national plans are heavily focused on mitigation activities, as they are formulated in countries that have a better development status and greater greenhouse gas emission rates than Bangladesh.⁶⁵ In this context, the *Bangladesh Climate Change Strategy and Action Plan* is a large step for adaptation strategies. It has endorsed 34 programs under five thematic areas (see Table 4.2).

Table 4.2: Adaptation Strategies under the *Bangladesh Climate Change Strategy and Action Plan*

	Theme	Program
1.	Food security, social protection and health	Institutional capacity for research towards climate-resilient cultivars and their dissemination
		Development of climate-resilient cropping systems
		Adaptation against drought
		Adaptation in fisheries
		Adaptation in livestock sector
		Adaptation in health sector
		Water and sanitation program in climate-vulnerable areas
2.	Comprehensive disaster management	Livelihood protection in ecologically fragile areas
		Livelihood protection of vulnerable socio-economic groups (including women)
		Improvement of flood forecasting and early warning systems
		Improvement of cyclone and storm surge warning systems
		Raising awareness and improving public education regarding climate resilience
3.	Infrastructure development	Risk management against loss on income and property
		Repair and maintenance of existing flood embankments
		Repair and maintenance of cyclone shelters
		Repair and maintenance of existing coastal polders
		Improvement of urban drainage
		Adaptation against floods

⁶⁵Md Khalid Hossain, 'Birth of a Climate Change Policy and Related Debates: Analysing the Case of Bangladesh' (Paper presented at the Environment Policy: A Multinational Conference on Policy Analysis and Detaching Methods, Seoul, South Korea, June 2009) 13.

		Adaptation against tropical cyclones and storm surges
		Planning and designing river training works
		Planning, designing and implementing the resuscitation of river and <i>khals</i> through dredging and de-siltation work
4.	Research and knowledge management	Establishment of a centre for knowledge management and training on climate change
		Climate change modelling at national and sub-national levels
		Preparatory studies for adaptation against sea-level rises
		Monitoring of ecosystem and biodiversity changes and their effects
		Macro-economic and sectoral economic effects of climate change
		Monitoring of internal and external migration of adversely affected populations and providing support to them through capacity-building for their rehabilitation in new environments
		Monitoring of effects on various issues related to management of tourism in Bangladesh and implementation in priority action plans
5.	Capacity-building and institutional strengthening	Revision of sectoral policies for climate resilience
		Mainstreaming climate change in national, sectoral and spatial development programs
		Strengthening human resource capacity
		Strengthening gender consideration in climate change management
		Strengthening institutional capacity for climate change
		Mainstreaming climate change in the media

Source: Ministry of Environment and Forests⁶⁶

Line ministries and agencies are responsible for the implementation of these programs. Despite all of the proposed actions, the *Bangladesh Climate Change Strategy and Action Plan* has failed to set up year-wise/annual milestones in the course of implementing the programs and actions (see Annex One). This has induced critics of the document to deem the actions vague in terms of setting specific implementation targets.⁶⁷ The document is also silent about planned migration. Many people are forecast to be displaced from their homes (especially from coastal areas) due to climate change effects. They would have no adaptation option other than migration, as Bangladesh does not have the capacity to accommodate these displaced people.⁶⁸

IV.IV.B Mitigation Strategies under the Action Plan

Bangladesh mainly tends to focus on adaptation and disaster management because of its vulnerability to climate change. Nevertheless, mitigation also requires serious attention to

⁶⁶Ministry of Environment and Forests, above n 8, 32.

⁶⁷Hossain, above n 65, 11.

⁶⁸Ibid 12.

ensure that the country pursues a low-carbon development path.⁶⁹ Bangladesh's per capita contribution to global emissions of greenhouse gases is infinitesimal (0.2 metric tonnes).⁷⁰ Still, the country intends to voluntarily contribute to the mitigation of climate change.⁷¹ While addressing climate change mitigation, Bangladesh stresses that economic growth and poverty alleviation should not be compromised by these mitigation efforts,⁷² and that it would receive financial and technical support from the Annex 1 parties as provided by the provisions of the UNFCCC. In fact, Bangladesh presented its 'Low Carbon Path of Development and NAMAs' at the session of the Ad Hoc Working Group on Long-term Cooperative Action under the UNFCCC in June 2011.⁷³ This presentation indicates that the country plans to reduce emissions from business-as-usual projections by at least one-third by 2030.⁷⁴ Section 41 of the *Bangladesh Climate Change Strategy and Action Plan 2008* confirms the low-carbon growth path for Bangladesh and states that the country is committed to reducing greenhouse gas emissions from agriculture and urban waste management.⁷⁵ The document provides 10 programs and 33 actions for mitigation and low-carbon development. The programs are: (i) improved energy efficiency in the production and consumption of energy; (ii) gas exploration and reservoir management; (iii) development of coal-fired power stations; (iv) renewable energy development; (v) lower emissions from agricultural land; (vi) management of urban wastes; (vii) A/R program; (viii) rapid expansion of energy-saving devices such as compact fluorescent lamps; (ix) energy and waste efficiency in built environments; and (x) improvement in energy consumption patterns in the transport sector and options for mitigation.⁷⁶

As Bangladesh industrialises and develops coal reserves, it needs to follow a low-carbon development pathway. The country needs transfer of state-of-the-art technologies from developed countries for that. Bangladesh is committed to the development of forestry

⁶⁹Jason Dion et al, 'Low-Carbon, Climate-Resilient Development: NAMA Concepts for Bangladesh' (Policy Brief, International Institute for Sustainable Development, December 2012) 7.

⁷⁰Planning Commission, *Outline Perspective Plan of Bangladesh 2010-2021: Making Vision 2021 A Reality* (2010) 109.

⁷¹Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, 'Low Carbon Path of Development and NAMA: The Case of Bangladesh' (Presented at the session of the AWG-LCA, Bangkok, Thailand, 4 April 2011) 2.

⁷²Dion et al, above n 69.

⁷³Ministry of Environment and Forests, above n 71.

⁷⁴Dion et al, above n 69.

⁷⁵Ministry of Environment and Forests, above n 8, 23.

⁷⁶Ibid 61–70.

resources; in this regard, it is exploring all avenues, including mechanisms under REDD.⁷⁷ As mentioned in Section II.V.B, the country is also carrying out research and studies for CDM. It is seeking to increase the number of similar programs, and it is experimenting with new instruments to generate carbon credits and facilitate carbon market financing in the future.⁷⁸

The Campaign for Sustainable Rural Livelihoods (CSRL), which is an alliance of more than 150 national and international NGOs working in Bangladesh, has been leading advocacy works regarding climate change in Bangladesh since 2007. The CSRL has criticised the *Bangladesh Climate Change Strategy and Action Plan* since the document was published. The alliance argues that Bangladesh does not have a policy on climate change as such and that the *Bangladesh Climate Change Strategy and Action Plan* was formulated without any policy reference. Moreover, the *Bangladesh Climate Change Strategy and Action Plan* has failed to provide any recommendations regarding the formulation of a climate change policy, and it does not refer to any South Asian regional cooperation to address climate change, which is argued by many experts to be an important aspect of addressing climate change effects in Bangladesh.⁷⁹

The CSRL also argues that the *Bangladesh Climate Change Strategy and Action Plan* did not conduct a ‘needs assessment’ in recommending actions. That means the strategy and action plans of the document are not based on solid analysis.⁸⁰ This is reflected in the section related to financing the plan, where it states that:

‘[i]t is estimated that a \$500 million programme will need to be initiated in Years 1 and 2 (e.g. for immediate actions such as strengthening disaster management, research and knowledge management, capacity building and public awareness programmes, and urgent investments such as cyclone shelters and selected drainage programmes) and that the total cost of programmes commencing in the first 5 years could be of the order of \$5 billion’.⁸¹

Without a ‘needs assessment’ and necessary budgetary breakdowns, these estimates have been deemed vague. Critics argue that this could weaken Bangladesh’s position in global

⁷⁷Ministry of Environment and Forests, above n 8, 23.

⁷⁸ Planning Commission, Sixth Five Year Plan FY2011–FY2015: Accelerating Growth and Reducing Poverty (2011) 206.

⁷⁹ Hossain, above n 65, 12.

⁸⁰Ibid.

⁸¹Ministry of Environment and Forests, above n 8, 29.

climate change negotiations, where it is seeking funds from emitters as compensation.⁸² While the *Bangladesh Climate Change Strategy and Action Plan* provides an overall framework for action on adaptation, it is not a costed and sequenced delivery framework. Thus, the integration of climate change into the annual 5-year and longer-term development planning process is vital to provide this planning framework.⁸³

IV.VII The National Adaptation Programme of Action 2005

The Climate Change Cell under the Department of Environment processed the NAPA in 2005 in response to the decision of COP7 of the UNFCCC. This is Bangladesh's first major climate change-related policy document. Although there was little participation from affected communities, the NAPA mentioned that:

“The basic approach to NAPA preparation was along with the sustainable development goals and objectives of the country where it has recognised necessity of addressing environmental issue and natural resource management with the participation of stakeholders”.⁸⁴

NAPA set up the tone of an action plan. However, it ended up proposing 15 immediate and urgent adaptation projects so they could be at least partly financially supported from the LDCF under the UNFCCC and partly by other bilateral or multilateral development agencies.⁸⁵ Among the priority activities mentioned by NAPA were those specific to coastal zone areas:

1. promoting the adaptation of coastal crop agriculture to combat increasing salinity through maize production under the wet bed no-tillage method and ‘Sorjan’ systems of cropping⁸⁶ in tidally flooded agro-ecosystems
2. promoting the adaptation of coastal fisheries through the aquaculture of salt-tolerant fish species in the coastal areas of Bangladesh
3. reducing climate change hazards through coastal afforestation with community participation

⁸² Hossain, above n 65, 13.

⁸³ Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 7.

⁸⁴ Hossain, above n 65, 9.

⁸⁵ Ibid 8–9.

⁸⁶ The Sorjan system was developed by farmers in Indonesia. It devotes low-lying areas of the farm to rice and upper areas to dry land crops. The rice crop can take advantage of the higher water table in the lower areas and can utilise runoff from the upper areas. <<http://www.ati.da.gov.ph/caraga/programs/technodemo/Sorjan-Cropping-System>>.

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4. promoting research on saline-tolerant crop varieties to facilitate further adaptation in the future
 5. providing drinking water to coastal communities to combat increased salinity in freshwater sources due to sea-level rises
 6. enhancing the resilience of urban infrastructure and industries to the effects of climate change
 7. exploring options for insurance and other emergency preparedness measures to cope with increased climatic disasters (e.g. floods, cyclones).⁸⁷

The experience of NAPA implementation so far has been frustrating for Bangladesh. According to the Global Environmental Facility (GEF), which administers the LDCF, out of 15 NAPA projects, only one project actually obtained the approval of the GEF council for funding, and it is still not in operation.⁸⁸ For its project-based approach, it could be argued that NAPA lacks a long-term planning vision. Nevertheless, it also suffers from a lack of wide acceptability, as it was drawn up with little participation or endorsement by affected communities.⁸⁹

IV.VIII Country Framework to Mainstream Climate Risk Management and Adaptation 2006

The *Country Framework to Mainstream Climate Risk Management and Adaptation* was adopted by Bangladesh in 2006. This is an operational tool to address climate matters in national development persuasion to structure climate-resilient development and guide through step to step actions to integrate the issue in a holistic approach. This document is generic in nature, broad based and flexible to accommodate and appreciate country specificity and user friendly response accordingly.⁹⁰ It is mentioned in the preface of this document that developing countries and least developed countries in particular shall benefit from this framework in structuring their development in a climate-resilient fashion. The

⁸⁷ Golam Rabbani, A Atiq Rahman and Nazria Islam, 'Climate Change and Sea Level Rise: Issues and Challenges for Coastal Communities in the Indian Ocean Region' in David Michel and Amit Pandya (eds), *Coastal Zones and Climate Change* (Henry L Stimson Centre, 2010) 17.

⁸⁸ Hossain, above n 65, 8.

⁸⁹ Ibid 8–9.

⁹⁰ Abu Mostafa Kamal Uddin et al, 'Climate Resilient Development: Country Framework to Mainstream Climate Risk Management and Adaptation' (Working Paper, Climate Change Cell, Department of Environment, November 2006) I.

objective of the *Country Framework to Mainstream Climate Risk Management and Adaptation* is to establish a mechanism that facilitates national development planning and implementation to integrate adaptation to climate change and climate risk management systematically and over time. There are a few general principles on which this *Country Framework to Mainstream Climate Risk Management and Adaptation* is based. The first one is that the framework continues to strive for development which is inherently resilient to climate perturbations (including extremes, shocks, and changed average values) of today (i.e. of reference year) and also of those likely to occur in future (any given time frame in future).⁹¹ The second principle is that it integrates climate-related concerns in planning activities, by accommodating responses to climate perturbations mentioned in earlier sections of this thesis. The third principle is that the framework identifies synergies between national (even regional) and international institutional architecture and policy instruments. It is envisaged that such principles will help achieve the objective of the *Country Framework to Mainstream Climate Risk Management and Adaptation*. The document adopts the following four approaches:

1. **Coordination and Integration of Development Plans:** The basic approach for continuing with development programs and activities should emphasise: (i) coordination across institutions and tiers; (ii) partnership among all stakeholders, including partnerships between agencies in charge of implementing development programs and local beneficiary groups; and (iii) integration of local plans into meso-scale plans, of meso-scale plans into macro-level plans, and of macro-level sectoral plans into national development plans. It is wise to devise location-specific plans (e.g. coastal zone) and integrate with plans that have been developed with a vision to address (meso-scale) regional problems.
2. **Alternative Development Plans:** A development plan should highlight alternatives in order to avoid perceived risks from climate perturbations. It must be considered whether climate change would: (i) put investment for development activities at additional risk; (ii) could aggravate vulnerability directly or indirectly; (iii) could pose a threat to local-level resilience in any perceived way. Note that development activities do not need to be abandoned in view of risks from climate perturbations; rather, they should be made robust against climate-related risks by incorporating measures that either increase resilience or decrease vulnerability.

⁹¹Ibid 20.

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3. **Participatory Plans:** A development plan should ensure stakeholders' buy-ins by integrating the concerns of local people (i.e. participatory planning) and respecting local indigenous knowledge. It is wise to blend local (indigenous) knowledge with technologies to ensure optimal benefits. Stakeholders of that development plan should be engaged in two-way communication, and inter-tier conflicts should be resolved as much as possible to avoid potential mal-adaptations.
 4. **Synergies among Development Plans:** Synergies among international and national institutional architecture, including policies and processes, could be intimately followed in order to maintain the pace of development and simultaneous capacity-building towards enhanced resilience and increased adaptation. The multi-national environmental agreements (MEA), the Millennium Development Goals (MDG) and related activities, Protocols (*viz* Kyoto Protocol), norms (i.e. environmental conservation, polluters' pay principle), institutions (*viz* Global Environmental Facility) are examples of global-scale institutions. National sectoral development plans, Poverty Reduction Strategy Papers (PRSP) for developed countries and LDCs, multiple-year medium-term development plans and programs are examples of national-scale institutional and policy regimes, which collectively define the development paradigm of a country.

There is general apprehension throughout the developing world (including Bangladesh) that many development activities will not perform up to their potential under climate change, because climate-driven issues would greatly reduce the effectiveness of such development activities.⁹² To many, sustaining development measures and maintaining accrual of development benefits under climate change would be a major development challenge. It would therefore be necessary to identify climate-related risks in sectoral development plans—mostly applicable at meso- and regional scales.⁹³ However, each micro-level Climate Risk Reduction Action Plan (CRRAP) needs to be tied to these sector-specific Risk Reduction Action Plans (RRAPs) in order to ensure synergy and integration. On a national scale, the integration of RRAPs with national-level sectoral programs is considered a major step towards ensuring climate-resilient development.⁹⁴

⁹²Ibid 33.

⁹³Ibid 33.

⁹⁴Ibid 33.

IV.VII The Climate-development Nexus into the Climate Change Legal Framework of Bangladesh

Climate change in Bangladesh is increasing the impetus to move ‘faster and harder’⁹⁵ on core development objectives. There is widespread awareness about the inter-relationship of climate change and development in Bangladesh. The discussion in Sections IV.VI–IV.VIII give a brief idea of how the *Bangladesh Climate Change Strategy and Action Plan 2009*, the *National Adaptation Programme of Action 2005* and the *Country Framework to Mainstream Climate Risk Management and Adaptation 2006* integrate climate change and development. These documents have not only identified the specific concerns relating to climate change and its effects on development, but they have also elaborated their linkages. Therefore, they score 3 in the category of issue (see Table 4.3). These documents provide a wide range of responses to enable strategies to be developed for a climate-development integrated approach, and significant attention is paid to interlinking climate change and development. Therefore, the overall score of these three documents is 11. This means that this policy document is developing plans and tools to address the requirements of the climate-development integrated approach.

Table 4.3: Average Score of National Climate Change Policies

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>Bangladesh Climate Change Strategy and Action Plan 2009</i>	3	2	3	3	11
<i>National Adaptation Plan of Action 2005</i>	3	2	3	3	11
<i>Country Framework to Mainstream Climate Risk Management and Adaptation 2006</i>	3	2	3	3	11

IV.X Conclusion

In its Development Report 2010, the World Bank mentions that climate policy cannot be framed as a choice between growth and climate change.⁹⁶ Climate-smart policies are those that enhance development, reduce vulnerability and finance the transition to low-carbon-growth paths. Climate change is accepted as a major issue for Bangladesh due to its extreme

⁹⁵Nicola Ranger, Alex Harvey and Su-Lin Garbett-Shiels, 'Safeguarding Development Aid Against Climate Change: Evaluating Progress and Identifying Best Practice' (Working Paper No 140, Grantham Research Institute on Climate Change and the Environment, November 2013) 6.

⁹⁶Bank, above n xx.

environmental vulnerability to climate hazards, irrespective of climate change. It has a well-established scientific community addressing the issue, and it was an early mover in the NAPA process. Since then, there has been a series of policy and institutional changes undertaken by the government⁹⁷ to address the issue and integrate it into national development planning. Sections IV.VI–IV.VIII show the extent of reflection of the climate-development integrated approach in Bangladesh’s climate change laws and policies. The next chapter focuses on the extent to which the integrated approach has been adopted into the country’s development policies.

⁹⁷Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 6.

Chapter V. Climate-development Integrated Approach in Bangladesh's Development Policies

V.I Introduction

Chapters IV–VII are the law and policy analysis chapters of this thesis. The aim of this analysis is to evaluate the extent to which the national laws and policies reflect the climate-development integrated approach. The findings of these chapters will help to address the research question of this thesis: ‘To what extent is the climate-development integrated approach incorporated into Bangladesh’s coastal laws and policies?’ The previous chapter dealt with the third issue of this thesis, which is the extent of reflection of the climate-development integrated approach in Bangladesh’s climate-change laws and policies. This chapter scrutinises different national development planning documents and examines the extent to which they have incorporated Bangladesh’s climate responses. It deals with the fourth issue of this research, which is the extent of reflection of the climate-development integrated approach in Bangladesh’s development policies. Three development policies are analysed in this chapter: *Vision 2021* (Section V.IV), *Perspective Plan* (Section V.V) and the *Sixth FYP* (Section V.VI). As the focus of this thesis is the coastal management of Bangladesh, this chapter limits its discussion to the provisions that are particularly relevant to coastal management. The aim of evaluating these three policy documents is to explore the extent to which these national development policies address climate concerns in the coastal zone. This chapter provides a clear picture of the extent of Bangladesh’s endeavours for a climate-development integrated approach to date.

V.II Inter-relationship of Climate Change and Development in Bangladesh

Section II.II mentions that climate change and development have long been viewed as separate issues. However, the connections between them are now increasingly recognised and

understood.¹ According to Halsnæs and Verhagen, the effectiveness of development strategies may be reduced, and sectoral vulnerability may be enhanced if climate change adaptation and mitigation are not taken into account.² Fankhauser notes that ‘economic development achieved in a sustainable manner could itself be regarded as an adaptation measure’.³ Suarez and Ribot suggest that ‘increased economic output...should eventually lead to...in an indirect way, to a reduction in vulnerability to climatic extreme events’.⁴ In contrast, some say that adapting to climate change is ‘a practical means of achieving sustainable development in the longer term, and of reducing or avoiding costs of climatic hazards in the short term’.⁵ Thus, the UNFCCC’s principles state that policies and measures to address climate change ‘should be integrated with national development programmes’ (Article 3.4).⁶ The UN Human Development Report 2010 warns that climate change could impede the continuing progress of human development.⁷ According to the Annual Report 2013 of the CDKN, ‘[c]limate change is moving from being an environment issue to a core economic planning issue’⁸ because the effects of climate change are already challenging development aspirations around the world.⁹ In this reality, developing countries such as Bangladesh need strong policies in addition to institutional and financial frameworks for a low-carbon and climate-resilient future.

Sections VI.V.A–VI.V.J will detail how climate change is having, or is predicted to have, severe effects on coastal development in relation to climate-sensitive activities such as agriculture,

¹ Malin Beckman et al, 'Adaptation or Development? Exploring the Distinctions (or Lack thereof) through Case Studies in Bangladesh and Vietnam' (Partner Report Series No 8, Adaptation Knowledge Platform, 2013) 12.

² Kirsten Halsnæs and Jan Verhagen, 'Development based climate change adaptation and mitigation—conceptual issues and lessons learned in studies in developing countries' (2007) 12(5) (2007/06/01) *Mitigation and Adaptation Strategies for Global Change* 665, 666.

³ S Fankhauser, 'The Costs of Adapting to Climate Change' (Working Paper No 16, Global Environment Facility (GEF), 1998) 1.

⁴ P Suarez and J Ribot, 'Climate Information as a Neo-Classical Approach to Risk? The Case for Addressing the Root Causes of Vulnerability' (Paper presented at the Third Annual Disaster Prevention Research Institute (DPRI) of the Kyoto University and the International Institute for Applied Systems Analysis (IIASA), 3–5 July 2003) 3.

⁵ Barry Smit (ed), 'Adaptation to Climatic Variability and Change: Report of the Task Force on Climatic Adaptation' (Occasional Paper No 19, Department of Geography, University of Guelph, 1993) 1.

⁶ *United Nations Framework Convention on Climate Change*, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992) Art 3.4.

⁷ Beckman et al, above n 1, 9.

⁸ Mairi Dupar, 'Climate and Development Knowledge Network Annual Report 2013' (Climate and Development Knowledge Network, 2013) 7.

⁹ Ministry of Food and Disaster Management, Government of the People's Republic of Bangladesh, 'From Vulnerability to Resilience: Bangladesh Preparing for Climate Resilient Development' (Communication Brief, Climate Change Cell, February 2008) 1.

fisheries, forestry, water and land use. Section II.VIII and Figure 2.3 describe that almost all aspects of development in Bangladesh could be affected by climate change.¹⁰ The annual average financial loss from extreme events is estimated at nearly US\$1.7 billion, which is equivalent to 1.18 per cent of Bangladesh's annual GDP.¹¹ Cyclone Sidr, which hit Bangladesh in 2006, caused £900 million of damage, which is around 2.7 per cent of GDP in 2007.¹² The World Bank estimates that £75 million is needed each year for roads, embankments and other infrastructure to cope with the effects of climate change.¹³ Climate change is also expected to reduce rice production in the country by 3.9 per cent each year, costing an estimated £84 billion by 2050.¹⁴

Realising the climate-development nexus in the country, the majority of its development partners, who have been working for decades now, have become engaged with climate change within the past five years.¹⁵ Development is now widely seen as a crucial factor in determining vulnerability to climate effects in the country because vulnerability depends not only on exposure to climate-related hazards, but also on people's and systems' abilities to adapt.¹⁶ In this context, Barry et al¹⁷ and Beckman et al¹⁸ note that development does not necessarily build adaptive capacity. Rather, in many cases, it can increase vulnerability if development policies do not take climate change into account. In such a situation, an integrated policy approach is crucial so that climate policies and development policies work together rather than at cross-purposes. The government of Bangladesh is now committed to adopting 'an integrated policy and plan to protect the country from the adverse effects of global warming'.¹⁹ Although the issue has been raised and nurtured by the environmental circle, the discourse continues to be shifted as a

¹⁰ Beckman et al, above n 1, 12.

¹¹ Ainun Nishat et al, 'Loss & Damage – A Range of Approaches to Address Loss and Damage from Climate Change Impacts in Bangladesh' (Centre for Climate Change and Environmental Research, BRAC University, June 2013) 7.

¹² ICAI, 'The Department for International Development's Climate Change Programme in Bangladesh' (Report No 3, Independent Commission for Aid Impact, November 2011) 2.

¹³ The World Bank Group, 'Economics of Adaptation to Climate Change: Bangladesh' (2010) xii.

¹⁴ ICAI, above n 12, 4.

¹⁵ Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 32.

¹⁶ Beckman et al, above n 1, 12.

¹⁷ Barry Smit et al, 'Adaptation to Climate Change in the Context of Sustainable Development and Equity' in James J McCarthy et al (eds), *Climate Change 2001: Impacts, Adaptation, and Vulnerability. A Contribution of Working Groups II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2001) 877.

¹⁸ Beckman et al, above n 1, 12.

¹⁹ Hedger, above n 15, 18.

development issue, and the government is committed to dealing with it through the regular development planning process.²⁰

V.III The National Development Planning of Bangladesh

The Constitution of Bangladesh requires that the country follow the path of planned economic growth for realising its development objectives.²¹ Accordingly, between Fiscal Year (FY) 1973 and FY 2002, Bangladesh implemented five successive *FYPs* and an interim *Two Year Plan* (1979–1980). From FY 2003 to FY 2010, there was a deviation from the *FYP* to a process of shorter-term *Poverty Reduction Strategy Paper* (PRSP).²² For FY 2011 to FY 2015, the country has drafted the *Sixth FYP* (*SFYP*). In fact, the government has outlined a 10-year *Perspective Plan* (2010–2021) under the guidance of a larger policy directive called *Vision 2021*, which is an overarching policy document that sets out Bangladesh's economic development objectives. This overarching document is complemented by the *Perspective Plan*, which is intended to be implemented through two successive *FYPs* spanning the period FY2011 to FY2020.²³ As development is a long-term process, the *SFYP* is cast in the context of a long-term development vision defined by *Vision 2021* and the *Perspective Plan*.

Following this national planning, Bangladesh has made considerable headway into improving education, poverty reduction and gender equality.²⁴ The country is identified as one of the 11 countries with promising outlooks for investment and future growth.²⁵ It maintained a solid GDP growth rate of 5.5–6 per cent annually from 2009 to 2012.²⁶ Per capita income exceeded

²⁰Khurshid Alam et al, 'Understanding the Political Economy of Low Carbon and Climate Resilient Development: Planning exceptionalism? Political Economy of Climate Resilient Development in Bangladesh' (The Learning Hub, Institute of Development Studies, 2011)11.

²¹*Constitution of the Peoples' Republic of Bangladesh* 1972, art. 15.

²²Fakrul Ahsan, Sixth Five Year Plan (2011-15) as the Tool of Accelerating Growth and Reducing Poverty <<http://napd.ac.bd/6thplan.pdf>> 1.

²³Ibid 2.

²⁴United Nations Population Fund Bangladesh, *6th FYP* <<http://unfpabgd.org/index.php?option=page&id=52&Itemid=69>>.

²⁵Hedger, above n 15, 16.

²⁶*Bangladesh Country Report* (2013) Global Finance <<http://www.gfmag.com/gdp-data-country-reports/321-bangladesh-gdp-country-report.html#axzz2g49JsJSO>>.

US\$1000 in 2013.²⁷ The poverty level was reduced from 59 to 40 per cent between 1991 and 2005.²⁸ The country has also made significant progress in human development in recent years. Its Human Development Index (HDI) rank incremented to 129 in 2010 from 145 in 2002.²⁹ However, climate change threatens to seriously undermine recent economic development in the country. Numerous studies suggest that all sectors of Bangladesh's economy are vulnerable to climate changes. GermanWatch, a non-profit organisation, ranked Bangladesh as the most vulnerable country to climate change in its Global Climate Risk Index 2010.³⁰ Realising the danger posed by climate change and the need to address it, the country has adopted the *National Adaptation Programme of Action 2005*, *Bangladesh Climate Change Strategy and Action Plan 2008* and a National Climate Change Trust Fund. Chapter IV discusses these climate policies. The focus of this chapter is to explore the extent to which the climate change issue has been reflected in the country's development policies. Sections V.IV–V.VI evaluate three documents—*Vision 2021*, the *Perspective Plan* and the *SFYP*—using the law and policy analysis methodology outlined in Section I.VIII.B.2.

V.IV Climate-development Integrated Approach and *Vision 2021*

The year 2021 will mark the golden jubilee of Bangladesh's independence. With this occasion in mind, *Vision 2021* and the associated *Perspective Plan* (2010–2021) have set solid development targets for the country by the end of 2021. It is expected that if the targets are achieved, this will transform the socio-economic environment of the country from a low-income economy to the first stages of a middle-income economy.³¹ *Vision 2021* encapsulates many of the core areas of Bangladesh's development needs articulated in the MDG indicators for the country.³² It lays out a development scenario where citizens will have a higher standard of living, be better educated,

²⁷Sohel Parvez, 'GDP Swells, Per Capita Income Crosses \$1000', *The Daily Star*, 5 September 2013 <<http://www.thedailystar.net/beta2/news/gdp-swells-per-capita-income-crosses-1000/>>.

²⁸Alam et al, above n 220, 26.

²⁹Ibid.

³⁰Sven Harmeling, 'Global Climate Risk Index 2010: Who is Most Vulnerable? Weather-related Loss Events Since 1990 and How Copenhagen Needs to Respond' (Briefing Paper, GermanWatch, 2010) <<http://germanwatch.org/en/download/2168.pdf>> 6.

³¹Planning Commission, *Sixth Five Year Plan FY2011-FY2015: Accelerating Growth and Reducing Poverty* (2011) 1.

³²United Nations Population Fund Bangladesh, *6th FYP* <<http://unfpabgd.org/index.php?option=page&id=52&Itemid=69>>.

have better social justice and have a more equitable socio-economic environment. Further, the sustainability of the development is expected to be ensured through better protection from climate change and natural disasters.³³

Vision 2021 proposes a set of concrete measures to achieve eight identified goals by 2021. The goals relate to the following aspirations: (i) become a participatory democracy, (ii) have an efficient, accountable, transparent and decentralised system of governance, (iii) become a poverty-free middle-income country, (iv) have a nation of healthy citizens, (v) have skilled and creative human resources, (vi) become a globally integrated regional economic and commercial hub, (vii) be environmentally sustainable, and (viii) be a more inclusive and equitable society.³⁴ In relation to the seventh goal, Section 7.10 of *Vision 2021* mentions that ‘the effects of rising levels of global warming include a possible rise in sea levels, a possible increase in temperatures, a disruption of monsoon patterns and possibly more intense if not more frequent cyclones’.³⁵ Therefore, a description of specific concerns relating to climate change is mentioned in this document, but the effects of climate change have not been linked with development. In response to these natural disasters, the document expects that:

By 2021 more substantive measures will be put in place which would enable Bangladesh to mitigate seasonal floods and drought. This will require long term investments in flood control and river management, establishment of a green belt, more efficient use of water resources, investments to ensure dry season river flows and water storage.³⁶

However, there is no extended discussion on these responses. After following the method of policy assessment as described in Section I.VIII.B.2, the overall score of this document is 2 (see Table 5.1), which indicates that in terms of climate-development integration, this document is very poor and cannot ensure the sustainability of development through better protection under a changing climate.

³³ Planning Commission, above n 31; Ahsan, above n 22, 3–4.

³⁴ Nagorik Committee, *Bangladesh Vision 2021* (Centre for Policy Dialogue, 2006).

³⁵ Ibid 43.

³⁶ Ibid.

Table 5.1: Average Score of *Vision 2021*

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>Vision 2021</i>	1	0	1	0	2

V.V Climate-development Integrated Approach and the *Perspective Plan*

This document is a blueprint that advances a more inclusive and holistic picture of development³⁷ to make *Vision 2021* a reality. The *Perspective Plan*(2010–2021) aims for environmentally friendly development and incorporates a separate chapter to address concerns relating to environment and climate change. This document receives a score of 2 in the category of specific concerns relating to climate change and its effects on development, as it elaborated the issue (see Table 5.2). It admits that climate change response in Bangladesh’s coastal zone deserves attention,³⁸ and it narrates the responses accordingly. Therefore, it also scores 2 in the response category.

Section 10.5 of the *Perspective Plan* mostly emphasises sectoral adaptation strategies, although it does not completely deny the necessity of cross-sectoral approaches and strategies. It upholds the necessity of ICZM, which seeks to strike a balance between economic welfare and environmental sustainability of the coastal region.³⁹ The *Perspective Plan* endorses the three categories of possible coastal adaptation options identified by the IPCC CZMS: (i) planned retreat, (ii) accommodation and (iii) protection. Chapter III details these three adaptation options.

V.V.A Planned Retreat

According to the SAR of the IPCC, planned retreat refers to the abandonment of land and structures in highly vulnerable areas and the resettlement of inhabitants.⁴⁰ The IPCC CZMS provides the following options for retreat, as discussed in Section III.IX.A:

³⁷Planning Commission, *Outline Perspective Plan of Bangladesh 2010-2021: Making Vision 2021 A Reality* (2010) 2.

³⁸Ibid 6.

³⁹Ibid 109.

⁴⁰Bijlsma, above n 313.

