NCAP The Netherlands Climate Assistance Programme

Poverty Reduction at Risk in Bangladesh

An Assessment of the Impacts of Climate Change on Poverty Alleviation Activities

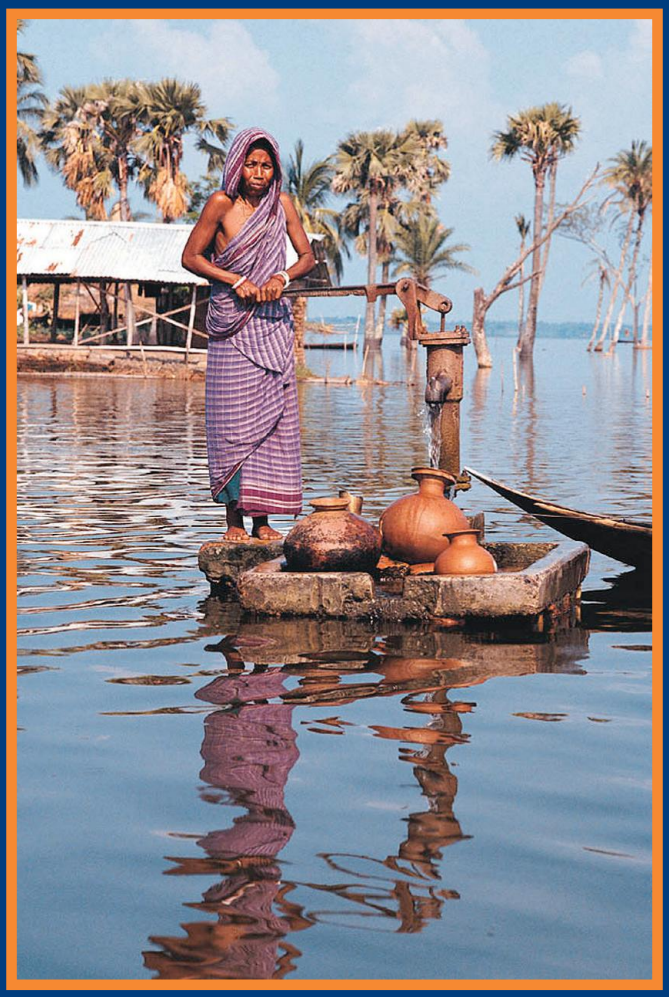

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES AND TABLES

ABBREVIATIONS

ADB	Asian Development Bank
APN	Asian Pacific Network on Global Change Research
BDPC	Bangladesh Development Partnership Centre (NGO involved in EWS)
BEI	Bangladesh Enterprise Institute
BRAC	Bangladesh Rural Advancement Committee
BUET	Bangladesh University of Engineering and Technology
BUP	Bangladesh Unnayan Parishad
BWDB	Bangladesh Water Development Board
CAMPE	Campaign for Popular Education
CC	Climate Change
CCC	Climate Change Cell at DOE
CCRRP	Climate Change Risk Reduction Plans
CDMP	Comprehensive Disaster Management Project
CDSP	Char Development and Settlement Project
CEGIS	Center for Environmental and Geographic Information Services
CIDA	Canadian International Development Agency
CLASSIC	Climate and Land-Surface Systems Interaction Centre
CRA	Climate Risk Assessment
DAE	Department of Agricultural Extension
DfID	Department for International Development
DGIS	Directorate General International Cooperation (Ministry of Foreign Affairs Netherlands)
DHI	Danish Hydraulic Institute
DOE	Department of Environment
DoFo	Department of Forestry
DPHE	Department of Public Health Engineering
DUT	Delft University of Technology
EDP	Estuary Development Project
EFDRP	Emergency Flood Damage Reduction project
EIA	Environmental Impact Assessment
ERD	Economic Relations Division of PC
EWS	Early Warning System Study
FFS	Flood Forecasting Scheme
GCM	Glocal Climate Model
GEF	Global Environmental Fund
GoB	Government of Bangladesh
GoN	Government of the Netherlands
GPWM	Guidelines for Participatory Water Management
HNPSP	Health, Nutrition and Population Sector program
HKI	Helen Keller International
ICZM	Integrated Coastal Zone Management
IMED	Implementation Monitoring and Evaluation Division of PC
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IPSWAM	Integrated Planning for Sustainable Water Management
IUCN	International Union for the Conservation of Nature and Natural Resources, since 1990 known as the World Conservation Union
IWM	Institute for Water Modelling
LCG	Local Consultancy Group
LDC	Least Developed Countries
LGD	Local Government Division of PC
LGED	Local Government Engineering Department
LLP	Low Lift Pump
MASP	Multi-Annual Strategic Plan 2005-2008, RNE Dhaka
MIDPRC	Market Infrastructure Development Project in Charland Regions
MOA	Ministry of Agriculture
MOEF	Ministry of Environment and Forest
MOFDM	Ministry of Food and Disaster Management
MOFL	Ministry of Fishery and Livestock
MOL	Ministry of Land
MOP	Ministry of Planning

MOPME	Ministry of Primary and Mass Education
MoU	Memorandum of Understanding
MOWR	Ministry of Water Resources
MR	Menstrual Regulation (locally acceptable term for abortion)
NAPA	National Action Plan for Adaptation
NCA	Net Cultivated Area
NCAP	Netherlands Climate Assistance Programme
NGO	Non-Governmental Organization
NNP	National Nutrition Program
NWMP	National Water Management Plan
NWPo	National Water Policy
ODA	Official Development Assistance
O&M	Operation and Maintenance
PC	Planning Commission
PDO-ICZMP	Program Development Office for ICZM Plan
PEDP	Primary Education Development Programme
PPTA	Project Preparation Technical Assistance
PRSP	Poverty Reduction Strategy Paper
RDCD	Rural Development and Cooperatives Division of PC
RegCM	Regional Climate Model
RNE	Royal Netherlands Embassy
RTI	River Technology Institute (USA)
RVCC	Reducing Vulnerability to Climate Change (CIDA project in SW Bangladesh)
SDRC	Sustainable Development Research Centre
SEMP	Sustainable Environment Management Programme
SLR	Sea Level Rise
SST	Sea Surface Temperature
SSWRDS	Small Scale Water resources Development Sector Project
STW	Shallow Tube Well
SW-IWRM	South-west Integrated Water Resources Management Project
TAR	Third Assessment Report IPCC
Tk	Taka; Bangladesh currency
UNDP	United Nations Development Program
UNICEF	United Nations Children's Emergency Fund
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services
WARPO	Water Resources Planning Organization
WASEC	Water Sector Education Project
WASH	Water, Sanitation and Hygiene Programme
WMA	Water Management Associations
WMIP	Water Management Implementation Project
WRM	Water Resources Management

SUMMARY

This document presents one of the three country studies in the DGIS Climate Risk Project, which aims "*to gain experience on how to integrate climate risk management into its bilateral development programme*." The interest in climate risk management is triggered by the concern about the impacts of climate change on sustainable developments and the question how the Dutch bilateral development activities could assist developing countries to better cope with such climate change impacts. The reasoning is that climate risk management --which use to deal with short-term impacts of normal climate variability and extreme events -- should encompass climate change issues --which relate to long-term changes in these variability and extreme events and in average values (trends). In Bangladesh, climate changes are minor compared with the huge climate variability and dimensions of the extreme events and they also may be small compared with other anthropogenic changes (such as: the empoldering of the flood plain, the over-extraction of groundwater aquifers and extractions upstream). However, though small, these climate changes are considered of great importance for long-term issues of sustainability and as such would add to short-term focused climate risk management. The study focuses on the change to climate risk (due to climate change) rather than on climate risk in a broad context.

The risk assessment, presented in Chapter 4 and Appendix F, was made in the month of September 2006. Figure 1 in the main text gives a schematic overview of the approach and structure of the report.

With respect to the *dimensions and impacts of climatic changes* a detailed state-of-the-art estimate was taken from a recent synthesis on Climate Change Impacts and Vulnerability made for the Bangladesh Climate Change Cell. For 2030 it is expected that average annual air temperature in the country will increase by 1.0 ^{o}C and average annual precipitation by about 4%. Variability, however, is expected to increase substantially more: more rainfall in the monsoon period and less rainfall in the dry season. It is further expected that in 2030 the rise in sea-level would be about 14 cm with respect to the base year 1990. Important in this context is the subsidence of the south-western part of Bangladesh (Patuakhali depression). Though the dimension of this subsidence is not known with certainty, it might well be in the same order of magnitude as the actual sea level rise. Finally, IPCC scenarios suggest that peak intensity of cyclones might increase by 5 and 10%.