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1. retreat the line—that is, prevent development in areas near the coast
 2. limit intervention—that is, allow development to take place on the condition that it will be abandoned if necessary (planned phase-out)
 3. no intervention—that is, no direct government role other than through the withdrawal of subsidies and the provision of information about associated risks.⁴¹

Section 10.5.A of the *Perspective Plan* mentions two of these three options for coastal adaptation in Bangladesh: retreat the line and limit development⁴²(planned phase-out).⁴³ It recommends:(i) regulatory measures to enforce the location of new developments at a designated minimum distance from the coastline; and (ii) financial incentives for the coastal population to help them relocate in inland growth centres and assist them to find alternate occupations.⁴⁴ The *Perspective Plan* also discusses phasing out non-essential development in the coastal zone and encouraging out-migration by introducing disincentive fiscal measures.⁴⁵ However, the document is silent about the third option of planned retreat (no intervention)⁴⁶ mentioned by the IPCC CZMS. The third option allows natural resources (such as mangroves, marshes and coral reefs) to be left to their natural processes as sea-levels rise. For a country such as Bangladesh, where land is scarce, this does not offer a broadly applicable alternative. However, as people continue to build in vulnerable coastal areas, the government must be prepared to take necessary actions to ensure public safety.⁴⁷

V.V.B Accommodation

The second adaptive option of coastal management in response to sea-level rises refers to accommodating the altered environment (including submergence) by adjusting livelihood patterns. This is the most practiced strategy in the coastal areas of Bangladesh. The *Perspective Plan* mentions the following accommodative strategies for coastal areas: (i) continuing the

⁴¹Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) 6.

⁴² See Section III.IX.A.1 for a detailed discussion on the ‘retreat the line’ adaptation strategy.

⁴³ See Section III.IX.A.2 for a detailed discussion on the ‘planned phase-out’ adaptation strategy.

⁴⁴Planning Commission, above n 37, 110.

⁴⁵Ibid.

⁴⁶ See Section III.IX.A.3 for a detailed discussion on the ‘no government intervention’ adaptation strategy.

⁴⁷Dronkers et al, above n 41, 7.

habitation of less vulnerable coastal sections by making *in situ* changes and minor adjustments to sea-level rises; and (ii) introducing livelihood and lifestyle changes such as cultivating salt-tolerant crops, increasing the practice of aquaculture, converting farmlands into fish ponds, elevating homesteads and other structures, and enlarging the network of inland water transport.⁴⁸

V.V.C Protection

The third adaptive measure for coastal management introduced by the IPCC CZMS and mentioned in the *Perspective Plan* aims to continue using vulnerable areas. According to the SAR, it involves defensive measures and seeks to maintain shorelines at their present positions by either building or strengthening protective structures, or by artificially nourishing or maintaining beaches and dunes.⁴⁹ As described in Section III.IX.C, the measures may be drawn from an array of hard and soft structural solutions. The soft or dynamic structures (e.g. sand nourishments, dune building, wetland restoration or creation) attempt to modify the natural processes by managing physical systems and maintenance practices. Hard or static structures (e.g. dikes, seawalls, groins, breakwaters, salt-water intrusion barriers) involve constructing permanent devices.⁵⁰

The *Perspective Plan* provides the following hard protection measures for the coastal adaptation of Bangladesh: (i) continuing existing land use by providing protection to the coastline through the construction of hard structures in order to keep out the rising sea-water; (ii) constructing and strengthening coastal polders and embankments, especially around dense population clusters, urban centres, transport nodes and other important infrastructures; and (iii) implementing projects aimed at coastal erosion control and land accretion promotion in the estuarine area, including the construction of cross-dams with a view to accelerating the accretion process and land reclamation in the coastal zone.⁵¹ However, the document is silent about any soft protection measures. It also fails to address any coastal mitigation strategies as discussed in Section III.X.

⁴⁸Planning Commission, above n 37, 110.

⁴⁹Bijlsma, above n 40, 311.

⁵⁰Pope and Chisholm, above n 151.

⁵¹Planning Commission, above n 37, 110.

V.V.D Assessment Result of the Perspective Plan

In the objective clause (Section 10.1) of Environmentally Sustainable Development, the *Perspective Plan* mentions that Bangladesh's climate change policies will revolve around both adaptation strategies and mitigation measures.⁵² This means that the document takes into account the necessity of adopting both response strategies in order to address climate change in Bangladesh. It also endeavours to integrate environmental issues such as climate change into national planning and development.⁵³ The overall score of the assessment is 6 (see Table 5.2), indicating that the document considers climate change a potential threat to the development aspirations that the action plan wishes to implement. For this document, some strategies are effective in the fight against climate change⁵⁴ and help to adapt the coastal zone to further vulnerabilities.

Table 5.2: Average Score of the *Perspective Plan*(2010–2021)

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
The <i>Perspective Plan</i> of 2010-2021	2	1	2	1	6

V.VI Climate-development Integrated Approach and the *SFYP*

Vision 2021 will be implemented through two medium-term development plans, with the first spanning FY 2011–2015. This *FYP* is the sixth in the series of development plans in Bangladesh starting from 1973. At the operational level, the fundamental task of the *SFYP* is to develop strategies, policies and institutions that allow Bangladesh to accelerate growth and reduce poverty.⁵⁵ A key strategic element of the *SFYP* is a firm commitment to pursue an environmentally sustainable development process.⁵⁶ It recognises the threat of climate change and its potentially significant effects on the country's development processes. Thus, it scores 2 in

⁵² Ibid 105.

⁵³ Ibid 112.

⁵⁴ Nazmul Huq et al, "Climate Proofing" Water Resources Development Policy: The Evidence from Bangladesh' in W Leal Filho (ed), *Climate Change and the Sustainable Use of Water Resources, Climate Change Management* (Springer-Verlag Berlin Heidelberg, 2012) 389, 397.

⁵⁵ Planning Commission, Ministry of Planning, Government of the People's Republic of Bangladesh, *Sixth Five Year Plan*(2011) 2.

⁵⁶ Ibid 8.

the category of specific concerns relating to climate change and its effects on development (see Table 5.3). The *SFYP* considers that climate change under a business-as-usual scenario will threaten the significant gains made in poverty reduction in Bangladesh over the past two decades. It will also disproportionately affect the lives and well-being of vulnerable groups (including women, children, the elderly and ethnic minorities), and constrain progress towards achieving the MDGs.⁵⁷ The *SFYP* has set several target programs that need to be completed within the next five years. It has also focused on how to integrate climate change into the national planning process. Thus, in the response category, this document scores 2 (see Table 5.3). The *SFYP* also focuses on environmental management objectives and strategies, as well as climate change benchmarks. These strategies have direct implications for the coastal zone management of Bangladesh. Sections V.VI.A–V.VI.C briefly incorporates the environmental management objectives, strategies and climate change benchmarks that are relevant to the coastal zone.

V.VI.A Environmental Management Objectives in the SFYP and its Relevance to Coastal Management

The *SFYP* has set a number of goals to attain a sustainable environment and to address the fallout of climate change. With a view to attaining these goals, the main objectives relating to environment and climate change under the *SFYP* can be described as follows:⁵⁸

1. **Integrated Approach:** The objective of the *SFYP* is to promote an appropriate environment management system for mitigation and adaptation to climate change, as well as a system for sustainable development.⁵⁹ Therefore, it refers to the climate-development integrated approach, as described in Chapter II.⁶⁰ It calls for climate change to be integrated into the development project design, budgetary process, project implementation and monitoring process.⁶¹

⁵⁷Planning Commission, *Sixth Five Year Plan FY2011-FY2015: Accelerating Growth and Reducing Poverty* (2011) 188.

⁵⁸Ibid 194.

⁵⁹Ibid.

⁶⁰ See Section II.VII for the definition of the climate-development integrated approach.

⁶¹Planning Commission, above n 57, 195.

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2. **Prevention of Natural Resources and Biodiversity:** The *SFYP* aims to preserve, protect and develop the natural resource base⁶² and to ensure the conservation of biodiversity and its sustainable utilisation.⁶³ These aims are also applicable to the environmental management of the coastal zone.
 3. **Environmentally Friendly Intervention:** Besides the prevention and conservation of natural resources, this document recommends environmentally friendly activities in the development of interventions. It promotes a 3R (Reduce, Reuse and Recycle) waste management strategy⁶⁴ and advocates the reduction of dependency on fossil fuels by promoting solar/green energy.⁶⁵ The *SFYP* aims for improved air quality in major cities through clean fuel and vehicles, and through monitoring and prevention measures.⁶⁶
 4. **Assessment, Monitoring and Reporting:** The *SFYP* suggests monitoring, controlling and preventing environmental pollution and degradation related to soil, water and air.⁶⁷ To ensure sustainable environment management, it advises that environmental assessments and reporting should be undertaken.⁶⁸ It also suggests establishing an Environment Management System (EMS) in industries for pollution control.⁶⁹
 5. **Participation of Concerned Groups:** The objective of the *SFYP* is to ensure the active participation of poor people, especially women in environment management activities at all levels.⁷⁰
 6. **Public–Private Partnership (PPP):** The *SFYP* discusses strengthening the capability of the public and private sectors to manage environmental concerns and environmental health.⁷¹ It emphasises promoting public–private partnerships in environment management.⁷²
 7. **International Cooperation:** This document initiates actions with regard to obligations under international treaties and conventions for minimising adverse effects on the global

⁶² Ibid 194.

⁶³ Ibid.

⁶⁴ Ibid 195.

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ Ibid 194.

⁶⁸ Ibid 195.

⁶⁹ Ibid.

⁷⁰ Ibid 194.

⁷¹ Ibid.

⁷² Ibid 195.

environment.⁷³ It suggests the promotion of cooperation with regional and international institutions or organisations in order to address local, regional and global environmental problems.⁷⁴

8. **Research and Awareness:** The objective of the *SFYP* is to undertake research and development for innovating technology at a national level, and to apply modern technology, information exchange and benefit sharing with other countries.⁷⁵ It suggests creating public awareness in order to participate in environment promotion activities.⁷⁶

All of these objectives have direct implications for the environmental management of the coastal zone.

V.VI.B Environmental Management Strategies in the SFYP and its Relevance for Coastal Management

The integrated approach is not only an environmental management objective;⁷⁷ it has also been adopted as an environmental management strategy in the *SFYP*.⁷⁸ The government of Bangladesh has undertaken several other strategies within the timeframe of the *SFYP* in order to attain sustainable environment. The strategies that have repercussions for coastal environment management are summarised in Sections V.VI.B.1– V.VI.B.3.

V.VI.B.1 Institutional Reform

The *SFYP* recommends three institutional reforms: (i) environment committees at the division, district and *upazila* levels to be activated with the participation of all stakeholders; (ii) the National Environment Council headed by the Prime Minister and executive committee of the National Environment Council headed by the Minister for Environment and Forests to be activated; and (iii) the Department of Environment to be strengthened in the light of the existing

⁷³ Ibid.

⁷⁴ Ibid.

⁷⁵ Ibid.

⁷⁶ Ibid.

⁷⁷ See Section V.VI.A for the Environmental Management Objectives in the *SFYP*.

⁷⁸ Planning Commission, above n 57, 196.

environment policy, environmental Act, rules and environment management action plan in order to coordinate, monitor and implement these activities.⁷⁹

V.VI.B.2 Legislative Reform

The guidelines for the EIA will be drafted for all sectors under the *Environment Conservation Act 1995*, to be followed while processing each development project requiring government approval. Existing environmental laws and regulations will be amended to address new environmental issues. The ‘polluter pays’ principle will be followed in order to ensure strict compliance with environment legislation. Sectoral legislation will be reviewed and redrafted in light of Bangladesh’s commitments expressed through signing and ratifying a number of international conventions and protocols on the environment.⁸⁰

V.VI.B.3 Incentives and Fund

Incentives in the form of taxrebates and taxholidays will be provided, and incremental costs incurred by environmentally friendly entrepreneurs will be met in various forms and sources. The National Environment Fund will be established in order to provide assistance to the victims of environment degradation caused by natural disasters and anthropogenic activities.⁸¹

V.VI.C Climate Change Benchmark in the SFYP and its Relevance to Coastal Management

The *SFYP* recognises that climate change is not something for which quantitative benchmarks in physical terms can be set. The agenda is large and involves the creation and management of knowledge, formulation of policies and development of institutions. It also requires coordination and collaboration with regional and global partners. The *Bangladesh Climate Change Strategy and Action Plan*⁸² 2008 provides a convenient framework to build on the climate change agenda for the *SFYP*. Given the large agenda, the *SFYP* prioritises the urgent tasks that need to be taken up and may be completed, by and large, within the next five years. The target programs of the

⁷⁹ Ibid 195.

⁸⁰ Ibid 196.

⁸¹ Ibid.

⁸² See Section IV.IV for the *Bangladesh Climate Change Strategy and Action Plan*.

SFYP are detailed in Annex 1 in accordance with approved themes. The programs that are relevant to the coastal zone are summarised below.

V.VI.C.1 Food Security, Social Protection and Health

The programs for food security, social protection and health include: (i) institutional capacity for research on climate-resilient cultivars and dissemination; (ii) adaptation against drought, salinity resistance and heat; (iii) adaptation in the fisheries sector; (iv) adaptation in the livestock sector; (v) adaptation in the health sector; (vi) water and sanitation programs for climate-vulnerable areas; (vii) livelihood protection in ecologically fragile areas; and (viii) livelihood protection of vulnerable socio-economic groups.⁸³ As mentioned in the *SFYP*, the benchmark for most of these programs is limited, and the target set as initial studies have to be undertaken for ideas on adaptation (see Annex One). It is expected that the *Coastal Zone Policy 2005* and the *Coastal Development Strategy* will have to come up with more ideas for adaptation options for coastal areas. Sections VI.V and VI.VI detail these two documents.

V.VI.C.2 Infrastructure

Among the nine programs mentioned under this category, seven have direct linkages with the coastal zone: (i) repair and maintenance of existing flood embankments; (ii) repair and maintenance of existing cyclone shelters; (iii) repair and maintenance of existing coastal polders; (iv) urban drainage ‘needs assessment’; (v) adaptation against floods and constructing new embankments and flood shelters; (vi) adaptation against tropical cyclones and storm surges through land use planning; and (vii) earthquake-resilient structures and landslide-protected structures must be constructed and retrofitted.⁸⁴ The *SFYP* highlights that so far there are limited activities on these issues, but it emphasises the need for immediate actions (see Annex One).

⁸³Planning Commission, above n 57, 207.

⁸⁴ Ibid.

V.VI.C.3 Research and Knowledge Management

The following programs have been prioritised by the *SFYP* under this theme: (i) national centre for research, knowledge management and training on disaster and climate change; (ii) climate change modelling and their effects; (iii) preparatory studies for adaptation against sea-level rises; and (iv) research on climate change adaptation for the knowledge and technology generation.⁸⁵ All of these target programs are relevant to coastal zone management in the reality of climate change.

V.VI.C.4 Low-carbon Development

Low-carbon development has been defined in Section I.IV and discussed in detail in Section II.V.B. The target programs for low-carbon development set by the *SFYP* are: (i) renewable energy development; (ii) management of urban waste; (iii) A/R; (iv) rapid expansion of energy-saving devices; and (v) improving energy efficiency in the transport sector.⁸⁶ This is a unique attempt by the *SFYP* to address the nexus of climate change and development. Thus, in the response category of assessment, this document has been given a score of 2 (see Table 5.3). Significant attention is paid here to interlinking climate change and development. Thus, the document also scores 2 in the process category.

V.VI.C.5 Capacity Building

The capacity-building programs mentioned in the *SFYP* are applicable to coastal management in Bangladesh. The immediately needed capacity-building programs are as follows: (i) revision of sectoral policies for climate resilience; (ii) mainstreaming climate change in national, sectoral and spatial development programs and policies; (iii) strengthening human resource capacity; (iv) gender considerations in climate change; (v) strengthening institutional capacity; and (vi)

⁸⁵ Ibid 208.

⁸⁶ Ibid.

mainstreaming climate change in media. The first target program under this theme is very relevant to this thesis.⁸⁷ It reviews the coastal zone policy for climate resilience.

V.VI.D Assessment Result of the SFYP

The climate change effects that Bangladesh may face present a daunting challenge for policy-makers. Adaptation is currently the prime need; any delay will create havoc with the growth prospects of the economy and deny millions of people basic necessities. International support might be received eventually, but it may be woefully inadequate given Bangladesh's enormous annual requirement of resources to combat the menace of climate change. In this situation, the *SFYP* places its first priority on the repair and maintenance of coastal polders and defences that have been washed away by Cyclones Sidr and Aila.⁸⁸ The second priority is to integrate the climate change issues of adaptation, mitigation and capacity-building based on the actions identified in Annex One and described in Section 6.5.4. This integrated approach is unique at the policy level in Bangladesh. Using the law and policy analysis methodology, the *SFYP* scores 2 in all four categories of issue, causal link, responses and process. The overall score that the *SFYP* evaluation matrix achieves is 8. This means that this policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

Table 5.3: Average Score of the *SFYP*

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>SFYP 2011–2015</i>	2	2	2	2	8

V.VII Conclusion

The main focus of this chapter is to examine the different national development planning documents of Bangladesh and scrutinise the extent to which they have integrated climate change response strategies. This chapter assesses three documents: *Vision 2012*, the *Perspective Plan*

⁸⁷ Ibid.

⁸⁸ Cyclone Sidr hit the south and south-western parts of Bangladesh on 15 November 2007, and Cyclone Aila hit the south-western part of the country in 2009.

(2010–2021) and the *SFYP*. Using the law and policy analysis methodology, this chapter examines the extent to which these documents have incorporated the climate-development integrated approach. A description of specific concerns relating to climate change is mentioned in *Vision 2021*, but the effects of climate change have not been linked with development (see Table 5.1). Table 5.2 shows that the *Perspective Plan* for 2010–2021 achieves a score of 6, indicating that the document considers climate change a potential threat to development aspirations. The *SFYP* achieves a score of 8 (see Table 5.3), indicating that the document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach. This chapter not only assesses these policy documents, but it also highlights their relevance to coastal management. Chapters VI and VII focus on the laws and policies that are relevant to the coastal management of Bangladesh. The evaluation of these laws and policies will help to understand the extent to which Bangladesh's coastal laws and policies incorporate the climate-development integrated approach.

Chapter VI. Climate-development Integrated Approach in Bangladesh's Coastal Zone Policy and Strategy

VI.I Introduction

Chapter VI is the third law and policy analysis chapter in this thesis. Chapter IV discussed the laws and policies that are relevant to climate change, and Chapter V examined three national development policies (*Vision 2021*, the *Perspective Plan* and the *SFYP*). This chapter will highlight two national coastal policy documents: the *Coastal Zone Policy* and the *Coastal Development Strategy*. Chapter VII will evaluate 21 sectoral policies and 39 statutes that are relevant to the coastal zone. The object of the analysis in these four chapters is to determine the extent to which the laws and policies of Bangladesh reflect the climate-development integrated approach. These findings will ultimately help to address the research question of this thesis: ‘To what extent is the climate-development integrated approach incorporated into Bangladesh's coastal laws and policies?’

This chapter deals with the fifth issue, which is the extent of reflection of the climate-development integrated approach in Bangladesh's *Coastal Zone Policy* and *Coastal Development Strategy*. Section VI.II begins with a brief discussion of the geo-morphological and socio-economic context of the study area. Sections VI.III and VI.IV conceptualise the evolution and first generation of coastal management in Bangladesh. Sections VI.V and VI.VI evaluate the *Coastal Zone Policy* and the *Coastal Development Strategy*. Sections VI.VI.A–VI.VI.I elaborate nine strategic priorities of the *Coastal Development Strategy*. To date, the *Coastal Zone Policy* and the *Coastal Development Strategy* are the main two national documents of ICZM. The detailed descriptions of the *Policy* and *Strategy*, as well as their scores using the law and policy analysis methodology, give an idea of the extent to which the two documents reflect the climate-development integrated approach.

VI.II Uniqueness of the Coastal Zone of Bangladesh

The coastal zone of Bangladesh is a perfect place to explore the climate-development nexus. It is known as a zone of vulnerabilities as well as opportunities.¹ For a long time, the zone has been recognised as a hotspot of vulnerability to climate change and sea-level rises.² Researchers have identified several hydro-geological and socio-economic factors that contribute to its vulnerability. According to Ahmed, a few of these factors are its: (i) geographical location in South Asia; (ii) flat delta topography with very low elevation; (iii) extreme climate variability, which is governed by monsoons and results in acute water distribution over space and time; (iv) high population density and poverty incidence; and (v) majority of population being dependent on crop agriculture, which is highly influenced by climate variability and change.³ These vulnerabilities adversely affect the lives and livelihoods of the people living there, and they slow down the pace of social and economic developments in the region.⁴ However, the coast also has distinctive development opportunities. As mentioned in Section I.V, the zone diverse natural resources, including coastal fisheries, mangrove forests, salt, onshore and offshore natural gas, and minerals. It has sites for Export Processing Zones (EPZs), harbours, airports, land ports, tourism complexes and opportunities for other industries.⁵ These opportunities can be instrumental in reducing poverty. The zone can contribute significantly to the development of Bangladesh as a whole.⁶ That is, in order to meet national socio-economic development objectives, a special approach has to be implemented for the coastal zone. The necessity of such an approach (i.e. climate-development integrated approach for coastal laws and policies) has been illustrated by the case study on shrimp farming in section III.III.⁷ To gain a better inside of Bangladesh's coastal zone, the following two sections describe the geo-morphological features of the zone and the unique socio-economic phenomena prevailing there.

¹Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy 2005*) 1.

²Helena Wright, Patti Kristjanson and Gopal Bhatta, 'Understanding Adaptive Capacity: Sustainable Livelihoods and Food Security in Coastal Bangladesh' (Working Paper No 32, CGIAR Research Programme on Climate Change, Agriculture and Food Security, 2012) 1.

³Ahmed, above n 1.

⁴Ministry of Water Resources, above n 1.

⁵ Ibid.

⁶ Ibid.

⁷See section III.III of chapter III for the case study on shrimp farming to understand the climate-development nexus.

VI.II.A The Geo-morphological Features of the Coastal Zone

The coastline of Bangladesh is 710 km long⁸ and represents an area of 47,201 km²,⁹ which is almost 32 per cent of the country's total geographical area.¹⁰ The landward distance of the delineated coastal zone from the shore is between 30 and 195 km, and the exposed coast is between 37 and 57 km¹¹ (see Figure 6.1). India is at the western end of the zone, Myanmar is at the eastern end and the Bay of Bengal is to the north. All parts of the zone are plains, except for Chittagong and Cox's Bazar.¹² The coastal zone is lowlying, with 62 per cent of the land having an elevation of up to 3 m, and 86 per cent up to 5 m.¹³ In terms of administrative considerations, 19 districts out of 64 are considered coastal districts.¹⁴

⁸ Ibid; Md Lokman Hossain and Mohammed Kamal Hossain, *Climate Change, Sea Level Rise and Coastal Vulnerabilities of Bangladesh with Adaptation Options* <http://academia.edu/1224958/CLIMATE_CHANGE_SEA_LEVEL_RISE_AND_COASTAL_VULNERABILITIES_OF_BANGLADESH_WITH_ADAPTATION_OPTIONS> 13.

⁹ Md Golam Mabub Sarwar, *Impacts of Sea Level Rise on the Coastal Zone of Bangladesh* (Masters Thesis, Lund University, 2005) 7.

¹⁰ Ibid.

¹¹ Centre for Environmental and Geographic Information Services, *Climate Change Economic Modeling: Economic Modeling of Climate Change Adaptation Needs for Physical Infrastructures in Bangladesh* (Climate Change Cell, Department of Environment, 2008) 12.

¹² Sarwar, above n .

¹³ Centre for Environmental and Geographic Information Services, above n 11.

¹⁴ Ministry of Water Resources, above n 1. The coastal districts are Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Gopalganj, Jessore, Jhalkati, Khulna, Lakshmipur, Narail, Noakhali, Patuakhali, Pirojpur, Satkhira and Shariatpur.

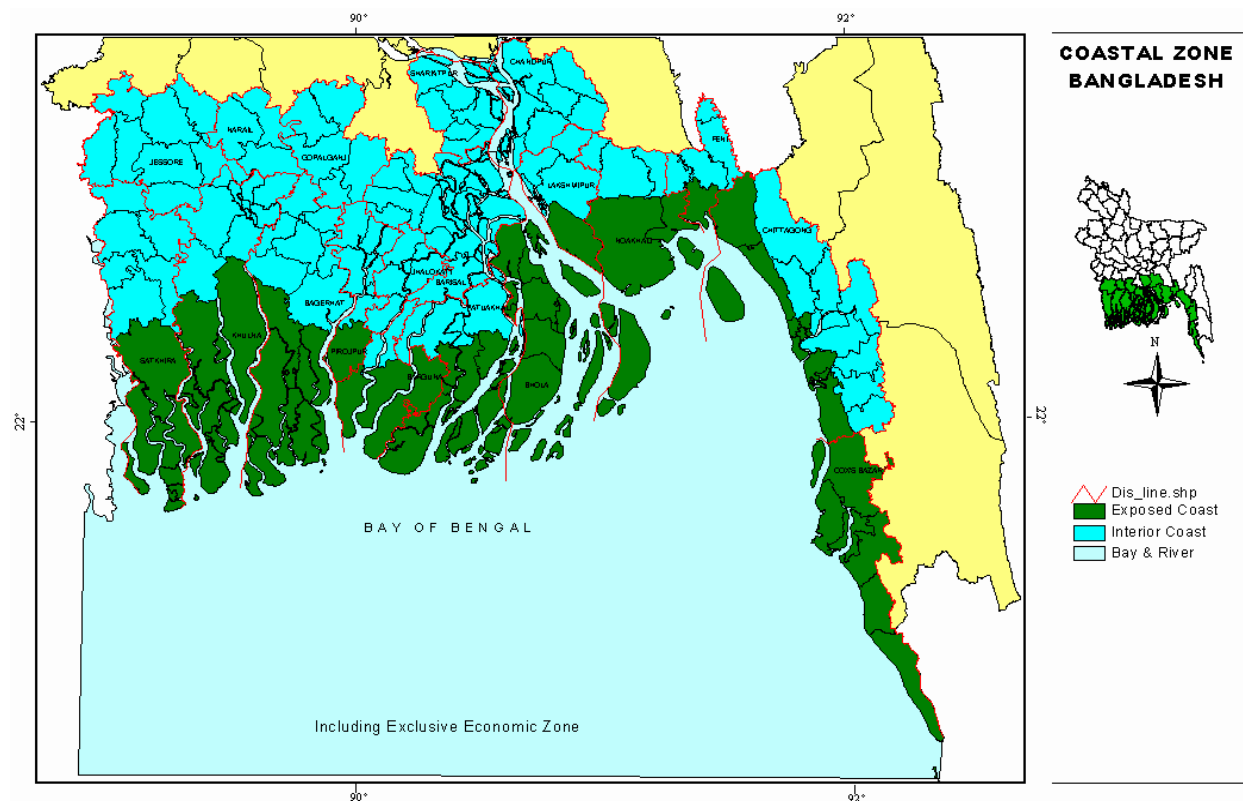


Figure 6.1: The Coastal Zone of Bangladesh¹⁵

Several previous studies have classified the coastal areas of Bangladesh into three distinct regions according to its geo-morphological features:¹⁶

1. **The Eastern Region:** This begins from the Feni River and extends up to Badar Mokam (southern tip of the mainland) along Chittagong.¹⁷ It comprises the world's longest unbroken sea beach (Cox's Bazar) of around 145 km.¹⁸ The coral ecosystems are found here around St Martin's Island.¹⁹ The eastern region is almost regular and unbroken.
2. **The Central Region:** This region is mostly irregular and consists of a series of islands and estuarine channels (Tetulia-Rabanabad channel, Hatiya channel, and Sandwip channel).²⁰ The exact location of this region starts from the Tetulia River and extends to

¹⁵Sarwar, above n .

¹⁶ Q K Ahmad et al, *A National Assessment of the Implications of Climate Change for Bangladesh: A Synthesis* <<http://www.bdresearch.org/home/attachments/article/305/A%20NATIONAL%20ASSESSMENT.pdf>>23.

¹⁷Hossain and Hossain, above n 8, 14.

¹⁸Sarwar, above n .

¹⁹Ministry of Water Resources, above n **Error! Bookmark not defined..**

²⁰Md Lokman Hossain and Mohammed Kamal Hossain, *Climate Change, Sea Level Rise and Coastal Vulnerabilities of Bangladesh with Adaptation*

the Feni River estuary, including the mouth of the Meghna River up to the confluence of the Padma (Ganges-Brahmaputra) and the Meghna River near Chandpur.²¹

3. **The Western Region:** This extends from the Tetulia River to the international boundary (India) located on the Hariabhanga River.²² This region is covered with the world's largest stretch of mangrove forest (Sundarban).²³ A submarine canyon (Swatch of no Ground) is present 25 km south of the western coastline.²⁴

Bangladesh's coastal zone also includes more than 70 islands,²⁵ tidal flats, estuaries, offshore waters, a neritic zone and a continental shelf (around 20 km to the edge).²⁶ The Exclusive Economic Zone (EEZ) is regarded as the seaward coastal zone.²⁷ It has many highly diverse ecosystems such as coral reefs, mangroves, beaches, dunes and wetlands.²⁸ This unique zone is crisscrossed by a vast river network, a dynamic estuarine system and a drainage basin. These eventually make the coastal ecosystem a potential source of natural resources, and diversified faunal and floral composition.²⁹ However, the region suffers from a range of factors that increase sensitivity to climate effects.³⁰ In fact, the region is predicted to be among the most substantially affected regions because of climate change.³¹ Therefore, the zone requires a distinctive policy approach because of its vulnerabilities and its potential.

Options<http://academia.edu/1224958/CLIMATE_CHANGE_SEA_LEVEL_RISE_AND_COASTAL_VULNERABILITIES_OF_BANGLADESH_WITH_ADAPTATION_OPTIONS>14.

²¹Sarwar, above n .

²²Ibid.

²³Hossain and Hossain, above n 20, 14.

²⁴Centre for Environmental and Geographic Information Services, above n 11.

²⁵Ministry of Water Resources, above n **Error! Bookmark not defined..**

²⁶Md. Shamsuddoha and Rezaul Karim Chowdhury, *Climate Change Impact and Disaster Vulnerabilities in the Coastal Areas of Bangladesh* (COAST Trust, 2007) 5.

²⁷Ministry of Water Resources, above n 1.

²⁸Hoozemans et al, above n 8.7.

²⁹Shamsuddoha and Chowdhury, above n 26.

³⁰Wright, Kristjanson and Bhatta, above n 2.

³¹Ahmed, above n 3.

VI.II.B Socio-economic Context of the Coastal Zone

The exclusive geo-physical characteristic is not the only decisive factor that makes the coastal zone of Bangladesh different from the rest of the country.³² Many other socio-economic trends eventually limit people's access to the endowed resources in this zone, which ultimately perpetuates its inhabitants' climate vulnerabilities. Therefore, it is important to understand the socio-economic context of the area.

According to the 2011 population census of Bangladesh, around 42.5 million people live in the coastal zone,³³ which is almost 30 per cent of the country's total population.³⁴ They live in 8.14 million households in the zone.³⁵ Several indigenous communities (e.g. Munda, Mahato, Marma, Murang, Khiyang, Pundra-Khatrion, Chakma, Tripura, Tanchangya, Rakhaing) also live there,³⁶ and they are mostly concentrated in the district of Chittagong.³⁷ The total population of indigenous communities is around 200,000.³⁸ The average population density is 743 per km².³⁹ The population density in the interior coast is much higher than that of the exterior coast and the country's average (see Figure 6.2).

³²Shamsuddoha and Chowdhury, above n 26.

³³Bangladesh Bureau of Statistics, Ministry of Planning, *Population and Housing Census: Socio-economic and Demographic Report 2011, National Series, vol 4* (December 2012) 23-24. Details of numbers of coastal population in different coastal districts are: Bagerhat 1,476,090; Barguna 892,781; Barisal 2,324,310; Bhola 1,776,795; Chandpur 2,416,018; Chittagong 7,616,352; Cox's Bazar 2,289,990; Feni 1,437,371; Gopalganj 1,172,415; Jessore 2,764,547; Jhalkati 682,669; Khulna 2,318,527; Lakshmipur 1,729,188; Narail 721,668; Noakhali 3,108,083; Patuakhali 1,535,854; Pirojpur 1,113,257; Satkhira 1,985,959 and Shariatpur 1,155,824.

³⁴Ibid 23. According to the 2011 population census, the total population of Bangladesh is 139 million.

³⁵Ibid 23-24. Details of numbers of coastal households in different coastal districts are: Bagerhat 348,200; Barguna 214,594; Barisal 508,586; Bhola 370,560; Chandpur 501,332; Chittagong 1,502,347; Cox's Bazar 410,474; Feni 274,198; Gopalganj 248,424; Jessore 652,878; Jhalkati 157,231; Khulna 538,801; Lakshmipur 363,496; Narail 161,961; Noakhali 581,946; Patuakhali 343,963; Pirojpur 254,421; Satkhira 467,486 and Shariatpur 245,816.

³⁶Mesbah Kamal et al, 'Resource Use by Indigenous Community in the Coastal Zone' (2001) 5.

³⁷Bernhard G Gunter, Atiq Rahman and A F M Aatur Rahman, 'How Vulnerable are Bangladesh's Indigenous People to Climate Change?' (Bangladesh Development Research Working Paper Series 1, April 2008) 2.

³⁸Kamal et al, above n 36, 8.

³⁹Sarwar, above n 8.

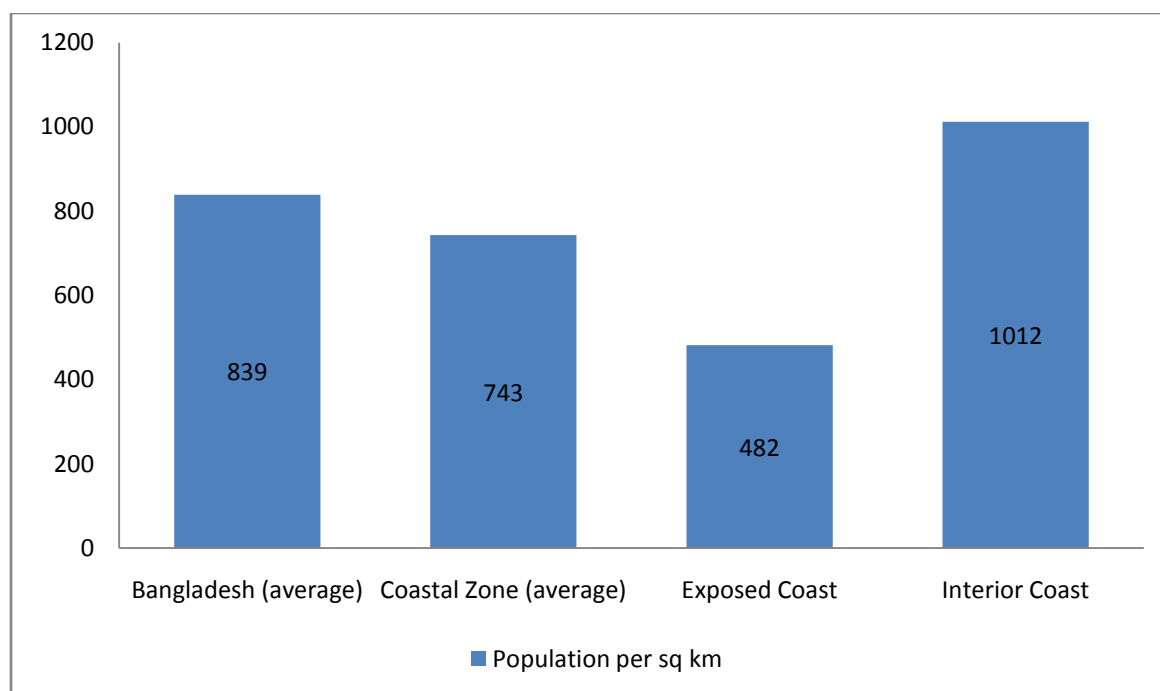


Figure 6.2: Population Density in the Coastal Zone of Bangladesh

Source: Sarwar⁴⁰

The population growth rate in the zone is also higher than the national average.⁴¹ The average population growth rate was 1.29 from 1991 to 2001. The coastal population is estimated to reach 44 million by 2020 (see Table 6.1). Rapid population growth has already pushed many people to the margin of survival in the zone, and it will create further strain on coastal systems and resources. Climate change and sea-level rises will then be a threat to a much higher number of people.⁴² The IPCC estimates that more than 30 million people living along the Bangladesh coastline could become refugees in the coming decades as a result of sea-level rises.⁴³ The cyclones of 1985, 1988 and 1991 caused deaths of 11,069, 5,708 and 138,000 people, respectively,⁴⁴ and the situation may become worse in the future. At present, 13 per cent of the areas of the south-western coastal districts (Bagerhat, Khulna and Sathkhira) are facing a salinity

⁴⁰Ibid 9, 8.

⁴¹Shamsuddoha and Chowdhury, above n 26, 6.

⁴²Ahmad et al, above n 16, 24.

⁴³Shahiduzzaman Khan, *Climate Change and its Effects on Bangladesh*, The Financial Express <<http://www.thefinancialexpress-bd.com/2009/09/27/79891.html>>

⁴⁴Anwar Ali, 'Climate Change Impacts and Adaptation Assessment in Bangladesh' (1999) 12(2-3) *Climate research* 109, 111.

problem because of sea-level rises. This is predicted to increase by 16 per cent in 2050 and 18 per cent in 2100.⁴⁵

Table 6.1: Population Growth Trend in the Coastal Zone

Year	Population (Million)			Urban Population (%)
	Coastal Rural	Coastal Urban	Total	
2001	27	8	35	23
2010	25	14	39	36
2020	22	22	44	50

Source: Shamsuddoha and Chowdhury⁴⁶

As mentioned by Ahmad et al, the coastal population is closely tied to the resources that land and water provide, either directly (e.g. fishing, agriculture and forestry) or indirectly (e.g. processing coastal fish, shrimp and timber).⁴⁷ The livelihoods of the coastal population are more diversified than in the rest of the country. The major livelihood groups of the rural coastal zone (as listed in Table 6.2) are farm labour (25.5 per cent), small farmer (25.2 per cent), medium and large farmers (6.7 per cent), fisher (7.5 per cent), salt farmer (0.6 per cent), shrimp fry collector (2.7 per cent) and forest resources collector (1.7 per cent).⁴⁸ According to Islam and Ahmad,⁴⁹ the pattern of household distribution in the coastal zone is also slightly different from the rest of the country. For example, the proportion of non-farm households is lower, and that of small farmers is higher. Some of the livelihoods are specific to the zone and are often influenced by different coastal conditions.⁵⁰ People work according to the seasonal moods of the coast, which include monsoon floods and rains, dry-season salinity and the seasonal threat of cyclones.⁵¹

⁴⁵Climate Frontlines, A Global Forum for Indigenous Peoples, Small Islands and Vulnerable Communities, *Impacts of Climate Change in Bangladesh* (27 August 2009) <<http://www.climatefrontlines.org/en-GB/node/426>>.

⁴⁶Shamsuddoha and Chowdhury, above n 26, 6.

⁴⁷Ahmad et al, above n 16, 24.

⁴⁸Islam and Ahmad, above n 35, 5.

⁴⁹Ibid 4.

⁵⁰Ibid.

⁵¹Ahmad et al, above n 16, 24.

Table 6.2: Major Livelihood Groups

Livelihood Group	Estimated Number of Households (2001) ⁵²	Percentage
Rural	5,254,000	76.7
Farm Labour	1,744,000	25.5
Small Farmer	1,724,000	25.2
Medium and Large Farmers	462,000	6.7
Fisher	514,000	7.5
Salt Farmer	38,000	0.6
Shrimp Fry Collector	185,000	2.7
Forest Resources Collector	119,000	1.7
Other Rural	809,000	11.8
Urban	1,596,000	23.3
Poor	798,000	11.7
Non-poor	798,000	11.7
Total	6,850,000	100.0

Source: Islam and Ahmed⁵³

The two main urban centres in the coastal zone of Bangladesh are Khulna and Chittagong, where most of the coastal industries are located.⁵⁴ The urban poor are thought to comprise 50 per cent of the total urban population⁵⁵ of the coastal zone (see Table 6.2). In a rural coastal setting, households consider land the most important natural asset.⁵⁶ However, land is scarce all over the country, and it is even scarcer in the coastal zone. The per capita availability of homestead land in this zone is 0.004 ha.⁵⁷ This estimate is lower than outside the coastal zone, where per capita homestead land availability is 0.005 ha.⁵⁸ The situation is worst in the case of distribution and ownership of cultivable land, gross cropped areas and net cultivable areas. Householders in rural settings who own less than half an acre or 50 decimal of land are considered functionally landless.⁵⁹ Around 53.4 per cent of coastal households are functionally landless; they own only

⁵² Estimates are based on the 1996 Census of Agriculture and 2001 Population Census.

⁵³ Islam and Ahmad, above n 35, 5.

⁵⁴ There are various types of industries in these coastal areas; major types include jute, pulp and paper, textiles, fertiliser, rubber and plastic, tannery, food and beverages, sugar, pharmaceuticals, tobacco, distilleries and ship-breaking.

⁵⁵ Islam and Ahmad, above n 35, 5.

⁵⁶ Shamsuddoha and Chowdhury, above n 26.

⁵⁷ Ibid.

⁵⁸ Ibid.

⁵⁹ Ibid.

(0.0+4.7+4.6+10.2=) 19.5 per cent of land (see grey shading in Table 6.3). The average landlessness of the indigenous population in the zone is 20.25 per cent.⁶⁰

Table 6.3: Distribution of Land Ownership in the Coastal Areas

Area (Acre/Decimal) [1Acre= 100Deci]	%of households	Amount %	Remarks
Noland	0.2	0.0	53.4%are functionally landless
NoAgri Land	21.3	4.7	
AgriLand ≤0.05 Deci	8.0	4.6	
5–49 Deci	23.9	10.2	
50–99 Deci	13.8	10.0	
100–149 Deci	9.6	10.7	
150–249 Deci	10.5	16.2	
250–749 Deci	11.1	33.1	
750Gi Deci	1.6	13.5	
Total	100.0	100.0	

Source: Shamsuddoha and Chowdhury⁶¹

Different survey data show that the living standard, average life expectancy, per capita farming land, access to education, health and other basic services, and social security in the zone are not at the expected level compared to the national average.⁶² The government has already identified the zone as an agro-ecologically disadvantaged region, and as one of the three neglected regions of the country.⁶³ In addition, increasing trends of climate change-related vulnerabilities and natural disasters are gradually making people's lives more helpless. According to Shamsuddoha and Choudhury, there is close proximity between the livelihoods of coastal people and such vulnerabilities.⁶⁴ Although the effects of climate change are common for everyone, coping with them is quite different among various classes of people. This is because the coping capacity is a function of the asset base (both ownership and access).⁶⁵ Poor people are more vulnerable because their asset base is weak and scanty. Most alarmingly, the number of poor, marginal and non-farm households is increasing in the zone.⁶⁶ A recent report of the Climate Change

⁶⁰ Gunter, Rahman and Rahman, above n 37, 7.

⁶¹ Shamsuddoha and Chowdhury, above n 26.

⁶² Ibid 7.

⁶³ Ministry of Water Resources, above n **Error! Bookmark not defined..**

⁶⁴ Shamsuddoha and Chowdhury, above n 26, 7.

⁶⁵ Ibid 7.

⁶⁶ Ibid 6.

Cell⁶⁷ points out that the poorest people are hit earliest and hardest by the effects of climate change. The changing climate not only affects agriculture, forestry and fisheries in the zone, but it also warrants attention regarding a range of other socio-economic effects, including population migration, changes in settlement patterns and health issues.⁶⁸ Apart from climate change effects, the zone is lagging behind other parts of the country in socio-economic developments.⁶⁹ Therefore, the zone requires a unique policy in order to realise the untapped development potential and to sustain the effects of climate change.

VI.III The Evolution of ICZM in Bangladesh

In examining possible mitigation and adaptation responses to climate change in the coastal management of Bangladesh, it is important to understand the underlying framework for ICZM in the country. Bangladesh's endorsement of ICZM, under the aegis of the UNEP-sponsored South Asian Regional Seas Programme,⁷⁰ is a follow-up of international developments after the UNCED in 1992. Section III.VI details the international regime of ICZM. However, ICZM in Bangladesh is a belated phenomenon compared with international developments. The country has mostly followed the diktat of its donors in instituting the program. As a result, initiatives mostly came from external agents rather than from the evolution of ICZM in Bangladesh. Even so, the process has a history of its own, marked by certain landmark events.⁷¹ According to Azad:

Such events and developments made the policy makers aware about the coastal problems not only in terms of hazards and disasters, but also about people's vulnerability in terms of their livelihood, isolation of the area, extreme unequal distribution of assets, and non-accessibility to local resources.⁷²

The next few sections explore the different approaches taken by the country's policy-makers for coastal management to date.

⁶⁷Climate Change Cell, 'Climate Change and Bangladesh' (2007) <<http://www.climatechange.org.bd/publications/13ccbd.pdf>> 3.

⁶⁸Ahmad et al, above n 16,24.

⁶⁹Ministry of Water Resources, above n 1.

⁷⁰Abul Kalam Azad, 'Integrated Coastal Zone Management: A Case for People's Management' (BISS Papers No 20, Bangladesh Institute of International and Strategic Studies, December 2003) 66.

⁷¹Ibid 67.

⁷²Ibid 65.

VI.III.A Reactive Approach for a Disaster-prone Area

In Bangladesh, development challenges are formidable for all parts of the country. However, the coastal zone was a long-neglected area in the government's development policies. It used to be termed interchangeably as a 'disaster-prone area', 'risk zone' or 'high-risk zone'.⁷³ Due to the area's vulnerability, the focus on the area was mainly reactive in nature. According to Azad, 'there was a rush to the affected zones immediately after the havoc with aid and assistance from the donors for rehabilitating the local masses, supplying them with food and clothes etc'.⁷⁴

VI.III.B Construction Approach to Protect the Area

The catastrophic cyclone and tidal surge of 1970 (during erstwhile East Pakistan) claimed the lives of nearly 150,000 people.⁷⁵ This event created a fresh dent in the minds of policy planners, who adopted a construction approach⁷⁶ to protect the coast from such natural hazards. Around 4,800 km of embankment was constructed under the Coastal Embankment Project (CEP), which was mostly funded by external donors.⁷⁷ An estimated amount of US\$72 million of grant assistance and US\$700 million of loans has been invested in various construction initiatives for the zone since the liberation of the country in 1971.⁷⁸ The construction approach is sectoral in nature and based on mono-agency,⁷⁹ as most of the works are done by the Bangladesh Water Development Board (BWDB).⁸⁰ For a long time, the problem of coastal areas was conceived as one of physical protection, and efforts concentrated on the construction of embankments and cyclone shelters only. The CEP was the single most dominant program in the coastal zone until the late 1970s.⁸¹ Until the 1990s, few governmental efforts addressed other problems of the zone,

⁷³Ibid 67.

⁷⁴Ibid 67.

⁷⁵Ibid 67.

⁷⁶DFID, 'Integrated Coastal Zone Management in Bangladesh: A Policy Review, Livelihood-Policy Relationships in South Asia' (Working Paper No 6, The UK Department for International Development) 4.

⁷⁷ Azad, above n 70, 68.

⁷⁸ Ibid 70, 68.

⁷⁹ DFID, above n 76, 5.

⁸⁰Ziaur Rahman, *Integrated Coastal Zone Management Capacity in Bangladesh* (Master of Defence Studies Thesis, National University of Bangladesh, 2006) R 1.

⁸¹ Ibid 76, 4.

such as people's vulnerability in terms of maintaining their livelihoods, the extremely unequal distribution of assets (such as land) and access to fishery resources.⁸²

VI.III.C Integrated Approach for a Unique Area

Beginning from the mid 1980s and in its aftermath, the country's policy-makers began to recognise the wider importance of many coastal issues, as well as the necessity of integrating them into the process of national development. This mostly happened with directions from donors that financed the country's development projects.⁸³ The Economic and Social Commission for Asia and Pacific (ESCAP) took the first initiative to formulate a coastal management policy in Bangladesh. It produced a report entitled 'Coastal Environmental Management Plan for Bangladesh (CEMPBD)' in 1988. This report emphasised the need to integrate coastal socio-economic and environmental issues.⁸⁴ Therefore, CEMPBD was a landmark event for an integrated approach to coastal zone management. Other attempts to introduce area-specific approaches in the coastal zone were: the Off-Shore Islands Development Board (1977–1982), the Bangladesh National Conservation Strategy (1987), the UN/ESCAP-GoB Coastal Environment Management Plan for Bangladesh (1987), the Coastal Area Resources Development Plan (1988), the formation and activities of the Special Parliamentary Committee on Coastal Area Development (1988–1990) and national capacity-building on the ICZM initiative (1997).⁸⁵

A new approach to undertaking coastal management began to take shape, and a broader perspective towards coastal development appeared to attract the policy planners.⁸⁶ Over the past decade, management objectives for the coastal zone have moved beyond the prescriptive use of plans, laws and administrative modalities, which emphasised a sectoral approach.⁸⁷ They have moved towards a more unified approach that addresses the coastal system as a whole. In 1999, the World Bank involved the Netherlands government and the World Food Programme in a

⁸² Ibid 76, 3.

⁸³ Azad, above n 70, 68.

⁸⁴ DFID, above n 76, 5.

⁸⁵ Ministry of Water Resources, above n **Error! Bookmark not defined.**, 2.

⁸⁶ Azad, above n 70, 68.

⁸⁷ DFID, above n 76, 7.

mission to move the ICZM in Bangladesh forward. A Programme Development Office—ICZM Planning (PDO-ICZMP)—was established in 2000 to prepare a framework for ICZM in the country.⁸⁸ ICZM makes all aspects of coastal management more structured into the development process. The aim of this thoroughly integrated approach is to reflect the needs and interests of all stakeholders, as well as the zone's special challenges.⁸⁹

VI.IV Conceptualising the First Generation of ICZM in Bangladesh

ICZM in Bangladesh is in its first generation, as mentioned in Section III.V. The process started with the approval of a government Policy Note on ICZM entitled 'Integrated Coastal Zone Management: Concept and Issues' in September 1999.⁹⁰ This Policy Note mentions the first four stages⁹¹ of a policy cycle of ICZM, but not the last one (evaluation).⁹² Below is a brief outline of the first four stages of the policy cycle of ICZM in Bangladesh.

1. **Issue Identification:** It was difficult to reach consensus on the issues that the ICZM program would address in Bangladesh, and to set them as its goals or objectives. However, the finalised issues are the reduction of poverty, development of sustainable livelihoods and integration of the coastal zone into national processes.⁹³ They have been set as the goals of ICZM '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'.⁹⁴ This means that ICZM in Bangladesh follows a people-centred⁹⁵ approach rather than an ecosystem approach. The ecosystem approach

⁸⁸Rahman, above n 80, 14.

⁸⁹Anjan Datta, Dirk Frans and John Soussan, 'Coastal Zone Policies and Livelihoods in Bangladesh' in *Water and Poverty: The Realities Experienced from the Field* (Asian Development Bank, 2004) 23, 29.

⁹⁰Ministry of Water Resources, Government of the People's Republic of Bangladesh, 'Investment and Financing Strategy for Coastal Zone Development in Bangladesh' (Working Paper No WP037, Programme Development Office, Integrated Coastal Zone Management Plan Project, April 2005) 4.

⁹¹Ministry of Water Resources, Government of the People's Republic of Bangladesh, 'Integrated Coastal Zone Management: Concept and Issues' (Policy Note of Government of Bangladesh, 22 September 1999) 19.

⁹² See Section III.V for the policy cycle of ICZM.

⁹³Ministry of Water Resources, above n 1, 3.

⁹⁴ Ibid.

⁹⁵Water Resources Planning Organization, Government of the People's Republic of Bangladesh, 'Previous Initiatives and Base Conceptual Documents' (Working Paper No WP001, Program Development Office-Integrated Coastal Zone Management, May 2002)1.

considers entire ecosystems, including humans,⁹⁶ whereas ICZM in Bangladesh primarily focuses on humans. Thus, its goal is to create the context within which the people and communities of the coastal zone can sustain and improve their livelihoods. However, addressing climate change is not a goal, despite its significant effects on the zone.

2. **Program Preparation:** This stage was formulated through a process of multi-level consultation with sectoral line ministries and departments, local government agencies, and a cross-section of stakeholders at the district and upazila levels over a period of two years.⁹⁷ The *Coastal Zone Policy* was then finalised at the cabinet meeting on 17 January 2005. This document provides a framework for the integrated management and development of coastal resources.⁹⁸ It sets eight development objectives based on the issues identified in stage 1 of the policy cycle. Section IV.V evaluates the extent to which the *Coastal Zone Policy* reflects the climate-development integrated approach.
3. **Formal Adoption and Funding:** A *Coastal Development Strategy* was adopted to implement the *Coastal Zone Policy* in 2006. The Inter-Ministerial Steering Committee on ICZMP approved it on 13 February 2006.⁹⁹ This document describes approaches for the realistic translation of policies into concrete actions. The eight development objectives described in the *Coastal Zone Policy* have been translated into nine strategic priorities here. Section VI.VI evaluates the extent to which the document reflects the climate-development integrated approach. The *Coastal Development Strategy* narrates four sources of financing investments for coastal development: (a) public-sector investments; (b) assistance from multilateral institutions and donors; (c) direct foreign investment; and (d) investments by private-sector entrepreneurs.¹⁰⁰ The government is already involved in regular investments in the coastal zone, and donor agencies are providing financial and technical assistance to a series of coastal development projects.¹⁰¹ NGOs also make a significant contribution to the financing needs for small-scale investments. The *Coastal Development Strategy* proposed the creation of two special funding facilities: (a) Coastal

⁹⁶West Coast Ecosystem-based Managemnet Network, *Community-Based Management of Coastal Ecosystems: Highlights and Lessons of Success from the West Coast Ecosystem-Based Management Network* (May 2010) <http://www.westcoastebm.org/WestCoastEBMNetwork_EBMGuide_June2010.pdf> 2.

⁹⁷Ministry of Water Resources, above n 90, 4.

⁹⁸ Ibid 3.

⁹⁹Ministry of Water Resources, above n **Error! Bookmark not defined..**

¹⁰⁰ Ibid 34.

¹⁰¹ Ibid.

Environment and Development Facility; and (b) Coastal Disaster Preparedness and Emergency Mitigation Fund (CDPEMF).¹⁰² The first one is for the long-term development of the zone to tackle the problems of erosions, cyclones, salinity and climate change by undertaking protective measures and ensuring the sustainable development of natural resources. The second one is different from a relief effort, which is necessary during cyclones, floods and storm surges in order to provide short-term safety to the victims of natural disasters. The objective of the CDPEMF fund is to establish permanent shelters for victims and comprehensive rehabilitation programs for erosion victims, and to construct embankments and dykes.¹⁰³ Neither of these funding facilities has been created to date.

4. **Implementation:** The *Coastal Development Strategy* is the main mechanism for implementing the *Coastal Zone Policy*. Each of the nine strategic priorities set in the *Coastal Development Strategy* is translated into 2–5 investment projects and packaged in a Priority Investment Programme (PIP).¹⁰⁴ Section VI.V details these investment projects and evaluates the extent to which they reflect the climate-development integrated approach. The combined *Coastal Development Strategy* and PIP are called ‘the plan’, which is translated into a program with three activities: (a) implementation of the PIP; (b) implementation of the District Development Plans; and (c) support to the Programme Coordination Unit (PCU).¹⁰⁵ As mentioned in Section III.IV, the PCU liaises with the service ministries of the government. The ‘support to PCU’ component was elaborated in a preliminary project entitled ‘Institutionalisation and Operationalisation of ICZM Approaches’ for the period 2006–2010.¹⁰⁶ The implementation of the CDS started in January 2006 with the establishment and operationalisation of the PCU. However, the District Development Plans must be formulated for two districts: Bhola and Cox’s Bazar. Primarily, the government’s decision is to pilot ICZM in these two districts only.¹⁰⁷ This means that ICZM does not yet cover all 19 coastal districts in the country.

¹⁰² Ibid 79.

¹⁰³ Ibid.

¹⁰⁴ Ibid ii.

¹⁰⁵ Ibid.

¹⁰⁶ Ibid.

¹⁰⁷ Ibid.

VI.V Climate-development Integrated Approach and the Coastal Zone Policy 2005

The *Coastal Zone Policy* was formulated by the government of Bangladesh to provide general guidance to all those concerned with the management and development of the coastal zone. It aims to enable coastal people to pursue their lives and livelihoods within a secure and conducive environment.¹⁰⁸ This document is unique because it is a harmonised policy that transcends sectoral perspectives. It initiates a process that commits different ministries, departments and agencies to agree to harmonise and coordinate their activities in the coastal zone, and it elaborates the basis for a firm coordination mechanism. It sets the goal of ICZM and finalises eight development objectives: (i) economic growth; (ii) basic needs and opportunities for livelihoods; (iii) reduction of vulnerabilities; (iv) sustainable management of natural resources; (v) equitable distribution; (vi) empowerment of communities; (vii) women's development and gender equity; and (viii) conservation and enhancement of critical ecosystems.¹⁰⁹

Addressing climate change is neither a goal nor one of the eight development objectives. However, Section II.II shows the intractable connection between climate change and development. It explains how 'the impact of climate change can hamper developmental efforts in key sectors, such as poverty reduction, agriculture, and health'.¹¹⁰ Kok et al state that any development efforts will be seriously hampered by the risks of climate change.¹¹¹ The goal and development objectives of ICZM may be jeopardised if climate change is not properly addressed and integrated into Bangladesh's coastal development policy. This thesis argues for a better inclusion of the climate-development integrated approach in the ICZM. Section III.XVII narrates the relevance of the climate-development integrated approach for coastal management, and Section II.VIII explores the relevance of this approach to Bangladesh.

Although climate change is not directly addressed as the goal or objective of ICZM in Bangladesh, two of the eight development objectives of the *Coastal Zone Policy* have taken the issue into account. These are: (a) the reduction of vulnerabilities; and (b) the conservation and

¹⁰⁸Ministry of Water Resources, above n 1, 3.

¹⁰⁹ Ibid.

¹¹⁰The Climate and Development Knowledge Network, *Climate and Development Research Review: Synthesis Report* (2012) 6.

¹¹¹Kok et al, above n .

enhancement of critical ecosystems. Under the first objective, the government admits that the majority of households in the coastal zone are vulnerable to climate change.¹¹² The second objective narrates the government's policy to address climate change while conserving and enhancing the critical ecosystems of the coastal zone.¹¹³ As the issue has been identified and the causal links have been elaborated for two of the development objectives, the *Coastal Zone Policy* is given a score of 2 under the first two categories of the policy analysis methodology (see Table 6.4). The next two categories of this methodology are responses and process, which are discussed below.

The response options of climate change are described in Sections III.IX and III.X, which narrate the adaptation and mitigation options for coastal management, respectively. Sections 4.3 and 4.8.3 of the *Coastal Zone Policy* note the response options for reducing vulnerabilities and for conserving and enhancing critical ecosystems from climate change in the coastal zone. All of the response options mentioned in this policy are adaptive in nature. Section III.IX in this thesis mentions three types of adaptive measures for coastal management: planned retreat, accommodation and protection.¹¹⁴ Sections 4.3.f and 4.8.3.c of the *Coastal Zone Policy* focus on the last adaptive measure—more specifically, on the hard or static structure option. These sections emphasise maintaining sea-dykes regularly as a first line of defence against storm surges¹¹⁵ and predicted sea-level rises.¹¹⁶ However, Section III.IX.C in this thesis identifies other hard-structure options in addition to sea-dykes—for example, seawalls, groins, breakwaters and salt-water intrusion barriers. The policy is also silent about soft or dynamic structures such as sand nourishment, dune building and wetland restoration or creation. The combination of both hard and soft protection measures is necessary; as mentioned in Chapter III, there is no single or generic best solution¹¹⁷ for protecting the coast from sea-level rises and other effects of climate change.

¹¹²Ministry of Water Resources, above n 1, sec 4.3.

¹¹³Ibid sec 4.8.3.

¹¹⁴ See Sections III.IX.A–III.IX.C for details of planned retreat, accommodation and protection.

¹¹⁵Ministry of Water Resources, above n 1, sec 4.3.f.

¹¹⁶ Ibid sec 4.8.3.c.

¹¹⁷Job Dronkers et al, *Strategies for Adaptation to Sea Level Rise*, Report of the Coastal Zone Management Subgroup (1990) 1.

Several sections of the *Coastal Zone Policy* highlight the second adaptive option, which is accommodation. Some examples includes: safety measures by combining cyclone shelters, multi-purpose embankments, road systems and a disaster warning system (Section 4.3.e); effective measures to enhance the coping capacity of the poor during the period of disaster (Section 4.3.c); initiation of an insurance scheme for improving poor people's social security (Section 4.3.c); safety of livestock during the disaster and post-disaster period (Section 4.3.h); integration of a Comprehensive Disaster Management (CDM) Plan on aspects concerning the coastal zone (Section 4.3.b); small water reservoirs to capture tidal water in order to enhance minor irrigation in coastal areas (Section 4.4.b); rainwater harvesting and conservation (Section 4.4.c); and development of salt-tolerant crop varieties (Section 4.4.5.d). The policy does not mention the first adaptive option (planned retreat), stating that '...[i]mplementation of adaptive measures identified in relation to climate change for coastal zone and resources shall be gradually undertaken'.¹¹⁸

Further, the policy does not mention the mitigation option of climate change. Chapter III elaborates the concept of payments to conserve blue carbon or carbon captured by coastal ecosystems such as mangroves, sea-grasses and intertidal marshes. Section III.XI states that halting the degradation of green and blue carbon and binding ecosystems together would represent an emission reduction equivalent to 1–2 times that of the entire global transport sector, or at least 25 per cent of the total global carbon emission reductions needed, with additional benefits for biodiversity, food security and livelihoods.¹¹⁹ Conserving and enhancing the critical ecosystems of the coastal zone is one of the eight development objectives of the *Coastal Zone Policy*. Bangladesh can contribute to the mitigation of climate change by conserving and enhancing mangroves, sea-grasses and intertidal marshes in the coastal area. However, Section 4.4.4.b of the *Coastal Zone Policy* encourages sea-grass exploitation, which is contrary to the concept. Apart from that section, several other sections in the policy actually promote the conservation of coastal ecosystems. Section 4.8 suggests taking necessary measures to conserve and develop mangroves and sea-grass beds, along with other critical ecosystems identified by the

¹¹⁸Ministry of Water Resources, above n 1, sec 4.8.3.c.

¹¹⁹Christain Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Carbon* (2009) 19.

Bangladesh National Conservation Strategy.¹²⁰ Other sections that are relevant to this issue are: conservation and development of the natural environment of Sundarban (Section 4.8.b); afforestation in coastal areas, including newly accreted lands (Sections 4.3.f and 4.4.7); conservation of forests (Section 4.4.7); and social forestry (Section 4.4.7). Although mitigation is not the primary objective of these sections, they ultimately contribute to conserving and enhancing the blue carbon sinks in the coastal area. The policy also states that the government will honour all commitments as signatory to the relevant international protocols and guidelines,¹²¹ and it will harmonise the provisions of different national laws and enact new laws (if required) to protect and preserve the coastal ecosystems.¹²² This means that Bangladesh can explore the blue carbon response options under the UNFCCC,¹²³ the Kyoto Protocol,¹²⁴ the national LULUCF,¹²⁵ the CDM,¹²⁶ REDD+¹²⁷ and the NAMA,¹²⁸ as mentioned in Chapter III, which details how Bangladesh can adopt blue carbon response options through these mechanisms.

Based on the aforementioned discussion, the *Coastal Zone Policy* has been scored 2 and 1 under the responses and process categories, respectively (see Table 6.4), giving the document a total score of 7. Section I.VII.B.2 narrates the interpretation of different scores in this thesis. According to this interpretation, a score of 7 means that the policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

Table 6.4: Average Score of the *Coastal Zone Policy*

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>Coastal Zone Policy 2005</i>	2	2	2	1	7

¹²⁰See Section IV.VII for the evaluation of the *Bangladesh National Conservation Strategy*.

¹²¹Ministry of Water Resources, sec 4.8.1.f.

¹²²Ibid sec 4.8.1.g.

¹²³ See Section III.XIII.

¹²⁴ See Section III.XIII.A.

¹²⁵ See Section III.XIII.A.1.

¹²⁶ See Section III.XIII.A.2.

¹²⁷ See Section III.XIII.B.1.

¹²⁸ See Section III.XIII.B.2.

VI.VI Climate-development Integrated Approach and the Coastal Development Strategy 2006

The *Coastal Development Strategy* focuses on the implementation of the *Coastal Zone Policy*. In this sense, it is the link between the policy and concrete interventions.¹²⁹ However, the document does not provide one overall framework or recipe for all development actions in the coastal zone.¹³⁰ As mentioned in the document, '[i]t describes about building a process to implement policies, not preparing a classic master plan'.¹³¹ It fixes priorities and targets based on the *Coastal Zone Policy*'s objectives. By following this selective approach, the document aims to be complementary to the ongoing but often fragmented activities of many government agencies, NGOs and development partners.¹³² The objectives of the *Coastal Development Strategy* are:

[T]o select strategic priorities and actions in implementation of the *Coastal Zone Policy* with emphasis on the creation of the institutional environment that will enable government of Bangladesh to embark on a continuous and structured process of prioritisation, development and implementation of concerted interventions for the development of the coastal zone.¹³³

With this aim, the document goes beyond the traditional one-shot approach and facilitates a continuing planning process for government and development partners. Thus, the *Coastal Development Strategy* is an evolving document that is intended to be revised at least once every five years in order to adapt to changing problems and priorities.¹³⁴ Eight years have passed since the strategy started being implemented in January 2006. Climate change is a pressing concern for the development projects of Bangladesh, as shown in Section II.VIII, which states that nearly 40 per cent of ADP projects in the country need to be modified for possible climate change mitigation or adaptation options.¹³⁵ Therefore, it is time to revisit the strategic priorities of the *Coastal Development Strategy*.

¹²⁹Ministry of Water Resources, above n **Error! Bookmark not defined.**, i.

¹³⁰ Ibid.

¹³¹ Ibid 4.

¹³² Ibid.

¹³³ Ibid.

¹³⁴ Ibid.

¹³⁵ A K Enamul Haque, *An Assessment of Climate Change on ADP of Bangladesh* (15 November 2009) <http://www.ergonline.org/documents/25_11_09%20Climate%20Change%20EHq.pdf> 4.

The eight development objectives described in the *Coastal Zone Policy* in Section VI.V have been translated into nine strategic priorities in this document: (i) ensuring fresh and safe water availability; (ii) ensuring safety from man-made and natural hazards; (iii) optimising the use of coastal lands; (iv) promoting economic growth by emphasising non-farm rural employment; (v) sustainably managing natural resources and exploiting untapped and less-explored opportunities; (vi) improving the livelihood conditions of people, especially women; (vii) conserving the environment; (viii) empowering through knowledge management; and (ix) creating an enabling institutional environment.¹³⁶ The linkage between the *Coastal Zone Policy* objectives and the *Coastal Development Strategy* strategic priorities are shown in Table 6.5.