Impacts of these changes on the geophysical system of Bangladesh would include: aggravated flood conditions all over the country; increased morphologic activities of rivers and along the Bangladesh coast; increased water logging and increased intrusion of saline waters in the coastal areas; increased water shortages and moisture stress; and higher incidence of storm surges. The following socio-economic consequences of these impacts can be anticipated: higher incidence of socio-economic disasters; risk to national food security; out migration from rural areas; deterioration of conditions for the urban poor; Sundarbans ecosystem at risk; and health risk to children and old people.

The country study evaluates the Dutch portfolio projects (Appendix D) in terms of: (i) threats to investments and performance (risk); (ii) relevance of sustainability aspects; (iii) the degree to which projects contribute to changes in the natural system adding to impacts of climate change (mal-adaptation); and (iv) opportunities to improve project performance. Assessments are made against the Dutch development objectives, which focus on supporting UN's eight Millennium Development Goals towards sustainable poverty alleviation).[1]

The risk assessment (Appendix F; criterion (i) above) concludes that, with exception of the WASH project, Dutch development cooperation projects in Bangladesh are not at risk for climate variations and climate change. Specific *recommendations on portfolio activities* are given for WASH, WMIP and several other projects to better account for impacts of climate variability and change (Section 6.2.2).

[1] In line with these objectives the multi-annual strategic plan (2005-2008) of RNE has continued its focus on the sectors: basic education; health; and integrated water resources management (with priority on the coastal zone).

The finding that ongoing projects are not at risk also implies that *cost of adaptation is difficult to be identified as additional cost of projects*. Ongoing and planned projects use to account for climate variability to which impacts of climate changes will not change the traditional B/C considerations. Additional cost might result when in a planning phase sustainability considerations would lead to the selection of a more costly alternative than the one that would result from the traditional B/C considerations.

Strategic recommendations stem from conclusions from previous studies that climate induced changes are a major threat to the country's potential for sustainable development. *Strategic planning* is an essential vehicle to pay adequate attention to long-term climate change issues, which might lead to the selection of solutions that are different from those that would result from traditional approaches. Important for such strategic approaches is that they are based on a *good understanding of vulnerabilities at local level* (vulnerability mapping). Other related recommendations refer to: country specific CCIA (Climate Change Impact Assessment) guidelines; the international dialogue on water related issues; and research to better understand the dimensions and impacts of climate changes. It is also recommended to pay more attention to urban poverty issues in relation to impacts of climate change.

1 INTRODUCTION AND APPROACH

1.1 Interpretation of the Terms of Reference[2]

This document presents one of the three country studies in the DGIS Climate Risk Project. According to the Terms of Reference for consultants, the aim of this project is "*to gain experience on how to integrate climate risk management into its bilateral development programme*." To this end, the country studies would undertake assessments on climate risk management, providing practical examples on: (i) how climate change presents significant risk to projects, programmes, sector support and national policies and plans supported by DGIS; and (ii) how climate risk management could be improved (quote from ToR).

The interest in climate risk management is triggered by the concern about the impacts of climate change on developments in Bangladesh and the question how the Dutch development cooperation could be made more effective to reduce Bangladesh' vulnerability for impacts of climate change. It is with this intention that the ToR terminology "threats to" and "under-performance" of projects is interpreted: not as risk to Dutch interventions, but as a possibility for improving their outputs.

The ToR rightly states that climate risk management deals with normal climate variability and extreme weather events and that climate change implies changes to this variability and extreme events. Many projects in Bangladesh focus on the water sector and deal explicitly with climate risk management (for example in designing embankments that would stand a statistical 1 in 20 year flood). These projects will not be assessed on whether climate risk management is done correctly, but on the need and possibility to incorporate impacts of climate changes in such risk management.

In summary: the assessment of projects will focus on the questions: *"what are the need and possibilities that projects take into account climate risk and that climate risk management accounts for the additional impacts of climate change in order to better comply with the Dutch development objectives?"*

In addition to the assessment of projects, the country study has made an evaluation of the needs and possibilities to address climate change issues in sector approaches and strategic planning.

1.2 Approach and structure of the document

The country study has been performed in the month of September 2006 in Bangladesh and the Netherlands. A detailed itinerary is presented in Appendix A. In Bangladesh the relevant projects, donor agencies and Bangladesh institutes have been visited and interviewed. Appendix A presents brief summaries, Appendix B gives full details of the people met. In the Netherlands, the report has been drafted and discussions were held with DGIS representatives and consultants responsible for the overall DGIS risk assessment project.

Figure 1 gives a schematic overview of the steps taken and the structure of the report. Three projects have been analyzed into more detail: the Water, Sanitation and Hygiene Programme (WASH) of BRAC; the Integrated Planning for Sustainable Water Management project (IPSWAM) of the BWDB; and the Southwest Area Integrated Water Resources Management Project (Southwest-IWRM), also of the BWDB.

1.3 Acknowledgement

Consultants are grateful for the easy access and helpful cooperation received from all persons and institutes interviewed. Special reference is made to the staff of the Royal Netherlands Embassy in Dhaka that was instrumental in collecting information on the project portfolio and giving insight in the Embassy's strategic plan. Special reference is also made to DfID, which at various opportunities offered

[2] See also Section 4.1 on the assessment framework.

full cooperation and shared with consultants the first results of a more extensive assessment DfID is undertaking in Bangladesh. Special thanks go to Mr Andrew Jenkins, team leader of the IPSWAM project who wrote the corresponding case study, included in this document as Appendix E2.

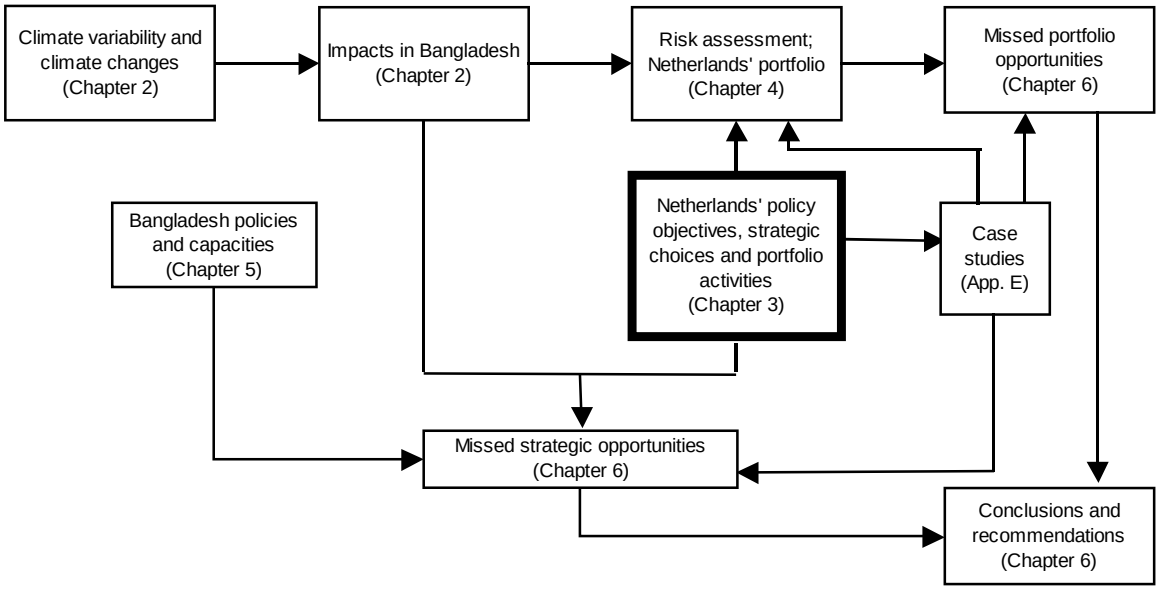


Figure 1: Schematic overview of the approach and structure of the report

2 SYNTHESIS OF CLIMATE CHANGE, IMPACTS AND VULNERABILITY[3]

2.1 Setting

Bangladesh is a low-lying deltaic country that experiences high climate variability, both spatially and temporally. The hydrologic regime of the country is predominantly influenced by the monsoon from early June to early October, which brings about 80% of the total annual rainfall. The post-monsoon months become drier and there is hardly any appreciable rainfall during the winter months (December to February). The western parts generally receive significantly lower amounts of rainfall compared to the eastern parts of the country, which is a manifestation of high spatial distribution of rainfall.