Table 6.5: Linkage between Development Objectives and Strategic Priorities

<i>Coastal Development Strategy</i> Strategic Priorities	CZP Objectives							
	Economic Growth	Basic Needs Opportunities for Livelihoods	Reduction of Vulnerabilities	Sustainable Management of Natural Resources	Equitable Distribution	Empowerment of Communities	Women's Development and Gender Equity	Conservation and Preservation of Critical Ecosystem
Ensuring fresh and safe water availability								
Safety from man-made and natural hazards								
Optimizing use of coastal lands								
Promoting economic growth emphasizing non-farm rural employment								
Sustainable management of natural resources								
Improving livelihood conditions of people; especially women								
Environmental conservation								
Empowerment through knowledge management								
Creating an enabling institutional environment								

Source: Ministry of Water Resources¹³⁷

¹³⁶ Ministry of Water Resources, above n **Error! Bookmark not defined.**, 4.

¹³⁷ Ibid 6.

Section VI.V mentions that two of the eight development objectives of the *Coastal Zone Policy* take climate change into account: (a) reducing vulnerabilities and (b) conserving and enhancing critical ecosystems. Table 6.4 indicates that the first development objective has been reflected in eight strategic priorities of the *Coastal Development Strategy*, and the second one has been reflected in six strategic priorities. Thus, five strategic priorities cover both development objectives of the policy: (a) ensuring safety from man-made and natural hazards; (b) optimising the use of coastal lands; (c) conserving the environment; (d) empowering through knowledge management; and (e) creating an enabling institutional environment. Three strategic priorities reflect only the objective of the reduction of vulnerabilities, and one reflects only the objective of the conservation and enhancement of critical ecosystems. Sections VI.V.A–VI.V.I evaluate the extent to which the nine strategic priorities take climate change into account. The order of the sections has been arranged as follows: first, the five strategies that deal with both development objectives; second, the three strategies that reflect the objective of the reduction of vulnerabilities; thirdly, the strategy that deals with only the objective of the conservation and enhancement of critical ecosystems.

VI.VI.A Safety from Man-made and Natural Hazards

Both the objectives of the reduction of vulnerabilities and the conservation and enhancement of critical ecosystems are reflected in this strategic priority. Two investment projects have been suggested under this strategy: (i) strengthening and rehabilitating sea-dykes; and (ii) reducing severe vulnerability in the coastal zone through multi-purpose cyclone shelters including coping mechanisms.¹³⁸ The first project focuses on the third adaptive measure of climate change (protection of the coast). Under this project, sea-dykes have been considered the first line of defence against storm surges and possible sea-level rises. The dykes do not cover the entire sea coast of the country. Therefore, the first project includes the construction of new sea-dykes if necessary, as well as a regular maintenance program and risk analysis of sea-dykes against the projected climate change scenario.¹³⁹ Like the *Coastal Zone Policy*, this strategy is silent about soft structure options and other hard structure options besides sea-dykes.

¹³⁸ Ibid 16.

¹³⁹ Ibid.

The next proposed project for this strategy mostly includes the second adaptive measure (accommodation). It covers the construction of cyclone shelters, connecting roads, design and development of a cyclone monitoring system, development of a database and an Interactive Information System (IIS), and public awareness and communication.¹⁴⁰

VI.VI.B Optimising Use of Coastal Lands

This strategic priority also covers both the objectives of the reduction of vulnerabilities and the conservation and enhancement of critical ecosystems. Land use in the coast is diverse; it is intensively used for agriculture, forests, shrimp farms, natural fisheries, salt production, industrial and infra-structural developments, settlements and tourism.¹⁴¹ The LULUCF has significant effects on the global carbon cycle. According to the special report of the IPCC,¹⁴² the LULUCF can add or remove CO₂ (or, more generally, carbon) from the atmosphere, thereby influencing climate. The UN Climate Change Secretariat defines it as '[a] greenhouse gas inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities'.¹⁴³ The Kyoto Protocol has particularly focused on the LULUCF as a climate issue. Articles 3.3 and 3.4 of the Kyoto Protocol, as mentioned in Section III.XIII.A, require countries to report on the changes in carbon stock and greenhouse gas emissions relating to LULUCF activities for each year of the commitment period.¹⁴⁴

Land-use changes in the coastal zone (e.g. conversion of mangrove forests into agricultural land or shrimp farms) can be a factor in CO₂ atmospheric concentration and is thus a contributor to climate change. Section III.XIII.A.1 narrates how Bangladesh can include its coastal carbon sinks (specially the mangroves) under the LULUCF. While dealing with the strategic priority of optimising the use of coastal lands, the *Coastal Development Strategy* has overlooked this issue.

¹⁴⁰ Ibid 17.

¹⁴¹ Ibid.

¹⁴² Robert T Watson et al (eds), *Land Use, Land-Use Change, and Forestry: A Special Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2000) 10.

¹⁴³ United Nations Framework Convention on Climate Change, *Glossary of Climate Change Acronyms* <http://unfccc.int/essential_background/glossary/items/3666.php#L>.

¹⁴⁴ Brian C Murray and Tibor Vegh, *Incorporating Blue Carbon as a Mitigation Action under the United Nations Framework Convention on Climate Change: Technical Issues to Address*, Nicholas Institute Report 12-04 (2012) 7.

However, three out of four investment projects suggested for this strategic priority may contribute to climate change mitigation and adaptation. The projects are: (i) development and settlement of accreted land; (ii) integrated management of coastal water infrastructures; (iii) coastal land zoning; and (iv) development of coastal agriculture in Bangladesh. The first program states that '[n]ewly accreted land in the form of mud shall be utilised for planting mangrove plants, the existing mangrove forests shall be managed through a participatory way, the degraded/depleted forests land shall be planted...' ¹⁴⁵ The third program recognises that coastal ecosystems are degrading because of diversified uses of coastal land, and it recommends coastal zoning. ¹⁴⁶ Both of these projects can enhance coastal carbon sinks and thus contribute to the climate change mitigation option. The fourth program promotes several adaptive measures, including the expansion of floating agriculture, the promotion and dissemination of a soil-less cultivation system, and management practice for producing crops in saline soil. ¹⁴⁷

VI.VI.C Environmental Conservation

Section III.XI details how coastal ecosystems—especially mangroves, tidal salt marshes and sea meadows—work as coastal carbon sinks or blue carbon sinks. Section III.XIII focuses on the emerging literature of blue carbon mechanism as a climate change mitigation option under the UNFCCC and the Kyoto Protocol. ¹⁴⁸ The *Coastal Development Strategy* has given special priority to conserving coastal ecosystems. It recommends harmonising the provisions of different existing laws and enacting new laws, where required, to protect and preserve coastal ecosystems. ¹⁴⁹ This strategic priority admits that mangroves in the coastal area are dwindling fast due to insufficient enforcement of conservation laws. Capacity-building and strengthening of the coast guard are required to enforce conservation laws and regulations. To date, the services of the coast guard have not been actively sought in coastal environment management. This strategic priority recommends a project entitled 'strengthening of coast guard for improvement of coastal safety and security, coordination with other law enforcing agencies'. ¹⁵⁰ Under this project,

¹⁴⁵Ministry of Water Resources, above n **Error! Bookmark not defined.**, 18.

¹⁴⁶ Ibid.

¹⁴⁷ Ibid 19.

¹⁴⁸ See Sections III.XIII.A and III.XIII.B for details.

¹⁴⁹Ministry of Water Resources, above n **Error! Bookmark not defined.**, 25.

¹⁵⁰ Ibid 25.

critical ecosystems are identified for the enforcement of conservation laws and regulations by the coast guard on issues such as the sustainable harvesting of marine resources and forestry.¹⁵¹ All of these initiatives promote the conservation of coastal ecosystems. Although climate change mitigation is not the primary objective of this strategic priority under the *Coastal Development Strategy*, it ultimately promotes coastal carbon sinks.

The strategy also mentions that climate change adaptive measures for the coastal zone will be gradually undertaken, especially in relation to the NAPA.¹⁵² Like the ‘Safety from Man-made and Natural Hazards’ strategy,¹⁵³ this strategy also emphasises the continuous maintenance of sea-dykes along the coastline as a first line of defence against predicted sea-level rises.¹⁵⁴ However, there is scope for exploring other adaptive measures, as described in Chapter III, to protect the coast.

VI.VI.D Empowerment through Knowledge Management

Knowledge management is not a technology, but a concept.¹⁵⁵ Beijerse defines it as the process of achieving organisational goals through the strategy-driven motivation and facilitation of knowledge workers to develop, enhance and use their capability to interpret data and information through a process of giving meaning to the data and information.¹⁵⁶ There is a four-step process of knowledge management: gathering, organising, refining and disseminating. Angus and Patel explain that gathering is the bringing in of information and data into the system, while organising is the process of associating items to subjects, giving them context and making them easier to find.¹⁵⁷ Refining is the process of adding value by discovering relationships, abstracting and synthesis, whereas sharing refers to disseminating knowledge to the people who can use it.¹⁵⁸

¹⁵¹ Ibid.

¹⁵² Ibid.

¹⁵³ See Section IV.III.A for the ‘Safety from Man-made and Natural Hazards’ strategy.

¹⁵⁴ Ibid 25.

¹⁵⁵ Jeff Angus and Jeetu Patel, *Knowledge-Management Cosmology* InformationWeek <<http://www.informationweek.com/673/73olkn2.htm>>.

¹⁵⁶ Roelof P uit Beijerse, ‘Questions in Knowledge Management: Defining and Conceptualising a Phenomenon’ (1999) 3(2) *Journal of knowledge management* 94, 102.

¹⁵⁷ Angus and Patel, above n 155.

¹⁵⁸ ‘Climate Change Knowledge Management Strategy’ in *Knowledge Management & Capacity Development* (Ministry of Environment and Mineral Resources, Government of Kenya, 2012) .

Knowledge management and sharing are central to the climate-development integrated approach.¹⁵⁹ There is a necessity for reliable and accessible climate and development knowledge, particularly among decision-makers and those who influence policy processes.¹⁶⁰

In ICZM, knowledge production must be a shared experience between national-level policy-makers, scientists and coastal communities. Many of Bangladesh's coastal communities have generated a significant amount of information and experience in climate change adaptation. They have adopted community-based indigenous coping techniques, such as raising the plinths of their homes, making structural adjustments, developing specific forms of housing for long-term adaptation and developing floating gardens to grow vegetables.¹⁶¹ The resilience of a few coastal communities has been enhanced through indigenous knowledge of how to survive a cyclone (through actions taken before, during and after the cyclone).¹⁶² These knowledge products need to be organised, refined and disseminated among the coastal population at large. Moreover, climate change science is continuously being updated, and new information and knowledge products in the form of coping strategies are continuously being developed at the national, regional and global levels.¹⁶³ These knowledge products do not always find their way to the coastal communities in Bangladesh. Further, there is an absence of appropriate institutional architecture in the coastal zone for knowledge management. Most importantly, there is no national strategy on climate change knowledge management to date. With this backdrop, it is commendable that the *Coastal Development Strategy* has incorporated a strategic priority for the empowerment of coastal communities through knowledge management. However, the projects suggested under this strategy¹⁶⁴ are very general in nature and have no special reference to climate change knowledge management.

VI.VI.E Creating an Enabling Institutional Environment

¹⁵⁹ Climate & Development Knowledge Network, 'Knowledge Management and Stakeholder Engagement in Climate Change Adaptation' (Paper presented in UNFCCC NWP Workshop, Dae es Salam, Tanzania, 21-23 March 2013) 6.

¹⁶⁰ Ibid.

¹⁶¹ Asian Development Bank, 'People's Republic of Bangladesh: Climate Change Capacity Building and Knowledge Management' (Technical Assistance Report, Project No 45065, Capacity Development Technical Assistance, August 2011) 1.

¹⁶² Ibid 2.

¹⁶³ Ibid.

¹⁶⁴ See Ministry of Water Resources, above n **Error! Bookmark not defined.**, 26–27.

The institutionalisation of ICZM requires the development of mechanisms for coordination and interaction between and among the various parties involved at the national, regional and local levels.¹⁶⁵ This strategy recommends eight projects: (i) operationalisation of a PCU at the national level; (ii) operationalisation of an institutional and coordination mechanism; (iii) capacity-building and training; (iv) supporting initiatives by local government institutions, NGOs and media in coastal management; (v) empowerment of female members/commissioners of local government institutions of the coastal zone; (vi) establishment of Information Technology-supported model unions in sea-facing *upazilas*; (vii) promotion of coastal community services through the establishment of community radio; and (viii) capacity-building of local government institutes for integrated coastal resource management.¹⁶⁶ If addressing climate change is set as one of the goals of ICZM in Bangladesh, this institutional environment can contribute to better adoption of the climate-development integrated approach in ICZM.

VI.VI.F Ensuring Fresh and Safe Water Availability

This strategic priority reflects only the objective of the reduction of vulnerabilities. One cause of the reduced inflow of fresh water in the coastal zone is saline water intrusion because of sea-level rises. Like the *Coastal Zone Policy*, the *Coastal Development Strategy* recommends the second adaptive measures (accommodation) in this response. It asks for the development and promotion of small-scale alternatives to fresh water supply systems, such as rainwater harvesting and pond sand filter techniques.¹⁶⁷ The document suggests four investment projects in this regard: (i) strengthening sanitation and safe water supply programs in arsenic- and salinity-affected areas; (ii) ground-water management in the coastal zone of Bangladesh; (iii) integrated water resource management of the greater Noakhali; and (iv) integrated drainage improvement of the tidal-influenced southwest region of Bangladesh.¹⁶⁸ One of the goals of the first project is to

¹⁶⁵ Ibid 28.

¹⁶⁶ Ibid 28–30.

¹⁶⁷ Ibid 14.

¹⁶⁸ Ibid 14–15.

provide salinity-free water to the coastal people.¹⁶⁹ The second project also aims to control saline water intrusion, among other activities.¹⁷⁰

VI.VI.G Promoting Economic Growth Emphasising Non-farm Rural Employment

The objective of the reduction of vulnerabilities is also reflected in this strategic priority. The rural non-farm sector includes both farm-oriented and non-farm-oriented activities, encompassing rural manufacturing, transportation, trade and a range of services such as employment in tourism.¹⁷¹ This strategic priority suggests two projects: (i) enhancement of coastal livelihoods through enterprise development; and (ii) tourism development in the coastal zone for the improvement of livelihoods and poverty reduction.¹⁷² The first program suggests floating agriculture and windmills, among other initiatives. As mentioned in Section II.V.C, floating agriculture is a good adaptive measure in the coastal region and has been traditionally practiced in the southwest region of the coastal zone for more than two centuries. More than 20 different types of vegetables and five different types of spices can be cultivated in floating agriculture.¹⁷³ The windmill may contribute to climate change mitigation, as the greenhouse gas emissions are generally very low for this type of renewable energy system.¹⁷⁴

VI.VI.H Improving Livelihood Conditions of People

This strategic priority only reflects the objective of the reduction of vulnerabilities and not the conservation and enhancement of critical ecosystems. It proposes five projects: (i) enhancement of livelihoods in exposed coast areas; (ii) integrated development of remotely located islands; (iii) capacity-building of female fish processors in Cox's Bazar district; (iv) comprehensive rehabilitation program for erosion victims of the coastal zone of Bangladesh; and (v)

¹⁶⁹ Ibid 14.

¹⁷⁰ Ibid 15.

¹⁷¹ Ibid.

¹⁷² Ibid 20.

¹⁷³ Ibid 19.

¹⁷⁴ Ralph E H Sims and Schock Robert N, 'Energy Supply' in Bert Metz et al (eds), *Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 251, 296.

improvement of livestock services in the coastal zone.¹⁷⁵ Although this strategic priority does not mention its implications for climate change, recent literature explores the linkages between climate change and livelihoods. Livelihood is an idea that has been gaining increasing attention in recent years.¹⁷⁶ It is now seen as a key goal of climate change adaptation strategies. Research shows that climate-induced changes to resource flows can fundamentally affect the viability of the livelihoods of the poor.¹⁷⁷ Sea-level rises are predicted to displace millions of poor people in low-lying coastal areas and deltas such as southern Bangladesh.¹⁷⁸ In many cases, those who are displaced will have few opportunities to re-establish their lives, except in urban areas. However, livelihood opportunities in urban areas are more limited for those without skills and capital. Currently, 50 per cent of the urban population is poor, as shown in Table 6.2. Even where people are not physically displaced, rising sea levels will reduce the natural capital in ecosystems such as coastal fisheries, mangroves and wetlands, which are essential to the current livelihood patterns of coastal communities.¹⁷⁹

The emergence of the livelihood approach has led to new understanding of climate change adaptation strategies. This approach has developed from the integration of adaptation into the wider development process, which is termed ‘climate-resilient development’ in Section II.V.C. The key goals of climate-resilient development in coastal areas are to reduce vulnerability to climate-induced changes and to sustain and enhance the livelihoods of poor coastal people. This strategic priority of the *Coastal Development Strategy* can significantly contribute to climate change adaptation, but it must be addressed properly in its projects.

¹⁷⁵ See Ministry of Water Resources, above n **Error! Bookmark not defined.**, 23–24.

¹⁷⁶ The Task Force on Climate Change, ‘Vulnerable Communities and Adaptation, Livelihoods and Climate Change: Combining Disaster Risk Reduction, Natural Resource Management and Climate Change Adaptation in a New Approach to the Reduction of Vulnerability and Poverty’ (International Institute for Sustainable Development, International Union for Conservation of Nature and Natural Resources, and Stockholm Environment Institute, 2003) 8.

¹⁷⁷ Ibid.

¹⁷⁸ Ibid 14.

¹⁷⁹ Ibid 14.

VI.VI.I Sustainable Management of Natural Resources

This strategic priority reflects only the objective of the conservation and enhancement of critical ecosystems. The *Coastal Development Strategy* focuses on people's access to the sustainable use of coastal resources. However, it also takes into account that such access should not in any way adversely affect the coastal ecosystem. One of the projects recommended under this strategy is the introduction and expansion of solar, tidal and wind energy in the remote coastal areas of the country.¹⁸⁰ As mentioned in Section IV.V.G, these renewable energy systems contribute as mitigation options and promote low-emission development.

The above discussion on the strategic priorities of the *Coastal Development Strategy* proves that the document has identified and elaborated the specific concern relating to climate change and its effect on development. A few of the strategic priorities have explored the causal links between climate change and development very well, and they have suggested responses accordingly in the investment projects. However, some of the projects have failed to address their contribution to mitigation options, although it emerges as the co-benefit of the project. Several projects could explore more adaptive options. The complementarity or synergy between climate change adaptation and mitigation is also missing in some cases. The promotion of synergy between mitigation and adaptation in these projects could ensure sustainable development,¹⁸¹ as mitigation options could contribute to reducing the vulnerability of coastal ecosystems and the socio-economic aspects of coastal population. In contrast, integrating adaptation practices in some projects would maximise the utility of the investment flow and contribute to enhancing the institutional capacity to cope with risks associated with climate change.¹⁸² Chapter VIII will elaborate these issues in its recommendations. Overall, the *Coastal Development Strategy* receives a score of 8 (see Table 6.6), which means that the policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

¹⁸⁰Ministry of Water Resources, above n **Error! Bookmark not defined.**, 21.

¹⁸¹Gert Jan Nabuurs et al, 'Forestry' in Bert Metz et al (eds), *Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 541, 566.

¹⁸²*Ibid.*

Table 6.6: Average Score of the *Coastal Development Strategy*

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>Coastal Development Strategy 2006</i>	2	2	2	2	8

VI.VII Conclusion

Almost seven years have passed since ICZM underpinned the policy approaches in coastal planning in Bangladesh. The *Coastal Zone Policy* and the *Coastal Development Strategy* are still the two main documents for ICZM. They incorporate detailed development guidelines for coastal areas. Both documents identify climate change concerns; however, the understanding of climate-development integration is at the stage of a growing level of awareness (see the scores in Tables 6.4 and 6.6). According to the AR4, the extent to which climate change is considered in coastal management plans is a useful measure of the commitment to integration and sustainability.¹⁸³ There is room for better inclusion of the climate-development integration in these two documents. In fact, addressing climate change through ICZM requires an integration of policy responses involving both mitigation and adaptation in coastal development projects. Both documents incorporate several adaptive measures, although there is scope for exploring more measures. The documents are silent about climate change mitigation, but they have significant opportunities to conserve coastal carbon sinks. Responses to climate change must be integrated into the broader context and the wider objectives of ICZM. These issues must be reflected in the goals and objectives of ICZM in Bangladesh to ensure the internal consistency of the management program in terms of national policy and investment projects. A policy that reflects a climate-development integrated approach can even fight against the negative effects of climate change. A well-defined legal framework is also essential for policy implementation. Chapter VII will focus on the legislation and other policies that are relevant to coastal management, and it will evaluate the extent to which they reflect the climate-development integrated approach.

¹⁸³Nicholls et al, above n , 340.

Chapter VII. Climate-development Integrated Approach in Bangladesh's Coastal Management Legislation

VII.I Introduction

Legislation is a basic structure for ICZM deriving authority from, or founded on, law and established rules.¹ Section I.II.B examines the importance of legislation in sustaining coastal management. Chapter II narrates the influence of international law on ICZM to address climate change adaptation and mitigation in coastal areas. Chapter III conceptualises ICZM legislation and its purpose. Section V.IV discusses the domestic legal framework of ICZM in Bangladesh. There are numerous laws that are supportive or relevant to the coastal zone and its resources, but there is no ICZM legislation in the country. To date, two policy documents directly deal with ICZM in Bangladesh: the *Coastal Zone Policy* and the *Coastal Development Strategy*, which are discussed in Chapter IV. In the absence of ICZM legislation, the chapter mainly focuses on the supportive legal framework or other laws that deal with, or are relevant to, the coastal zone in Bangladesh. Section VII.V evaluates different sectoral policies of the government and laws that support ICZM in order to assess the extent to which the climate-development integrated approach is reflected in other sectoral laws and policies that are relevant to the coastal management of Bangladesh. This chapter assesses 13 sectoral policies and 39 statutes using the law and policy analysis methodology.² Thus, it addresses the last issue of this thesis, which is the extent of reflection of the climate-development integrated approach in other sectoral laws and policies relevant to Bangladesh's coastal management.

¹Eisma, Christie and Hershman, above n , 338.

² See Section I.VII.B.2 for details of the law and policy analysis methodology.

VII.II Influence of International Law on ICZM to Address Climate Change

A broad set of international legal tools influences ICZM,³ ranging from general environmental agreements to specific marine and coastal measures with a global or regional coverage.⁴ Examples include the Convention on Biological Diversity 1992,⁵ the United Nations Framework Convention on Climate Change 1992,⁶ the Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979⁷ and the Bern Convention on the Conservation of European Wildlife and Natural Habitats 1979. Section III.VI notes the issue briefly, and Table 3.1 shows the relevance of different international treaties to key ICZM issues. There is also growing attention on climate change measures for coastal management internationally. Coastal wetlands and coastal carbon sinks are considered important in coastal adaptation and mitigation policies because they offer natural sea defences and carbon sequesters. Chapter III details coastal adaptation and mitigation options to combat climate change effects through ICZM. There is a budding recognition of these options within other international legal frameworks in addition to the UNFCCC and Kyoto Protocol.

The COP of the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat⁸ adopted a resolution on 'Climate Change and Wetlands: Impacts, Adaptation and Mitigation'⁹ in 2002. An Ad Hoc Technical Expert Group on Biodiversity and Climate Change, under the Convention on Biological Diversity,¹⁰ has been examining the broad relationship between climate change and biodiversity. In 2010, the parties to this Convention repeatedly stressed the need to integrate marine and coastal biodiversity policies with climate-

³*Environment and Development in Coastal Regions and in Small Islands*, UNESCO <<http://www.unesco.org/csi/act/russia/legalpro5.htm>> above n 5.

⁴John Gibson, 'Integrated Coastal Zone Management Law in the European Union' (2003) 31(2) *Coastal Management* 127, 131.

⁵*Convention on Biological Diversity* (29 December 1993, adopted 5 June 1992).

⁶*United Nations Framework Convention on Climate Change*, UN Doc 1771 UNTS 107 (21 March 1994, adopted 4 June 1992).

⁷*Bonn Convention on the Conservation of Migratory Species of Wild Animals* (1 November 1983, adopted 23 June 1979).

⁸*Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (21 December 1975, adopted 2 February 1971).

⁹Conference of the Parties, *Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Climate Change and Wetlands: Impacts, Adaptation, and Mitigation- Resolution VIII.3 of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971) at its Eighth Session*, (8-26 November 2002).

¹⁰*Convention on Biological Diversity*, above n 5.

related policies.¹¹ Attention has also been paid to the issue under the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).¹² In a 2009 Report,¹³ the OSPAR Commission reviewed the national climate change adaptation and mitigation policies of its member states. It urged its members to integrate climate change response measures into ICZM and marine spatial planning.¹⁴ Further, in 2010, the UN General Assembly encouraged states to develop means of coastal adaptation and mitigation to climate change under the UN Convention on the Law of the Sea (UNCLOS)¹⁵ and other relevant international frameworks.¹⁶ The UNCLOS secretariat produced a general document on oceans and climate change.¹⁷ This document paid attention to the resilience of coastal ecosystems such as mangroves, salt marshes and sea-grasses.¹⁸ It also contributed to climate change mitigation as well as serving as coastal carbon sinks. Chapter III explores the existing and emerging international climate change mitigation framework under the UNFCCC,¹⁹ the Kyoto Protocol,²⁰ the national LULUCF,²¹ the CDM,²² REDD+²³ and the NAMA.²⁴ There are other examples of multilateral organisations in which similar developments are taking place, especially those dealing with regional seas.

¹¹Conference of the Parties, Convention on Biological Diversity, *Marine and Coastal Biodiversity- Decision X/29 of the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting* (18-29 October 2010); Conference of the Parties, Convention on Biological Diversity, *Biodiversity and Climate Change- Decision X/33 of the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting* (18-29 October 2010).

¹²*Convention for the Protection of the Marine Environment of the North-East Atlantic* (25 March 1998, adopted 22 September 1992).

¹³OSPAR Commission, 'Assessment of Climate Change Mitigation and Adaptation' (2009) <http://qsr2010.ospar.org/media/assessments/p00464_climate_change_mitigation_adaptation_final.pdf>.

¹⁴Ibid 27.

¹⁵*United Nations Convention on the Law of the Sea* (16 November 1994, adopted 10 December 1982).

¹⁶*Oceans and the Law of the Sea*, UN Doc GA Res 64/71, 64th sess, Agenda Item 76(a), UN Doc A/RES/64/71 (12 March 2010).

¹⁷Division for Ocean Affairs and the Law of the Sea of the UN, 'Oceans and Climate Change' (13 September 2010) <http://www.un.org/Depts/los/oceans_climate_change/oceans_climate_change_7_september_2010.pdf>.

¹⁸Ibid 6–7.

¹⁹See Section III.XIII.

²⁰See Section III.XIII.A.

²¹See Section III.XIII.A.1.

²²See Section III.XIII.A.2.

²³See Section III.XIII.B.1.

²⁴See Section III.XIII.B.2.

VII.III Conceptualising ICZM Legislation and its Purpose

The focus of this thesis is national laws—more specifically, the domestic laws of Bangladesh that apply at the national and local levels. The diverse human activities within the coastal region of Bangladesh are regulated with a wide variety of laws with diverse purposes. Typically, these include legislation related to environment, tourism, forestry, fishing, water, land-use planning and development. According to the FAO Legislative Study, such laws may affect coastal management, but they may not contribute to ICZM.²⁵ In contrast, these laws often hinder the ICZM program by entrenching sectoral divisions and failing to consider the integrated and distinctive nature of the coastal areas.²⁶ Therefore, the FAO Legislative Study confines the term ‘ICZM legislation’ to a smaller subset of laws that in some way gives effect to the fundamentals of the ICZM approach.²⁷ More specifically, ICZM legislation refers to laws that: (i) particularly or impliedly acknowledge the need for special coast-specific rules, principles or other legal mechanisms; and (ii) expressly or impliedly manage human interactions with the coastal environment based on an appreciation that the coast is an integrated ecological whole.²⁸ However, there is no ICZM legislation in Bangladesh that meets any of these criteria.

The primary purpose of ICZM legislation is to establish a governance system that enables, facilitates and supports an integrated approach to managing the human uses of coastal areas.²⁹ Different countries and jurisdictions have given effect to this purpose in different ways. The ICZM legislation can be classified into four categories according to its approach, although its primary purpose is to promote ICZM. The categories of ICZM legislation are:

1. **National Integrated Coastal Management Approach:** According to this category, ICZM legislation is enacted specifically to implement or promote existing ICZM policy in the country.³⁰ The best example of this type of legislation is the *Federal Coastal Zone Management Act 1972* of the US. Other examples include the *Coastal Regulation Zone*

²⁵Cormac Cullinan, ‘Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management’ (FAO Legislative Study No 93, Food and Agriculture Organisation of the United Nations, 2006), 8. Cullinan, above n 8.

²⁶*Ibid.*

²⁷*Ibid.*

²⁸*Ibid* 8–9.

²⁹ *Ibid* 9.

³⁰Cullinan, above n 25, 110.

Notification 1991 of India, the *Coastal Zone Management Act 1998* of Belize, the *Korean Coastal Zone Management Act 1999* and the *Integrated Coastal Management Act 2008* of South Africa.

2. **Sustainable Development Approach:** This category gives rise to ICZM as part of a wider purpose to achieve sustainable development (e.g. Sweden) or the sustainable management of natural resources (i.e. New Zealand) throughout the country.³¹ The *Resource Management Act 1991* in New Zealand promotes sustainable development and mandates the preparation of a *New Zealand Coastal Policy Statement*. This statement is a national framework for coastal planning, and it is the only mandatory national policy statement.³² The main motivation for enacting the *Resource Management Act* was not to implement the ICZM, but to sustainably manage all natural resources in New Zealand. Similarly, when the Swedish government enacted the *Environmental Code 1998* by replacing 15 other Acts, the main object was to create a more integrated governance system based as far as possible on common principles and rules.³³ Nevertheless, the comprehensive and holistic nature of the *Resource Management Act* in New Zealand or the *Environmental Code* in Sweden is consistent with ICZM. Therefore, when implemented, they tend to have the effect of promoting ICZM in those countries.
3. **Extended Land-use Planning Approach:** This category attempts to modify terrestrial planning techniques to achieve more integrated management of coastal areas.³⁴ Following this approach, countries mainly adapt their existing legal frameworks for land-use planning and development control in coastal areas. This approach has several advantages, such as relying on existing institutions rather than replacing them. Therefore, the implementation of this approach is easy. However, these strengths are also the weaknesses of this approach. In most cases, it cannot go beyond the established ways of thinking about land-use planning and control. This is why the FAO Legislative Study states that there is a limit to how

³¹Ibid.

³²Raewyn Peart, *Beyond the Tide: Integrating the Management of New Zealand's Coasts* (Environmental Defence Society, 2007).

³³Cullinan, above n 25, 119.

³⁴Ibid 110.

much can be achieved by reforming a system designed for terrestrial planning and development control instead of coastal management'.³⁵

4. **Special Region Approach:** This category implements the integrated management of coastal resources within particular regions of the coastal area in order to achieve specific objectives that are more limited in scope than those that are typical of a full ICZM program.³⁶ Objectives may include programs to restrict urban encroachment into sensitive areas, plans to preserve the value of an area as a tourist destination and programs to conserve and manage valuable resources. The region often serves as a laboratory for developing or amending broader national ICZM legislation or for testing particular national coastal management strategies.³⁷

Out of these four approaches, researchers only consider the first two as truly integrated and national in scope, and only the first one as primarily motivated by the specific intention to implement ICZM on a national scale.³⁸ Such ICZM legislation establishes public institutions for coastal management and determines who must make particular decisions and how. The success of any coastal management depends heavily on factors such as: (i) the nature of the institutions that are given responsibility for coastal management; (ii) the extent of their jurisdiction; and (iii) the extent of their powers.³⁹ It also defines the rights and obligations of different groups in society. The rights and obligations (or lack thereof) of the public, which the law recognises, can be an important factor in determining how effectively a coastal management policy can be implemented and enforced.⁴⁰ ICZM legislation can also determine the type of information for a coastal area that is required for the realisation of management. Further, it can define necessary subsequent actions regarding public opinion and promote the harmonisation of relations between various users of natural resources in the coastal zones.⁴¹ Moreover, the long-term prospects of a coastal management initiative are seriously jeopardised if they are not based on a clear

³⁵Ibid 221.

³⁶Ibid 110.

³⁷Ibid 227.

³⁸Ibid 110.

³⁹Ibid 7.

⁴⁰Ibid.

⁴¹*Environment and Development in Coastal Regions and in Small Islands*, above n 3.

understanding of the legal framework governing coastal management and if appropriate legal mechanisms are not used to implement them.⁴²

VII.IV Current Domestic Legal Framework for ICZM in Bangladesh

To date, the government of Bangladesh has not enacted ICZM legislation. According to Section 4.2 of the *Coastal Development Strategy*, '[i]mplementation of the *Coastal Zone Policy* will be carried out within the existing legal framework of the country'.⁴³ This does not mean that ICZM in Bangladesh follows the extended land-use planning approach, as this approach relies on the existing legal framework.⁴⁴ Rather, Section 5.6 of the *Coastal Zone Policy* gives an indication to explore the necessity of umbrella legislation to implement ICZM in the country. This means that Bangladesh is following the national integrated coastal management approach.

In the absence of ICZM legislation, all of the country's laws are applicable to the coastal zone. Section 5.6 of the *Coastal Zone Policy* states that:

A number of laws are in operation since long authorising 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 the coastal zone.⁴⁵

Numerous laws in the country are relevant to the coastal zone and its resources. The *Coastal Development Strategy* places the number at 90.⁴⁶ A 'Compendium on the Laws Relating to and/or having bearing on Coastal Areas'⁴⁷ compiles 27 such laws out of 90. These are all sectoral laws that do not consider the integrated and distinctive nature of the coastal areas. Many laws commonly overlap in subject matter and delegate various types of authority and responsibility over the marine environment to numerous government agencies.⁴⁸ Despite the presence of

⁴²Food and Agriculture Organization of the United Nations, *Integrated Coastal Area Management and Agriculture, Forestry and Fisheries, FAO Guidelines* (1998) <
http://www.fao.org/docrep/w8440e/W8440e03.htm#P111_16472>.

⁴³Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Development Strategy* (2006) 45.

⁴⁴ See Section VII.III for the extended land-use planning approach.

⁴⁵Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy* 2005, 12.

⁴⁶Ministry of Water Resources, above n 43.

⁴⁷Borhan Uddin Khan, 'Compendium on the Laws Relating to and/or having bearing on Coastal Areas' (Working Paper No WP029, Integrated Coastal Zone Management Plan Project, March 2004).

⁴⁸Eisma, Christie and Hershman, above n 1, 342.

numerous laws, there is a total absence of integrity and coherency. There are inadequacies and discrepancies in the legislation (e.g. out-dated laws or not adapted according to the ICZM approach). In fact, most of these laws affecting the coastal areas have been created for purposes that were very different from the requirements of ICZM. According to Gibson, this may cause unintended legal impediments to achieving the goals of ICZM.⁴⁹ Thus, the FAO Legislative Study says that it is almost invariably necessary to repeal or amend existing legislation and to enact entirely new legislation.⁵⁰ These legislative changes may include a change in the rights of different parties to use the coastal environment, or the introduction of new mechanisms to regulate human activities that may have a negative effect on coastal areas—for example, permit systems or requirements to undertake environmental assessments of proposed activities or plans.⁵¹ Both the *Coastal Zone Policy* and the *Coastal Development Strategy* support the view that efforts are needed to strengthen the current domestic legal framework for ICZM through revision, modification of existing laws, rules and regulations, and (if necessary) by making new laws.⁵²

VII.V Climate-development Integrated Approach in the Supportive Legal Framework for ICZM in Bangladesh

In the absence of ICZM legislation in Bangladesh, this chapter deals with the laws and policies that are relevant to ICZM. In addition to the *Coastal Zone Policy* and the *Coastal Development Strategy*, several other policies have implications for ICZM. Over the years, different ministries of the government have announced, and are still announcing, their respective policies for carrying out their mandates. Coastal issues are being adopted directly or indirectly within many of these policies. The *Coastal Zone Policy* mentions at least 10 other sectoral policies that are relevant for its purpose:⁵³ (i) the *Environment Policy and Implementation Plan 1992*; (ii) the *National Tourism Policy 1992*; (iii) the *National Forestry Policy 1994*; (iv) the *National Fisheries Policy 1998*; (v) the *National Water Policy 1999*; (vi) the *National Land Use Policy*; (vii) the *National Energy Policy 2004*; (viii) the *National Policy for Safe Water Supply and*

⁴⁹Gibson, above n 4, 127

⁵⁰Cullinan, above n 25, 7.

⁵¹Ibid 8.

⁵²Ministry of Water Resources, above n 45; Ministry of Water Resources, above n 43.

⁵³Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy 2005*.

Sanitation 1998; (ix) the *National Agricultural Policy 1999*; and (x); the *National Rural Development Policy 2001*. Some of these policies have been translated into laws (see Table 7.1), while others have not. Sections VII.VI.A–VII.VI.J briefly examine the extent to which these sectoral laws and policies reflect the climate-development integrated approach. They also explore the implications of these laws and policies for coastal management.

Table 7.1: Relevant Laws of Different Sectoral Policies

Sectoral Policies	Relevant Laws
<i>Environment Policy and Implementation Plan 1992</i>	<i>Environment Conservation Act 1995</i>
	<i>Environment Conservation Rules 1997</i>
	<i>Environment Court Act 2000</i>
<i>National Tourism Policy 1992</i>	<i>Bangladesh Tourism Board Act 2010</i>
	<i>Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010</i>
	<i>Bangladesh Parjatan Corporation Order 1972</i>
	<i>Bangladesh Hotel and Restaurant Ordinance 1982</i>
	<i>Bangladesh Travel Agencies (Registration and Control) Ordinance 1977</i>
	<i>Bangladesh Tourist Act 2012 (Draft)</i>
<i>National Forest Policy 1994</i>	<i>Forest Act 1927</i>
	<i>Private Forest Ordinance 1959</i>
	<i>Social Forestry Rules 2004</i>
<i>Fisheries Policy 1998</i>	<i>Protection and Conservation of Fish Act 1950</i>
	<i>Protection and Conservation of Fish Rules 1985</i>
	<i>Marine Fisheries Ordinance 1983</i>
	<i>Marine Fisheries Rules 1983</i>
	<i>Private Fisheries Protection Act 1889</i>
	<i>Tanks Improvement Act 1939</i>
	<i>Government Fisheries (Protection) Ordinance 1959</i>
	<i>Fish and Fish Products (Inspection and Quality Control) Ordinance 1983</i>
	<i>Shrimp Cultivation Tax Act 1992</i>
	<i>Fish and Animal Food Act 2010</i>
	<i>Fish Feed Rules 2011</i>
	<i>Hatchery Act 2010 and Rules 2012</i>
<i>National Water Policy 1999</i>	<i>Canals Act 1864</i>
	<i>Irrigation Act 1876</i>
	<i>Irrigation Water Rate Ordinance 1983</i>
	<i>Embankment and Drainage Act 1952</i>
	<i>Groundwater Management Ordinance 1985</i>
	<i>Water Resources Planning Act 1992</i>
	<i>Bangladesh Water and Power Development Boards Order 1972</i>
	<i>Bangladesh Water Development Board Act 2000</i>
	<i>Bangladesh Water Act 2013</i>
<i>National Land Use Policy 2001</i>	<i>Bengal Alluvion and Diluvion Regulation 1825</i>
	<i>Alluvial Lands Act 1920</i>
	<i>Bengal Alluvion (Amendment) Act 1868</i>
<i>National Energy Policy 1995</i>	<i>Energy Conservation Act 2008</i>
	<i>Sustainable and Renewable Energy Development Authority (SREDA) Act 2012</i>



VII.V.A The Environment Policy and Relevant Laws

In addition to international conventions, treaties and protocols, the main sources of domestic environmental law in Bangladesh are the Constitution, statutory laws and by-laws.⁵⁴ In 2011, the fifteenth amendment of the Constitution added Art 18A, which states that:

The state shall endeavour to protect and improve the environment and to preserve and safeguard the natural resources, biodiversity, wetlands, forests and wildlife for the present and future citizens.⁵⁵

Thus, environmental protection is now a constitutional obligation in Bangladesh. The Ministry of Environment and Forestry enacted the *Environment Policy and Implementation Plan* in 1992.⁵⁶ One of the objectives of this policy is to maintain ecological balance and overall development through the protection and improvement of the environment (Section 2.1). It also aims to protect the country against natural disasters (Section 2.2). However, the policy did not address climate change and thus failed to identify the effects of climate change on development. Therefore, the policy has been scored 0 for the purpose of this thesis (see Table 7.2).

However, the Department of Environment recently made public the draft of the *National Environment Policy 2013* and invited public opinion.⁵⁷ This draft policy has taken climate change as a serious concern for Bangladesh. Its preamble mentions that the coastal zones of the country are in a most vulnerable situation due to the changing climate of the world.⁵⁸ The document justifies the amendment of the *Environment Policy and Implementation Plan 1992*, as the last one failed to mainstream climate change into development and environmental conservation.⁵⁹ One of the aims of this draft policy is to integrate climate change adaptation and

⁵⁴ The United Nations Environment Programme, *Legal and Institutional Framework Promoting Environmental Management in Bangladesh* <<http://www.unep.org/delc/Portals/119/publications/Speeches/Bangladesh.pdf>> 1.

⁵⁵ *The Constitution of the Peoples' Republic of Bangladesh 1972* art 18A.

⁵⁶ Ministry of Environment and Forestry, Government of the People's Republic of Bangladesh, *Environment Policy and Implementation Plan 1992*.

⁵⁷ Department of Environment, *Opinion on the National Environment Policy 2013* <http://www.doc-bd.org/env/contact_us/contact_us.php>.

⁵⁸ Ministry of Environment and Forestry, Government of the People's Republic of Bangladesh, *The National Environment Policy 2013*, 3.

⁵⁹ *Ibid* 4.

mitigation strategies into all development activities in the country.⁶⁰ This integration is termed the ‘climate-development integrated approach’ in Chapter II.⁶¹ Thus, the draft *National Environment Policy 2013* identifies the issue as required under the law and policy analysis methodology.⁶²

The draft policy also deals with response strategies against climate change in Section 3.19. Policy declarations that have a particular bearing on climate change relate to: (i) preparation and implementation of a climate change master plan for Bangladesh (Section 3.19.1); (ii) vulnerability assessment of different sectors (including the coastal zone) due to climate change (Section 3.19.2); (iii) adoption of necessary adaptation and mitigation strategies (Section 3.19.2); (iv) persuasion for international cooperation for economic and technical support for the implementation of these adaptation and mitigation strategies (Section 3.19.2); (v) work with all state parties following the common but differentiated responsibilities under the UNFCCC (Section 3.19.3); (vi) rehabilitation of climate migrants or climate-induced displaced people (Section 3.19.4); (vii) demand for sufficient economic and technical compensation from the countries responsible for global warming (Section 3.19.8); and (viii) continue the international initiatives to combat climate change under the UN (Section 3.19.10). The coastal and marine ecosystem is one of 23 sectors addressed in this document. Section 3.13.5 of this draft policy strongly supports the initiation and implementation of ICZM in Bangladesh.

The draft *National Environment Policy* emphasises both the adaptation and mitigation strategies in Bangladesh. Some of the adaptation strategies include: adoption and implementation of a climate change adaptation policy (Section 3.19.5); ensure the production, acquisition, utilisation and management of climate- and disaster-resilient agriculture, food, water, industry, building, transport, energy, education and health (Sections 3.19.7, 3.5.14, and 3.7.10); incorporation of afforestation in all development works (Section 3.9.1); conservation and development of coastal afforestation and mangrove forests to fight against natural disasters (Sections 3.13.4, 3.13.6 and 3.13.16); incorporation of the effects of sea-level rises and their mitigation strategies in all

⁶⁰Ministry of Environment and Forestry, Government of the People's Republic of Bangladesh, *The National Environment Policy 2013*.

⁶¹ See Section II.VII for the definition of the climate-development integrated approach.

⁶² See Section I.VII.B.2 for details of the law and policy analysis methodology.

development activities in the coastal zone (Section 3.13.7); management practice for producing crops in saline water (Section 3.13.8); and empowerment of people to combat climate change (Sections 2.10 and 3.20.4). All of these adaptation strategies are accommodative in nature. However, Section III.IX mentions two further types of adaptive measures for coastal management: planned retreat and protection.⁶³ The *National Environment Policy 2013* is silent about these two measures.

The mitigation strategies mentioned in the draft policy are: keeping the emission of greenhouse gases at a minimum level in all types of domestic development activities (e.g. industrialisation, production, transport, urbanisation, modernisation, energy, education, business, entertainment) that emit greenhouse gases (Sections 3.19.6, 3.5.22 and 3.23.1); implementing several CDMs, such as carbon trading (Section 3.19.11); promoting research, development and transfer of clean technology (Section 3.21.5); and adopting green economy, producing green products and creating green jobs (Section 3.23). The draft *National Environment Policy 2013* scores 2 under all four categories (i.e. issues, causal links, responses and process) of the law and policy analysis methodology (see Table 7.2). This gives the document a total score of 8. As mentioned earlier, Section I.VII.B.2 narrates the interpretation of different scores in this thesis. According to this interpretation, a score of 8 means that the policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

In addition to these policies, there are several environmental laws in the country. The *Environment Conservation Act 1995* and the accompanying *Environment Conservation Rules 1997* are currently the main legislative framework documents relating to environmental protection in Bangladesh.⁶⁴ The amendment to the Act in 2002 has given this law an overriding effect over all other laws.⁶⁵ The preamble of the Act mentions that it is passed for the conservation and improvement of environmental standards, and for control through the mitigation of the pollution in the environment in Bangladesh. The Act includes provisions for: declaring

⁶³ See Sections III.IX.A–III.IX.C for details of planned retreat, accommodation and protection.

⁶⁴ ECODIT, 'Bangladesh Environment Sector Assessment and Strategic Analysis: Tropical Forestry and Biodiversity Analysis Update' (Task Order No EPP-1-08-06-00010-00, USAID, February 2010) 17.

⁶⁵ *The Environment Conservation (Amendment) Act 2002* sec 2A.

Ecologically Critical Areas (ECAs) (Section 5); restrictions regarding vehicles emitting smoke injurious to health (Section 6); restrictions on the manufacture and sale of articles injurious to the environment (Section 6A); remedial measures for injury to ecosystems (Section 7); and issuance of necessary clearance certificates (Section 12). It plays a crucial role in promoting environmental protection through the sustainable use of natural resources, prevention of pollution and integration of environment and development.⁶⁶ However, the Act fails to address the climate change issue, as did the *Environment Conservation Rules 1997*. There is no mention of sea-level rises, coastal inundation or coastal hazards caused by climate change and their effects on existing property rights. In fact, there is no legislative safeguards in the country against intergenerational liability for poor planning decisions, land use and development in coastal areas.

To execute the objectives of the *Environmental Conservation Act 1995* and *Environment Conservation Rules 1997*, the government has set up two Environmental Courts in Dhaka and Chittagong under the *Environment Court Act 2000*. According to Mohammad et al, the Environmental Court is a mechanism to protect the natural environment so that human beings or any other beings cannot affect the environment directly or indirectly.⁶⁷ The Environment Courts in Bangladesh deal with offences committed under the environmental laws for conserving and maintaining the natural environment in the country. The *Environment Court Act 2000* was amended in 2002, 2003 and 2010. The latest amendment proposes setting up an Environmental Court at every district headquarters with expanded jurisdiction to take stern actions against all types of polluters.⁶⁸ However, the existing two courts remain somewhat inactive, and they mainly handle civil and criminal cases in the absence of environmental cases.⁶⁹ According to court documents, in 2013, only five cases were filed under the *Environment Conservation Act* in Dhaka and three cases were filed in Chittagong.⁷⁰ To date, neither court has dealt with any cases in which the regulation of greenhouse gas emissions or the responsibility for adaptation to climate change were debated. No development proposal has ever questioned whether climate

⁶⁶Noor Mohammad et al, 'Overview of the Bangladesh Environment Conservation Act 1995' (2013) 7(2) *Australian Journal of Basic and Applied Sciences* 156, 162.

⁶⁷Ibid 166.

⁶⁸*The Environment Court Act 2010* sec 4(1).

⁶⁹Prokash Biswas, 'No work' at Environment Court', *bdnews24.com* (online), 21 June 2013 <<http://bdnews24.com/bangladesh/2013/06/21/no-work-at-environment-court>>.

⁷⁰Ibid.

change-induced hazards such as projected sea-level rises, coastal erosion or flooding have been considered in the planning processes. Therefore, the *Environment Court Act 2000* scores 0 for the purpose of this thesis (see Table 7.2).

Table 7.2: Average Score of the Environment Policy and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>Environment Policy and Implementation Plan 1992</i>	0	0	0	0	0
<i>National Environment Policy 2013 (Draft)</i>	2	2	2	2	8
<i>Environment Conservation Act 1995</i>	0	0	0	0	0
<i>Environment Conservation Rules 1997</i>	0	0	0	0	0
<i>Environment Court Act 2000</i>	0	0	0	0	0

VII.V.B The National Tourism Policy and Relevant Laws

A significant part of the Bangladesh coast comprises sandy beaches—for example, Kuakata beach in Patuakhali district, Patenga beach in Chittagong district and Cox's Bazar beach in Cox's Bazar district.⁷¹ These beaches attract domestic and international tourists. Tourism is one of the world's top job creators, especially for developing countries.⁷² It is an effective way of redistributing wealth and a catalyst for gender equality, cultural preservation and nature conservation.⁷³ As a result, this sector can play a significant role in achieving the MDGs. Table 2.1 mentions all eight MDGs. Tourism in Bangladesh can contribute to the eradication of poverty (MDG 1), promotion of gender equality (MDG 3), environmental sustainability (MDG 7) and global partnerships for development (MDG 8).⁷⁴ However, there is a growing body of knowledge about the effects of climate change on tourism and about tourism's commitment to address these effects.⁷⁵ The first International Conference on Climate Change and Tourism was organised by

⁷¹Md Lokman Hossain and Mohammed Kamal Hossain, *Climate Change, Sea Level Rise and Coastal Vulnerabilities of Bangladesh with Adaptation Options* <http://academia.edu/1224958/CLIMATE_CHANGE_SEA_LEVEL_RISE_AND_COASTAL_VULNERABILITIES_OF_BANGLADESH_WITH_ADAPTATION_OPTIONS> 36.

⁷²Anita Pleumarom, *The Politics of Tourism, Poverty Reduction and Sustainable Development* (Third World Network 2012) 7.

⁷³UNWTO, 'From Davos to Copenhagen and Beyond: Advancing Tourism's Response to Climate Change' (UNWTO Background Paper, The World Tourism Organization, 2009) 2.

⁷⁴Pleumarom, above n 72.

⁷⁵Heather Zeppel and Narelle Beaumont, 'Climate Change and Tourism Futures: Responses by Australian Tourism Agencies' (2012) 12(2) *Tourism and Hospitality Research* 73, 73.

the UN World Tourism Organisation (UNWTO) in Tunisia in 2003. It came up with the Djerba Declaration on Climate Change and Tourism, which highlights the obligation of the tourism industry to reduce its greenhouse gas emissions, and it recognises the two-way relationship between tourism and climate change.⁷⁶ The second International Conference, which was held in Davos in Switzerland in 2007, resulted in the Davos Declaration. In 2008, the UNWTO published ‘Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices’.⁷⁷

Rising sea levels is a threat for numerous tourism-related infrastructures in the coastal zone of Bangladesh. All tourist facilities, establishments, public- or private-owned hotels and motels or guest houses in this zone will be affected by sea-level rises either directly or indirectly.⁷⁸ According to Hossain and Hossain, the ‘[t]ourism sector of Kuakata will suffer the most because all the facilities are very close to the coastline, and the area is more vulnerable comparative to Cox’s Bazar and Chittagong’.⁷⁹ However, the *National Tourism Policy 1992* and the draft *National Tourism Policy 2010* failed to address the climate change concern. Section 5.3 of the *National Tourism Policy 1992* asks for infrastructure development that facilitates and connects tourist sites. Sections 8 and 9 suggest the development of Cox’s Bazar, Kuakata and other beach areas in southern Bangladesh. The policy identified seven different regions for tourism development (Section 18). Among them, three relate to the coastal zone: (i) Chittagong Metropolitan Area and its surroundings; (ii) Sonadia island of Cox’s Bazar and neighbouring coastal islands; and (iii) Khulna, Mongla, Sunderbans, Kuakata and Hiron Point. Climate change may affect any development activities in these areas. In fact, there has been limited research about climate change responses by national tourism agencies and the role they play in providing information, incentives and leadership to encourage the uptake of climate change actions.⁸⁰ As the issue has not been identified in the *National Tourism Policy 1992* or in the draft *National Tourism Policy 2010*, both documents score 0 in Table 7.3.

⁷⁶UNWTO, above n 73.

⁷⁷ Ibid 3.

⁷⁸Hossain and Hossain, above n 71.

⁷⁹ Ibid.

⁸⁰Zeppel and Beaumont, above n 75.

Bangladesh has a number of Acts that deal with tourism: the *Bangladesh Tourism Board Act 2010*, the *Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010*, the *Bangladesh Parjatan Corporation Order 1972*, the *Bangladesh Hotel and Restaurant Ordinance 1982*, and the *Bangladesh Travel Agencies (Registration and Control) Ordinance 1977*. A tourism board has been created under Section 4 of the *Bangladesh Tourism Board Act 2010* to develop, manage and expand the scope of tourism in the country. The board has been assigned power to locate, acquire and transfer land for the expansion of tourism (Section 8). The government can declare any area as a tourism-reserved area or a special tourism zone under the *Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010*. In a tourism-reserved area, the government can prohibit any type of activity (Section 4), whereas in a special tourism zone, it can manage and direct any development activities (Section 5). The *Bangladesh Parjatan Corporation Order 1972* establishes a tourism corporation for the purposes of promotion, better operation and development of tourism in the country. The *Bangladesh Hotel and Restaurant Ordinance 1982* provides measures to control and regulate the standards of service and amenities in hotels and restaurants in tourist areas. The *Bangladesh Travel Agencies (Registration and Control) Ordinance 1977* provides for the registration and control of travel agencies in the country. However, the country has no policy to regulate tour operators and rent-a-car businesses to provide best services to tourists. The Bangladesh Tourism Board (BTB) is preparing an umbrella Act entitled the *Bangladesh Tourist Act 2012* to incorporate and upgrade all existing laws that are relevant to tourism. However, none of these laws address the climate change issue. Therefore, all of them score 0 in Table 7.3.

Table 7.3: Average Score of the National Tourism Policy and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>National Tourism Policy 1992</i>	0	0	0	0	0
<i>National Tourism Policy 2010 (Draft)</i>	0	0	0	0	0
<i>Bangladesh Tourism Board Act 2010</i>	0	0	0	0	0
<i>Bangladesh Tourism Reserved Area and Special Tourism Zone Act 2010</i>	0	0	0	0	0
<i>Bangladesh Parjatan Corporation Order 1972</i>	0	0	0	0	0
<i>Bangladesh Hotel and Restaurant Ordinance 1982</i>	0	0	0	0	0
<i>Bangladesh Travel Agencies (Registration</i>	0	0	0	0	0

<i>and Control) Ordinance 1977</i>					
<i>Bangladesh Tourist Act 2012 (Draft)</i>	0	0	0	0	0

VII.V.C The National Forestry Policy and Relevant Laws

The *National Forest Policy 1994* is a successor to the 1979 policy. The general objective of this policy is to meet the basic needs of present and future generations and to ensure greater contribution of the forestry sector to economic development.⁸¹ This general objective accords with the vision of ICZM in Bangladesh. Afforestation in newly accreted lands in coastal areas⁸² is also mentioned in Sections 4.3.f and 4.4.7 of the *Coastal Zone Policy*. In the objective clause, the *National Forest Policy 1994* confirms that the government will follow national and international commitments to address global warming.⁸³ However, the document gives no further explanation in this regard. Therefore, it has been given a score of 1 (see Table 7.4), which means that the issue has been identified but not elaborated.

Many researchers now strongly link forest and climate change, and they have identified deforestation as a major driver for global warming.⁸⁴ According to the IPCC, at least one-third of forests will be adversely affected by climate change, thereby reducing carbon sinks.⁸⁵ It has projected that the state of tropical forest ecosystems is likely to worsen as a result of climate change.⁸⁶ Bangladesh is located in the tropical region; as a result, the forests may suffer from different physical effects of climate change, including increased temperature and precipitation, increased salinity, and extreme weather events such as floods, cyclones and droughts.⁸⁷ The Sunderban is highly vulnerable to the changing climate,⁸⁸ and it is predicted to disappear with a

⁸¹M Rafiqul Islam and Rob Koudstaal, 'Coastal Zone Management: An Analysis of Different Policy Documents' (Working Paper No WP009, Program Development Office for Integrated Coastal Zone Management, January 2003) 13.

⁸²Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, *The National Forest Policy 1994*, 3.

⁸³Ibid.

⁸⁴Ritwajit Das and Shabnam Lama Tamang, *Community Forest Management and Localised Climate Change Adaptation Strategies: A Socio-economic and Socio-ecological Study of Forest People Communities on Forest and their Localised Resilience towards Changing Climate with Internalising Sustainable Forest Management in Kalahandi Forest Division, Orissa, India*, 9.

⁸⁵Ministry of Environment Forest, Government of the People's Republic of Bangladesh, *Climate Change and Biodiversity and Forests in Bangladesh: Information Brief* <<http://cmsdata.iucn.org/downloads/bio.pdf>> 3.

⁸⁶Ibid.

⁸⁷Ibid.

⁸⁸Ahmed, above n 27.

1 m rise in sealevels.⁸⁹ The World Bank says that '[a] possible 45 centimetre sea-level rise by the year 2050 could inundate 75 per cent of the Sundarban'.⁹⁰ In recent times, the speed of deforestation in the country has increased alarmingly. Forest cover per person is around 0.022 hectares, which is one of the lowest ratios in the world.⁹¹ Therefore, while Bangladesh's industrial contribution to global warming is very small, its contribution through deforestation is significant.⁹² Under the UNFCCC, REDD+ designs a mechanism that rewards developing countries for their achievements in climate change mitigation through the forest sector.⁹³ Section III.XIII.B.1 shows how Bangladesh can ensure the full and comprehensive inclusion of mangrove forests under REDD+. Unfortunately, the *National Forest Policy 1994* fails to address any of these issues.

The *Forest Act 1927* covers all procedural matters relating to the conservation and protection of government-owned forests in Bangladesh.⁹⁴ In contrast, the management of private forests is dealt with under the *Private Forest Ordinance 1959*. The *Forest Act 1927* contains provisions such as the constitution of reserved forest (Section 3) and protected forest (Section 29). In reserved forest, all operations are prohibited unless explicitly permitted, whereas in protected forest, all operations are permitted unless explicitly prohibited.⁹⁵ The mangrove forest (Sundarban) and coastal plantations (artificial mangrove forest) are reserved forests under this Act.⁹⁶ The Act vests considerable power in the hands of the Forest Department to determine the use of forest lands and to gazette forests as reserves (Section 4). While allowing for the designating of land-use rights in the forest for villages, it does not provide a role to neighbouring communities in decision-making (Section 28). Even the indigenous or minority communities settled in the forest areas are kept out of its scope. There is no recognition of community-

⁸⁹M T H Chowdhury, Z P Sukhan and M A Hannan, 'Climate Change and its Impact on Fisheries Resource in Bangladesh' (Paper presented at the International Conference on Environmental Aspects of Bangladesh, Japan, September 2010) 97.

⁹⁰Bank, above n 38.

⁹¹James S Pender, 'What is Climate Change? And How it will Effect Bangladesh' (Briefing Paper, Church of Bangladesh Social Development Programme, August 2008) 26.

⁹²Ibid.

⁹³*Bangladesh REDD+ Readiness Roadmap* (UN-REDD Programme, Draft 1.2, United Nations Environmental Programme, April 2012) 13.

⁹⁴Noor Mohammad, 'Empirical Findings on the Forest Law and Policy in Bangladesh ' (2013) 2(2) *Agriculture, Forestry and Fisheries* 49, 57.

⁹⁵*Bangladesh REDD+ Readiness Roadmap*, above n 95, 13.

⁹⁶Ibid.

managed forests other than social forestry (Section 28A), which is aimed primarily at fast-growing exotics to generate income for poor people.⁹⁷ However, the government has since enacted the *Social Forestry Rules 2004* (updated in 2010 and 2011) to promote community participation in forest plantation and management. Here also, the community has no decision-making authority. Rather, the Forest Department identifies beneficiaries and appropriate locations for plantations (Section 5A). The community only assists in implementing these decisions.⁹⁸

The carbon payment of REDD+ may ensure benefits for the marginal forest-dependent communities in Bangladesh, and community forest management can be a cost-effective platform to reduce carbon emission.⁹⁹ According to Agrawal and Angelsen, community participation can increase the three Es—effectiveness, efficiency and equity¹⁰⁰—and thus enhance the sustainability of REDD+ initiatives in the country. Very recently, Bangladesh paved the way in REDD+ not only for its climate-financing mechanism, but also for sustainable forest conservation, management and halting the trend of deforestation. The Ministry of Environment and Forest approved the Bangladesh REDD+ Readiness Roadmap on 19 December 2012.¹⁰¹ As the initiatives are still emerging, none of the laws mentioned above reflect the carbon governance mechanism under REDD+ or any other climate change mitigation strategies. As a result, the *Forest Act 1927*, the *Private Forest Ordinance 1959* and the *Social Forestry Rules 2004* score 0 (see Table 7.4).

⁹⁷ ECODIT, above n 64, 16.

⁹⁸ *Bangladesh REDD+ Readiness Roadmap*, above n 95, 26.

⁹⁹ Anar Koli, *Emerging Role of Community Forest Management in Reducing Carbon Emission —Insights from Land Tenure & REDD+ Nexus*, 2010.

¹⁰⁰ Arun Agrawal and Arild Angelsen, 'Using Community Forest Management to Achieve REDD+ Goals' in Arild Angelsen (ed), *Realising REDD+: National Strategy and Policy Options* (The Center for International Forestry Research, 2009) 201, 201.

¹⁰¹ UN-REDD Programme, *Bangladesh Paves the Way in Climate Financing Sector: National Workshop on REDD+ Highlights Progress Achieved in Bangladesh's National REDD+ Readiness Roadmap* (April 2013) <http://www.un-redd.org/Newsletter37/Bangladesh_Climate_Financing_Sector/tabid/106148/Default.aspx>.

Table 7.4: Average Score of the Forest Policy and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>National Forest Policy 1994</i>	1	0	0	0	1
<i>Forest Act 1927</i>	0	0	0	0	0
<i>Private Forest Ordinance 1959</i>	0	0	0	0	0
<i>Social Forestry Rules 2004</i>	0	0	0	0	0

VII.V.D The National Fisheries Policy and Relevant Laws

Bangladesh is highly vulnerable to the effects of climate change in fisheries because of its economics, diets and social dependencies on this sector.¹⁰² Fisheries are the second-largest export sector.¹⁰³ The fishing communities in the coastal zone are subject not only to sea-level rises, but also to flooding and increased typhoons.¹⁰⁴ The coastal embankment infrastructure in the country was destroyed during Cyclones Sidr and Aila, which caused salinity intrusion in vast areas of the coastal region. The increase of salinity, including sea-level rises, has harmful effects on existing fish species.¹⁰⁵ Coral reefs provide a habitat for millions of fish species, and climate change can cause these reefs to die.¹⁰⁶ It is also predicted that the dry fish industry in the coastal region will be affected by anticipated sea-level rises.¹⁰⁷ There are 21 government fisheries service centres very close to coastlines or estuaries, and they may be inundated by sea-level rises.¹⁰⁸ Ironically, the *National Fisheries Policy 1998* failed to address the climate change issue, so it scores 0 in Table 7.5.

The *Fisheries Policy 1998* has a significant influence on coastal and marine fisheries. It contains 23 sub-sections under Section 8 for coastal shrimp and aquaculture policy.¹⁰⁹ The document places a higher priority on small-scale fishers in the coastal region and recommends special measures to limit uncontrolled fish harvesting from the marine environment (Section 9.3). It also

¹⁰² Chowdhury, Sukhan and Hanna, above n 89, 95.

¹⁰³ Ibid 97.

¹⁰⁴ Fisheries and Climate Change (17 June 2013) Wikipedia http://en.wikipedia.org/wiki/Fisheries_and_climate_change.

¹⁰⁵ Chowdhury, Sukhan and Hanna, above n 89, 96.

¹⁰⁶ Ibid.

¹⁰⁷ Hossain and Hossain, above n 71, 34.

¹⁰⁸ Ibid.

¹⁰⁹ Ministry of Fisheries and Livestock, Government of the People's Republic of Bangladesh, *National Fisheries Policy 1998*, 6-8.

recommends the conservation of biodiversity in the coastal region (Section 8.2). However, the policy is silent about the increased salinity intrusion in the coastal area and inland because of sea-level rises and tidal surges in relation to climate change. Salinity intrusion causes a shift in the biodiversity from freshwater species to salt-water species of fish. Therefore, more guidelines are required for adaptation to coastal fisheries through the culture of salt-tolerant fish.

Section 8.2 of the policy recommends taking necessary steps to culture fish or shrimp along with rice crops either in rotational or concurrent phases.¹¹⁰ By integrating coastal aquaculture with wet rice farming in coastal areas where saline water intrusion has been significant, Bangladesh can boost food security and combat climate change.¹¹¹ Thus, Section 8.2 has the potential to address climate change, although the issue has not been directly identified in the policy. Many other techniques may generate both mitigation and adaptation benefits, as well as boost the fisheries sector. For example, the restoration of mangrove forests can protect shorelines from erosion and provide breeding grounds for fish while also sequestering carbon.¹¹² Chapter III narrates that coastal ecosystems play a vital role in climate change mitigation working as carbon sinks.¹¹³

The basic Act regulating inland fisheries in Bangladesh is the *Protection and Conservation of Fish Act 1950*. This Act was amended in 1982, 1995 and 2002, and it is implemented by the *Protection and Conservation of Fish Rules 1985*. The *Protection and Conservation of Fish Act 1950* allows the government to frame rules for prohibiting the destruction of fishes in inland water or within coastal territorial waters (Section 3). It bans the use of current *jal* (nets) for fishing purposes (Section 4A) and prohibits the destruction of fish by the poisoning of waters or the depletion of fisheries by pollution, trade effluents or otherwise (Section 3).

The *Marine Fisheries Ordinance 1983*, as implemented by the *Marine Fisheries Rules 1983*, is the basic Act regulating marine fisheries.¹¹⁴ This Ordinance authorises the Marine Fisheries Wing

¹¹⁰Ibid 7.