The in-country variability in rainfall over time and space is further complicated by regional aspects of rainfall-runoff. Bangladesh constitutes only about 7% of the area of the combined catchments of three major eastern Himalayan rivers: the Ganges, the Brahmaputra, and the Meghna (GBM) and the country drains over 92% of the total annual flow of this GBM system. As the lowest riparian with almost a flat terrain, when monsoon-driven excessive runoff in these rivers combines with local rainfall, the country is frequently faced with over-bank spillages and floods, particularly along the major rivers.

On the contrary, during the winter months, river discharges become minimal (discharges in the Ganges River may even reduce to zero). This leads to water shortages all over the country and the intrusion of saline waters into the surface and groundwater systems along the coast[4]. In combination with the fact that the net winter evapo-transpiration becomes higher than the available topsoil moisture during the winter months, this often leads to serious moisture stress and severe drought conditions in the floodplains and in the coastal zone in particular.

The temporal variability of availability of water becomes more acute due to either early arrival or late departure of the monsoon when agricultural goes through critical periods of harvesting and transplanting, respectively.

2.2 The extent of climate change

Based on currently available regional climate modelling efforts focused on Bangladesh, Table-1 provides the best possible guesses of changes in temperature and precipitation against the IPCC B2 scenario (see for details Appendix C and Ahmed 2004a).

Table 1: GCM projections for changes in temperature and precipitation for Bangladesh

Year	Changes in mean temperature (°C) (in brackets: standard deviation)			Changes in mean precipitation (%) (in brackets: standard deviation)		
	Annual	**DJF**	**JJA**	**Annual**	**DJF**	**JJA**
Baseline average 2030	+1.0 (0.11)	+1.1 (0.18)	+0.8 (0.16)	+3.8 (2.30)	-1.2 (12.56)	+4.7 (3.17)
2050	+1.4 (0.16)	+1.6 (0.26)	+1.1 (0.23)	+5.6 (3.33)	-1.7 (18.15)	+6.8 (4.58)
2100	+2.4 (0.28)	+2.7 (0.46)	+1.9 (0.40)	+9.7 (5.8)	-3.0 (31.6)	+11.8 (7.97)

Note: DJF represents the winter months of December, January and February, JJA represents the monsoon months of June, July and August

Source: Agrawala *et al.*, 2003.

[3] Appendix C contains a more detailed - and fully referenced - description of climate variability, extremes, water-related events and implications.

[4] In addition to natural causes of salinity ingress, diversion and utilization of water from the Ganges River by the upper riparian state, India, has also contributed to the increase in surface water salinity along the coastal zones of Bangladesh (Mirza, 2004).

Table 1 suggests that the average annual air temperature in the country would increase by 1.0, 1.4 and 2.4 ^{o}C by the year 2030, 2050, and 2100, respectively, the rate of change in winter season being slightly higher than that in the monsoon. Average annual precipitation is expected to increase by 3.8, 5.6 and 9.7% in the three scenario years, respectively. Variability, however, is expected to increase substantially more as peak monsoon rainfall will increase and the already precarious winter rainfall is likely to be further reduced.

It is speculated that the rise in sea-level would be 14, 32, and 88 cm with respect to the base year 1990 in the three time horizons specified above. Reference should also be made to the tectonic condition of the country which encompasses *subsidence* of the south-western area of Bangladesh (Patuakhali depression) (CEGIS, 2003 and WARPO, 2004). Though the dimension of this subsidence is not known with certainty, it might well be in the same order of magnitude as the actual sea level rise.

IPCC scenarios suggest that peak intensity of cyclones might increase by 5 and 10%, with increasing rate of precipitation by 20 and 30% (upper and lower bound scenarios, respectively).

2.3 The risks associated with climate change

Risk to climate change relates to *long-term changes* in trends, variability and extreme events of climate and related impacts. In Bangladesh such changes are relatively small compared with the natural climate variability and may be also with respect to other anthropogenic impacts such as: empoldering of the flood plains; deforestation of watersheds; over-extraction from groundwater aquifers (and their consequent salinization in coastal areas); and extractions upstream. This implies that risks in the short run are low, but that they can be (and for Bangladesh they really are) of great importance in terms of sustainable development.

An extensive World Bank study (World Bank, 2000) concluded that the most critical impacts associated with climate change in Bangladesh are: (i) drainage congestion (flooding); (ii) reduced fresh water availability; (iii) disturbance of morphological processes (erosion); and (iv) an increased intensity of disasters (extreme events: cyclone/storm surges, floods and droughts). Sometimes, these hazards assume disastrous proportions causing great damages to lives and livelihoods and the incidence of large-scale poverty may be attributed primarily to their frequent occurrence (PC, 2005).

More specifically (see for references Appendix C) the following impacts of climate change on geo-physical systems of Bangladesh are identified[5].

- The *stronger monsoon rainfall* will aggravate flood conditions (higher flood coverage) while catastrophic flood events may occur with higher frequency. Overall, the research findings suggest that under climate change scenario about 18 per cent of current lowly flooded areas will be susceptible to higher levels of flooding while about 12 to 16 per cent of new areas will be at risk of varied degrees of flooding. On an average hydrological year, flood prone areas will increase from about 25 per cent to 39 per cent.
- Increased monsoon flows will result in an *increased sediment transport capacity and morphologic dynamics of the rivers.* Additional sediments to transport are most likely to be "picked up" mainly from river banks, thus leading to increased riverbank erosion (particularly along the GBM rivers).
- The coastal zone, particularly the southwestern and Noakhali areas of the country would face *increased water-logging* due to increased flood volumes to drain and increased sea levels downstream. In addition the increased transport of sediments might also lead to sedimentation of riverbeds in the mouth of the estuaries, further hampering the drainage of the upstream rivers and estuary branches.

[5] This section (dealing with geo-physical and socio-economic impacts of climate change) heavily draws from a few key references such as Warrick and Ahmad, 1996; Huq *et al.*, 1998; and Ahmed, 2006a. The complete list of references is provided in Annex C.

- Southwestern embankments might face *occasional tidal overtopping*, leading to saline water-logging within embanked areas.
- Dry season low flow of rivers would further decrease, leading to *increased water shortages* all over the country and increased salinization in the coastal areas. The drier areas (particularly in the western parts) will face acute moisture stress. The expected rise in sea level and corresponding backwater effect will aggravate the expected inland shift of brackish water zones.
- Reduced winter fresh water flows might aggravate the *draw-down of shallow aquifer systems*, reducing its potential for drinking and irrigation water (particularly in the western part of the country).
- *Cyclones will be stronger and more frequent* due to increase in sea surface temperature due to warming.

As consequence of these changes, one anticipates the following socio-economic impacts.

- *A higher incidence of socio-economic disasters* due to increased extreme weather events such as: severe and prolonged flooding; cyclonic storm surges; tornadoes; and riverbank erosion. These events will result in increases in: loss of lives and livelihoods and hardship for the poor, in particular women and children; devastation of human settlements and national infrastructure; and bottlenecks for national development due to frequent diversion of development budget to facilitate post-disaster rehabilitations.
- Higher risks for crop agriculture and the fisheries and livestock sector (floods, droughts, and salinity intrusion) will pose *risks to both livelihoods and national food security*.
- Loss of livelihoods and productive activities in the rural areas might lead *to out-migration from rural areas (climate change refugees).*
- Fast growing urban areas in Bangladesh (PC, 2005 and MOWR, 2005b) will face growing problems with environmental conditions, in particular in the slum areas and mostly affecting the *urban poor*. This is associated with the supply of clean water and sanitation facilities (PC, 2005) while slum areas often suffer from poor drainage. All these water related issues are adversely affected by impacts of CC. Urban poor require special attention as the nature of their poverty is more severe than rural poverty (PC, 2005, p121) [6]. Urban poor are "at the end of the line" both in terms of access to resources and access by support programmes and safety nets. It might be feared that the difficult-to-reach hardcore poor in urban areas will grow in the near future.
- *The Sundarbans ecosystem will be at risk due to increased salinity*, which in turn will affect forest biodiversity and population depending on its resources.
- General warming and increased heat waves will pose severe *health related risks* (particularly in April and August) especially for the children and old people.