¹¹¹Naimul Huq, *Bangladesh Tackles Climate Change by Fusing Rice Paddies with Fish Farms* (2 March 2013) The Guardian: Guardian Development Network <<http://www.guardian.co.uk/global-development/2013/mar/01/bangladesh-climate-change-rice-fish-farms>>.

¹¹²*Fisheries and Climate Change*, above n 104.

¹¹³See Section III.X.

¹¹⁴Food and Agriculture Organization of the United Nations, *National Aquaculture Legislation Overview: Bangladesh* (2013) <http://www.fao.org/fishery/legalframework/nalo_bangladesh/en>.

of the Department of Fisheries to deal with matters relating to marine fisheries' exploitation, including the licensing and monitoring of operations of fishing vessels (Section 8–16). The government can also declare any area of the Bangladesh fisheries' waters to be a marine reserve (Section 28). To date, four locations in the Bay of Bengal in the territorial waters of Bangladesh have been declared marine-protected areas.¹¹⁵

Other fisheries legislation include the *Private Fisheries Protection Act 1889*, *Tanks Improvement Act 1939*, *Government Fisheries (Protection) Ordinance 1959*, *Fish and Fish Products (Inspection and Quality Control) Ordinance 1983* and *Rules 1997*, *Shrimp Cultivation Tax Act 1992*, *Fish and Animal Food Act 2010*, *Fish Feed Rules 2011*, *Hatchery Act 2010* and *Rules 2012*. Among them, the *Private Fisheries Protection Act 1889* is the oldest fisheries regulation protecting the rights of fishing in private waters. The *Tanks Improvement Act 1939* provides for the improvement of tanks for irrigation and aquaculture purposes. The *Government Fisheries (Protection) Ordinance 1959* makes provision for preventing unauthorised fishing in fisheries belonging to, or under the management and control of, the government. Under this authority, the government can declare any fishery to be a *khash-* (government-) managed fishery (Section 3) and can impose licensing options to restrict unauthorised fishing (Section 5).

The *Fish and Fish Products (Inspection and Quality Control) Ordinance 1983* prohibits the operation of a fish-processing and packing plant without a license. It is basically intended to develop quality improvement to promote export trade.¹¹⁶ The Ordinance is further implemented by the *Fish and Fish Product (Inspection and Quality Control) Rules* of 1997. This instrument lays down detailed procedures for the inspection and quality control of fish and fish products during transportation, processing and export.¹¹⁷ The *Shrimp Cultivation Tax Act 1992* dictates that shrimp cultivation areas developed by the government through the construction of embankments, excavation of canals or other water management structures, will be liable to

¹¹⁵Tanzim Afroz and Shawkat Alam, 'Sustainable Shrimp Farming in Bangladesh: A Quest for an Integrated Coastal Zone Management' (2013) 71 *Ocean & Coastal Management* 275, 278.

¹¹⁶ Ibid. Afroz and Alam, above n .

¹¹⁷ Ibid.

payment of tax (Section 4). All tax arrears, including interest under this Act, are recovered as public demands¹¹⁸ (Section 7), and the Water Development Board is authorised in this regard.

The government of Bangladesh has recently enacted the *Fish and Animal Food Act 2010* and the *Fish Feed Rules 2011* to ensure the quality of fish feed used in the fish culture sector. The laws are enacted to cover the country's score of feed producers and importers, who often sell sub-standard and adulterated fish and animal feeds, exposing millions of people to deadly diseases such as cancer.¹¹⁹ To stop the toxic antibiotics from getting into the food chain, and to control the fish feed manufacturing, registration is mandatory under Section 4 of the *Fish and Animal Food Act 2010*. The *Hatchery Act 2010* and *Rules 2012* have been enacted to mitigate inbreeding and cross-breeding practical problems in many hatcheries. These will also help to improve the quality of fish seed from hatcheries. Registration is mandatory under Section 4 of the *Hatchery Act*, and no one can run or establish a hatchery without registering it as required in Section 5. Ironically, none of these Acts or Rules take climate change into account. Therefore, they score 0.

¹¹⁸ According to Section 3 of the *Public Demands Recovery Act 1913*, 'public demand' means any arrear to government.

¹¹⁹ Afroz and Alam, above n 115.

Table 7.5: Average Score of the Fisheries Policies and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>Fisheries Policy 1998</i>	0	0	0	0	0
<i>Protection and Conservation of Fish Act 1950</i>	0	0	0	0	0
<i>Protection and Conservation of Fish Rules 1985</i>	0	0	0	0	0
<i>Marine Fisheries Ordinance 1983</i>	0	0	0	0	0
<i>The Marine Fisheries Rules 1983</i>	0	0	0	0	0
<i>Private Fisheries Protection Act 1889</i>	0	0	0	0	0
<i>Tanks Improvement Act 1939</i>	0	0	0	0	0
<i>Government Fisheries (Protection) Ordinance 1959</i>	0	0	0	0	0
<i>Fish and Fish Products (Inspection and Quality Control) Ordinance 1983</i>	0	0	0	0	0
<i>Shrimp Cultivation Tax Act 1992</i>	0	0	0	0	0
<i>Fish and Animal Food Act 2010</i>	0	0	0	0	0
<i>Fish Feed Rules 2011</i>	0	0	0	0	0
<i>Hatchery Act 2010 and Rules 2012</i>	0	0	0	0	0

VII.V.E The National Water Policy and Relevant Laws

Effects of climate change on water resources—especially in the coastal areas of Bangladesh—are assumed to be one of the potential problems.¹²⁰ However, these problems have not received any mention in the *National Water Policy 1999*.¹²¹ Therefore, the policy scores 0 under all four categories in Table 7.6. Climate change mitigation and adaptation measures both pose a broad range of challenges to water policy.¹²² Climate change mitigation measures include cleaner energy measures, energy efficiency measures and land-use change measures.¹²³ These measures may have a number of effects on water resources and services, such as: (i) effects on balancing the supply of, and demand for, water, (ii) effects on the costs of water-related infrastructure and services, and (iii) effects on the environment and the broader community.¹²⁴

¹²⁰M Faridy, *Impact of Climate Change on Water Resources in Bangladesh*, International Water Centre <<http://www.watercentre.org/education/programs/highlights/student-projects/student-projects/faridy-m-2010>>.

¹²¹Islam and Koudstaal, above n 81, 21.

¹²²The National Water Commission, Australian Government, 'Water Policy and Climate Change in Australia' (2012) 84.

¹²³Ibid xii.

¹²⁴Ibid.

Reduced water availability and increasing demand is increasing the competition for water among coastal populations, irrigated agricultural and industrial users. The effects of these pressures on supply and demand depend on the adaptation responses available to users, many of which are influenced by water policy settings.¹²⁵ Adaptation primarily aims to moderate the adverse effects of climate change through a wide range of actions targeted at specific vulnerabilities and risks. Climate change adaptation responses may affect the management and use of water resources, as well as the provision of water-related services in the country. In fact, adaptation responses are likely to have greater effects on water policy than mitigation responses, and they may be more challenging to address.¹²⁶ The *National Water Policy* needs to address these issues.

There are many laws relating to the water sector—some dating back over a century.¹²⁷ The list includes: the *Canals Act 1864*, the *Irrigation Act 1876*, the *Irrigation Water Rate Ordinance 1983*, the *Embankment and Drainage Act 1952*, the *Groundwater Management Ordinance 1985*, the *Water Resources Planning Act 1992*, the *Bangladesh Water and Power Development Boards Order 1972*, the *Bangladesh Water Development Board Act 2000* and the *Bangladesh Water Act 2013*. These laws are briefly discussed below.

The *Canals Act 1864* was enacted to amend and consolidate laws relating to the collection of tolls on canals and other lines of navigation, and for the construction and improvement of lines of navigation in Bangladesh. The *Irrigation Act 1876* makes provision for the construction, maintenance and regulation of canals, for the supply of water therefrom, and for the levy of rates for water so supplied. The *Irrigation Water Rate Ordinance 1983* imposes water rates for supply, regulation or storage of water for irrigation or drainage. The *Embankment and Drainage Act 1952* makes better provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of lands and for their protection from floods, erosion or other damage by water. The *Groundwater Management Ordinance 1985* manages the groundwater resources for agricultural production. The *Water Resources Planning Act 1992* ensures the development and balanced use of water resources. The

¹²⁵Ibid xiii.

¹²⁶Ibid.

¹²⁷Banglapedia National Encyclopedia of Bangladesh, *Water Resources Management* (2006) <http://www.banglapedia.org/HT/W_0032.HTM>

Bangladesh Water and Power Development Boards Order 1972 constitutes a Power Development Board, while a Water Development Board was established under the *Bangladesh Water Development Board Act 2000*.

The recently published *Bangladesh Water Act 2013* is based on the *National Water Policy 1999*. According to Section 3(1) of this Act, all forms of water (e.g. surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. Section 3(2) allows private landowners to use the surface water inside their property for all purposes in accordance with the Act. Section 16 initiates the requirement for permits/licenses for large-scale water withdrawal by individuals and organisations beyond domestic use. However, the maximum amount of surface water or groundwater that can be withdrawn by individuals or organisations is not mentioned in the Act.¹²⁸ Section 18 sets up a priority order for water usage in an area where water resources are in critical condition. The priority order as depicted in the Act is as follows: drinking water> domestic usage> irrigation> fish culture> bio-diversity> wildlife> in-stream flow> industry> salinity control> power generation> recreation> miscellaneous.¹²⁹ Neither the *Water Act 2013* nor the other water-related laws consider the climate change issue. As a result, they score 0.

Table 7.6: Average Score of the Water Policies and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>National Water Policy 1999</i>	0	0	0	0	0
<i>Canals Act 1864</i>	0	0	0	0	0
<i>Irrigation Act 1876</i>	0	0	0	0	0
<i>Irrigation Water Rate Ordinance 1983</i>	0	0	0	0	0
<i>Embankment and Drainage Act 1952</i>	0	0	0	0	0
<i>Groundwater Management Ordinance 1985</i>	0	0	0	0	0
<i>Water Resources Planning Act 1992</i>	0	0	0	0	0
<i>Bangladesh Water and Power Development Boards Order 1972</i>	0	0	0	0	0
<i>Bangladesh Water Development Board Act 2000</i>	0	0	0	0	0
<i>Bangladesh Water Act 2013</i>	0	0	0	0	0

¹²⁸The Bangladesh Chronicle, *Review of the Water Act 2013* (14 July 2013) <<http://www.bangladeshchronicle.net/index.php/2013/07/review-of-the-water-act-2013/>>.

¹²⁹The Bangladesh Water Act 2013 sec 18.

VII.V.F The National Land-use Policy and Relevant Laws

Change and variability in land use and the resulting alterations in surface features are major drivers of long-term global climate patterns.¹³⁰ Deforestation, urban sprawl, agriculture and other human influences have substantially altered the world's landscape.¹³¹ Such disturbance of the land can change the global atmospheric concentration of carbon dioxide and affect local, regional and global climates by changing the energy balance on the earth's surface.¹³² Even small changes of 100 km² in urban development or deforestation can change local rainfall patterns and trigger other climate disruptions.¹³³ To keep up with evolving science, the IPCC is currently in the process of including land-use and land-cover change and variability as a first-order climate forcing.¹³⁴ However, national land-use planning can play an important role in mitigating and preparing for climate change by reducing current and future risks associated with climate change in coastal communities, enhancing their preparedness, facilitating their response and recovery, and thus mitigating the negative effects of climate change.¹³⁵

The *National Land Use Policy 2001* is a vital policy document in Bangladesh for the future development of the coastal zone. It aims for the best possible use of land and waterbodies in the country, and it imposes restrictions on the misuse and inappropriate use of land and waterbodies. Section 10 specifically deals with the coastal zone and recommends land reclamation by artificial means. However, such an initiative is very expensive and effective only in the long run.¹³⁶ The document does not contain specific contingencies for the rapid levels of land erosion and accretion or the very different problems associated with land tenure and land rights found in

¹³⁰Roger A Pielke Jr, 'Land Use and Climate Change' (2005) 310(5754) *Science* 1625, 1625.

¹³¹Union of Concerned Scientists, *The Impacts of Land Use on Climate Change* (14 July 2003) <http://www.ucsusa.org/global_warming/science_and_impacts/impacts/the-impacts-of-land-use-on.html>.

¹³²*Ibid.*

¹³³*Ibid.*

¹³⁴Pielke Jr, above n 130, 1626.

¹³⁵Bhishna Bajracharya, Iraphne Childs and Peter Hastings, 'Climate Change Adaptation through Land Use Planning and Disaster Management: Local Government Perspectives from Queensland' (17th Pacific Rim Real Estate Society Conference Climate Change and Property: Its Impact Now and Late, Gold Coast, Australia, 16-19 January 2011) 4.

¹³⁶Islam and Koudstaal, above n 81, 24.

coastal areas. Islam and Koudstaal mention that it also does not refer to land-use conflicts in the coastal zone and does not contain any effective prescriptions for their resolution.¹³⁷

The laws that are relevant for coastal land-use planning are the *Bengal Alluvion and Diluvion Regulation 1825*, the *Alluvial Lands Act 1920* and the *Bengal Alluvion (Amendment) Act 1868*. The instances of alluvion, encroachment and dereliction are common in coastal areas. The *Bengal Alluvion and Diluvion Regulation 1825* declares rules to be observed in determining claims to land, and the *Alluvial Lands Act 1920* prevents disputes concerning the possession of such lands gained by alluvion or by dereliction of the sea.

Neither these laws nor the *National Land Use Policy 2001* address the climate change issue in the country. Thus, there is no legal guideline to reduce the future carbon effects of new developments or for improving resilience against natural hazards associated with climate change through land-use planning. The *Policy* needs to incorporate mitigation and adaptation strategies in the land-use planning context in order to deal with climate change. The carbon effect of future land-use or development forms must be taken into consideration in all strategic land-use planning and development assessment processes.¹³⁸ Strategic and legally enforceable plans need clear objectives for the reduction of greenhouse gas emissions, or requirements for assessing the carbon performance of individual development proposals.¹³⁹ Such requirements then need to be placed within a legal framework that establishes incentives to encourage and reward effective carbon performance development, and disincentives that discourage developments associated with poor carbon performance.¹⁴⁰ Bajracharya, Childs and Hastings explain how climate-resilient land-use planning can minimise climate risks: (i) prohibiting development in high-risk areas through zoning and overlay controls; (ii) limiting the types of development in high- to moderate-risk areas; and (iii) applying appropriate development controls in moderate- and lower-risk areas such as minimum elevations, setbacks and lot sizes, as well as maximum densities and site

¹³⁷ Ibid 25.

¹³⁸ Nicole Gurran, Elisabeth Hamin and Barbara Norman, 'Planning for Climate Change: Leading Practice Principles and Models for Sea Change Communities in Coastal Australia' (Report No 3, The National Sea Change Taskforce, July 2008) 25.

¹³⁹ Ibid.

¹⁴⁰ Ibid.

coverage.¹⁴¹ The climate-development integrated approach recommends that Bangladesh integrate climate change mitigation and adaptation measures in all coastal land-use planning. As the *National Land Use Policy 2001* and relevant laws fail to do so, they score 0 in Table 7.7.

Table 7.7: Average Score of the Land-use Policies and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>National Land Use Policy 2001</i>	0	0	0	0	0
<i>Bengal Alluvion and Diluvion Regulation 1825</i>	0	0	0	0	0
<i>Alluvial Lands Act 1920</i>	0	0	0	0	0
<i>Bengal Alluvion (Amendment) Act 1868</i>	0	0	0	0	0

VII.V.G The National Energy Policy and Relevant Laws

The burning of fossil fuels (often called non-renewable energy) such as coal and oil is considered a trigger for climate change. In contrast, renewable energy sources such as solar energy, wind energy, ocean energy, hydro energy and bioenergy play a role in providing energy services in a sustainable manner and, in particular, in mitigating climate change.¹⁴² The IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation brought together the most relevant and best information available to provide the world with a scientific assessment of the potential of renewable energy sources to mitigate climate change.¹⁴³ Bangladesh's renewable resources are adequate; they include: wind- and sunlight-based technologies, biogas (from digesting animal manure), hydro opportunities in the hills and tidal power in the delta islands of the south.¹⁴⁴ Although the usages of renewable energy sources in the country are still very limited, the relevant policies and legislation are currently promoting them, which will lead Bangladesh on a path to green energy.

¹⁴¹ Bajracharya, Childs and Hastings, above n 135.

¹⁴² William Moomaw et al, 'Renewable Energy and Climate Change' in Ottmar Edenhofer et al (eds), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (Cambridge University Press, 2011) 161, 167.

¹⁴³ Intergovernmental Panel on Climate Change, *Press Release: Potential of Renewable Energy Outlined in Report by the Intergovernmental Panel on Climate Change* (9 May 2011) <<http://srren.ipcc-wg3.de/press/content/potential-of-renewable-energy-outlined-report-by-the-intergovernmental-panel-on-climate-change>>.

¹⁴⁴ Bikash Singha Sutradhar, 'Green Energy Financing in Bangladesh' (Paper Presented in IFAD-APRACA FinPower Regional Green Finance Forum: Integrated Clean and Renewable Energy and Environmental Sustainability Components into Rural Financing, Nepal, 2010) 8.

The *National Energy Policy 1995* acknowledges the remoteness of off-shore islands and the coastal zone in general, and it finds virtually no possibility of bringing this area under the networks of commercial fuels. Nevertheless, Section 3.4 of the *Policy* recommends assessing the prospect of renewable energy (i.e. tidal and wave power) in coastal areas. Therefore, this document scores 1 in Table 7.8 under the category of issue identification. The Ministry of Power, Energy and Mineral Resources drafted *National Energy Policy 2008* and the *Energy Conservation Act 2008* without any focus on the coastal zone. However, both documents focus on renewable energy usage in the country, as it contributes to the security of energy supply and protection of the environment. Thus, they also score 1 in Table 7.8. The government enacted the *Sustainable and Renewable Energy Development Authority (SREDA) Act 2012* and drafted the *Energy Efficiency and Conservation Rules 2012*. These laws will help Bangladesh to reduce future emissions through the development of renewable energy. Therefore, they score 1 under each category in Table 7.8.

Table 7.8: Average Score of the Energy Policy and Relevant Laws

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>National Energy Policy 1995</i>	1	0	0	0	1
<i>National Energy Policy 2008 (Draft)</i>	1	0	0	0	1
<i>Energy Conservation Act 2008</i>	1	0	0	0	1
<i>Sustainable and Renewable Energy Development Authority (SREDA) Act 2012</i>	1	1	1	1	4
<i>Energy Efficiency and Conservation Rules 2012 (Draft)</i>	1	1	1	1	4

VII.V.H The National Policy for Safe Water Supply and Sanitation

Safe water and sanitation are basic human needs. The UN also notes them as a basic human right.¹⁴⁵ However, the availability of safe drinking water and sanitation in Bangladesh is expected to worsen as the country experiences the effects of climate change.¹⁴⁶ The shallow

¹⁴⁵*The Human Right to Water and Sanitation*, GA Res 64/292, GAOR, 64th sess, Agenda Item 48, UN Doc A/Res/64/292 (3 August 2010).

¹⁴⁶Syful Islam, *Safe Drinking Water Disappearing Fast in Bangladesh* (7 May 2013) The Guardian: Guardian Development Network <<http://www.guardian.co.uk/global-development/2013/may/07/safe-drinking-water-disappearing-bangladesh>>.

coastal aquifers have high salinity.¹⁴⁷ As a result, deep tube-wells do not yield sweet water. Around 28 million people are already living in harsh conditions with a scarcity of safe water.¹⁴⁸ Climate change is expected to make drinking water even scarcer in coastal regions.

The sea-level rises are jeopardising clean water supplies with the intrusion of salt-water.¹⁴⁹ Natural sources of freshwater such as ponds and wetlands are becoming unusable because of increased salinity intrusion. Salinity in the water of coastal areas has now reached over 20 parts per thousand, but the human body can only tolerate five parts per thousand.¹⁵⁰ Therefore, obtaining safe drinking water has become a challenge for coastal people. Women in these areas need to go miles to collect a pitcher of safe drinking water.¹⁵¹ Section 8.1.10 of the *National Policy for Safe Water Supply and Sanitation 1998* assigns priority to under-served and un-served areas.¹⁵² The coastal zone receives higher priority under this section, although the policy does not address the zone separately.

More frequent and severe flooding and cyclones damage water and sanitation facilities. They inundate latrines and tube-wells in low-lying coastal areas. In 2007, a storm surge associated with Cyclone Aila breached embankments and inundated several localities.¹⁵³ It trapped seawater in those areas for a long time, increased salinity levels of both surface and groundwater, and made the water no longer fit for human consumption.¹⁵⁴ Section 8.1.7 of the *National Policy for Safe Water Supply and Sanitation 1998* mentions several measures to ensure the supply of safe water during natural disasters: (i) necessary measures will be taken on an emergency basis so that people have access to safe water and do not have to drink contaminated water; (ii) necessary measures will be taken to prevent contamination and damage of tube-wells during natural disasters, and (iii) the Department of Public Health Engineering will store enough materials and

¹⁴⁷ Ahmed, above n 88, 22.

¹⁴⁸ Ibid.

¹⁴⁹ Bangladesh UNICEF, United Kingdom <<http://www.unicef.org.uk/UNICEFs-Work/What-we-do/Issues-we-work-on/Climate-change/Climate-adaptation-case-studies/Bangladesh/>>.

¹⁵⁰ Islam, above n 146.

¹⁵¹ Ibid.

¹⁵² Islam and Koudstaal, above n 81, 18.

¹⁵³ Water Aid, 'Handbook on Climate Change and Disaster Resilient Water, Sanitation and Hygiene Practices' (Water Aid in Bangladesh, December 2012), 13.

¹⁵⁴ Ibid.

spares to take immediate action to repair or install tube-wells in collaboration with local bodies and NGOs.¹⁵⁵

However, the document does not recommend any such emergency measures for sanitation facilities during or after natural disasters. In fact, sanitation faces its own set of challenges, with only 39 per cent of the population estimated to have had access to adequate sanitation facilities in 2004.¹⁵⁶ Increased cyclones and tidal surges may damage sanitation services and seriously reduce coastal people's access to safe sanitation. To sustain a safe water supply and sanitation service in the climate change disaster-affected areas, it is crucial to find new sources of water (e.g. rainwater instead of groundwater), and new technologies (e.g. reverse osmosis instead of tube-wells).¹⁵⁷

In addition to emergency measures, more guidelines are required under this *Policy* to address the long-term effects of climate change on water supply and sanitation. Water supply and sanitation in urban areas can also affect climate change. For example, the carbon footprint of water supply and sanitation through energy used in pumping can be significant.¹⁵⁸ This must be taken into account in adaptation measures such as demand management and leakage minimisation. In fact, these types of measures have the potential to contribute to both the mitigation of adverse effects and the adaptation of technologies and systems to increase resilience.¹⁵⁹ The *National Policy for Safe Water Supply and Sanitation 1998* scores 1 under each category of issue identification, causal link exploration and response strategies (see Table 7.9), giving it a total score of 3, which means that the document shows little progress in the integration of climate change and development.

¹⁵⁵Ministry of Local Government, Rural Development and Cooperatives, Government of the People's Republic of Bangladesh, *National Policy for Safe Water Supply and Sanitation, 1998*, 9.

¹⁵⁶*Water Supply and Sanitation in Bangladesh* (7 July 2013) Wikipedia <http://en.wikipedia.org/wiki/Water_supply_and_sanitation_in_Bangladesh>.

¹⁵⁷Water Aid, above n 153, 25.

¹⁵⁸World Health Organisation, 'Summary and Policy Implications Vision 2030 : The Resilience of Water Supply and Sanitation in the Face of Climate Change' (2009) 5.

¹⁵⁹*Ibid.*

Table 7.9: Average Score of the National Policy for Safe Water Supply and Sanitation

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>National Policy for Safe Water Supply and Sanitation 1998</i>	1	1	1	0	3

VII.V.I The National Agricultural Policy

The agricultural sector is the single largest contributor to the Gross Domestic Product (GDP) in Bangladesh.¹⁶⁰ At the same time, it is the most vulnerable sector because its productivity completely depends on climatic factors such as temperature, rainfall, light intensity, radiation and sunshine duration.¹⁶¹ Climate change poses additional challenges to agriculture beyond the abovementioned variability.¹⁶² The World Bank says that crop agriculture would be more vulnerable in Bangladesh in a warmer world.¹⁶³ Overall, agricultural GDP is projected to be 3.1 per cent lower each year (US\$36 billion in lost value-added) as a result of climate change.¹⁶⁴ However, the *National Agricultural Policy* does not mention climate change as one of its constraints under Section 1.5.¹⁶⁵

Sea-level rises affect agriculture in three ways: (i) salinity intrusion, (ii) flooding, and (iii) increasing cyclone frequency and depth of damage.¹⁶⁶ The combined effects of these three factors decrease agricultural production in the coastal zone. Salinity intrusion due to sea-level rises causes unavailability of fresh water and soil degradation.¹⁶⁷ It also decreases agricultural production in the region. At present, around 0.83 million ha of the coastal area are under salinity in different magnitudes.¹⁶⁸ Increased salinity alone from a 0.3 m sea-level rise may cause a net

¹⁶⁰Ministry of Agriculture, Government of the People's Republic of Bangladesh, *National Agricultural Policy 1999*, 1.

¹⁶¹Ministry of Environment Forest, Government of the People's Republic of Bangladesh, *Climate Change and Agriculture in Bangladesh: Information Brief* <<http://cmsdata.iucn.org/downloads/agriculture.pdf>> 2.

¹⁶²Group, above n 68.

¹⁶³The World Bank, above n 90, 37.

¹⁶⁴The World Bank Group, above n 162, 73.

¹⁶⁵Ministry of Agriculture, above n 160, sec 1.5.

¹⁶⁶Ministry of Environment Forest, above n 161, 3.

¹⁶⁷Ibid.

¹⁶⁸M Harun-ur-Rashid and M Shirazul Islam, 'Adaptation to Climate Change for Sustainable Development of Bangladesh Agriculture' (Bangladesh Country Paper, Bangladesh Agricultural Research Institute, November 2007) 4.

reduction of 0.5 million metric tonnes of rice production.¹⁶⁹ In 2002, flash floods damaged around 80,000 acres of crops in 12 upazillas in Chittagong and Cox's Bazar districts.¹⁷⁰ The coastal inundation area is estimated to increase in the future, with an adverse effect on crop production.¹⁷¹ Section 17.2 of the *National Agricultural Policy 1999* recognises water logging and salinity as a serious problem in coastal areas. The section recommends salt-tolerant crops along with possible measures to resist salinity.¹⁷² Section 9 prioritises research on the development of improved crop varieties and technologies that are suitable for cultivation in flooded conditions or in salinity-affected coastal areas.¹⁷³ Therefore, the *Policy* recommends few responses, although it does not identify or elaborate the linkages of climate change and agricultural development activities. Thus, it scores 1 under the response category in Table 7.10.

There is a clear imperative for action to prepare the agricultural sector of Bangladesh to adapt to climate change. Adaptation cannot be left to farmers alone. They need skills, capital, access to the right information and advice, and suitable incentives to make the necessary changes.¹⁷⁴ Successful adaptation to climate change requires flexible and risk-based approaches that deal with future uncertainty, and it provides strategies that are robust enough to cope with a range of possible local climate outcomes and variations.¹⁷⁵ The *National Agricultural Policy 1999* needs to incorporate such robust strategies. The policies adopted by government at various levels, and the signals they send to farmers and others in the food chain, influence the performance of the agricultural sector in adapting to climate change and counteracting its negative effects.¹⁷⁶ There are several potential areas of emission of greenhouse gases in agriculture, as well as consequent potential for mitigation. Energy consumption in agriculture is increasing due to mechanised irrigation and tillage practices.¹⁷⁷ In the case of rice cultivation, the use of diesel and electricity is increasing every year. The *National Agricultural Policy* needs to take this issue into account.

¹⁶⁹Hossain and Hossain, above n 71, 35.

¹⁷⁰Rashid and Islam, above n 168, 7.

¹⁷¹Ministry of Environment Forest, above n 161, 3.

¹⁷²Ministry of Agriculture, above n 160, 19.

¹⁷³Ibid 12.

¹⁷⁴Chris Stokes and Mark Howden, 'Adapting Agriculture to Climate Change' in Helen Cleugh et al (eds), *Science and Solutions for Australia: Climate Change* (CSIRO, 2011) 85, 88.

¹⁷⁵Ibid 85.

¹⁷⁶Stokes and Howden, above n .

¹⁷⁷M Asaduzzaman, 'Managing Bangladesh Agriculture under Climate Change' (Bangladesh Institute of Development Studies, December 2008 2008) 13.

Table 7.10: Average Score of the Agricultural Policy

Name of Policy Document	Category				Total Score
	Issue	Causal Links	Responses	Process	
<i>National Agricultural Policy 1999</i>	0	0	1	0	1

VII. V.J The National Rural Development Policy

The overall economic development of Bangladesh is closely linked with rural development,¹⁷⁸ as 80 per cent of the country's total population lives in rural areas.¹⁷⁹ The *National Rural Development Policy 2001* aims at comprehensive and stable social and economic development in the villages of Bangladesh (Section 2.17). Thus, all directives in the document, in general, are applicable to the rural areas of the coastal zone. Moreover, Section 5.15 provides an Area Specific Special Development Programme that focuses on coastal areas and islands. This section recommends the introduction of suitable integrated programs and their implementation for the development of education, human resources, family planning, agriculture, water resources, physical infrastructure and housing of these areas.¹⁸⁰ However, the policy is silent about the implications of climate change on rural development.

Poor people in rural coastal areas are already facing severe vulnerability to the threats posed by climate change.¹⁸¹ There is degradation of land, increased salinity of seawater, and fisheries are also affected. Climate change brings a variation in the occupation of coastal-rural people. They shift from agro-based occupations to more informal sectors, making a rural-urban migration.¹⁸² In general, migrants are particularly susceptible to environmental disruptions. Even if not displaced, climate change is threatening food security for the most vulnerable people in Bangladesh.¹⁸³ Sustainable land and resource management can contribute to mitigating climate

¹⁷⁸Rural Development and Cooperatives Division, Government of the People's Republic of Bangladesh, *National Rural Development Policy 2001*, 5.

¹⁷⁹*People and Population of Bangladesh: The Racial Mix*, Meet Bangladesh <<http://www.discoverybangladesh.com/meetbangladesh/people.html>>.

¹⁸⁰Rural Development and Cooperatives Division, above n 178, 21.

¹⁸¹Mehrin Karim, *Climate Change as an Environmental as well as Development Issue*, Policy Research Institute <http://www.pri-bd.org/index.php?option=com_content&view=article&id=348:climate-change-as-an-environmental-as-well-as-development-issue&catid=47:bangladesh-economy&Itemid=59>.

¹⁸²*Ibid.*

¹⁸³*Ibid.*

change while improving the livelihoods of rural populations.¹⁸⁴ Rural development schemes can help in adapting to climate change.¹⁸⁵ Therefore, several provisions of the *National Rural Development Policy 2001* need to be revised to include criteria for climate change adaptation and mitigation. Some of these provisions are: poverty alleviation (Section 5.2), rural infrastructure development (Section 5.3), agro-based rural economy (Section 5.4), rural health services and nutrition development (Section 5.6), and land-use and development (Section 5.9). As the linkage between climate change and rural development has not been explored, the document scores 0 in Table 7.11.

Table 7.11: Average Score of the National Rural Development Policy

Name of Policy Document	Category				Total Score
	Issue	Casual Links	Responses	Process	
<i>National Rural Development Policy 2001</i>	0	0	0	0	0

VII.VI Conclusion

The law exerts an inevitable influence over the process of ICZM.¹⁸⁶ According to Eisma, Christie and Hershman, ICZM cannot be effectively implemented without an overarching legislative framework.¹⁸⁷ For climate-resilient coastal management, ICZM legislation needs to incorporate the climate-development integrated approach. However, this chapter finds that, to date, there is no ICZM legislation in Bangladesh. In the absence of any such law, this chapter reviews all other sectoral laws and policies that are relevant to, or have an influence on, the coastal zone and coastal resources. Using the law and policy analysis methodology, this chapter evaluates the extent to which these sectoral laws and policies reflect the climate-development integrated approach. This is the fourth issue in this thesis.

¹⁸⁴*Sustainable Development: Climate Change Responses that Strengthen Rural Communities*, Ford Foundation <<http://www.fordfoundation.org/issues/sustainable-development/climate-change-responses-that-strengthen-rural-communities>>.

¹⁸⁵Jayashree Nandi, *Rural Development Schemes can also Help in Adapting to Climate Change*, (5 June 2013) The Times of India <<http://timesofindia.indiatimes.com/india/Rural-development-schemes-can-also-help-in-adapting-to-climate-change/articleshow/20437731.cms?>>.

¹⁸⁶Gibson, above n 4, 127.

¹⁸⁷Eisma, Christie and Hershman, above n 1, 355.

All of these sectors are either already facing, or are predicted to face in the near future, the severe effects of climate change. However, most of the sectoral laws and policies still do not address climate change issues. This chapter finds that the sectoral policies and legal responses to combating climate change in the country are very poor. Tables 7.3, 7.5–7.7 and 7.11 show that none of the laws and policies that are relevant to coastal tourism, fisheries, water, land-use and development, or rural development reflect the climate-development integrated approach. As a result, they have been given a score of 0 in all categories of the law and policy analysis methodology.

The energy sector is an exception in this regard, as the relevant laws and policies promote renewable energy sources in the country to mitigate climate change. The *National Forest Policy 1994* also confirms the government's commitments to follow national and international obligations to address global warming.¹⁸⁸ Thus, the document has scored 1 in Table 7.4, which indicates that the issue has been identified but not elaborated. In contrast, the *National Agricultural Policy 1999* recommends a few response strategies to combat the effects of climate change, although it did not identify or elaborate the linkages of climate change and agricultural development activities. This policy also scored 1 under the response category in Table 7.10. The chapter finds the draft *National Environmental Policy 2013* to be the most promising document. This policy has incorporated the climate-development integrated approach in its true sense. It not only identifies the issue, but it also elaborates the climate change adaptation and mitigation options in detail. Therefore, it has scored 8 in Table 7.2, which means that the document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

Overall, the findings of this chapter show that most of the sectoral laws and policies that are relevant to ICZM require revision to address the climate change issue. The incorporation of a climate-development integrated approach in these sectoral laws and policies may ensure the climate-resilient future of the nation.

¹⁸⁸Ministry of Environment and Forest, above n 82.

Chapter VIII. A Way Forward to Achieve Climate-development Integration into Coastal Management of Bangladesh

VIII.I Introduction

This chapter synthesises what has been previously discussed and pulls together all of the findings from Chapters II–VII. It addresses the research question of this thesis: ‘To what extent is the climate-development integrated approach incorporated into Bangladesh’s coastal laws and policies?’ At the beginning of this thesis (in Section I.III), this research question is broken down into six issues for convenience: (i) the relevance of the climate-development integrated approach for Bangladesh—the first issue and discussed in Chapter II; (ii) the relevance of the climate-development integrated approach for coastal management—the second issue and discussed in Chapter III; (iii) the extent of reflection of the climate-development integrated approach in Bangladesh’s climate change laws and policies—the third issue and discussed in Chapter IV; (iv) the extent of reflection of the climate-development integrated approach in Bangladesh’s development policies—the fourth issue and discussed in Chapter V; (v) the extent of reflection of the climate-development integrated approach in Bangladesh’s coastal policies—the fifth issue and discussed in Chapter VI; and (vi) the extent of reflection of the climate-development integrated approach in Bangladesh’s coastal management legislation—the sixth issue and discussed in Chapter VII. Chapter VIII summarises the findings of Chapters II–VII in order to address the research question. Section VIII.III shows the extent to which Bangladesh’s coastal laws and policies reflect the climate-development integrated approach.

This chapter is more than just a summary of the previous chapters presented in the main thesis. It provides a synthesis of the key findings and arguments projected by the research. It also recommends how to adopt the climate-development integrated approach into Bangladesh’s coastal laws (Section VIII.VI) and policies (Section VIII.V). Overall, this chapter justifies the approach used by the study and examines the pathways forward.

VIII.II Context of the Study

It is now well established that Bangladesh is one of the most vulnerable countries in the world to climate change. Ericson et al.¹ estimate that more than one million people will be directly affected by 2050 in three mega deltas: the Ganges–Brahmaputra delta in Bangladesh, the Mekong delta in Vietnam and the Nile delta in Egypt.² Taking a regional perspective, Watson et al.³ and Nicholls et al.⁴ mention that the threat of increased coastal flooding will be most severe for South and South-East Asia (Bangladesh is located in this region), Africa, the southern Mediterranean coasts, the Caribbean and most islands in the Indian and Pacific oceans. This thesis deals with the coastal areas of Bangladesh as a case study, and the rationales are mentioned in Section I.V. Section VI.II also gives a brief geo-morphological and socio-economic context of the study area. In fact, this coastal zone is a perfect place to explore the climate-development nexus. It is known as a zone of vulnerabilities as well as opportunities.⁵ Therefore, the zone needs special attention and requires a distinctive legal framework for its management. Cicin-Sain and Knecht⁶ argue for more proactive and integrated management of coastal zones as an effective mechanism for strengthening sustainable development, and to make it both environmentally sound and economically efficient.⁷ This raises the issue of integration of climate change and development in coastal management.

¹Jason P Ericson et al, et al, 'Effective Sea-Level level Rise and Deltas: Causes of Change and Human Dimension Implications' (2006) 50 *Global Planet Change* 63. Ericson et al, above n .

²Robert J Nicholls et al, et al, 'Coastal Systems and Low-lying Areas' in Martin L Parry et al et al (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 316, 327. Nicholls et al, above n , 327.

³R T Watson, M C Zinyowera and Richard H Moss (eds), *The Regional Impacts of Climate Change-An Assessment of Vulnerability. Special Report of Working Group II of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 1998).

⁴Robert J Nicholls, Frank M J Hoozemans and Marcel Marchand, 'Increasing Flood Risk and Wetland Losses due to Global Sea-Level Rise: Regional and Global Analyses' (1999) 9 *Global Environmental Change* S69.

⁵Ministry of Water Resources, Government of the People's Republic of Bangladesh, *Coastal Zone Policy 2005*, 1.

⁶Biliana Cicin-Sain, 'Sustainable development and integrated coastal management' (1993) 21(1-3) *Ocean & Coastal Management* 11; Biliana Cicin-Sain et al, *Integrated Coastal and Ocean Management: Concepts and Practices* (Island Press, 1998) 499p.

⁷Richard S J Tol et al, 'Some economic considerations on the importance of proactive integrated coastal zone management' (1996) 32(1) *Ocean & Coastal Management* 39.

According to Gaast and Begg,⁸ climate policy-making has increasingly become inter-related with economic, financial, environmental and development policies, both in industrialised and developing countries. This thesis is also based on the proposition that climate change cannot be considered in isolation in coastal areas. In fact, there is a paradigm shift from an isolated to an integrated approach for dealing with climate change responses and development issues. Sections II.V and II.VI detail the nature and reasons of such a paradigm shift. The focus of a climate-development integrated approach in a changing climate, as mentioned by Mitchell and Maxwell,⁹ reflects growing recognition that mitigation, adaptation and development need to be tackled together rather than as separate issues. The provisions under the Cancun Agreement, such as formulating NAMAs ‘in the context of sustainable development’,¹⁰ are important steps in that direction. Further, the recently updated process of ‘technology needs assessments for climate change’¹¹ takes developing countries’ development priorities as a starting point for identifying strategic sectors for achieving climate and sustainable development goals, and selecting technologies for mitigation and adaptation with development benefits.¹²

These developments, as noted by Gaast and Begg, add an increased focus on how to conduct climate adaptation and mitigation as an integrated part of domestic development policies.¹³ Linking climate and development goals in national policies enables countries to make a change in domestic systems for achieving long-term objectives with low-carbon development and climate-resilient development.¹⁴ This emerging concept of linked climate-development objectives is addressed in this thesis as a climate-development integrated approach. Sections II.V and II.VI detail how and why this integrated approach is emerging. How this integrated approach can be addressed in a domestic legal framework is a question of time, especially for developing

⁸Wytze van der Gaast and Katherine Begg, *Challenges and Solutions for Climate Change* (Springer, 2012) 7.

⁹Tom Mitchell and Simon Maxwell, *Defining Climate Compatible Development* (November 2010) Climate & Development Knowledge Network (CDKN), Policy Brief <<http://cdkn.org/wp-content/uploads/2010/11/CDKN-CCD-DIGI-MASTER-19NOV1.pdf>>.

¹⁰Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on its Sixteenth Session, Held in Cancun from 29 November to 10 December 2010-Addendum-Part 2: Action Taken by the Conference of the Parties at Its Sixteenth Session*, UN Doc FCCC/CP/2010/7/Add.1 (15 March 2011) para 48.

¹¹United Nations Development Programme, *Handbook for Conducting Technology Needs Assessment for Climate Change* (2010)<<http://unfccc.int/ttclear/pdf/TNA%20HANDBOOK%20EN%2020101115.pdf>>.

¹²Gaast and Begg, above n 8, 19.

¹³Ibid.

¹⁴Ibid.

countries such as Bangladesh. This thesis is an endeavour to examine the extent to which the climate-development integrated approach has been reflected in the coastal laws and policies of Bangladesh.

VIII.III Climate-development Integrated Approach: A Triple Win kit for Coastal Management of Bangladesh

According to Section II.VII, the climate-development integrated approach moves beyond the traditional separation of adaptation, mitigation, and development strategies.¹⁵ It aims to deliver low-carbon development,¹⁶ while at the same time supporting people's ability to adapt to climate change¹⁷ (climate-resilient development¹⁸). A sizeable body of literature on the climate-development nexus has been developed by the research community in recent times.¹⁹ Sections II.V.A–II.V.D narrate them in detail. Apart from those literatures, Tompkins et al²⁰ conducted a study on developing countries to obtain an initial insight on the reality of triple wins (i.e. generating climate adaptation, mitigation and development benefits). The authors consider a range of triple wins in coastal policies of four coastal countries, namely: Vietnam, Kenya, Ghana and Belize. These are all developing countries with long coastlines and belong to four very different areas in the developing world—that is, South-east Asia, East Africa, West Africa, and Latin America and the Caribbean. Like Bangladesh, these countries are also prone to multi-faceted challenges posed by climate change and have the potential to reduce emissions through programs, such as REDD+. The study considers several coastal management policy choices that deliver triple-wins, for example, mangrove restoration and management, conservation of water catchment areas, creation of greenbelts between coastal farms and sea, construction of offshore wind/wave or tidal energy, etc.²¹ Thus, the study shows an empirical evidence of triple wins in

¹⁵Feri Gwata, *Climate Compatible Development: Key Messages from the Climate Change Symposium 2011* (16 June 2011) http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=779:climate-compatible-development-key-messages-from-the-climate-change-symposium-2011&catid=92:enviro-africa&Itemid=297.
Cosultancy Africa Intelligence

¹⁶ See Section II.V.B for low-carbon development.

¹⁷Emma L Tompkins et al, 'An Investigation of the Evidence of Benefits from Climate Compatible Development' (Working Paper No 124, Centre for Climate Change Economics and Policy, January 2013) 2.

¹⁸ See Section II.V.C for climate-resilient development.

¹⁹ See Section II.V.

²⁰Tompkins et al, above n 17, 4.

²¹ Ibid 13.

terms of the trade-offs and synergies in the coastal management policies of these four countries.²² A few researchers highlight the triple win issue from the Bangladesh perspective as well. For example, Ayers and Huq²³ demonstrate the climate adaptation, mitigation and development nexus through a waste-to-compost project in Bangladesh.²⁴ Venema and Cisse assessed the ability of CDM to support mitigation and adaptation through decentralised renewable energy.²⁵ The UNDP project on coastal afforestation in Bangladesh, mentioned in Section II.IX, also bears the potential of triple benefits for the coastal communities of the country. In fact, there is growing evidence of triple win policies on the ground, and this thesis considers the issue for coastal management.

With the climate-development integrated approach, the coastal management of Bangladesh needs to move beyond the traditional separation of adaptation, mitigation and development strategies. The aim of this integration is to enhance the resilience of natural coastal systems and reduce vulnerability of coastal communities (i.e. adaptation to climate change), to manage the coastal carbon sinks as described in Section III.XIV (i.e. mitigation) and to secure the economic development of the coastal people.²⁶ Thus, the climate-development integrated approach aims to work as a triple win kit for the coastal management of Bangladesh by (i) promoting economic growth through low-carbon growth, (ii) mitigating carbon emissions through participation in a global REDD+ scheme, and (iii) adapting to climate related hazards in the coastal areas. Laws and policies that deliver triple wins are practical solutions for Bangladesh in the context of limited resources to invest separately in coastal management and climate response.

VIII.IV Findings of this Thesis

VIII.IV.A The Relevance of the Climate-development Integrated Approach for Bangladesh

²² Ibid 16.

²³ Jessica M Ayers and Saleemul Huq, 'The Value of Linking Mitigation and Adaptation: A Case Study of Bangladesh' (2009) 43(5) Environmental Management 753, 753. Ayers and Huq, above n , 753.

²⁴ Transforming waste into compost works as a means of improving soil quality in drought-prone areas while also reducing methane emissions.

²⁵ Henry David Venema and Moussa Cisse (eds), *Seeing the Light: Adapting to Climate Change with Decentralized Renewable Energy in Developing Countries* (International Institute for Sustainable Development & Climate Change Knowledge Network, 2004) 143.

²⁶ See the case study in Section II.IX.

Bangladesh is a disaster-prone developing country. It needs to adopt a new generation development process that safeguards development from climate effects (climate-resilient development) and reduces or keeps emissions low without compromising development goals (low-emissions development).²⁷ The country has a desire to benefit from new economic opportunities and also to improve access to climate finance. This requires a strong legal framework, leadership and political will. This thesis justifies the relevance of a climate-development integrated approach for Bangladesh (first issue),²⁸ as the country needs to become more resilient to climate change, achieve growth via a low greenhouse gas emissions pathway and reduce poverty. Such a triple win goal can be achieved through an integrated approach.

The thesis produces references from international documents and national estimates, and shows the importance of this integration.²⁹ According to chapter II, about US\$2.7 billion of investment in different development projects are at risk due to climate change in Bangladesh.³⁰ If no action is taken, the changing climate may cause damage of about US\$4-14 billion in a year in this country.³¹ The thesis mentions the research of Haque on the ADP projects,³² which says nearly 40 per cent of the development projects need to be modified for possible mitigation or adaptation options.³³ It also identifies seven specific drivers (logical perspective, resource use perspective, developing country perspective, donors' perspective, climate finance perspective, new market perspective and reporting perspective) for the adoption of the climate-development integrated approach in this country.³⁴ Such an integrated approach can minimise the negative effects of climate change whilst maximising 'triple wins' of low emissions, increased resilience and development benefits³⁵ under the same policy framework.³⁶

²⁷Tom Mitchell and Simon Maxwell, *Defining Climate Compatible Development* (November 2010) Climate & Development Knowledge Network (CDKN), Policy Brief <<http://cdkn.org/wp-content/uploads/2010/11/CDKN-CCD-DIGI-MASTER-19NOV1.pdf>> 1.

²⁸ See Chapter II for the first issue of this thesis.

²⁹ See Section II.VIII for the relevance of the climate-development integrated approach for Bangladesh.

³⁰A K Enamul Haque, *An Assessment of Climate Change on ADP of Bangladesh* (15 November 2009) <http://www.ergonline.org/documents/25_11_09%20Climate%20Change%20EHq.pdf> 6.

³¹Ibid 2.

³² See Section II.VIII.

³³ Ibid 4.

³⁴ See Section II.VIII.

³⁵Climate & Development Network, *News from CDKN: Loss and Damage Agenda Promoted within Bangladesh* (March 2013) Bangladesh Country Snapshot <<http://cdkn.org/wp-content/uploads/2013/03/Bangladesh-Country-Snapshot.pdf>> 14.

³⁶Feri Gwata, *Climate Compatible Development: Key Messages from the Climate Change Symposium 2011* (16

The thesis identifies four challenges of this approach namely, institutional constraints, financial constraints, lack of awareness and challenge from anti-reform groups.³⁷ Section II.X suggests several recommendations for the country how to address these challenges. Bangladesh needs to develop appropriate coordination mechanisms to facilitate inter-ministerial discussion and decision-making to overcome these constraints. The researchers, policy makers, civil society and the private sectors can come together to explore the key issues and examine different scenarios and their implications for low-carbon, climate-resilient growth. A wide-spread awareness is required among the policy-makers to accommodate the co-benefits of climate-development integrated approach. The investigation in this thesis ultimately reveals an in-depth evidence about the needs and opportunities of Bangladesh for a low-carbon and climate-resilient development.³⁸

VIII.IV.B The Relevance of the Climate-development Integrated Approach for Coastal Management

The thesis focuses on coastal management. It explores the relevance of the climate-development integrated approach for coastal management (second issue of this thesis). The finding of this thesis is that the climate-development integrated approach minimises the harm caused by climate effects in the coastal zone (climate-resilient development),³⁹ and maximises the development opportunity of the zone while reducing emissions (low-carbon development).⁴⁰ Chapter III narrates a number of implications of the integrated approach on coastal management. First, it enhances the resilience of natural coastal systems and reduces the vulnerability of coastal communities (i.e. adaptation to climate change). Second, it works for the management of coastal carbon sinks as described in Section III.XIV (i.e. mitigation). Third, this approach is beneficial from both an economic and development perspective. Fourth, a climate-development integrated

June 2011) Consultancy Africa Intelligence
http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=779:climate-compatible-development-key-messages-from-the-climate-change-symposium-2011&catid=92:enviro-africa&Itemid=297.

³⁷ See Section II.X for the challenges of Bangladesh to adopt the climate-development integrated approach.

³⁸ See Chapter II.

³⁹ See Section II.V.C for climate-resilient development.

⁴⁰ See Section II.V.B for low-carbon development.

approach minimises the conflicts between development objectives and climate change response options in the coastal management of developing countries. Lastly, it encompasses the large lengths of shorelines that are presently undeveloped, but may be subject to significant pressures in the coming decades for climate change. By acting now, future development may be designed to be sustainable and to accommodate the potential effects of climate change and sea-level rises.⁴¹

The thesis explores all available adaptation and mitigation options for coastal management,⁴² and shows the relevance of integrating them in coastal management⁴³ (second issue). It narrates three adaptation strategies (i.e. planned retreat, accommodation and protection) recommended by the IPCC CZMS in detail.⁴⁴ The evaluation shows that the *Coastal Zone Policy*⁴⁵ and the *Coastal Development Strategy*⁴⁶ of Bangladesh incorporates several accommodative and protective measures, although there is scope for exploring other adaptive measures as described in Chapter III. The thesis also shows several ways in which Bangladesh can utilise its coastal carbon sinks as a mitigation strategy of climate change. For instance, (i) Bangladesh can include its blue carbon sinks (especially the mangroves) under Land Use, Land Use Change and Forestry (LULUCF) while submitting the annual National Inventory Submissions (NIS);⁴⁷ (ii) the country has immense potential for hosting emission reduction projects under the approved CDM methodology for afforestation and reforestation of degraded mangrove habitats in its coastal areas;⁴⁸ (iii) it can ensure the full and comprehensive inclusion of mangrove forests under REDD+;⁴⁹ and (iv) the country can even use NAMA-readiness activities to increase the understanding of the sink capacity of blue carbon ecosystems and of the emissions resulting from the conversion and degradation of mangroves, saltmarshes and/or seagrasses, identify drivers of

⁴¹Luitzen Bijlsma et al, 'Coastal Zones and Small Islands' in Robert T Watson, M C Zinyowera and Richard H Moss (eds), *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 1996) 289, 345, 315.

⁴² See Sections III.IX and III.X for the adaptation and mitigation options for coastal management.

⁴³ See Section III.XVII for the relevance of the climate-development integrated approach in coastal management.

⁴⁴ See Section III.IX.

⁴⁵ See Section VI.V for a discussion on the *Coastal Zone Policy*.

⁴⁶ See Section VI.VI for a discussion on the *Coastal Development Strategy*.

⁴⁷ See Section III.XIII.A.1 for Blue Carbon under the LULUCF.

⁴⁸ See Section III.XIII.A.2 for Blue Carbon under the CDM.

⁴⁹ See Section III.XIII.B.1 for Blue Carbon under REDD+.

these emissions and activities needed to address those drivers.⁵⁰ The evaluation of the *Coastal Development Strategy* in Section VI.VI shows that few projects under this document already support the management of coastal carbon sinks. However, they fail to address its contribution as a coastal mitigation strategy, although it emerges as a co-benefit of those projects.⁵¹ In fact, the thesis gives an indication that the purpose and design of ICZM in Bangladesh needs to be revisited, as do the policies and statutes that are relevant to its coastal management.

VIII.IV.C The Climate-development Integrated Approach in Climate Change laws and Policies

The thesis gives a brief idea of how seriously Bangladesh is addressing the climate change issue in its policies and legislations.⁵² The country has demonstrated its willingness to find a proper solution to the climate change problem by ratifying the UNFCCC and the Kyoto Protocol.⁵³ It considers climate change a development challenge rather than an environmental or geo-climatic problem.⁵⁴ Section IV.III discusses the administrative structure of Bangladesh related to climate change. It explores the climate-development institutional nexus in the country. As the thesis focuses on national laws and policies, it is important to understand the law and policy-making process of the country. Section IV.IV serves this purpose. The chapter mainly deals with the third issue of this thesis, which is the extent of reflection of the climate-development integrated approach in Bangladesh's climate change laws and policies. It examines the *Bangladesh Climate Change Strategy and Action Plan 2009*, the *National Adaptation Programme of Action 2005* and the *Country Framework to Mainstream Climate Risk Management and Adaptation 2006* by using a law and policy analysis methodology. Section I.VIII.B.2 describes this methodology in detail. The law and policy analysis methodology uses four major categories to examine the reflection of the climate-development integrated approach in any policy document or statute. All four categories are then provided with a score, and the total score interprets the extent of the reflection of the climate-development integrated approach in that particular policy document or

⁵⁰ See Section III.XIII.B.2 for Blue Carbon under the NAMAs.

⁵¹ See Sections VI.VI.A–VI.VI.I for a detailed discussion on nine strategic priorities of the *Coastal Development Strategy*.

⁵² See Chapter IV.

⁵³ See Section IV.II for the shift towards an integrated approach for climate change in Bangladesh.

⁵⁴ Fahmida Khatun and AKM Nazrul Islam, 'Policy Agenda for Addressing Climate Change in Bangladesh: Copenhagen and Beyond' (Occasional Paper No 88, Centre for Policy Dialogue, March 2010) 17.

statute. The scores of these three documents in Table 4.3 indicate that significant attention is paid to interlink climate change and development in Bangladesh. The finding of this chapter is that these documents have not only identified the specific concerns relating to climate change and its effect on development, but also have elaborated their linkages (the third issue of the research).

VIII.IV.D The Climate-development Integrated Approach in Development Policies

Climate change is moving from being an environmental issue to a core economic planning issue⁵⁵ in Bangladesh. If national development policies do not take climate change into account it may increase vulnerability in many cases. Development is now widely seen as a crucial factor in determining vulnerability to climate effects as vulnerability depends not only on exposure to climate-related hazards, but also on people's and systems' abilities to adapt.⁵⁶ Bangladesh is committed to adopt 'an integrated policy and plan to protect the country from the adverse effects of global warming'.⁵⁷ The thesis gives a brief idea about the national development planning of the country.⁵⁸ Chapter V deals with the fourth issue of this thesis, which is the extent of reflection of the climate-development integrated approach in Bangladesh's development policies. The thesis assesses three documents: the *Vision 2012*, the *Perspective Plan 2010–2021* and the *SFYP*. The finding of this chapter is mixed. A description of specific concerns relating to climate change is mentioned in *Vision 2021*, but the effects of climate change have not been linked with development.⁵⁹ Table 5.2 shows that the *Perspective Plan* for 2010–2021 has scored 6. This indicates that the document is considering climate change as a potential threat for development aspirations. The discussion about the *SFYP* in Section V.VI and its score in Table 5.3 explain that this document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

⁵⁵Mairi Dupar, 'Climate and Development Knowledge Network Annual Report 2013' (Climate and Development Knowledge Network, 2013) 7.

⁵⁶Malin Beckman et al, 'Adaptation or Development? Exploring the Distinctions (or Lack thereof) through Case Studies in Bangladesh and Vietnam' (Partner Report Series No 8, Adaptation Knowledge Platform, 2013) 12.

⁵⁷Merylyn Hedger, 'Climate Finance in Bangladesh: Lessons for Development Cooperation and Climate Finance at National Level' (Policy Brief No 14, Seventh Framework Programme, EDC 2020, March 2011) 18.

⁵⁸ See Section V.III for the national development plan of Bangladesh.

⁵⁹ See Section V.VI for a detailed discussion on *Vision 2021*.

VIII.IV.E The Climate-development Integrated Approach in Coastal Policies

The focus of this thesis is national laws and policies relevant to coastal management. Chapter VI particularly deals with coastal policies, and Chapter VII evaluates all other laws and policies relevant for coastal management in the country. There are two coastal policies in Bangladesh: the *Coastal Zone Policy* and the *Coastal Development Strategy*. The first one sets eight development objectives,⁶⁰ and the second one narrates their implementation mechanisms. The eight development objectives described in the first document have been translated into nine strategic priorities in the *Coastal Development Strategy*.⁶¹ Each of these nine strategic priorities is translated into 2–5 development projects.⁶² That means the *Coastal Zone Policy* is implemented through these development projects. Therefore, the evaluation of these development projects is important to understand the extent to which they reflect the climate-development integrated approach. Chapter VI deals with these two policy documents in detail. It addresses the fifth issue of this thesis, which is the extent of reflection of the climate-development integrated approach in Bangladesh's *Coastal Zone Policy* and the *Coastal Development Strategy*. The scores of these two documents indicate that both documents have identified climate change concerns, but the understanding of climate-development integration is at the stage of a growing level of awareness.⁶³ The complementarity or synergy between climate change adaptation and mitigation is missing in most of these projects. All the climate change response options, mentioned in these development projects, are accommodative in nature.⁶⁴ They could explore other adaptation options as mentioned in Sections III.IX.A and III.IX.C. Several projects of the *Coastal Development Strategy* have the potential to promote climate change mitigation,⁶⁵ but the document is silent about it.

⁶⁰ See Section VI.V.

⁶¹ See Section VI.VI.

⁶² See Sections VI.VI.A–VI.VI.I.

⁶³ See Tables 6.5 and 6.6.

⁶⁴ See Section III.IX.B for detail about the accommodation adaptive response to climate change.

⁶⁵ See Section III.XI to understand how coastal carbon sinks or blue carbon contributes to climate change mitigation.

VIII.IV.F The Climate-development Integrated Approach in Coastal Management Legislation

The thesis conceptualises what ICZM legislation is and what is its purpose.⁶⁶ According to Section VII.III, the term ICZM legislation refers to laws that (i) particularly or impliedly acknowledge the need for special coast-specific rules, principles, or other legal mechanisms; and (ii) expressly or impliedly manage human interactions with the coastal environment based on an appreciation that the coast is an integrated ecological whole.⁶⁷ The thesis establishes that the government of Bangladesh has enacted no ICZM legislation to date.⁶⁸ In the absence of any ICZM legislation, Chapter VII focuses on other sectoral laws and policies which have implications on the coastal zone or coastal resources in the country. The finding of this chapter is very alarming. Section VII.VI illustrates how emerging climate stresses are increasingly endangering the food and agricultural sector,⁶⁹ water supply and sanitation,⁷⁰ fisheries,⁷¹ forestry,⁷² environment,⁷³ land use,⁷⁴ energy⁷⁵ and tourism sector⁷⁶ of the country. Ironically, the evaluation and analysis show that most of these sectoral laws and policies fail to integrate climate considerations.⁷⁷ Tables 7.3, 7.5–7.7 and 7.11 show that none of the laws and policies relevant to coastal tourism, fisheries, water, land use and development, or rural development reflects the climate development integrated approach. As a result, they have received a score of 0 in all categories of law and policy analysis methodology.

The thesis finds that the energy sector of Bangladesh is an exception in this regard. The relevant laws and policies are promoting renewable energy sources in the country to mitigate climate change. Government's commitment to follow national and international obligations to address

⁶⁶ See Section VII.III for conceptualising ICZM legislation.

⁶⁷ Cormac Cullinan, 'Integrated Coastal Management Law: Establishing and Strengthening National Legal Frameworks for Integrated Coastal Management' (FAO Legislative Study No 93, FAO of the UN, 2006) 8-9.

⁶⁸ See Sections VII.III and VII.IV.

⁶⁹ See Section VII.VI.J.

⁷⁰ See Sections VII.VI.E and V.VI.H.

⁷¹ See Section VII.VI.D.

⁷² See Section VII.VI.C.

⁷³ See Section VII.VI.A.

⁷⁴ See Section VII.VI.F.

⁷⁵ See Section VII.VI.G.

⁷⁶ See Section VII.VI.B.

⁷⁷ See Tables 7.1–7.11.

global warming is confirmed in the *National Forest Policy* of 1994⁷⁸ and the *National Agricultural Policy* of 1999. The first document has scored 1 in Table 7.4, which indicates that the issue has been identified but not elaborated. In contrast, the *National Agricultural Policy 1999* recommends a few response strategies to combat the effects of climate change, although it does not identify or elaborate the linkages of climate change and agricultural development activities. This policy also scores 1 under the response category in Table 7.10. The thesis finds the draft *National Environmental Policy 2013* the most promising of all documents. This policy has incorporated the climate-development integrated approach in its true sense. It not only identifies the issue, but also elaborates the climate change adaptation and mitigation options in detail. Thus, it has scored 8 in Table 7.2, which means the policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.

The overall finding of this thesis is there is an absence of clear guidance on how to assess the conflicts, trade-offs and synergies between adaptation, mitigation and development actions in the existing coastal laws and policies of the country. There is scope for better inclusion of the climate-development integrated approach in the coastal management legal framework of Bangladesh. The country can enhance its coastal management by adopting strategic policies and legislation based on this integrated approach. Sections VIII.V and VIII.VI provide several recommendations for adopting the climate-development integrated approach into coastal laws and policies, respectively.

VIII.V Recommendations for Adopting the Integrated Approach into Coastal Policies

The thesis evaluates two existing coastal policies of Bangladesh, ie the *Coastal Zone Policy* and the *Coastal Development Strategy*. The first policy sets the goal of ICZM in the country and finalises eight development objectives.⁷⁹ The second one narrates the mechanism for implementing the *Coastal Zone Policy*. The eight development objectives described in the first document have been translated into nine strategic priorities in the *Coastal Development*

⁷⁸Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, *The National Forest Policy 1994*, 3.

⁷⁹ Sec Section VI.V.

Strategy.⁸⁰ Each of these nine strategic priorities is translated into 2–5 development projects.⁸¹ The *Coastal Zone Policy* is ultimately implemented through these development projects and aim to secure the development of coastal communities in the country. However, Sections II.II and III.VII argue that climate change can undermine or, in some cases, reverse the effectiveness and sustainability of development projects in the coastal region. Conversely, integrating climate change responses (mitigation and adaptation) into development activities can increase people's resilience (climate-resilient development),⁸² and promote low-carbon development.⁸³ That is the connotation of the climate-development integrated approach.⁸⁴ Therefore, Sections VI.VI.A to VI.VI.I analyse the development projects under the nine strategic priorities of the *Coastal Development Strategy* to get an idea of the extent to which these development projects reflect this integrated approach.

The finding is impressive as the policy document has a growing level of awareness and understanding of the value and requirements of the climate-development integrated approach.⁸⁵ However, all the climate change response options, mentioned in these development projects, are accommodative in nature.⁸⁶ They could explore other adaptation options as mentioned in Sections III.IX.A and III.IX.C. Section III.XI of the same chapter highlights how coastal carbon sinks or blue carbon contributes to climate change mitigation. Several projects of the *Coastal Development Strategy* have the potential to promote climate change mitigation, but the document is completely silent about it. This thesis emphasises the need to integrate climate change adaptation and mitigation into these coastal development projects. The following paragraphs narrate how to promote this process. Ideally, the integration occurs throughout the policy cycle, as poorly designed and conflicting policies exacerbates the vulnerabilities of the coastal communities.

⁸⁰ See Section VI.VI.

⁸¹ See Sections VI.VI.A–VI.VI.I.

⁸² See Section II.V.C.

⁸³ See Section II.V.B.

⁸⁴ See Section II.VII.

⁸⁵ See the score in Table 6.6.

⁸⁶ See Section III.IX.B for detailsof the accommodation adaptive response to climate change.

Section III.V describes the policy cycle of ICZM in detail. Figure 3.1 of the same chapter shows that the policy cycle of ICZM consists of five stages: (i) issue identification and assessment;(ii) program preparation;(iii) formal adoption and funding;(iv) implementation; and (v) evaluation. In fact, Section III.XVII and Figure 3.3 already give a brief idea of how to adopt the climate-development integrated approach in each stage of the policy cycle of ICZM. This chapter elaborates the idea from the perspective of coastal development projects mentioned in the *Coastal Development Strategy*. These five stages of the abovementioned policy cycle can be simplified as three main stages for the development projects: (i) project analysis;(ii) project design; and (iii) project implementation. Figure 8.1 illustrates these three stages. Here, the issue identification and assessment are covered under the project analysis stage. The project design stage includes program preparation, formal adoption and funding. The implementation stage is the same, whereas evaluation (including monitoring and knowledge management) has been considered as an ongoing function of each of these three stages.