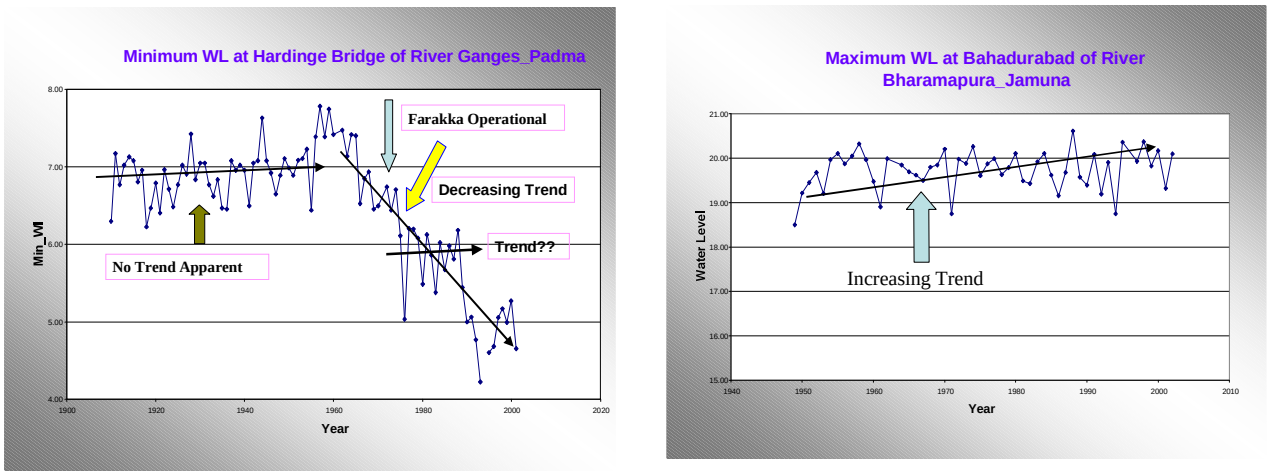
The above summary is drawn from currently available literature, which is based on conjecture and gross reflections of physical laws in isolation of each other. Given the complexity of inter-relationships among geo-physical variables observed currently, many of the above mentioned changes are likely to have many dramatic adverse effects. Super-imposing such developments as: climate change impacts; population growth; degradation of the environmental resource base; and increasing competition on the remainder of the resources; one might portray a rather bleak future for the country, especially for its millions of poverty stricken population. It is feared that the utmost attempt to reach the MGDs and providing basic

[6] Though head count poverty indices improved between 1992 and 2000 in both urban and rural areas, this was associated with a rise in inequality which grew faster in urban than in rural areas. Consumption expenditure inequality in this period increased from 30.7 to 36.8% in urban areas against 24.3 to 27.1% in rural areas (PC, 2005, p15).

services to poor population might not be successful in the long run if the adverse impacts of climate change cannot be addressed properly well ahead of time (Ahmed, 2006b).

2.4 Observations of climate change

Available time series of observations are too short or incomplete to provide "proof" of long-term changes in climate or in hydrological conditions. Moreover, long year series of water levels in such rivers as the Ganges and Brahmaputra also reveal impacts of anthropogenic origin (e.g.: deforestation of watersheds; diversion of Ganges water upstream the Bangladesh-Indian border; increased water consumption in the Ganges plain; and empoldering of parts of the flood plain) and natural disasters such as the great Assam earthquake of 1950. It is important to realize that the impacts of these non-climate changes use to be aggravated by the impacts of climate change. Figure 2 gives examples. The decreasing and increasing trends in this figure of minimum and maximum water levels, respectively, coincide with expected impacts of climate change but should NOT be considered as proof of them.



Note: trend lines represent general directions of developments and not computed trends
Courtesy of BWDB, Processing and Flood Forecasting Circle

Figure 2: Examples of water level trends

3 NETHERLANDS POLICIES, STRATEGIES AND PORTFOLIO OF ACTIVITIES

In Section 3.1 highlights are given of the Dutch policy with respect to development cooperation in general and for Bangladesh in particular[7]. Sections 3.2 and Appendix D contain a more detailed overview of the Netherlands' portfolio activities in Bangladesh.

3.1 Policies and strategies

The main development objective of the Dutch Official Development Assistance (ODA) is *sustainable poverty alleviation*. To this end activities are developed that aim to support UN's eight Millennium Development Goals (MDGs), designed to lead to a 50% reduction of worldwide poverty in 2015 (DGIS, 2003). Focus will be on the priority themes: basic education; reproductive health; HIV/Aids; and Environment and Water; and within these themes in particular on the crosscutting issues: gender; governance; human rights; and the private sector. The Policy Note (DGIS, 2003) proposes a substantial intensification of activities in these areas.

Bangladesh remains an important partner for development.

On Environment and Water the aim is to re-establish an expenditure of 0.1% of the Dutch GNP. Three sub-objectives are mentioned:

- ◊ the integration of the principle of sustainable development in policies and the reversal of environmental degradation;
- ◊ a 50% reduction of the number of people without access to safe water for drinking purposes before 2015; and
- ◊ a substantial improvement of the living conditions of at least 100 million inhabitants of slums before the year 2020.

Working in partnerships at bilateral and multilateral levels is a guiding principle in implementing the above policies.

In line with this general ODA policy and approach, RNE Dhaka has the intention to place its portfolio activities more and more in (a) (sub-) sectoral framework(s) and to this end is willing to take the lead in the donor community (RNE, 2005; www.netherlandsembassydhaka.org). In the period 2005-2008 the RNE portfolio continues to focus on the sectors[8]: basic education; health; and integrated water resources management (with priority on the coastal zone). In addition, strategic choices for this period explicitly include: (i) a strong gender focus in all sectors and programs; (ii) an operationalisation of a governance strategy, which among other things is geared towards corruption, overall governance of GoB and human rights; (iii) stimulation of partnerships between NGOs and GoB; and (iv) exploring opportunities to get involved in regional water issues (involving India, Nepal and Bhutan). Though relatively small, strategic choices (ii) and (iv) have highest priority.

RNE's main objective in the water sector is to contribute to poverty alleviation by targeting MDGs 1, 3 and 7[9], through the development and implementation of an integrated water and environmental resources management framework. To this end RNE will continue to stimulate the development of an enabling institutional environment (in which the implementation and follow-up of the NWMP plays an important

[7] Based on: (i) the Policy Note "aan elkaar verplicht" (committed to each other, DGIS, 2003) in which the Dutch Minister for Development Cooperation informs Dutch parliament about the Dutch Development Cooperation Policy and road map to 2015; and (ii) the Multi-Annual Strategic Plan 2005-2008 of the Netherlands Embassy in Dhaka (RNE, 2005).

[8] Also included is the rural electrification sector; this sector is not considered in this report as activities are phasing out.

[9] MDG 1: eradicate extreme poverty and hunger; MDG 3: promote gender equality and empower women; and MDG 7: ensure environmental sustainability.

role) and to support the implementation of poverty reducing water management projects and programmes.

3.2 Portfolio of activities

The portfolio of activities is very much in line with the above policies and strategic choices. The water sector portfolio consists mainly of a series of individual projects, though several are executed in a multi-donor context. Implicitly or explicitly, most of these projects aim at the development of an enabling environment, in particular through the BWDB and related water management organizations. Projects such as IPSWAM, CDSP-III and SSWRDS -- with strong infrastructure implementation components alongside institutional developments -- are strongly focused on poverty alleviation. The new WASH project explicitly addresses health and sanitation issues and thus has strong links with the health sector.

For the themes basic education and health activities concentrate on contributions to partnership programs with national and international agencies. This makes these activities less adequate for an assessment of possible links to climate change issues.

The table in Appendix D gives an overview of the main characteristics of the Dutch portfolio activities, including: the project period; budget; financing and implementation partners; goals; objectives and outputs; and status. Information has been provided by RNE staff and drawn from individual project documents (in particular for the water sector projects). Though not complete, the collected information suffices for the intended risk assessment.

4 RISK ASSESSMENT

4.1 Assessment framework

The ToR specifies climate risk to include:

- ◊ direct threats (e.g., infrastructure affected by extreme events);
- ◊ under-performance (e.g., irrigation investments and agricultural programmes that fail to deliver the mal-nutrition reductions they were expected to generate); and
- ◊ mal-adaptation: development that creates vulnerabilities (e.g., infrastructure development triggering settlements in vulnerable areas or affecting the resilience of natural resources).