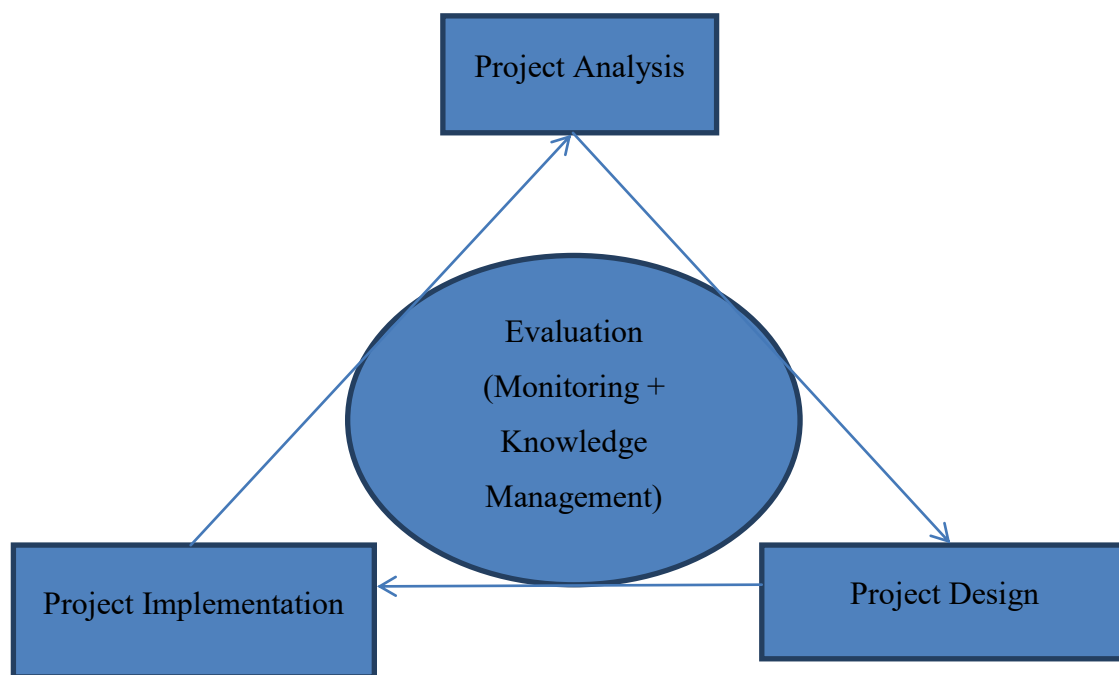


Figure 8.1: Climate-development Integrated Approach into ICZM Development Projects

Sections VIII.IV.A–VIII.IV.C provides step-by-step guidance on how to adopt the climate-development integration into the project analysis stage, design stage and implementation stage. There are around 32 development projects under nine strategic priorities of the *Coastal*

Development Strategy.⁸⁷ For better understanding, this chapter deals with two development projects in detail and shows how to incorporate the climate-development integrated approach into their project analysis stage, design stage and implementation stage. These two development projects are: (i) integrated management of coastal water infrastructures and (ii) development of coastal agriculture. These two projects are mentioned under the strategic priority of ‘_optimising use of coastal lands’⁸⁸ of the *Coastal Development Strategy*. Other coastal development projects can also adopt the climate-development integrated approach by following the same process, as that recommended for these two development projects in Sections VIII.IV.A–VIII.IV.C.

VIII.V.A Integration into the Project Analysis Stage

Analysis is the key to appropriate and effective project design, implementation and evaluation. This stage commonly involves analyses such as: needs assessment, institutional assessment, stakeholder analysis, gender analysis, rights assessment, livelihoods analysis (often including environmental and socio-economic assessments) and causal/problem analysis.⁸⁹ In fact, this stage is the best time for gathering crucial information on the project’s climate context, for example, climate risks that may affect the development project, coastal communities’ current and future climate change vulnerability, adaptive capacity and mitigation strategy from those analyses. The climate-development integrated approach must be adopted from this analysis stage of the development project. This enables consideration and integration of appropriate climate change adaptation and mitigation strategies from the beginning of the project.

To properly integrate climate change into an ICZM development project, it is necessary to address several issues, namely: (i) the past and current climate context of the project area; (ii) future changes to climate context due to climate change; (iii) livelihood-climate linkages for different groups within the community; (iv) opportunity of climate change mitigation from the development project; (v) process of gathering data (both quantitative and qualitative), synthesising information and validating the analysis. A checklist can be prepared with key considerations addressing these issues at the project analysis stage. Exploring those key

⁸⁷ See Sections VI.VI.A–VI.VI. I for nine strategic priorities of the *Coastal Development Strategy*.

⁸⁸ See Section IV.VI.B for the strategic priority of ‘_optimising use of coastal lands’.

⁸⁹ CARE International, above n 89, 16.

considerations can contribute to integrating climate change into a coastal development project. The following five sections (Sections VIII.IV.A.1–VIII.IV.A.5) provide a set of key considerations that need to be addressed in the project analysis stage of the two development projects (‘integrated management of coastal water infrastructures’ project and ‘development of coastal agriculture’ project). A similar set of key considerations would work for other development projects under the *Coastal Development Strategy*. The key considerations in Sections VIII.IV.A.1–VIII.IV.A.5, VIII.IV.B.1–VIII.IV.B.5 and VIII.IV.C.1–VIII.IV.C.3 have been set following documents such as: Toolkit for Integrating Climate Change Adaptation into Development Projects,⁹⁰ Climate Vulnerability and Capacity Analysis Handbook,⁹¹ Community-based Risk Screening Tool – Adaptation and Livelihoods,⁹² Climate Change Mitigation Tools,⁹³ and Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects.⁹⁴

VIII.V.A.1 Past and Current Climate Context

The key considerations that have to be addressed for the ‘integrated management of coastal water infrastructures’ project, are: (i) climate variables that may affect water resources in the coastal area; (ii) climate change effects on both quantity and quality of water resources; (iii) the causes and effects of these changes; (iv) the effects of climate change on water resources that have been observed by the coastal community (both in the past and present); (v) patterns of water stress (past and current) due to seasonal variations or other factors.

The key considerations that have to be addressed for the ‘development of coastal agriculture’ project are: (i) climate variables that may affect coastal agriculture; (ii) climate change effects on coastal agriculture; (iii) the effects of climate change on coastal agriculture that have been

⁹⁰Ibid.

⁹¹Angie Dazé, Kaia Ambrose and Charles Ehrhart, *Climate Vulnerability and Capacity Analysis Handbook* (CAREInternational, 2009).

⁹²CRiSTAL User’s Manual Version 5 Community-based Risk Screening Tool – Adaptation and Livelihoods (International Institute for Sustainable Development, 2012)

⁹³United Nations Environment Programme, *Climate Change Mitigation Tools*<<http://www.unep.org/climatechange/mitigation/Tools/tabid/4893/Default.aspx>>

⁹⁴‘Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects’(Document No GEF/C 33/Inf 18, Global Environment Facility, 16 April 2008)<http://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf>.

observed by the coastal community (both past and present); (iv) patterns of the current seasonal food and income insecurity.

VIII.V.A.2 Future Changes to Climate Context due to Climate Change

In order to integrate climate change adaptation and mitigation into the coastal development projects, the analysis must examine both observed trends, and future climate events and conditions. Two key considerations have to be addressed for the ‘integrated management of coastal water infrastructures’ project: (i) projected climate changes that may affect the quantity and quality of coastal water resources; and (ii) change of the climate-effects on coastal water availability in the future.

For the ‘development of coastal agriculture’ project, two similar key considerations have to be addressed: (i) projected climate changes that would affect coastal agricultural resources and production; and (ii) change of the climate-effects on coastal agriculture in the future.

VIII.V.A.3 Livelihoods-climate Linkages for Different Groups within the Community

The analysis of livelihoods-climate linkages aim to enhance greater understanding about the climate change adaptation strategies into the coastal development project. This analysis must consider different economic and social groups within the coastal community. It should also explore all three different kinds of coastal adaptation options (planned retreat,⁹⁵ accommodation,⁹⁶ and protection⁹⁷).

The key considerations that have to be addressed for the ‘integrated management of coastal water infrastructures’ project to address livelihoods-climate linkages are: (i) current water availability, collection and usage patterns for different groups within the coastal community; (ii) groups within the coastal community that may be particularly vulnerable to water stress; (iii) effects of climate change on water availability, quality and demand; (iv) effectiveness and sustainability of

⁹⁵ See Section III.IX.A.

⁹⁶ See Section III.IX.B.

⁹⁷ See Section III.IX.C.

current adaptation options for water stress; and (v) change in future in water availability, quality and demand as a result of climate change (based on scientific projections and data).

The key considerations that have to be answered for the ‘development of coastal agriculture’ project to address livelihoods-climate linkages are: (i) livelihood groups, crops, or species that may be particularly vulnerable to climate variability and change; (ii) livelihoods resources that are most important to coastal agriculture and adaptation; (iii) effects of climate change on coastal agriculture; (iv) effectiveness and sustainability of current adaptation options; (v) effects of future climate hazards on resources important to coastal agriculture and adaptation; (vi) opportunities that exist for diversification, both within coastal agriculture and non-agricultural livelihoods strategies; and (vii) resources that may be necessary for different groups to diversify both within and outside coastal agriculture.

VIII.V.A.4 Opportunity of Climate Change Mitigation from the Development Project

This analysis aims to enhance greater understanding about climate change mitigation measures in the coastal development project. As mentioned in Section V.II.E, climate change mitigation measures include cleaner energy measures, energy efficiency measures and land-use change measures.⁹⁸ These measures may have a number of effects on coastal development projects. Conversely, different coastal development projects can have an influence on greenhouse gas emissions and thus can contribute to climate change mitigation.

Two key considerations that have to be addressed for the ‘integrated management of coastal water infrastructures’ project to address climate change mitigation are: (i) energy that would be used for coastal water treatment and distribution or discharge; and (ii) technologies that would be used for improving coastal water management, increasing efficiency, reducing costs and addressing future changes.

For the ‘development of coastal agriculture’ project, two similar key considerations have to be looked for to address climate change mitigation: (i) energy that would be used for coastal

⁹⁸ National Water Commission, Australian Government, ‘Water Policy and Climate Change in Australia’ (2012)xii.

irrigation? (ii) technologies and soil management practises that would be used to improve soil organic carbon.

VIII.V.A.5 Process of Gathering Data, Synthesising Information and Validating the Analysis

This is the evaluation phase of the project analysis stage. The results of the entire analysis have to be presented to all actors to confirm the validity of conclusions drawn. This would bring multi-faceted benefits for the project. For example, the results of the analysis create awareness about the views of different stakeholders, promote dialogue, collective interpretation and ownership of suggested project modifications.⁹⁹ While evaluating a project analysis stage, clarifications on how the results should be integrated into the project and roles of partners should be agreed upon and documented, too. It is also vital to document the analytical process used, the sources of information and the validation process. This would help to check and incorporate new information appropriately as it comes to light later on.¹⁰⁰ This evaluation is particularly important in the case of integrating climate change into development projects, as climate change is a dynamic and changing phenomenon. Therefore, the analysis will correspondingly change over time.

The considerations that have to be taken into account in both the development projects (‘integrated management of coastal water infrastructures’ project and ‘development of coastal agriculture’ project) are: (i) incorporation of information (both quantitative and qualitative) from a variety of primary and secondary sources, including through participatory analysis in the analytical process of the project; (ii) synthesis of information according to climate change adaptation and mitigation; (iii) validation of the context analysis by stakeholders, including particularly vulnerable groups due to climate change; and (iv) appropriate documentation of the gaps and uncertainties due to climate change, validated conclusions and recommended actions in a changing climatic condition.

⁹⁹ CARE International, above n 89, 35.

¹⁰⁰ Ibid.

VIII.V.B Integration into the Project Design Stage

The project design is the stage when the results of the project analysis stage are used to identify project goals, objectives and expected results, as well as the project methodology, team structure and management approach.¹⁰¹ This stage often includes the development of a logical framework for the project, including objectives, expected results and performance indicators.¹⁰² This is also the stage at which the project budget is developed.¹⁰³ One of the key things that must be kept in mind in designing coastal development projects adopting a climate-development integrated approach is flexibility. This is because, the exact nature of climatic stresses and affects the timeframe of a typical project is uncertain.¹⁰⁴ In order to manage this uncertainty, project designs have to be flexible to consider changing climatic conditions. It also has to be noted that people implementing the project are not necessarily those who designed it. Therefore, effective documentation of the design process, including key decisions and rationale, is important to facilitate better implementation.¹⁰⁵

The following five issues have to be considered to properly adopt climate change adaptation and mitigation into the project design stage of a coastal development project. The issues are: (i) climate change adaptation and mitigation into project objectives and expected results; (ii) inclusion of coastal adaptation and disaster risk reduction strategies; (iii) climate-resilient livelihoods; (iv) inclusion of climate change mitigation strategies; and (v) developing indicators to monitor changes. Just like the project analysis stage, a checklist can be prepared with key considerations addressing these five issues at the project design stage. Exploring these key considerations may contribute to adopting a climate-development integrated approach in the project design. The following five sections (Sections VIII.IV.B.1 to VIII.IV.B.5) provide a set of key considerations that need to be addressed in the project design stage of the two development projects (‘integrated management of coastal water infrastructures’ project and ‘development of coastal agriculture’ project). A similar set of key considerations would work for other development projects under the *Coastal Development Strategy*.

¹⁰¹ Ibid 36.

¹⁰² CAREInternational, above n 89,36.

¹⁰³ Ibid 18.

¹⁰⁴ Ibid 19.

¹⁰⁵ CAREInternational, above n 89, 19.

VIII.V.B.1 Climate Change Adaptation and Mitigation into Project Objectives and Expected Results

Integrating climate change adaptation and mitigation into a development project may result in objectives and expected results that are slightly different from a development project that does not take climate change into account. The aim is not to turn every coastal development project under the *Coastal Development Strategy* into an adaptation or mitigation project, but to ensure that the objectives of these coastal development projects are appropriate in the context of climate change.

For example, the objectives and expected results of the ‘_integrated management of coastal water infrastructures’ project may include: (i) increased resilience and adaptive capacity to water stress; (ii) coastal water infrastructure improved to withstand climate change; and (iii) improved planning and technologies for climate change mitigation in coastal water management.

Similarly, the objectives and expected results of the ‘_development of coastal agriculture’ project may include: (i) reduced effect of climate-related shocks on food security of coastal households; (ii) increased use of climate-resilient agricultural practices; (iii) increased capacity of agricultural extension workers to support farmers in adapting to climate change; and (iv) improved planning and technologies for climate change mitigation in coastal agriculture.

VIII.V.B.2 Inclusion of Coastal Adaptation and Disaster Risk Reduction Strategies

In the present context of climate change effects on the coastal zone of Bangladesh, it is absurd to assume that no major climate hazard or extreme events will occur over the life of any coastal development project. Whether an extreme event turns into a disaster is highly dependent on the adaptive capacity of coastal communities.¹⁰⁶ This means that integrating adaptation and disaster risk reduction strategies into coastal development projects are critically important.

¹⁰⁶ Ibid 40.

The key considerations that have to be taken into account for the ‘integrated management of coastal water infrastructures’ project to include the coastal adaptation and disaster risk reduction strategies are: (i) water systems must be designed to withstand extreme weather events; (ii) project activities must include disaster risk reduction strategies to reduce the negative effects of hazards on coastal water resources; (iii) the project must have a strategy for ensuring access to safe water in the event of an emergency; and (iv) the project should aim to involve coastal water management committees and other local institutions in disaster risk management.

The ‘development of coastal agriculture’ project needs to address a similar set of key considerations to include the coastal adaptation and disaster risk reduction strategies into the project design stage. The questions are: (i) project activities must include disaster risk reduction strategies for coastal agriculture; and (ii) the project should include measures to protect crops and livestock from climate events.

VIII.V.B.3 Climate-resilient Livelihoods

A key element of future adaptive capacity is for coastal people to have a range of options available to them to sustain their livelihood under different conditions.¹⁰⁷ Most of the coastal development projects under the *Coastal Development Strategy* aim to increase livelihoods security for coastal populations. Table 6.5 shows that eight out of nine strategic priorities of the *Coastal Development Strategy* reflect the livelihood development objective of the Coastal Zone Policy. The ‘integrated management of coastal water infrastructures’ project and the ‘development of coastal agriculture’ project, both have the same aim.

The key considerations that have to be taken care of for the first project to address livelihoods-climate linkages are: (i) coastal water infrastructure has to be designed taking into account potential changes in water availability due to climate change; (ii) coastal water infrastructure has to be designed to be sufficiently resilient towards potential effects from climate change; (iii) project activities should take into account that demand for coastal water may change as a result of climate change; (iv) the project has to support integration of all coastal adaptation options into

¹⁰⁷ Ibid38.

planning for coastal water management; (v) the project has to build capacity of stakeholders to monitor coastal water resources in a changing climate; (vi) project resources need to be allocated for such monitoring efforts; (vii) the project must develop local capacity on longer-term adaptation; and (viii) project activities must promote efficient use of coastal water resources.

The key considerations that have to be addressed for the ‘development of coastal agriculture’ project to address livelihoods-climate linkages are: (i) the crop and livestock types being promoted by the project has to be appropriate in the context of future climate projections for the coastal area; (ii) the coastal agricultural practices need to promote sustainability in the context of climate change; (iii) the project has to support integration of coastal adaptation into planning for land use management; (iv) project activities need to build capacity of stakeholders to access and use climate information for coastal agricultural planning and risk management; (v) project resources need to be allocated for such monitoring efforts; (vi) the project must develop local capacity on longer-term adaptation; (vii) project activities need to promote efficient use of resources for coastal agriculture such as land, water and inputs; (viii) the project should incorporate diversification to off-farm livelihood strategies that may be less sensitive to climate change.

VIII.V.B.4 Inclusion of Climate Change Mitigation Strategies

Section VI.VI explores whether significant mitigation can be achieved from the coastal development projects under the *Coastal Development Strategies*. The climate change mitigation strategies need to be incorporated in the project design stage. One key consideration needs to be answered to reduce the greenhouse gas emissions from the ‘integrated management of coastal water infrastructures’: coastal water infrastructure has to be designed taking into account potential climate change mitigation strategies. A similar thing needs to be addressed for the ‘development of coastal agriculture’ project, that is: the project has to be designed taking into account potential climate change mitigation strategies for land use management?

VIII.V.B.5 Developing Indicator to Monitor Changes

This is the evaluation phase of the project design stage. Many research and reports have highlighted good monitoring of a development project in a changing climate.¹⁰⁸ Integrating climate change adaptation and mitigation into coastal development projects may require considering new and additional performance indicators. This may involve indicators that are more process-oriented than usual indicators, given that climate change adaptation and mitigation are all about managing uncertainty.

For example, the indicators of climate change adaptation and mitigation in the ‘integrated management of coastal water infrastructures’ project may include: (i) equitable access to, and control over, coastal water resources; (ii) adoption of efficient coastal water use and management practices; (iii) establishment of mechanisms for monitoring coastal water availability, quality and use; and (iv) development and implementation of watershed management plans.

Similarly, the indicators of climate change adaptation and mitigation in the ‘development of coastal agriculture’ project may include: (i) use of weather and climate information for coastal agricultural planning at different levels; (ii) adoption of sustainable and climate-resilient agriculture and land use management strategies, for example, conservation agriculture, efficient irrigation techniques, agroforestry, etc; (iii) equitable access to and utilisation of appropriate coastal agricultural knowledge, skills, technologies and resources by vulnerable groups, for example, soil conservation, seed selection etc; (iv) mechanisms to monitor changes in the quantity and quality of coastal agricultural produce, together with changes in weather and climate; (v) establishment of safe storage for reserves of food and coastal agricultural inputs; (vi) increase in incomes from improved market access and value addition to produce.¹⁰⁹

¹⁰⁸ Dazé, Ambrose and Ehrhart, above n 93; CARE International, above n 89, 38.

¹⁰⁹ CARE International, above n 89, 51.

VIII.V.C Integration into the Project Implementation Stage

The project implementation stage is when the project takes action to achieve its expected results after completion of the project analysis and design stage.¹¹⁰ The elements of the project implementation stage are narrated by the CARE International as follows:

This is the phase when project resources are deployed, planned activities are undertaken, stakeholders and partners are actively engaged, the capacity of project stakeholders is built, and the project is monitored and adapted to new conditions that may arise.¹¹¹

Among these elements, the report considers monitoring and documentation of the project approach, results and lessons as the most important one for this stage.¹¹² However, in the context of climate change, the project implementation stage may involve three key issues that may not be typical for a development project. First, there is the importance of partnerships, especially cross-sectoral ones, in the context of climate change adaptation.¹¹³ Second, projects must be flexible enough to accommodate regular and systematic monitoring of climate changes. Third, the project implementation strategy should incorporate emergency preparedness measures. These three issues need to be addressed in the project implementation stage to incorporate the climate-development integrated approach. Just like the project analysis stage and design stage, a checklist can be prepared with key considerations addressing these three issues at the project implementation stage. The following three sections (Sections VIII.IV.C.1 to VIII.IV.C.3) provide such a checklist of key considerations. These checklists are for the ‘integrated management of coastal water infrastructures’ project and ‘development of coastal agriculture’ project. A similar set of key considerations would work for other development projects under the *Coastal Development Strategy*.

¹¹⁰ Ibid 52.

¹¹¹ Ibid 19.

¹¹² Ibid 52.

¹¹³ Ibid 20.

VIII.V.C.1 Establishing Appropriate Partnerships to Achieve Expected Results

In view of identified effects of climate change affecting project activities, it may be necessary to engage new partners in the project.¹¹⁴ Key issues to consider in selecting and engaging with new partners include their complementary technical capacity and expertise on climate change adaptation and mitigation. Other considerations include the partners' potential contribution to climate change policies. For example, engaging relevant government agencies and local government in project activities could facilitate integration of climate change adaptation and mitigation into relevant policies and plans at local and/or national levels.¹¹⁵ Climate change is a cross-sectoral challenge. Therefore, partners from different sectors (such as land use planning, energy, transportation, infrastructure, water and other natural resources) need to be added for a coastal development project.

For example, partners for the 'integrated management of coastal water infrastructures' project may include: (i) climate and hydrological modelling agencies, (ii) water supply agencies, (iii) water engineers, (iv) policy-makers in the water sector, (v) land use planners, (vi) environmental agencies in charge of other natural resources, such as forestry, fisheries and agriculture, and (vii) disaster risk management agencies.¹¹⁶

Similarly, partners for the 'development of coastal agriculture' project may include: (i) meteorological department and/or other climate modelling agencies, (ii) agricultural researchers, (iii) suppliers and distributors of seeds and other inputs, (iv) policy-makers in the agriculture and land-use management sector, and (v) technical staff in the agriculture and land use management sector, including extension agents.¹¹⁷

¹¹⁴ Ibid 52.

¹¹⁵ CARE International, above n 89, 52.

¹¹⁶ Ibid 53.

¹¹⁷ CARE International, above n 89, 53.

VIII.V.C.2 Monitoring Context and Adjusting Project Approach

Like the design stage of a coastal development project,¹¹⁸ the implementation stage also requires flexibility in management and regular review of project performance in the face of a changing climate. Given the uncertainties in climate projections, it is important for the project team to consider a range of adaptation and mitigation options for varied climate change scenarios.¹¹⁹ The project can achieve triple wins (climate change adaptation, mitigation and development goals), if the project strategies and activities are adjustable under a changing climatic context.

The following key considerations from the monitoring context and adjusting approach need to be answered at the implementation stage of the ‘integrated management of coastal water infrastructures’ project: (i) the project strategy should incorporate monitoring of changes in seasonal weather patterns and climate, and the effects of these changes on coastal water resources; (ii) the project strategy need to incorporate monitoring of effects of water and other relevant policies on water availability and accessibility for coastal populations; (iii) the project strategy has to revise coastal water management plans accordingly; and (iv) the project strategy and implementation plan need to be reviewed regularly and updated to reflect climate changes, or new opportunities for adaptation and mitigation from the water sector.

Similar kinds of considerations need to be taken into account for the ‘development of coastal agriculture’ project. These are: (i) the project strategy should incorporate monitoring of changes in seasonal weather patterns and climate, and the effects of these changes on coastal agricultural production, including yields and quality of produce; (ii) the project strategy need to incorporate monitoring of effects of agricultural and other relevant policies on resource availability and accessibility among coastal populations; (iii) the project strategy has to revise coastal agriculture and land use plans accordingly; and (iv) the project strategy and implementation plan need to be reviewed regularly and updated to reflect climate changes, or new opportunities for adaptation and mitigation from the agriculture sector.

¹¹⁸ See Section VIII.IV.B for the project design stage of a coastal development project.

¹¹⁹ CARE International, above n 89, 55.

VIII.V.C.3 Incorporating Emergency Preparedness Measures

Recent trends show that extreme weather events, such as floods and cyclones, are becoming more frequent and intense in the coastal area of Bangladesh. Without adequate planning, these events can lead to disasters.¹²⁰ They can even undermine the progress of any coastal development project and divert precious human and financial resources from long-term development. Therefore, all coastal development projects under the *Coastal Development Strategy* need to incorporate emergency preparedness measures. In this regard, all such development projects need to address the following key considerations mentioned by CARE International: (i) the project office must have an emergency preparedness plan that staff and partners are familiar with; (ii) staff and partners need to be trained in emergency response and humanitarian accountability; (iii) the project team must have access to early warnings for hazards affecting the project area; (iv) the project strategy should include a contingency plan for emergencies; and (v) there should be flexibility in funds and activities to respond to crises efficiently and with least disruption to ongoing activities.¹²¹

VIII.VI Recommendations for Adopting the Integrated Approach into Coastal Legislation

Section VII.III of this thesis examines what ICZM legislation is and what purposes it serves. It classifies ICZM legislation into four categories according to its approach, namely: (i) the national integrated coastal management approach, (ii) the sustainable development approach, (iii) the extended land-use planning approach and (iv) the special region approach. Section VII.III also notes that researchers only consider the first approach (ie the national integrated coastal management approach) as primarily motivated by the specific intention to implement ICZM on a national scale.¹²² The *Federal Coastal Zone Management Act 1972* of the USA, the *Coastal Regulation Zone Notification 1991* of India, the *Coastal Zone Management Act* of Belize 1998, the *Korean Coastal Zone Management Act 1999* and the *Integrated Coastal Management Act* of South Africa 2008 are a few instances of such kinds of ICZM legislation. Bangladesh has no such ICZM legislation to date. However, Section 5.6 of the *Coastal Zone Policy* indicates the

¹²⁰Ibid 54.

¹²¹CARE International, above n 89.

¹²²Cullinan, above n 67, 110.

need to examine whether legislation to implement ICZM should be enacted. This thesis also recommends the introduction of ICZM legislation for Bangladesh. More specifically, the thesis recommends ICZM legislation that incorporates the climate-development integrated approach.

The thesis makes this recommendation based on the findings. That chapter evaluates thirty nine sectoral laws of the country that have implications for the coastal zone or coastal resources. The sectors are agriculture, water, fisheries, forest, environment, land, energy, tourism and rural development. All of these sectors are in grave danger due to climate change.¹²³ Following a ‘law and policy analysis methodology’, the thesis showed in Tables 7.1–11 that most of the sectoral laws still do not address the climate change issue. That is why this thesis recommends ICZM legislation for Bangladesh that incorporates the climate-development integrated approach. For example, the *Queensland Coastal Protection and Management Act 1995* and the *New South Wales Coastal Protection Act 1979* specifically reference climate change. Since April 2011, the coastal legislation of Queensland has required the relevant minister to consider the effect of climate change on coastal management when preparing Queensland's state coastal management plan.¹²⁴ Since 2010, the coastal legislation of the New South Wales has required climate change to be taken into account in preparing the local coastal zone management plans.¹²⁵

VIII.VIIConclusion

The analysis of 39 laws and 21 sectoral policies in Chapters IV–VII indicates that Bangladesh falls well short of adopting the climate-development integrated approach in coastal laws and policies. There is absence of clear guidance on how to assess the conflicts, trade-offs and synergies between adaptation, mitigation and development actions in the existing coastal laws and policies of the country.¹²⁶ If the laws and policies are not climate-resilient, they cannot ensure the planned economic growth of this area. Therefore, the thesis recommends for an ICZM

¹²³ See Sections V.VI.A–V.VI.J.

¹²⁴ Meredith Gibbs and Tony Hill, 'Coastal Climate Change Risk - Legal and Policy Responses in Australia' (The Department of Climate Change and Energy Efficiency, Commonwealth of Australia, 2011) 11.

¹²⁵ Ibid 11.

¹²⁶ See Section VIII.III for the extent to which the climate-development integrated approach is reflected Bangladesh's coastal laws and policies.

legislation that particularly address the integrated approach.¹²⁷ It also makes recommendations for integration of climate change adaptation and mitigation into coastal development projects as mentioned in the *Coastal Development Strategy*.¹²⁸

Section VIII.IV describes in detail how to integrate climate change adaptation and mitigation into coastal development projects in Bangladesh. Sections VIII.IV.A–VIII.IV.C provide step-by-step guidance on how to adopt the climate-development integration into the project analysis stage, design stage and implementation stage. In the project analysis stage, according to this chapter, it is necessary to address following issues: (i) the past and current climate context of the project area; (ii) future changes to climate context due to climate change; (iii) livelihoods-climate linkages for different groups within the community; (iv) opportunity of climate change mitigation from the development project; (v) process of gathering data (both quantitative and qualitative), synthesising information and validating the analysis.¹²⁹ In the project design stage, following five issues have to be considered: (i) climate change adaptation and mitigation into project objectives and expected results; (ii) inclusion of coastal adaptation and disaster risk reduction strategies; (iii) climate-resilient livelihoods; (iv) inclusion of climate change mitigation strategies; and (v) developing indicators to monitor changes.¹³⁰ The project implementation stage may involve three key issues. First, there is the importance of partnerships, especially cross-sectoral ones, in the context of climate change adaptation.¹³¹ Second, projects must be flexible enough to accommodate regular and systematic monitoring of climate changes. Third, the project implementation strategy should incorporate emergency preparedness measures.¹³² Sections VIII.IV.A–VIII.IV.C provide a set of key questions that need to be addressed in the project analysis stage, design stage and implementation stage to ensure climate-development integration.

The climate-development integration is an emerging concept both in climate change and development literature. This thesis is an attempt how to incorporate this concept into coastal

¹²⁷ See Section VIII.V for the recommendations of adapting the climate-development integrated approach into coastal legislation.

¹²⁸ See Section VIII.IV for the recommendations of adapting the climate-development integrated approach into coastal policies.

¹²⁹ See Section VIII.IV.A for integration into the project analysis stage.

¹³⁰ See Section VIII.IV.B for integration into the project design stage.

¹³¹ CareInternational, above n 89, 20.

¹³² See Section VIII.IV.C for integration into the project implementation stage.

management of Bangladesh. In fact, the coastal zone of this country is the perfect place to explore the climate-development nexus. The zone has great value for economic development of the whole country. At the same time, this zone showcases what will happen under climate change to many coastal countries in the years ahead.¹³³ In this milieu, the thesis suggests moving beyond the traditional separation of adaptation, mitigation and development strategies in coastal management of Bangladesh. By following a climate-development integrated approach, the coastal management can ensure low-carbon development and support people's ability to adapt to climate change (climate-resilient development). Laws and policies that deliver triple wins (adaptation, mitigation and development) are practical solutions for Bangladesh in the context of limited resources to invest separately in coastal management and climate response. Although the study is based on a very particular region of the country, it is an integral component of wider government policy cycles and planning processes. Lastly, the recommendations of this thesis may contribute not only to the laws and policies of Bangladesh, but also to other developing countries for sustainable coastal management.

¹³³Climate Change Cell, 'Changing the Way We Develop: Dealing with Disasters and Climate Change' (Paper Prepared for the Oslo Policy Forum, Oslo, Norway, 28-29 February 2008) 3.

Annex One

Theme	Program	Benchmark	Target
<i>Food security, social protection and health</i>	Institutional capacity for research on climate resilient cultivars and dissemination	Capacity exists; certain new varieties released recently	Extension service to be geared up
	Adaptation against drought, salinity resistance and heat	Very limited experience	To be started
	Adaptation in fisheries sector	Very limited experience	Initial studies for ideas on adaptation
	Adaptation in livestock sector	Very limited experience	Initial studies for ideas on adaptation
	Adaptation in health sector	Very limited experience	Initial studies for ideas on adaptation
	Water and sanitation programs for climate vulnerable areas	Limited experience	Immediate actions needed
	Livelihood protection in ecologically fragile areas	Limited experience	Initial interventions to be made
	Livelihood protection of vulnerable socioeconomic Groups	Major experience	To be made immediately
<i>Comprehensive disaster management</i>	Improvement of cyclone and storm surge warning	Limited experience	Needs review for improvement
	Awareness raising and public Dissemination	Some experience	Needs review for improvement
	Risk management against loss of income and property	Limited experience	Needs review for improvement
<i>Infrastructure</i>	Repair and maintenance of existing flood Embankments	Limited activity	To be taken up immediately
	Repair and maintenance of existing cyclone shelters	Limited activity	To be taken up immediately
	Repair and maintenance of existing coastal polders	Limited activity	To prioritize and taken up

			immediately
	Urban drainage needs assessment	Limited activity	To prioritize and taken up immediately
	Adaptation against Floods and constructing new embankments and flood shelters	Limited activity	Needs review for improvement & construction
	Adaptation against tropical cyclones and storm surges through land use planning	Limited activity	To be taken up immediately
	Planning & Design of river training and bank erosion mitigation works	Major experience with limited success	Needs review for significant improvement
	Resuscitation of rivers and khals through dredging	Limited activity	To prioritize and taken up immediately
	Earthquake resilient structure and land slide protected structure have to be constructed and retrofitted	Limited activity	To prioritize and taken up immediately
<i>Research and knowledge management</i>	National Centre for research, knowledge management and training on disaster and climate change	Limited activity	Scope to be extended immediately
	Climate change modeling and their Impacts	Limited human and institutional capacity	Training to be arranged for imparting skill
	Preparatory studies for adaptation against SLR	Capacity exists; limited experience of adaptation	To be initiated and continued
	Research on the climate change adaptation for knowledge and technology generation	Capacity exists, some technologies are in use	To be expanded the scope and ongoing effort
<i>Low carbon development</i>	Renewable energy development	Limited experience	To be expanded
	Management of urban waste	Limited experience	To be taken up immediately
	Aforestation and reforestation	Some experience	To be taken up immediately
	Rapid expansion of energy saving devices	Some experience	To be taken up immediately

	Improving energy efficiency in transport sector	Limited experience	To be introduced in phases
<i>Capacity building</i>	Revision of sectoral policies for climate resilience	-	Immediate need
	Mainstreaming CC in national, sectoral and spatial development programs and policies	-	Immediate need; BCCSAP to be part of National Plan
	Strengthening human resource capacity	Limited capacity	To be started
	Gender considerations in CC	-	To be started
	Strengthening institutional capacity	Limited capacity	To be started
	Mainstreaming CC in media	Limited experience	To be started

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