In addition, the ToR makes reference to the "risk" of missing opportunities that may arise from climate change and could be captured if factored in.

The developed assessment framework is justified and described below. It is based on first experience in assessing the Netherlands' project portfolio in Bangladesh and the fact that this portfolio is dominated by projects in the water sector.

Climate is characterized by average values, variability (around e.g., average daily, seasonal or annual values) and extreme events of climate parameters such as: precipitation; temperatures; hours of sunshine; and wind velocity. These climatic phenomena affect natural system processes, and directly or indirectly human beings and human activities.

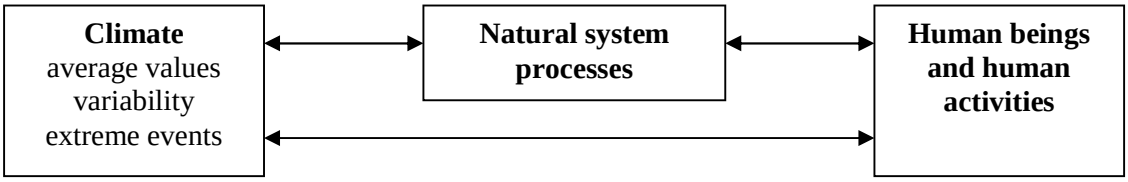


Figure 3: Direct and indirect impacts of climate on natural and socio-economic systems

Climate change due to global warming refers to changes in average values (trends), climate variability and extreme events. These changes have to be seen in their proper perspective. In Bangladesh they are generally small in comparison with current variations or compared with changes brought about by other human interference, such as the construction of dams or extraction of water from natural systems for irrigation (see also Section 2.4). Though relatively small, they are likely to add adversely to the *climate risk* in general, to which many human beings and activities, in particular in developing societies, are exposed. The *risk to climate change* due to global warming should thus be interpreted as the *change in these current climate risks and their corresponding impacts on the natural and socio-economic systems*. They are highly relevant for issues of sustainable development.

The Netherlands Development Cooperation in Bangladesh has a long tradition and is heavily involved in the water sector, the coastal zone being one of the focus areas. Most of the projects explicitly deal with *climate risk management* as they aim to contribute to a reduced vulnerability for variations in the water resources system (e.g., floods, droughts, erosion) induced by climate variability and extreme events. Additional variations because of climate change due to global warming would not add significantly to the current climate risk these projects try to reduce.

To analyze threats to infrastructure and under-performance in economic terms clear distinction has been made between impacts of climate variability and (additional) impacts of climate change. Risks related to climate (and consequent hydro-meteorological) variability are commonly considered in water sector projects. Implicitly, traditional engineering economics would account for aspects of risks, e.g., through

using design criteria based on a frequency of exceeding certain water levels. Cost of infrastructure and damages, which occur in the future with a certain frequency are then incorporated in traditional Benefit-Cost analyses in which future values are reduced to present-day values (discounted). In such B-C oriented approaches of project assessment, additional long-term impacts from climate changes are negligible as present-day values reduce substantially after being discounted over a period of more than 20 years. This holds for most of the projects in the Dutch portfolio with exception of the WASH project, which so far does not explicitly account for aspects of climate variability. It is strongly recommended to include such aspects of variability in the further development of the project, which is still in its initial phase (see also Appendix E1 and Chapter 6).

In this kind of approaches *additional cost* should be interpreted in terms of cost-efficiency rather than in terms of economic cost and benefits. Such cost-effectiveness criteria can be included in a multi-criteria analysis assessing different alternatives in terms of least (additional) cost to make people less vulnerable for impacts of climate change. This might lead to the selection of a more expensive alternative than the alternative with the highest B/C ratio in economic terms.

The above implies three perspectives for an assessment of the Dutch portfolio projects.

High, medium or low risk would apply to direct threats and under-performance[10] in the short run (say 20 year, being a normal life span for investments and corresponding B/C analysis) of projects which are affected by -- but do not account for -- impacts of climate variability and extreme events. A high risk would imply that the project urgently should consider impacts of climate variability in the design and implementation stage. As mentioned, this does not hold for most of the water sector projects in Bangladesh. It holds though for the WASH project.

Sustainability aspects (in terms of *full, moderate or marginal relevance*) would assess the need to include aspects of climate change in the long run. The classification "fully exposed" would then imply that impacts of climate change should be considered with priority in management beyond the project implementation phase. This is addressed in mid-term or long-term strategic planning and could specifically relate to such actions as: reviewing the design criteria for water related infrastructure (see cases 2 and 3 in Appendix E) or developing alternative sources of water supply (case 1 in Appendix E).

Major, minor or no "agent of change" would refer to the issue of what is called in the ToR (see above) mal-adaptation. From this perspective, projects are classified in terms of the degree they contribute to changes in the natural system and are likely to add to impacts of climate change elsewhere. E.g., the CDSP project adversely affects the drainage conditions of the hinterland area, which will be under stress because of impacts of climate change and consequent sea level rise.

An additional assessment will be given on *opportunities (in terms of ample, limited or none)* to improve project performance by factoring in aspects of climate variability and climate change. They will be discussed under the recommendations in Chapter 6.

4.2 Portfolio assessment

The assessment focuses on the projects in the water sector for two main reasons: (i) most of the water sector projects directly deal with issues of climate variability; and (ii) in contrast with the water sector projects, major other projects deal with support to national programmes or programmes of other organizations. The table in Appendix F presents detailed assessments of projects in terms of the above-mentioned 4 criteria or perspectives, while Table 2 below gives a summary. In this table different shading indicates the degree of importance of the respective criterion for the considered activity. Black-grey-white respectively means: high-medium-low threats to investments and /or performance; full-moderate-marginal relevance to aspects of sustainability; major-minor-no impact as agent of change; and

[10] This is interpreted in terms of the objectives of the Dutch development aid: poverty alleviation with emphasis on attaining the MDGs 1, 3 and 7.

ample-limited-none missed opportunities. Comparison among these scores should only be made in vertical direction.

As mentioned, projects in the health care and education sectors and the cross cutting themes mostly refer to supporting national programmes or programmes of other organizations. Such programmes might contain elements or components that relate to aspects of climate variability or extreme events and thus to impacts of climate change. Examples include activities that deal with water supply, sanitation or with infrastructure (schools, health centres) in flooded or cyclone-prone areas. It is understood that the Bangladesh Primary Education Program explicitly deals with flood-free schools and thus accounts for climate risk. An in-depth orientation on the details of these national programs was beyond the resources (time and budget) of this country study, which was intended to be a quick reconnaissance. Suggestions for issues to be addressed by the corresponding RNE sector specialists are flagged as *opportunities*.

From Table 1 can be concluded that, with exception of the WASH project, Dutch development cooperation projects in Bangladesh are not at risk for climate variations and climate change. This is mainly because these projects explicitly deal with the variability in the water resources system -- which results from climate variability -- and changes in this variability are not an issue in the short-term project implementation periods. The WASH project is considered to be at risk because the project in the inception phase does not take into account aspects of water availability, quality and drainage conditions. The CDSP-III and EDP project are considered to be at medium risk because the infrastructure they are dealing with includes sea defences and cross dams which are designed with a longer lifespan than inland infrastructure.

Changes in hydro-morphological conditions due to climate change are long-term issues that should be reflected in planning. Table 1 reflects that this is particularly relevant for the overall national planning effort and for projects in the coastal zone where climate changes are expected to be felt most. The MIDPCR project is flagged as “fully” relevant, because this is a considered a highly relevant activity to make local people less vulnerable for environmental hazards in general.

Special attention is asked for the triggered vulnerabilities. Due to lack of strategic planning in Bangladesh, external and accumulating effects of projects receive insufficient attention. Examples refer to the impact of empoldering schemes on flood levels or drainage conditions. Though the impact of individual projects often may be negligible, the combined impact of several projects may contribute to a deterioration of the conditions of regional (sub-national) local water resources systems, aggravating the impacts of climate change. These aspects need full consideration in the national water management planning efforts. Specific agents of change in this context are the CDSP and EDP projects, dealing with land reclamation and cross dams.

4.3 Case studies

Three projects have been analysed in some detail:

- the WASH project, which represents a major project on water supply, sanitation and hygiene that is still in its inception phase;
- the IPSWAM project, which is considered a pilot project in implementing the country’s NWMP and is about half way its implementation; and
- the Southwest-IWRM project on the rehabilitation of the existing flood control, drainage and irrigation schemes in two beel areas, which is about to start but has already created raised some controversial discussions among stakeholders.

The three cases are described in the appendices E1, E2 and E3, respectively. The descriptions include: an overview of the project in terms of objectives, methodology and progress made so far; an assessment of the risk associated with impacts of climate change; and detailed recommendations on how to deal with climate change issues and options for adaptation.

Table 2: Summary assessment relevant RNE portfolio projects

Activity	Threats to investments and performance	Sustainability at stake	Vulnerability triggered	Opportunities
Integrated water resources management				
General activity RNE: LCG				
General activity RNE: Regional dialogue				
WMIP				
IPSWAM				
SSWRDS				
PDO-ICZMP (concluded 2006)				
CDSP-III				
EDP				
MIDPCR				
Twinning				
WASH				
Southwest-IWRM				
EFDRP, Part D				
EWS				
Health				
HNPSP				
NNP (concluded 2006)				
Basic education				
PEDP-II				

The case studies support the conclusions that for water sector projects: (i) short-term risk is low if projects properly account for climate and hydrologic variability; and (ii) more attention is needed for issues of sustainability.

- Ad (i). The WASH project did not consider aspects of water resources such as water availability and flood and drainage conditions. Concrete recommendations are given on including these aspects in this project.
- Ad (ii). Recommendations on the other two projects reflect on the need of an effective and flexible system of participative management and maintenance of water management infrastructure. This should be based on continuous monitoring and analysis of changes in the water resources system.

5 BANGLADESH POLICIES AND CAPACITIES IN RELATION TO CLIMATE CHANGE ADAPTATION

5.1 Bangladesh government

Since its independence, Bangladesh has been striving for achieving development under a policy framework which revolved around Five Year Planning Documents (MOP, 1997). Since the beginning of neo-environmental movement, marked by the Earth Summit and signing of Agenda-21, the country entered into a new development paradigm that is marked by the formulation of sector-specific policies. Lately (2005), with the advent of a National Strategy for Accelerated Poverty Reduction[11] the sectoral focus of development has been integrated within a three-year evolving planning mechanism (PC, 2005). From the policy pronouncements, two observations find great relevance: (a) no sectoral policy[12] has considered the issue of climate change; and (b) even without specific policy guidelines, a number of sectoral policies provided ample guidance for combating climate change, especially towards increasing societal resilience and expanding adaptation safety nets into development practices at different tiers (Ahmed, 2004).

The National Water Policy (MOWR, 1999), the National Agriculture Policy (MOA, 1999) and the Coastal Zone Policy (CZP, 2005) are the three most important policy documents in Bangladesh where policy elements are found that would promote adaptation (Ahmed, 2005a). The recently completed PRSP with a focus on 'poverty reduction' also provides guidance how to safeguard livelihoods of hazard-threatened population, particularly of poor, women and the disadvantaged (PC, 2005). To add to the policy dimensions, one may consider few development programmes as reflections of sector-specific policies: (a) National Water Management Plan (MOWR, 2005a); (b) Coastal Development Strategy (MOWR, 2005b); and (c) Corporate Plan of the Ministry of Food and Disaster Management (MOFDM, 2005).

From this policy discourse, one may easily find a host of policy elements, which -- if implemented properly -- would eventually help the population of Bangladesh to at least reduce their vulnerability to climate variability and change. Few selected examples include:

- ◊ improvement in early warning system for floods, flash floods and cyclonic hazards;
- ◊ increasing freshwater flow in the south-western parts of Bangladesh;
- ◊ addressing drainage congestion to reduce flood susceptibility;
- ◊ resuscitate choked rivers;
- ◊ promotion of conjunctive use of water to reduce pressure on groundwater tables;
- ◊ crop diversification to reduce extreme dependence on rice based productive system;
- ◊ increasing the number of multi-purpose cyclone shelters (MCS) and rehabilitating/ maintaining the existing ones;
- ◊ building a greenbelt along the coastal belt to reduce damage to cyclonic hazards;
- ◊ development of crop seeds with increasing resistance to droughts and salinity;
- ◊ promotion of regional cooperation to solve long lasting problems of water sharing with co-riparian countries;
- ◊ shying away from relief based disaster management approaches and dealing with hazards with a focus on preparedness, response, and rehabilitation;
- ◊ promotion of community-based approaches to deal with local-level hazards; and
- ◊ extending 'safety nets' in order to serve disaster affected people.

It is evident from past analyses of people's responses to exposure to certain water-related extreme events (including climate variability) that individual's preparedness has limited potential to reduce climate related vulnerability, since it leads to survival coping only (Ahmed, 2005b). Local level initiatives need

[11] Popularly known as the Poverty Reduction Strategy Paper (PRSP) (PC, 2005).

[12] With an exception of a recently pronounced Coastal Zone Policy (MOWR, 2005c).

to be facilitated at district and national levels and need to be strengthened to serve adaptation for large-scale population. Many collective activities have so far been identified that a flood vulnerable community can undertake in each stage of a flood event: before incidence, during the flood, and following the event[13]. The local government at its lowest tier can effectively facilitate these community based flood management activities. The government pronounced its pledge by stating that people should be involved in planning and implementation of projects (MOWR, 1999). It is understood now that local level micro-planning and initiatives must be paid sufficient attention in order to facilitate adaptation to climate change induced floods. Instead of focusing on post-flood relief, resilience-building activities should be given adequate support – be it through the official channels, or by involving community based organizations. Such ideas have recently been accepted and incorporated in the corporate focus of the Ministry of Food and Disaster Management (MOFDM, 2005) and the Comprehensive Disaster Management Project (CDMP, see also Section 5.2). For example, offering soft-term credits for the poor to enhance resilience, particularly for flood-proofing, can greatly help adapt to increased risks from flooding (Ahmed, 2004). Again, the PRSP has attached high priority to use such modalities for the benefit of the poor (PC, 2005).

The National Focal Point on climate change issues resorts under the Department of Environment (DOE) of the Ministry of Environment and Forest (MOEF). Only recently, the government has decided to establish a 'climate change cell (CCC)' with a view to mainstream climate change issues in disaster management practices under the CDMP. Despite the fact that this project component resorts under the MOFDM, it is housed within DOE. The proximity to the National Focal Point on CC issues could certainly facilitate CCC's mission to mainstream its agenda.

Since inception, the CCC has been trying to establish links among sectoral agencies and to integrate NGO efforts to develop a common knowledge base on CC related issues. The CCC has now taken a coordination role to establish 'focal points' in each development sector, including ministries and their respective technical/planning and implementing agencies. The entire effort so far has been to promote 'climate resilient' development, as has been recommended by the scientific community and NAPA (Ahmed, 2004; GOB-UNDP, 2005).

The CCC is now contemplating to develop a uniform Climate Risk Assessment (CRA) guideline[14], which will be complementary to the emerging Community Risk Assessment guideline developed under the CDMP (CDMP, 2006). It is believed that once such a uniform methodology is used for every vulnerable union[15] and subsequently, Climate Change Risk Reduction Plans (CCRRP) are completed, development efforts at the lowest tier of the government could be integrated with concerns of climate change.

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[13] Following community activities are taken from a community-based flood management programme (Ahmed and Karim, 2004 and Ahmed, 2005c):

- ◊ organized approach, delegation of responsibilities;
- ◊ community flood warning (in locally acceptable/meaningful language);
- ◊ organized relocation to flood shelters/camps;
- ◊ collective water purification efforts involving locally available science teachers and students;
- ◊ management of operations in flood shelters/camps;
- ◊ facilitation of health services during and after a flood event;
- ◊ safeguarding livestock during the flood collectively;
- ◊ agricultural rehabilitation (shared seedbed preparation, exchange of labour services to minimize cash investment etc.); and
- ◊ needs-based rehabilitation, instead of politically motivated relief distribution approach.

[14] A project document has just been developed by the MOEF where the use of such a methodology has been incorporated. The proposal is about to be placed with GEF under the aegis of UNDP and the GOB is looking for participation of development agencies in this joint effort.

[15] The lowest tier of local government system, mandated to development their own development plans by integrating 'multi-hazard risk reduction efforts and programmes' under the CDMP.

The CCC has a strong 'Technical Advisory Group (TAG)', consisting of representatives of the academia and civil society organizations, including a few experts from the IPCC panel. The TAG members provide guidance to the CCC through frequent meetings. Such a group can become instrumental towards advancing the agenda of mainstream climate change issues among various sectors and at various tiers of governance system.

5.2 Projects and donor coordination

The following ongoing projects and activities merit mention.

- *The Comprehensive Disaster Management Programme* (CDMP) which has been designed as a long-term programme of the MOFDM with multi-agency involvement. Funded jointly by the United Nations Development Programme (UNDP) and the Department for International Development (DFID), the programme was launched in November 2003. CDMP seeks to reduce the level of community vulnerability and enhance sustainable development initiatives through a range of integrated strategies. Implementation agencies are drawn from government and non-government sources. Activities of CDMP have been designed to be implemented in two phases. The first phase of CDMP is a five-year programme which will: (i) lay the foundation of a shift from disaster relief and recovery towards a more holistic approach focusing on community preparedness, and (ii) undertake design, formulate and mobilize resources of the components under phase II. As mentioned in Section 5.1 the CCC at DOE is established by this project, serving CDMP's exclusive disaster management purposes.
- Under a recently completed on-the-ground adaptation project titled "*Reducing Vulnerability to Climate Change (RVCC)*", a methodology of assessing climate risk and social-group-specific vulnerability has been developed and given trial in the field (Schaerer and Ahmed, 2004)[16]. It involves an analytical framework in relation to assessing poverty, identification of climate-related hot spots and consultation of local people at risk of climate related vulnerability. It also developed a methodology to assess the effectiveness and feasibility of tested adaptation measures. The methodology has further been applied in a number of vulnerable areas having diverse vulnerability contexts (SDRC, 2005). The RVCC approach has also been applied for another coastal region (i.e., Noakhali) to assess people's vulnerability to cyclone-related hazards[17], implemented by IUCN-Bangladesh.
- Reference should also be made to the *capacity to quantify (through modelling) regional (supra-national) climate changes and corresponding impacts*. Under auspices of the CC, several Bangladesh research institutes (including BUP, CEGIS, IWM, BMD and BIDS) have recently signed a memorandum of understanding to cooperate in further developing this capacity. Funded by the Asian Pacific Network on Global Change Research (APN) several groups of scientists from different agencies, under the aegis of BUP, have already received dedicated training on different aspects of modelling. The following three "layers" of modelling are considered (Uddin, 2006)
    - ◊ In the first layer (guided by BUP) the capacity to make Bangladesh specific climate change estimates is developed. This includes the implementation of a regional climate model (RegCM) nested in IPCC's Global Climate Model (GCM).
    - ◊ Under guidance of IWM a second layer would enable to analyze the impacts of predicted climate changes on the physical systems. For example, grid-based water balance models have been made available (CLASSIC) that assesses changes in water levels and flows.
    - ◊ CEGIS will guide modelling efforts in the third layer (so-called application models) which will translate changes in the physical system in terms of impacts on, e.g., agriculture produce, people at risk, and land suitability.

[16] The aim of this assessment was to identify promising local adaptation measures for testing in the field.

[17] With financial support from Dutch sources; results are yet to be published.

With respect to present donor activities, the following tentative observations are made.

- DfID seems a most active donor with respect to CC issues. Activities include the CDMP project and an ongoing portfolio assessment (which is expected to address the issue of CCC institutionalization). Since the assessment team is still in the process of getting to know what should be done, it is too early to make note of any 'best' or 'good practice' in this regard.
- No portfolio assessments of other donors are known. To stimulate such an assessment it would be useful to develop a common joint guideline to evaluate past, current, and future projects/ interventions. The LCG could guide such assessment processes which will certainly help mainstreaming climate concerns in development interventions.
- DANIDA was mentioned to have shown interest in CC issues (information DOE) but no concrete activities were found.
- UNDP is supporting the general 'governance' issue in the country. They are instrumental in helping Bangladesh to fulfil its UNFCCC requirements. Presently they are the main “promoter” behind the institutionalization of the CCC. However, keeping CC in perspective and its linkage with the water sector, UNDP could start thinking about 'water governance' as a major subset of its governance program. UNDP could also initiate a study on how their MDG interventions would fare and continue to help Bangladesh prosper under moderate climate change scenario (2030). Finally, UNDP could check whether and to what extent climate change issues have been considered in the designing of the SEMP Phase II.
- The ADB in Bangladesh does not pay specific attention to climate change issues in any of their projects. They refer to general papers issued by headquarters. As ADB is the major financing agency for 'road communication' it could be suggested that they revaluate its past infrastructural interventions and check whether it is still a possibility to incorporate climate change concerns.
- World Bank Bangladesh was instrumental in the CC and Sustainable Development study on Bangladesh (World Bank, 2000). Draft reports of that study were intensively discussed with all relevant agencies, institutes and experts. Climate change issues are still part of the Bank’s Country Assistance Strategy 2006–2009, but actions are delayed until WMIP is “on track” after which both ICZM and CC would get priority.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- Risk to climate change relates to **long-term changes** in trends, variability and extreme events of climate and related impacts. In Bangladesh such changes are relatively small compared with the natural climate variability and may be also with respect to other anthropogenic impacts (e.g., empoldering in-country and extractions upstream). For this reason, the issue of climate change has little to add to climate change management (CRM) that only deals with climate variability on the short run, but is of extreme importance in relation to (long-term) sustainability. Though CRM is considered to be an excellent platform for dealing with long-term climate change issues, it is certainly not the answer, unless it deals explicitly with these long-term issues.
- Anticipated long-term impacts of climate change put Bangladesh in a difficult decision dilemma: whether and how to incorporate the needs for adaptation while defining its short-term development pathway. Since proper management of water and agricultural resources and in particular those of the coastal zone is vital for the development of the country, **climate induced changes are a major threat to the country's potential for sustainable development** (Ahmad and Ahmed, 2002). In order to maintain the usual process of development, the country must invest on adaptation in all possible ways: physical adaptation, technological adaptation, social adaptation and institutional adaptation. It has been emphasized that, rather than being mutually exclusive, adapting to climate change can be part of and complementary to a sustainable development strategy (Ahmed, 2004). There are many opportunities that would help accrue benefits even without climate change. Those adaptations could be identified and implemented on a priority basis.
- The starting point for the assessment and the recommendations has been the concern that Dutch partner developing countries should be assisted in their efforts to become less vulnerable to climate variability and thus would be better adapted to cope with impacts of climate change. In other words, the driving question is: **how to bring climate change into the development agenda?**
- In general it can be stated that the **Dutch portfolio activities in Bangladesh are NOT at direct risk** for climate variability and climate change (in terms of attainment of DGIS development objectives).
    - ◊ About *half of the presently committed contributions under the Dutch portfolio agenda relate to projects in the water sector* (commitment order of magnitude US $200 million). Most of these projects implicitly or explicitly deal with reducing the vulnerability of people in rural areas for climate variability (and consequent hydro-morphological variability) and extreme events. A reduced vulnerability in this context would encompass a reduced vulnerability for impacts brought about by climate change.
    - ◊ *Projects in the health and education sectors mostly consist of contributions to sector-wide programs* and do not directly deal with investments in infrastructure such as schools and health centres.
- Impact of climate change on climate parameters and consequent hydro-morphologic phenomena in Bangladesh is a **highly relevant sustainability issue that should be properly accounted for in strategic planning efforts.** This does not only hold for the water sector, but also for planning efforts at national /regional level (PRSP, ICZM) and in sectors that relate to the water resources system[18]. In strategic planning three aspects should be addressed in this context.

[18] In Bangladesh most or even all sectors deal with the conditions of the water system. For example in the education and health sectors, accessibility of primary schools and health centres under flood conditions is a serious concern.

- ◊ The identification and selection of *alternative solutions.* Additional criteria for the identification and selection of interventions could be considered that account for the vulnerability to climate change on the long run in addition to criteria that account for short-term benefits and cost (B/C). This might lead to the selection of alternatives that are more expensive than the one that would have been selected based on more traditional analyses based on discounted benefits and cost (to present values). This could be identified as *additional cost.*
- ◊ *Accumulated impact of projects*. Projects in the water and related sectors (such as embankments, roads and sluices) may have a lasting impact on the environment (externalities). For example: projects that promote the conjunctive use of ground and surface water (positive) reduce the stress on groundwater aquifers; polders reduce storage capacity of the flood plain and increase water levels in unprotected areas (negative); roads hamper drainage (negative); and groundwater extractions may exhaust aquifers (negative). In particular in the complex interconnected water system in Bangladesh external impacts of individual projects might accumulate. Most of these adverse effects will be aggravated by impacts of climate change and need to be addressed on a level beyond that of project planning.
- ◊ Increased focus on *projects that would contribute to the social and economic capability to cope*, reducing vulnerability. For example: facilitating marketing; stimulating crop diversification towards low water-consuming crops; and insurance systems against extreme events.

- The above implies that **cost of adaptation is difficult to be identified as additional cost of projects,** ongoing or planned for the near future. Such projects usually account for climate variability to which impacts of climate changes will not change the B/C considerations. Additional cost might result when in a planning phase sustainability considerations would lead to the selection of more costly alternatives than would result from the traditional B/C considerations.

6.2 Opportunities and recommendations

The following opportunities and recommendations draw on the above general conclusions and the portfolio assessment of specific projects (Chapter 4, Appendix F and Table 1).

It merits mention that it is understood that major changes, such as new areas of work and new priorities cannot easily be accommodated in the activities of the Netherlands Development Cooperation in Bangladesh before 2008, the last year of RNE-Dhaka's current Multi-Annual Strategic Plan (MASP).

6.2.1 General

- **Support strategic planning efforts** based on quantitative analysis (modelling) and better understanding of vulnerabilities at local level. More specifically this could consider:
  - ◊ *development of methodologies,* including the understanding and mapping of the vulnerability of local people (elaborated below); and modelling of climate changes and impacts on the physical and socio-economic systems;
  - ◊ *institutionalization of planning efforts* that account for climate change, including: the formulation of guidelines (elaborated below); NAPA implementation (co-financing UNDP proposal – see below on CCC); capacity building of the climate cell; and using RNE's leading role in the water sector to properly account for aspects of climate change (e.g, in WMIP and ICZM); and
  - ◊ *awareness building and donor coordination*, for example through a pro-active role in the LCG and the development of a uniform approach (compare with livelihood approach DfID).

- **Bridge the gap between national adaptation efforts and understanding of local vulnerabilities**. As mentioned, issues of impacts of climate change are best addressed through comprehensive and integrated planning efforts. However, such top-down approaches should be based on a proper understanding of vulnerabilities at local level, leading, for example, to a spatially differentiated vulnerability mapping for different social groups and different economic activities. Activities in this sense have been initiated in Bangladesh (RVCC, SDRC, IUCN) but need to be further developed, structured and disseminated (see Chapter 5).

- **Make guidelines for climate change impact assessment.** Country specific CCIA guidelines could be developed that will help projects and strategic planning efforts to better and more consistently account for climate risk and changes. Such guidelines will also be instrumental in sensitizing Netherlands' Embassies and giving them the possibility to lead country related efforts to better deal with CC issues. These guidelines should at least be based on country-specific in-depth knowledge on: (i) impacts of climate change on the physical and socio-economic systems; (ii) vulnerability perceptions of local people; and (iii) the policy and strategic planning framework. The CCIA would assess how a project is affected on the long run and whether additional measures can be identified to better cope with climate variability and impacts of climate change. More specifically, an approach for the development of such CCIAs could be as follows:
    - look for interested donors to draft a CCIA;
    - make a detailed and annotated table of contents for a CCIA with a group of experts;
    - draft a pilot CCIA for a specific country;
    - introduce, disseminate, train, mainstream and apply the pilot CCIA; and
    - evaluate findings.

- **Continue to promote the international dialogue on water related issues**. Bangladesh occupies only 7% of the joint river basins of the GBM rivers. To properly assess impacts of climate change the issues of climate variability should be addressed on river basin level. This would include sharing of information and making joint assessments of the impacts of climate change on the hydro-morphology of GBM watersheds. Chairing the LCG, the Netherlands Embassy is in a position to play a proactive role in further stimulating this dialogue.

- **Consider urban poverty issues.** An explicit sub-objective of the Dutch general policy is to improve the living conditions of slum inhabitants. Increased attention on urban poor should explicitly deal with issues of climate variability and climate change. Though poverty in Bangladesh is reducing in general, the number of hard-core poor in urban areas is expected to continue to increase; part of this increase may consist of what some have called **"climate refugees"**, often people from the rural areas that fall below the poverty line after having lost their means to survive after a disaster. However, after becoming urban poor, they might even be more vulnerable than the rural poor for deteriorating water availability and sanitation conditions. In terms of water supply they use to be "at the end of the pipe", where an increased water scarcity would be felt most. With respect to sanitation, slum areas often are in drainage-congested areas, directly impacted by (an increased) climate variability.

- **Support institutionalization of the CCC.** The CCC is now being operational within a very narrow mandate and moreover, its shoulder is too weak to carry forward the 'intended mandate' which is beyond the scope of a small component of CDMP. It needs to be strengthened, both financially and expert capability wise, which would never happen if it remains under the control of CDMP. This would imply that at least one donor (or the entire LCG) takes the lead to help reform such a cell with specific mandates, authorization and financial security. Without such a support CCC will perish after CDMP ends.

- **Continuous research** to better understand the dimensions and impacts of climate changes is needed to enable adaptation efforts to be more efficient and effective. Main gaps in knowledge are summarized in Appendix C, Section 4. They refer to: regional climate changes; morphologic dynamics; salinity intrusion; and extreme weather events.

6.2.2 *Suggested portfolio actions in Bangladesh*

Opportunities resulting from the portfolio risk assessment relate either to planning efforts such as WMIP and ICZM or to the possibility that specific projects would play a role in future management that better accounts for impacts of climate change. More specifically opportunities would be the following.

- Under **WMIP**: promote the development (with corresponding training) of a planning framework which explicitly analyzes: (i) the accumulated impact of individual projects; and (ii) the development of Bangladesh' water resources system and the performance of (accumulated) individual projects under different scenarios for (impacts of) climate change.
- Under **WMIP**: make a more detailed analysis of the identified and recommendations adaptation measures in WARPO's NAPA preparation report.
- Under **WMIP**: strongly promote the IPSWAM approach as a means to more effective and flexible joint management, maintenance and adaptation of water management infrastructure.
- Under **WMIP:** reconsider design criteria for water related infrastructure.
- Support the further development of institutionalized **ICZM** in Bangladesh, being an excellent vehicle to include aspects of climate change in strategic planning for the development of the coastal zone of Bangladesh in high priority areas such as: fresh water supply, coastal water resources management and coast line development.
- Strongly promote and "anchor" the **CDSP, EDP and MIDPCR** projects and approaches in the above ICZM approach.
- Ensure that the **WASH** programme fully accounts for climate variability and thus is better prepared for impacts of climate change.
- Make vulnerability for impacts of climate change an additional consideration in the selection among alternative solutions for water management problems under **IPSWAM, CDSP, and Southwest IWRM.**

6.2.3 *Suggested NCAP actions*

NCAP's means are limited. A structuring and coordinating role in how to bring CC issues in the national development agenda's requires careful planning and a coherent, though flexible, approach. The following is given for consideration in designing such an approach.

- The **CC and sustainable development study** for Bangladesh (World Bank, 2000) has proven to be a valuable tool in disseminating actual knowledge on CC issues, creating a common understanding on the impacts of CC and identifying and assessing possible adaptation measures. Such documents (following a prescribed recipe) could be repeated in other NCAP countries, providing a "shared basis" for any concrete in-country action plan in the future and a reference for projects that should consider impacts of CC.
- Formats and directives could be developed on how to make **country specific guidelines** for the assessment of projects and programmes on impacts of climate change (Climate Change Impact Assessments – CCIA). This could be done based on pilot CCIAs to be developed in a few selected countries.
- As mentioned above a methodology is needed for vulnerability assessment of local groups and for the assessment of alternative adaptation measures. Ideally, a common approach is followed to make results comparable and exchangeable. Reference is made to the livelihood approach promoted by DfIDs, which has been accepted as a kind of common standard. NCAP could aim to produce such a common standard for local level **vulnerability mapping**. This is extremely important in bridging the gap between national strategic approaches and the vulnerabilities of real people.

- Above suggestions refer to a leading and guiding role of NCAP in bringing climate change issues into development agenda's. It should be realized that *such a role requires a substantially improved access to the results of NCAP activities*, not only by the Netherlands Embassies, but by all relevant development partners and international organizations dealing with climate change issues. In addition, Netherlands Embassies should be given concrete tools and guidelines on how to incorporate climate change aspects in their work. An open and accessible **publication series** to share approaches and experiences on climate change issues could be an important vehicle to bring NCAP to the forefront.

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